IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF NEW MEXICO

THE CITY OF ALBUQUERQUE and THE BOARD OF COUNTY COMMISSIONERS OF THE COUNTY OF BERNALILLO, Plaintiffs, v. SPARTON TECHNOLOGY, INC., Defendant.	Civil Action No. CIV 97 0206 LH/JHG Consolidated with: CIV 97 0208 JC/RLP CIV 97 0210 M/DJS CIV 97 0981 LH/JHG

CONSENT DECREE

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I. BACKGROUND

A. The City of Albuquerque ("Albuquerque") and the Board of County Commissioners of the County of Bernalillo (collectively "the Municipal Parties") filed Civil Action No. CIV 97 0206 LH/JHG on February 19, 1997 specifically alleging claims against Sparton Technology, Inc. ("Sparton") under the federal Resource Conservation and Recovery Act ("RCRA") Section 7002(a)(1)(B), 42 U.S.C. § 6972(a)(1)(B), and federal and New Mexico common law.

B. The State of New Mexico; the New Mexico Environment Department ("NMED"); and the New Mexico Office of the Natural Resources Trustee ("ONRT") (collectively the "State Parties") filed Civil Action No. CIV 97 0208 JC/RLP on February 19, 1997 specifically alleging claims against Sparton under RCRA Section 7002(a)(1)(B), 42 U.S.C. § 6972(a)(1)(B); New Mexico Hazardous Waste Act, NMSA 1978, §§ 74-4-1 through 74-4-14 ("HWA"); the New Mexico Water Quality Act, NMSA 1978, §§ 74-6-1 through 74-6-17 ("WQA"); and federal and New Mexico common law.

C. The United States of America ("United States") on behalf of the Administrator of the United States Environmental Protection Agency ("EPA"), filed Civil Action No. CIV 97 0210 M/DJS on February 19, 1997 specifically alleging claims against Sparton under RCRA Section 7003, 42 U.S.C. § 6973, and Safe Drinking Water Act ("SDWA") Section 1431, 42 U.S.C. § 300i.

D. The lawsuits filed by the Municipal Parties, the State Parties, and the United States (collectively "Plaintiffs") seek, *inter alia*, injunctive relief in the form of an order requiring Sparton to abate an imminent and substantial endangerment to public health, welfare, and the environment resulting from the contamination of soil and Groundwater at Sparton's Facility located at 9621 Coors Road, NW, Albuquerque, Bernallilo County, New Mexico (the "Facility"). In addition, the NMED claims civil penalties under the HWA and the WQA.

E. By Order dated May 16, 1997, Plaintiffs' lawsuits were consolidated under the caption of City of Albuquerque, et al. v. Sparton Technology, Inc., CIV 97 0206 LH/JHG (D.N.M.).

F. On August 7, 1996, Sparton filed Civil Action No. 3-96CV2229-G in the United States District Court for the Northern District of Texas asserting various claims, including a claim under the Administrative Procedure Act, 5 U.S.C. §§ 551-559, 701-706, challenging a June 24, 1996 decision document that described EPA's proposed cleanup plan for the Facility. By Order dated February 27, 1997, the Northern District of Texas granted Sparton's unopposed motion for leave to file its Amended Complaint. That Complaint challenged, among other things, EPA's September 16, 1996 Initial Administrative Order, U.S. EPA Docket No. RCRA-VI-001(h)-96-H. The United States filed motions to dismiss both Sparton's Complaint and Amended Complaint. By Order dated July 7, 1997, the Northern District of Texas transferred the case, including the United States' pending motions to dismiss, to the District of New Mexico where it was assigned No. CIV 97 0981 LH/JHG.

G. By Order dated July 31, 1997, Civil Action No. CIV 97 0981 LH/JHG was consolidated with the other civil actions under the caption of City of Albuquerque et al. v. Sparton Technology, Inc., CIV 97 0206 LH/JHG (D.N.M.).

H. By motion filed February 24, 1998, Sparton sought leave of Court to file its Second Amended Complaint. On May 18, 1998, the United States filed a motion to dismiss Sparton's Second

Amended Complaint. No rulings have previously been issued on Sparton's motion for leave to file its Second Amended Complaint or on the United States' motion to dismiss Sparton's Second Amended Complaint. Nor were any rulings issued on the United States' motions to dismiss Sparton's Complaint and Amended Complaint.

I. By motion filed May 11, 1998, Plaintiffs sought leave of the Court to file their First Amended Complaints. The United States' First Amended Complaint added (i) a claim for enforcement of a final administrative order issued by EPA to Sparton on February 10, 1998 which requires Sparton to perform corrective action to clean up soil and Groundwater contamination from the Facility and (ii) a claim under RCRA Section 3008(g) and (h), 42 U.S.C. § 6928(g) and (h), for assessment of civil penalties for Sparton's violation of that final administrative order. The State and Municipal Parties' First Amended Complaint added (i) a claim for enforcement of the EPA final administrative order and (ii) a claim under RCRA Sections 3008(g) and 7002(a), 42 U.S.C. §§ 6928(g) and 6972(a), for assessment of civil penalties for Sparton's violation of that order.

J. Sparton denies any liability to Plaintiffs arising out of the transactions or occurrences alleged in their Complaints and First Amended Complaints. Neither Sparton's election to enter into this Consent Decree nor the terms of this Consent Decree shall be construed as (1) an admission of any fact by Sparton; (2) an admission of liability or fault on the part of Sparton; or (3) an admission of a violation of the law by Sparton. This Consent Decree shall not be used by any Party against any other Party in any litigation as an admission or otherwise, except in litigation to enforce the terms of the Consent Decree. Except as provided in Paragraphs 1, 2, and 3, Sparton's agreement to this Consent

Decree shall not operate as a waiver of any defense to any claim in the complaints or to any crossclaim, counterclaim, third party complaint, or other judicial or administrative claim against Sparton with respect to the Site.

K. The United States denies any liability to Sparton arising out of the transactions or occurrences alleged in Sparton's Complaint, Amended Complaint, and Second Amended Complaint. Neither the United States' election to enter into this Consent Decree nor the terms of this Consent Decree shall be construed as (1) an admission of any fact by the United States; (2) an admission of liability or fault on the part of the United States; or (3) an admission of a violation of the law by the United States.

L. The Parties, without the necessity of trial or adjudication of any issues of fact or law, and without any admission of liability or of any factual or legal allegations (except as provided in Section II (Jurisdiction and Venue)), consent to entry of this Consent Decree, which:

(a) Resolves civil claims specifically alleged in Plaintiffs' Complaints and First Amended Complaints; civil claims under RCRA Section 3008(h), 42 U.S.C. § 6928(h), civil claims for corrective action or other response measures related to the contamination identified as the basis for the February 10, 1998 *Final Administrative Order issued under RCRA Section 3008(H) of the Resource Conservation and Recovery Act, as amended 42 U.S.C. § 6928(H)*, U.S. EPA Docket No. RCRA-VI-001(h)-96-H ("the Final Administrative Order"); claims for compliance orders and civil judicial actions under RCRA 3008(a), 42 U.S.C. § 6928(a), for corrective action or other response measures related to the contamination identified as the basis for the Final Administrative Order; and affirmative claims under CERCLA for response costs, as defined by CERCLA Section 101(23)-(25), 42 U.S.C. § 9601(23)-(25), incurred by the United States in connection with the Site through the Effective Date of this Consent Decree; and

(b) Dismisses with prejudice Sparton's Second Amended Complaint.

M. The Parties recognize, and the Court by entering this Consent Decree finds, that this Consent Decree has been negotiated by the Parties in good faith, that implementation of this Consent Decree will expedite the cleanup of the Site and avoid complicated litigation between the Parties, and that this Consent Decree is fair, reasonable, and in the public interest.

NOW, THEREFORE, it is hereby Ordered, Adjudged, and Decreed:

II. JURISDICTION AND VENUE

1. This Court has jurisdiction over the subject matter of the lawsuit filed by the Municipal and State Parties (CIV 97 0206 and CIV 97 0208) pursuant to 28 U.S.C. §§ 1331 and 1367 and RCRA Section 7002(a), 42 U.S.C. § 6972(a). Venue is proper in this judicial district pursuant to 28 U.S.C. § 1391 and RCRA Section 7002(a), 42 U.S.C. § 6972(a).

2. This Court has jurisdiction over the subject matter of the lawsuit filed by the United States (CIV 97 0210) pursuant to 28 U.S.C. §§ 1331, 1345, and 1355; RCRA Sections 3008 and 7003, 42 U.S.C. §§ 6928 and 6973; and SDWA Section 1431, 42 U.S.C. § 300i. Venue is proper in this judicial district pursuant to RCRA Sections 3008 and 7003, 42 U.S.C. §§ 6928 and 6973; SDWA Section 1431, 42 U.S.C. § 300i; and 28 U.S.C. §§ 1331 and 1345.

3. Only for the purposes of entry and enforcement of this Consent Decree, Sparton waives all objections and defenses that it may have to jurisdiction of the Court or to venue in this District. Sparton shall not challenge the provisions of this Consent Decree or this Court's jurisdiction to enter and enforce this Consent Decree.

III. DEFINITIONS

4. Unless otherwise expressly provided herein, terms used in this Consent Decree which are defined in RCRA, SDWA, or CERCLA shall have the meaning assigned to them in those statutes. Whenever terms listed below are used in this Consent Decree the following definitions apply:

- "Attached Work Plans" means the following documents attached to this Decree: Ground Water Monitoring Program Plan (Attachment A); Public Involvement Plan (Attachment B); Work Plan for the Off-Site Containment System (Attachment C); Work Plan for the Assessment of Aquifer Restoration (Attachment D); Vadose Zone Investigation and Implementation Workplan (Attachment E); Work Plan for the Installation of a Source Containment System (Attachment F). The terms "*work plan*" and "*workplan*" mean any plan, work plan, proposal, submittal, report, or other item (other than the Attached Work Plans) which specifies activities that are proposed or required to be performed under this Consent Decree and/or a schedule for performing those activities.

- "Background Contaminant Level" means the concentration of a contaminant in the Groundwater at the Site which originates from undisturbed natural sources or from contaminant sources other than those that can be attributed to Sparton. Sparton shall have the burden of proof to demonstrate the Background Contaminant Level for a particular contaminant.

- "CERCLA" means the Comprehensive Environmental Response, Compensation, and Liability Act, 42 U.S.C. §§ 9601-9675.

- "Consent Decree" means this Decree; all Attachments to this Decree, including Attached Work Plans; and all items approved by EPA and NMED pursuant to Section X (Review of Submittals). In the event of conflict between this Decree and any Attachment, this Decree shall control.

- "Day" means a calendar day where the period of time allowed is eleven (11) days or more. "Day" means a day other than a Saturday, Sunday or Federal Holiday where the period of time allowed is less than eleven (11) days. The computation of any period of time under this Consent Decree shall be done in accordance with Paragraph 111.

- "Effective Date of this Consent Decree" means the date specified in Paragraph 17.

- "Effective Date of this Work Plan" means the same date as the effective date of this Consent Decree.

- "EPA" means the United States Environmental Protection Agency.

- "Facility" means the land and improvements including all buildings and other improvements currently owned by Sparton and located at 9621 Coors Road, NW, Albuquerque, Bernallilo County, New Mexico.

- "Groundwater" means subsurface water that fills available openings in rock or soil materials such that they may be considered water saturated under hydrostatic pressure.

- "HWA means the New Mexico Hazardous Waste Act, NMSA 1978, §§ 74-4-1 through 74-4-14 (Repl. Pamp. 1993).

- "Municipal Parties" means the City of Albuquerque, New Mexico and the Board of County Commissioners of the County of Bernalillo, New Mexico.

- "NMED" means the New Mexico Environment Department on behalf of the State of New Mexico and any predecessor and successor agencies.

- ONRT means the New Mexico Office of the Natural Resources Trustee and any predecessor and successor agencies.

- "Paragraph" means a portion of this Consent Decree identified by an Arabic numeral or upper case letter.

- "Parties" or "Party" means the Municipal Parties, the State Parties, the United States, and Sparton.

- "Performance Standards" means the following:

  a. With respect to Groundwater at the Site, the performance standard shall be to achieve and maintain contaminant levels in the Groundwater at or below the more stringent of either the applicable federal drinking water standards (Maximum Contaminant Levels ("MCLs") established under the SDWA) or the applicable state ground water standards (maximum allowable concentrations in ground water set by the New Mexico Water Quality Control Commission). If it is determined through the appropriate laws or regulations that such Performance Standard is technically impracticable or technically infeasible or EPA and/or the appropriate State entity approve a request by Sparton for alternate standards for a particular contaminant through a process authorized by federal or state regulations in effect at the relevant time, then Sparton may propose under this Consent Decree an alternate Performance Standard to EPA and NMED for review and approval. No submission by Sparton proposing an alternate Performance Standard under the previous sentence will be approved by EPA or NMED unless Sparton demonstrates that such alternate cleanup standard is justified based upon all relevant data including information obtained during the operation of the off-site containment and the on-site source containment systems and that Sparton has complied with all necessary regulatory requirements and obtained all required approvals for the alternate cleanup standard; and

  b. With respect to the Vadose Zone, the performance standard shall be to achieve a concentration of each volatile organic compound in the Vadose Zone that is less than 10 parts per million volume ("ppmv").

- "Plaintiffs" means the Municipal Parties, the State Parties, and the United States.

- "RCRA" means the Resource Conservation and Recovery Act, 42 U.S.C. §§ 6901-6992k.

- "SDWA" means the Safe Drinking Water Act, 42 U.S.C. §§ 300f-300j-26.

- "Section" means a portion of this Consent Decree identified by an uppercase Roman numeral.

- "Sparton" means Sparton Technology, Inc., a corporation organized under the laws of the State of New Mexico, that conducts business in the State of New Mexico, that is headquartered at 4901 Rockaway Boulevard, NE, Rio Rancho, New Mexico 87124.

- "Site" means the land (including the subsurface and Groundwater) consisting of an area including (a) the Facility, (b) the land (including the subsurface and Groundwater) in the general vicinity of the Facility where any hazardous wastes, as defined in RCRA Section 1004, 42 U.S.C. § 6903(5), or hazardous constituents, as defined in 40 C.F.R. § 260.10 and Part 261, App. VIII, originating from the Facility have come to be located and (c) any other land (including the subsurface and Groundwater) or improvements in the general vicinity of the Facility where Work is conducted including, but not limited to, land where structures and equipment used to extract, treat, and dispose of extracted Groundwater are installed. The currently documented boundaries of this area are depicted generally on the map attached as Attachment G.

- "State of New Mexico" means the Office of the Attorney General on behalf of the State of New Mexico.

- "State Parties" means the State of New Mexico; the New Mexico Environment Department; and the New Mexico Office of the Natural Resources Trustee.

- "United States" means the United States of America, including its departments, agencies, and instrumentalities.

- "Vadose Zone" means that portion of the Site below the ground surface and above the water table which consists of a porous medium within which the capillary pressure is less than atmospheric and the moisture content is less than saturation.

- "WQA" means the New Mexico Water Quality Act, NMSA 1978, §§ 74-6-1 through 74-6-17 (Repl. Pamp. 1993).

- "Work" means all activities that Sparton is required to perform under this Consent Decree, except those required by Section XV (Civil Penalties) and Section XXVI (Access to Information; Quality Assurance; and Record Retention).

IV. PARTIES BOUND

5. This Consent Decree shall apply to and be binding upon Plaintiffs and upon Sparton and its successors and assigns. If necessary to enforce compliance with the requirements of this Consent Decree, Plaintiffs may move the Court for an order requiring action by Sparton's officers, agents, servants, employees, attorneys, successors, assigns and upon those persons in active concert or participation with such persons who receive actual notice of this Consent Decree by personal service or otherwise.

6. No change in ownership or corporate status of Sparton, including, but not limited to, any lease or transfer of assets or real or personal property shall alter Sparton's obligation to comply with the requirements of this Consent Decree or Sparton's liability for compliance by any successor or assign of Sparton in the event such successor or assign fails to perform obligations required by the Consent Decree. For such period of time as this Consent Decree is in force, any deed, title, or other instrument of conveyance utilized by Sparton with respect to the Facility shall contain a notice that the Facility is the subject of a Consent Decree in United States District Court for the District of New Mexico in the case of Albuquerque, et al. v. Sparton Technology, Inc., No. CIV 97 0206 (D.N.M.).

7. Sparton shall notify EPA and NMED in the manner specified in 40 C.F.R. § 270.72(a)(4) (1999) prior to a change in the operational control or ownership status of any portion of the Facility including, but not limited to, the conveyance of title, easement, leasehold or other interest. This notice shall also include a description of both the current and expected future activities (to the extent known by Sparton) on that portion of the Facility to be conveyed, leased, or otherwise alienated. Sparton shall also provide a copy of this Consent Decree to the grantee prior to any such conveyance.

8. Sparton shall provide a copy of this Consent Decree to its designated Project Coordinator and shall provide a copy of this Decree and all attachments which are applicable to each contractor hired by Sparton to perform or monitor any of the Work required by this Consent Decree, and shall do so within ten (10) days after the date of entry of this Consent Decree or, for Work commenced after such date, at least ten (10) days prior to the commencement of such Work. Sparton or its contractors shall provide written notice of this Consent Decree to each other person representing

Sparton with respect to the Work, including, but not limited to, each subcontractor, and shall do so within ten (10) days after the date of entry of this Consent Decree or, for persons hired after such date, at least ten (10) days prior to commencement of Work by such person. Sparton shall condition all contracts entered into hereunder upon performance of the Work in conformity with the terms of this Consent Decree.

9. Notwithstanding any retention of contractors, subcontractors, or agents to perform or monitor any Work required under this Consent Decree, Sparton shall be responsible for ensuring that all Work is performed in accordance with the requirements of this Consent Decree. In any action to enforce this Consent Decree or obtain stipulated penalties hereunder, Sparton shall not assert as a defense the failure of its employees, servants, agents, contractors, or subcontractors to take actions necessary to comply with this Consent Decree, unless Sparton establishes that such failure resulted from a "force majeure" event as defined in Section XII (Force Majeure).

V. RULINGS ON PENDING MOTIONS

10. Sparton's Unopposed Motion for Leave to File its Second Amended Complaint, filed on February 24, 1998, is granted and the Second Amended Complaint is hereby deemed filed as of the Effective Date of this Consent Decree.

11. The United States' Motion to Dismiss Sparton's Second Amended Complaint, filed May 18, 1998, is hereby granted, and Sparton's Second Amended Complaint is dismissed with prejudice.

12. Plaintiffs' Joint Opposed Motion for Leave to Amend Complaints filed on May 11, 1998 is hereby granted. The First Amended Complaints are accordingly deemed to be filed as of the date this Consent Decree is lodged.

VI. GENERAL PROVISIONS

13. Compliance with Applicable Laws: All activities undertaken by Sparton pursuant to this Consent Decree shall be performed in accordance with the requirements of all applicable federal, state, and local laws, regulations, and permits including, without limitation, federal, state, and local laws and regulations governing land use, natural resources, and the generation, management, treatment, storage, transport, and disposal of hazardous waste; the terms and conditions of all permits issued to Sparton; and all applicable Occupational Safety and Health Act and Department of Transportation regulations.

14. Permits: Where any portion of the Work requires a federal, state, or local permit or approval, Sparton shall be responsible for obtaining the required permit or approval. Where such a permit or approval is required, Sparton shall submit timely and complete applications, shall take all other actions required by law to obtain such permits or approvals, and shall use best efforts to take all other actions necessary to obtain all such permits or approvals. Where any portion of the Work requires a federal, state, or local permit, license, or approval, the Parties shall cooperate with one another in applying for and obtaining any such permit, license, or approval to the maximum extent practicable and only if consistent with the requirements of applicable law.

15. Health and Safety Plan: For all field activities to be performed under this Consent Decree, Sparton shall submit to EPA and NMED a Health and Safety Plan, which conforms to the applicable Occupational Safety and Health Administration, EPA, and NMED requirements including, but not limited to, 29 C.F.R. § 1910.120. EPA shall review the Health and Safety Plan but will not approve it; NMED will review and approve the Health and Safety Plan under Section X (Review of Submittals). Unless otherwise provided in the Attached Workplans, the Health and Safety Plan shall be submitted within ninety (90) days after the Effective Date of this Consent Decree. Within thirty (30) days after any item submitted for review and approval under Section X (Review of Submittals) is approved by EPA or NMED, Sparton shall update the Health and Safety Plan to cover any and all additional field work to be performed under the newly approved item.

16. This Consent Decree is not, and shall not be construed to be, a permit issued pursuant to any federal, state, or local law or regulation.

17. This Consent Decree shall be effective on the date upon which this Consent Decree is entered by the Court, except as otherwise provided herein.

VII. PERFORMANCE OF THE WORK BY SPARTON

18. Sparton shall implement all requirements of this Consent Decree, including all Work and other requirements of the Attached Work Plans, in accordance with the applicable schedules and shall achieve the Performance Standards.

19. No later than ten (10) days after entry of this Consent Decree, Sparton shall designate a Project Coordinator and provide written notification as provided in Section XXVII (Notices and

Submittals) to EPA and NMED of the name, address, and telephone number of its designated Project Coordinator. If Sparton wishes to change its Project Coordinator, Sparton shall provide written notification to EPA and NMED of the name, address, and telephone number of its replacement Project Coordinator at least five (5) working days before the change. Within ten (10) working days after EPA and NMED receive notice that Sparton has designated a Project Coordinator or a replacement Project Coordinator, EPA and NMED may notify Sparton in writing that they disapprove the Project Coordinator. EPA and NMED may only disapprove the Project Coordinator selected by Sparton if they find that the selected Project Coordinator has insufficient technical expertise to adequately oversee the performance of the Work or the selected Project Coordinator is otherwise unfit to oversee the Work due to debarment, fraudulent conduct, history of noncompliance with environmental laws, or other similar reasons. Sparton's Project Coordinator shall not be an attorney for Sparton, Sparton Corporation, or any subsidiary of Sparton Corporation. The Project Coordinator may assign other representatives, including other consultants or contractors, to serve as a Site representative for oversight of performance of daily operations during the Work.

20. Beginning on the Effective Date of this Consent Decree, Sparton shall provide written progress reports to EPA and NMED. The progress report shall, at a minimum:

a. Describe all tasks and other Work pursuant to this Consent Decree which Sparton completed during the period since the last progress report was prepared;

b. Describe all tasks and other Work pursuant to this Consent Decree which Sparton plans to undertake before the next scheduled progress report; and

c. Identify any problems encountered or anticipated, including, but not limited to, failure to complete Consent Decree requirements.

Progress reports shall be submitted by the tenth day of each month during the implementation of the Work required by this Consent Decree. Sparton may submit a written request to change the frequency of progress reports to EPA and NMED for review and approval pursuant to Section X (Review of Submittals). Progress reports may be submitted to the EPA and NMED Project Coordinators by e-mail; if the progress report is submitted by e-mail, Sparton shall also send a copy of the report to EPA and NMED by first class U.S. mail.

21. Sparton acknowledges and agrees that nothing in this Consent Decree constitutes a warranty or representation of any kind by Plaintiffs that compliance with the requirements set forth in the Attached Work Plans will achieve the Performance Standards. Compliance with the requirements of the Attached Work Plans by Sparton shall not foreclose Plaintiffs from seeking compliance with all terms and conditions of this Consent Decree, including, but not limited to, the applicable Performance Standards.

VIII. COMPLETION OF APPLICATION FOR POST CLOSURE CARE PERMIT

22. (a) Currently pending before NMED is an incomplete RCRA Post Closure Care Permit Application filed by Sparton on February 15, 1995. Attached to this Consent Decree as Attachment H is a list of outstanding deficiencies in Sparton's Post Closure Care Permit Application. Sparton shall submit to NMED within six (6) months of the Effective Date of this Consent Decree additional information to address the deficiencies identified in Attachment H under the title "Outstanding Items Required to be Submitted" and numbered one through

eleven. At the request of Sparton and for good cause shown, NMED may, in its sole discretion, grant an extension of the six month deadline for such submittal. Upon receipt of the information requested in Attachment H, NMED will process Sparton's application in accordance with the procedures and standards set forth in the applicable laws and regulations including 20 NMAC 4.1 and 4.2.

(b) Except as otherwise provided in Subparagraph (c), corrective action related to the Vadose Zone, Groundwater, and soil below the water table at the Site that might otherwise be part of a Post Closure Care Permit, including items listed in Attachment H under the title "Previous Outstanding Items in the Post-Closure Application Satisfied by the Proposed Workplans" and numbered one through eight, are incorporated into this Consent Decree and will not be included in the Post Closure Care Permit.

(c) All other requirements and conditions of the Post Closure Care Permit, including requirements and conditions related to:

(i) The items listed in Attachment H listed under the title "Outstanding Items Required to be Submitted" and numbered one through eleven and

(ii) Corrective action related to the Site, if any, that may be required after the termination of this Consent Decree, including, but not limited to, monitoring for three years after the Performance Standards are achieved as set forth in the applicable regulations and corrective action to address contamination identified by such monitoring, are not addressed by this Consent Decree and shall not be enforced by NMED pursuant to this Consent Decree, but shall be enforced under applicable laws and regulations.

(d) NMED and Sparton agree to cooperate with each other to ensure that the RCRA Post Closure Care Permit issued to Sparton will not duplicate or be inconsistent with this Consent Decree. Any dispute between Sparton and NMED regarding the Post Closure Care Permit shall be resolved in accordance with 20 NMAC 4.1 and 4.2.

IX. ACCESS

23. Sparton agrees to provide EPA, NMED, and/or their representatives, including contractors, access at all reasonable times to enter and move about all property at the Facility and all areas at the Site under Sparton's control, with due regard for safety of personnel and property, for any purpose relating to the implementation, monitoring, or enforcement of this Consent Decree, including, without limitation: interviewing Sparton's Project Coordinator, his/her designated representative(s) or personnel involved in field work at the Site; inspecting records, operating logs and contracts related to the implementation, monitoring or enforcement of this Consent Decree; reviewing progress of Sparton in carrying out terms of this Consent Decree; conducting such sampling and tests as EPA, NMED, and/or their representatives deem appropriate for implementation, monitoring or enforcement of this Consent Decree; using a camera, sound recording, or other documentary type equipment; and verifying the reports and data that Sparton submits to EPA and NMED. Sparton shall permit such persons to inspect and copy all records, files, photographs, computer records and other writings, including all sampling and monitoring data, required to implement, monitor, or enforce this Consent Decree.

Sparton or its representatives may accompany EPA, NMED, and/or their representatives throughout their presence at the Facility, but may not in any way delay or impede investigative activities authorized under this Section. Upon request at the time of sampling, Sparton may obtain splits of any Site-related samples taken by EPA, NMED, and/or their representatives and upon request shall be provided with copies of the results of analyses or tests made on such samples. Sparton shall also make available to EPA and/or NMED for purposes of investigation, information gathering, or testimony, its employees, agents, or representatives with knowledge of relevant facts concerning the performance of the Work.

24. In the event Sparton believes that information, data, or other material accessible to EPA, NMED, and/or their representatives under this Consent Decree, including information, data, or other material accessible under Paragraph 23, is privileged or is entitled to protection as confidential information under Federal Rule of Civil Procedure 26(c)(7), Sparton shall proceed as follows:

(a) If Sparton believes that information, data, or other material is privileged under a privilege which it is entitled to assert under Federal Rule of Evidence 501, Sparton may claim that privilege as provided in this Subparagraph. If Sparton asserts such a privilege in lieu of providing documents, within ten (10) days after the request, it shall provide to the requesting Party the following information for each item as to which a privilege is claimed:

(i) A description of the information, data, or other material which contains sufficient information to allow the requesting Party and the Court to determine whether the claimed privilege applies; if the material at issue is a document, Sparton shall, at a minimum, provide the following information: (1) the title of the document; (2) the date of the document; (3) the name and title of the author of the document; (4) the name and title of each address and recipient; and (5) a description of the contents of the document; and

(ii) A statement of the specific privilege(s) claimed and the basis for the claim.

If Sparton fails to timely provide the information required by this Subparagraph, it automatically waives any claim of privilege with respect to the specific information, data, or other material for which the description is untimely and/or incomplete. If the requesting Party objects to Sparton's claim that the information, data, or other material is privileged, it may file a motion to compel access to the material.

(b) If Sparton claims that such information, data, or other material is entitled to protection as confidential information under Federal Rule of Civil Procedure 26(c)(7), it shall designate the information, data, or other material as "Confidential Information" as provided in the Agreed Order Regarding Confidential Information Produced or Obtained in these Proceedings, entered June 15, 1998 in this case. The provisions of that Order shall apply to Sparton's claim.

(c) If Sparton inadvertently discloses information, data, or other material which is privileged within the meaning of Subparagraph (a) above or entitled to protection as Confidential Information as provided in Subparagraph (b) above, such disclosure shall be treated in accordance with applicable principles of federal law.

In no case shall Sparton claim that documents, reports, or other information created or generated pursuant to the requirements of this Consent Decree or data, including, but not limited to, all sampling, analytical, monitoring, hydrogeologic, scientific, chemical, or engineering data, or any other documents or information evidencing conditions at or around the Site are privileged or entitled to protection as confidential information under Federal Rule of Civil Procedure 26(c)(7).

25. To the extent that Work required by this Consent Decree must be done on property which Sparton does not currently own or control or have access to, Sparton shall use best efforts, including the payment of reasonable sums of money in consideration of access, to obtain site access agreements from the owner(s) of such property for (a) itself and its contractors and (b) EPA, NMED, and/or their authorized representatives and contractors. Sparton shall seek to obtain such access agreements as expeditiously as practicable in order to prevent any delays in Work required under this Consent Decree. If within thirty (30) days after Sparton's initial request for access to such property, Sparton cannot, despite its best efforts, secure access to property where Work is required under this Consent Decree, Sparton shall within five (5) days thereafter again request access in a certified letter, return receipt requested, to the property owner. If an agreement for access to such property is not obtained within sixty (60) days after Sparton's initial request for access, Sparton shall notify EPA and NMED in writing. This notification shall include a summary of the steps Sparton has taken in attempting to obtain access and shall request Plaintiffs' assistance in obtaining the required access. Plaintiffs may, as they deem appropriate, assist Sparton in obtaining access. If Plaintiffs obtain access for Sparton, Sparton shall undertake the Work required under this Consent Decree on such property. If Plaintiffs

do not obtain access, EPA or NMED shall so notify Sparton in writing. No less than thirty (30) days after receiving such notice, Sparton shall submit to EPA and NMED an alternate work plan or proposed modification to the applicable work plan which accounts for the inaccessibility of the subject property. Regardless of whether access is obtained, if one or more Plaintiffs assist Sparton in its efforts to obtain access, Sparton shall reimburse Plaintiffs for all reasonable costs, direct or indirect, incurred by Plaintiffs in their efforts to obtain such access. Such costs include, but are not limited to, the cost of attorney time and the amount of monetary consideration or just compensation paid.

26. Nothing in this Section limits or otherwise affects Plaintiffs' rights of access and entry pursuant to any applicable law including, but not limited to, RCRA Section 3007, 42 U.S.C. § 6927; CERCLA Section 104(e), 42 U.S.C. § 9604(e); HWA, NMSA 1978, § 74-4-4.3; WQA, NMSA 1978, § 74-6-9(E); and applicable municipal authority.

X. REVIEW OF SUBMITTALS

27. EPA and NMED shall review items (including, but not limited to, work plans and reports) submitted by Sparton for review and approval pursuant to this Consent Decree. After review of any item which is required to be submitted for approval pursuant to this Consent Decree, EPA and NMED shall: (a) approve the item, in whole or in part; (b) approve the item subject to conditions specified in the approval notice; (c) modify the item to cure the deficiencies; (d) disapprove the item, in whole or in part, directing that Sparton modify it; or (e) any combination of the above. EPA and NMED shall notify Sparton in writing of their decisions regarding each item submitted for review, and if

EPA or NMED disapproves the item in whole or in part, the notice shall specify those portions of the item that have been disapproved and the reasons for such disapproval.

28. In the case of an item which has been approved by EPA or NMED, Sparton shall proceed to take all actions required by the item as approved.

29. In the case of an item that has been approved subject to specified conditions or that has been modified and approved by EPA or NMED, Sparton shall commence implementation of the Work required by the item in accordance with the approved schedule by the day specified below:

a. Thirty (30) days after receipt of notice of the decision by EPA or NMED if EPA and NMED issue their decisions on the same day; or

b. Ninety (90) days after receipt of notice of the decision by EPA or NMED that is issued first in time or thirty (30) days after receipt of the decision by EPA or NMED that is issued second in time, whichever is less, if EPA and NMED do not issue their decisions on the same day.

Sparton may also invoke the dispute resolution procedures set forth in Section XIII (Dispute Resolution) with respect to EPA's or NMED's decision. Regardless of whether Sparton invokes such dispute resolution procedures, if Sparton fails to timely commence implementation of the Work required by the item approved subject to specified conditions or modified and approved, Sparton shall be liable for any stipulated penalties demanded under Section XIV (Stipulated Penalties).

30. a. In the case of an item which has been disapproved, in whole or in part, by

EPA or NMED, Sparton shall, within forty-five (45) days of receipt of the notice of disapproval, correct the deficiencies and resubmit the item for approval. Sparton may also invoke the dispute resolution procedures set forth in Section XIII (Dispute Resolution) with respect to a notice of disapproval. Regardless of whether Sparton invokes such dispute resolution procedures, if it fails to timely correct the deficiencies specified in the notice of disapproval and resubmit the item, (i) Sparton shall be liable for any stipulated penalties demanded under Section XIV (Stipulated Penalties) and (ii) EPA and NMED may modify and approve the item. An item that is resubmitted with the same deficiencies which were identified in the notice of disapproval or with substantially similar deficiencies shall be deemed to have never been submitted for purposes of calculating stipulated penalties.

b. Notwithstanding the receipt of a notice of disapproval pursuant to Paragraph 27, Sparton shall proceed, if so directed by EPA and NMED in the notice, to take any action required by any non-deficient portion of the item.

c. In the event that a resubmitted item, or portion thereof, is disapproved by EPA or NMED, EPA and/or NMED may again require Sparton to correct the deficiencies, in accordance with the procedure set forth in this Paragraph. EPA and/or NMED may also approve the item subject to conditions specified in the approval notice or modify and approve the item as set forth in Paragraph 27 above. In the event that EPA and/or NMED approve the item subject to specified conditions or modify and approve the item, Sparton shall commence implementation of the Work required by the item in accordance with the schedule set forth in the item as approved within thirty (30) days of receipt of notice of EPA's or NMED's decision. Sparton may also invoke the dispute resolution procedures set forth in Section XIII (Dispute Resolution) with respect to a decision by EPA or NMED pursuant to this Subparagraph. Regardless of whether Sparton invokes such dispute resolution procedures, if Sparton fails to timely re-submit the item or to implement the Work required by the item as approved, Sparton shall be liable for any stipulated penalties demanded under Section XIV (Stipulated Penalties).

31. All items required to be submitted to EPA and NMED for review and approval under this Consent Decree shall, upon approval, approval subject to specified conditions, or modification and approval by EPA or NMED, be enforceable under this Consent Decree. In the event EPA or NMED approves; approves subject to specified conditions; or modifies and approves a portion of an item required to be submitted to EPA and NMED under this Consent Decree, the approved or modified portion shall be enforceable under this Consent Decree.

32. If Sparton determines that a difference in the decisions by EPA and NMED regarding an item submitted for review under this Consent Decree will impose inconsistent obligations upon it, Sparton may invoke the procedures set forth in Section XIII (Dispute Resolution). If, after the conclusion of the nonjudicial phase of the dispute resolution process, Sparton still maintains that the decisions by EPA and NMED impose inconsistent obligations upon it, Sparton may move the Court to stay performance of the obligations which Sparton maintains are inconsistent until the matter is fully resolved pursuant to the procedures set forth in Section XIII (Dispute Resolution).

33. The provisions of this Paragraph shall only apply to an item submitted by Sparton for approval under Section X (Review of Submittals) which addresses the subject of whether additional remedial systems should be utilized to achieve the Performance Standard for Groundwater. If at the time such an item is submitted by Sparton there is pending before EPA and/or NMED (a) a request for a determination that attaining a Performance Standard for a particular contaminant in Groundwater is technically impracticable or technically infeasible, or (b) a request that EPA and/or NMED approve alternate standards for a particular contaminant through a process authorized by federal or state regulations in effect at the relevant time, then neither EPA nor NMED shall issue a decision under Section X (Review of Submittals) on that portion of the item affected by the pending request until such time as EPA and/or NMED, as applicable, issues an administrative decision on the request pending before it. Notwithstanding any other provision of this Paragraph, EPA or NMED may issue a decision on an item submitted by Sparton for approval under Section X (Review of Submittals) which addresses the subject of whether additional remedial systems should be utilized to achieve the Performance Standard for Groundwater prior to making an administrative decision on any pending request by Sparton described in the second sentence of this Paragraph, provided that such decision by EPA and NMED assumes that such request will be granted. Any decision by EPA or NMED pursuant to the previous sentence shall be reviewed by the appropriate agency(ies) after an administrative decision is issued. For purposes of this Paragraph, the term "additional remedial systems" shall mean systems for remediating Groundwater contamination other than the systems installed pursuant to the "Work Plan for the Installation of a Source Containment System" (Attachment F to this Decree) and the "Work Plan

for the Off-Site Containment System" (Attachment C to this Decree). The term "additional remedial systems" shall not include modifications to the operation of systems for remediating Groundwater contamination to be installed pursuant to the Attached Workplans and/or which have already been installed at the time the dispute is initiated.

34. Documents, including work plans, reports, approvals, disapprovals, and other correspondence to be submitted for review and approval pursuant to this Consent Decree shall be sent to the following addresses, or any other address that Sparton, EPA, and NMED hereafter agree upon in writing:

(a) Three (3) copies of each document to be submitted to EPA should be sent to:

United States Environmental Protection Agency - Region VI
Technical Section (6EN-HX)
Compliance Assurance and Enforcement Division
1445 Ross Avenue
Dallas, Texas 75202
Attn: Sparton Technology, Inc. Project Coordinator

(b) One copy of each document shall be sent to each of the locations listed below:

Director
Water and Waste Management Division
New Mexico Environment Department
P.O. Box 26119 or 1190 St. Francis Drive, 4th Floor
Santa Fe, NM 87502-6110 Santa Fe, NM 87503

Chief
Hazardous and Radioactive Materials Bureau
New Mexico Environment Department

P.O. Box 26119	or	1190 St. Francis Drive, 4th Floor
Santa Fe, NM 87502-6110		Santa Fe, NM 87503

Chief
Groundwater Bureau
New Mexico Environment Department

P.O. Box 26119	or	1190 St. Francis Drive, 4th Floor
Santa Fe, NM 87502-6110		Santa Fe, NM 87503

(c) One copy of each document to be submitted to Sparton should be sent to:

Secretary	Tony Hurst, P.E.
Sparton Technology, Inc.	General Civil Engineering Resource
2400 E. Ganson St.	153 Camino de Sabinal–P.O. Box 220
Jackson, Michigan 49202	Bosque, New Mexico 87006

35. All documents submitted by Sparton to EPA and NMED for review and approval under this Consent Decree shall be signed by a responsible agent of the Facility as defined in 40 C.F.R. § 270.11(a)(1) (1999), or his or her duly authorized representative, and shall include the following certification statement:

> I certify under penalty of law that this document and all attachments were prepared under my direction and supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based upon my inquiry of either the person or persons who manage the system and/or the person or persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I further certify, to the best of my knowledge and belief, that this document is consistent with the applicable requirements of the Consent Decree entered among the New Mexico Environment Department, the U.S. Environmental Protection Agency, Sparton Technology, Inc., and others in connection with Civil Action No. CIV 97 0206 LH/JHG, United States District Court for the District of New Mexico. I am aware that

there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

XI. CERTIFICATE OF COMPLETION

36. Within sixty (60) days after Sparton concludes that the Work has been fully performed and all Performance Standards achieved ("Full Completion"), Sparton shall submit to EPA and NMED a letter requesting a Certificate of Full Completion. Within sixty (60) days after Sparton concludes that the Work connected with one of the two Performance Standards (i.e. the Performance Standard for Groundwater or for the Vadose Zone) has been fully performed and that one Performance Standard achieved ("Partial Completion"), Sparton may submit to EPA and NMED a letter requesting a Certificate of Partial Completion. The letter shall be submitted as specified in Paragraph 34. In either case, the letter shall contain a list of all items (including, but not limited to, work plans and reports) approved by EPA and NMED pursuant to Section X (Review of Submittals) and the associated dates of approval correspondence from EPA and NMED. EPA and NMED may provide comments on the letter but shall not review or approve the letter under Section X (Review of Submittals). In coordination with EPA and NMED, Sparton shall also schedule and conduct, at a time agreeable to EPA and NMED, a pre-certification inspection to be attended by Sparton, EPA, and NMED.

37. If, after the pre-certification inspection, Sparton concludes that it has not achieved Full Completion or Partial Completion (as applicable), Sparton shall so notify EPA and NMED in writing within thirty (30) days after the pre-certification inspection. In this event, Sparton shall continue to comply with all requirements of this Consent Decree.

38. If, after the pre-certification inspection, Sparton still maintains it has achieved Full Completion or Partial Completion (as applicable), Sparton shall submit for review and approval a written certification by a registered professional engineer (or other qualified person with relevant expertise in groundwater and/or vadose zone cleanups approved by EPA and NMED). If Sparton maintains it has achieved Partial Completion, the certification shall state that the Work connected with one Performance Standard specified in this Consent Decree has been fully performed and the Performance Standard has been achieved. If Sparton maintains it has achieved Full Completion, the certification shall state that the Work has been completed and all Performance Standards achieved in full satisfaction of the requirements of this Consent Decree. In either case, the certification shall be accompanied by the following statement, signed by a responsible agent of the Facility as defined in 40 C.F.R. § 270.11(a)(1) (1999):

> I certify under penalty of law that this document and all attachments were prepared under my direction and supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based upon my inquiry of either the person or persons who manage the system and/or the person or persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I further certify, to the best of my knowledge and belief, that this document is consistent with the applicable requirements of the Consent Decree entered among the New Mexico Environment Department, the U.S. Environmental Protection Agency, Sparton Technology, Inc., and others in connection with Civil Action No. CIV 97 0206 LH/JHG, United States District Court for the District of New Mexico. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

39. If, after review of the written report, EPA or NMED determines that Sparton has not achieved Full or Partial Completion (as applicable), EPA and/or NMED will notify Sparton in writing of that portion of the Work not yet completed and/or the Performance Standard(s) not yet achieved.

40. If EPA and/or NMED conclude, based on the initial or any subsequent request for Certificate of Partial Completion by Sparton, that the Work connected with one Performance Standard has been fully performed and that Performance Standard achieved, EPA and/or NMED will so notify Sparton in writing. In the event of such a notification from EPA and NMED, Sparton will be deemed to have achieved the applicable Performance Standard. Until such time as a Certificate of Full Completion is granted, Sparton shall continue to comply with all requirements of this Consent Decree.

41. If EPA and NMED conclude, based on the initial or any subsequent request for Certificate of Full Completion by Sparton, that the Work has been fully performed and the Performance Standards achieved in accordance with this Consent Decree, EPA and NMED will so notify Sparton in writing. However, no Certificate of Full or Partial Completion shall be interpreted as proof that Sparton has fully complied with the conditions and requirements of a Post Closure Care Permit requested by Sparton or issued by NMED.

42. If EPA and NMED receive a letter from Sparton requesting a Certificate of Full Completion and a written request from Sparton to schedule a pre-certification inspection pursuant to Paragraph 36, and EPA and NMED do not respond to Sparton's request to schedule a pre-certification inspection within ninety (90) days, Sparton may proceed to submit a certification stating that it has achieved Full Completion pursuant to Paragraph 38 and EPA and NMED shall consider the

submission as set forth in Paragraphs, 39, 40, and 41. If EPA and NMED receive from Sparton a certification stating that it has achieved Full Completion pursuant to Paragraph 38 and EPA or NMED does not respond within 180 days, Sparton may file a motion to terminate this Consent Decree. Plaintiffs shall be served with copies of any such motion and may file a response within ninety (90) days of the date of service. Plaintiffs fully reserve their rights to oppose any such motion. No motion to terminate pursuant to this Paragraph shall be granted unless Sparton demonstrates that (a) it is entitled to a Certificate of Full Completion and (b) that it has met all other requirements of Section XXXIII (Termination).

43. If Sparton maintains that the Background Contaminant Level of a contaminant present in the Groundwater at the Site is greater than the Performance Standard for Groundwater, Sparton may submit to EPA and NMED for review and approval a request that it not be required to attain the Performance Standard for Groundwater with respect to that contaminant. In any such submittal, Sparton shall demonstrate that the Background Contaminant Level for that contaminant exceeds the Performance Standard. If such submittal is approved by EPA and NMED, Sparton need not attain the Performance Standard for Groundwater with respect to that contaminant, but Sparton shall attain the Background Contaminant Level for that contaminant in the Groundwater at the Site.

XII. FORCE MAJEURE

44. "Force majeure," for purposes of this Consent Decree, is defined as any event (including fire, unusual delay in transportation, adverse weather conditions, unavoidable casualties, failure to obtain, or a delay in obtaining, a permit or authorization to proceed, and acts of God, war or

riot) arising from causes beyond the control of Sparton, any entity controlled by Sparton, or Sparton's contractors, that delays or prevents the performance of any obligation under this Consent Decree despite Sparton's best efforts to fulfill the obligation. However, failure to obtain or delay in obtaining a permit or authorization to proceed shall not in any event be a force majeure event if Sparton failed to apply for the permit or approval or failed to provide in a timely manner all information required to obtain the permit or approval. The requirement that Sparton exercise "best efforts to fulfill the obligation" includes using best efforts to anticipate any potential force majeure event and best efforts to address the effects of a potential force majeure event (a) as it is occurring and (b) following the potential force majeure event, such that the delay is minimized to the greatest extent practicable. "Force Majeure" does not include financial inability to complete the Work or a failure to attain the Performance Standards.

45. If any event occurs or has occurred that may delay the performance of any obligation under this Consent Decree, whether or not caused by a force majeure event, Sparton shall notify orally the designated representatives of EPA and NMED or, in the event that those designated representatives are unavailable, the offices of the Director of the Compliance Assurance and Enforcement Division, EPA Region 6, and of the Director of the Water and Waste Management Division, NMED (or such other persons as EPA or NMED designates in a written notice to Sparton), within seventy-two (72) hours of when Sparton first knew that the event might cause a delay. Within seven (7) days thereafter, Sparton shall provide in writing to EPA and NMED an explanation and description of the reasons for the delay; the anticipated duration of the delay; all actions taken or to be

taken to prevent or minimize the delay; a schedule for implementation of any measures to be taken to prevent or mitigate the delay or the effect of the delay; Sparton's rationale for attributing such delay to a force majeure event if it intends to assert such a claim; and a statement as to whether, in the opinion of Sparton, such event may cause or contribute to an endangerment to public health, welfare or the environment. Sparton shall include with any notice all documentation that is within the custody or control of Sparton, any entity controlled by Sparton, or any contractor of Sparton supporting Sparton's claim that the delay was attributable to a force majeure. Failure to comply with the above requirements shall preclude Sparton from asserting any claim of force majeure for that event for the period of time of such failure to comply, and for any additional delay caused by such failure. Sparton shall be deemed to know of any circumstance of which Sparton, any entity controlled by Sparton, or Sparton's contractors knew or should have known.

46. If EPA and NMED agree that the delay or anticipated delay is attributable to a force majeure event, the time for performance of the obligations under this Consent Decree that are affected by the force majeure event will be extended by at least such time as is necessary to complete those obligations. An extension of the time for performance of the obligations affected by the force majeure event shall not, of itself, extend the time for performance of any other obligation. If EPA or NMED does not agree that the delay or anticipated delay has been or will be caused by a force majeure event, then Sparton will be notified in writing of this decision and the reasons for the decision. If EPA and NMED agree that the delay is attributable to a force majeure event, they will notify Sparton in writing of

the length of the extension, if any, for performance of the obligations affected by the force majeure event.

47. If Sparton elects to invoke the dispute resolution procedure set forth in Section XIII (Dispute Resolution) in connection with EPA's and/or NMED's decision that a delay or anticipated delay is not attributable to a force majeure event, it shall do so no later than fifteen (15) days after receipt of EPA and NMED's notice pursuant to Paragraph 46. In any such proceeding, Sparton shall have the burden of demonstrating by a preponderance of the evidence that the delay or anticipated delay has been or will be caused by a force majeure event, that the duration of the delay or the extension sought was or will be warranted under the circumstances, that best efforts were exercised to avoid and mitigate the effects of the delay, and that Sparton complied with the requirements of Paragraphs 44 and 45, above. If Sparton carries this burden, the delay at issue shall be deemed not to be a violation by Sparton of this Consent Decree.

XIII. DISPUTE RESOLUTION

48. Unless otherwise expressly provided for in this Consent Decree, the dispute resolution procedures of this Section shall be the exclusive mechanism to resolve disputes arising under or with respect to this Consent Decree. However, the procedures set forth in this Section shall not apply to actions by Plaintiffs to enforce obligations of Sparton that have not been disputed in accordance with this Section. Within thirty (30) days after a decision is issued by EPA and NMED (or, if EPA and NMED issue decisions at different times, within thirty (30) days after a decision by whichever agency

issues its decision last) under Section X (Review of Submittals), that decision shall be final and not subject to dispute resolution unless Sparton has invoked dispute resolution pursuant to this Section.

49. Any dispute which arises under or with respect to this Consent Decree shall in the first instance be the subject of good-faith informal negotiations between the parties to the dispute. In the case of a dispute regarding a decision by EPA or NMED regarding an item submitted for review and approval under Section X (Review of Submittals), the parties to the dispute shall be Sparton and the agency that issued the disputed decision. The goal of the informal negotiations shall be to resolve the dispute without further proceedings. The period for informal negotiations shall not exceed thirty (30) days from the time the dispute arises, unless (a) EPA or NMED (whichever is party to the dispute), in their sole discretion, determines that a shorter period shall be allowed due to an immediate threat to the environment or (b) all parties to the dispute agree in writing to an extension. The dispute shall be considered to have arisen when Sparton sends Plaintiffs a written Notice of Dispute, which in the case of items submitted for review and approval need not be provided until after both EPA and NMED have issued written decisions regarding the submittal. The Notice of Dispute shall contain a concise statement of the issue or issues in dispute. If informal negotiations result in an agreement between the parties to the dispute, then those parties shall state the agreement in a single document in writing. If informal negotiations do not result in an agreement between the parties to the dispute, then the agency that issued the disputed decision shall provide to Sparton a written statement of its position on the disputed issues or issues.

50. The provisions of this Paragraph apply only to disputes related to (a) whether it is possible to predict future conditions with sufficient reliability to evaluate the benefit to aquifer restoration by utilizing additional remedial systems and (b) whether additional remedial systems should be utilized to achieve the Performance Standard for Groundwater. For purposes of this Paragraph, the term "additional remedial systems" shall mean systems for remediating Groundwater contamination other than the systems installed pursuant to the "Work Plan for the Installation of a Source Containment System" (Attachment F to this Decree) and the "Work Plan for the Off-Site Containment System" (Attachment C to this Decree). The term "additional remedial systems" shall not include modifications to the operation of systems for remediating Groundwater contamination to be installed pursuant to the Attached Workplans and/or which have already been installed at the time the dispute is initiated. Provided that sufficient funds to pay for the mediator are available to EPA and NMED, EPA, NMED, and Sparton agree that if informal negotiations under Paragraph 49 fail to resolve a dispute to which this Paragraph applies, then EPA, NMED, and Sparton will attempt to resolve the dispute through non-binding mediation using a neutral, third-party mediator. In any mediation under this Paragraph, the procedures for selecting the mediator and the ground rules of the mediation shall be those specified in Attachment I to this Consent Decree. The time for mediation under this Paragraph shall not continue for more than ninety (90) days after conclusion of informal negotiations unless extended for a specific period by written agreement of all parties to the mediation. Half the cost of the mediator will be paid by Sparton and half will be paid by EPA and/or NMED. However, no provision of this Consent Decree shall be interpreted or construed as a commitment or requirement that the United States or NMED

obligate or pay funds in contravention of the Anti-Deficiency Act, 31 U.S.C. § 1341, et seq., or any other applicable provision of law. All communications, including, but not limited to, documents and oral statements, by a Party during the mediation shall be treated as confidential unless the Party making the communication provides a written waiver of confidentiality. Statements by the mediator shall also be treated as confidential communications unless all Parties to the mediation provide a written waiver of confidentiality. Information which is otherwise discoverable shall not be treated as a confidential communication. Confidential communications shall not be released to non-Parties and shall not be admissible in any formal dispute resolution or motion to enforce under this Consent Decree. If the mediation fails to resolve the dispute and Sparton initiates formal dispute resolution pursuant to Paragraph 51 below, no Party shall attach documents which are confidential communications or documents which refer to confidential communications to its written Statement of Position pursuant to Paragraph 51 below. A Party may attach to its written Statement of Position documents submitted to the mediator which do not refer to confidential communications by other parties to the mediation; however, by attaching documents submitted to the mediator to a Statement of Position, a party thereby waives the confidentiality of the document.

51. a. If the parties to the dispute cannot resolve it by the methods described in the preceding Paragraphs of this Section, then the position advanced by the agency that issued the disputed decision shall be considered binding unless, within fifteen (15) days after the issuance of a written statement of position under Paragraph 49 (and, if applicable, after the conclusion of mediation under Paragraph 50) by the agency that issued the disputed decision,

Sparton invokes the formal dispute resolution procedures of this Section by serving on the agency that issued the disputed decision a written Statement of Position on the matter in dispute. In its Statement of Position, Sparton shall describe the subject of the dispute, state its position on the dispute, and set forth in detail the basis for that position. The Statement of Position shall include the factual data, analysis, and opinions supporting Sparton's position and the supporting documentation relied upon by Sparton. The Statement of Position shall specify Sparton's position as to whether formal dispute resolution should proceed under Paragraph 52 or Paragraph 53.

b. Within fifteen (15) days after receipt of Sparton's Statement of Position, the agency that issued the disputed decision will serve on Sparton its Statement of Position. In its Statement of Position, that agency shall describe the subject of the dispute, state its position on the dispute, and set forth in detail the basis for that position. The Statement of Position shall include the factual data, analysis, and opinions supporting the agency's position and the supporting documentation relied upon by it. The Statement of Position shall specify the agency's position as to whether formal dispute resolution should proceed under Paragraph 52 or Paragraph 53.

c. Within seven (7) days after receipt of the Statement of Position by the agency that issued the disputed decision, Sparton may submit a Reply to that agency's Statement of Position.

d. If there is disagreement between the parties to the dispute as to whether dispute resolution should proceed under Paragraph 52 or 53, the parties to the dispute shall follow the procedures set forth in the Paragraph determined by the agency that issued the disputed decision to be applicable. However, after a decision is issued under Paragraph 52(c) or 53(a), if Sparton appeals the dispute to the Court for resolution under Paragraph 52(d) or 53(a), the Court shall determine which Paragraph is applicable in accordance with the standards of applicability set forth in Paragraphs 52 and 53.

52. The formal dispute resolution procedures set forth in this Paragraph shall apply to disputes pertaining to matters that are accorded review on the administrative record under applicable principles of administrative law. The provisions of this Paragraph shall apply, without limitation, to (1) disputes regarding items requiring approval by EPA and NMED under this Consent Decree including, but not limited to, disputes regarding the adequacy or appropriateness of work plans and procedures to implement Work, (2) disputes regarding the selection, evaluation, implementation, performance, or adequacy of any Work, and (3) disputes to which Paragraph 50 above applies.

a. An administrative record of the dispute shall be maintained by the agency that issued the disputed decision and shall contain all Statements of Position submitted pursuant to Paragraph 51, including supporting documentation, submitted pursuant to this Section. Where appropriate, the agency that issued the disputed decision may allow submittal of supplemental statements of position by the parties to the dispute.

b. In the case of disputes related to issues within the scope of Paragraph 50, if Sparton requests a meeting with the Director of the Compliance Assurance and Enforcement Division for EPA Region 6, or the Secretary of the NMED (whichever agency issued the disputed decision) it shall be entitled to a meeting of at least one hour in length to take place prior to any decision under Subparagraph (c) below. During a meeting pursuant to this Subparagraph, Sparton may present the case in favor of its position on the dispute.

c. In a case where the disputed decision was issued by EPA, the Director of the Compliance Assurance and Enforcement Division for EPA Region 6 will issue a final administrative decision resolving the dispute based on the administrative record described in Subparagraph (a) above. In a case where the disputed decision was issued by NMED, the Secretary of the NMED will issue a final administrative decision resolving the dispute based on the administrative record described in Subparagraph (a) above. This decision shall be binding upon Sparton, subject only to the right to seek judicial review pursuant to Paragraph 52(d) and (e).

d. Any administrative decision pursuant to Subparagraph (c) above shall be reviewable by this Court, provided that a motion for judicial review of the decision is filed by Sparton with the Court and served on all Parties within ten (10) days of receipt of the decision. The motion shall include a description of the matter in dispute, the efforts made to resolve it, the relief requested, and the schedule, if any, within which the dispute must be resolved to ensure orderly implementation of this Consent Decree. Both EPA and NMED may file a response to Sparton's motion.

e. In proceedings on any dispute governed by this Paragraph, Sparton shall have the burden of demonstrating that the decision under Subparagraph (c) above is arbitrary and capricious or otherwise not in accordance with law. Judicial review of EPA's decision shall be on the administrative record compiled pursuant to Subparagraph (a) above.

53. Formal dispute resolution for disputes that do not pertain to the selection, evaluation, implementation, or adequacy of any corrective action or that are not otherwise accorded review on the administrative record under applicable principles of administrative law, shall be governed by this Paragraph. The provisions of this Paragraph shall apply, without limitation, to disputes arising under Section XII (Force Majeure) regarding whether any failure by Sparton to meet a deadline was caused by a force majeure event.

a. In a case where the disputed decision was issued by EPA, the Director of the Compliance Assurance and Enforcement Division, EPA Region 6 will issue a final decision resolving the dispute. In a case where the disputed decision was issued by NMED, the Secretary of the NMED will issue a final decision resolving the dispute. Such decision shall be binding on Sparton unless, within ten (10) days of receipt of the decision, Sparton files with the Court and serves on the other Parties a motion for judicial review of the decision setting forth the matter in dispute, the efforts made to resolve it, the relief requested, and the schedule, if any, within which the dispute must be resolved to ensure orderly implementation of the Consent Decree. Both EPA and NMED may file a response to Sparton's motion.

b. Judicial review of any dispute governed by this Paragraph shall be governed by applicable principles of law.

54. In the event of any re-organization of EPA which affects the Compliance Assurance and Enforcement Division for EPA Region 6 and/or any substantial change in the responsibilities of the Director of the Compliance Assurance and Enforcement Division for EPA Region 6, EPA may notify Sparton that the authorities and responsibilities of the Director of the Compliance Assurance and Enforcement Division for EPA Region 6 will be transferred to an official specified in the notice.

55. Invocation of the dispute resolution procedures under this Section shall not extend, postpone or affect in any way any obligation of Sparton under this Consent Decree, not directly in dispute, unless EPA and NMED or the Court agrees otherwise. Except as set forth in Paragraph 60, stipulated penalties with respect to the disputed matter shall continue to accrue but payment shall be stayed pending resolution of the dispute according to the procedures set forth in Section XIV (Stipulated Penalties). Notwithstanding the stay of payment, stipulated penalties shall accrue from the first day of noncompliance with any applicable provision of this Consent Decree. In the event that Sparton does not prevail on the disputed issue, it shall be liable for any stipulated penalties demanded as provided in Section XIV (Stipulated Penalties).

XIV. STIPULATED PENALTIES

56. If EPA or NMED demand stipulated penalties pursuant to Paragraph 61, Sparton shall be liable for stipulated penalties in the amounts set forth in Paragraphs 57 or 58 (as applicable) for failure to comply with the requirements of this Consent Decree, unless excused under Section XII (Force Majeure). "Compliance" by Sparton shall include, but not be limited to, completion of the Work required by this Consent Decree (including Work required by an Attached Work Plan and Work required by an item approved under Section X (Review of Submittals)). Completion of the Work shall mean that all required Work is completed by the deadline specified in the applicable schedules and in accordance with all applicable requirements of this Consent Decree including Paragraph 13.

57. The stipulated penalty amounts set forth in this Paragraph shall apply to the following categories of violations of this Consent Decree:

a. Failure to timely submit a report or workplan required to be submitted for review and approval under Section X (Review of Submittals);

b. Failure to timely complete construction;

c. Failure to timely provide notice to the public as required in the Public Involvement Plan (Attachment B);

d. Failure to timely collect and analyze samples as required in the Groundwater Monitoring Program Plan (Attachment A); and

e. Failure to timely commence operation of remedial systems.

The following stipulated penalties shall be payable per violation per day for any noncompliance with any requirements of this Consent Decree which fall within the categories specified in this Paragraph:

STIPULATED PENALTY SCHEDULE FOR SPECIFIED CATEGORIES	
Number of calendar days after deadline	**Amount of stipulated penalty**
1st through 15th day	$1,500 per day
After 15th day	$3,000 per day

58. The stipulated penalty amounts set forth in this Paragraph shall apply to all violations of this Consent Decree other than those specified in Paragraph 57:

STIPULATED PENALTY SCHEDULE FOR ALL OTHER CATEGORIES	
Number of calendar days after deadline	**Amount of stipulated penalty**
1st through 15th day	$1,000 per day
After 15th day	$2,000 per day

59. Except insofar as specifically provided in Paragraph 56, stipulated penalties shall not be assessed solely for failure to comply with the requirements of Paragraph 13.

60. Except as specifically provided in this Paragraph, all stipulated penalties shall begin to accrue on the day after performance is due or the day a violation occurs, and shall continue to accrue through the final day of the correction of the noncompliance or completion of the activity.

a. If Sparton fails to timely perform Work required by a decision under Section X (Review of Submittals); Sparton has invoked dispute resolution pursuant to Section XIII (Dispute Resolution) with regard to the portion of the decision which contains the requirement to perform the Work which Sparton failed to timely perform; and the matter does not fall within the scope of Subparagraph (b) of this Paragraph, the accrual of stipulated penalties shall be tolled during the following periods:

(i) If informal negotiations pursuant to Paragraph 49 fail to resolve a dispute, the period from thirty (30) days after the end of informal negotiations through the time the agency that issued the disputed decision issues a written statement of its position on the disputed issue or issues pursuant to Paragraph 49; and

(ii) The period from thirty (30) days after the final Statement of Position is submitted pursuant to Paragraph 51 through the date that the agency that issued the disputed decision makes a final administrative decision pursuant to Paragraph 52(c) or 53(a). However, if Sparton requests a meeting under Paragraph 52(b), then the accrual of stipulated penalties shall be tolled during the period from thirty days after the requested meeting occurs through the date that the agency that issued the disputed decision makes a final administrative decision pursuant to Paragraph 52(c) or 53(a); and

(iii) The period, if any, from the date specified in Paragraph 51(b) for the submission of a Statement of Position by the agency that issued the disputed decision through the date that the agency completes the Statement of Position.

b. If Sparton fails to timely perform the Work required by a decision under Section X (Review of Submittals); Sparton has invoked dispute resolution pursuant to Section XIII (Dispute Resolution) with regard to the portion of the decision which contains the requirement to perform the Work which Sparton failed to timely perform; and the Work at issue falls within the scope of Paragraph 50, the accrual of stipulated penalties shall be tolled for the following periods:

(i) If informal negotiations pursuant to Paragraph 49 fail to resolve a dispute, the period from five (5) days after the end of informal negotiations through the time the agency that issued the disputed decision issues a written statement of its position on the disputed issue or issues;

(ii) The period during which mediation is conducted under Paragraph 50;

(iii) The period from five (5) days after the final Statement of Position is submitted pursuant to Paragraph 51 through the date that the agency that issued the disputed decision makes a final administrative decision pursuant to Paragraph 52(c) or 53(a);

(iv) The period, if any, from the date specified in Paragraph 51(b) for the submission of a Statement of Position by the agency that issued the disputed decision through the date that the agency completes the Statement of Position; and

(v) the period from five (5) days after the date the final brief is submitted in any judicial appeal pursuant to Paragraph 51(d) or 53(a) through the date that the District Court issues its decision on the matter.

In the case of any failure to comply with the requirements of this Consent Decree which falls within the scope of this Subparagraph (b), stipulated penalties shall accrue at the rate specified in Paragraph 58 during the period from the date a written Notice of Dispute pursuant to Paragraph 49 until the District Court issues a decision as provided in Paragraph 51(d) or 53(a). Nothing herein shall prevent the simultaneous accrual of separate penalties for separate violations of this Consent Decree.

61. All penalties owed under this Section shall be due and payable within thirty (30) days of Sparton's receipt from EPA or NMED of a demand for payment of the penalties, unless Sparton invokes the dispute resolution procedures under Section XIII (Dispute Resolution).

62. Payment of stipulated penalties shall be tendered to the Office of the United States Attorney for the District of New Mexico. Payment shall be made by money order, cashier's check or certified check payable to the "Treasurer, United States of America." The payment shall be sent to:

Chief, Civil Division
United States Attorney's Office
District of New Mexico
200 3rd Street, NW, Suite 900
Albuquerque, New Mexico 87102

The stipulated penalty payment shall be accompanied by a cover letter which specifically describes the violation(s) of this Consent Decree for which the payment is being made, and the words "Civil Action CIV 97 0206" and "D.J. No. 90-7-1-875" shall be clearly typed on the money order or check. The United States Attorney's Office for the District of New Mexico shall then divide the stipulated penalty payment (and any interest paid pursuant to Paragraph 65(a)) in half and transfer one half of the payment by money order, cashier's check, or certified check made payable to the New Mexico Environment Department and sent to the following address:

New Mexico Environment Department
Office of General Counsel
Post Office Box 26110
1190 St. Francis Drive
Harold Runnels Building
Santa Fe, New Mexico 87502

The money order, cashiers check or certified check shall be accompanied by a copy of the cover letter from Sparton. The NMED shall credit monies transferred to it as provided by law.

63. The payment of stipulated penalties shall not alter in any way Sparton's obligation to complete the performance of the Work required under this Consent Decree.

64. Penalties shall continue to accrue as provided in Paragraphs 57 and 58 during the pendency of any dispute resolution proceeding under Section XIII (Dispute Resolution) but need not be paid until the following:

a. If the dispute is resolved by agreement or by a decision by the Director of the Compliance Assurance and Enforcement Division of EPA Region 6 that is not appealed to this Court, accrued penalties determined to be owing shall be paid within fifteen (15) days of the agreement or receipt of a decision by the Director of the Compliance Assurance and Enforcement Division of EPA Region 6;

b. If the dispute is appealed to the Court and the United States prevails in whole or in part, Sparton shall pay all accrued penalties determined by the Court to be owed within thirty (30) days of receipt of the Court's decision or order, except as provided in Subparagraph c;

c. If the District Court's decision is appealed by any Party, Sparton shall pay all accrued penalties determined by the District Court to be owing to the United States and NMED into an interest-bearing escrow account within thirty (30) days of receipt of the Court's decision or order. Penalties shall be paid into this account as they continue to accrue, at least every thirty (30) days. Within fifteen (15) days of receipt of the final appellate court decision, the escrow agent shall pay the balance of the account to the United States Attorney's Office for the District of New Mexico or to Sparton to the extent that they prevail.

65. a. If Sparton fails to pay stipulated penalties when due, the United States and/or the NMED may institute proceedings to collect the penalties, as well as interest. If such a proceeding is instituted, Sparton shall be liable to reimburse the United States and/or the NMED for its costs and attorney fees connected with the proceeding. Sparton shall pay interest on the unpaid balance, which shall begin to accrue on the date of demand made pursuant to Paragraph 53 at a rate equal to the rate established pursuant to 28 U.S.C. § 1961 plus ten (10) percent.

b. In addition to assessing stipulated penalties as provided in this Section, Plaintiffs shall also have all rights provided by federal, state, or local law to seek any and all other remedies or sanctions available to Plaintiffs for any violation by Sparton of this Consent Decree.

XV. CIVIL PENALTIES

66. Within five (5) days of the Effective Date of this Consent Decree, Sparton shall pay a civil penalty in the amount of $475,000.00 (four hundred seventy five thousand dollars). Payment of the civil penalty shall be made as provided in Section XVIII (Payments).

67. Sparton shall not seek to make any part of the civil penalty tax deductible for federal tax purposes.

68. If Sparton fails to pay the civil penalty as required by Paragraph 66, the United States and/or NMED may institute proceedings to collect the civil penalty. If such a proceeding is instituted, Sparton shall be liable to reimburse the United States and/or NMED for its costs and attorney fees connected with the proceeding. In addition, if Sparton fails to pay the full amount of the civil penalty as required by Paragraph 66, then interest on the civil penalty shall accrue from the date of entry of this Consent Decree on any unpaid portion of the penalty at the rate established pursuant to 28 U.S.C. § 1961 and shall continue to accrue until full payment is made. Interest shall be compounded annually. Sparton shall also be liable for stipulated penalties pursuant to Section XIV (Stipulated Penalties) for any failure to comply with the requirements of Paragraph 66.

XVI. STATE AND MUNICIPAL PARTIES' COSTS

69. Within five (5) days of the Effective Date of this Consent Decree, Sparton shall pay $200,000.00 (two hundred thousand dollars) in satisfaction of claims by the State and Municipal Parties for costs of litigation under RCRA Section 7002, 42 U.S.C. 6972, and claims by the Municipal

Parties for costs of litigation under federal and state common law. Payment shall be made as provided in Section XVIII (Payments).

70. If Sparton fails to make payment as required by Paragraph 69, any Plaintiff may institute proceedings to collect the payment, all accrued interest, and stipulated penalties. If such a proceeding is instituted, Sparton shall be liable to reimburse the Plaintiff(s) bringing the action for its costs and attorney fees connected with the proceeding. If Sparton fails to make payment as required by Paragraph 69 above, then interest shall accrue from the date payment was due on any unpaid amount at the rate established pursuant to 28 U.S.C. § 1961 and shall continue to accrue until full payment is made. Interest shall be compounded annually. Sparton shall also be liable for stipulated penalties pursuant to Section XIV (Stipulated Penalties) for any failure to comply with the requirements of Paragraph 69.

XVII. STATE CLAIM FOR NATURAL RESOURCE DAMAGES

71. Within five (5) days of the Effective Date of this Consent Decree, Sparton shall pay $1,000,000.00 (one million dollars) in satisfaction of the ONRT's claim under CERCLA Section 107(a)(4)(C), 42 U.S.C. § 9607(a)(4)(C), for damages for injury to, destruction of, or loss of natural resources resulting from the release or threatened release of hazardous substances from the Facility, and for the reasonable costs of assessing such damages. Payment shall be made as provided in Section XVIII (Payments).

72. If Sparton fails to make the payment as required by Paragraph 71, the United States and/or ONRT may institute proceedings to collect the principal, all accrued interest, and stipulated

penalties. If such a proceeding is instituted, Sparton shall be liable to reimburse the United States and/or ONRT for their costs and attorney fees connected with the proceeding. If Sparton fails to make payment as specified in Paragraph 71, interest shall accrue on any unpaid amount at the rate established pursuant to 28 U.S.C. § 1961 and shall continue to accrue until full payment is made. Interest shall be compounded annually. Sparton shall also be liable for stipulated penalties pursuant to Section XIV (Stipulated Penalties) for any failure to comply with the requirements of Paragraph 71.

73. In accordance with CERCLA Section 107(f)(1), 42 U.S.C. § 9607(f)(1), ONRT will use the damage award to restore, replace, or acquire the equivalent of the injured Groundwater resources.

XVIII. PAYMENTS

74. All payments pursuant to Paragraphs 66 (Civil Penalty), 69 (State and Municipal Parties Costs), and 71 (State Natural Resource Damages Claim) shall be made as specified in this Section:

a. On or before the date established for payment, Sparton shall deposit in the Registry of the Court ("the Registry") a total of $1,675,000.00 consisting of (i) the $475,000.00 Civil Penalty pursuant to Paragraph 66; (ii) the $200,000.00 payment for State and Municipal Parties' Costs pursuant to Paragraph 69; and (iii) the $1,000,000.00 payment for the New Mexico Natural Resources Damages claim pursuant to Paragraph 71. The Clerk of the Court shall manage and distribute these monies in accordance with the collateralization provisions of 31 C.F.R. § 202 (formerly Treasury Circular 176). The Clerk of the Court shall be authorized to charge and deduct a Registry Fee as provided in Local Rule 67.1(b). This agreement shall be approved by the Court and implemented by its Order. Sparton shall notify Plaintiffs in writing at the time it deposits funds in the Registry. Should Sparton fail to timely deposit all funds into the Registry, any Plaintiff may withdraw its consent to this Consent Decree.

b. All funds paid into the Registry by Sparton shall remain in the Registry until payment is required by Subparagraph (c), unless a final judicial determination is made that the Consent Decree will not be approved and entered in the form signed by the Parties. In this event, all sums in the Registry plus any accrued interest and less any applicable fees shall be returned to Sparton.

c. If no appeal is filed, within sixty-five (65) days after entry of this Consent Decree in the form signed by the Parties or, if an appeal to entry of the Consent Decree is filed, within five (5) days after a final decision on all appeals affirming the District Court's entry of the Consent Decree in the form signed by the Parties, all sums in the Registry plus any accrued interest and less any applicable fees, shall be paid to the United States according to instructions which will be provided prior to the time for payment by the Financial Litigation Unit of the United States Attorney's Office for the District of New Mexico.

d. Upon receipt of payment from the Registry pursuant to Subparagraph (c) above, the Financial Litigation Unit of the United States Attorney's Office for the District of New Mexico ("FLU") will transfer the following sums:

(i) $181,500.00 plus 10.83 percent of any interest paid to the United States in the Escrow Account to the NMED. Transfer of monies to the NMED shall be made by money order, cashiers check, or certified check made payable to the "New Mexico Environment Department" and sent to the following address:

New Mexico Environment Department
Office of General Counsel–Attn: Ana Marie Ortiz
Post Office Box 26110
1190 St. Francis Drive
Harold Runnels Building
Santa Fe, New Mexico 87502

The money order, cashiers check or certified check shall be accompanied by a letter stating that payment is pursuant to Paragraph 66 (Civil Penalties) of the Consent Decree in Albuquerque, et al v. Sparton Technology, Inc., CV 97 0206 (D.N.M.). NMED shall credit monies transferred to it pursuant to this Paragraph to the Hazardous Waste Emergency Fund as provided in NMSA 1978, § 74-4-10.J.

(ii) $22,000.00 plus 1.31 percent of any interest paid to the United States to the New Mexico Attorney General. Transfer of monies to the Office of the Attorney General shall be made by money order, cashiers check, or certified check made payable to the "New Mexico Office of the Attorney General" and sent by certified mail to the following address:

New Mexico Office of the Attorney General
Administrative Services Division
Bataan Memorial Building
407 Galisteo Street
Santa Fe, New Mexico 87501

The check or money order shall be accompanied by a letter stating that payment is pursuant to Paragraph 69 (Costs) of the Consent Decree in Albuquerque, et al. v. Sparton Technology, Inc., No. CV 97-0206 (D.N.M.). The Office of the Attorney General shall use this award of costs for investigating, developing, and litigating environmental matters at the discretion of the Attorney General.

(iii) $56,000.00 plus 3.34 percent of any interest paid to the United States to NMED, Waste and Water Management Division in satisfaction of NMED's claims for costs for oversight under the WQA and claims asserted thereunder. Transfer of monies to the NMED shall be made by money order, cashiers check, or certified check made payable to the "New Mexico Environment Department" and sent to the following address:

New Mexico Environment Department
Office of General Counsel–Attn: Ana Marie Ortiz
Post Office Box 26110
1190 St. Francis Drive
Harold Runnels Building
Santa Fe, New Mexico 87502

The money order, cashiers check or certified check shall be accompanied by a letter stating that payment is pursuant to Paragraph 69 (State and Municipal Parties' Costs) of the Consent Decree in Albuquerque, et al v. Sparton Technology, Inc., CV 97 0206 (D.N.M.). NMED shall credit monies transferred to it pursuant to this Paragraph as provided by law; and

(iv) $122,000.00 plus 7.28 percent of any accrued interest interest paid to the United States to the City of Albuquerque. The FLU shall transfer these funds by EFT to the following account:

Bank Name: Norwest Bank New Mexico
ABA#: 107002192
Acct Name: City of Albuquerque Common Fund
Acct#: 1061038394
Contact: Attn: Larry Geter
Ref: Payment for litigation costs recovered settlement of Albuquerque v. Sparton Technology, Inc., No. CV 96 0206 (D.N.M.).

(v) $1,000,000.00 plus 59.70 percent of any interest paid to the United States to the ONRT. Transfer of monies to ONRT shall be made by money order, cashiers check, or certified check made payable to the "Natural Resources Trustee Fund" and sent by certified mail to the following address:

New Mexico Office of the Natural Resources Trustee
1190 St. Francis Drive
Harold Runnels Building
Santa Fe, New Mexico 87502

The check or money order shall be accompanied by a letter stating that payment is pursuant to Paragraph 66 (State Claim for Natural Resource Damages) of the Consent Decree in Albuquerque, et al v. Sparton Technology, Inc., No. CV 97 0206 (D.N.M.)

XIX. NOTICE OF PAYMENTS

75. At the time that Sparton makes payment pursuant to Paragraphs 66, 69, and 71, it shall send a letter to the persons listed below which states the date payment was made and the amount of the payment made pursuant to each Paragraph. The letter should also refer to "Albuquerque v. Sparton

Technology, Inc., No. CV 97 0206 (D.N.M.)" and "D.J. No. 90-7-1-875." The letter shall be mailed to the following:

Chief
Environmental Enforcement Section
Environment and Natural Resources Division
U.S. Department of Justice
P.O. Box 7611
Washington, D.C. 20044-7611
Re: DJ # 90-7-1-875

Director
Compliance Assurance and Enforcement Division
United States Environmental Protection Agency
Region 6
1445 Ross Avenue, Ste 1200
Dallas, Texas 75202-2733

Albuquerque City Attorney
Legal Department
P.O. Box 2248
Albuquerque, New Mexico 87103

County Attorney
County of Bernallilo
One Civic Plaza, N.W., Tenth Floor
Albuquerque, New Mexico 87103

New Mexico Environment Department
Office of General Counsel
P.O. Box 26110
1190 St. Francis Drive
Santa Fe, New Mexico 87502

Director, Environmental Enforcement Division
New Mexico Attorney General's Office
P.O. Drawer 1508
Santa Fe, New Mexico 87504

XX. COVENANT NOT TO SUE BY PLAINTIFFS

76. In consideration of the actions that will be performed under the terms of this Consent Decree by Sparton and the payments that Sparton will make pursuant to Paragraphs 66 (Civil Penalty) and 69 (State and Municipal Parties' Claims for Costs) and subject to Paragraph 78 of this Section, the Plaintiffs covenant not to sue or to take administrative action against Sparton:

(a) for civil claims specifically alleged in Plaintiffs' First Amended Complaints;

(b) for civil claims under RCRA Section 3008(h), 42 U.S.C. § 6928(h), for corrective action or other response measures related to the contamination identified as the basis for the February 10, 1998 *Final Administrative Order issued under RCRA Section 3008(H) of the Resource Conservation and Recovery Act, as amended 42 U.S.C. § 6928(H)*, U.S. EPA Docket No. RCRA-VI-001(h)-96-H;

(c) for compliance orders or civil judicial actions under RCRA Section 3008(a), 42 U.S.C. § 6928(a), for corrective action or other response measures related to the contamination identified as the basis for the February 10, 1998 *Final Administrative Order issued under RCRA Section 3008(H) of the Resource Conservation and Recovery Act, as amended 42 U.S.C. § 6928(H)*, U.S. EPA Docket No. RCRA-VI-001(h)-96-H; and

(d) for claims under CERCLA for response costs, as defined by CERCLA Section 101(23)-(25), 42 U.S.C. § 9601(23)-(25), incurred by the United States in connection with the Site through the Effective Date of this Consent Decree ("Past Response Costs").

This covenant not to sue is conditioned upon the satisfactory performance by Sparton of its obligations under this Consent Decree. If Sparton fails to satisfactorily perform its obligations under this Consent Decree, any Plaintiff may move the Court for a determination that the covenant not to sue is void. If the Court determines that the covenant not to sue is void because Sparton has failed to satisfactorily perform its obligations under this Consent Decree, Plaintiffs shall not assert any of the following claims: (a) claims under RCRA Section 3008(g), 42 U.S.C. § 6928(g), for civil penalties for failure prior to the

Effective Date of this Consent Decree to comply with the February 10, 1998 *Final Administrative Order issued under RCRA Section 3008(H) of the Resource Conservation and Recovery Act, as amended 42 U.S.C. § 6928(H)*, U.S. EPA Docket No. RCRA-VI-001(h)-96-H; and (b) claims for costs of litigation incurred in connection with this case through the Effective Date of this Consent Decree under RCRA Section 7002(e), 42 U.S.C. § 6972(e). Nothing in this covenant not to sue precludes the United States from asserting in the Missouri proceeding (Sparton Technology, Inc. v. Allied Signal, Inc., et al., Case No. 98-1005-CV-W-5 (W.D. Mo.), that any recovery by Sparton in that case should be offset or reduced by the Past Response Costs incurred by the United States. The Parties stipulate that the proper procedural mechanism for the United States to pursue such an offset or reduction is to raise it as a defense to Sparton's affirmative claims in Sparton Technology, Inc. v. Allied Signal, Inc., et al., Case No. 98-1005-CV-W-5 (W.D. Mo.). Although Sparton agrees that it will not object to any defense of offset or reduction asserted by the United States in the Missouri proceeding on the grounds that the United States should have raised such offset or reduction in some other manner, such as a counterclaim, Sparton nevertheless reserves its right to raise any substantive challenges that it may have under existing law to a defense of offset or reduction. The United States will bear the ordinary burdens of proof and persuasion to establish such a defense of offset or reduction, as provided under existing law. This covenant not to sue shall take effect upon the receipt by Plaintiffs of the full payments required by Paragraphs 66 (Civil Penalty) and 69 (State and Municipal Parties' Claims for Costs). This covenant not to sue extends only to Sparton and does not extend to any other person.

77. In addition, in consideration of the payment that Sparton will make pursuant to Section XVII (State Claim for Natural Resource Damages) and subject to Paragraph 78 of this Section, the ONRT covenants not to sue or take administrative action against Sparton pursuant to CERCLA Section 107(a)(4)(C), 42 U.S.C. § 9607(a)(4)(C), to recover damages for injury to, destruction of, or loss of natural resources, including the costs of assessing such damages, resulting from the release of hazardous substances from the Facility. This covenant not to sue shall take effect upon the receipt by ONRT of the full payment required by Section XVII (State Claim for Natural Resource Damages). This covenant not to sue extends only to Sparton and does not extend to any other person.

78. Subject to the covenants not to sue in Paragraphs 76 and 77, Plaintiffs retain all authority and reserve all rights to take any and all response actions authorized by law to protect human health and the environment. Except as otherwise provided in Paragraphs 76 and 77, the entry of this Consent Decree and Sparton's consent to comply shall not limit or constitute a waiver or settlement of any rights or remedies, or otherwise preclude the rights or remedies of the Plaintiffs, and this Consent Decree is without prejudice to Plaintiffs' rights and remedies including, but not limited to, the following:

a. claims based on a failure by Sparton to meet a requirement of this Consent Decree;

b. liability to the United States for damages for injury to, destruction of, or loss of natural resources;

c. claims under CERCLA for response costs, as defined by CERCLA Section 101(23)-(25), 42 U.S.C. § 9601(23)-(25), incurred by the United States in connection with the Site after the Effective Date of this Consent Decree ("Future Response Costs");

d. criminal liability;

e. liability for violations of federal or state law, that occur during or after implementation of the Work;

f. failure to obtain a post-closure care permit pursuant to 20 NMAC 4.1 and 4.2 and failure to comply with any Post Closure Care Permit requirement or conditions pursuant to 4.1 and 4.2;

g. liability to the State for damages for injury to, destruction of, or loss of natural resources, and reasonable assessment costs, if after the Effective Date of this Consent Decree: (i) conditions at the Facility previously unknown to the State are discovered and such conditions result or have resulted in the release or threatened release of a hazardous substance that causes or contributes to injury to, destruction of, or loss of natural resources that was previously unknown; or (ii) information previously unknown to the State is received that indicates there is injury to, destruction of, or loss of natural resources that was previously unknown; for purposes of this Subparagraph, conditions and information that are currently known to the State shall include all information either submitted to or in the files of the State Parties, all information in the EPA Administrative Record for the *Final Administrative Order Issued under RCRA Section 3008(H) of the Resource Conservation and Recovery Act, as amended, 42 U.S.C. § 6928(H), U.S. EPA Docket No. RCRA-VI-001(h)-96-H*, and all information that has been filed with the Court in this action or submitted in discovery in this action;

h. liability to the Municipal Parties for damages for injury to, destruction of, or loss of natural resources, property, or property rights, if after the effective date of this Consent Decree: (i) conditions at the Facility previously unknown to the Municipal Parties are discovered and such conditions result or have resulted in the release or threatened release of a hazardous substance that causes or contributes to injury to, destruction of, or loss of natural resources, property, or property rights; or (ii) information previously unknown to the Municipal Parties is received that indicates there is injury to, destruction of, or loss of natural resources, property, or property rights that was previously unknown; for purposes of this Subparagraph, conditions and information that are currently known to the Municipal Parties shall include all information either submitted to or in the files of the Municipal Parties, all information in the EPA Administrative Record for the *Final Administrative Order Issued under RCRA Section 3008(H) of the Resource Conservation and Recovery Act, as amended, 42 U.S.C. § 6928(H), U.S. EPA Docket No. RCRA-VI-001(h)-96-H*, and all information that has been filed with the Court in this action or submitted in discovery in this action.

79. Except as expressly provided in this Consent Decree, the Plaintiffs retain all authority and reserve all rights to take any and all response actions authorized by law, including, but not limited to, CERCLA Sections 104 and 106, 42 U.S.C. §§ 9604 and 9606.

80. This Consent Decree shall not be construed as a ruling or determination of any issue related to any federal, state, or local permit which Sparton is required to obtain for any reason including, but not limited to, permits required under RCRA, permits required to implement this Consent Decree, and permits required to initiate, alter, or continue operations of the Facility (including, but not limited to, construction, operation, closure, or post closure care permits required under RCRA and/or state law), and Sparton shall remain subject to all such permitting requirements. Sparton shall be responsible for obtaining any federal, state, or local permit(s) for any activity at the Facility, including, but not limited to, those necessary for performance of the Work required by this Consent Decree.

81. Nothing in this Consent Decree is intended either to create any rights in or grant any cause of action to any person not a Party to this Consent Decree, or to release or waive any claim, cause of action, demand, or defense in law or equity that any Plaintiff to this Consent Decree may have against any person(s) or entity not a Party to this Consent Decree.

82. Except as provided in Paragraphs 76 and 77, the Plaintiffs hereby reserve all statutory and regulatory powers, authorities, rights, remedies, both legal and equitable, civil, criminal, or administrative, including those that may pertain to Sparton's failure to comply with any of the requirements of this Consent Decree, RCRA, or state law including, without limitation, additional

enforcement action and the assessment of penalties under RCRA Section 3008, 42 U.S.C. § 6928, the HWA, and the WQA against Sparton, its officers and directors.

XXI. COVENANTS BY SPARTON; EFFECT OF SETTLEMENT

83. Sparton hereby covenants not to sue and agrees not to assert any claims or causes of action against Plaintiffs with respect to the performance of the Work or with respect to this Consent Decree, including any claims arising out of actions taken at the Site by Sparton.

84. In any subsequent administrative or judicial proceeding initiated by any Plaintiff for injunctive relief, recovery of response costs, or other appropriate relief relating to the Site, Sparton shall not assert, and may not maintain, any defense or claim based upon the principles of waiver, res judicata, collateral estoppel, issue preclusion, claim-splitting, or other defenses based upon any contention that the claims raised by a Plaintiff should have been brought in the instant case; provided, however, that nothing in this Paragraph affects the enforceability of the covenant not to sue set forth in Section XX (Covenant Not to Sue by Plaintiffs).

85. Sparton hereby releases the United States of America and Samuel L. Coleman, Director, Compliance Assurance and Enforcement Division, United States Environmental Protection Agency, Region 6 for all claims asserted in the Second Amended Complaint in Sparton Technology, Inc. v. United States Environmental Protection Agency et al., No. CV 97-981 (D.N.M.), and any and all other claims related to (a) the October 1, 1988 *Administrative Order On Consent* U.S. EPA Docket No. VI-004(h)-87-H; (b) the June 24, 1996 *Final Decision and Response to Comments RCRA Corrective Action for the Sparton Technology, Inc. Coors Road Facility, Albuquerque,*

NM; (c) the September 16, 1996 *Initial Administrative Order issued under RCRA Section 3008(h)*, U.S. EPA Docket No. RCRA-VI-001(h)-96-H; and (d) the February 10, 1998 *Final Administrative Order issued under RCRA Section 3008(H) of the Resource Conservation and Recovery Act, as amended 42 U.S.C. § 6928(H)*, U.S. EPA Docket No. RCRA-VI-001(h)-96-H.

86. Nothing in this Consent Decree shall be construed to limit any claims, causes of action, or any rights which Sparton may have against any person not a Party to this Consent Decree.

87. Notwithstanding any other provision in Section XXI (Covenants by Sparton; Effect of Settlement), Sparton reserves its right to pursue claims against the Department of Energy arising out of the same transactions and occurrences alleged in the First Amended Complaint filed on July 28, 1999, in Sparton Technology, Inc. v. Allied Signal, Inc., et al., Case No. 98-1005-CV-W-5 (W.D. Mo.), and in the Complaint filed on February 11, 1998, in Sparton Technology, Inc. v. United States, Case No. 98-111-C (Ct. Fed. Claims).

XXII. PRECLUSION OF CLAIMS AGAINST THE HAZARDOUS SUBSTANCE SUPERFUND

88. Sparton agrees not to make any claims pursuant to CERCLA Sections 106(b), 111, or 112, 42 U.S.C. §§ 9606(b), 9611, or 9612, or any other provision of law, directly or indirectly against the Hazardous Substance Superfund established by CERCLA or any comparable funds maintained by the State of New Mexico for costs incurred in complying with this Consent Decree. Nothing in this Consent Decree shall be deemed to constitute pre-authorization of a CERCLA claim within the meaning of CERCLA Section 111, 42 U.S.C. § 9611, or 40 C.F.R. § 700(d).

XXIII. WITHDRAWAL OF ADMINISTRATIVE ORDER

89. EPA hereby agrees to withdraw the February 10, 1998 *Final Administrative Order issued under RCRA Section 3008(H) of the Resource Conservation and Recovery Act, as amended 42 U.S.C. § 6928(H)*, U.S. EPA Docket No. RCRA-VI-001(h)-96-H ("the Final Administrative Order"). EPA shall withdraw the Final Administrative Order within sixty (60) days after payment is made to the United States pursuant to Paragraph 74(d).

XXIV. FINANCIAL ASSURANCES

90. Within thirty (30) days of the effective date of this Consent Decree, Sparton shall submit to EPA and NMED for review under Section X (Review of Submittals) an assurance of its financial ability to complete the Work required by this Consent Decree. The financial assurances submitted by Sparton shall comply with the requirements of 40 C.F.R. Part 264, Subpart H (§§ 264.140-151). Sparton's submittal shall include an itemized estimate of the cost, including capital, operation, and maintenance costs, of completing the Work required by this Consent Decree. Sparton's financial assurance shall be in one or a combination of the forms specified in 40 C.F.R. § 264.143(a)-(f). If Sparton chooses one or a combination of the instruments described in 40 C.F.R. § 264.143(a)-(e), Sparton shall submit a copy of the instrument(s) and describe the nature and extent to which the instrument(s) is available to EPA and NMED for the purpose of ensuring the completion of the requirements of this Consent Decree. If Sparton chooses the instrument described in 40 C.F.R. § 264.143(f), it shall submit audited financial reports and/or other reliable evidence of its financial assets or the assets of its corporate guarantor.

91. If alternate remedial systems or technologies for restoration of the Groundwater at the Site are proposed for implementation in the annual report prepared pursuant to Section 3.4 of the "Work Plan for the Assessment of Aquifer Restoration" (Attachment D to this Decree), Sparton shall submit to EPA and NMED for review under Section X (Review of Submittals) an updated assurance of its financial ability to complete the Work. The updated assurance shall include an itemized estimate of the cost, including capital, operation, and maintenance costs, of the proposed alternate remedial systems or technologies. The updated assurance shall be in one of the forms specified in Paragraph 90 above.

92. EPA and NMED shall review the submittals described in Paragraphs 90 and 91 pursuant to Section X (Review of Submittals) and shall notify Sparton in writing whether the submitted financial assurance is adequate to ensure financing of the Work. If EPA and/or NMED determine that the submitted financial assurances are inadequate, the notice shall state the basis for that determination and what additional financial assurance is required.

93. Within thirty (30) days of receipt of a notice that its financial assurance is not adequate and subject only to its right to dispute such determination under Section XIII (Dispute Resolution), Sparton shall submit to EPA and NMED for review under Section X (Review of Submittals) additional financial assurances as specified in the notice provided pursuant to Paragraph 92.

94. Annually, on the anniversary of EPA's and NMED's approval of the financial assurance required by this Section, Sparton shall submit an updated financial assurance that accounts for inflation and any increases in the estimated cost of the Work. The updated financial assurance shall

(a) state whether inflation has increased the estimated cost of the Work; (b) state whether the estimated cost of the Work has otherwise increased; and (c) if the estimated cost of the Work has increased, shall include additional financial assurances sufficient to cover the increased estimate of the cost in one of the forms specified in Paragraph 90. EPA and NMED will review the updated financial assurance pursuant to Section X (Review of Submittals) in accordance with the procedures set forth in this Section.

95. In the event that Sparton is or reasonably expects that it will be unable to maintain the financial assurance(s) provided pursuant to this Section, Sparton shall obtain and submit to EPA and NMED alternate financial assurance(s) in one or a combination of the forms of financial assurance listed in Paragraph 90. Sparton shall submit such alternate financial assurances within thirty (30) days of the earlier of (a) the time that Sparton determines that it is unable to maintain the original financial assurance(s) or (b) the time that Sparton receives information that gives rise to the reasonable expectation that it will be unable to maintain the original financial assurance(s).

96. Sparton's inability to demonstrate financial ability to complete the Work shall not excuse performance of any of the requirements of this Consent Decree.

XXV. INDEMNIFICATION OF PLAINTIFFS

97. Plaintiffs do not assume any liability to third parties by entering into this agreement. Sparton agrees to indemnify, save, and hold harmless Plaintiffs, their agencies, departments, officials, agents, employees, contractors, subcontractors, and representatives from any and all claims or causes of action arising from or on account of wrongful, negligent, or otherwise tortious acts or omissions of Sparton, its officers, directors, employees, contractors, subcontractors, receivers, trustees, agents, or

assignees, and any other person acting on its behalf or under its control in carrying out the Work or other activities pursuant to this Consent Decree. Further, Sparton agrees to pay Plaintiffs all costs they incur including, but not limited to, all attorney fees and other expenses of litigation and settlement arising from or on account of claims made against Plaintiffs based on wrongful, negligent, or otherwise tortious acts or omissions of Sparton, its officers, directors, employees, agents, contractors, subcontractors, and any persons acting on its behalf or under its control in carrying out the Work or other activities pursuant to this Consent Decree. None of the Plaintiffs shall be held out as a party to any contract entered into by or on behalf of Sparton in carrying out the Work or other activities pursuant to this Consent Decree. Neither Sparton nor any such contractor shall be considered an agent of any Plaintiff. If any Plaintiff(s) seeks to be indemnified by Sparton pursuant to this Section, it shall give Sparton written notice of any claim for which indemnification is sought and shall consult with Sparton prior to settling such claim. Nothing in this Paragraph shall be construed to limit Sparton's right to pursue claims against the Department of Energy, as expressly provided in Paragraph 87 of this Consent Decree.

98. Subject to Paragraph 87 of this Consent Decree, Sparton waives all claims against Plaintiffs (a) for damages or reimbursement and (b) for set-off of any payments made or to be made to Plaintiffs which arise from or on account of any contract, agreement, or arrangement between Sparton and any person for performance of the Work on or relating to the Site, including, but not limited to, claims on account of construction delays. In addition, Sparton shall indemnify and hold harmless Plaintiffs with respect to any and all claims for damages or reimbursement arising from or on account of

any contract, agreement or arrangement between Sparton and any person for performance of the Work on or relating to the Site, including, but not limited to, claims on account of construction delays.

XXVI. ACCESS TO INFORMATION; QUALITY ASSURANCE; AND RECORD RETENTION

99. Throughout all sample collection and analysis activities, Sparton shall use EPA-approved Quality Assurance, Quality Control, and chain-of-custody procedures as specified in the Attached Work Plans and other items approved pursuant to Section X (Review of Submittals). In addition, Sparton shall:

a. Require that laboratories used by Sparton for analysis of any samples collected pursuant to this Consent Decree perform such analysis according to the methods set forth in the "*Test Methods for Evaluating Solid Waste*" (SW-846, latest edition). Sparton may submit a request to use alternate methods to EPA and NMED for review under Section X (Review of Submittals). Any such request must be submitted at least forty-five (45) days prior to the date Sparton wishes to commence the sampling event and must fully describe the sampling protocol which Sparton proposes to use. Sparton shall not use such alternative methods unless approved in writing by EPA and NMED. Submittal of a request to use alterative methods shall not excuse Sparton from complying with any deadlines under this Consent Decree.

b. Require that laboratories used by Sparton implement a quality assurance/quality control ("QA/QC") program that satisfies the requirements set forth in SW-846, latest edition, and that complies with the EPA quality assurance requirements within *EPA Requirements for Quality Management Plans*, R-2, October 1998, and *EPA Requirements for Quality*

Assurance Project Plans, R-5, October 1998. Laboratories used by Sparton may be required to demonstrate their QA/QC program upon request by EPA or NMED. At their discretion, EPA or NMED may provide the samples for analysis and require a QA/QC demonstration without providing prior notice.

100. Until five (5) years after Sparton's receipt of EPA's and NMED's notification granting a Certificate of Full Completion pursuant to Paragraph 41 of Section XI (Certificate of Completion), Sparton shall maintain and provide to EPA and/or NMED, upon request, subject to the protections for privileged and confidential documents provided by Paragraph 24, copies of all documents and information within its possession or control or that of its contractors or agents relating to activities at the Site or to the implementation of this Consent Decree, including, but not limited to, sampling, analysis, chain of custody records, manifests, trucking logs, receipts, reports, sample traffic routing, correspondence, or other documents or information related to the Work. Nothing herein shall be construed as a waiver of any attorney client, work product, or confidential business information privilege that Sparton might otherwise possess. At least sixty (60) days prior to destruction or disposal of any records covered by this Paragraph, Sparton shall notify EPA and NMED and make such records available to EPA and NMED for inspection or retention.

101. Unless otherwise provided for in this Consent Decree or by agreement among EPA, NMED, and Sparton, Sparton shall notify EPA and NMED as provided in Section XXVII (Notices and Submittals), Paragraph 102 at least ten (10) calendar days prior to engaging in any field activities specified in the Attached Workplans or in any other workplans, schedules, reports, or other documents

approved under this Consent Decree, including but not limited to well drilling, installation of equipment, and sampling. This notification shall also be sent by telecopier to the EPA and NMED Project Coordinators designated pursuant to Paragraph 103. At the request of EPA or NMED, Sparton shall provide split samples to EPA or NMED, or allow EPA, NMED, or their authorized representatives to take samples or split or duplicate samples of any samples collected by, or on behalf of, Sparton pursuant to the implementation of the Consent Decree.

XXVII. NOTICES AND SUBMITTALS

102. Unless otherwise specified in this Consent Decree, whenever, under the terms of this Consent Decree, written notice is required to be given or any document (except documents submitted for review and approval under Section X (Review of Submittals)) is required to be sent by one Party to another, it shall be directed to the individuals at the addresses specified below, unless those individuals or their successors give notice of a change to the other Parties in writing. All notices and submittals shall be considered effective upon receipt, unless otherwise provided. Written notice as specified in this Paragraph shall constitute complete satisfaction of any written notice requirement of the Consent Decree with respect to the Parties listed below:

As to the United States:
Chief
Environmental Enforcement Section
Environment and Natural Resources Division
U.S. Department of Justice
P.O. Box 7611
Washington, D.C. 20044-7611
Re: DJ # 90-7-1-875

Director
Compliance Assurance and Enforcement Division
United States Environmental Protection Agency
Region 6
1445 Ross Avenue, Suite 1200
Dallas, Texas 75202-2733

As to EPA:

Director
Compliance Assurance and Enforcement Division
United States Environmental Protection Agency
Region 6
1445 Ross Avenue, Suite 1200
Dallas, Texas 75202-2733

Regional Counsel
Office of Regional Counsel
United States Environmental Protection Agency
Region 6
1445 Ross Avenue, Suite 1200
Dallas, Texas 75202-2733

As to the City of Albuquerque:

Albuquerque City Attorney
Legal Department
P.O. box 2248
Albuquerque, New Mexico 87103

As to the Board of County Commissioners of the County of Bernalilo:

County Attorney
One Civic Plaza, N.W., Tenth Floor
Albuquerque, New Mexico 87103

As to the New Mexico Environment Department:

Chief
Hazardous and Radioactive Materials Bureau
New Mexico Environment Department
P.O. Box 26110
Santa Fe, New Mexico 87502-6110

As to the State of New Mexico and the Office of Natural Resources Trustee:

Director, Environmental Enforcement Division
New Mexico Attorney General's Office
P.O. Drawer 1508
Santa Fe, New Mexico 87504

As to Sparton:

Tony Hurst, P.,E.	Secretary
General Civil Engineering Resource	Sparton Technology, Inc.
153 Camino de Sabinal -- P.O. Box 220	2400 Ganson Street
Bosque, New Mexico 87006	Jackson, Michigan 49202

103. Where Sparton is required to provide to EPA or NMED oral notice or notice by telecopier, Sparton shall provide such notice to the designated EPA and NMED Project Coordinators. The Project Coordinators shall be:

EPA Project Coordinator
Michael Hebert (6EN-HX)
Project Manager
Compliance Assurance and Enforcement Division
United States Environmental Protection Agency
Region 6
1445 Ross Avenue, Suite 1200
Dallas, Texas 75202-2733
Telephone: (214) 665-8315
Telecopier: (214) 665-7264
E-mail: hebert.michael@epa.gov

NMED Project Coordinator
James Bearzi
Chief
Hazardous and Radioactive Materials Bureau
New Mexico Environment Department
P.O. Box 26110
Santa Fe, New Mexico 87502-6110
Telephone: (505) 827-1567
Telecopier: (505) 827-1544
E-mail: james_bearzi@nmenv.state.nm.us

EPA or NMED may change their respective Project Coordinators at any time by providing written notice to Sparton.

XXVIII. MODIFICATION

104. Schedules for completion of the Work may be modified by agreement of EPA, NMED, and Sparton. All such modifications shall be made in writing.

105. No material modifications shall be made to this Consent Decree without written notification to and written approval of each of the Plaintiffs, Sparton, and the Court. Modifications to the Attached Work Plans or to items approved under Section X (Review of Submittals) that do not materially alter that document may be made by written agreement between EPA, NMED, and Sparton.

106. Nothing in this Consent Decree shall be deemed to alter the Court's power to enforce, supervise, or approve modifications to this Consent Decree.

XXIX. LODGING AND OPPORTUNITY FOR PUBLIC COMMENT

107. After this Consent Decree has been signed by the Parties, it shall be lodged with the Court for a period of not less than thirty (30) days for public notice and comment in accordance with 28 C.F.R. § 50.7 and Section 7003(d) of RCRA, 42 U.S.C. § 6973(d). The United States and the State Parties reserve the right to withdraw or withhold their consent if comments by the public regarding the Consent Decree disclose facts or considerations which indicate that the Consent Decree is inappropriate, improper, or inadequate. Sparton consents to the entry of this Consent Decree without further notice.

108. If for any reason the Court should decline to approve this Consent Decree in the form presented, this agreement is voidable at the sole discretion of any Party and the terms of the agreement may not be used as evidence in any litigation between the Parties.

XXX. COSTS

109. Except as otherwise provided in this Consent Decree, each Party to this action shall bear its own costs and attorneys' fees in the actions resolved by this Consent Decree.

XXXI. RETENTION OF JURISDICTION

110. This Court retains jurisdiction over both the subject matter of this Consent Decree and the Parties for the duration of the performance of the terms and provisions of this Consent Decree for the purpose of enabling any of the Parties to apply to the Court at any time for such further order, direction, and relief as may be necessary or appropriate for the construction or modification of this Consent Decree, or to effectuate or enforce compliance with its terms, or to resolve disputes in accordance with Section XIII (Dispute Resolution) hereof.

XXXII. TIME

111. Any period of time prescribed or allowed by this Consent Decree shall be computed in accordance with the rules set forth in Federal Rule of Civil Procedure 6(a).

XXXIII. TERMINATION

112. This Consent Decree shall terminate only after a Motion to Terminate the Consent Decree has been granted by the Court. No such motion shall be filed or granted until all the following conditions have been met:

a. Either EPA and NMED have issued a Certificate of Full Completion pursuant to Paragraph 41; or Sparton files its motion pursuant to Paragraph 42 and demonstrates that it is entitled to a Certificate of Full Completion;

b. Sparton has been in compliance with the terms of the Consent Decree for six (6) months preceding the date of termination; and

c Sparton has paid all civil penalties, costs, damages, stipulated penalties, and other sums due under this Consent Decree.

Any Motion to Terminate this Consent Decree shall be filed with the Court and copies served upon all other Parties. Any Party may file an opposition to the Motion to Terminate within ninety days of the date of service. Termination of this Consent Decree shall not affect any continuing obligations of Sparton or the covenants set forth in Section XX (Covenant Not To Sue By Plaintiffs) and Section XXI (Covenants by Sparton; Effect of Settlement).

XXXIV. SIGNATORIES

113. Each undersigned representative of a Party certifies that he or she is fully authorized to enter into the terms and conditions of this Consent Decree and to execute and legally bind such Party to this document.

SO ORDERED THIS ______ DAY OF ____________________________, 1999,

____

HONORABLE C. LEROY HANSEN
United States District Judge

FOR THE UNITED STATES OF AMERICA

____

LOIS J. SCHIFFER
Assistant Attorney General
Environment and Natural Resources Division
United States Department of Justice

____

MICHAEL T. DONNELLAN, Trial Attorney
ARNOLD ROSENTHAL, Senior Attorney
Environmental Enforcement Section
Environment and Natural Resources Division
United States Department of Justice
P.O. Box 7611
Washington, D.C. 20044-7611
(202) 514-4226/(202) 514-3446

____

WENDY BLAKE, Trial Attorney
MARY EDGAR, Senior Attorney
Environmental Defense Section
Environment and Natural Resources Division
United States Department of Justice
P.O. Box 23986
Washington, D.C. 20026-3986
(202) 305-0851/(202) 514-2741

JOHN J. KELLY
United States Attorney

JOHN W. ZAVITZ
Assistant United States Attorney
District of New Mexico
P.O. Box 607
Albuquerque, NM 87103
(505) 766-3341

<u>OF COUNSEL</u>
GLORIA MORAN
EVAN PEARSON
Assistant Regional Counsel
United States Environmental Protection Agency, Region 6
1445 Ross Ave.
Dallas, TX 75202-2733

FOR THE ENVIRONMENTAL PROTECTION AGENCY

____
GREGG A. COOKE
Regional Administrator
U.S. Environmental Protection Agency, Region VI
1445 Ross Avenue
Dallas, Texas 75202-2733

____
STEVEN A. HERMAN
Assistant Administrator for Enforcement
U.S. Environmental Protection Agency
Washington, D.C.

FOR THE STATE OF NEW MEXICO

PATRICIA A. MADRID
Attorney General of the State of New Mexico

GLENN SMITH
Special Counsel
CHARLES de SAILLAN
Special Assistant Attorney General
Office of the Attorney General of the State of New Mexico
Post Office Drawer 1508
Santa Fe, New Mexico 87504-1508
(505) 827-6014

FOR THE NEW MEXICO ENVIRONMENT DEPARTMENT

Peter Maggiore

PETER MAGGIORE
Secretary
New Mexico Environment Department

Ana Marie Ortiz

ANA MARIE ORTIZ
Special Assistant Attorney General
Assistant General Counsel
New Mexico Environment Department
Post Office Box 26110
Santa Fe, New Mexico 87502-6110
(505) 827-2987

FOR THE NEW MEXICO OFFICE OF THE NATURAL RESOURCES TRUSTEE

Acquiescing: ______________________________

DR. WILLIAM M. TURNER
New Mexico Natural Resources Trustee

PATRICIA A. MADRID
Attorney General of the State of New Mexico

____

GLENN SMITH
Special Counsel
CHARLES de SAILLAN
Special Assistant Attorney General
Office of the Attorney General of the State of New Mexico
Post Office Drawer 1508
Santa Fe, New Mexico 87504-1508
(505) 827-6014

FOR THE CITY OF ALBUQUERQUE

ROBERT M. WHITE
City Attorney

GARY A. O'DEA
Assistant City Attorney
Post Office Box 2248
Albuquerque, New Mexico 87103
(505) 768-4500

FOR THE BERNALILLO COUNTY COMMISSIONERS

TITO D. CHAVEZ
County Attorney

PATRICK F. TRUJILLO
Assistant County Attorney
One Civic Plaza, N.W., Tenth Floor
Albuquerque, New Mexico 87103
(505) 768-4655

FOR SPARTON TECHNOLOGY, INC.

JOHN J. SMITH
President
Sparton Technology, Inc.
4901 Rockaway Boulevard, NE
Rio Rancho, New Mexico 87124

JAMES B. HARRIS
Thompson & Knight L.L.P.
1700 Pacific Avenue, Suite 3300
Dallas, Texas 75201-4693
(214) 969-1700

LIST OF ATTACHMENTS
To the Consent Decree In
Albuquerque v. Sparton Technology, Inc., No. CV 07 0206 (D.N.M.)

A Groundwater Monitoring Program Plan

B Public Involvement Plan for Corrective Measure Activities

C Work Plan for the Off-Site Containment System

D Work Plan for the Assessment of Aquifer Restoration

E Vadose Zone Investigation and Implementation Workplan

F Work Plan for the Installation of a Source Containment System

G. Site Map

H. Post Closure Care Permit Application Information

I. Selection of a Mediator and Ground Rules for the Mediation

ATTACHMENT

A

GROUNDWATER MONITORING PROGRAM PLAN

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

LIST OF FIGURES

LIST OF TABLES

APPENDICES

SECTION ONE
INTRODUCTION

This Groundwater Monitoring Program Plan (GWMPP) has been developed for the Sparton Technology, Inc. Coors Road facility located in Albuquerque, New Mexico. Pursuant to Section VII, Task I, Item 2 (and Task I.B. of Attachment I - Corrective Action Plan) of the Final Administrative Order (FAO) RCRA-VI-001(h)-96-H (USEPA, February 1998), Sparton Technology, Inc., shall continue monitoring the existing groundwater monitoring wells in accordance with the GWMPP. This Plan supersedes all previous groundwater monitoring programs.

The purpose of the GWMPP is to provide detailed procedures, methodologies, and guidance, for the implementation of a site-specific groundwater sampling and analyses program. The GWMPP is prepared as a complete, stand-alone document for field personnel to use in the implementation of the sampling program. The GWMPP is designed to be an evolving document which incorporates modifications to the sampling program as site-specific conditions change. The objective of the GWMPP is to provide consistent, high-quality, reproducible water elevation and water quality data in support of multiple site assessment and remedial programs.

The GWMPP is separated into five sections, including this introduction. Historical groundwater monitoring programs and a brief discussion of the site geology and hydrogeology, are described in Section Two. The groundwater sampling and analysis plan and procedures for sampling the existing groundwater monitoring well network is described in Section Three. The schedule for implementation and reporting is described in Section Four. Field procedures used in the routine monitoring of groundwater are described in Section Five.

SECTION TWO
HISTORICAL GROUNDWATER MONITORING

Since 1983, Sparton has conducted groundwater monitoring activities under a variety of programs. A summary of the site geology and hydrogeology and monitoring well characteristics, as well as a discussion of the groundwater monitoring to date, is presented below.

2.1 SITE GEOLOGY AND HYDROGEOLOGY

A revised RCRA Facility Investigation (RFI) Report dated May 1, 1992 presents a description of the site geology and hydrogeology that was compiled from previous investigations and the RFI investigation. A summary of the site geology and hydrogeology as presented in the RFI report is presented below.

2.1.1 Site Soils and Geologic Stratigraphy

Three convergent site surface soils of the Bluepoint Series; the Bluepoint loamy fine sand, the Bluepoint fine sand, and the Bluepoint-Kokan Association hilly, are identified on the Sparton property. The soils are defined using the Unified Soil Classification System (USCS) as a silty sand (SM) and borderline silty sand/poorly graded sand (SM/SP), respectively. The Bluepoint Series profile consists of an approximate 8-inch surficial brown loamy fine sand with an underlying pale brown to light yellowish brown loamy sand to a depth of approximately 60 inches or more. The profile is described as being slightly calcareous and mildly to moderately alkaline, with a high permeability and rapid infiltration.

The Sparton facility is located within the Albuquerque Basin, which is a fault trough (Bryan, 1938) component of the Rio Grande depression. Precambrian to Holocene Age geologic materials are present within the Albuquerque Basin, with outcrops of Precambrian, Paleozoic, and Mesozoic rock identified on the east and west basin rims. The basin fill material consists of Tertiary (Santa Fe Group) and Quaternary deposits, which have been estimated to be up to 18,000 feet in depth. The Santa Fe Group and the Quaternary deposits represent the local aquifer underlying the Sparton facility.

The Santa Fe Group was defined by Kelley (1977) as consisting of three members; the lower Zia Sandstone Member, the middle Red Member, and the uppermost Ceja Member. At the time of the RFI report, all monitoring wells installed were estimated to be installed above the top of the uppermost Ceja Member. The upper portion of the Ceja Member was characterized as "dominantly yellowish to grayish sandy pebble gravel and pebbly sand with lesser amounts of interbedded clay, mud, and sand" (Lambert, 1967, p.74).

Lambert (1967, Fig. 2) mapped cobble and pebble gravels resting on the lower part of a larger and deeper section of sands and muds identified as the Los Duranes Formation. The Los Duranes Formation is described by Lambert (1967, p. 154) as a relatively thick sequence of clay, mud, sand, and gravel deposited by the Rio Grande. Lambert estimated the formation to be approximately 300 to 400 feet in thickness and filling a broad valley cut into the Ceja Member.

Exposed sections of the Los Duranes were described by Lambert as consisting of well-stratified sequences of alternating clay and sandy mud layers of overbank origin. In addition to the mud-clay sequences, interbedded lenses of pebbly sand and sandy pebble gravel channel deposits were identified. Gravel is apparently less abundant in the formation than mud-clay or pebble sand, occurring locally within the sand beds and as separate layers up to 15 to 20 feet thick according to Lambert.

Rio Grande Floodplain Alluvium, consisting of fine to medium sand and gravels, overlie the Los Duranes Formation and is intertwined with alluvial fans and aprons of Young alluvium. The estimated thicknesses of the alluvium based upon the studies of Lambert (1967, p. 213) and Borklund and Maxwell (1961) are 120 to 130 feet and 80 to 120 feet, respectively. Young alluvium, consisting of primarily muddy fine sand with lesser amounts of sandy gravel and mud, is present as alluvial fans and aprons at the facility.

2.1.2 Site Hydrogeology

Groundwater is encountered beneath the facility at depths ranging from 65 to 75 feet. West of the facility the depth to water becomes larger; at the location of off-site containment well CW-1 (about ½ mile west of the site) the depth to water is 200 feet Groundwater elevation at the site fluctuates approximately two to three feet in response to recharge from farm irrigation and the Corrales Main Canal. Off-site calculated hydraulic gradients vary from 1:350 to 1:780, with the gradient in a general westward direction. The gradients on-site range from 1:50 to 1:350. In general, the RFI data concluded that groundwater flows in a westerly direction.

On-site aquifer tests conducted at PW-1 indicated a transmissivity value of 12,000-18,000 gpd/ft, hydraulic conductivity of 160-240 gpd/ft^2, storativity of 0.002-0.003, and porosity of 0.25-0.40.

Off site tests at well CW-1 indicate a hydraulic conductivity in the same range (240 gpd/ft^2) but a larger transmissivity (37,500 gpd/ft) due to the larger thickness of the tested interval.
The RFI report indicated that two primary sediment types were encountered in borings advanced at the Sparton facility; clays and sandy muds interbedded with gravelly sands. Both types of sediment were identified in every boring however, gravelly sands were predominate in the upper and lower portions of the aquifer.

2.2 STATE MONITORING PROGRAM

In 1983, Sparton began groundwater monitoring activities at the Coors Road Plant in conformance with New Mexico Environment Department's Hazardous and Radioactive Materials Bureau (NMED-HRMB) requirements. A total of 27 wells were installed (MW-1 through MW-25, PW-1, and P-1). The required State sampling protocol conducted by Sparton is referred to as the Alternate Groundwater Monitoring Program (AGMP). Per the AGMP sampling protocol, eight on-site wells (MW-9, MW-14, MW-15, MW-16, MW-19, MW-20, MW-21, and MW-22) were sampled on a quarterly basis. In the 1st, 2nd, and 4th Quarters, these wells are sampled for the following parameters: VOC by EPA Method 8010, TOX, TOC, pH and specific conductivity (starting in the 2nd Quarter in 1993, NMED approved changing analytical methods for VOC analysis from 8240 to 8010 for the aforementioned quarterly events). In the 3rd Quarter, the same AGMP wells were sampled for the following parameters: VOC by EPA Method 8240 (now Method 8260), TOX, TOC, pH, specific conductivity, TKN, chloride, sulfate, Nitrate as N, sodium, boron, manganese, nickel, and chromium.

2.3 RFI MONITORING PROGRAM

In response to the USEPA Administrative Order on Consent dated October 1988, Sparton installed 40 groundwater monitoring wells (MW-26 through MW-64, and PZ-1) and implemented an on-site groundwater extraction and treatment Interim Measure (IM) in December 1988. Using both new (RFI) and existing wells, sampling and analyses of PW-1, MW-18, MW-23, MW-24, MW-25, MW-26, MW-27, and MW-28 were conducted in accordance with the RFI work plan (originally submitted on December 28, 1988, revised March 3, 1989, and approved by USEPA on March 6, 1998) and USEPA guidance.

Including the wells installed prior to the AOC, a combined total of 67 wells were installed through June 1991. Ten wells were plugged and abandoned (P-1, MW-1, MW-2, MW-3, MW-4, MW-5, MW-6, MW-8, MW-10, and MW-11), resulting in an active network of 57 groundwater monitoring wells located both on-site and off-site. Eight of the wells (PW-1, MW-18, MW-23, MW-24, MW-25, MW-26, MW-27, and MW-28) are used for IM recovery purposes. A total of 45 wells have dedicated bladder pumps. The remaining three wells (PZ-1, MW-50, and MW-54) are used for static water level measurements.

The RFI monitoring program terminated with the June 1991 sampling event included in the August 13, 1991 revised RFI Report submitted in final form and approved by USEPA on July 1, 1992.

2.4 SUPPLEMENTARY GROUNDWATER MONITORING PROGRAM

Sparton unilaterally initiated its own groundwater monitoring program in the 4th Quarter of 1991, called the Supplementary Groundwater Monitoring Program (SGMP). Originally, this program involved sampling 12 off-site wells (MW-35, MW-36, MW-37, MW-46, MW-48, MW-51, MW-53, MW-55, MW-56, MW-58, MW-60, and MW-62) and three on-site wells (MW-32, MW-42, and MW-43) on a quarterly basis for VOC analysis using EPA Method 8240. The SGMP was expanded to sample 19 off-site wells (MW-36, MW-37, MW-46, MW-48, MW-51, MW-53, MW-55, MW-56, MW-57, MW-58, MW-60, MW-61, MW-62, MW-64, MW-65, MW-66, MW-67, MW-68, and MW-69) and three on-site wells (MW-32, MW-42, and MW-43) on a quarterly basis. Analytical methodology was changed from Method 8240 to 8260 as of the 1st Quarter of 1998. The SGMP was designed to compliment the ongoing on-site State Groundwater Monitoring Program (i.e., the AGMP) and to track results of the IM.

Sparton also monitored eight on-site wells (MW-9, MW-14, MW-15, MW-16, MW-19, MW-20, MW-21, and MW-22) under the AGMP quarterly over the same time period. The sampling procedure under the SGMP consisted of monitoring for VOC's under USEPA Method 8240 and then Method 8260B.

On an annual frequency (approximately), USEPA/State of New Mexico split samples under the SGMP and AGMP with Sparton. During two of the annual events (December 1993 and January 1996), additional monitoring wells were also sampled. Monitoring wells sampled during the December 1993 sampling event include MW-13, MW-29, MW-30, MW-31, MW-34, MW-38, MW-39, MW-40, MW-41, MW-44, MW-45, MW-47, MW-49, MW-52, MW-57, MW-59, MW-63, and MW-64. Monitoring wells sampled during the January 1996 sampling event include PZ-1, MW-12, MW-13, MW-17, MW-29, MW-30, MW-31, MW-33, MW-34, MW-38, MW-39, MW-40, MW-41, MW-44, MW-45, MW-47, MW-49, MW-52, MW-59, and MW-63.

In 1996, Sparton installed five additional downgradient "sentinel" groundwater monitoring wells to confirm plume limits and rates of movement. The new wells, with subsequent sampling and analysis, were added to the SGMP well network (current total of 28 monitoring wells).

In February 1998, a deeper "sentinel" well (MW-70) was added to on-site well cluster #4 (MW-15, MW-41, and MW-32). Monitoring well MW-70 is screened approximately twenty feet below MW-32. During the summer of 1998, Sparton installed monitoring well MW-71 adjacent to existing well cluster MW-60/61 to define the plumes vertical extent. In the fall of 1998, MW-71 was retro-fitted and converted to a two-inch diameter well upon identification of potential casing leakage.

During February and March 1999, Sparton installed on site wells MW-72 and MW-73. Well MW-72 is located between MW-15 and MW-43, and is screened about 25 to 35 feet below the water table. Well MW-73 is located between MW-14 and MW-15, and is screened about 24 to 29 feet below the water table. Both wells were installed to better define the plume along the northwest property line.

2.5 EXISTING MONITORING WELL SYSTEM CHARACTERISTICS

The existing groundwater monitoring well network characteristics are presented in Table 2-1. Specifically, Table 2-1 describes the characteristics of each groundwater monitoring well in the monitoring system including location, diameter, ground and top of casing elevations, total depth, screen interval (length), and screen construction and slot size. Table 2-2 presents a summary of the status of each respective well including a description of dedicated sampling equipment, pump depth/elevation (if applicable), and well packer information (if applicable). Sparton will update and redistribute Table 2-1 to EPA and NMED each time the present groundwater monitoring system is altered. Figure 1 presents the network of monitoring wells. Appendix A is a compilation of all available well construction and boring logs.

SECTION THREE
SAMPLING AND ANALYSES PLAN FOR EXISTING WELLS

The following sections describe the procedures for the collection and analysis of groundwater samples and the measurement of water levels from the existing monitoring well network.

3.1 GROUNDWATER SAMPLING NETWORK, PARAMETERS, AND FREQUENCY

The existing groundwater monitoring network consists of all on-site and off-site monitoring wells and is summarized as Table 3-1 and identified on Figure 1. The frequency of groundwater sampling and water level measurement recording, as well as the respective analytical parameters for each well, are also summarized on Table 3-1. In general, water level measurements are to be completed from all wells on a quarterly basis, while sample collection and analysis is conducted quarterly, semi-annually, or annually.

The frequency of water level measurements and the groundwater sampling and analysis will be reviewed every five years under this plan. From this review the plan will be modified as necessary and proposed modifications to this plan will be presented to the U.S. EPA and NMED for their review and approval.

As shown in Table 3-1, eight sentinel/perimeter monitoring wells (MW-52, MW-57, MW-62, MW-65 through MW-69, and MW-71) are required to be sampled on a quarterly basis. This frequency can be modified in the future if data collected since the implementation of the off-site containment system indicates that sampling of these wells is no longer required.

Analytical parameters include volatile organic compounds (VOC's) utilizing U.S. EPA SW-846 Method 8260B and analysis of chromium (total). Chromium will be analyzed utilizing U.S. EPA SW-846 6000/7000 series. Method detection limits for all constituents must be less than or equal to maximum contaminant levels (MCL's) or the state groundwater standards, whichever is more stringent for the respective constituents. Table 3-1 and Table 3-2 provides a list of the analytical parameters and respective constituent reporting limits.

In the event that additional groundwater monitoring wells are installed, this plan will be revised by Sparton to include the respective well(s) in the sampling program. In the event that the status of a well changes (i.e., from active groundwater recovery well to inactive), this plan will be updated by Sparton to include such wells as groundwater monitoring wells as appropriate.

3.2 GROUNDWATER SAMPLING PROCEDURES

3.2.1 Decontamination

To reduce the possibility for cross contamination, dedicated pumps or bailers will be placed in the wells. All non-dedicated measuring, purging, and sampling equipment will be decontaminated prior to purging and sample collection. In general, decontamination will include washing all purging and sampling equipment with a non-phosphate laboratory detergent, potable water rinse, followed by a distilled water rinse in accordance with Field Procedure P-5 presented in Section Five.

3.2.2 Water Level Measurements

During all sampling events, hydraulic performance evaluations, and in accordance with the frequency identified on Table 3-1, groundwater elevations will be determined in all available wells in accordance with Field Procedure P-4 presented in Section Five. If groundwater sampling will be performed, a complete circuit of water levels will be measured before purging and sampling. Water level measurements will be recorded beginning with the uncontaminated wells and ending with the wells showing the highest constituent levels. Measurements will be made consecutively in a minimal amount of time. Groundwater levels will be measured with respect to surveyed reference points. Water levels will be obtained using either an electrical water level tape and probe or a chalked, weighted surveyor's tape. The measuring device will be rinsed with distilled water prior to each use.

3.2.3 NAPL Measurements

The presence or absence of DNAPLS will be measured once in wells MW-16, MW-18, MW-23 through 26 and MW-32 in accordance with Field Procedure P-4 presented in Section Five.

3.2.4 Well Purging

The wells will be evacuated and sampled using dedicated pumps or bailers. Wells will be purged of a minimum of three well volumes in accordance with Field Procedure P-1 presented in Section Five, and sampled as soon as possible thereafter. Purging will continue until the pH, conductivity, and temperature have stabilized. The purged water will be contained in a graduated container to monitor volume removed. All purge water will be disposed in the treatment system holding tank.

3.2.5 Redox-Potential and Dissolved Oxygen Measurements

Redox-potential and dissolved oxygen will be measured at each well on an annual basis in accordance with Field Procedure P-3 presented in Section Five.

3.2.6 Sample Collection

Samples will be obtained with dedicated pumps or bottom filling/discharging bailers. If a pump is used, the dedicated purge/sample pump will be adjusted to achieve a minimum smooth steady flow appropriate for sample collection, consistent with rates to be established during November 1999 sampling event, and to be reported in the first annual report. Samples will be collected by pumping directly into each of the required containers. In the event additional samples are collected and filtered for dissolved metal analysis, the sample will be placed into the required container following field filtration. If a bailer is used, the bailer will be slowly lowered and raised into the well to minimize agitation. The contents of the bailer will also be slowly poured into the sample bottles through a bottom discharging device. Sampling bottles will have been filled with the proper preservatives by the analytical laboratory.

Bottles will be filled completely, but will not be overflowed. The VOC bottles will be filled so that no headspace exists. The samples for VOC analyses will be collected in 40 mL glass septum vials with Teflon-lined lids and preserved with hydrochloric acid. The maximum holding time for VOC's is 14 days.

A detailed field data sheet for each well will be completed during each sampling event. The field data sheet will document actual sampling and purging procedures and observations. The integrity of all monitor wells will be checked and noted during each sampling event.

3.2.7 Sample Handling

To prevent misidentification of samples, a label will be securely fixed to each sample container. These will be waterproof and carry the following information:

- Project name and number
- Sample identification and number
- Analytical parameter(s) and method and preservatives used
- Initials of collector
- Date and time of collection

3.2.8 Sample Packaging and Shipping

Following sample collection, all samples will be brought to an on-site location for batching and paperwork checks. At this location, like sample types are matched with similar sample types from all sample locations. Label information is checked to ensure there is no error in sample identification. The samples are packaged to prevent breakage and/or leakage, and the shipping containers are labeled in accordance with DOT regulations and International Air Transport Association (IATA) regulations for transport when local laboratories are not used.

Sample packaging and shipment requirements will vary depending on the expected concentration of contaminants, whether or not samples will be shipped by common carrier, and whether or not the samples are expected to constitute hazardous materials. For those samples expected to be non-hazardous in nature, packaging and shipping criteria are designed only to maintain chain-of-custody protocol as well as to prevent breakage of the sample containers. The packaging and shipping procedures for liquid samples will be as follows:

Approximately a 3-inch layer of cushioning material will be placed in the bottom of water-tight, insulated metal or equivalent strength plastic shipping containers, when necessary.

Bottles will be enclosed in clear plastic bags, through which the labels are visible, and the bag sealed. Bottles will be placed upright into the shipping container so they do not touch and will not touch during shipment, as necessary.

Using the necessary packing material, the sample bottles will be packed to ensure that they do not shift during shipment.

- Sealed plastic bags of ice cubes or chips will be placed around and on top of the samples bottles to keep the samples cool during delivery.

The appropriate chain-of-custody form(s) will be placed in a zip-lock plastic bag, and placed inside of the shipping container.

When samples are to be shipped by common carrier, the shipping container will be closed and locked/hatched. If the shipping container used is a picnic cooler, the drain plug will be taped closed to prevent any leakage of water as the ice packs melt during transport. The lid will be secured by taping. The cooler will be wrapped completely with strapping tape at a minimum of two location. Labels will not be covered. A completed shipping label will be attached to the top of the cooler. Signed custody seals will be affixed on the cooler. The seals will be covered with wide, clear tape. Appropriate labeling will be affixed to the sides of cooler (i.e., "Class 9" and "This end up" labels).

When samples are to be shipped by common carrier, as soon as field personnel are ready to transport samples from the field to the laboratories, the laboratory Point of Contact (POC) at each laboratory will be notified by telephone of the shipment along with the estimated time of arrival. A breakdown of required analyses by matrix and concentration level will be included. Samples will either be shipped to the laboratory via overnight carrier, delivered directly to the laboratory or maintained at the site so as not to exceed sample holding times and then delivered to the laboratory. Upon arriving at the laboratory the samples and chain-of-custody records will be placed into a walk-in cold room or refrigerator until they can be logged in by the laboratory sample custodian.

3.3 ENVIRONMENTAL SAMPLES

During implementation of this Groundwater Monitoring Program Plan, Sparton will collect and submit for laboratory analysis groundwater and groundwater treatment system samples. A detailed description of the sampling locations and procedures that will be used during the field investigation program are presented in previous sections of this document.

3.3.1 Field-Generated QC Samples

As a part of the project QA objectives, field-generated QC samples (i.e., equipment blanks, field duplicates, and trip blanks) will be collected throughout each sampling event. Technical judgment will be used to determine the days on which equipment blanks and locations at which field duplicates will be collected. One equipment blank will be collected at a frequency of approximately 5% of the samples collected for each type of non-dedicated sampling equipment. One field duplicate sample will be collected at a frequency of approximately 5% of the samples collected. In addition, one set of trip blanks will accompany every cooler of samples submitted for volatile organic analysis.

3.3.2 Sample Containers and Preservation Methods

Table 3-3 summarizes the sampling parameters, containers, and preservation requirements for the aqueous samples collected during the monitoring program. Sample containers, including those necessary for field QC samples, will be obtained from the laboratory or a commercial bottle supplier.

3.4 SAMPLE CUSTODY AND FIELD DOCUMENTATION

An overriding consideration essential for the validation of environmental measurement data is the necessity to demonstrate that samples have been obtained from the locations stated and that they have reached the laboratory without alteration. Evidence of the sample traceability from collection to shipment, laboratory receipt, and laboratory custody (until proper sample disposal and the introduction of field investigation results as evidence in legal proceedings when pertinent) will be documented. A sample will be considered to be in a person's custody if the sample is:

In a person's actual possession
In view after being in a person's possession

- Locked so that no one can tamper with it after having been in physical custody
- In a secured area, restricted to authorized personnel

The field team leader (or designee) will be responsible for overseeing and supervising the implementation of proper sample custody procedures in the field. The field team leader or a designee will also be responsible for ensuring sample custody until the samples have been transferred to a courier or directly to the laboratory. Once received by the laboratory, the samples will be processed through an orderly sequence specifically designed to ensure continuous integrity of both the sample and its documentation.

3.4.1 Chain of Custody

The chain of custody procedures will be initiated in the field following sample collection. The procedures will consist of: 1) preparing and attaching a unique sample label to each sample collected; 2) completing the chain of custody (COC) record; and 3) preparing and packing the samples for shipment. These procedures are briefly described in the following sections.

3.4.1.1 Sample Labels

Field personnel will be responsible for uniquely identifying and labeling all samples collected during the monitoring program. All labeling will be completed in indelible/waterproof ink and securely affixed to the sample container.

3.4.1.2 Custody Seal

Custody seals will be secured across the shipping container openings to ensure content integrity. The custody seals will contain both the date and the signature of the person affixing them and will be completed in indelible/waterproof ink. The custody seals will be covered with clear plastic tape.

3.4.1.3 Chain-of-Custody Record

The COC record as shown in Figure 2 or similar lab form will be completed for each sample set submitted for off-site analyses. These forms will be maintained as a record of sample collection, transfer, shipment, and receipt by the laboratory. These forms will also contain pertinent information concerning sampling location, date, and times; signatures of at least one team member; types of samples collected along with a unique sample identification number; the number of samples collected and shipped for analysis in each lot; the project number, and the name of the laboratory to which the samples are being sent. The chain-of-custody records will be completed to ensure proper transfer of custody. The appropriate copies will be sent to the laboratory and the Project QA Manager.

3.4.1.4 Transfer of Custody

Samples will be accompanied by an approved COC form during each step of custody, transfer, and shipment. When physical possession of samples is transferred, both the individual relinquishing the samples and the individual receiving them will sign, date, and record the time on the chain of custody form. In the case of sample shipment by an overnight courier, a properly prepared air bill will serve as an extension of the COC form while the samples are in transit.

3.4.1.5 Laboratory Chain-of-Custody

Upon receipt at the laboratory, the designated sample custodian will inventory the sample cooler, log in the samples, and generate an internal COC or custody transfer record. The samples will then be stored in an appropriate secured sample storage area (freezer, refrigerator, etc.). Samples will remain in locked sample storage until removal for sample preparation or analysis. All transfers of samples from storage to the laboratory until sample disposal will be documented on a laboratory sample tracking/custody form that is dated and signed by each person using or transferring the samples.

3.4.2 Documentation

The program designed to ensure that field samples and field data are valid and useful is summarized in Table 3-4. In all cases, the field team will maintain a concise, detailed field logbook containing accounts of all field activities and actions taken as well as documentation of observations made.

All sampling procedures, instrument calibration, and information pertinent to sampling conditions, progress, and field data collection will be documented following a prescribed set of guidelines. The documentation will serve as a permanent and traceable record of all activities related to a specific field investigation program. The record will be legible and accessible for verifying sampling activities and addressing future questions that may arise concerning such issues as sample integrity, and sample traceability.

All documentation will be recorded in permanent ink. Corrections to errors in field documentation or recorded calculations will be made by the first striking out the error with a single line so as not to obliterate the original entry. The person originating the change will initial each separate change. All revisions, deletions, and changes will be made in indelible ink.

3.5 CALIBRATION PROCEDURES OF ANALYTICAL INSTRUMENTS

Instruments and equipment used for the laboratory analyses are controlled by the method selected to be used to perform the analyses. The calibration procedures verify that equipment is of the proper type, range, accuracy, and precision to provide data compatible with specified requirements. All instruments and equipment which measure a quantity, or whose performance is expected at a stated level, are subject to calibration.

Before any instrument is used as a measurement device, the instrumental response to known reference materials will be determined. The manner in which various instruments are calibrated will be dependent on the particular type of instrument and its intended use. All sample measurements will be made within the calibrated range of the instrument. Preparation of all reference materials used for calibration will be documented in a standards preparation notebook.

Instrument calibration typically consists of two types: initial calibration and continuing calibration. Initial calibration procedures establish the calibration range of the instrument and determine instrument response over that range. Typically, three to five analyte concentrations will be used to establish instrument response over a concentration range. The instrument response over the range is generally absorbance, peak height, etc., which will be expressed as a linear model with a correlation coefficient (i.e., as a response factor), or as an amount vs. response plot. Continuing calibration may be used within an analytical sequence to verify stable calibration throughout the sequence and/or to demonstrate that instrument response did not drift during a period of non-use of the instrument.

Method detection limits (MDLs) achievable by the laboratory will be based on in-house instrument capabilities. Estimated quantitation limits (EQLs) are the lowest concentration that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operating conditions. The EQLs are generally five to ten times higher than published MDLs, which are generally determined using clean matrixes (e.g., deionized water) free of interferences and are analyzed under optimal laboratory conditions. For actual sample analysis, these MDLs may not be routinely achievable and the EQLs are employed.

Individual sample detection limits may vary from the MDLs or EQLs reported by the laboratory. These variances may be due to sample dilution requirements, variability in the sample weight or volume used relative to that specified in the analytical procedure, dry weight adjustments for solid samples, the presence of interfering analyte contaminants, or other conditions related to sample matrix or instrumental analysis.

3.5.1 Organic, Inorganic, and Wet Chemistry Analyses

All organic and inorganic analyses will be performed using EPA methods.

Gas Chromatograph/Mass Spectrometer (GC/MS)
Gas Chromatograph (GC)
Inductively Coupled Argon Plasma (ICP)
Inductively Coupled Argon Plasma/Mass Spectrometer (ICP-MS)
Graphite Furnace Atomic Absorption (GFAA) Spectrophotometer
Cold Vapor Mercury Analysis by Atomic Absorption (CVAA) Spectrophotometer: Flameless Spectrophotometer (absorption wavelength of 540 nm)

3.5.2 Field Analyses

Prior to the use of any test equipment in the field, such as a pH probe, thermometer, conductivity meter, ORP meter, DO meter, or PID, proper calibration will be ensured. Specific calibration procedures and frequencies for various instruments are described in the Field Procedure P-3 presented in Section Five.

3.6 ANALYTICAL PROCEDURES

The analytical procedures to be used for samples collected during the groundwater monitoring activities will consist of EPA-approved methods. These procedures will provide project-specific detection limits as well as QC requirements.

3.6.1 Standard Analytical Methods

Samples collected during the monitoring program will be analyzed for chemical parameters by EPA methods. The analytical methods that will be used are summarized in Tables 3-5.

3.6.2 Project-Specific Detection Limits

In order to produce data capable of meeting the data use objectives, project-specific reporting limits for individual parameters have been determined. Metals data will be reported using current quarterly instrument detection limits, which must be lower than the project-specific maximum allowable reporting limits to be acceptable. It should be noted that the detection limits specified by any method may not be attained for all samples because of such factors as matrix effects or volume dilution.

3.7 QUALITY ASSURANCE OBJECTIVES OF ANALYTICAL DATA

The five major characteristics of data quality that have been addressed in the development of the monitoring program are defined below. Specific QA objectives pertinent to this field investigation program are presented in Tables 3-6 and 3-7.

3.7.1 Accuracy

Accuracy is defined as the degree of agreement of a measurement (or measurement average) with an accepted reference or true value. It is a measure of system bias and is usually expressed as a percentage of the true value. An evaluation of accuracy incorporates both laboratory and field sampling variables.

Accuracy will be determined in the laboratory through the use of matrix spike and matrix spike duplicate (MS/MSD) analyses for most VOC and inorganic analyses. Accuracy criteria for the laboratory methods chosen for this project are defined in the method protocols and are listed in Tables 3-6 and 3-7.

The field team will select one environmental sample in 20 to be analyzed for accuracy for each matrix being submitted. The resulting MS/MSD analyses will be used to evaluate accuracy and precision for both organic and inorganic analyses. Matrix effects may affect the analyte recoveries of the spiked compounds. The percent recoveries of the target compounds will be calculated and used as an indication of the accuracy of the analyses performed.

Sampling accuracy will be maintained by the implementation and adherence to strict procedural protocols. Trip blanks will be collected and analyzed to ensure that no cross-contamination of samples by VOC's occurs during sampling or transportation to the laboratory. When non-dedicated sampling equipment is used, equipment blanks will be collected and analyzed. One trip blank will be included in each cooler containing samples to be analyzed for VOC's. Equipment blanks will be collected at a frequency of 5% of samples collected for each matrix for non-dedicated equipment.

3.7.2 Precision

Precision is a measure of agreement among individual measurements of the same property under similar conditions. It is expressed in terms of relative percent difference (RPD) between replicates or in terms of the standard deviation when three or more replicate analyses are performed. Laboratory precision will be determined through the use of MS/MSD analyses (as described in section 3.10) for organic compounds and inorganic analytes. The RPD between the two results will be calculated as a measure of analytical precision. Specific criteria for precision are listed in Tables 3-6 and 3-7. Sampling precision will also be determined through the collection and analysis of field duplicates at a frequency of 5%. In addition, field duplicate analyses will provide an estimate of each sample medium's heterogeneity.

3.7.3 Completeness

Completeness is a measure of the amount of valid data obtained compared to the amount expected to be collected. It is usually expressed as a percentage. The objectives for the monitoring activities are to obtain samples for all analyses required in each individual area, to provide a sufficient quantity of samples for each of the required analyses, and to obtain quality control samples representative of all possible contamination sources (e.g., sample collection, storage, transportation, etc.). Completeness goals are presented in Tables 3-6 and 3-7.

3.7.4 Representativeness

Representativeness expresses the degree to which data accurately and precisely represents a characteristic of a data population, process condition, a sampling point, or an environment. For this monitoring program, grab and composite samples will be taken and such samples are, by definition, representative of only the conditions at the point in time collected, within sampling and analytical error.

3.7.5 Comparability

Comparability expresses the confidence with which one data set can be compared to another. To achieve comparability in this program, the data generated will be reported using units of ug/L and mg/L. By using sampling and analysis procedures consistent with EPA protocols, all data sets will be comparable within the Sparton Technology Site and between other EPA sites to ensure that a consistent database is used from which decisions concerning remedial action are made. To ensure data comparability, NIST traceable, standard reference materials will be analyzed to establish that analytical procedures are generating valid data.

3.7.6 Procedures for Data Assessment

The QA objectives for the laboratory analyses conducted during this program are listed in Tables 3-6 and 3-7. Accuracy values include components of both random error (i.e., variability due to imprecision) and systematic error (i.e., bias), thereby reflecting the total error for a given measurement, expressed as a percentage of the true value. The precision values presented therein represent variability for replicate measurements of the same analyte and are expressed in terms of the RPD for duplicate measurements of the same samples. The QA objectives for the laboratory analyses are based primarily on performance data derived from method validation studies for MS/MSD analyses, surrogate spike recoveries, and other QC samples. These are not intended to represent data validation criteria *per se*, but rather represent the performance capability of the methods.

3.8 INTERNAL DATA REDUCTION, VALIDATION AND REPORTING PROCEDURES

Described below are the types of procedures that will be followed by during the reduction, validation, and reporting of field and analytical data. Field and analytical data collected during this monitoring program will be used to monitor the groundwater contamination and determine the groundwater pump and treat system efficiency.

3.8.1 Data Reduction

Data reduction will consist of compiling and summarizing data collected during monitoring activities. Field and analytical data will be summarized in a tabular or other appropriate format. All information and data will be reported and verified for accuracy with the original sources of data. For analytical data, units designated by the analytical method will be reported.

Data produced for internal records and not reported as part of the analytical data will include laboratory worksheets and notebooks, sample tracking system forms, instrument logs, standards records, maintenance records, calibration records, and associated quality control. From non-laboratory sources, these data will include field logbooks, sample and QC sample tracking sheets, well development logs, instrumentation and calibration logs, and geologic logs. These data will be generated during the field activities, and where relevant, will be summarized for interpretation or use throughout the data evaluation process.

3.8.2 Data Validation

Quality control data provided by the laboratory will enable the Project QA Manager to evaluate the validity of the analytical data in terms of accuracy, precision, and environmental significance. The Project QA Manager will review the data applying the evaluation acceptance criteria specified below.

All analytical data will be evaluated in accordance with the essential applicable elements specified in the analytical method. The data evaluation will consist of a review of the following items:

Data Completeness: If data packages are incomplete or illegible, the laboratory will be contacted to cure and resubmit the data package.

Holding Times: If the holding time is exceeded, all positive results will be flagged as estimated (J) and all non-detects will be flagged as estimated (UJ). If holding times are grossly exceeded, the data will be qualified as unusable or rejected (R).

Blanks: Any analyte detected in the blank and in any of its associated samples will be considered non-detected in the samples when the sample's concentration is less than five times the blank concentration (or less than ten times the blank concentration for the common laboratory contaminants methylene chloride, acetone, or 2-butanone).

Sample Duplicate: If laboratory or field duplicate analyses result in a RPD greater than QC criteria, the positive results for the analysis will be flagged as estimated (J) and all non-detects will be reported unqualified. If one value is non-detected and the other is above the detection limit, all positive results will be flagged as estimated (J) and all non-detects will be flagged as estimated (UJ).

Laboratory Control Sample (LCS): The LCS recovery control limits will be generated by the laboratory and updated on a regular basis. The laboratory will submit the most current control limits for the analyses requested in each data report. If the LCS recoveries are less than the lower limit reported by the laboratory, all associated results will be flagged as estimated (J or UJ). If the LCS recoveries are greater than the upper limit reported by the laboratory, all associated positive results will be qualified as estimated (J). If the LCS recoveries are grossly low, all associated non-detect results will be qualified as unusable (R).

Surrogate (Organics Only): If the results of the surrogate are greater than QC criteria (above the true concentration) all positive results will be flagged as estimated (J) and all non-detects will be reported unqualified. If the results of the surrogate are less than QC criteria (below the true concentration) all positive results will be flagged as estimated (J) and all non-detects will be flagged as estimated (UJ). If the results of the surrogate analyses are grossly below the true concentration, all positive results and all non-detects will be flagged as unusable or rejected (R).

Matrix Spike: If the spike recovery is not within the control limits, data for that sample will be qualified appropriately. If the results of the matrix spike are greater than QC criteria (above the true concentration) all positive results will be flagged as estimated (J) and all non-detects will be reported unqualified. If the results of the matrix spike are less than QC criteria (below the true concentration) all positive results will be flagged as estimated (J) and all non-detects will be flagged as estimated (UJ). If the results of the matrix spike analyses are grossly below the true concentration, all positive results and all non-detects will be flagged as unusable or rejected (R). Field measurement data (i.e., pH, temperature) will be reviewed for completeness and accuracy only.

3.9 FIELD GENERATED QC SAMPLES

Quality control samples collected in the field and submitted to the laboratories along with the environmental samples are discussed in this section. The types of QC samples that will be collected during the monitoring program include: trip blanks, equipment blanks, and field duplicates. Field QC samples and frequency of collection are shown in Table 3-8.

3.9.1 Trip Blank

One trip blank will be submitted to the laboratory with each cooler of samples for volatile organic analysis. The analysis of this blank will provide a baseline measurement of any contamination that the samples may have been exposed to during transport. A trip blank will be comprised of a sample bottle filled with deionized, organic-free water, preserved, handled like a sample, and sent to the laboratory for analysis. Trip blanks will be prepared by the laboratory and will be submitted for liquid samples.

3.9.2 Equipment Blank

For non-dedicated sampling equipment, one equipment blank will be collected per sampling episode per sampling medium or at a frequency equal to approximately 5% of the samples collected for each media, whichever is more frequent. The analysis of these blanks will serve to verify the cleanliness of the sampling equipment. An equipment blank will be collected by rinsing decontaminated field equipment with water, transferring the water to a sample bottle, and submitting the sample for analysis. Deionized, organic-free water will be used. The equipment blank will be analyzed for the same parameters as the samples associated with that equipment.

3.9.3 Field Duplicates

Approximately 5% of all the samples will be collected in duplicate and submitted for laboratory analysis. Duplicates are two samples that will be collected independently from one sampling location during a single episode of sampling. Duplicates will provide information about sample variability.

3.9.4 Documentation and Review of Quality Control Activities

Custody of field quality control samples will be documented from the time of QC sample collection throughout transfer of the sample to the laboratory. Documentation of sample collection, shipment, laboratory receipt, and laboratory custody will be maintained in order to accomplish this objective. Field quality control samples will be packed and delivered along with their corresponding environmental samples.

3.10 LABORATORY GENERATED QC SAMPLES

The laboratory will comply with the QC sample requirements for the analytical methods used during this monitoring program. The QC sample types generally required by the analytical methods are described in the following sections. The type and frequency of laboratory QC samples is shown in Table 3-8.

3.10.1 Laboratory Control Standard

One laboratory control sample (LCS) will be analyzed with each batch of aqueous volatile samples supplied from the field and with each batch of samples prepared for inorganic analysis. A LCS will be analyzed for each batch of samples tested for inorganics. The LCS will routinely be used to establish the precision and accuracy of an instrument or procedure. The analytical results of the LCS will be recorded in the instrument logbook and on the control chart; results must be within the acceptable control limits. An LCS solution will be prepared by adding known quantities of an EMSL-Cincinnati Standard, a NIST Standard Reference Material, or a reference-traceable stock material to deionized water or the solvent of interest. A LCS solution will typically be carried through the entire sample preparation and analysis procedure.

3.10.2 Method Blank

One method blank will be analyzed with every batch of samples supplied from the field for VOC's and metals analysis. A method blank will be comprised of laboratory-pure, analyte-free water carried through the entire sample preparation and analysis procedure. Analysis of the method blank will provide a check of the background contamination due to sample preparation procedures.

3.10.3 Laboratory Replicates

Inorganic parameters will be analyzed in duplicate by the laboratory at a frequency of one per twenty samples. A replicate analysis will be produced by analyzing two aliquots of a single sample to determine analytical precision.

3.10.4 Matrix Spike/Matrix Spike Duplicates

One organic matrix spike and matrix spike duplicate pair will be analyzed for each combination of matrix and level (low or medium) at a frequency of one per twenty samples per matrix. The analyte spike will be added prior to digestion/distillation of the sample. If the spike recovery is not within the control limits specific to this project, the data for that sample will be qualified appropriately.

3.10.5 Surrogate Spikes

All collected samples requiring organic analysis by GC/MS or GC will be spiked with an appropriate set of surrogate standards prior to sample preparation. The surrogate standards will encompass the full range of types of organics to be analyzed in the sample and will also serve as checks on any matrix interference exhibited by the samples. If the percent recoveries of the surrogates are outside the acceptable method-required criteria limits given in Table 3-6, the associated samples will be treated as specified in the analytical method being followed.

3.10.6 Documentation and Review of Quality Control Activities

Laboratory quality control samples will be documented as specified by the analytical method. The QC activities pertinent to the analysis of each shipment of samples from the field will be documented in discrete sections of the analytical data report and will include:

- A case narrative describing any problems encountered with method blanks, matrix spike, and matrix spike duplicates, surrogate recoveries, initial calibration, and continuing calibration;
- Compilation of method blanks data;
- Compilation of matrix spike and matrix spike duplicates; and

- Surrogate recoveries data

3.11 PREVENTIVE MAINTENANCE

The ability to generate valid analytical data requires that all analytical instrumentation be properly and regularly maintained. The laboratories will maintain full service contracts on major instruments. These service contracts provide emergency service repair. The laboratories will keep large inventories of replacement parts for instruments and have mechanical and electrical repair capabilities in-house. Routine maintenance will be performed by laboratory personnel. Records of preventive maintenance for each instrument will be kept in a bound notebook.

Preventive maintenance of field equipment is also required in order to ensure the collection of valid field measurements. The field team leader will be responsible for maintenance on all field equipment.

3.12 DATA ASSESSMENT PROCEDURES

The following are procedures for evaluating the precision, accuracy, and completeness of analytical data generated during laboratory analysis for this monitoring program. The Project QA Manager will be responsible for overseeing data assessment and review.

3.12.1 Evaluation Of Analytical Precision and Accuracy

Precision and accuracy for all laboratory analyses will be ensured by adherence to protocols specified in the analytical methods specified in Tables 3-6 and 3-7.

3.12.2 Evaluation of Completeness

Completeness will be measured as the percentage of valid data points obtained compared to the amount expected to be collected. Factors that affect completeness by resulting in the loss of valid data can include exceedance of validation criteria or sample loss because of broken containers or other reasons.

3.12.3 Review of Data Quality

A review of data quality will be conducted on data that are not validated and following the validation of analytical data. The purpose of the review is to provide the following types of information pertinent to characterizing data quality:

Adequacy of data recording and transfer
Precision or bias of data
Adequacy of data calculation, generation, and processing
Documentation of procedures
Identification of data qualifiers to define the usability and limitations of the data

3.12.3.1 Evaluation of Analytical Precision

For replicate results D_1 and D_2, the RPD is calculated as follows:

$$RPD = \frac{D1 - D2}{(D1 + D2)/2} \times 100$$

When the RPD is obtained for at least ten (10) replicate pairs, the average RPD and the standard deviation are calculated using:

$$\bar{m} = \frac{\sum_{I=1}^{n} m_i}{n}$$

and

$$S_m = \frac{\left[\sum_{I=1}^{n} (m - \bar{m})^2\right]^{1/2}}{n - 1}$$

where:

$\bar{m}$	=	the average of the Relative Percent Difference determinations,
m	=	the RPD of a replicate pair,
Sm	=	the standard deviation of the data set of RPD determinations,
n	=	the number of RPD determinations.

3.12.3.2 Evaluation of Analytical Accuracy

To determine the accuracy of an analytical method and/or the laboratory analyst, a periodic program of sample spiking will be conducted. The results of sample spiking will be used to calculate the quality control parameter for accuracy evaluation, the %R. The %R will be defined as 100 times the observed concentration, minus the sample concentration, divided by the true concentration of the spike.

$$\%R = \frac{O_i - O_s}{T_i} \times 100$$

where:

$\%R$	=	the percent recovery,
O_i	=	the observed spiked sample concentration,
O_s	=	the sample concentration;
T_i	=	the true concentration of the spike.

The true concentration is calculated from:

$$Ti = \frac{\text{Spike Conc. [c] (mg/L) x Volume of Spike (mL)}}{\text{Volume of Sample (mL) + Volume of Spike (mL)}}$$

When the percent recovery is obtained for at least ten spiked samples, the mean percent recovery and the standard deviation are calculated using the formulae:

$$\overline{\%R} = \frac{\sum_{I=1}^{n} \%R_i}{n}$$

and

$$S_r = \frac{[\sum_{I=1}^{n} (\%R_i - \overline{\%R})^2]^{1/2}}{n - 1}$$

where:

$\overline{\%R}$	=	the mean percent recovery;
$\%R_i$	=	the mean percent recovery of a single spiked sample;
n	=	the number of results;
S_R	=	the standard deviation of the data set of percent recovery determinations.

3.12.4 Evaluation of Field Data

The accuracy and precision of field measurements are given in Table 3-7. Even though field measurements produce definitive data, the simplicity of the measurements eliminates the need for extensive QC analyses; also, the equations used in the evaluation of accuracy and precision of laboratory data are not applicable to the field measurements to be performed. The field data are used to determine stability prior to sampling and, therefore, do not require a data quality assessment such as that performed for the laboratory data. Parameter stability for pH, temperature, and specific conductance will be defined as achieved when three consecutive measurements are within ± 0.1 pH units, ± 1 °C and ± 20 μmhos, respectively.

3.13 CORRECTIVE ACTION PROCEDURE

Corrective action procedures will be initiated when a failure to properly follow project plans is recognized. Errors in following sampling protocols or improperly or inadequately decontaminating sampling equipment may make it impossible to meet the data quality objectives. Ordinarily, dedicated equipment will be used. Therefore, the deficiencies noted in following standard protocol will be addressed immediately upon recognition.

Corrective action procedures for this project may be the result of a field surveillance activity or an observation made by a field team member or other trained personnel. The person recognizing the failure is responsible for bringing the error to the attention of the responsible party (i.e., the person improperly following procedures), making note of the problem in the field notebook, and notify the Program QA Manager.

The Program QA Manager will issue a Non-Conformance Report for all areas signaling significant and systematic deficiencies to the Project Manager. Each NCR requires that a Corrective Action Report (CAR) be completed by the project manager and project QA manager to the Sparton program QA manager. A QA file will be used to track NCRs and CARs. These reports will be addressed in the final removal action report where appropriate.

Corrective action by the laboratory will be implemented whenever out-of-control events exist. If the analyst perceives problems which may affect data quality, it is his/her responsibility to report the event to his/her supervisor. If the supervisor determines that the problem will affect data quality, he/she will initiate corrective action and the client should be contacted by the laboratory Quality Assurance Officer. Samples analyzed during out-of-control situations will be reanalyzed prior to reporting of results.

Corrective action procedures to be implemented by the laboratories will be addressed in the laboratory's QAPP. Quality control records addressing daily instrumental calibration, instrumental control limits, method detection limits, and analyses of quality control samples will be maintained for five years. Any problems encountered and corresponding corrective action will be documented by the laboratory.

3.14 REFERENCES

U.S. Environmental Protection Agency (U.S. EPA). 1983. *Methods for Chemical Analysis of Water and Wastes*. EPA-600/4-79-020. March 1983.

U.S. Environmental Protection Agency (U.S. EPA). 1986. *Test Methods for Evaluating Solid Waste*. SW-846, 3rd Edition. September, 1986.

U.S. Environmental Protection Agency (U.S. EPA). 1992. *Test Methods for Evaluating Solid Waste*. SW-846, Updates I, 3rd Edition. June, 1992

U.S. Environmental Protection Agency (U.S. EPA). 1994. *Test Methods for Evaluating Solid Waste*. SW-846, Update II, IIA, IIB, 3rd Edition. July, 1994.

U.S. Environmental Protection Agency (U.S. EPA). 1996. *Test Methods for Evaluating Solid Waste*. SW-846, Update III, 3rd Edition. December, 1996.

SECTION FOUR
REPORTING AND SCHEDULING

The GWMPP will generate data to monitor changes in the plume configuration and concentrations. Specific deliverables will be submitted as described below and presented in Table 4-1.

4.1 SEMI-ANNUAL PROGRESS REPORTS

Mr. Michael Hebert of EPA Region 6 , and Mr. Dennis McQuillan, Mr. Baird Swanson, and the chief of the HRMB, of NMED, will be notified two weeks prior to each scheduled sampling event.

Sparton will provide Mr. Michael Hebert of EPA Region 6, and Mr. Dennis McQuillan, Mr. Baird Swanson, and the chief of the HRMB, of NMED, with signed semi-annual progress reports while implementing the Groundwater Monitoring Program Plan. For the purpose of this Groundwater Monitoring Program Plan, analytical reports submitted shall only include analytical data set summaries, unless the full analytical package is requested. The semi-annual progress reports will be submitted within 60 days of Sparton's receipt of all the analytical data and will include water level summaries and analytical data summaries. Sparton will provide quarterly progress reports within 60 days of Sparton's receipt of all analytical data, if requested by EPA or NMED. The quarterly progress reports will include water level summaries and analytical data summaries.

In addition to the semi-annual progress reports and possible quarterly progress reports, the Site Annual Report described in Consent Decree Attachment D will include the following elements:

- A description of significant activities (e.g. sampling events, groundwater elevations data, summary of analytical results, etc.) and work completed/work accomplishments during the reporting period;

- Potentiometric surface maps and contaminant concentration contour maps (annual basis);

- Summaries of all contacts between groundwater sampling personnel and representatives of the local community, public interest groups or State government during the reporting period associated with the implementation of this plan;

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

- Actions being taken and/or planned to rectify problems; and,

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

4.2 ANALYTICAL DATA PACKAGES

The analytical data packages from the laboratory shall be received by Sparton's project chemist or quality assurance officer within 21 business days of the collection of samples in the field. The analytical data reports shall contain a minimum of the following:

- Analytical data for each sample submitted for analysis;
- Procedure used for each requested analysis performed;
- Date of sample receipt;
- Date of sample extraction, digestion and date of analysis;
- Matrix of each sample analyzed;
- Volume or weight of sample digested and/or analyzed;
- Estimated Quantitation Limits (EQLs) for each parameter;
- Method or Preparation Blank analytical results associated with the project samples;
- Laboratory Control Sample (LCS) Recoveries;
- Project specific and/or batch Matrix spike/Matrix Spike Duplicate (MS/MSD) Recoveries and Relative Percent Differences (RPD);
- Surrogate Recoveries for organic analyses;
- Initial and Continuing Calibration associated with each analysis;
- Case Narrative documenting any out-of-control events during sample analysis;
- Technical problems, quantitation limit adjustments due to interferences; and
- Analysis with respect to holding time requirements.

The analytical reporting as outlined above shall allow for the data review and validation as stated in Section Three.

4.3 CORRECTIVE ACTION REPORTS

Corrective action procedures shall be initiated when a failure to properly follow project plans is recognized. Errors in following sampling protocols or improperly or inadequately decontaminating sampling equipment may make it impossible to meet data quality objectives. Therefore, the deficiencies noted in following standard protocol will be addressed immediately upon recognition.

Corrective action procedures for this project may be the result of a field surveillance activity, a direct result of performance, or an observation made by a field team member or other trained personnel. The person recognizing the failure is responsible for bringing the error to the attention of the responsible party (i.e. the person improperly following procedures), making note of the problem in the field notebook, and modify the program QA manager. The program QA manager shall issue a Non-Conformance Report (NCR) for all areas signaling significant and systematic deficiencies to the project manager. Each NCR required that a Corrective Action Report (CAR) be completed by the project manager to the program QA manager.

A QA file will be used to track NCRs and CARs. These reports will be addressed in the final corrective action measure report where appropriate.

Corrective action by the laboratory shall be implemented whenever out-of-control events exist. If the analyst perceives problems which may affect data quality, it is his/her responsibility to report the event to his/her supervisor. If the supervisor determines that the problem will affect data quality, he/she will initiate corrective action and the client should be contacted by the laboratory Quality Assurance Officer. Sample analyzed during out-of-control situations shall be reanalyzed prior to reporting of results.

SECTION FIVE
FIELD PROCEDURES

The following sections describe field procedures related to the collection and analysis of groundwater and the measurement of water levels. The field procedures comply with the requirements specified in the Corrective Action Plan for the Sparton facility, presented as Attachment I of the Final Administrative Order RCRA-VI-001(h)-96-H (USEPA, February 1998).

5.1 INDEX OF FIELD PROCEDURES

PROCEDURE:	DESCRIPTION:
P-1	Well Purging
P-2	Groundwater Sampling
P-3	Redox-Potential, Dissolved Oxygen, Temperature, pH, and Conductivity Measurements and Equipment Calibration
P-4	Measurement of Depth to Water, Total Depth, and Nonaqueous Phase Liquids
P-5	Decontamination of Non-Dedicated Sampling Equipment
P-6	Well Development
P-7	Calculation of Borehole and Purge Volumes
P-8	Borehole and Well Abandonment
P-9	Surveying

Procedure P-1

WELL PURGING

1.0 PURPOSE

The purpose of this procedure is to provide general information on well purging by the pumping method or bailing method prior to the sampling of groundwater wells. The methods and equipment described are for the purging prior to the collection of water samples from the saturated zone.

2.0 SCOPE

This procedure applies to purging variable volumes of water. The wells need to be properly purged prior to sampling to obtain a representative sample from the well location.

3.0 REQUIREMENTS

Methods for purging from completed wells include the use of pumps, bailers, and various types of samplers. The primary considerations in obtaining a representative sample of the groundwater are to avoid collection of stagnant (standing) water in the well and to avoid physical or chemical alteration of the water due to purging and sampling techniques.

4.0 EQUIPMENT

The following equipment may be needed to purge the groundwater wells.

4.1 Purge pump, sample pump, or bailer
4.2 Compressed gas or air compressor
4.3 Water Level Indicator
4.4 Portable Tank to contain the purge water
4.5 Field Logbook
4.6 Calculator
4.7 Groundwater Sampling Form
4.8 Disposable Latex or Nitrile Gloves
4.9 Teflon or other appropriate purging/sampling tubing
4.10 pH, temperature, and conductivity meter(s)

4.11 HNu or OVA as appropriate for health and safety screening

5.0 PROCEDURE FOR WELLS WITH GOOD (HIGH) RECHARGE RATES

Good or high recharge wells are those wells which can be reasonably purged of the required three well volumes within a reasonable time frame.

The groundwater wells with good (high) recharge rates shall be purged according to the following procedure. Details regarding the groundwater sampling procedure and field data will be recorded in both a bound field log book and on the groundwater sampling form. All non-dedicated purging equipment shall be decontaminated prior to and after use per procedure P-5 or dedicated or disposable equipment shall be used.

1. The wells shall be unlocked and the caps removed. Appropriate health and safety procedures shall be followed to protect against potential exposure to organic vapors which may include screening the well with an HNu or OVA. In the event that an HNu or OVA is utilized, all readings shall be recorded in the field logbook.

2. Procedure P-4 should be followed to determine the presence of immiscible layers, when appropriate (for select on-site wells) and to determine the depth of water and total depth of the well. In the event that a dedicated pump is stationed in the well preventing total depth measurements, historical well depths from previous soundings or the well construction logs shall be used.

3. The volume of water to be purged from the well is determined using procedure P-7.

4. Once the volume of water to be removed is calculated, a dedicated pump, disposable bailer or decontaminated non-dedicated pump will be used to remove the water form the well and place it in a portable tank. If a pump is used, it shall be at an appropriate rate that prevents extremely rapid drawdown, allows for adequate recharge, and minimizes turbidity and aquifer disturbance. The portable tank shall be graduated so that the amount of water purged from the well can be measured or the pumping rate and duration shall be closely monitored to assure adequate purge volume removal.

5. To document that the wells have been adequately purged, specific conductance, temperature, and pH (See Procedure P-3) shall be measured utilizing appropriate meters. The meters shall

be properly calibrated and used in a manner consistent with the manufacturers specifications. The readings shall be collected in accordance with Procedure P-3. Once the well has been properly purged and the parameters have stabilized the water samples can be collected as described in Procedure P-2.

6.0 PROCEDURE FOR WELLS WITH POOR (LOW) RECHARGE RATES

Poor or low recharge wells are those wells which can not be reasonably purged of the required three well volumes within a reasonable time frame.

The groundwater wells with poor (low) recharge rates shall be purged according to the following procedure. Details regarding the groundwater sampling procedure and field data will be recorded in both a bound field log book and on the groundwater sampling form. All non-dedicated purging equipment shall be decontaminated prior to and after use per procedure P-5 or dedicated or disposable equipment shall be used.

1. The wells shall be unlocked and the caps removed. Appropriate health and safety procedures shall be followed to protect against potential to organic vapors which may include screening the well with an HNu or OVA. In the event that an HNu or OVA is utilized, all readings shall be recorded in the field logbook.

2. Procedure P-4 should be followed to determine the presence of immiscible layers when appropriate (for select on-site wells) and to determine the depth of water and total depth of the well.

3. The volume of water to be purged from the well is determined using procedure P-7.

4. The wells will be evacuated of water using a disposable bailer with care taken to minimize agitation.

5. For poor recharge wells, it will not be necessary to demonstrate that pH, conductivity, and temperature have stabilized. One measurement of pH, conductivity, and temperature will be made and recorded during the purging event.

Procedure P-2

GROUNDWATER SAMPLING

1.0 PURPOSE

The purpose of this procedure is to obtain groundwater samples that are representative of the source from which they are taken and minimize sampler exposure to groundwater contaminants.

2.0 SCOPE

This procedure provides information on proper equipment and techniques for groundwater sampling. The techniques described should be followed whenever applicable, noting that site-specific conditions, may require adjustments in methodology.

3.0 REQUIREMENTS

Generally, wells should be sampled immediately following purging or within three hours of purging. However, wells with poor recharge rates should be sampled within 24 hours of purging. Poor recharge wells are those that cannot be reasonably purged of three well volumes. If the well is evacuated of water during purging prior to removal of the required volume, the well may be sampled once the well has recharged to a water level that allows for the required samples to be obtained.

Applicable preservatives must be added to the sample containers before the sample is added to the container. All non-dedicated sampling equipment must be decontaminated in accordance with the Field Procedure P-5, before commencement of sampling.

4.0 SAMPLING EQUIPMENT

The following pieces of equipment may be needed to collect groundwater samples.

4.1 Sample Containers
4.2 Submersible or dedicated sample pumps or disposable bailers
4.3 Coolers for sample shipping and cooling
4.4 Labels

4.5 Appropriate Packing Cartons and Filler
4.6 Chain-of-Custody Documents
4.7 Camera and Film
4.8 Appropriate Keys (for locked wells)
4.9 Water Level Indicator
4.10 Field Logbook
4.11 Well Sampling Form
4.12 Indelible Marking Pens
4.13 Plastic Trash Bags
4.14 Disposable Latex or Nitrile Gloves
4.15 Ice
4.16 Teflon or appropriate sampling tubing
4.17 55-gallon drums
4.18 Field Filtration Apparatus and Filters

5.0 PROCEDURE

5.1 General

To be useful and accurate, a groundwater sample must be representative of the particular saturated zone of the substrata being sampled. Wells will be purged prior to sampling by the use of a dedicated submersible pump or bailers as described in Procedure P-1. Water produced during purging and well sampling shall be collected in 55-gallon containers. Details regarding the groundwater sampling procedure and field data will be recorded on the groundwater sampling form. The following procedures shall be adhered to when sampling the monitoring wells.

1. The well shall be purged as described in Procedure P-1.

2. Samples shall be collected by discharging the water directly into the required containers. In the event additional samples are collected and filtered for dissolved metal analysis, the samples will be placed into the required container following field filtration. After the purge period, dedicated purge/sampling pumps will be adjusted to achieve a minimum smooth steady flow appropriate for sample collection, consistent with rates to be established during November 1999 sampling event, and to be reported in the first annual report.

3. The samples for VOC's analysis shall be collected first in 3-40 mL vials with Teflon-lined

lids. The vials shall be completely filled so that no headspace is present. Samples for metals analysis shall be collected last in a 250 ml, 500 ml or 1 L polyethylene bottle pre-preserved with nitric acid (HNO_3).

4. Prior to or subsequent to sample collection, additional well water shall be collected for the field measurement of dissolved oxygen and redox-potential consistent with the protocols of Procedure P-3, when necessary.

5. When samples to be filtered are obtained using a disposable bailer, the water will be emptied from the bailer into a new polyethylene cubitainer. The water will be drawn from the cubitainer using a Geotech Series 2 peristaltic pump, pushed through a 0.45 um disposable cartridge filter and discharged directly into the appropriate sample containers. Following sample collection, the peristaltic pump will be reversed to evacuate the filter prior to disposal. The evacuated water will be disposed with the purge water. The tubing used in the peristaltic pump will be dedicated to each well or new tubing will be used for each well.

   When samples to be filtered are obtained using a bladder pump, the water will be pushed through a 0.45 um disposable cartridge filter and discharged directly into the appropriate sample containers. The filter will be drained prior to disposal.

6. The samples shall be labeled and immediately be placed in a cooler containing ice to maintain a temperature of 4 degrees Celsius. Ideally, a temperature blank should be provided by the laboratory to accompany the ice chest and is used to verify that the samples have been stored at the proper temperature during sample delivery. The label on the sample container shall contain the following information.

   Project name and number
   Sample identification
   Analysis
   Sampler's Initials
   Sample Date and Time
   Preservatives

7. The cooler shall be sealed and shipped or hand delivered to the laboratory for analysis.

Procedure P-3

REDOX-POTENTIAL, DISSOLVED OXYGEN, TEMPERATURE, pH, AND CONDUCTIVITY MEASUREMENTS AND EQUIPMENT CALIBRATION

1.0 PURPOSE

The purpose of this procedure is to provide information on how to perform the measurements of redox-potential, dissolved oxygen, turbidity, temperature, pH, and conductivity in the field. The field measurements of pH, temperature, and conductivity are to be collected during the well purging process (Procedure P-1) and the well development process (Procedure P-6) to determine when well purging and development is complete (i.e. stabilization). In addition to pH, temperature, and conductivity readings, measurement of turbidity shall be collected and stabilized during the well development process. The collection of dissolved oxygen and redox-potential measurements can be completed during the purging or well sampling process. The dissolved oxygen and redox-potential measurements are factors relating to long-term aquifer monitoring and restoration and are to be collected on an annual basis.

2.0 SCOPE

This procedure addresses the field measurement of redox-potential, dissolved oxygen, temperature, pH, and conductivity using appropriate instrumentation which may include using flow-through cells or down-hole water quality loggers, or combination or individual parameter meters.

3.0 REQUIREMENTS

For monitoring wells with good or high recharge rates, the field measurements of temperature, pH, and conductivity should be stabilized prior to sampling groundwater from a monitoring well. If the parameters have not stabilized, then additional water will need to be removed until stabilization occurs. Stabilization is achieved when three consecutive readings for the parameters of temperature, pH, and conductivity are within $\pm$ 1° Celsius, $\pm$ 0.1 pH units, and $\pm$ 20 μmhos/cm, respectively. The field measurements will be made either in the well ahead of the pump intake in the case of a down-hole meter, or "in-line" prior to the purge water container in the case of a flow-through cell meter, or at the discharge of the pump tubing in the case of hand held meters. Readings collected with the pH meter, conductivity meter, and thermometer or electronic meter shall be obtained at regular intervals during the purging process and continued as necessary until stabilization has occurred.

For wells with poor or low recharge rates, it will not be necessary to demonstrate that pH, conductivity, and temperature have stabilized. One measurement of pH, conductivity, and temperature will be made and recorded during the purging event.

The collection of dissolved oxygen and redox-potential measurements can be completed during the purging or well sampling process and is a one-time reading (not consecutive readings) collected on an annual basis.

4.0 EQUIPMENT

4.1 Disposable Latex or Nitrile Gloves
4.2 Field Logbook
4.3 Teflon® or appropriate purging/sampling tubing
4.4 Drums to collect purging or excess sampling water
4.5 Plastic Cups
4.6 pH Meter/Buffer Solutions
4.7 Conductivity Meter/Calibration Solutions
4.8 Temperature Thermometer or Electronic Meter
4.9 Dissolved Oxygen Meter, Oxidation-Reduction Potential (ORP) Meter, and Flow-Through Cell (if necessary)

5.0 PROCEDURE

A pH meter, conductivity meter, and temperature thermometer or electronic meter, will be used to collect the measurements of pH, conductivity, and temperature during well purging or well development. A dissolved oxygen meter and a redox-potential meter will be utilized to collect dissolved oxygen and redox-potential measurements after well purging or during well sampling on an annual basis. In general, a best effort should be made to collect the measurements simultaneously and from the same representative water. The respective meters are to be calibrated in accordance with standard industry practice and in accordance with the manufactures recommended protocols. In general, the meters are calibrated and utilized for the collection of measurements by the following general procedures:

Calibration and Collection for Dissolved Oxygen

The oxygen probe should be calibrated daily. The oxygen probe will be calibrated and operated in accordance with the manufacturer's procedures.

Calibration and Collection for pH with pH Meter

The pH meter must be calibrated using buffer solutions with known values. A two point calibration will be used. The following steps will be followed to calibrate the pH meter and obtain readings.

1. The probe on the pH meter shall be rinsed with distilled water.

2. Gently remove any water droplets from the probe before using the buffer solutions.

3. Place the meter into the 7.0 buffer solution. Turn the meter on. If the meter does not read 7.0, the meter will need to be adjusted.

4. Adjust the meter in accordance with manufacturers specifications until 7.0 appears on the meter.

5. Remove the meter from the 7.0 buffer solution. Rinse the probe with distilled water.

6. Gently remove any water droplets.

7. Place the mater into the 10.0 buffer solution. Turn the meter on. If the meter does not read 10.0, adjust the meter as discussed in Step #4.

8. Remove the meter from the 10.0 buffer solution. Rinse the probe with distilled water.

9. Pump some water from the well into a plastic cup. Turn the pH meter on and place it in the water. Record the reading.

10. Readings collected with the pH meter shall be obtained at regular intervals during the purging process and continued as necessary until stabilization has occurred. Stabilization is achieved when the pH parameter measurements are within ± 0.1 pH units.

Calibration and Collection for Conductivity with Conductivity Meter

The conductivity meter must be calibrated using buffer solutions with known values. The buffer solutions to be used will have a value of between 500 and 1500. The meter shall be calibrated and operated in accordance with manufacturer's specifications and procedures.

Temperature Readings

Temperature readings will be taken with an alcohol-filled scientific thermometer or electronic meter. The temperature readings shall be recorded in degrees Celsius. The following steps should be followed when obtaining temperature readings.

1. Rinse the thermometer with distilled water.

2. Gently remove any water droplets.

3. At the same time pH and conductivity readings are collected, a third cup or the cup on the thermometer shall be filled with water from the well. The thermometer shall be placed into the cup and a temperature recorded or a direct reading shall be collected from the electronic meter.

4. Remove the thermometer and rinse it with distilled water.

5. Readings collected with the thermometer shall be obtained at regular intervals during the purging process and continued as necessary until stabilization has occurred. Stabilization is achieved when the temperature parameter measurements are within ± 1 ° Celsius.

Calibration and Collection for Redox Potential

The redox-potential probe should be calibrated daily. The redox-potential probe will be calibrated and operated in accordance with the manufacturer's specifications and procedures.

Procedure P-4

MEASUREMENT OF DEPTH TO WATER, TOTAL DEPTH, AND NON AQUEOUS PHASE LIQUIDS

1.0 PURPOSE

The purpose of this section is to provide information on the proper measurement of piezometric head levels, total depth of monitoring wells, and determining the presence and measurement of immiscible liquids.

2.0 SCOPE

This section provides guidance for obtaining water level measurements, total depth measurements, the thickness of non aqueous phase liquids (if present), and determination of well volumes. These procedures are frequently conducted in conjunction with groundwater sampling and the preparation of potentiometric surface maps. Only select monitoring wells as presented below will be gauged on a one-time basis (assuming non-detect) for the presence of non aqueous phase liquids.

3.0 REQUIREMENTS

Groundwater level measurements should precede groundwater purging or sampling and should progress from non-impacted wells to wells which are known to be impacted.

4.0 EQUIPMENT

The following equipment may be needed to measure the depth to water, total depth, and thickness (if present) of immiscible layers.

4.1 Disposable Latex or Nitrile Gloves
4.2 Water Level Indicator
4.3 Oil-Water Interface Probe
4.4 Appropriate Keys (for locked wells)
4.5 Field Logbook
4.6 Groundwater Sampling Form

5.0 PROCEDURE

1. Wells that have a water tight or pressure cap should be unsealed at least 24 hours prior to measurement to allow for water levels to stabilize. The protective casing will remain locked during this time period to prevent vandalism.

2. Check operation of water level indicator above ground. All water level indicators must be decontaminated by rinsing with distilled water before and after each use per Procedure P-5. In general, water level measurements should first be collected from monitoring wells that are not contaminated or have minimal contamination and proceed to wells which have elevated concentrations of contaminants.

3. All information shall be recorded in the field log book and on the groundwater sampling form (if sampling is to occur).

4. The presence of non-aqueous phase liquids (DNAPL) will be determined using an interface probe by first checking the surface of the groundwater and then slowly taking continuous readings until the bottom of the well is reached. Specifically, on-site monitoring wells MW-16, MW-18, MW-23 through MW-26, and MW-32, should be gauged once to verify the presence/absence of DNAPL. If DNAPL is detected, the respective wells should be monitored quarterly for DNAPL and thickness measurements should be recorded on sample logs. If the interface probe indicates a change in potential (most meters have an audible alarm and/or light system; see specific meter operating manual), the depth shall be recorded per step five of this procedure. No further gauging for DNAPL will be required if it is not detected in the above on-site wells unless changes in site specific conditions merit DNAPL reevaluation.

5. Measurements should be taken from a surveyed reference mark on the top edge of the well head. All measurements are to be accurate to the nearest 0.01 foot.

6. Measurements of depth to water, total depth, and depth to top and bottom of all immiscible layers are to be recorded along with the date and time of measurement, well number, diameter of the well, and visual condition of the well.

Procedure P-5

DECONTAMINATION OF NON-DEDICATED SAMPLING EQUIPMENT

1.0 PURPOSE

The purpose of this section is to provide information on the proper decontamination of non-dedicated sampling equipment used to perform field investigations.

2.0 SCOPE

This procedure addresses decontamination of all field sampling equipment.

3.0 REQUIREMENTS

To ensure that chemical analysis results are reflective of the actual concentrations present at sampling locations, equipment used in sampling activities must be properly cleaned and decontaminated prior to and following each use. This will minimize the potential for cross-contamination between sampling locations and the transfer of contamination off-site.

4.0 DECONTAMINATION EQUIPMENT

The following equipment may be needed to properly decontaminate sampling equipment.

4.1 Disposable Latex or Nitrile Gloves
4.2 Laboratory Grade Non-Phosphate Detergent
4.3 Tap Water
4.4 Distilled Water
4.5 Aluminum Foil
4.6 Scrub Brushes
4.7 Four to Six 55-gallon Drums
4.8 Pressure Washer

5.0 PROCEDURE

5.1 Decontamination of Non-Dedicated Groundwater Sampling Equipment

Prior to and after the collection of groundwater samples, sampling equipment shall be decontaminated by the following procedure.

Water Level Meter Tape

1. Rinse several times with distilled water.

Procedure P-6

WELL DEVELOPMENT

1.0 PURPOSE

The purpose of this procedure is to attempt to remove fine particulate matter from the formation near the well intake. The methods and equipment discussed are for the development of a well following installation and prior to purging and sampling.

2.0 SCOPE

This procedure applies to removing fine particulate matter from the geologic formation near the well intake. The wells need to be properly developed so that the water sampled will not be turbid and so that the viability of the water quality analysis will not be impaired.

3.0 REQUIREMENT

Methods for well development may include the use of, air ejector pumps, bailers, submersible pumps, and jetting tools. The primary consideration in well development is to remove fine particulate matter from the well so that the analyses of samples is not impaired.

4.0 EQUIPMENT

The following equipment may be needed to develop wells:

4.1 Bailer, or Jetting Tool
4.2 Electric Submersible Pump or Air Ejector Pump
4.3 Water Level Meter Tape
4.4 Portable Tank to Contain the Development Water
4.5 Field Logbook
4.6 Plastic Sheeting
4.7 Disposable Latex or Nitrile Gloves
4.8 Teflon or Appropriate Tubing
4.9 HNu or OVA

5.0 PROCEDURE

The groundwater wells will be developed according to the following procedure:

1. The wells shall be unlocked and the caps removed. Appropriate health and safety procedures shall be followed to protect against potential exposure to organic vapors which may include screening the well with an HNu or OVA. In the event that an HNu or OVA is utilized, all readings shall be recorded in the field logbook.

2. Well development shall include the removal of water added and lost to the formation during the well installation process. At a minimum, two-times the volume of water lost must first be removed.

3. At a minimum, well development shall consist of the removal of a three well volumes as calculated by Procedure P-7. The well will be pumped until the water is visibly observed to be clear.

4. Well specific devices, such as bailers, submersible pumps, and jetting tools, shall be used to develop and remove water from the well. The following procedures will apply to wells of a specific size:

   - 2-inch wells: Wells that are 2-inch in diameter shall be developed using decontaminated bailers and/or air ejector pumps.

   - 4-inch wells: Wells that are 4-inch in diameter shall be developed using a combination of jetting and pumping. A jetting tool will be placed above a four-inch electric submersible pump. The well will be jetted by closing the a valve on top of the drop pipe and working the jetting tool up and down within the screen interval. After each jetting cycle, the valve will be opened and the well will be pumped until the water is clear. Following jetting, the jetting tool will be removed and the pump will be placed back in the well and operated until three well volumes have been removed from the well, and the water being pumped is visibly observed to be clear.

Procedure P-7

CALCULATION OF BOREHOLE AND PURGE VOLUMES

1.0 PURPOSE

The purpose of this procedure is to calculate the standing volume of water within a well and to determine the requisite volume of water to be removed during well purging or development for wells with good or high recharge rates.

2.0 SCOPE

This procedure applies to groundwater purging prior to sampling or well development. This procedure is intended to ensure that standing water within the well is removed prior to sampling.

3.0 REQUIREMENTS

Procedure P-4 (Measurement of Depth to Water, Total Depth, and Non Aqueous Phase Liquids) should be completed prior to initializing this procedure.

4.0 EQUIPMENT

The following equipment may be needed to determine the standing and purge volumes of a well.

4.1 Well Construction Log
4.2 Groundwater Sampling Form
4.3 Field Logbook
4.4 Calculator

5.0 PROCEDURE

1. Complete the following form and attach to Groundwater Sampling Form.

CALCULATION OF WELL VOLUMES

WELL ID:____________ DATE:__________

Parameter Definitions:	Parameter:	Symbol:
Depth to water from MP*:	__________ ft.	D
Total Depth of well from MP:	__________ ft.	TD
Height of water column in well*:	__________ ft.	TD - D = h
Radius of well casing:	__________ in.	r_w

Volume per lineal foot given a diameter:__________ gal/liner ft. c

diameter:	gal./linear ft.:	diameter:	gal./linear ft.:
2 in.	0.17	7.25 in.	2.14
3 in.	0.38	7.75 in.	2.45
4 in.	0.66	8.25 in.	2.78
6 in.	1.5	10.25 in.	4.29
8 in.	2.6	12.25 in.	6.13

VOLUME CALCULATIONS:

volume of water in casing, v_c:

v_c = c x h ________ x ________ = ________ gal.

TOTAL VOLUME TO BE REMOVED:

$v_R = 3\ (v_C)$ 3 x ____________ = ________ gal.

Notes:

MP = Measuring Point

* = or depth to/from packer for wells so equipped.

Procedure P-8

BOREHOLE AND WELL ABANDONMENT

1.0 PURPOSE

This section describes the methods of securing a borehole or monitoring well from external contamination after testing is completed.

2.0 SCOPE

This procedure applies to the abandonment of test holes and wells.

3.0 REQUIREMENTS

The potential exists for a borehole or well to act as a migratory pathway for contaminants into groundwater or the unsaturated soils. Therefore, specific procedures must be established to prevent this potential occurrence. The State of New Mexico, through specific regulation at 20 NMAC 6.2 Section 4107.C, has identified specific requirements for the plugging, abandonment, or destruction of monitoring or water supply wells. These requirements shall be followed in the event that any monitoring well is proposed for abandonment.

4.0 EQUIPMENT

4.1 Well Construction Log
4.2 Field Logbook
4.3 Drill Rig equipped with the appropriate tooling
4.4 Bentonite Powder
4.5 Bentonite Chips or Pellets
4.6 Portland Type I Cement
4.7 Clean, Potable Water

5.0 PROCEDURE

Monitoring wells or borings requiring abandonment shall be abandoned in accordance with State of New Mexico regulations and guidance. In general, the procedures identified below represent standard industry practices for the abandonment of bore holes and monitoring wells.

1. Boreholes that have been damaged to such an extent that they are no longer functional shall be identified to the regulatory agencies.

2. Boreholes that have served their intended purpose and are no longer required, shall be identified to the regulatory agencies.

3. Abandonment of boreholes or wells on or off-site, shall not be initiated until written notification has been received from the regulatory agencies. This notification shall include a specific location or unique identification number for each borehole or well to be abandoned.

4. The well casing will be perforated in significant intervals which are either not grouted or not screened. The well will then be filled with grout using a tremie pipe. The well will then be pressure grouted to assure that the annular space in screened and perforated intervals are properly grouted.

5. The grout will consist of water mixed with 94 pounds of Portland type I cement to which five pounds of bentonite powder is added. The mixture shall weigh 13.5 to 14.0 pounds per gallon.

6. The grout shall be placed in such a fashion as to prevent voids or air pockets from forming.

7. A written abandonment report shall be sent to all authorizing agencies stating what abandonment occurred and how it was performed.

8. The Groundwater Monitoring Program Plan will be updated to reflect the abandonment of any monitoring wells.

Procedure P-9

SURVEYING

1.0 PURPOSE

The purpose of this procedure is to outline the requirements for performing engineering measurements and other land surveying for the purposes of establishing benchmarks, baselines, and mapping of sampling locations and altitudes.

2.0 SCOPE

This procedure describes the minimum standards for surveying procedures and required results associated with determining sampling locations and altitudes. These measurements will rely primarily on the use of pre-established benchmarks, baselines, or monuments. This procedure does not take precedence over detailed site specific surveying needs that may be required for engineering design or construction.

3.0 REQUIREMENTS

Surveying operations may be performed before or after sampling locations are established. The altitude of wellheads must be measured by the surveyor after the well has been installed. All surveying is to be performed by a licensed surveyor who is Registered in the State of New Mexico.

4.0 EQUIPMENT

The equipment utilized for surveying shall be of types which are appropriate for obtaining the results and accuracies specified within this procedure. All measuring devices must be recently calibrated in accordance with the particular manufacturer's recommendations and, where appropriate, calibrated against a comparable National Bureau of Standards calibrated device.

5.0 PROCEDURE

The required survey accuracy and precision depends on the intended purpose of the survey work. Such requirements could range from gross estimation to determination of monitoring well heads to 0.01 feet in order to evaluate groundwater gradients. However, no more than Third Order Accuracy will be required for sampling station location and altitude measurement.

Leveling Accuracy: Order of accuracy for leveling is determined by comparing the two differences of altitude obtained by running levels I both directions over a line, and comparing the difference in feet against the following standard:

- First Order   I.e. 0.017 x (M)
- Second Order   I.e. 0.035 x (M)

- Third Order I.e. 0.05 x (M)
- Fourth Order 0.1 to 0.5 x (M)

Traverse Accuracy: Order of accuracy for measured distances in a traverse are determined by comparing the closure error in position of the traverse as a portion of the total traverse distance measured against the following standard:

- First Order 1 in 25,000
- Second Order 1 in 10,000
- Third Order 1 in 5,000
- Fourth Order 1 in 1,500

5.2 MONITORING AND PUMPING WELLS OR PIEZOMETERS

The surveyor will measure and mark the altitude of the top of the ~~inner casing~~ well head to 0.01 feet as this point will be used as a reference to measure precise groundwater altitudes. The wellhead elevation and the well designation shall be permanently recorded directly on the protective casing.

5.6 REPORTS AND DOCUMENTATION

The Registered Surveyor shall submit a map to the Project Manager at the completion of each survey assignment. The map shall identify the elevation and grid coordinates for each monitoring well. Additional information that may be appropriate to document includes: the activity, personnel involved, survey approach used, benchmark location, construction, and elevation, and any technical evaluations that were made in the performance of the work.

FIGURES

Pinnacle Laboratories Inc.

DATE: ____________ PAGE: ___ OF ___

SHADED AREAS ARE FOR LAB USE ONLY.

PLEASE FILL THIS FORM IN COMPLETELY.

PROJECT MANAGER:

COMPANY: ______________________

ADDRESS: ______________________

____

PHONE: ______________________

FAX: ______________________

BILL TO: ______________________

COMPANY: ______________________

ADDRESS: ______________________

ANALYSIS REQUEST

SAMPLE ID	DATE	TIME	MATRIX	LAB I.D.	Petroleum Hydrocarbons (418.1) TRPH	(MOD.8015) Diesel/Direct Inject		(M8015) Gas/Purge & Trap	8021 (BTEX)/8015 (Gasoline) MTBE	8021 (BTEX) ☐ MTBE ☐ TMB ☐ PCE	8021 (TCL)	8021 (EDX)	8021 (HALO)	8021 (CUST)	504.1 EDB ☐ / DBCP ☐		8260 (TCL) Volatile Organics	8260 (Full) Volatile Organics	8260 (CUST) Volatile Organics	8260 (Landfill) Volatile Organics	Pesticides /PCB (608/8081/8082)	Herbicides (615/8151)	Base/Neutral/Acid Compounds GC/MS (625/8270)	Polynuclear Aromatics (610/8310/8270-SIMS)	General Chemistry:		Priority Pollutant Metals (13)	Target Analyte List Metals (23)	RCRA Metals (8)	RCRA Metals by TCLP (Method 1311)	Metals:		NUMBER OF CONTAINERS

PROJECT INFORMATION

PROJ. NO.:

PROJ. NAME:

P.O. NO.:

SHIPPED VIA:

SAMPLE RECEIPT

NO. CONTAINERS	
CUSTODY SEALS	Y / N / NA
RECEIVED INTACT	
BLUE ICE/ICE	

PRIOR AUTHORIZATION IS REQUIRED FOR RUSH PROJECTS

(RUSH) ☐ 24hr ☐ 48hr ☐ 72hr ☐ 1 WEEK (NORMAL) ☐

CERTIFICATION REQUIRED: ☐ NM ☐ SDWA ☐ OTHER

METHANOL PRESERVATION ☐

COMMENTS: FIXED FEE ☐

RELINQUISHED BY: 1.

Signature: Time:

Printed Name: Date:

Company:

See reverse side (Force Magure)

RELINQUISHED BY: 2.

Signature: Time:

Printed Name: Date:

Company:

RECEIVED BY: 1.

Signature: Time:

Printed Name: Date:

Company:

RECEIVED BY: (LAB) 2.

Signature: Time:

Printed Name: Date:

Pinnacle Laboratories Inc.

TABLES

TABLE 2-1
SUMMARY OF GROUNDWATER MONITORING WELL CHARACTERISTICS

Well Designation	Well Location		Coordinates		Diameter (inches)	Ground Elev. (feet)	Measuring Point Elev. (feet)	Total Depth of Boring (feet)	Bottom of Well Screen (feet)	Screen Length (feet)	Screen Construction /Slot Size - (inches)
	On Site	Off Site	XI	Y1							
MW-1	X				2			90	89	20	PVC/Unknown
MW-2	X				2			90	89	20	PVC/Unknown
MW-3	X				2			85	85	20	PVC/Unknown
MW-4	X		377321	1524144	2			90	90	20	PVC/Unknown
MW-5	X		377347	1524651	2	5052.2		135	78	10	PVC/Unknown
MW-6	X		377782	1524375	2	5044.6	5046.39	150	66.5	5	PVC/Unknown
MW-7	X		377535.4060	1524101.1430	2	5046	5044.80	75.5	68.5	5	PVC/Unknown
MW-8	X		377366	1523881	2	5040.4	5042.62	150	63	5	PVC/Unknown
MW-9	X		377005.7534	1524062.2480	2	5045.3	5044.11	80	67.5	5	PVC/Unknown
MW-10	X				2	5044.7		150.5	140	5	PVC/Unknown
MW-11	X				2	5042.2	5046.31	150	139	5	PVC/Unknown
MW-12	X		377023.2740	1524102.5590	4	5041.6	5042.58	140	134	10	PVC/Unknown
MW-13	X		377137.2349	1523998.3430	2	5042.2	5043.25	140	139.5	10	PVC/Unknown
MW-14	X		376711.0496	1524226.8401	2	5045.7	5043.04	130	127	10	PVC/Unknown
MW-15	X		376976.1308	1524514.1260	2	5046.2	5047.49	140	125	10	PVC/Unknown
MW-16	X		377340.5697	1524378.3800	2	5047.6	5047.50	73	73	5	PVC/Unknown
MW-17	X		377423.1837	1524452.6790	2	5043.1	5049.28	72	72	5	PVC/Unknown
MW-18	X		377005.2247	1524260.5830	4	5043.1	5045.58	81	78	10	PVC/0.020

TABLE 2-1 (continued)
SUMMARY OF GROUNDWATER MONITORING WELL CHARACTERISTICS

Well Designation	Well Location On Site	Well Location Off Site	Coordinates XI	Coordinates Y1	Diameter (inches)	Ground Elev. (feet)	Measuring Point Elev. (feet)	Total Depth of Boring (feet)	Bottom of Well Screen (feet)	Screen Length (feet)	Screen Construction /Slot Size - (inches)
MW-19	X		376986.5230	1524269.2680	4	5043.1	5046.25	110	107.5	10	PVC/Unknown
MW-20	X		376967.9830	1524277.9750	4	5042.9	5045.79	138	137.5	12	PVC/Unknown
MW-21	X		377171.2231	1524458.7050	2	5044.8	5048.36	69.5	69.5	5	PVC//Unknown
MW-22	X		377531.7671	1524267.2409	2		5048.06	78	77	5	PVC/Unknown
MW-23	X		377333.6307	1524123.0290	2	5045.4	5048.51	78	76	5	PVC/Unknown
MW-24	X		377338.0465	1524367.3910	4	5046	5048.70	75	73	5	PVC/Unknown
MW-25	X		377307.9122	1524380.4020	4	5046	5049.00	75	74	5	PVC/Unknown
PW-1	X		377014.8930	1524058.4810	10		5044.54	145	137	10	PVC/Unknown
P-1	X							90	90	20	PVC/Unknown
MW-26	X		377180.8851	1524187.4000	2	5043.8	5045.71	81	78	5	S.S./Unknown
MW-27	X		377078.9143	1524323.4643	2	5043.8	5045.50	73	72	5	S.S./Unknown
MW-28	X		376745.7569	1524262.6970	2	5040.9	5042.69	71	70	5	S.S./Unknown
MW-29	X		377144.4750	1523998.7390	4	5041.7	5044.51	115.5	113	10	S.S./Unknown
MW-30	X		376924.1207	1524105.1480	4	5042	5044.70	109.5	107	10	S.S./Unknown
MW-31	X		376731.4893	1524215.0430	4	5040	5043.53	109	106.5	10	S.S./Unknown
MW-32	X		376958.3748	1524494.1820	4	5045.2	5048.05	120	117.5	10	S.S./Unknown
MW-33	X		376940.7991	1524097.7420	2	5042.2	5044.29	73	73	10	S.S./0.012
MW-34		X	376715.2537	1523469.1680	2	5034.52	5034.49	66.5	66.5	10	S.S./0.010

TABLE 2-1 (continued)
SUMMARY OF GROUNDWATER MONITORING WELL CHARACTERISTICS

Well Designation	Well Location		Coordinates		Diameter (inches)	Ground Elev. (feet)	Measuring Point Elev. (feet)	Total Depth of Boring (feet)	Bottom of Well Screen (feet)	Screen Length (feet)	Screen Construction /Slot Size - (inches)
	On Site	Off Site	XI	Y1							
MW-35		X	376322.4523	1523822.3680	2	5042.5	5042.50	75	73.2	10	S.S./0.010
MW-36		X	376161.8540	1524154.6630	2	5059.3	5059.46	94	92.3	10	S.S./Unknown
MW-37		X	376108.1749	1524746.7840	2	5091.66	5090.85	126.5	125.0	10	S.S./0.010
MW-38	X		377150.5217	1523995.1740	4	5044.35	5044.32	137.5	136.5	10	S.S./0.020
MW-39	X		376961.1284	1524088.1710	4	5044.07	5044.06	134	133.0	10	S.S./0.020
MW-40	X		376745.3343	1524207.4020	4	5043.46	5043.35	128	127.0	10	S.S./0.020
MW-41	X		376945.6669	1524479.2830	4	5046.79	5046.77	118	97.0	5	S.S./0.020
MW-42	X		377183.2832	1524730.6850	4	5057.28	5057.33	117	115.0	10	S.S./0.020
MW-43	X		377169.6564	1524747.2690	4	5057.69	5057.74	138	137.0	10	S.S./0.020
MW-44		X	376166.1366	1524136.0870	4	5060.68	5058.75	120	116.0	10	S.S./0.020
MW-45		X	376108.6022	1524726.7480	4	5092.35	5089.65	153	153.0	10	S.S./0.020
MW-46		X	376067.0912	1525279.8360	4	5118.95	5118.98	182	180.0	10	S.S./0.020
MW-47		X	375638.1370	1524967.7407	4	5155.84	5155.83	197	195.0	15	S.S./0.020
MW-48		X	375369.7482	1525239.8550	4	5168.33	5168.31	209	207.0	15	S.S./0.020
MW-49	X		376763.4006	1524197.3220	4	5043.68	5043.67	148	147.5	10	S.S./0.020
MW-50		X	372810.1654	1527180.0898	4	5211.51	5211.22	260	250.0	15	S.S./0.020
MW-51		X	377291.6420	1524999.9759	2	5058.74	5060.31	86	85.0	10	S.S./0.020
MW-52		X	374343.4259	1525239.4497	4	5165.41	5156.79	208	206.0	15.2	S.S./0.020

TABLE 2-1 (continued)
SUMMARY OF GROUNDWATER MONITORING WELL CHARACTERISTICS

Well Designation	Well Location		Coordinates		Diameter (inches)	Ground Elev. (feet)	Measuring Point Elev. (feet)	Total Depth of Boring (feet)	Bottom of Well Screen (feet)	Screen Length (feet)	Screen Construction /Slot Size - (inches)
	On Site	Off Site	XI	Y1							
MW-53		X	374899.5031	1525314.4133	4	5163.96	5164.24	206	204.0	14.2	S.S./0.020
MW-54		X	375974.5495	1526106.2743	4	5097.64	5097.64	132	132.0	15	S.S./0.020
MW-55		X	375370.695	1525224.1487	4	5168.61	5168.61	267	265.0	10	S.S./0.020
MW-56		X	375371.3079	1525207.6796	4	5168.61	5168.61	232	230.0	10	S.S./0.020
MW-57		X	375849.0239	1526406.9797	4	5103.54	5103.54	144	141.0	15	S.S./0.020
MW-58		X	375148.4325	1525330.7336	4	5168.89	5168.89	211	209.0	15	S.S./0.020
MW-59		X	377253.6451	1524991.5683	4	5059.18	5060.61	117	115.0	10.5	S.S./0.020
MW-60		X	375530.1855	1525753.6046	4	5133.62	5134.87	197	195.0	10	S.S./0.020
MW-61		X	375523.1613	1525821.6538	4	5133.98	5135.23	177	173.0	15	S.S./0.020
MW-62		X	375421.2397	1524395.9372	2	5075	5075.00	115	110.0	15	S.S./0.010
MW-63		X	376840.4989	1525236.5173	2	5065.74	5065.74	98	98.0	15	S.S./0.010
MW-64		X	375968.8099	1526127.8080	4	5097.84	5097.84	153	149.0	10.2	S.S./0.020
PZ-1		X	372283.5987	1523148.3059	2	5147.2	5147.17	206	199.0	15	S.S./0.020
MW-65		X	374343.87	1525277.92	4	5156.45	5156.45	275	270	10	PVC/0.020
MW-66		X	375859.24	1526389.09	4	5103.03	5103.03	217	210	10	PVC/0.020
MW-67		X	375352.47	1525220.38	4	5169.21	5169.21	390	380	10	PVC/0.020
MW-68		X	374503.81	1526216.71	4	5165.53	5165.53	220	214	20	PVC/0.010
MW-69		X	374502.60	1526239.55	4	5165.46	5165.46	278	270	10	PVC/0.020

TABLE 2-1 (continued)
SUMMARY OF GROUNDWATER MONITORING WELL CHARACTERISTICS

Well Designation	Well Location		Coordinates		Diameter (inches)	Ground Elev. (feet)	Measuring Point Elev. (feet)	Total Depth of Boring (feet)	Bottom of Well Screen (feet)	Screen Length (feet)	Screen Construction /Slot Size - (inches)
	On Site	Off Site	XI	Y1							
MW-70	X		376982.13	1524493.58	2	5046.65	5046.65	143	143	10	PVC/0.010
MW-71		X	375530.63	1525711.81	2	5134.65	5134.59	356	353	5	PVC/0.020
MW-72	X		377079.68	1524630.73	2	5053.75	5056.25	110	109	10	PVC/0.010
MW-73	X		376821.45	1524346.08	2	5042.57	5045.07	104	102	5	PVC/0.010
OB-1		X	374665.25	1525599.56	4	5166.2	5169.10	377	373.5	170.5	PVC/0.020
OB-2		X	374537.89	1525606.66	4	5165.26	5165.26	378	374.6	170.6	PVC/0.020
CW-1		X	374740.47	1525601.24	8	5166.4	5168.02	372	367	160	S.S./0.020

Notes:
1) S.S. = Stainless Steel

TABLE 2-2
STATUS OF GROUNDWATER MONITORING AND RECOVERY WELLS

Well Designation	Well Status	Purging/Sampling/Recovery Equipment	Approximate Pump Intake Setting	Approximate Well Packer Setting
MW-1	Plugged & Abandoned	-----	-----	-----
MW-2	Plugged & Abandoned	-----	-----	-----
MW-3	Plugged & Abandoned	-----	-----	-----
MW-4	Plugged & Abandoned	-----	-----	-----
MW-5	Plugged & Abandoned	-----	-----	-----
MW-6	Plugged & Abandoned	-----	-----	-----
MW-7	Groundwater Monitoring	-----	-----	-----
MW-8	Plugged & Abandoned	-----	-----	-----
MW-9	Groundwater Monitoring	Bladder Pump	1-foot from bottom of screen	None Present
MW-10	Plugged & Abandoned	-----	-----	-----
MW-11	Plugged & Abandoned	-----	-----	-----
MW-12	Plugged Back to UFZ, Groundwater Monitoring	-----	-----	-----
MW-13	Plugged back to UFZ, Groundwater Monitoring	Bladder Pump	1-foot from bottom of screen	None Present
MW-14	Plugged back to UFZ, Groundwater Monitoring	Bladder Pump	1-foot from bottom of screen	None Present
MW-15	Plugged back to UFZ, Dry	Bladder Pump	1-foot from bottom of screen	None Present
MW-16	Groundwater Monitoring, Samples are Bailed	None Present - Samples are Bailed	-----	-----
MW-17	Groundwater Monitoring	None Present	-----	-----
MW-18	Groundwater Recovery, Groundwater Monitoring	Pneumatic Displacement Pump	1-foot from bottom of screen	None Present
MW-19	Groundwater Monitoring	Bladder (Sampling) & Pneumatic Displacement Pump (Purging)	1-foot from bottom of screen	None Present

TABLE 2-2 (continued)
STATUS OF GROUNDWATER MONITORING AND RECOVERY WELLS

Well Designation	Well Status	Purging/Sampling/Recovery Equipment	Approximate Pump Intake Setting	Approximate Well Packer Setting
MW-20	Groundwater Monitoring	Bladder (Sampling) & Pneumatic Displacement Pump (Purging)	1-foot from bottom of screen	None Present
MW-21	Groundwater Monitoring, Samples are Bailed	None Present - Samples are Bailed	-----	-----
MW-22	Groundwater Monitoring	Bladder	1-foot from bottom of screen	None Present
MW-23	Groundwater Monitoring, Groundwater Recovery	Pneumatic Displacement	1-foot from bottom of screen	None Present
MW-24	Former Groundwater Monitoring Well, Converted to Groundwater Recovery	Pneumatic Displacement	1-foot from bottom of screen	None Present
MW-25	Groundwater Monitoring, Groundwater Recovery	Pneumatic Displacement	1-foot from bottom of screen	None Present
PW-1	Groundwater Recovery, Plugged back to UFZ	Pneumatic Displacement	1-foot from bottom of screen	None Present
P-1	Plugged & Abandoned	-----	-----	-----
MW-26	Groundwater Monitoring, Groundwater Recovery	Pneumatic Displacement	1-foot from bottom of screen	None Present
MW-27	Former Groundwater Monitoring Well Converted to Groundwater Recovery	Pneumatic Displacement	1-foot from bottom of screen	None Present
MW-28	Former Groundwater Monitoring Well Converted to Groundwater Recovery - Now Dry	Pneumatic Displacement	1-foot from bottom of screen	None Present
MW-29	Groundwater Monitoring	Bladder	1-foot from bottom of screen	None Present
MW-30	Groundwater Monitoring	Bladder	1-foot from bottom of screen	None Present
MW-31	Groundwater Monitoring	Bladder	1-foot from bottom of screen	None Present
MW-32	Groundwater Monitoring	Bladder (Sampling) & Pneumatic Displacement (Purging)	1-foot from bottom of screen	None Present
MW-33	Groundwater Monitoring	Bladder - Pump removed for water level measurements	1-foot from bottom of screen	None Present

TABLE 2-2 (continued)
STATUS OF GROUNDWATER MONITORING AND RECOVERY WELLS

Well Designation	Well Status	Purging/Sampling/Recovery Equipment	Approximate Pump Intake Setting	Approximate Well Packer Setting
MW-34	Groundwater Monitoring	Bladder	1-foot from bottom of screen	None Present
MW-35	Groundwater Monitoring	Bladder	1-foot from bottom of screen	None Present
MW-36	Groundwater Monitoring	Bladder	1-foot from bottom of screen	None Present
MW-37	Groundwater Monitoring, Samples are Bailed	None Present - Samples are Bailed	-----	-----
MW-38	Groundwater Monitoring	Bladder (Sampling) & Pneumatic Displacement (Purging)	1-foot from bottom of screen	None Present
MW-39	Groundwater Monitoring	Bladder (Sampling) & Pneumatic Displacement (Purging)	1-foot from bottom of screen	None Present
MW-40	Groundwater Monitoring	Bladder (Sampling) & Pneumatic Displacement (Purging)	1-foot from bottom of screen	None Present
MW-41	Groundwater Monitoring	Bladder (Sampling) & Pneumatic Displacement (Purging)	1-foot from bottom of screen	None Present
MW-42	Groundwater Monitoring	Bladder (Sampling) & Pneumatic Displacement (Purging)	1-foot from bottom of screen	None Present
MW-43	Groundwater Monitoring	Bladder (Sampling) & Pneumatic Displacement (Purging)	1-foot from bottom of screen	None Present
MW-44	Groundwater Monitoring	Bladder (Sampling) & Pneumatic Displacement (Purging)	1-foot from bottom of screen	None Present
MW-45	Groundwater Monitoring	Bladder (Sampling) & Pneumatic Displacement (Purging)	1-foot from bottom of screen	None Present
MW-46	Groundwater Monitoring	Bladder (Sampling) & Pneumatic Displacement (Purging)	1-foot from bottom of screen	None Present
MW-47	Groundwater Monitoring	Bladder	1-foot from bottom of screen	None Present

TABLE 2-2 (continued)
STATUS OF GROUNDWATER MONITORING AND RECOVERY WELLS

Well Designation	Well Status	Purging/Sampling/Recovery Equipment	Approximate Pump Intake Setting	Approximate Well Packer Setting
MW-48	Groundwater Monitoring	Bladder	1-foot from bottom of screen	None Present
MW-49	Groundwater Monitoring	Bladder (Sampling) & Pneumatic Displacement (Purging)	1-foot from bottom of screen	None Present
MW-50	Groundwater Monitoring, Now Dry	Bladder, Well Now Dry	1-foot from bottom of screen	None Present
MW-51	Groundwater Monitoring	Bladder	1-foot from bottom of screen	None Present
MW-52	Groundwater Monitoring	Bladder	1-foot from bottom of screen	None Present
MW-53	Groundwater Monitoring	Bladder	1-foot from bottom of screen	None Present
MW-54	Water Level Measurements	None Present	-----	-----
MW-55	Groundwater Monitoring	Bladder	center of screen	Packer set 3-feet above screen
MW-56	Groundwater Monitoring	Bladder	center of screen	Packer set 3-feet above screen
MW-57	Groundwater Monitoring	Bladder	1-foot from bottom of screen	None Present
MW-58	Groundwater Monitoring	Bladder	1-foot from bottom of screen	None Present
MW-59	Groundwater Monitoring	Bladder (Sampling) & Pneumatic Displacement (Purging)	1-foot from bottom of screen	None Present
MW-60	Groundwater Monitoring	Bladder (Sampling) & Pneumatic Displacement (Purging)	1-foot from bottom of screen	None Present
MW-61	Groundwater Monitoring	Bladder	1-foot from bottom of screen	None Present
MW-62	Groundwater Monitoring	Bladder	1-foot from bottom of screen	None Present
MW-63	Groundwater Monitoring	Bladder, pump is removed for water level measurements	1-foot from bottom of screen	None Present

TABLE 2-2 (continued)
STATUS OF GROUNDWATER MONITORING AND RECOVERY WELLS

Well Designation	Well Status	Purging/Sampling/Recovery Equipment	Approximate Pump Intake Setting	Approximate Well Packer Setting
MW-64	Groundwater Monitoring	Bladder (Sampling) & Pneumatic Displacement (Purging)	1-foot from bottom of screen	None Present
MW-PZ-1	Groundwater Monitoring	Bladder	1-foot from bottom of screen	None Present
MW-65	Groundwater Monitoring	Bladder	center of screen	Packer set 3-feet above screen
MW-66	Groundwater Monitoring	Bladder	center of screen	Packer set 3-feet above screen
MW-67	Groundwater Monitoring	Bladder	center of screen	Packer set 3-feet above screen
MW-68	Groundwater Monitoring	Bladder	center of screen	Packer set 3-feet above screen
MW-69	Groundwater Monitoring	Bladder	center of screen	Packer set 3-feet above screen
MW-70	Groundwater Monitoring	Bladder	center of screen	Packer set 3-feet above screen
MW-71	Groundwater Monitoring	Bladder	center of screen	Packer set 3-feet above screen
MW-72	Groundwater Monitoring	Bladder	1 foot from bottom of screen	None present
MW-73	Groundwater Monitoring	Bladder	1 foot from bottom of screen	None present
OB-1	Water Level Measurements	None present	-	None present
OB-2	Water Level Measurements	None present	-	None present
CW-1	Plume Containment	25 hp submersible	300 ft.	None present

Notes: UFZ = Upper Flow Zone; TOC = Top of Casing; TBD = To be Determined

TABLE 3-1
SUMMARY OF EXISTING GROUNDWATER MONITORING WELL SAMPLING PROGRAM

Monitoring Well Identification	Status	Well Location		Parameters		Frequency	
		On-Site	Off-Site	VOC's	Chromium (total)	Sampling & Analysis	Water Level Measurements
MW-1	Abandoned	X		Not Applicable		N/A	N/A
MW-2	Abandoned	X		Not Applicable		N/A	N/A
MW-3	Abandoned	X		Not Applicable		N/A	N/A
MW-4	Abandoned	X		Not Applicable		N/A	N/A
MW-5	Abandoned	X		Not Applicable		N/A	N/A
MW-6	Abandoned	X		Not Applicable		N/A	N/A
MW-7	Monitoring	X		X	X	Annual	Quarterly
MW-8	Abandoned	X		Not Applicable		N/A	N/A
MW-9	Monitoring	X		X	X	Annual	Quarterly
MW-10	Abandoned	X		Not Applicable		N/A	N/A
MW-11	Abandoned	X		Not Applicable		N/A	N/A
MW-12	Monitoring	X		X	X	Annual	Quarterly
MW-13	Monitoring	X		X	X	Annual	Quarterly
MW-14 Poor Recharge	Monitoring	X		X	X	Annual	Quarterly
MW-15 Poor Recharge	Monitoring	X		Not Applicable		N/A	Quarterly
MW-16	Monitoring	X		X	X	Annual	Quarterly
MW-17	Monitoring	X		X	X	Annual	Quarterly
MW-18	GWR/ Monitoring	X		X	X	Annual	N/A
MW-19	Monitoring	X		X	X	Annual	Quarterly
MW-20 Poor Recharge	Monitoring	X		X	X	Annual	Quarterly

TABLE 3-1 (continued)
SUMMARY OF EXISTING GROUNDWATER MONITORING WELL SAMPLING PROGRAM

Monitoring Well Identification	Status	Well Location		Parameters		Frequency	
		On-Site	Off-Site	VOC's	Chromium (total)	Sampling & Analysis	Water Level Measurements
MW-21 Poor Recharge	Monitoring	X		X	X	Annual	Quarterly
MW-22	Monitoring	X		X	X	Annual	Quarterly
MW-23	GWR/ Monitoring	X		X	X	Annual	N/A
MW-24	GWR	X		Not Applicable		N/A	N/A
MW-25	GWR/ Monitoring	X		X	X	Annual	N/A
PW-1	GWR	X		Not Applicable		N/A	N/A
P-1	Abandoned	X		Not Applicable		N/A	N/A
MW-26	GWR/ Monitoring	X		X	X	Annual	N/A
MW-27	GWR	X		Not Applicable		N/A	N/A
MW-28 Poor Recharge	GWR	X		Not Applicable		N/A	N/A
MW-29	Monitoring	X		X	X	Annual	Quarterly
MW-30	Monitoring	X		X	X	Annual	Quarterly
MW-31	Monitoring	X		X	X	Annual	Quarterly
MW-32	Monitoring	X		X	X	Annual	Quarterly
MW-33	Monitoring	X		X	X	Annual	Quarterly
MW-34	Monitoring		X	X	X	Annual	Quarterly
MW-35 Poor Recharge	Monitoring		X	X	X	Annual	Quarterly
MW-36 Poor Recharge	Monitoring		X	X	X	Annual	Quarterly
MW-37 Poor Recharge	Monitoring		X	X	X	Annual	Quarterly
MW-38	Monitoring	X		X	X	Annual	Quarterly

TABLE 3-1 (continued)
SUMMARY OF EXISTING GROUNDWATER MONITORING WELL SAMPLING PROGRAM

Monitoring Well Identification	Status	Well Location		Parameters		Frequency	
		On-Site	Off-Site	VOC's	Chromium (total)	Sampling & Analysis	Water Level Measurements
MW-39	Monitoring	X		X	X	Annual	Quarterly
MW-40	Monitoring	X		X	X	Annual	Quarterly
MW-41	Monitoring	X		X	X	Annual	Quarterly
MW-42	Monitoring	X		X	X	Annual	Quarterly
MW-43	Monitoring	X		X	X	Annual	Quarterly
MW-44	Monitoring		X	X	X	Annual	Quarterly
MW-45	Monitoring		X	X	X	Annual	Quarterly
MW-46	Monitoring		X	X	X	Annual	Quarterly
MW-47	Monitoring		X	X	X	Annual	Quarterly
MW-48	Monitoring		X	X	X	Annual	Quarterly
MW-49	Monitoring	X		X	X	Annual	Quarterly
MW-50	Monitoring		X	Not Applicable Dry		N/A	Quarterly
MW-51	Monitoring		X	X	X	Annual	Quarterly
MW-52	Monitoring		X	X	X	Quarterly	Quarterly
MW-53	Monitoring		X	X	X	Annual	Quarterly
MW-54	Monitoring		X	Not Applicable		N/A	Quarterly
MW-55	Monitoring		X	X	X	Annual	Quarterly
MW-56	Monitoring		X	X	X	Annual	Quarterly
MW-57	Monitoring		X	X	X	Quarterly	Quarterly
MW-58	Monitoring		X	X	X	Annual	Quarterly
MW-59	Monitoring		X	X	X	Annual	Quarterly
MW-60	Monitoring		X	X	X	Annual	Quarterly

TABLE 3-1 (continued)
SUMMARY OF EXISTING GROUNDWATER MONITORING WELL SAMPLING PROGRAM

Monitoring Well Identification	Status	Well Location		Parameters		Frequency	
		On-Site	Off-Site	VOC's	Chromium (total)	Sampling & Analysis	Water Level Measurements
MW-61	Monitoring		X	X	X	Annual	Quarterly
MW-62 Poor Recharge	Monitoring		X	X	X	Quarterly	Quarterly
MW-63	Monitoring		X	Not Applicable		N/A	Quarterly
MW-64	Monitoring		X	X	X	Annual	Quarterly
MW-PZ-1	Monitoring		X	Not Applicable		N/A	Quarterly
MW-65	Monitoring		X	X	X	Quarterly	Quarterly
MW-66	Monitoring		X	X	X	Quarterly	Quarterly
MW-67	Monitoring		X	X	X	Semi-Annual	Quarterly
MW-68	Monitoring		X	X	X	Quarterly	Quarterly
MW-69	Monitoring		X	X	X	Quarterly	Quarterly
MW-70	Monitoring	X		X	X	Annual	Quarterly
MW-71	Monitoring		X	X	X	Quarterly	Quarterly
MW-72	Monitoring	X		X	X	Semi-Annual	Quarterly
MW-73	Monitoring	X		X	X	Annual	Quarterly
OB-1	Monitoring		X	Not Applicable		N/A	Quarterly
OB-2	Monitoring		X	Not Applicable		N/A	Quarterly
CW-1	Plume Con tainment		X	Per State Discharge Permit			Quarterly

Notes:
GWR = Groundwater Recovery Well
CW-1 = Containment Well #1

TABLE 3-2
PROJECT-SPECIFIC MAXIMUM ALLOWABLE REPORTING LIMITS

Parameter/Analyses	Water Reporting Limit (μg/L)
Metals by U.S. EPA SW-846 6000/7000 Series	
Chromium	5
Volatile Organic Compounds by U.S. EPA SW-846 Method 8260B	
Acetone	5.0
Acetonitrile	5.0
Acrolein (Propenal)	5.0
Acrylonitrile	5.0
Benzene	1.0
Bromodicloromethane	1.0
Bromoform	1.0
Bromomethane	2.0
2-Butanone (MEK)	5.0
Carbon disulfide	1.0
Carbon tetrachloride	1.0
Chlorobenzene	1.0
Chloroethane	2.0
Chloroform	1.0
Chloromethane	2.0
1,2-Dibromo-3-chloropropane	5.0
1,2-Dibromoethane	1.0
Dibromochloromethane	5.0
Dibromomethane	1.0
Dichlorodifluoromethane	2.0
1,1-Dichloroethane	1.0
1,2-Dichloroethane	1.0
1,1-Dichloroethene	1.0
trans-1,2-Dichloroethene	1.0
trans-1,4-Dichloro-2-butene	1.0
1,2-Dichloropropane	1.0

TABLE 3-2 (continued)
PROJECT-SPECIFIC MAXIMUM ALLOWABLE REPORTING LIMITS

Parameter/Analyses	Water Reporting Limit ($\mu g/L$)
cis-1,3-Dichloropropene	1.0
trans-1,3-Dichloropropene	1.0
Ethylbenzene	1.0
2-Hexanone	5.0
Iodomethane	5.0
Methylene chloride	1.0
4-Methyl-2-pentanone (MIBK)	5.0
Styrene	1.0
1,1,1,2-Tetrachloroethane	1.0
1,1,2,2-Tetrachloroethane	1.0
Tetrachloroethene	1.0
Toluene	1.0
1,1,1-Trichloroethane	1.0
1,1,2-Trichloroethane	1.0
Trichloroethene	1.0
Trichlorofluoromethane	5.0
1,2,3-Trichloropropane	1.0
Vinyl acetate	5.0
Vinyl chloride	2.0
o-Xylene	1.0
m-Xylene	1.0
p-Xylene	1.0

TABLE 3-3
SAMPLE CONTAINERS, PRESERVATIVES AND HOLDING TIMES FOR AQUEOUS SAMPLES

Matrix	Analytical Parameter	Container[a]	Number of Containers per Sample[b]	Preservation	Holding Time[c]
Aqueous	Appendix IX Volatile Organic Compounds (VOC's)	40 mL, G vial w/Teflon-lined septa cap	3	HCl to pH <2, Ice to 4°C[d]	14 days
	Chromium, Total	1 L, P or 0.5 L, P or 0.25 L, P	1	HNO_3 to pH < 2	6 months

[a] All containers must have lids with Teflon® liners. G=Glass; P=High-Density Polyethylene.

[b] The number of containers will be three times the amount noted for samples designated for MS/MSD aqueous analyses. The number of containers will be two times the amount noted for samples designated for field duplicate analyses.

[c] When only one holding time is designated, it is the total holding time until analysis.

[d] If due to natural carbonation in the groundwater, VOC samples effervesce upon preservation, discard sample and collect non-preserved. The holding time for a non-preserved VOC's is 7 days.

TABLE 3-4
FIELD SAMPLING TEAM DOCUMENTATION OBJECTIVES TO ENSURE VALID DATA COLLECTION

Objective	Action	Responsible Person
Verify sample and location information conforms to conditions and requirements specified.	Review labeled samples and in-process samples using daily sample inventory.	Field sampling team.
Verify incoming field data and sample completeness.	Maintain daily count of incomplete items.	Field sampling team.
Verify completeness of field log books.	Review daily.	Field team leader (or designee).
Review field calibration criteria and record test calibration acceptance.	Perform as necessary.	Field team leader (or designee).
Ensure all data forms are properly completed.	Review and check off during each sample collection.	Field team leader (or designee).
Verify all field generated QC samples were collected as required.	Review requirements and confirm sample collection.	Field team leader (or designee).

TABLE 3-5
ANALYTICAL METHODS FOR AQUEOUS SAMPLES

Parameter	Published Method
Laboratory Analyses:	
Volatile Organics	SW-5030B[a] SW-8260B[a]
Chromium	SW-6010B[a]
Field Analyses:	
Temperature	E170.1[d]
Specific Conductivity	E120.1[d]
pH	E150.1[d]

(a) Test Methods for Evaluating Solid Waste, SW846, Update III, 3rd ed. (U.S. EPA, 1996).

(b) Test Methods for Evaluating Solid Waste, SW846, Update I, 3rd ed. (U.S. EPA, 1992).

(c) Test Methods for Evaluating Solid Waste, SW846, Update II, 3rd ed. (U.S. EPA, 1994).

(d) Methods for Chemical Analysis of Water and Wastes. EPA 600/4-79-020 (U.S. EPA, 1983).

TABLE 3-6
QA OBJECTIVES FOR LABORATORY MEASUREMENTS OF AQUEOUS SAMPLES

Parameter/Method [1]		Precision[2] (as RPD)	Accuracy[3] (Recovery)	Completeness
INORGANIC ANALYSES				
Metals	**SW 3010A/ 6010B or 6020**			
Chromium		20%/30%	80-120%	90%
ORGANIC ANALYSES				
Volatile Organics	**SW-8260B**			
Chloromethane		NPM/30%	NPM	90%
Bromomethane		NPM/30%	NPM	90%
Vinyl Chloride		NPM/30%	NPM	90%
Chloroethane		NPM/30%	NPM	90%
Methylene Chloride		NPM/30%	NPM	90%
Acetone		NPM/30%	NPM	90%
Carbon Disulfide		NPM/30%	NPM	90%
1,1-Dichloroethene		14%/30%	61-145%	90%
1,1-Dichloroethane		NPM/30%	NPM	90%
cis-1,2-Dichloroethene		NPM/30%	NPM	90%
trans-1,2-Dichloroethene		NPM/30%	NPM	90%
Chloroform		NPM/30%	NPM	90%
1,2-Dichloroethane		NPM/30%	NPM	90%
2-Butanone		NPM/30%	NPM	90%
1,1,1-Trichloroethane		NPM/30%	NPM	90%
Carbon Tetrachloride		NPM/30%	NPM	90%
Bromodichloromethane		NPM/30%	NPM	90%
1,2-Dichloropropane		NPM/30%	NPM	90%
cis-1,3-Dichloropropene		NPM/30%	NPM	90%
Trichloroethene		14%/30%	71-120%	90%
Dibromochloromethane		NPM/30%	NPM	90%

TABLE 3-6 (continued)
QA OBJECTIVES FOR LABORATORY MEASUREMENTS OF AQUEOUS SAMPLES

Parameter/Method [1]		Precision[2] (as RPD)	Accuracy[3] (Recovery)	Completeness
1,1,2-Trichloroethane		NPM/30%	NPM	90%
Benzene		11%/30%	76-127%	90%
trans-1,3-Dichloropropene		NPM/30%	NPM	90%
Bromoform		NPM/30%	NPM	90%
4-Methyl-2-pentanone		NPM/30%	NPM	90%
2-Hexanone		NPM/30%	NPM	90%
Tetrachloroethene		NPM/30%	NPM	90%
Toluene		NPM/30%	NPM	90%
1,1,2,2-Tetrachloroethane		NPM/30%	NPM	90%
Chlorobenzene		13%/30%	75-130%	90%
Ethyl Benzene		NPM/30%	NPM	90%
Styrene		NPM/30%	NPM	90%
Total Xylene		NPM/30%	NPM	90%
Acetonitrile		NPM/30%	NPM	90%
Acrolein		NPM/30%	NPM	90%
Acrylonitrile		NPM/30%	NPM	90%
1,2-Dibromo-3-chloropropane		NPM/30%	NPM	90%
1,2-Dibromoethane		NPM/30%	NPM	90%
trans-1,4-Dichloro-2-butene		NPM/30%	NPM	90%
Dichlorodifluoromethane		NPM/30%	NPM	90%
1,1,1,2-Tetrachloroethane		NPM/30%	NPM	90%
Trichlorofluoromethane		NPM/30%	NPM	90%
1,2,3-Trichloropropane		NPM/30%	NPM	90%
Vinyl acetate		NPM/30%	NPM	90%
Surrogates:				
1,2-Dichloroethane-d_4		NPM	76-114%	90%
Bromofluorobenzene		NPM	86-115%	90%
1,2-Dichlorobenzene-d_4		NPM	88-110%	90%

TABLE 3-6 (continued)
QA OBJECTIVES FOR LABORATORY MEASUREMENTS OF AQUEOUS SAMPLES

NOTES:
1. Methods

Organics: VOC's by SW-8260B in *Test Methods for the Evaluation of Solid Waste*, SW-846, Update III, Third Edition, U.S. EPA, June 1996

Inorganics: Metals by SW-6010B or 6020/7470A/ in *Test Methods for the Evaluation of Solid Waste*, SW-846, Updates II and III, Third Edition, U.S. EPA, 1994 and 1996.

2. Precision - Relative percent difference (RPD) between laboratory replicates/field replicate analyses with the exception of VOC's. Where one RPD is listed, it is the laboratory replicate acceptance criteria; where two numbers are listed, they are the laboratory replicate/field duplicate RPD acceptance criteria, respectively.

   Precision for VOC's is measured on a quarterly basis as the Relative Standard Deviation (RSD) of the Laboratory Fortified Blank (LFB) replicate analyses.

3. Accuracy - Acceptable matrix spike recovery range as specified by the method.

NPM Not part of method

TABLE 3-7
QA OBJECTIVES FOR FIELD MEASUREMENTS

Parameter	Method[1] Reference	Precision[2]	Accuracy[3]	Completeness
WATER				
Standing Water Levels	**Water Level Indicator**	±0.01 ft	0.005 ft	90%
Temperature	**E170.1, Mercury Thermometer or Electronic Temperature Probe**	±0.1 °C	0.05 °C	90%
Conductivity	**E120.1, Electrometric**	±20 μmho/cm^2	10 μmho/cm^2	90%
pH	**E150.1, Electrometric**	±0.1 pH units	0.05 pH units	90%

NOTES:
1. Methods: E - *Method for Chemical Analysis for Water and Wastes* (U.S. EPA, 1983).
2. Expressed as the acceptable deviation from the scale.
3. Expected based on equipment manufacturer specifications.

TABLE 3-8

QC SAMPLE TYPES, CRITERIA, AND CORRECTIVE ACTION

Type	Purpose	Frequency	Criteria	Corrective Action
Field Generated QC Samples:				
Trip Blank	Verifies no contamination during sample transport/storage	1 per cooler of VOC samples for each matrix	No compound of interest >EQL	Qualify data or resample
Equipment Blank	Verifies effective decontamination procedures used in field for Non Dedicated equipment	5% of samples collected per media	No compound of interest >EQL	Qualify data or resample
Field Duplicate	Measure sample variability (submit "blind" to lab)	5% of samples	±30% RPD(2) (aqueous)	Compare to lab replicates; check systems for possible matrix interferences or improper sample collection procedure
Laboratory Generated QC Samples:				
Matrix Spikes and Duplicates (MS/MSD)	Checks recovery from real matrix	1 per 20 samples or 1 per batch as supplied from the field	Recoveries as specified in Table 4-6	Qualify data or recalibrate, reanalyze, and document corrective action
Laboratory Control Samples (for Metals)	Verifies analyst proficiency with method and instrumentation	1 per 20 samples or 1 per batch as supplied from the field	Metals - ± 20% of true value	Check system; reanalyze all samples in batch

TABLE 3-8 (continued)
QC SAMPLE TYPES, CRITERIA, AND CORRECTIVE ACTION

Type	Purpose	Frequency	Criteria	Corrective Action
Continuing Calibration - Organics	Verifies calibration curve	≥ 1 per day of analysis	±25% initial calibration	Recalibrate; check system
Continuing Calibration - Inorganics	Verifies Calibration Curve	1 per batch[2] of ten samples	±10% of true value	Recalibrate; check system
Method Blank	Verifies clean reagents, instrument systems, and lab environment	1 per batch[2] as supplied from the field. VOC's after each GC/MS tune	No compound of interest >5 times EQL[3]	Reanalyze; if second blank exceeds criteria, clean and recalibrate system; document corrective action
Laboratory Replicates (including matrix spike duplicates)	Checks precision of analytical method	1 per 20 samples per matrix	RPD as specified in Tables 4-6 and 4-7	Compare with field duplicates; check matrix interferences
Surrogate Standards	Measures recoveries in actual sample matrices	All GC/MS and all GC samples	Recoveries as specified in the Tables 4-6	Reanalyze samples where method requires; qualify or reject data

NOTES:
1. Between duplicate measurements.
2. The term "batch" refers to samples analyzed together in a specified group using the same methods, the same types and lots of reagents, and the same time frame for analysis.
3. Validation criteria. Acetone, methylene chloride, and 2-butanone.

RPD - Relative Percent Difference

VOC - Volatile Organic Compounds

TABLE 4-1
SCHEDULE OF SAMPLE DATA AND QA REPORTS

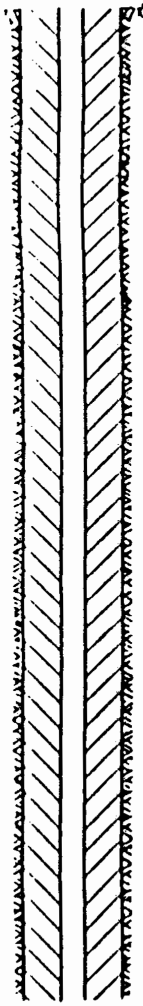
Type of Report	Frequency	Submitted by	Submitted to
Semi-Annual Progress Report	Semi-Annual	Project Coordinator	USEPA and NMED
Analytical Data Packages	21 days after sample receipt	Laboratory Project Manager	Sparton's Project Chemist or Quality Assurance Officer
Corrective Action Report	As needed, per occurrence	Personnel taking corrective action	Project Manager

APPENDICES

APPENDIX A

BORING, WELL, AND ABANDONMENT RECORDS AND LOGS

WELL CONSTRUCTION



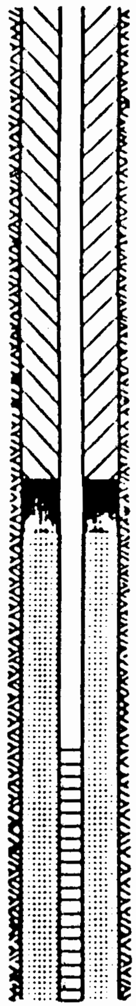
Blows/foot | Moisture Content (%) | Dry Density (pcf) | Depth (ft) | Sample

Equipment Hollow Auger

Elevation ____ Date 5/24/83

Depth (ft)	Description
0	LIGHT BROWN SAND (SP) loose, fine-grained, with trace of silt
5	medium dense, moist at 5 feet
10	
15	occasional gravel to cobbles at 14 feet
20	
25	BROWN SANDY GRAVEL (GP) dense, dry
30	LIGHT BROWN SAND (SP) dense, fine-grained, dry
35	occasional gravel at 34 feet
40	

WELL CONSTRUCTION



Blows/foot | Moisture Content (%) | Dry Density (pcf) | Depth (ft) | Sample

(Continuation of Log)

Depth (ft)	Description
40	
45	BROWN GRAVEL (GP) very dense, coarse, dry
50	LIGHT BROWN SAND (SP) very dense, fine-grained, moist, with occasional gravel
55	BROWN SANDY GRAVEL (GP) very dense, cobble to very coarse, interbedded with sand layers
60	
65	
70	
75	
80	

HLA Harding Lawson Associates
Engineers Geologists & Geophysicists

LOG OF WELL P-1

SPARTON SOUTHWEST, INC.
ALBUQUERQUE, NEW MEXICO

PLATE 9

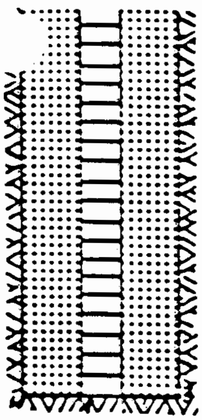
DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
ARM	6310,004.12	[illegible]	6/83		

Pocket Penetrometer (ksf)	Vane Shear (ksf)	Blows/Foot	Moisture Content (%)	Dry Density (pcf)	Depth, feet	Sample

Equipment Hollow Auger

Elevation Date 5/24/83

WELL CONSTRUCTION



80

85

90 End of Boring at 90.0 feet

95

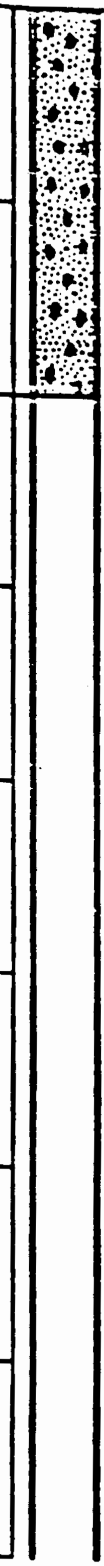
100

105

110

115

120



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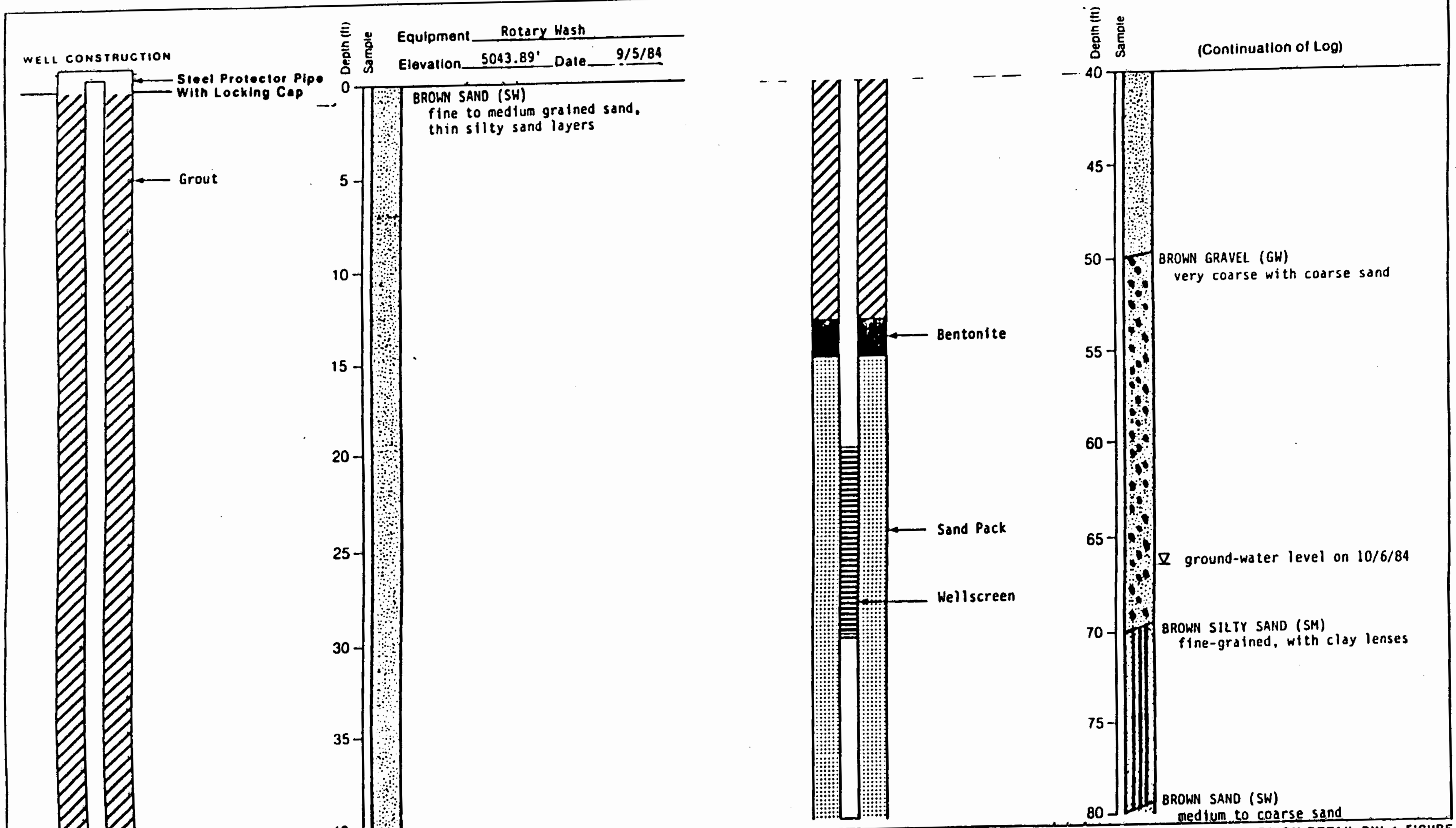
& Geophysicists

LOG OF WELL P-1

SPARTON SOUTHWEST, INC.
ALBUQUERQUE, NEW MEXICO

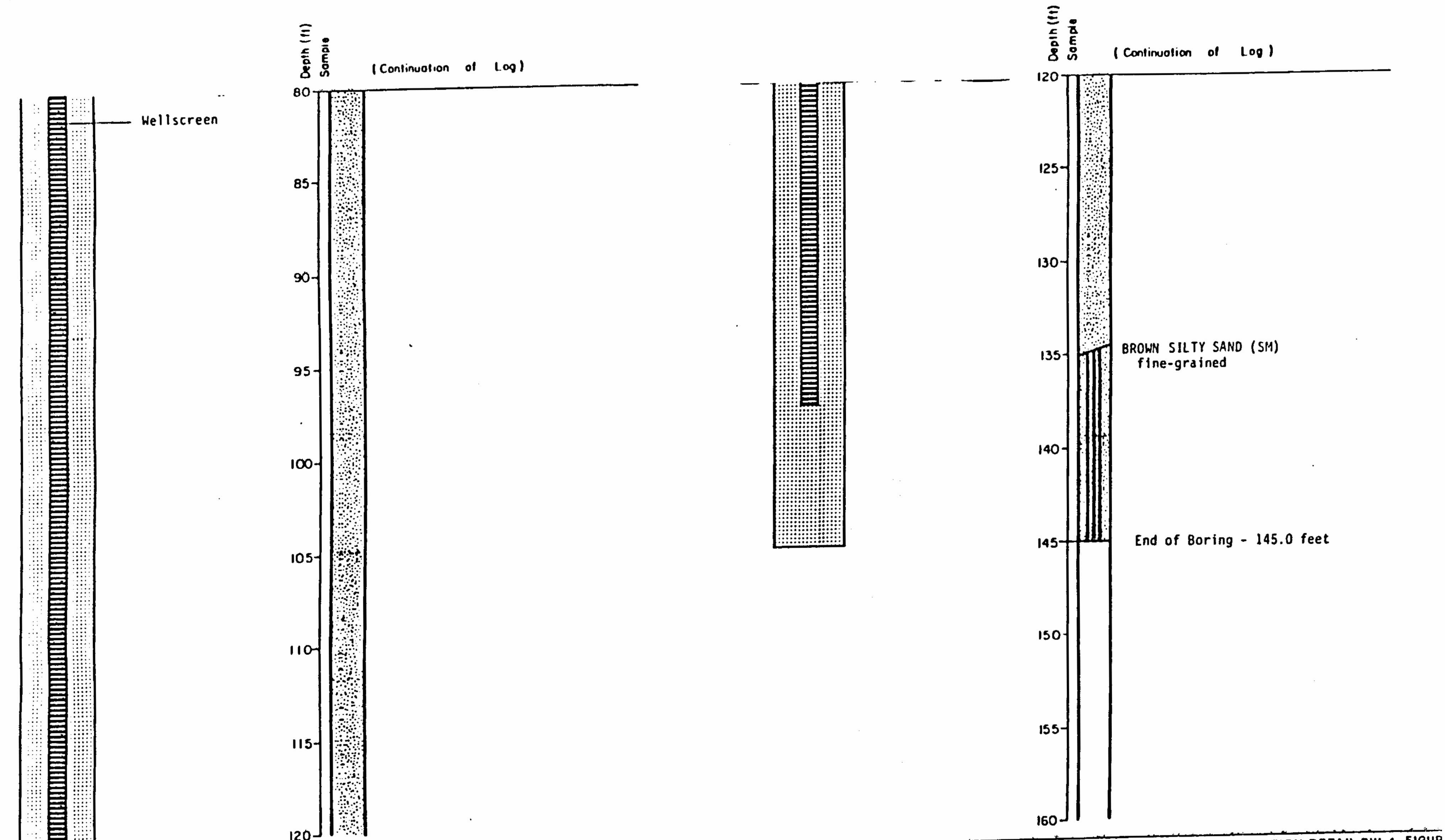
PLATE 9A

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
ARM	6310.004.12	[illegible]	6/83		



HLA Harding Lawson Associates Engineers Geologists & Geophysicists	LOG OF BORING AND WELL COMPLETION DETAIL PW-1 Sparton Technology, Inc. Albuquerque, New Mexico	FIGURE 1-1a

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
LM	6310,039.12		10/85		



Harding Lawson Associates Engineers Geologists & Geophysicists

LOG OF BORING AND WELL COMPLETION DETAIL PW-1

Sparton Technology, Inc.
Albuquerque, New Mexico

FIGUR

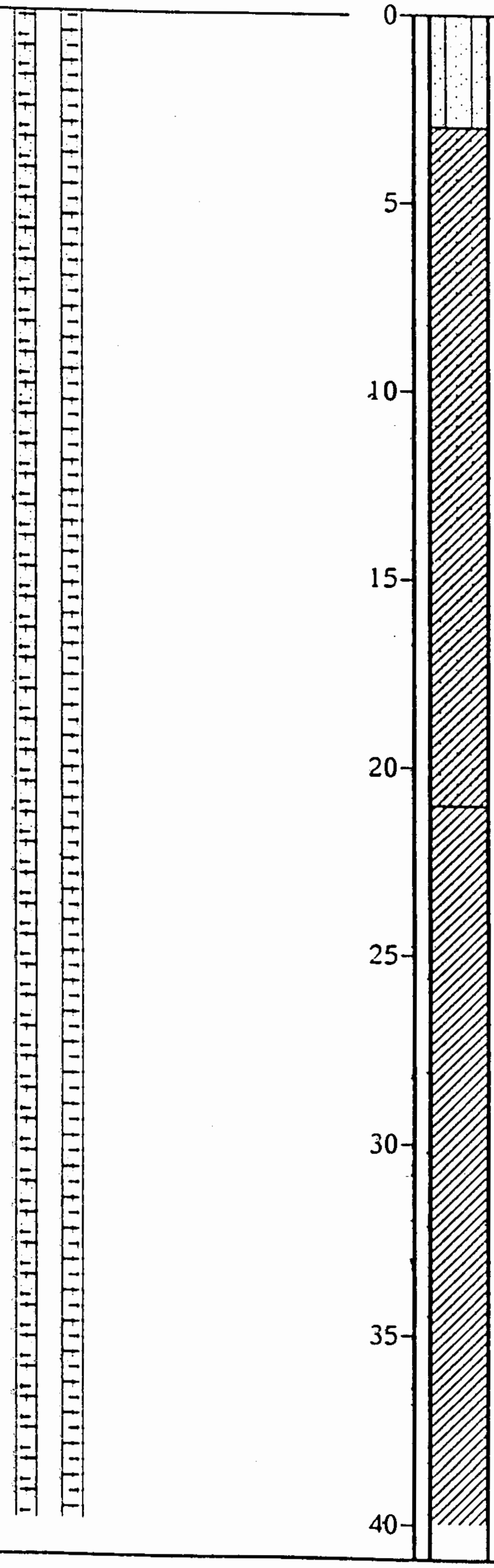
1-1

Top of PVC Casing
Elevation 5142.22

Equipment GD-1500

Elevation ft Date 4/13/90

GROUND SURFACE



TAN SILTY FINE TO MEDIUM SAND (SM)

TAN & BROWN CLAYEY MEDIUM TO COARSE SAND (SC)

TAN SILTY CLAY (CL)
with fine sand

Cement/Bentonite Grout

2" PVC Casing
to 173 feet

6-3/4" Borehole
to 206 feet

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Environmental Services

MONITORING WELL DETAIL PZ-1

Sparton Technology Inc.
Albuquerque, New Mexico

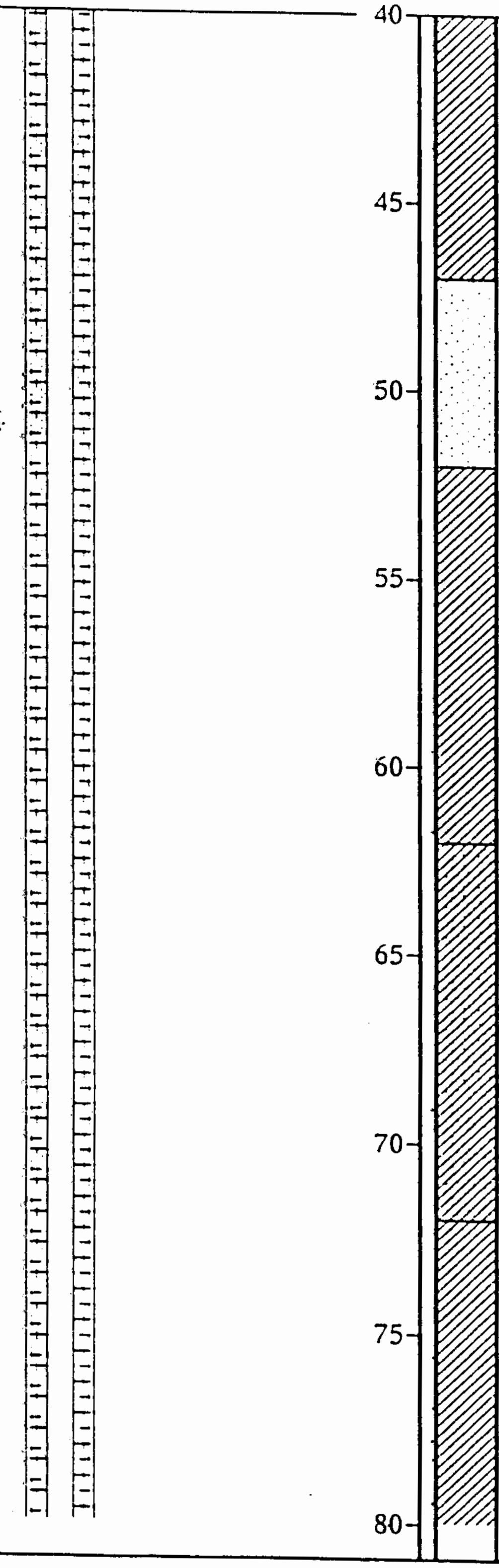
DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	06310.039.12		12/90		

Top of PVC Casing
Elevation 5142.22

Equipment GD-1500

Elevation ft   Date 4/13/90

GROUND SURFACE



TAN, BROWN & BLACK MEDIUM TO COARSE SAND (SP)

TAN SILTY CLAY (CL)
with sand

-with medium grained sand seam from 57 to 59 feet

TAN, BROWN & BLACK MEDIUM TO COARSE SAND (SC)

TAN SILTY CLAY (CL)
with sand

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MONITORING WELL DETAIL PZ-1

Sparton Technology Inc.
Albuquerque, New Mexico

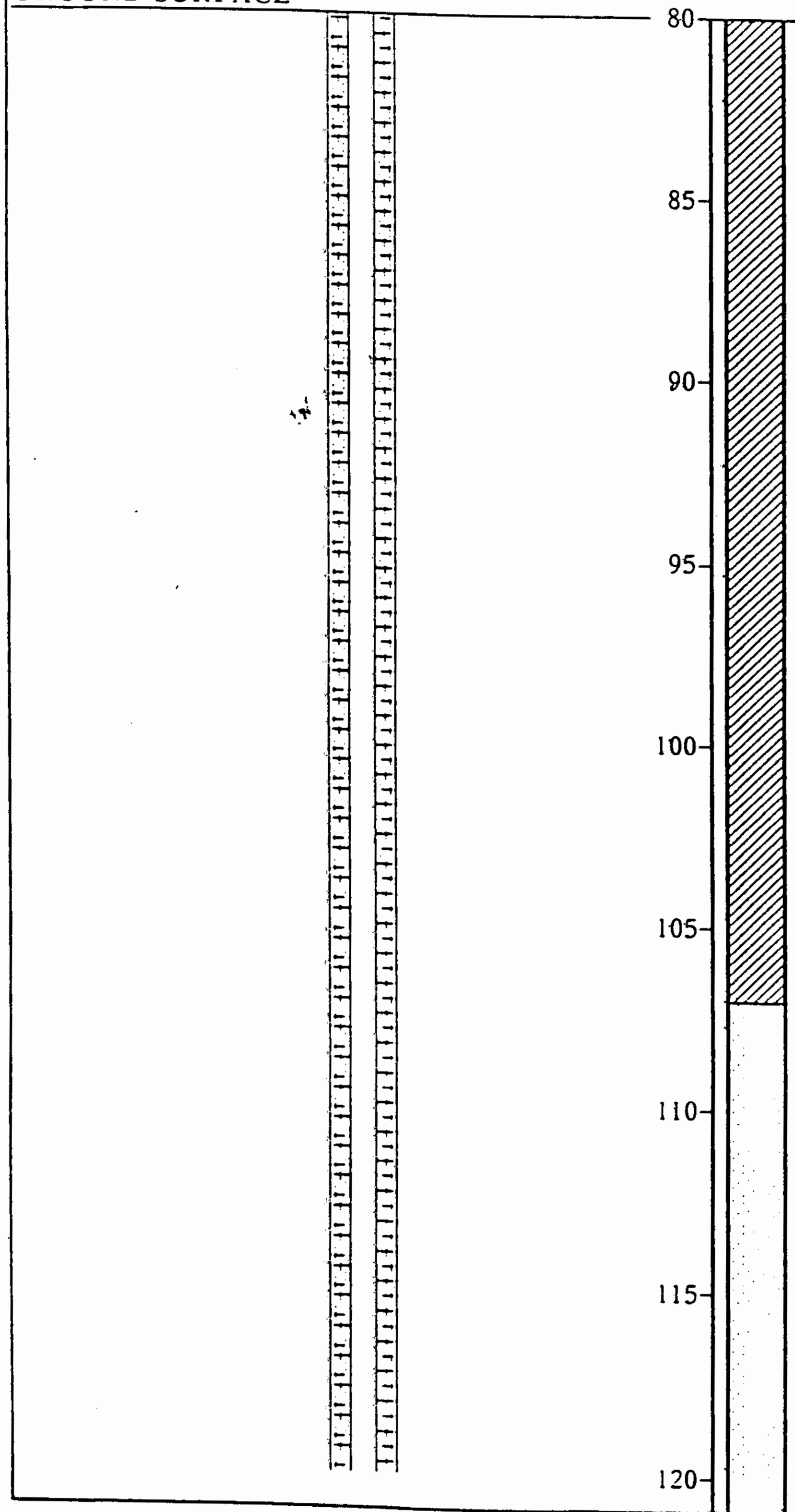
DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	06310.039.12		12/90		

Top of PVC Casing
Elevation 5142.22

Equipment GD-1500

Elevation ft   Date 4/13/90

GROUND SURFACE



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MONITORING WELL DETAIL PZ-1

Sparton Technology Inc.
Albuquerque, New Mexico

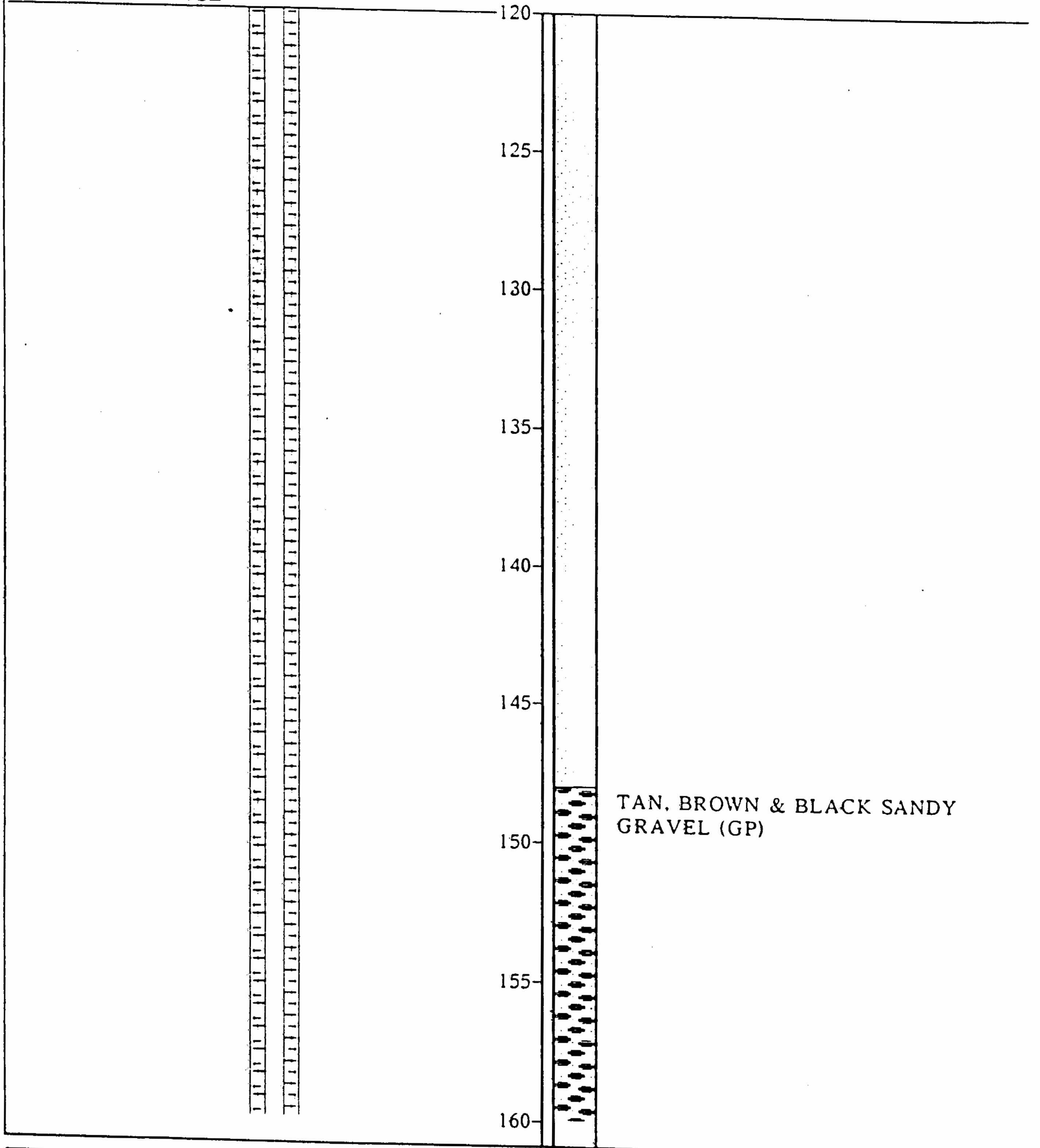
DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	06310.039.12		12/90		

Top of PVC Casing
Elevation 5142.22

Equipment GD-1500

Elevation ft Date 4/13/90

GROUND SURFACE



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MONITORING WELL DETAIL PZ-1

Sparton Technology Inc.
Albuquerque, New Mexico

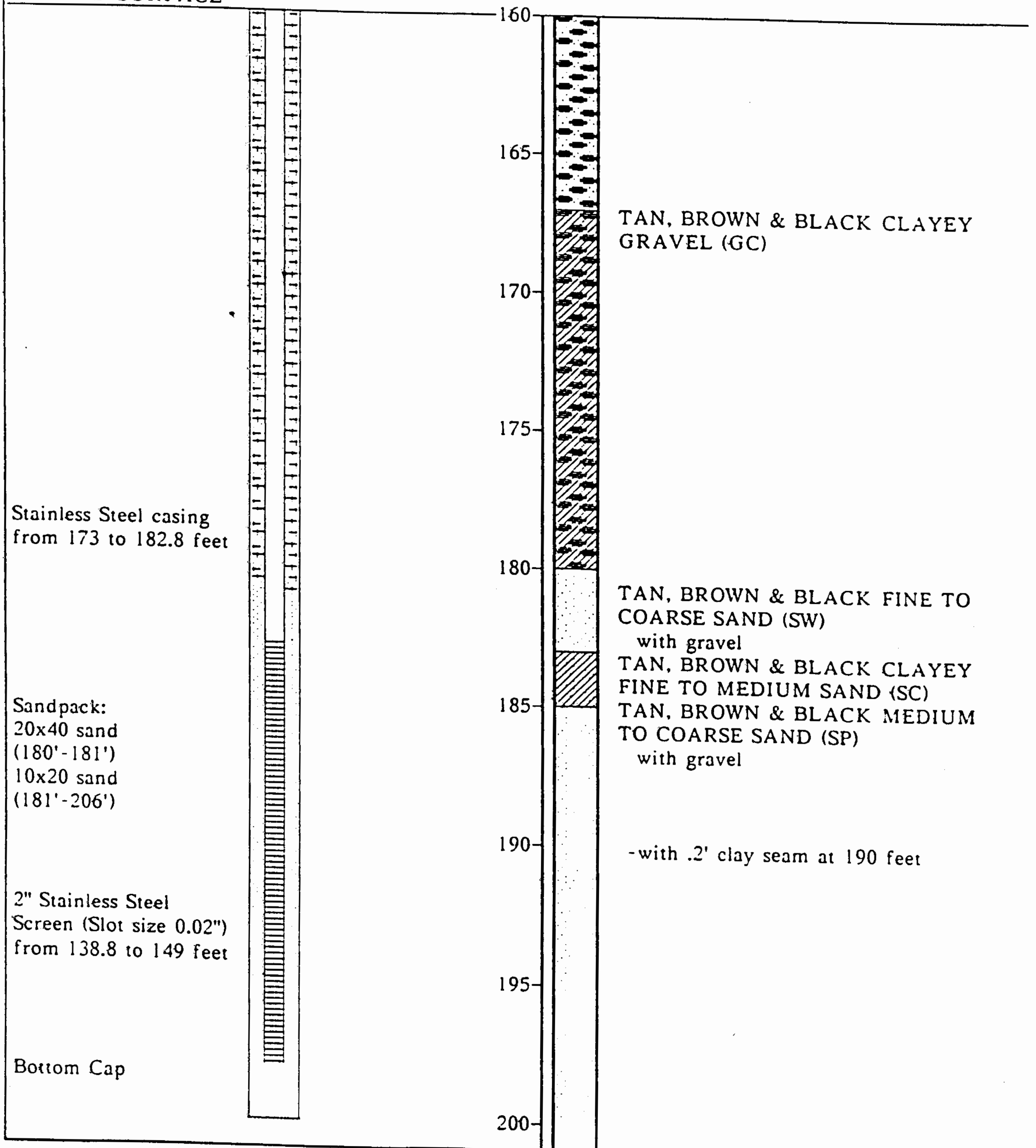
DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	06310.039.12		12/90		

Top of PVC Casing
Elevation 5142.22

Equipment GD-1500

Elevation ft Date 4/13/90

GROUND SURFACE



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MONITORING WELL DETAIL PZ-1

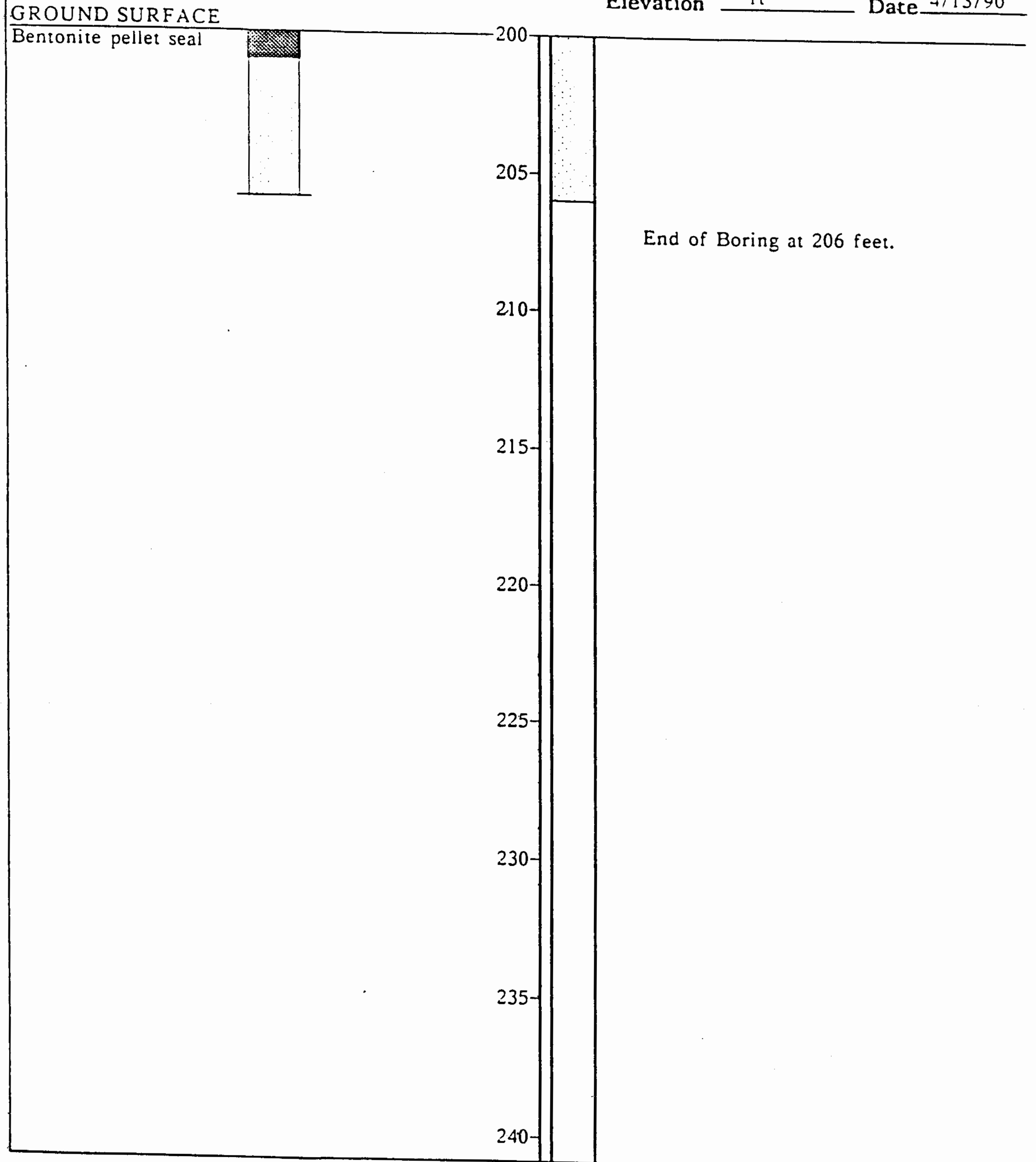
Sparton Technology Inc.
Albuquerque, New Mexico

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	06310.039.12		12/90		

Top of PVC Casing
Elevation 5142.22

Equipment GD-1500

Elevation ft Date 4/13/90



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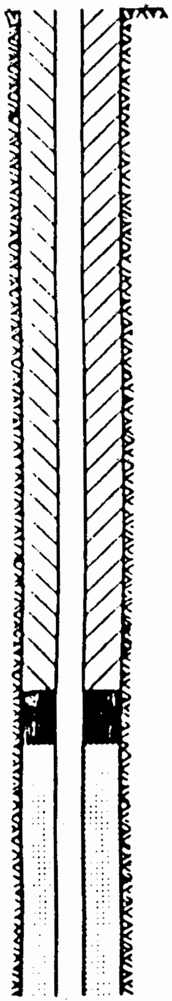
MONITORING WELL DETAIL PZ-1

Sparton Technology Inc.
Albuquerque, New Mexico

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	06310.039.12		12/90		

WELL CONSTRUCTION



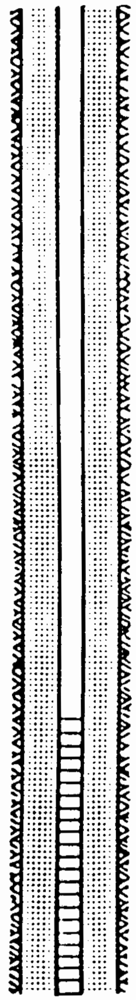
Blows/foot | Moisture Content (%) | Dry Density (pcf) | Depth (ft) | Sample

Equipment Hollow Auger

Elevation ____________ Date 5/23/83

Depth (ft)	Description
0	BROWN SAND (SP) medium dense, fine-grained with trace of silt moist at 3 feet
5	strong odor present at 5.5 feet
10	some angular gravel at 10 feet
15	
20	strong odor present at 20 feet
25	
30	sandy clay layers at 31 feet
35	
40	

WELL CONSTRUCTION



Blows/foot | Moisture Content (%) | Dry Density (pcf) | Depth (ft) | Sample

(Continuation of Log)

Depth (ft)	Description
40	
45	
50	BROWN SANDY GRAVEL (GP) very dense, cobble to coarse, moist some coarse gravel from 51 to 53 feet
55	
60	
65	varying amounts of coarse gravel at 67 feet
70	
75	
80	

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LOG OF WELL MW-1

SPARTON SOUTHWEST, INC.
ALBUQUERQUE, NEW MEXICO

PLATE 5

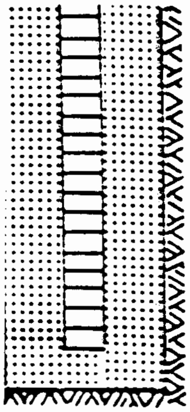
DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
ARM	6310,004.12	A.R.M.	6/83		

Pocket Penetrometer (ksf)	Vane Shear (ksf)	Blows/Foot	Moisture Content (%)	Dry Density (pcf)	Depth, feet	Sample

Equipment Hollow Auger

Elevation Date 5/23/83

WELL
NSTRUCTION



80
85
90
95
100
105
110
115
120

End of Boring at 90.0 feet

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LOG OF WELL MW-1

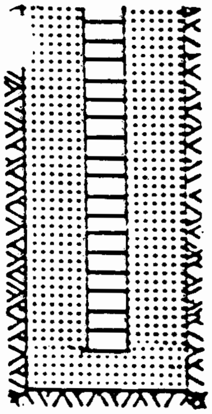
SPARTON SOUTHWEST, INC.
ALBUQUERQUE, NEW MEXICO

PLATE 5A

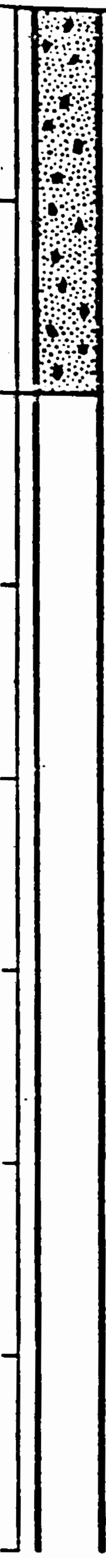
DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
ARM	6310.004.12	[illegible]	6/83		

Equipment	Hollow Auger	
Elevation		Date 5/25/83

WELL CONSTRUCTION



Pocket Penetrometer (ksf)	Vane Shear (ksf)	Blows/Foot	Moisture Content (%)	Dry Density (pcf)	Depth, feet	Sample
					80	
					85	
					90	
					95	
					100	
					105	
					110	
					115	
					120	



End of Boring at 90.0 feet

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LOG OF WELL MW-2

SPARTON SOUTHWEST, INC.
ALBUQUERQUE, NEW MEXICO

PLATE 6A

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
ARM	6310,004.12	[illegible]	6/83		

WELL CONSTRUCTION

Blows/foot | Moisture Content (%) | Dry Density (pcf) | Depth (ft) | Sample

Equipment Hollow Auger

Elevation ________ Date 5/26/83

LIGHT BROWN SAND (SP)
medium dense, fine-grained
occasional gravel at 4 feet

interbedded with thin clay layers at 29 feet

becomes more gravelly at 36 feet

interbedded with thin clay layers at 38 feet

WELL CONSTRUCTION

Blows/foot | Moisture Content (%) | Dry Density (pcf) | Depth (ft) | Sample

(Continuation of Log)

BROWN SANDY GRAVEL (GP)
very dense, moist, with varying amounts of sand

Harding Lawson Associates
Engineers, Geologists & Geophysicists

LOG OF WELL MW-3

SPARTON SOUTHWEST, INC.
ALBUQUERQUE, NEW MEXICO

PLATE 7

Drawn	Job Number	Approved	Date	Revised	Date
ARM	6310,004.12	A.B.M.	6/83		

WELL
ONSTRUCTION

Pocket Penetrometer (ksf)	Vane Shear (ksf)	Blows/Foot	Moisture Content (%)	Dry Density (pcf)	Depth, feet	Sample

Equipment Hollow Auger

Elevation Date 5/26/83

80

85

End of Boring at 85.0 feet

90

95

100

105

110

115

120

Harding Lawson Associates
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& Geophysicists

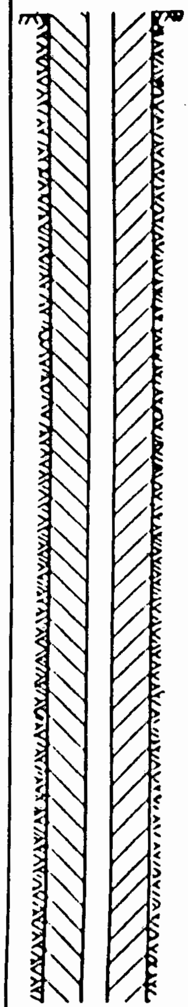
LOG OF WELL MW-3

SPARTON SOUTHWEST, INC.
ALBUQUERQUE, NEW MEXICO

PLATE 7A

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
ARM	6310,004.12	[illegible]	6/83		

WELL CONSTRUCTION



Blows/foot	Moisture Content (%)	Dry Density (pcf)	Depth (ft)	Sample

Equipment Hollow Auger

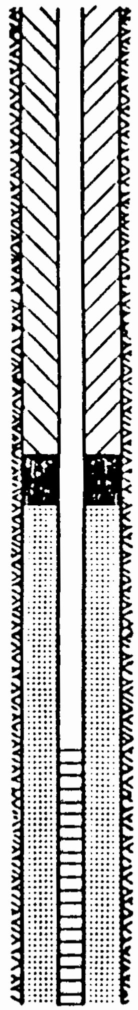
Elevation ______ Date 5/27/83

Depth (ft): 0, 5, 10, 15, 20, 25, 30, 35, 40

LIGHT BROWN SAND (SP)
medium dense, fine-grained
moist, with intermittent gravelly
zones

occasional gravel at 9 feet

WELL CONSTRUCTION



Blows/foot	Moisture Content (%)	Dry Density (pcf)	Depth (ft)	Sample

(Continuation of Log)

Depth (ft): 40, 45, 50, 55, 60, 65, 70, 75, 80

BROWN SANDY GRAVEL (GP)
very dense, moist

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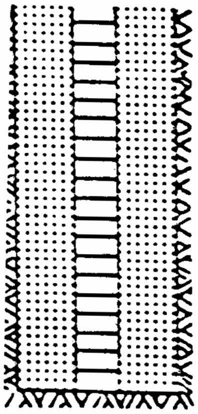
LOG OF WELL MW-4
SPARTON SOUTHWEST, INC.
ALBUQUERQUE, NEW MEXICO

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED
ARM	6310,004,12	A.R.M.	6/83	

WELL ONSTRUCTION	Pocket Penetrometer (ksf)	Vane Shear (ksf)	Blows/Foot	Moisture Content (%)	Dry Density (pcf)	Depth, feet	Sample

Equipment Hollow Auger

Elevation Date 5/27/83



80

85

90 End of Boring at 90.0 feet

95

100

105

110

115

120

Harding Lawson Associates
Engineers Geologists
& Geophysicists

LOG OF WELL MW-4

SPARTON SOUTHWEST, INC.
ALBUQUERQUE, NEW MEXICO

PLATE 8A

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
ARM	6310,004.12	[illegible]	6/83		

Equipment: Auger - Rotary Wash

Elevation: 5053 Date: 11/2/83

Laboratory Tests	Blows/foot	Moisture Content (%)	Dry Density (pcf)	Depth (ft)	Description
				0	LIGHT BROWN SILTY SAND (SM) medium dense to dense, dry
	36				
	49			10	
	37				decreased silt content at 14 feet
					LIGHT BROWN SILTY CLAY (CL) stiff to very stiff, dry
2% Sand 45% Silt 53% Clay	30			20	
	15				LIGHT BROWN SILTY SAND (SM) medium dense, moist
	25			30	
	37				
	33			40	
	27				LIGHT BROWN SANDY GRAVEL (GW) very dense, moist
	100+			50	GRAY AND BROWN SAND (SP) very dense, dry, poorly graded
	100+				increased gravel content at 59 feet
	100+			60	LIGHT GRAY SANDY GRAVEL (GP) very dense, dry, poorly graded
78% Gravel 20% Sand 2% Fines	100+				
	100+			70	light gray and white
					water level at 73 feet
	100+				GRAY SILTY SAND (SM) very dense, wet
				80	driller's note: cobbles at 78 to 83 feet

(Continuation of Log)

Laboratory Tests	Blows/foot	Moisture Content (%)	Dry Density (pcf)	Depth (ft)	Description
				80	LIGHT GRAY AND RED SAND (SW) very dense, wet, well graded
				90	
				100	
83% Sand 9% Silt 8% Clay	100+			110	
	100+			120	
	100+			130	
					End of Boring at 135 feet
				140	
				150	
				160	

Two inch diameter PVC monitoring well set to a depth of 83 feet with lower 15 foot section consisting of 5 foot sump and 10 foot screened section. Boring caved from 65 to 84 feet. Natural filter pack from 41 to 65 feet. Bentonite seal from 40 to 41 feet. Grout from 0 to 40 feet.

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LOG OF WELL MW-5
Sparton Southwest, Inc.
Albuquerque, New Mexico

A-2

Drawn: HM | Job Number: 6310,008.12 | Approved: [illegible] | Date | Revised | Date

Equipment Auger - Rotary Wash

Elevation 5045 Date 11/16/83 - 11/...

Laboratory Tests	Blows/foot	Moisture Content (%)	Dry Density (pcf)	Depth (ft)	Description
				0	LIGHT BROWN SILTY SAND (SM) medium dense to dense, dry
	15				
	19			10	
	35				becomes more coarsely graded
70% Sand 23% Silt 7% Clay	17			20	occasional gravel
	44				LIGHT BROWN SAND (SP) dense to very dense, dry
	62			30	
	39				coarse sand at 34 to 34.5 feet
	53			40	driller's note: gravel layer at 41 to 41.5 feet
	65				BROWN SILTY SAND (SM) with some gravel, very dense, moist
				50	decreased gravel content below 53 feet
	77				
	59			60	DARK GRAY SAND (SP) very dense, moist
	52				water level at 63.5 feet; driller's note: occasional gravel from 64 to 68 feet
LL=63 PI=34	20			70	BROWN CLAY (CH) stiff, wet
					DARK GRAY SAND (SP) very dense, wet
				80	

(Continuation ... og)

Laboratory Tests	Blows/foot	Moisture Content (%)	Dry Density (pcf)	Depth (ft)	Description
	52			80	
					interbedded with course gravel at 85 to 89 feet
7% Gravel 86% Sand 2% Silt 5% Clay	100+			90	
				100	
	100+			110	
					BROWN CLAYEY SAND (SC) very dense, wet
	100+			120	
					DARK GRAY SAND (SP) very dense, wet
	100+			130	
	100+			140	LIGHT BROWN SILT (ML) very dense, wet; driller's note: increased sand content below 145 feet
				150	End of Boring at 150 feet
				160	

Two inch diameter PVC monitoring well set to a depth of 71.5 feet with lower 10 foot section consisting of 5 foot sump and 5 foot screened section. Gravel backfill from 71.5 to 150 feet. Boring caved from 58 to 71.5 feet. Natural backfill from 30 to 58 feet. Bentonite seal from 29 to 30 feet. Grout from 0 to 29 feet.

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LOG OF WELL MW-6
Sparton Southwest, Inc.
Albuquerque, New Mexico

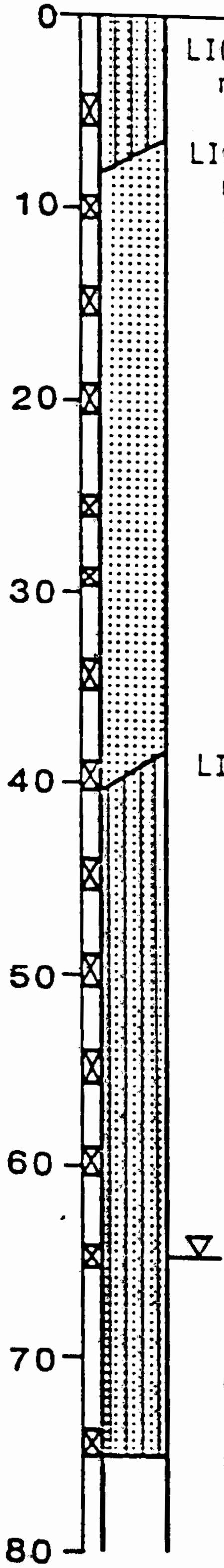
A-

Job Number 6310,008.12

Laboratory Tests	Blows/foot	Moisture Content (%)	Dry Density (pcf)	Depth (ft)	Sample

Equipment Auger - Rotary Wash

Elevation 5044 Date 11/11/83



Blows/foot	Description
	LIGHT BROWN SILTY SAND (SM) medium dense, dry
20	
	LIGHT BROWN SAND (SP) medium dense to very dense, dry
30	
12	
27	
21	
100+	driller's note: gravel at 28.5 feet
57	
32	LIGHT BROWN SILTY SAND (SM) medium dense to dense, moist
18	
34	
31	
29	grades course with depth
28	water level at 64.5 feet
	interbedded with brown and gray clay layers 2-6 inches thick
6	End of Boring at 75.5 feet

Two inch diameter PVC monitoring well set to a depth of 73.5 feet with lower 10 foot section consisting of 5 foot sump and 5 foot screened section. Natural filter pack from 39 to 74 feet. Bentonite seal from 37 to 39 feet. Sand backfill from 29 to 37 feet. Grout from 0 to 29 feet.

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LOG OF WELL MW- 7
Sparton Southwest, Inc.
Albuquerque, New Mexico

PLATE **A-4**

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
LM	6310,008.12				

Equipment Auger - Rotary Wash

Elevation 5042 Date 11/13/83

Laboratory Tests	Blows/foot	Moisture Content (%)	Dry Density (pcf)	Depth (ft)	Sample	Description
				0		LIGHT BROWN SILTY SAND (SM) medium dense to dense, dry
	14					
				10		
	14					
	15					
				20		
75% Sand 18% Silt 7% Clay	16					
	18					
				30		LIGHT BROWN SAND (SW) with some gravel, dense, moist
	42					
				40		
	50					
	14					3 inch silt layer at 44.5 feet
				50		
	14					
						occasional silt layers
	19					
						∇ water level at 59 feet occasional silt layers
	26			60		
						BROWN CLAY (CH) stiff, wet
	14			70		
						driller's note: gravel at 75 feet
						BROWN SAND (SW) very dense, wet, coarse grained
	58					
				80		

(Continuation of Log)

Laboratory Tests	Blows/foot	Moisture Content (%)	Dry Density (pcf)	Depth (ft)	Sample	Description
				80		
						GRAY SANDY GRAVEL (GW) very dense, wet
55% Gravel 43% Sand 2% Fines	100+					
				90		
				100		
						GRAY SAND (SW) very dense, wet
87% Sand 9% Silt 4% Clay	100+					
				110		
	100+					
				120		
	100+					driller's note: some gravel at 115 feet
				130		
	100+					
				140		
	100+			150		End of Boring at 150 feet
				160		

Two inch diameter PVC monitoring well set to a depth of 68 feet with lower 10 foot section consisting of 5 foot sump and 5 foot screened section. Gravel backfill from 68 to 150 feet. Natural filter from 33 to 68 feet. Bentonite seal from 32 to 33 feet. Natural backfill from 15 to 32 feet. Grout from 0 to 15 feet.

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LOG OF WELL MW-8
Sparton Southwest, Inc.
Albuquerque, New Mexico

A-5

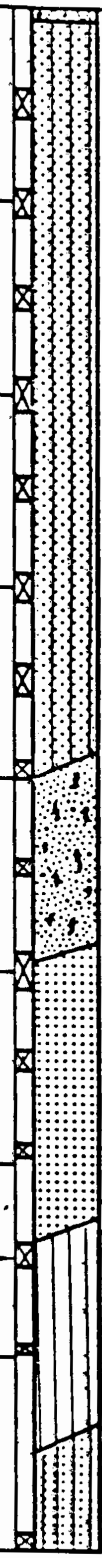
Drawn	Job Number	Approved	Date	Revised	Date
JM	6310,008.12				

Laboratory Tests | Blows/foot | Moisture Content (%) | Dry Density (pcf) | Depth (ft) | Sample

Equipment Auger - Rotary Wash

Elevation 5043 Date 11/31/83

Laboratory Tests	Blows/foot	Depth (ft)	Description
		0	2 inch Bituminous Concrete Pavement
	9		LIGHT BROWN SILTY SAND (SM) loose to medium dense, dry
80% Sand 14% Silt 6% Clay	16	10	
	12		
	24	20	
	21		
	20	30	
	28		
62% Gravel 35% Sand 3% Fines	98	40	LIGHT GRAY SANDY GRAVEL (GW) very dense, moist
	100+		
45% Sand 47% Silt 8% Clay	45	50	BROWN GRAVELLY SAND (SP) dense to very dense, moist, gravel size up to 2 inch diameter
	100+	60	
			water level at 63 feet
			LIGHT GRAY SANDY SILT AND SILTY SAND (ML-SM) very dense, wet
	100+	70	
			MEDIUM GRAY SILTY SAND (SM) very dense, wet
	100+	80	End of Boring at 80 feet



Two inch diameter monitoring well set to a depth of 72.5 feet with lower 10 foot section consisting of 5 foot sump and 5 foot screened section. Boring caved from 57.5 feet to 72.5 feet.

Bentonite seal from 55.5 to 57.5 feet. Sand backfill from 40 to 55.5 feet. Grout from 0 to 40 feet.

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LOG OF WELL MW- 9

Sparton Southwest, Inc.
Albuquerque, New Mexico

PLATE A-6

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
LM	6310,008.12	JR			

Equipment Auger - Rotary Wash

Elevation 5046 Date 11/13/82

Laboratory Tests	Blows/foot	Moisture Content (%)	Dry Density (pcf)	Depth (ft)	Description
				0	6 Inch Concrete Pavement LIGHT BROWN SILTY SAND (SM) medium dense, dry (Fill)
	21				
86% Sand 8% Silt 6% Clay	35			10	LIGHT BROWN SAND (SW) medium dense to dense, dry
	37				
	25			20	silty fine sand at 19 feet
	38				
	19			30	sandy silt seam at 30 feet
	30				
	18			40	
	16				
	35			50	abundant gravel at 49 to 50 feet
44% Gravel 48% Sand 8% Fines	100+				LIGHT GRAY AND BROWN GRAVEL AND SAND (GW-SW) very dense, moist
	100+			60	sand layer starts at 63 feet
	58				DARK GRAY SAND (SP) very dense, moist water level at 65 feet gravel at 67 feet
				70	
				80	BROWN AND GRAY SAND (SW) very dense, wet

(Continuation ... og)

Laboratory Tests	Blows/foot	Moisture Content (%)	Dry Density (pcf)	Depth (ft)	Description
	100+			80	driller's note: gravel layer at 85 to 87 feet
	100+			90	driller's note: gravel layer at 90 to 91 feet driller's note: gravel layer at 94 to 94.5 feet
	100+			100	
44% Gravel 48% Sand 8% Fines	100+			110	
	100+			120	driller's note: gravel layer at 121 to 122 feet
91% Sand 5% Clay 4% Silt	100+			130	brown sandy clay at 131 to 132 feet
				140	driller's note: gravel layer at 144.5 to 145.5 feet
				150	End of Boring at 150.5 feet
				160	

Two inch diameter PVC monitoring well set to 145 feet with lower 10 foot section consisting of 5 foot sump and 5 foot screened section. Boring caved from 55 to 150 feet. Bentonite seal from 53 to 55 feet. Natural backfill from 30 to 53 feet. Grout from 0 to 30 feet.

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LOG OF WELL MW-10

Sparton Southwest, Inc.
Albuquerque, New Mexico

A-7

Drawn: [illegible] Job Number: 6310,008.12 Approved: [illegible] Date Revised Date

Laboratory Tests	Pocket Penetrometer (ksf)	Blows/foot	Moisture Content (%)	Dry Density (pcf)	Depth (ft)	Description
					0	6 Inch Concrete Pavement LIGHT BROWN SILTY SAND (SM) medium dense, dry
		12				driller's note: gravel at 7 to 7.5 feet
		22			10	
		29				occasional gravel
		42			20	increasing gravel content
		32				brown sandy clay at 24 to 26 feet
	4.5+	37			30	brown sandy clay at 29 to 29.5 feet
		38				brown sandy clay at 34.5 to 35 feet
76% Sand 13% Silt 11% Clay		34			40	
		30				MEDIUM GRAY AND BROWN SAND (SM) medium dense, moist BROWN AND GRAY SANDY GRAVEL (GP) very dense, moist, with some sand driller's note: clay layer at 52 to 53 feet
		55			50	
		68				GRAY AND BROWN SAND (SP) very dense, moist brown sandy clay layer at 59 to 59.5 feet
	4.5+	100+			60	DARK GRAY AND BLACK GRAVEL (GP) ∇ water level at 65 feet strong organic smell
69% Gravel 29% Sand 2% Fines		100+				BROWN AND GRAY CLAYEY SILT (ML) very stiff, wet
		22			70	driller's note: occasional coarse gravel at 71.5 feet LIGHT BROWN SAND (SW) very dense, wet
					80	

(Continuation of Log)

Laboratory Tests	Blows/foot	Moisture Content (%)	Dry Density (pcf)	Depth (ft)	Description
				80	driller's note: occasional gravel at 80 to 81 feet
	100+			90	becomes clayey sand at 92 feet
	100+			100	driller's note: occasional gravel slightly cemented becomes black at 105 feet driller's note: increased gravel layers
	100+			110	becomes light brown at 114 feet
89% Sand 8% Silt 3% Clay	100+			120	dark gray and black at 122 feet grades coarser
	100+			130	increased clay content BROWN AND GRAY CLAYEY SILT (ML) hard, wet
	100+			140	GRAY CLAYEY SAND (SC) very dense, wet driller's note: occasional gravel at 140 feet driller's note: occasional gravel at 146 feet
	100+			150	End of Boring at 150 feet
				160	

Two inch diamter PVC monitoring well set to 144 feet with lower 10 foot section consisting of 5 foot sump and 5 foot screened section. Boring caved from 63 to 149 feet. Bentonite seal from 62 to 63 feet. Natural backfill from 9 to 62 feet. Grout from 0 to 9 feet.

Equipment: Auger - Rotary Wash
Elevation: 5045 Date: 11/14/83

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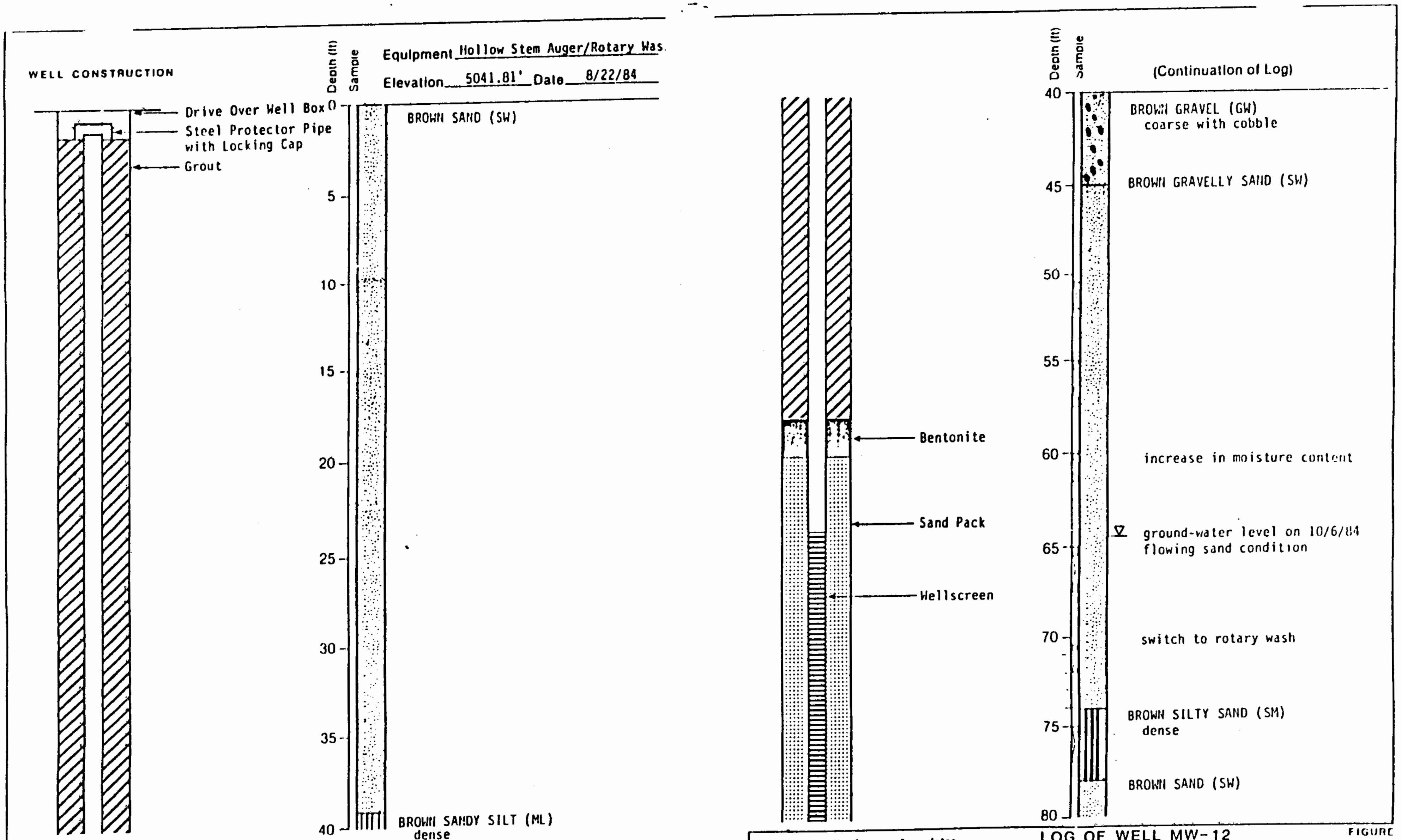
LOG OF WELL MW-11
Sparton Southwest, Inc.
Albuquerque, New Mexico

A-8

Drawn: [illegible] | Job Number: 6310,008.12 | Approved: [illegible] | Date | Revised | Date



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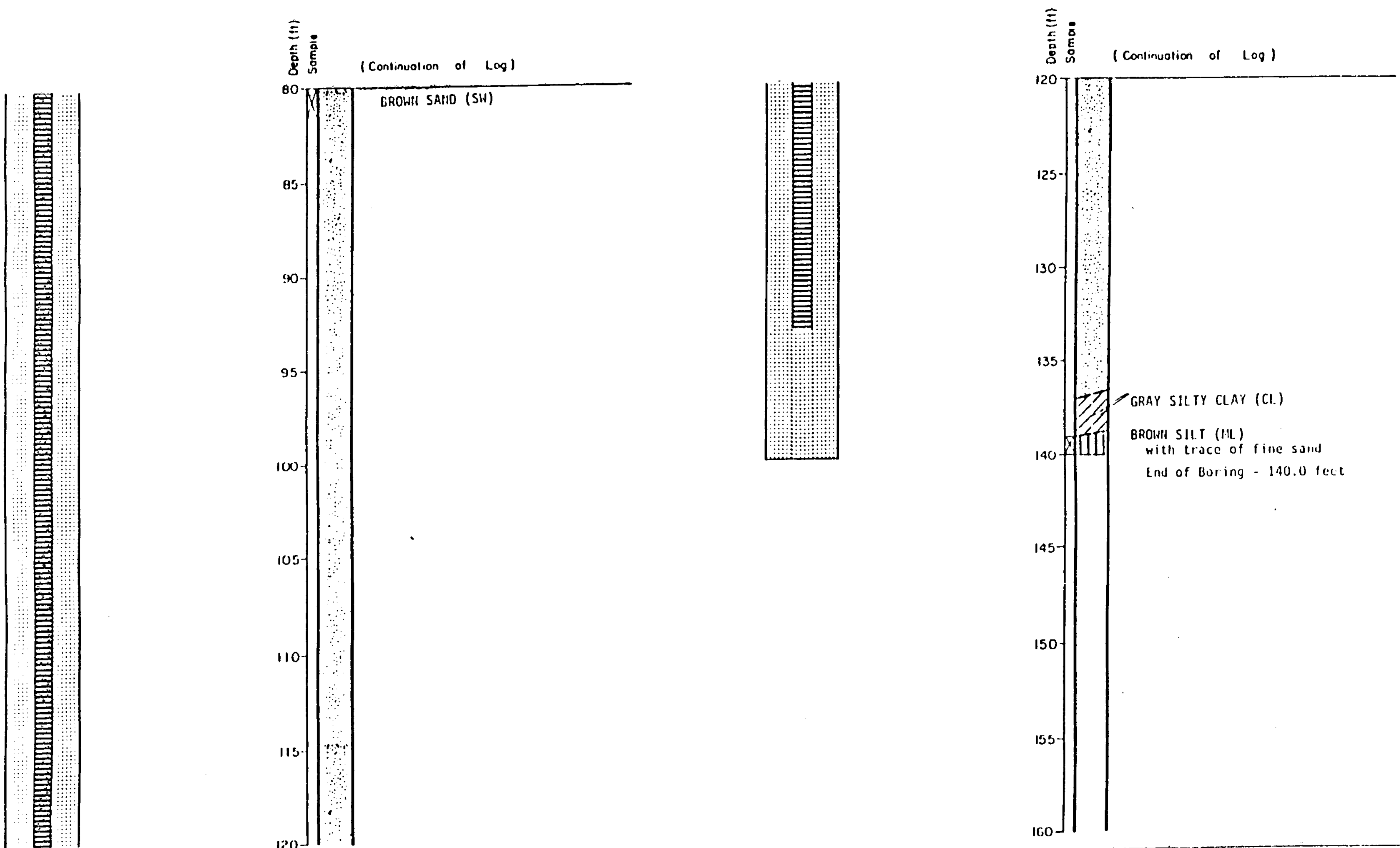
LOG OF WELL MW-12
Sparton Technology, Inc.
Albuquerque, New Mexico

FIGURE 2A

6310,013.12



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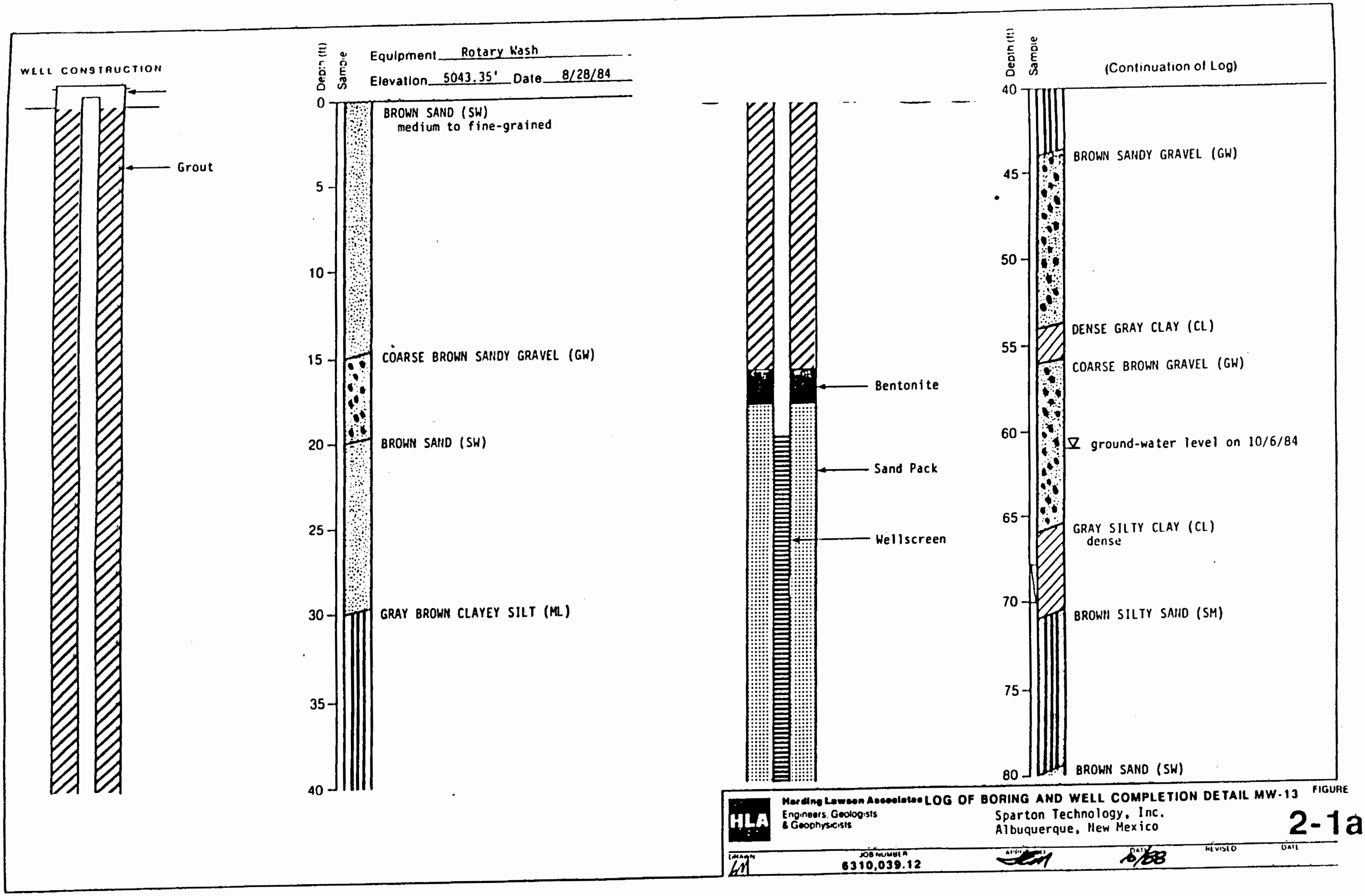
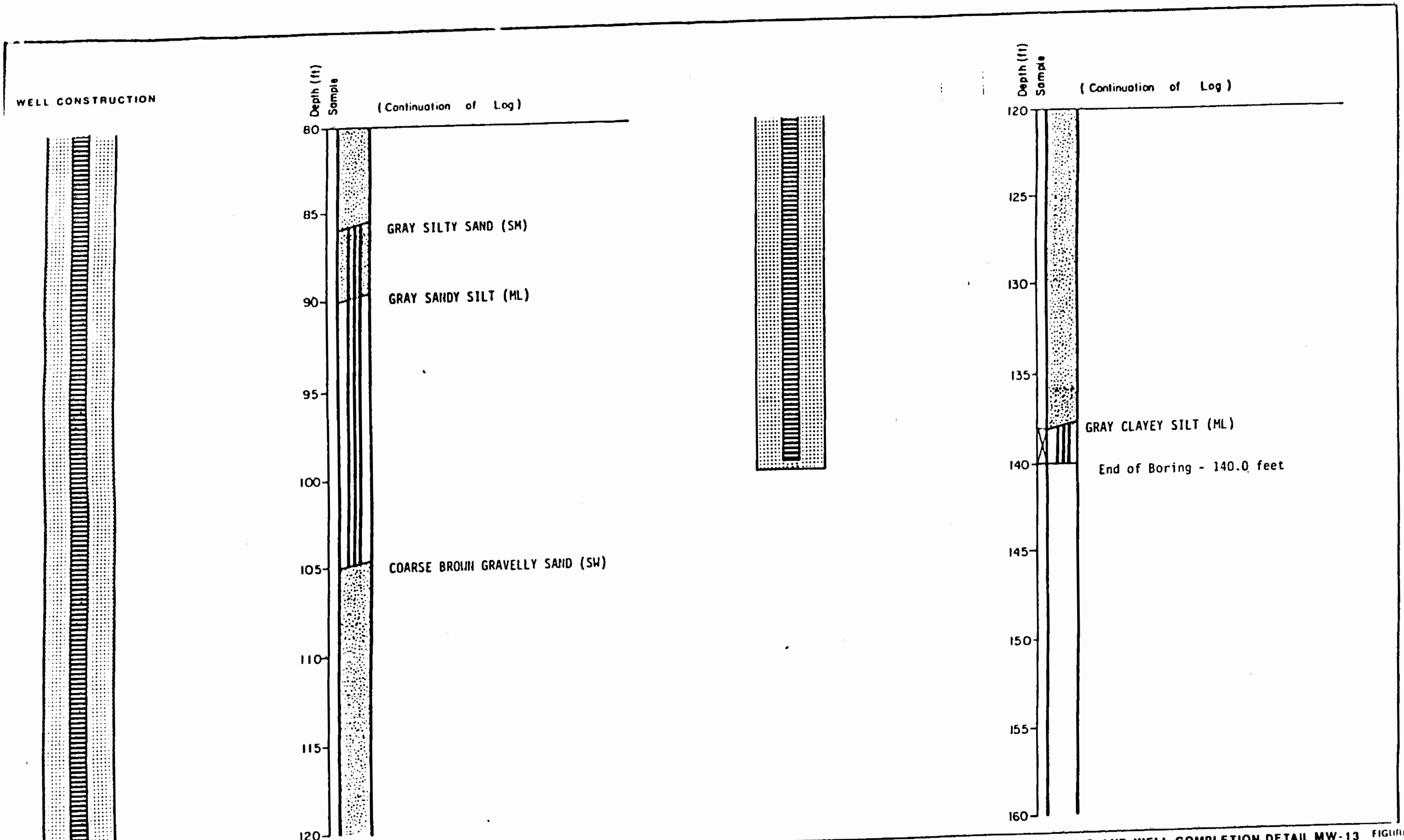
LOG OF WELL MW-12 (Cont'd)
Sparton Technology, Inc.
Albuquerque, New Mexico

FIGURE 2E

6310,013.12



LOG OF BORING AND WELL COMPLETION DETAIL MW-13



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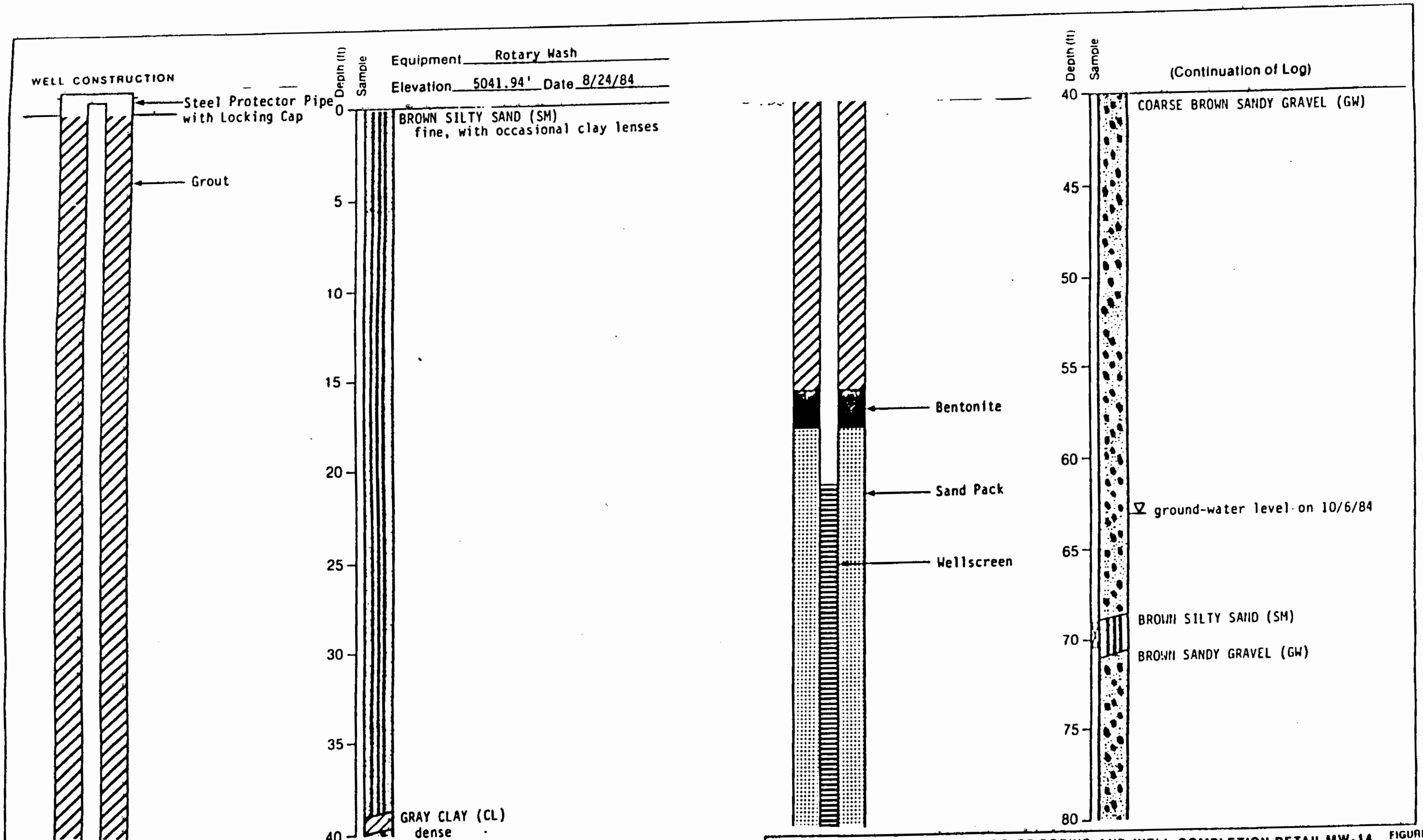
LOG OF BORING AND WELL COMPLETION DETAIL MW-13

Sparton Technology, Inc.
Albuquerque, New Mexico

FIGURE 2-1b



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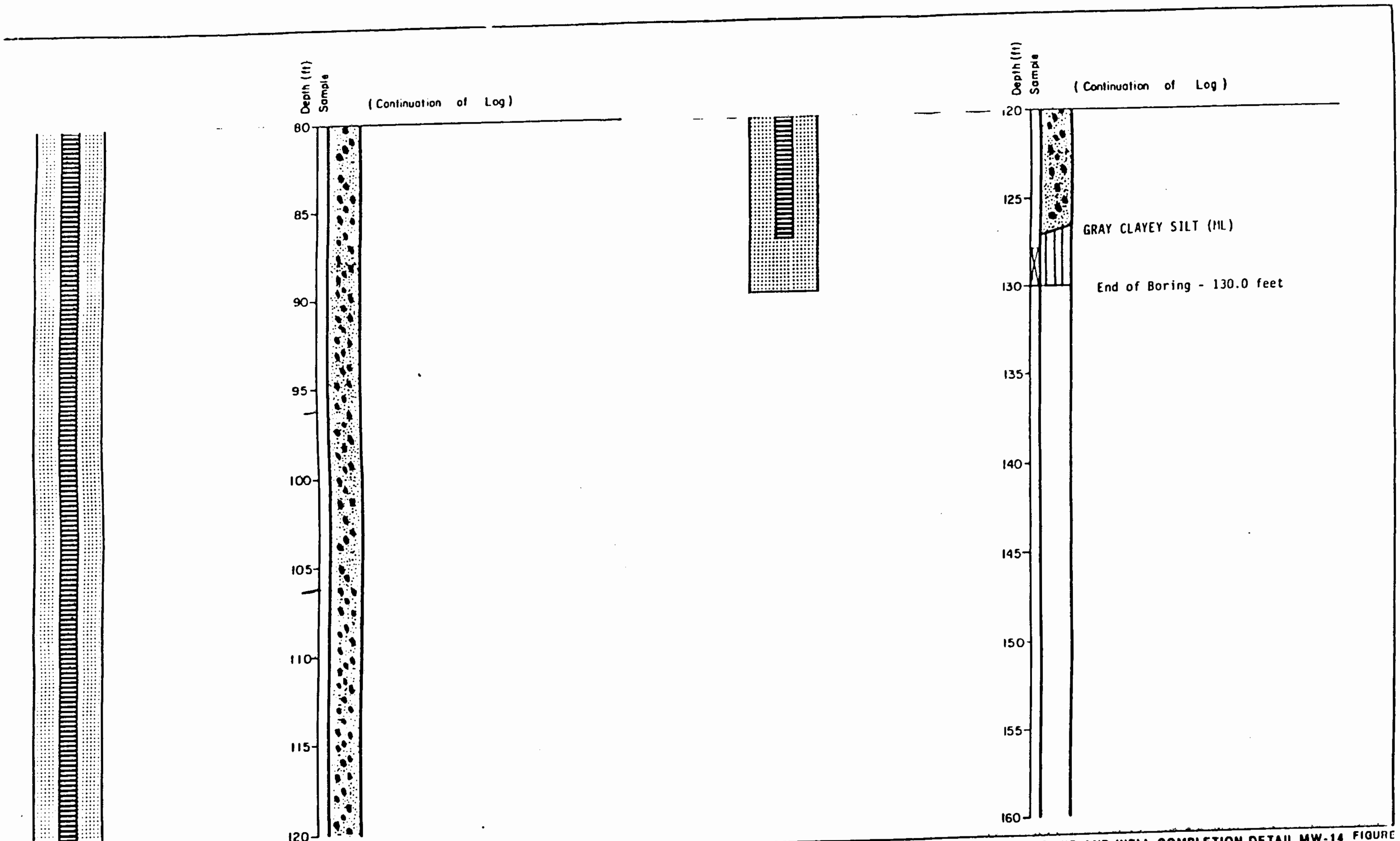
LOG OF BORING AND WELL COMPLETION DETAIL MW-14

Sparton Technology, Inc.
Albuquerque, New Mexico

FIGURE 2-2a

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
KM	6310,039.12	JEM	10/88		



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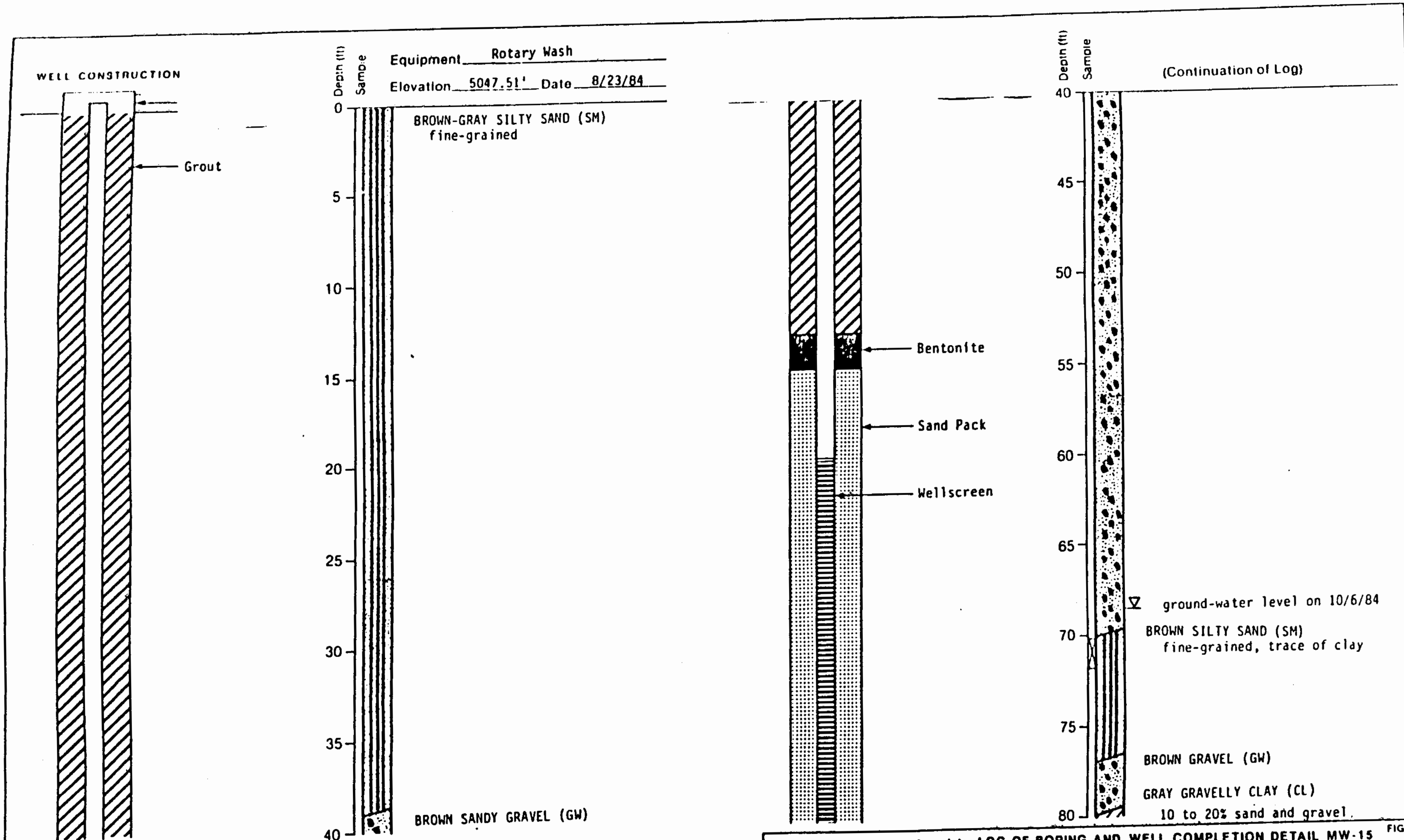
LOG OF BORING AND WELL COMPLETION DETAIL MW-14

Sparton Technology, Inc.
Albuquerque, New Mexico

FIGURE **2-2b**



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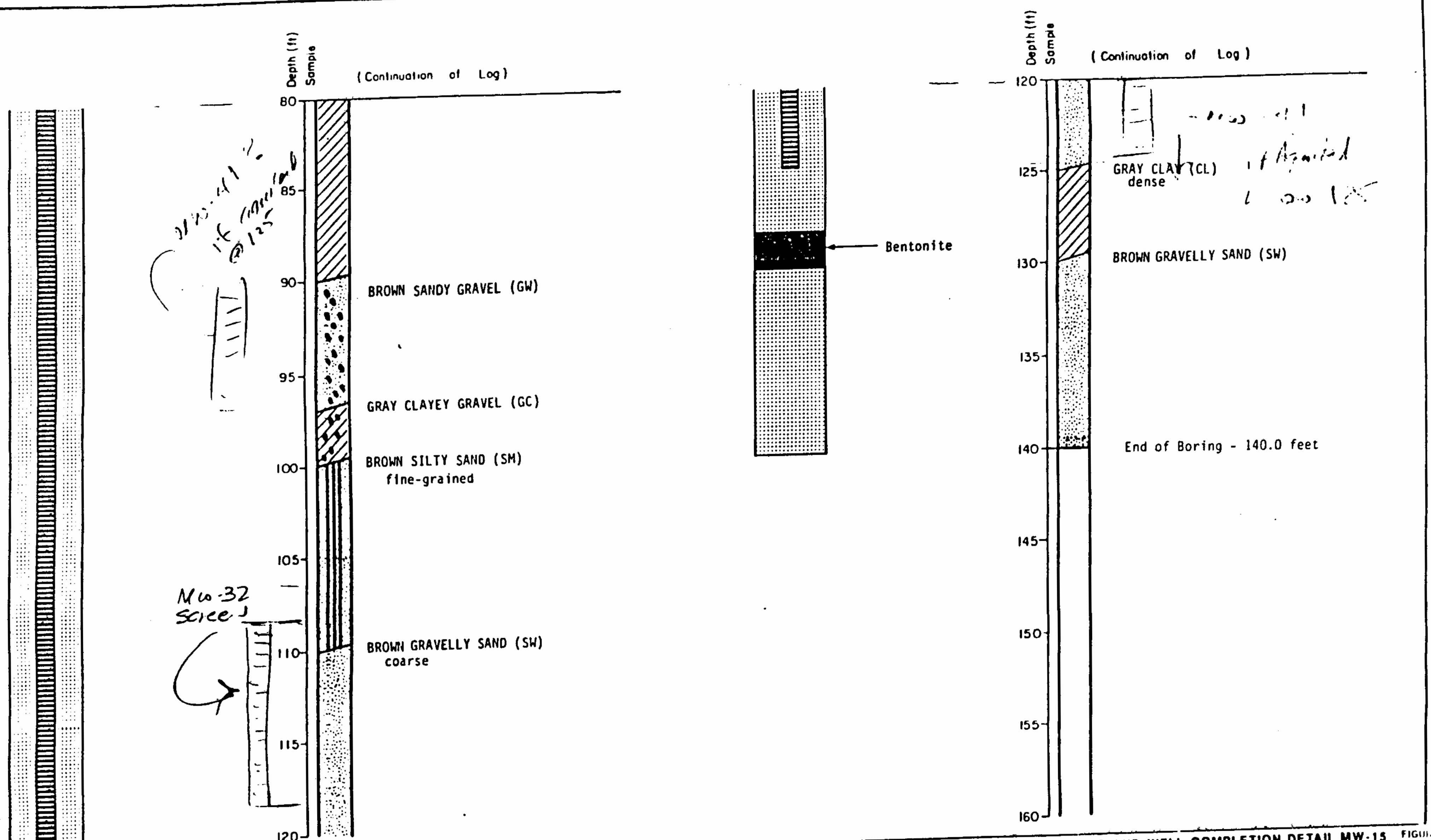
LOG OF BORING AND WELL COMPLETION DETAIL MW-15
Sparton Technology, Inc.
Albuquerque, New Mexico

FIGURE **2-3a**

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
LM	6310,039.12	[illegible]	10/88		



Harding Lawson Associates LOG OF BORING AND WELL COMPLETION DETAIL MW-15

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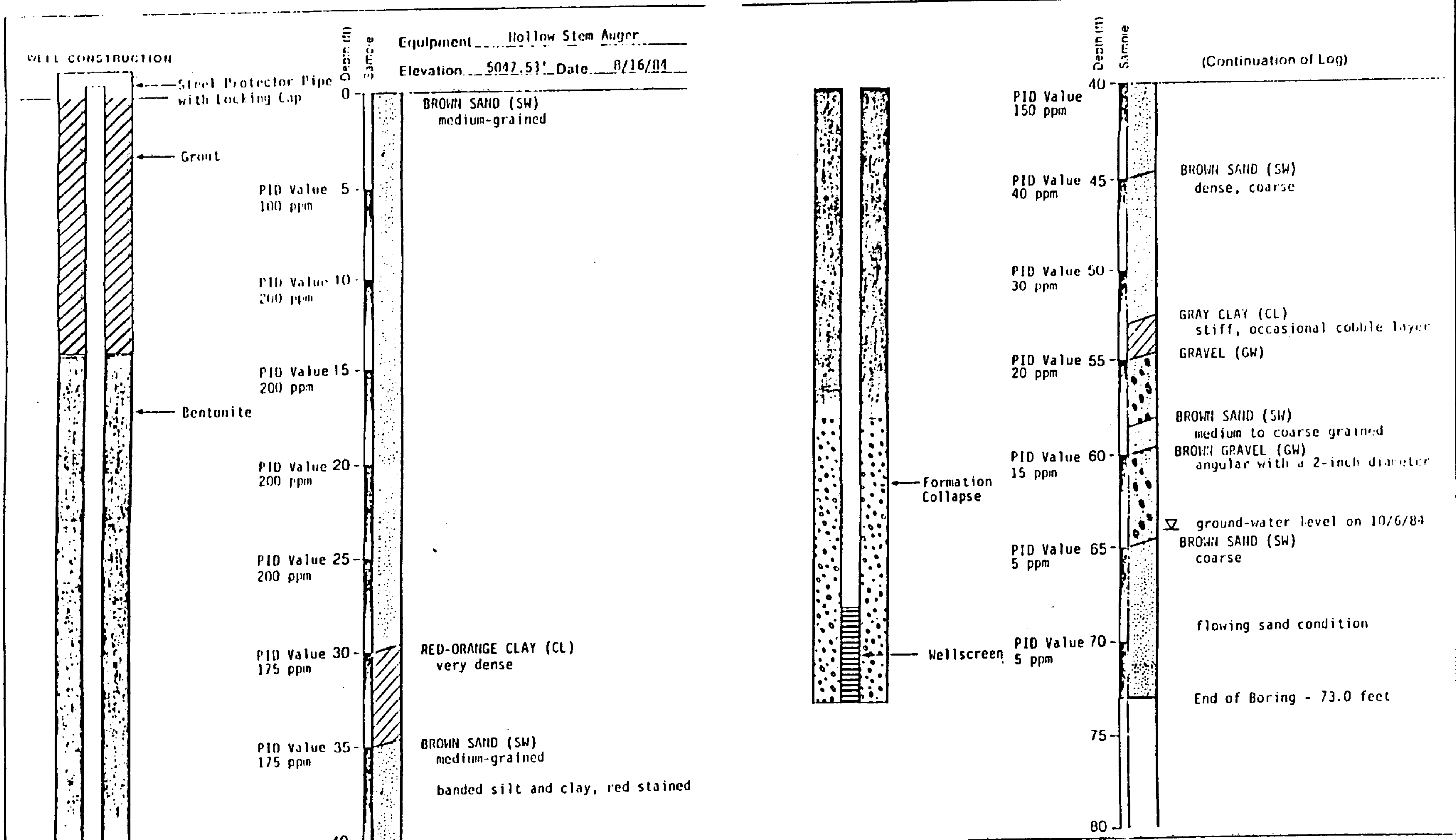
Albuquerque, New Mexico

FIGURE 2-3b



NOTE: PID Values were obtained with an HNU Systems Model 101 with an 11.7eV lamp and are referenced to benzene.

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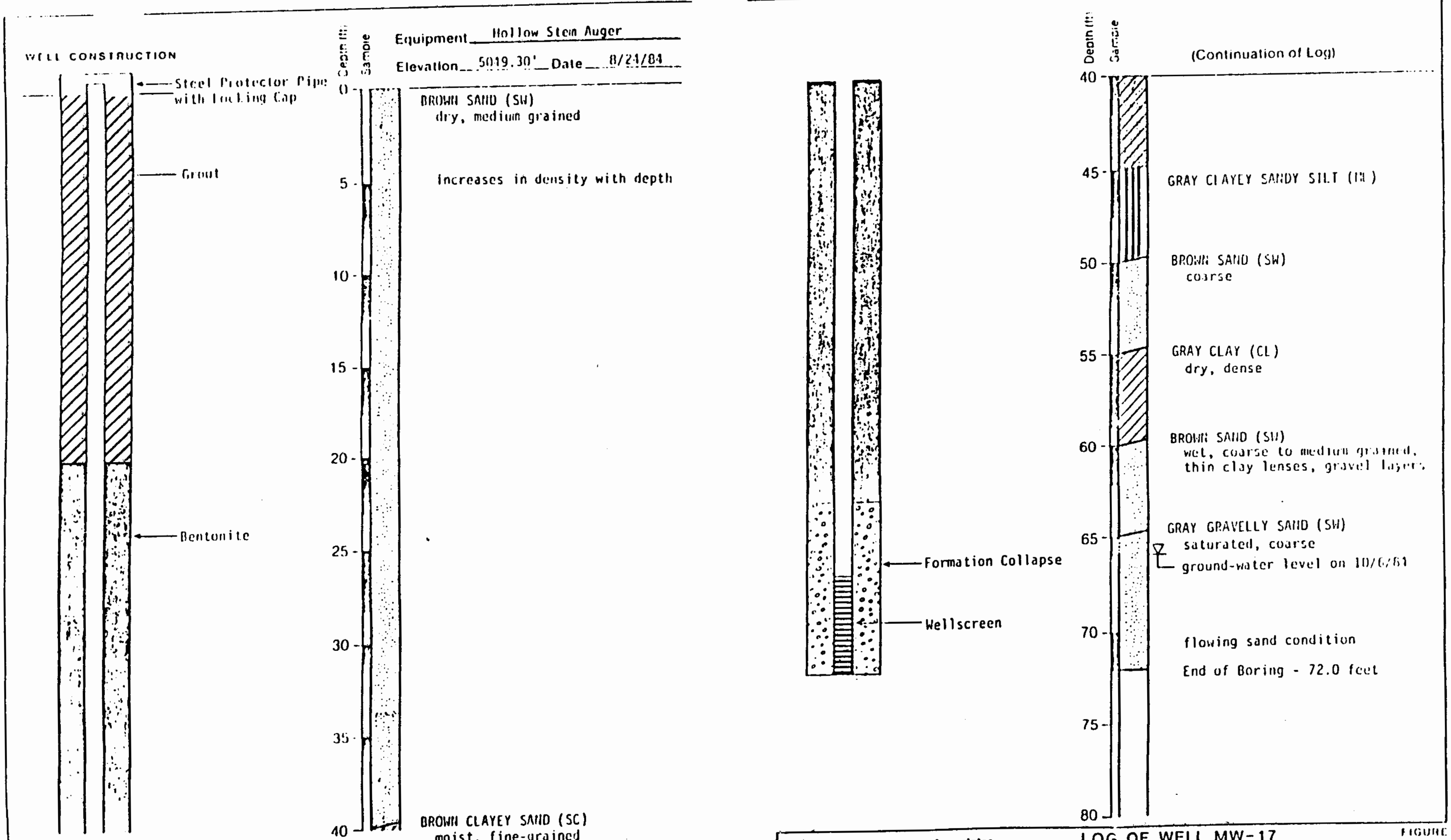
LOG OF WELL MW-16
Sparton Technology, Inc.
Albuquerque, New Mexico

FIGURE 7

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
JJL	6310,013.12				



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LOG OF WELL MW-17
Sparton Technology, Inc.
Albuquerque, New Mexico

FIGURE 8

DRAWN: AM | JOB NUMBER: 6310,013.12 | APPROVED | DATE | REVISED DATE

PID Background (ppm)	PID Sample (ppm)	Depth (ft)	Sample
0.5	1.6	80	

(Continuation of Log)

GRAY FINE TO MEDIUM SAND (SW)
saturated, trace silt, grains subangular to rounded, 94% quartz, 4% feldspar, 2% other

End of Boring 81 feet

Note: Above 43 feet the 11.7 ev PID probe was used. Below 43 feet the 10.2 ev PID probe was used.

85
90
95
100
10
110
115
120

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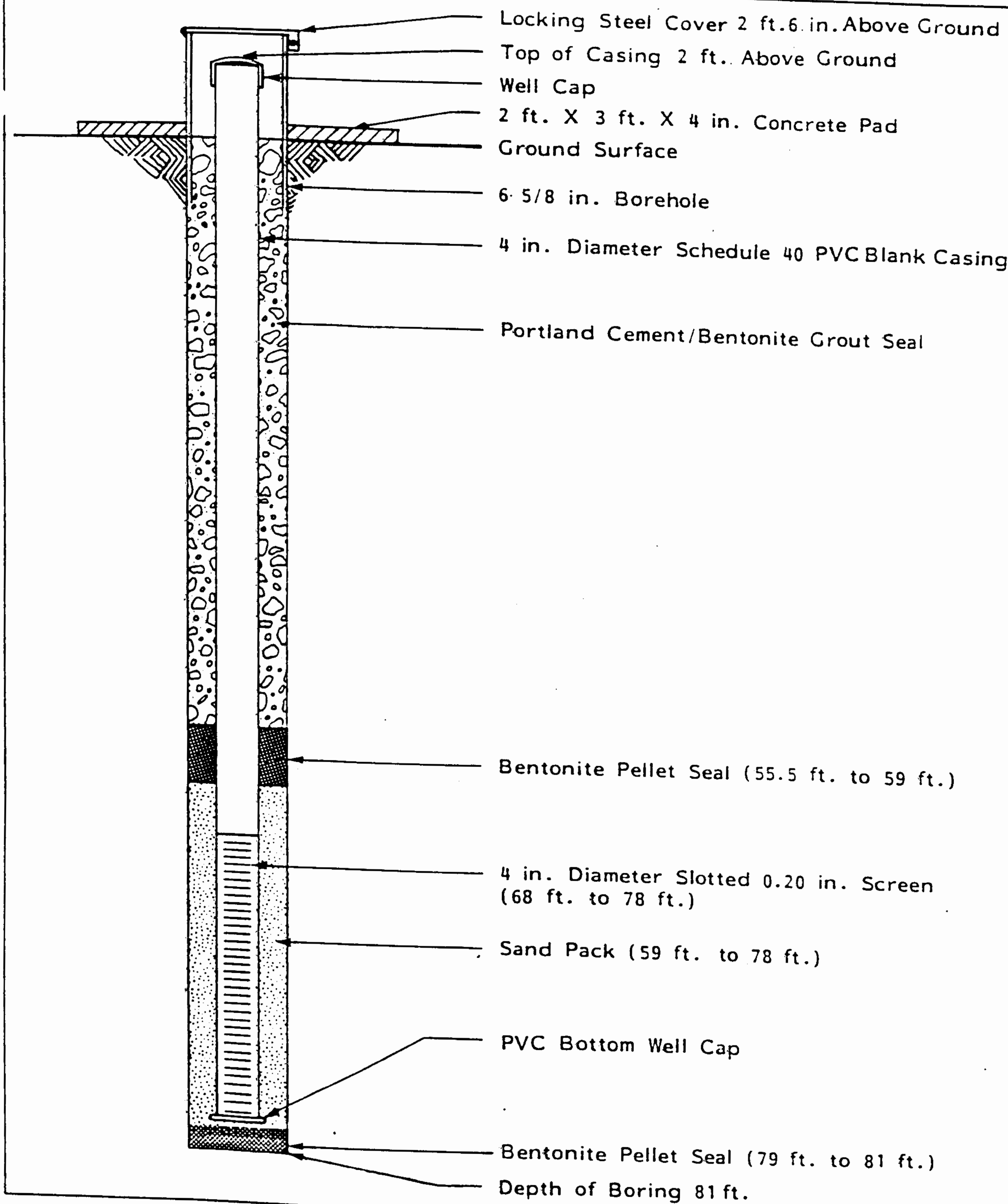
LOG OF BORING MW-18 (cont.)
Sparton Technology, Inc.
Albuquerque, New Mexico

PLATE 3a

DRAWN | JOB NUMBER 6310,031.12 | APPROVED | DATE 6/25/86 | REVISED | DATE



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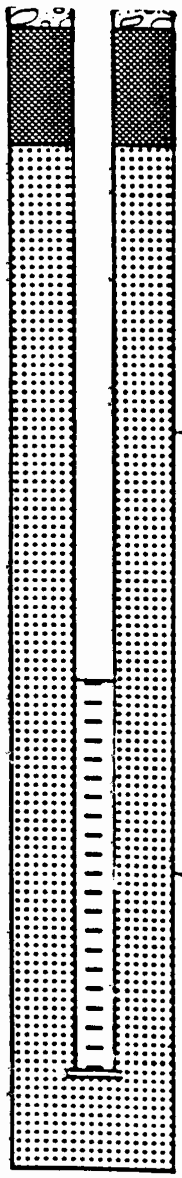
TYPICAL CONSTRUCTION OF MW-18

Sparton Technology, Inc.
Albuquerque, New Mexico

4

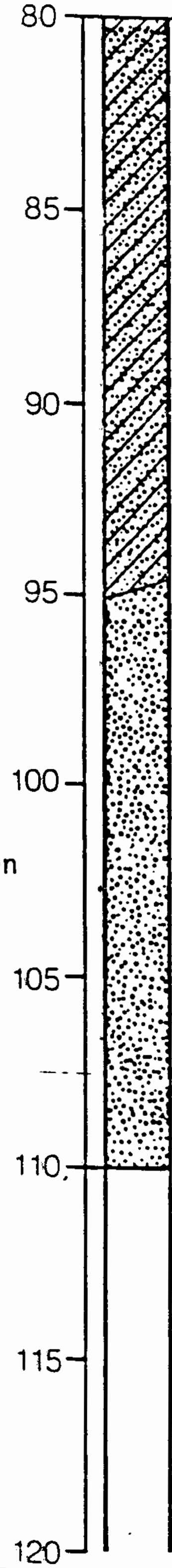
MK | 6310,023.12 | TSB | 6/25/86 | TB

MONITORING WELL DETAIL
(CONT.)



Depth (ft) | Sample

(Continuation of Log)



GRAY FINE TO COARSE SAND (SW)
angular to subrounded, 80% quartz, 5% feldspar, 15% other
trace small gravel, angular to subrounded, mostly quartzite

larger gravel 100 - 100.7 feet

End of Boring at 110 feet

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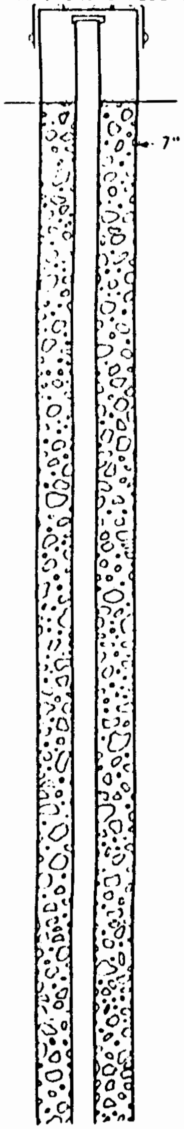
LOG OF BORING/MONITORING WELL MW-19 (CONT.)
Sparton Technology, Inc.
Albuquerque, New Mexico

PLATE 5a

DRAWN R.L. | JOB NUMBER 6310,033.12 | APPROVED | DATE | REVISED | DATE

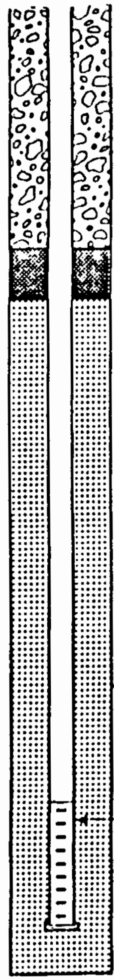
MONITORING WELL DETAIL



Equipment Hollow-Stem-Auger

Elevation 5045.4 Date 8/9/86 to 8/11/86

PID Sample (ppm)	PID Background (ppm)	Depth (ft)	Description
		0	6-inch asphalt and stabilized fill
			LIGHT BROWN SILTY FINE SAND (SM) moist, grains angular to subrounded, 96% quartz, 1% feldspar, 3% other
0.1	0.0	5	coarse sand 3.4 to 3.8 feet
			LIGHT GRAY FINE TO COARSE SAND (SW) moist, subangular to rounded, 94% quartz, 4% feldspar, 2% other, with horizontal bedding
0.5	0.0	10	sandy silt from 9.4 to 9.5 feet, silty sand with gravel from 9.5 to 10.1 feet, grains subrounded to well rounded, 88% quartz, 7% feldspar, 5% other, gravel is subangular to rounded mostly granite and caliche-cemented sandstone
2.0	0.0	15	sandy silt 14.25 to 14.45 feet
			very silty 14.75 to 15.0 feet
4.8	0.0	20	silty fine sand from 18.8 to 20.4 feet subangular to rounded, 96% quartz, 2% feldspar, 2% other
			LIGHT BROWN SILTY FINE SAND (SM) moist, rounded to well rounded, 95% quartz, 1% feldspar, 4% other
1.4	0.0	25	brown clayey silt 25.2 feet to 25.5 feet
			LIGHT BROWN FINE TO MEDIUM SAND (SP) moist, subangular to rounded, 95% quartz, 2% feldspar, 3% other
3.8	0.0	30	silty 30.4 to 31.6 feet
			1-inch silty clay 31 feet
			decrease in medium grain sand content below 31.6 feet
			LIGHT BROWN SILTY FINE TO MEDIUM SAND (SM) moist, subangular to rounded, 96% quartz, 2% feldspar, 2% other
3.0	0.0	35	1-inch clayey silt at 34.4 feet
			clayey silt 35.6 to 36.0 feet
2.0	0.0	40	



(Continuation of Log)

PID Sample (ppm)	PID Background (ppm)	Depth (ft)	Description
		40	LIGHT BROWN FINE TO COARSE SAND (SW) moist, subangular to well rounded, 94% quartz, 3% feldspar, 3% other
2.2	0.0	45	silty 45.1 to 45.4 feet
			silty with trace clay 45.6 to 45.9 feet
			BROWN FINE SAND (SP) moist, sugangular to well rounded, 97% quartz, 1% feldspar, 2% other, with silt and clay
1.2	0.0	50	with charcoal pieces at 49 feet
2.3	0.0		
		55	LIGHT BROWN FINE TO COARSE SAND (SW) moist, grains subangular to well rounded, 94% quartz, 3% feldspar, 3% other
			sandy clay 51.4 to 51.5 feet
4.8	0.0	60	with trace gravel below 61.3 feet
1.4	0.0		
		65	seepage encountered at 66.0 feet
			trace silt below 69.5
14.0	0.0	70	
			horizontal bedding below 74.2 feet
			silty 75.7 to 76 feet
6.8	0.0	75	BROWN SANDY SILT (ML) dense, saturated, with clay laminations, trace fine sand
			End of Boring at 78 feet
		80	

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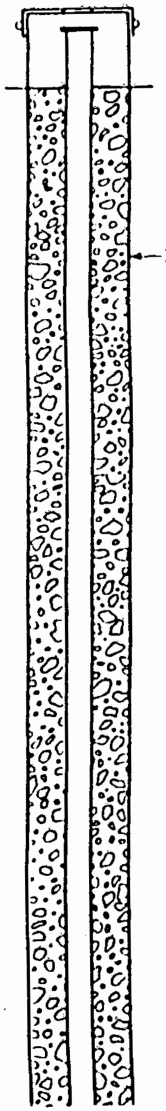
LOG OF BORING AND WELL COMPLETION DETAIL MW-23
Sparton Technology, Inc.
Albuquerque, New Mexico

FIGURE 1-3

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
EL	6310,039.12	[signature]	10/88		

MONITORING WELL DETAIL

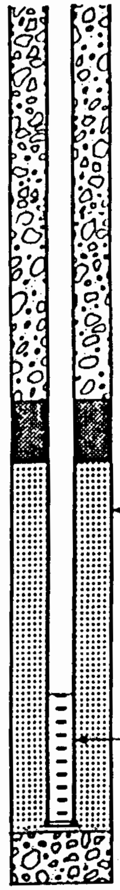


Equipment Hollow Stem Auger

Elevation 5046.3 Date 12/8/86 12/9/86

PID Background (ppm)	PID Sample (ppm)	Depth (ft)	Description
		0	ASPHALT
			STABILIZED BASE
			LIGHT BROWN WELL-GRADED SAND (SW) moist, fine to coarse, subangular to well rounded, 94% quartz, 2% feldspar, 4% other, trace silt with gravel 2.0 to 2.5 feet, subangular to rounded, mainly quartzite with granite
		10	slightly coarser below 11.5 feet
			LIGHT BROWN POORLY-GRADED SAND (SP) moist, medium grained, subrounded to well rounded, 95% quartz, 2% feldspar, 3% other, trace coarse sand and small gravel
0.0	135	40	BROWN SANDY CLAY WITH SILT (CL) very moist

MONITORING WELL DETAIL (CONT.)



(Continuation of Log)

PID Background (ppm)	PID Sample (ppm)	Depth (ft)	Description
0.0	70	40	LIGHT BROWN SILTY SAND (SM) moist, fine to medium, subrounded to well rounded, 97% quartz, 1% feldspar, 2% other
0.0	185		BROWN SANDY SILT WITH CLAY (ML) moist, fine sand
0.0	50	45	BROWN POORLY-GRADED SAND (SP) moist, clay balls
			LIGHT GRAY WELL-GRADED SAND WITH GRAVEL (SW) moist, medium to coarse, rounded to well rounded, 90% quartz, 6% feldspar, 4% other, gravel subrounded to well rounded, mainly quartzite with some granite hard drilling 46 to 47 feet
			LIGHT GRAY SANDY WELL-GRADED GRAVEL (GW) moist, gravel subrounded to well rounded, mostly quartzite, medium to coarse grained, subangular to well rounded, 96% quartz, 2% feldspar, 2% other
0.0	>20		seepage encountered at 65 feet
		65	BROWN POORLY-GRADED SAND (SP) saturated, medium with trace fine, subangular to rounded, 98% quartz, 1% feldspar, 1% other, faint horizontal bedding
0.0	6.0	70	LIGHT GRAY WELL-GRADED SAND (SW) saturated, fine to medium with trace coarse, subrounded to well rounded, 96% quartz, 2% feldspar, 2% other, faint horizontal bedding
0.0	55		LIGHT BROWN SILTY CLAY (CL) saturated, sandy toward base
		75	End of Boring - 75 feet

Note: 10.2 ev PID probed used

Harding Lawson Associates
Engineers, Geologists & Geophysicists

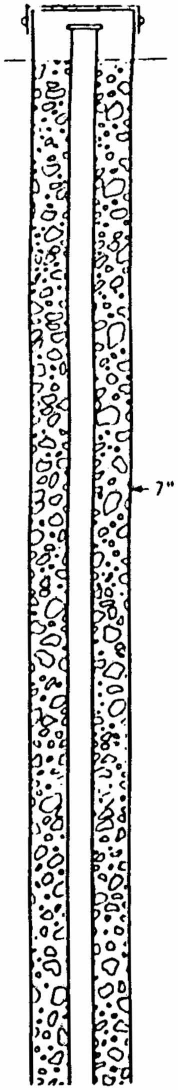
LOG OF BORING AND WELL COMPLETION DETAIL MW-24

Sparton Technology, Inc.
Albuquerque, New Mexico

FIGURE 1-4

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
ES	6310,039.12		10/88		

MONITORING WELL DETAIL



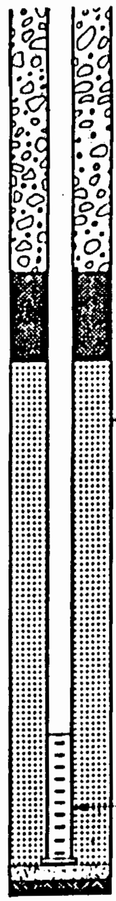
PID Background (ppm)	PID Sample (ppm)
0.0	180
0.0	55

Equipment Hollow Stem Auger

Elevation 5046.0 Date 12/10/86 12/11/86

Depth (ft)	Description
0	LIGHT BROWN WELL-GRADED SAND (SW) moist, medium to coarse, subangular to rounded, 95% quartz, 2% feldspar, 3% other
5	trace gravel and 93% quartz, 4% feldspar, 3% other below 5 feet
25	RED-BROWN CLAY (CH) moist
	LIGHT BROWN WELL-GRADED SAND WITH GRAVEL (SW) moist, medium to coarse, subrounded to well rounded, 95% quartz, 2% feldspar, 3% other, gravel mainly quartzite, subrounded to well rounded
37	BROWN SILTY CLAY (CL) moist
	LIGHT BROWN SILTY SAND (SM) moist, fine sand, angular to rounded, 96% quartz, 1% feldspar, 3% other 1-inch clayey layers at 39.2 and 39.7 feet

MONITORING WELL DETAIL (CONT.)



PID Background (ppm)	PID Sample (ppm)
0.0	58
0.0	10.0
0.0	110
0.0	55
0.0	30

(Continuation of Log)

Depth (ft)	Description
40	BROWN SANDY CLAYEY SILT (ML) moist, fine to medium sand
	LIGHT GRAY POORLY-GRADED SAND (SP) moist, medium, subrounded to well rounded, 97% quartz, 1% feldspar, 2% other with gravel 46 to 50 feet, subrounded to rounded, mainly quartzite
50	trace gravel below 50 feet
57	LIGHT GRAY WELL-GRADED GRAVEL WITH SAND (GW) moist, subrounded to well rounded, mainly quartzite, medium sand, subrounded to well rounded, 97% quartz, 1% feldspar, 2% other
	seepage encountered at 64.5 feet
	LIGHT GRAY WELL-GRADED SAND (SW) saturated, fine to medium with trace coarse, subangular to rounded, 96% quartz, 2% feldspar, 2% other
70	some cementation at 70 feet
	LIGHT BROWN SILTY CLAY (CL) saturated, trace fine to medium sand blocky 73.2 to 73.5 feet
	LIGHT BROWN SANDY SILT WITH CLAY (ML) saturated, fine to medium sand
	LIGHT BROWN SILTY SAND (SM) saturated, fine sand, angular to subrounded, 98% quartz, 2% other End of Boring - 75 feet

Note: 10.2 ev PID probe used.

Harding Lawson Associates
Engineers Geologists & Geophysicists

LOG OF BORING AND WELL COMPLETION DETAIL MW-25

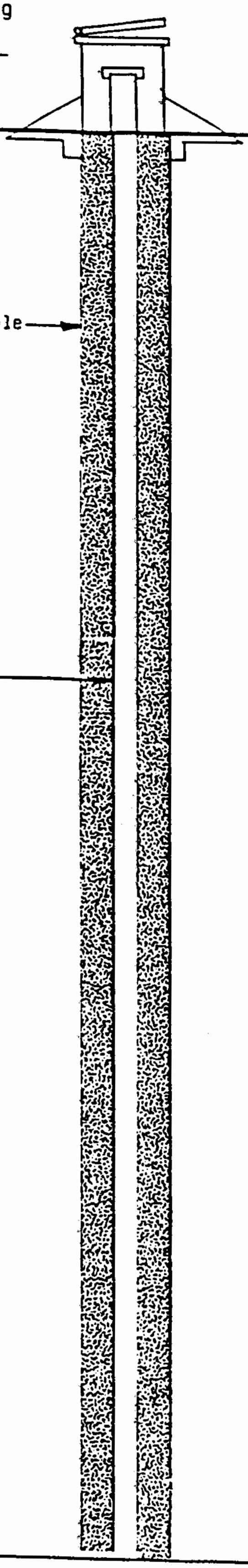
Sparton Technology, Inc.
Albuquerque, New Mexico

FIGURE 1-5

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
EJ	6310,039.12		10/88		

Top of PVC Casing
Elevation____

GROUND SURFACE



REC. % | PID (ppm) | Depth (ft) | Sample

Equipment Hollow Stem Auger

Elevation ft Date 5/17/88

Depth (ft)	Description
0	LIGHT BROWN FINE TO MEDIUM SAND (SP)
5	gray fine sand seam at 5.0 - 5.5'
10	
15	caliche lamination at 14.5'
20	
25	
30	clayey sand seam at 30.0' - 30.3' LIGHT BROWN FINE-COARSE SAND (SW) with fine gravel at 31.5' -31.7' LIGHT BROWN TO BROWN FINE-MEDIUM SAND (SP) with occasional clayey sand laminations to 39.0'
35	
40	

Harding Lawson Associates
Engineers and Geoscientists

Log of Boring and Well Completion Detail MW-26
Sparton Technology Inc.
Albuquerque, New Mexico

FIGURE
1-6a

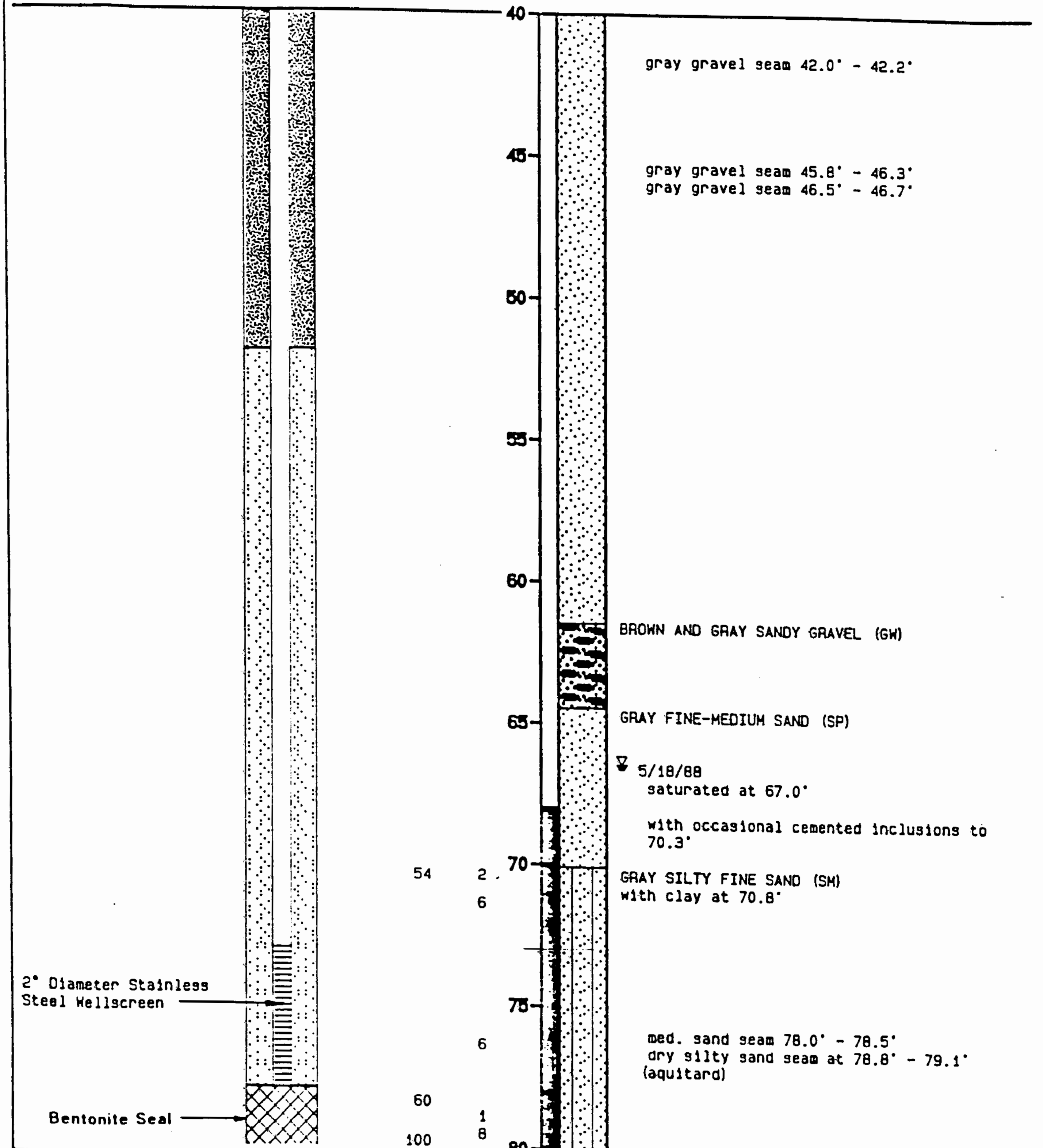
DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
ES	06310.039.12	AM	9/88		

Top of PVC Casing
Elevation________

GROUND SURFACE

REC. % | PID (ppm) | Depth (ft) | Sample

Equipment Hollow Stem Auger
Elevation ft Date 5/17/88



Harding Lawson Associates
Engineers and Geoscientists

Log of Boring and Well Completion Detail MW-26
Sparton Technology Inc.
Albuquerque, New Mexico

FIGURE
1-6b

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	06310.039.12		9/88		

Top of PVC Casing
Elevation ______

GROUND SURFACE

REC. %

PID (ppm)

Depth (ft)

Sample

Equipment Hollow Stem Auger

Elevation ft Date 5/17/88

80

End of Boring - 81.0 ft.

85

90

95

100

105

110

115

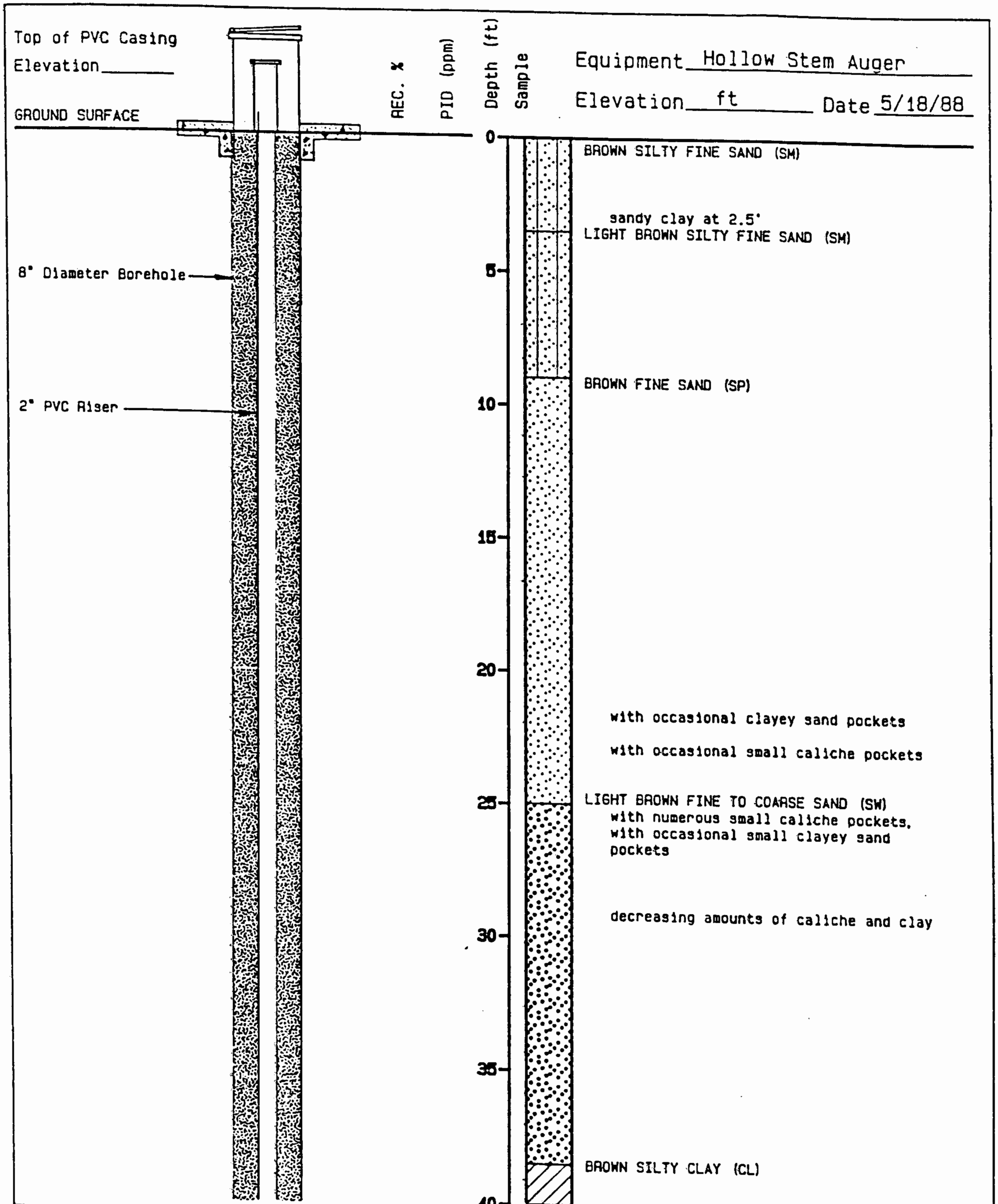
120

Harding Lawson Associates
Engineers and Geoscientists

Log of Boring and Well Completion Detail MW-26
Sparton Technology Inc.
Albuquerque, New Mexico

FIGURE **1-6c**

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
ES	06310.039.12	Jem	9/88		



Harding Lawson Associates
Engineers and Geoscientists

Log of Boring and Well Completion Detail MW-27
Sparton Technology Inc.
Albuquerque, New Mexico

FIGURE **1-7a**

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
ES	06310.039.12	[signature]	9/88		

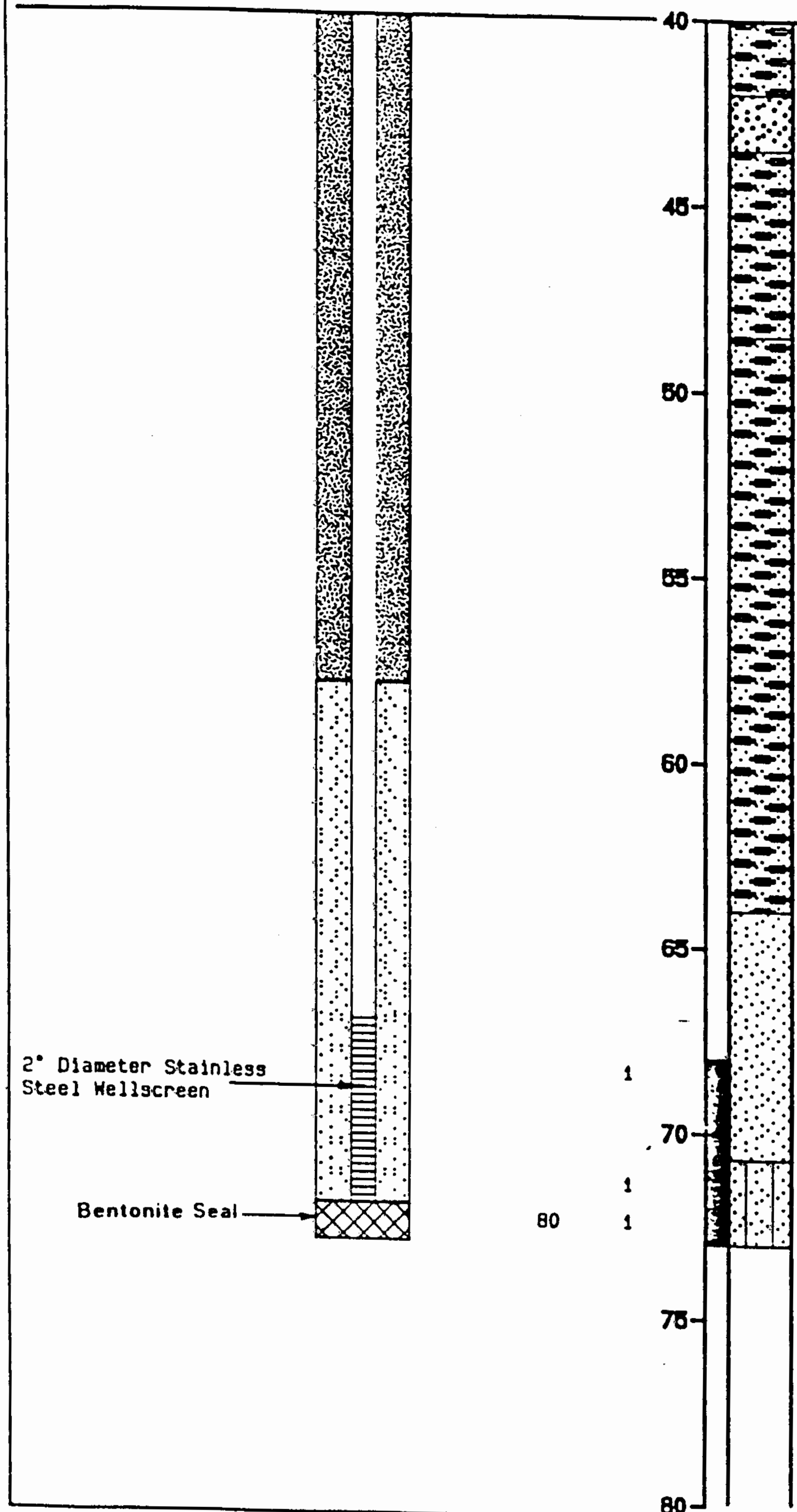
Top of PVC Casing
Elevation ________

GROUND SURFACE

REC. % | PID (ppm) | Depth (ft) | Sample

Equipment Hollow Stem Auger

Elevation ft   Date 5/18/88



LIGHT BROWN AND GRAY SANDY GRAVEL (GP)

LIGHT BROWN FINE TO COARSE SAND (SW)
with occasional gravel
LIGHT BROWN AND GRAY SANDY GRAVEL (GP)

sand seam at 45.0' - 46.0'

with occasional cobbles
GRAY FINE TO COARSE GRAVEL (GP)

GRAY FINE SAND (SP)

▽ 5/19/88

saturated

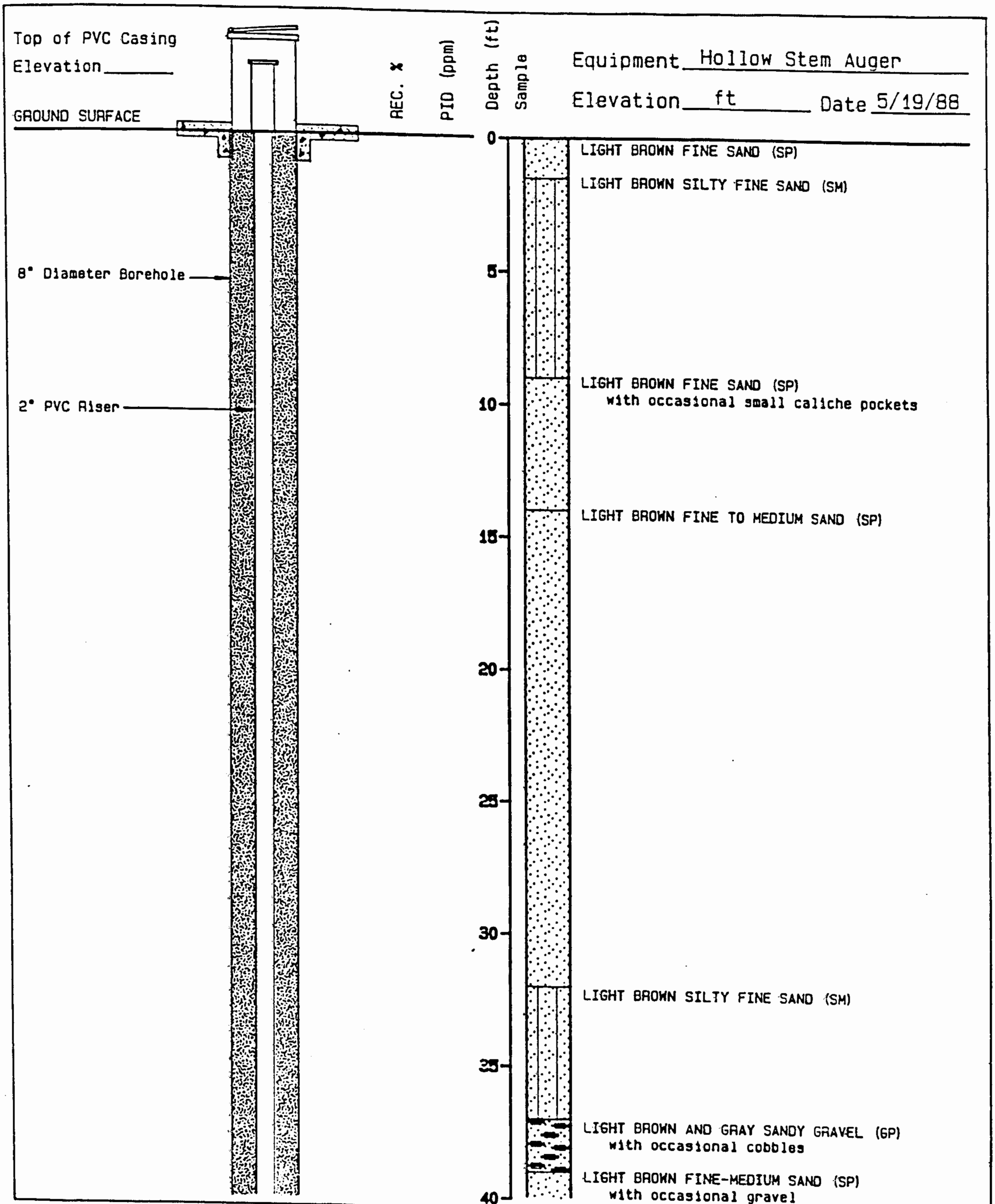
GRAY SILTY FINE SAND (SM)
with silty clay seam at 71.2' - 71.5'
End of Boring - 73.0 ft.

Harding Lawson Associates
Engineers and Geoscientists

Log of Boring and Well Completion Detail MW-27
Sparton Technology Inc.
Albuquerque, New Mexico

FIGURE
1-7b

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
ES	06310.039.12		9/88		

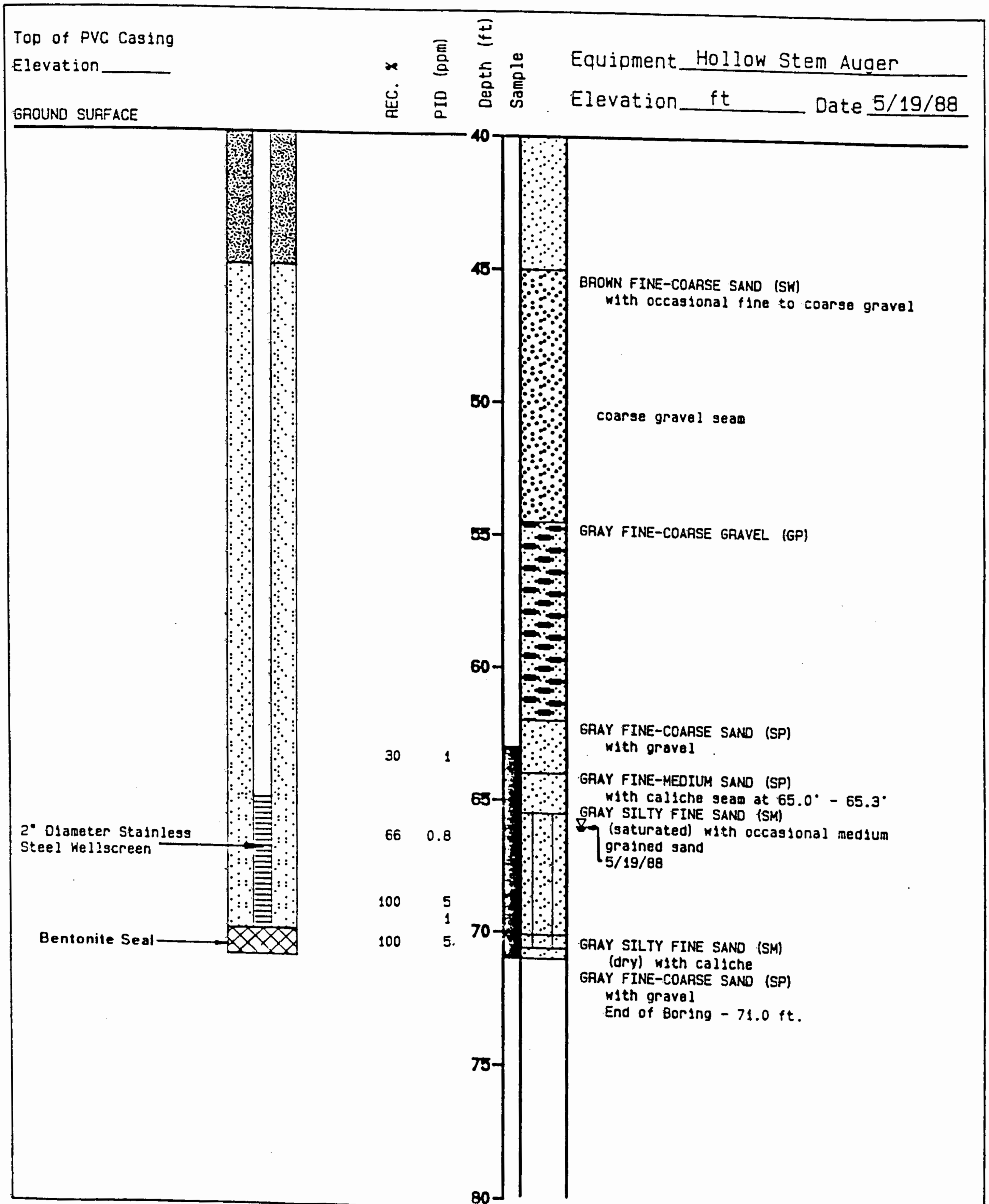


Harding Lawson Associates
Engineers and Geoscientists

Log of Boring and Well Completion Detail MW-28
Sparton Technology Inc.
Albuquerque, New Mexico

FIGURE **1-8**

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
E.S.	06310.039.12	[signature]	9/88		



Harding Lawson Associates
Engineers and Geoscientists

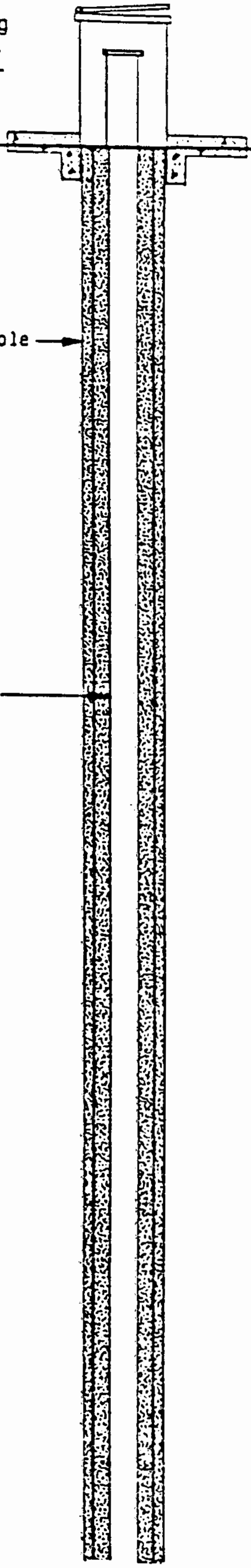
Log of Boring and Well Completion Detail MW-28
Sparton Technology Inc.
Albuquerque, New Mexico

FIGURE
1-8b

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
ES	06310.039.12	[signature]	9/88		

Top of Casing Elevation 5044.57

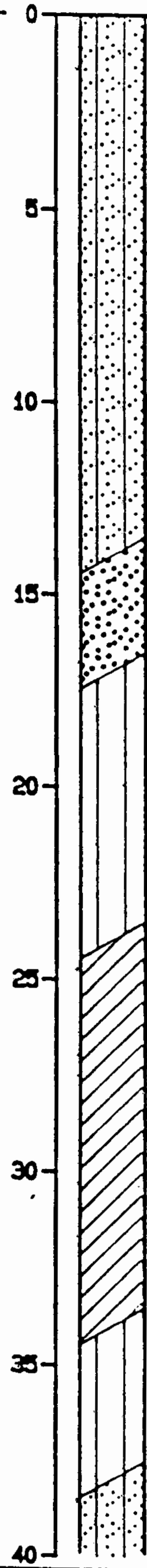
GROUND SURFACE



REC. % | PID (ppm) | Depth (ft) | Sample

Equipment Rotary Wash

Elevation ft Date 6/22/88



BROWN SILTY SAND (SM)
medium dense, moist, fine-medium grained.

BROWN SAND (SW)
medium dense, moist fine-coarse grained

BROWN SILT (ML)
medium dense, moist with sand

BROWN LEAN CLAY (CL)
stiff, moist

BROWN SANDY SILT (ML)
medium dense, moist

BROWN SILTY FINE SAND (SM)
dense, with clay stringers and coarse sand stringers

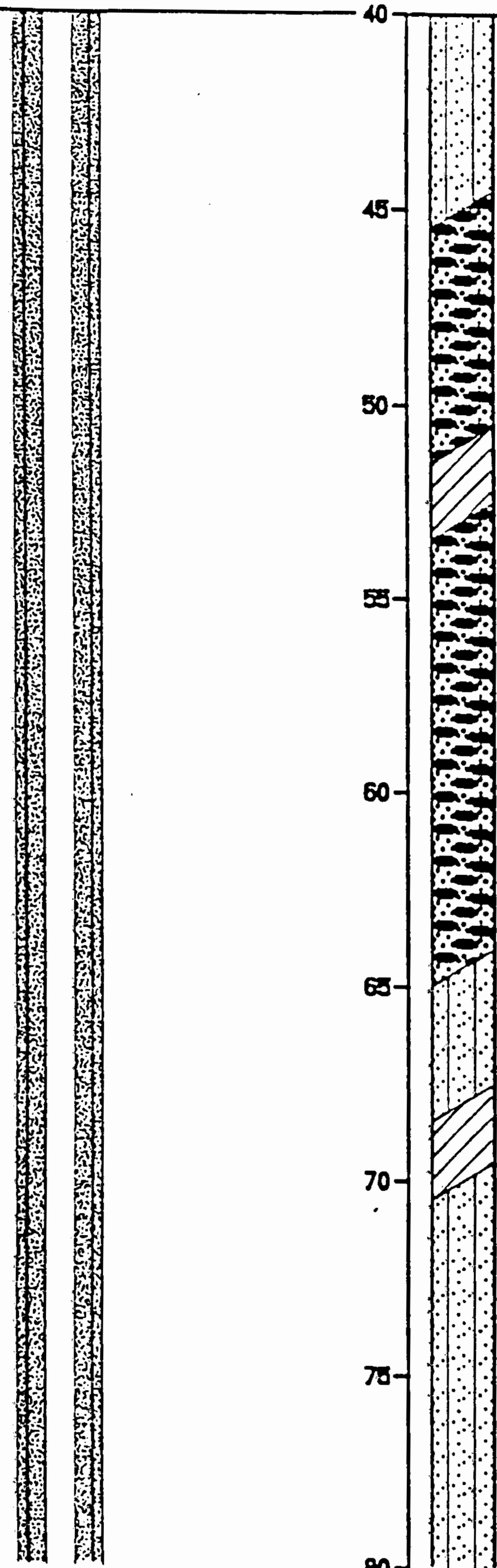
Harding Lawson Associates
Engineers and Geoscientists

Log of Boring and Well Completion Detail MW-29 FIGURE

Sparton Technology Inc.
Albuquerque, New Mexico

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
E.G.	06310,039.12		9/88		

REC. %	PID (ppm)	Depth (ft)	Sample	Equipment Rotary Wash
				Elevation ft Date 6/22/88



DARK GRAY & BROWN GRAVEL (GW)
with sand

BROWN LEAN CLAY (CL)
very stiff, moist

DARK GRAY & BROWN GRAVEL (GW)
with sand and with
clay stringers

BROWN SILTY SAND (SM)
dense, fine-coarse grained
with gravel stringers

GRAY SANDY CLAY (CL)
stiff, moist

BROWN SILTY FINE SAND (SM)
dense, with sandy silt
stringers

10"-12" gravel layer at 73.0'

14"-16" gravel layer at 75.0'

No silt stringers below 76.0'

with gravel and gravel stringers below
77.5'

Harding Lawson Associates
Engineers and Geoscientists

Log of Boring and Well Completion Detail MW-29
Sparton Technology Inc.
Albuquerque, New Mexico

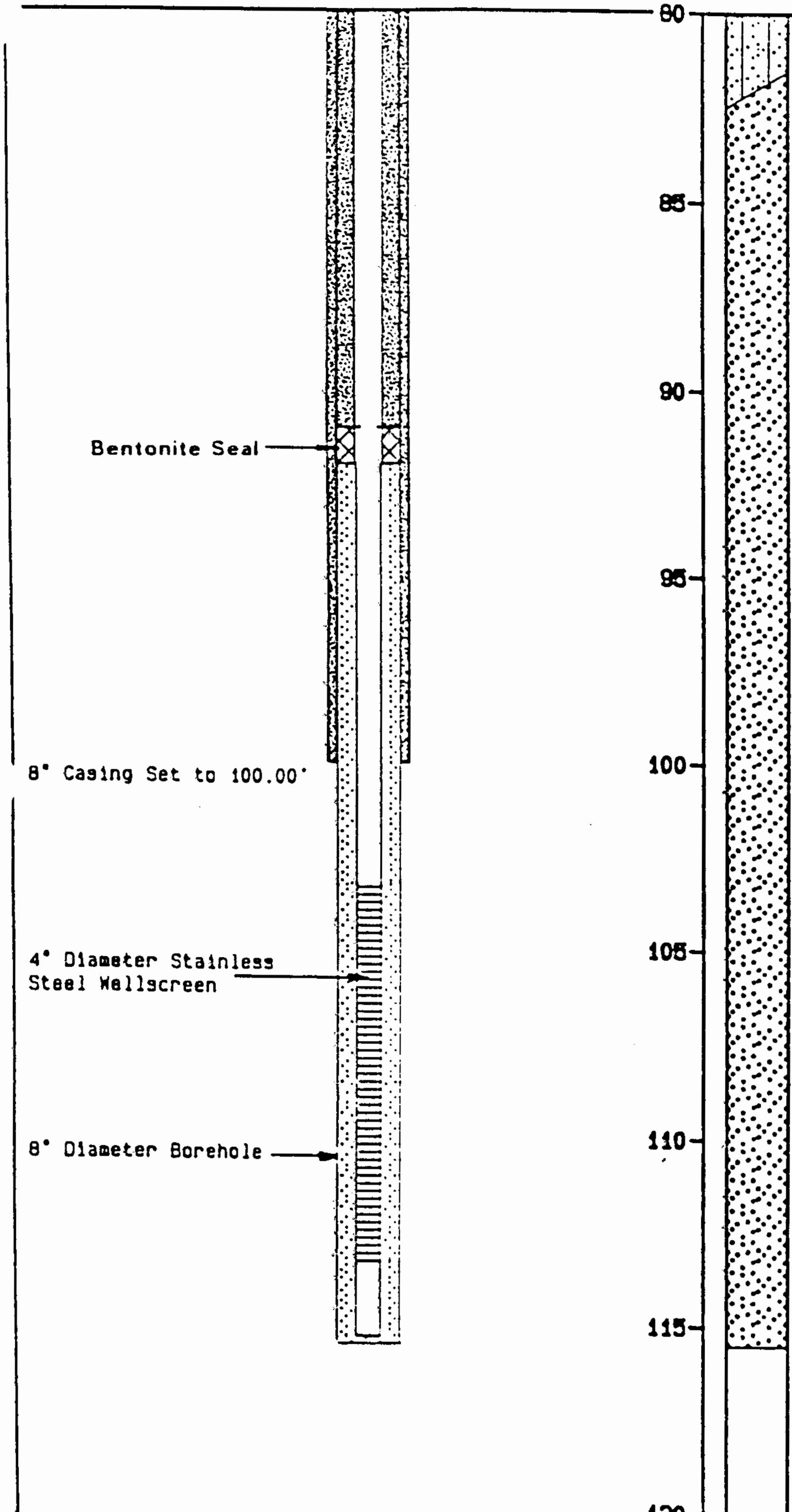
FIGURE

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
ES	06310.039.12		9/88		

REC. % | PID (ppm) | Depth (ft) | Sample

Equipment Rotary Wash

Elevation ft Date 6/22/88



BROWN SAND (SW)
medium dense, fine-coarse grained with gravel

10"-12" gravel layer at 85.0'

with gravel seams below 86.0'

with silt seams below 99.0'

increased gravel content below 102.0'

End of Boring - 115.5 feet

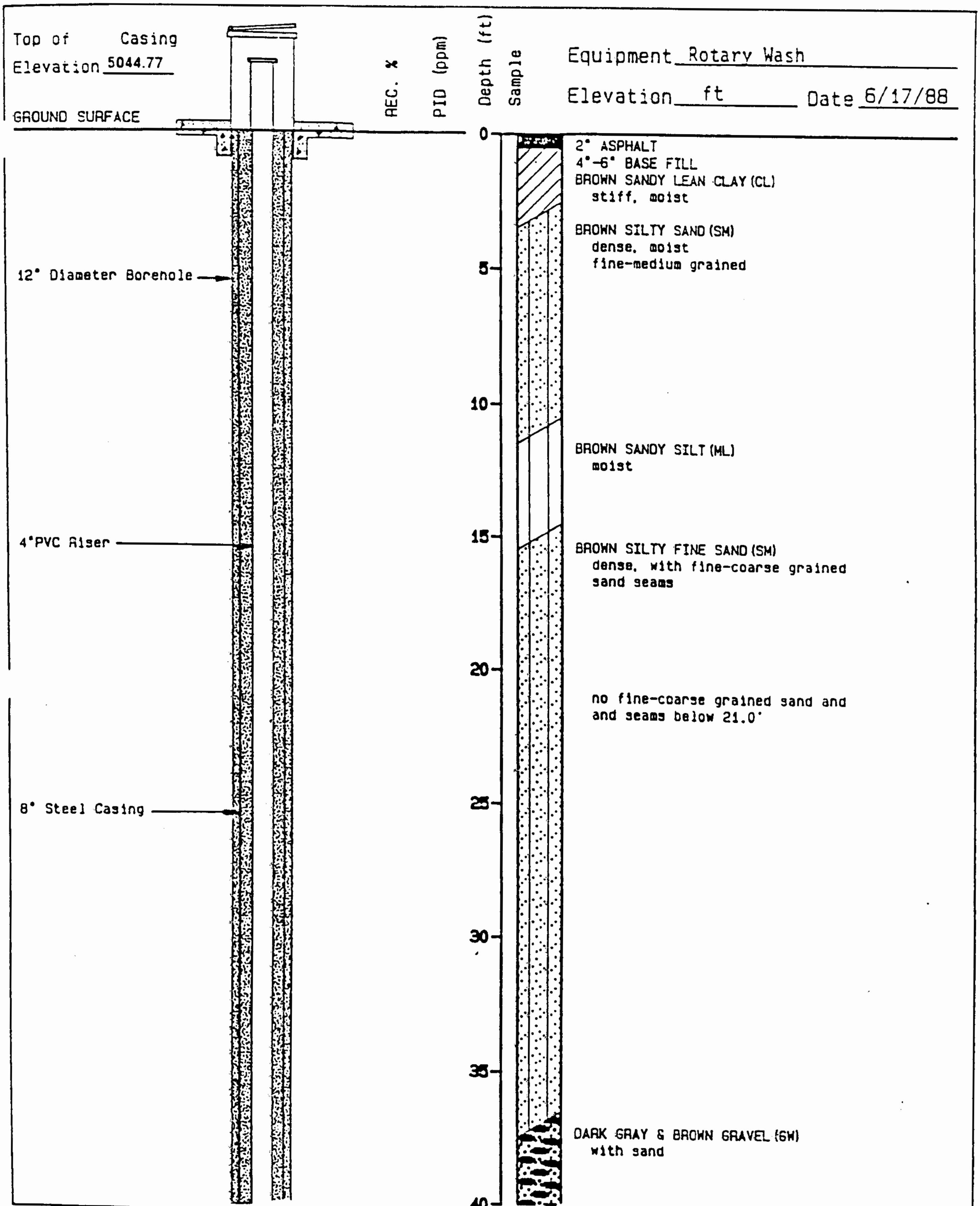
Harding Lawson Associates
Engineers and Geoscientists

Log of Boring and Well Completion Detail MW-29 FIGURE

Sparton Technology Inc.

Albuquerque, New Mexico

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
E.S.	06310.039.12		9/88		



Harding Lawson Associates
Engineers and Geoscientists

Log of Boring and Well Completion Detail MW-30
Sparton Technology Inc.
Albuquerque, New Mexico

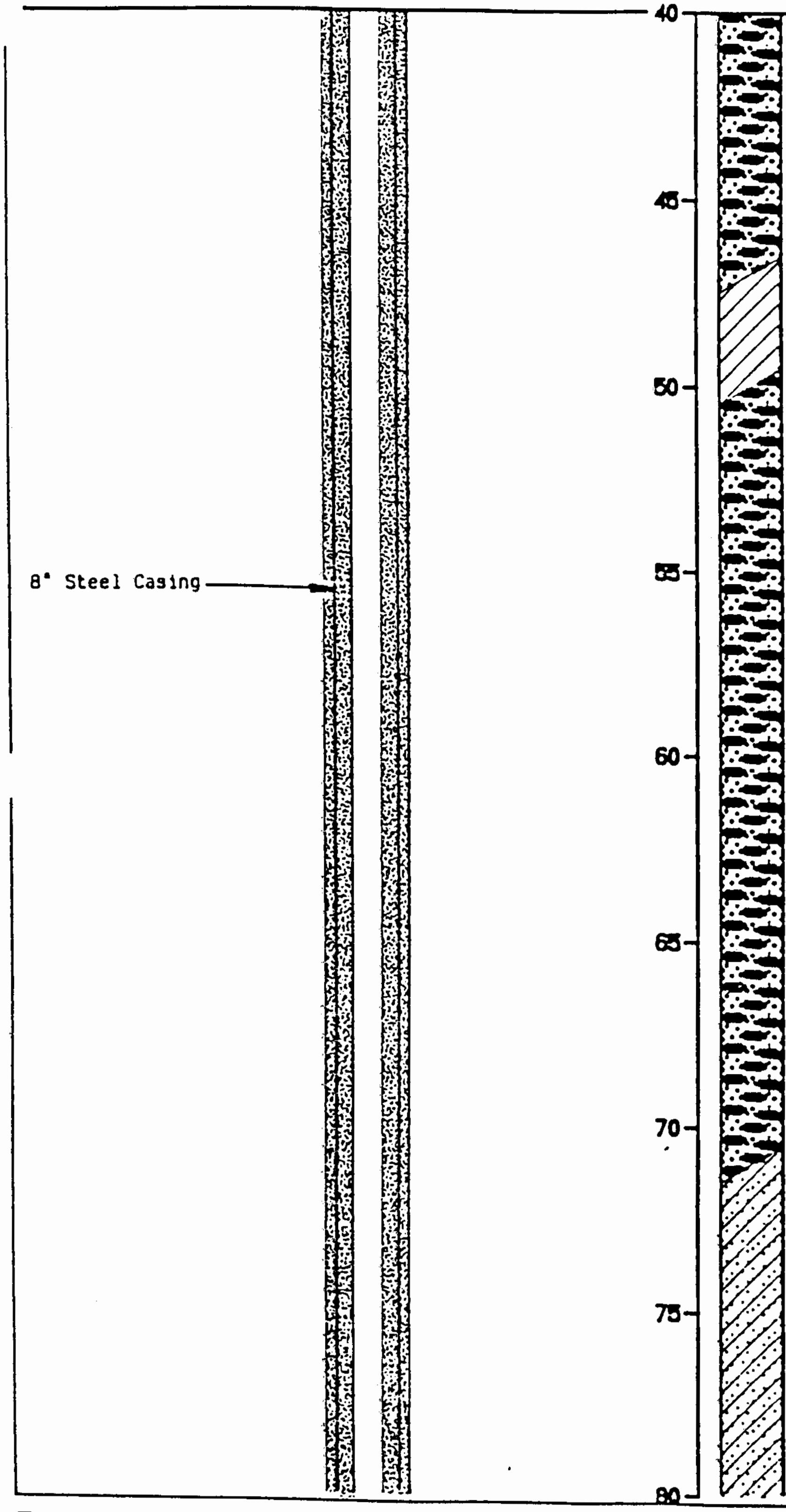
FIGURE

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
E.S.	06310,039.12		9/88		

REC. % | PID (ppm) | Depth (ft) | Sample

Equipment Rotary Wash

Elevation ft Date 6/17/88



BROWN SANDY LEAN CLAY (CL)
stiff, moist with gravel

with interbedded gravel below 49.0'

DARK GRAY & BROWN GRAVEL (GW)
with sand, with sandy clay seams

6"-8" light brown clayey sand layer at 69.5'

LIGHT BROWN CLAYEY SAND (SC)
with interbedded coarse sand and gravel

Harding Lawson Associates
Engineers and Geoscientists

Log of Boring and Well Completion Detail MW-30

Sparton Technology Inc.
Albuquerque, New Mexico

FIGURE

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
M.K.	06310,039.12		9/88		

PLEASE FILL THIS FORM IN COMPLETELY.

SHADED AREAS ARE FOR LAB USE ONLY.

DATE: ________ PAGE: ___ OF ___

PROJECT MANAGER:

COMPANY: ________

ADDRESS: ________

PHONE: ________

FAX: ________

BILL TO: ________

COMPANY: ________

ADDRESS: ________

SAMPLE ID	DATE	TIME	MATRIX	LAB I.D.

ANALYSIS REQUEST

- Petroleum Hydrocarbons (418.1) TRPH
- (MOD.8015) Diesel/Direct Inject
- (M8015) Gas/Purge & Trap
- 8021 (BTEX)/8015 (Gasoline) MTBE
- 8021 (BTEX) ☐ MTBE ☐ TMB ☐ PCE
- 8021 (TCL)
- 8021 (EDX)
- 8021 (HALO)
- 8021 (CUST)
- 504.1 EDB ☐ / DBCP ☐
- 8260 (TCL) Volatile Organics
- 8260 (Full) Volatile Organics
- 8260 (CUST) Volatile Organics
- 8260 (Landfill) Volatile Organics
- Pesticides /PCB (608/8081/8082)
- Herbicides (615/8151)
- Base/Neutral/Acid Compounds GC/MS (625/8270)
- Polynuclear Aromatics (610/8310/8270-SIMS)
- General Chemistry:
- Priority Pollutant Metals (13)
- Target Analyte List Metals (23)
- RCRA Metals (8)
- RCRA Metals by TCLP (Method 1311)
- Metals:
- NUMBER OF CONTAINERS

PROJECT INFORMATION

PROJ. NO.:

PROJ. NAME:

P.O. NO.:

SHIPPED VIA:

SAMPLE RECEIPT

NO. CONTAINERS	
CUSTODY SEALS	Y / N / NA
RECEIVED INTACT	
BLUE ICE/ICE	

PRIOR AUTHORIZATION IS REQUIRED FOR RUSH PROJECTS

(RUSH) ☐ 24hr ☐ 48hr ☐ 72hr ☐ 1 WEEK (NORMAL) ☐

CERTIFICATION REQUIRED: ☐ NM ☐ SDWA ☐ OTHER

METHANOL PRESERVATION ☐

COMMENTS: FIXED FEE ☐

RELINQUISHED BY: 1.

Signature: Time:

Printed Name: Date:

Company:

See reverse side (Force Magure)

RECEIVED BY: 1.

Signature: Time:

Printed Name: Date:

Company:

RELINQUISHED BY: 2.

Signature: Time:

Printed Name: Date:

Company:

RECEIVED BY: (LAB) 2.

Signature: Time:

Printed Name: Date:

Pinnacle Laboratories Inc.

TABLES

TABLE 2-1
SUMMARY OF GROUNDWATER MONITORING WELL CHARACTERISTICS

Well Designation	Well Location		Coordinates		Diameter (inches)	Ground Elev. (feet)	Measuring Point Elev. (feet)	Total Depth of Boring (feet)	Bottom of Well Screen (feet)	Screen Length (feet)	Screen Construction /Slot Size - (inches)
	On Site	Off Site	XI	Y1							
MW-1	X				2			90	89	20	PVC/Unknown
MW-2	X				2			90	89	20	PVC/Unknown
MW-3	X				2			85	85	20	PVC/Unknown
MW-4	X		377321	1524144	2			90	90	20	PVC/Unknown
MW-5	X		377347	1524651	2	5052.2		135	78	10	PVC/Unknown
MW-6	X		377782	1524375	2	5044.6	5046.39	150	66.5	5	PVC/Unknown
MW-7	X		377535.4060	1524101.1430	2	5046	5044.80	75.5	68.5	5	PVC/Unknown
MW-8	X		377366	1523881	2	5040.4	5042.62	150	63	5	PVC/Unknown
MW-9	X		377005.7534	1524062.2480	2	5045.3	5044.11	80	67.5	5	PVC/Unknown
MW-10	X				2	5044.7		150.5	140	5	PVC/Unknown
MW-11	X				2	5042.2	5046.31	150	139	5	PVC/Unknown
MW-12	X		377023.2740	1524102.5590	4	5041.6	5042.58	140	134	10	PVC/Unknown
MW-13	X		377137.2349	1523998.3430	2	5042.2	5043.25	140	139.5	10	PVC/Unknown
MW-14	X		376711.0496	1524226.8401	2	5045.7	5043.04	130	127	10	PVC/Unknown
MW-15	X		376976.1308	1524514.1260	2	5046.2	5047.49	140	125	10	PVC/Unknown
MW-16	X		377340.5697	1524378.3800	2	5047.6	5047.50	73	73	5	PVC/Unknown
MW-17	X		377423.1837	1524452.6790	2	5043.1	5049.28	72	72	5	PVC/Unknown
MW-18	X		377005.2247	1524260.5830	4	5043.1	5045.58	81	78	10	PVC/0.020

TABLE 2-1 (continued)
SUMMARY OF GROUNDWATER MONITORING WELL CHARACTERISTICS

Well Designation	Well Location On Site	Well Location Off Site	Coordinates XI	Coordinates Y1	Diameter (inches)	Ground Elev. (feet)	Measuring Point Elev. (feet)	Total Depth of Boring (feet)	Bottom of Well Screen (feet)	Screen Length (feet)	Screen Construction /Slot Size - (inches)
MW-19	X		376986.5230	1524269.2680	4	5043.1	5046.25	110	107.5	10	PVC/Unknown
MW-20	X		376967.9830	1524277.9750	4	5042.9	5045.79	138	137.5	12	PVC/Unknown
MW-21	X		377171.2231	1524458.7050	2	5044.8	5048.36	69.5	69.5	5	PVC//Unknown
MW-22	X		377531.7671	1524267.2409	2		5048.06	78	77	5	PVC/Unknown
MW-23	X		377333.6307	1524123.0290	2	5045.4	5048.51	78	76	5	PVC/Unknown
MW-24	X		377338.0465	1524367.3910	4	5046	5048.70	75	73	5	PVC/Unknown
MW-25	X		377307.9122	1524380.4020	4	5046	5049.00	75	74	5	PVC/Unknown
PW-1	X		377014.8930	1524058.4810	10		5044.54	145	137	10	PVC/Unknown
P-1	X							90	90	20	PVC/Unknown
MW-26	X		377180.8851	1524187.4000	2	5043.8	5045.71	81	78	5	S.S./Unknown
MW-27	X		377078.9143	1524323.4643	2	5043.8	5045.50	73	72	5	S.S./Unknown
MW-28	X		376745.7569	1524262.6970	2	5040.9	5042.69	71	70	5	S.S./Unknown
MW-29	X		377144.4750	1523998.7390	4	5041.7	5044.51	115.5	113	10	S.S./Unknown
MW-30	X		376924.1207	1524105.1480	4	5042	5044.70	109.5	107	10	S.S./Unknown
MW-31	X		376731.4893	1524215.0430	4	5040	5043.53	109	106.5	10	S.S./Unknown
MW-32	X		376958.3748	1524494.1820	4	5045.2	5048.05	120	117.5	10	S.S./Unknown
MW-33	X		376940.7991	1524097.7420	2	5042.2	5044.29	73	73	10	S.S./0.012
MW-34		X	376715.2537	1523469.1680	2	5034.52	5034.49	66.5	66.5	10	S.S./0.010

TABLE 2-1 (continued)
SUMMARY OF GROUNDWATER MONITORING WELL CHARACTERISTICS

Well Designation	Well Location		Coordinates		Diameter (inches)	Ground Elev. (feet)	Measuring Point Elev. (feet)	Total Depth of Boring (feet)	Bottom of Well Screen (feet)	Screen Length (feet)	Screen Construction /Slot Size - (inches)
	On Site	Off Site	XI	Y1							
MW-35		X	376322.4523	1523822.3680	2	5042.5	5042.50	75	73.2	10	S.S./0.010
MW-36		X	376161.8540	1524154.6630	2	5059.3	5059.46	94	92.3	10	S.S./Unknown
MW-37		X	376108.1749	1524746.7840	2	5091.66	5090.85	126.5	125.0	10	S.S./0.010
MW-38	X		377150.5217	1523995.1740	4	5044.35	5044.32	137.5	136.5	10	S.S./0.020
MW-39	X		376961.1284	1524088.1710	4	5044.07	5044.06	134	133.0	10	S.S./0.020
MW-40	X		376745.3343	1524207.4020	4	5043.46	5043.35	128	127.0	10	S.S./0.020
MW-41	X		376945.6669	1524479.2830	4	5046.79	5046.77	118	97.0	5	S.S./0.020
MW-42	X		377183.2832	1524730.6850	4	5057.28	5057.33	117	115.0	10	S.S./0.020
MW-43	X		377169.6564	1524747.2690	4	5057.69	5057.74	138	137.0	10	S.S./0.020
MW-44		X	376166.1366	1524136.0870	4	5060.68	5058.75	120	116.0	10	S.S./0.020
MW-45		X	376108.6022	1524726.7480	4	5092.35	5089.65	153	153.0	10	S.S./0.020
MW-46		X	376067.0912	1525279.8360	4	5118.95	5118.98	182	180.0	10	S.S./0.020
MW-47		X	375638.1370	1524967.7407	4	5155.84	5155.83	197	195.0	15	S.S./0.020
MW-48		X	375369.7482	1525239.8550	4	5168.33	5168.31	209	207.0	15	S.S./0.020
MW-49	X		376763.4006	1524197.3220	4	5043.68	5043.67	148	147.5	10	S.S./0.020
MW-50		X	372810.1654	1527180.0898	4	5211.51	5211.22	260	250.0	15	S.S./0.020
MW-51		X	377291.6420	1524999.9759	2	5058.74	5060.31	86	85.0	10	S.S./0.020
MW-52		X	374343.4259	1525239.4497	4	5165.41	5156.79	208	206.0	15.2	S.S./0.020

TABLE 2-1 (continued)
SUMMARY OF GROUNDWATER MONITORING WELL CHARACTERISTICS

Well Designation	Well Location		Coordinates		Diameter (inches)	Ground Elev. (feet)	Measuring Point Elev. (feet)	Total Depth of Boring (feet)	Bottom of Well Screen (feet)	Screen Length (feet)	Screen Construction /Slot Size - (inches)
	On Site	Off Site	XI	Y1							
MW-53		X	374899.5031	1525314.4133	4	5163.96	5164.24	206	204.0	14.2	S.S./0.020
MW-54		X	375974.5495	1526106.2743	4	5097.64	5097.64	132	132.0	15	S.S./0.020
MW-55		X	375370.695	1525224.1487	4	5168.61	5168.61	267	265.0	10	S.S./0.020
MW-56		X	375371.3079	1525207.6796	4	5168.61	5168.61	232	230.0	10	S.S./0.020
MW-57		X	375849.0239	1526406.9797	4	5103.54	5103.54	144	141.0	15	S.S./0.020
MW-58		X	375148.4325	1525330.7336	4	5168.89	5168.89	211	209.0	15	S.S./0.020
MW-59		X	377253.6451	1524991.5683	4	5059.18	5060.61	117	115.0	10.5	S.S./0.020
MW-60		X	375530.1855	1525753.6046	4	5133.62	5134.87	197	195.0	10	S.S./0.020
MW-61		X	375523.1613	1525821.6538	4	5133.98	5135.23	177	173.0	15	S.S./0.020
MW-62		X	375421.2397	1524395.9372	2	5075	5075.00	115	110.0	15	S.S./0.010
MW-63		X	376840.4989	1525236.5173	2	5065.74	5065.74	98	98.0	15	S.S./0.010
MW-64		X	375968.8099	1526127.8080	4	5097.84	5097.84	153	149.0	10.2	S.S./0.020
PZ-1		X	372283.5987	1523148.3059	2	5147.2	5147.17	206	199.0	15	S.S./0.020
MW-65		X	374343.87	1525277.92	4	5156.45	5156.45	275	270	10	PVC/0.020
MW-66		X	375859.24	1526389.09	4	5103.03	5103.03	217	210	10	PVC/0.020
MW-67		X	375352.47	1525220.38	4	5169.21	5169.21	390	380	10	PVC/0.020
MW-68		X	374503.81	1526216.71	4	5165.53	5165.53	220	214	20	PVC/0.010
MW-69		X	374502.60	1526239.55	4	5165.46	5165.46	278	270	10	PVC/0.020

TABLE 2-1 (continued)
SUMMARY OF GROUNDWATER MONITORING WELL CHARACTERISTICS

Well Designation	Well Location		Coordinates		Diameter (inches)	Ground Elev. (feet)	Measuring Point Elev. (feet)	Total Depth of Boring (feet)	Bottom of Well Screen (feet)	Screen Length (feet)	Screen Construction /Slot Size - (inches)
	On Site	Off Site	XI	Y1							
MW-70	X		376982.13	1524493.58	2	5046.65	5046.65	143	143	10	PVC/0.010
MW-71		X	375530.63	1525711.81	2	5134.65	5134.59	356	353	5	PVC/0.020
MW-72	X		377079.68	1524630.73	2	5053.75	5056.25	110	109	10	PVC/0.010
MW-73	X		376821.45	1524346.08	2	5042.57	5045.07	104	102	5	PVC/0.010
OB-1		X	374665.25	1525599.56	4	5166.2	5169.10	377	373.5	170.5	PVC/0.020
OB-2		X	374537.89	1525606.66	4	5165.26	5165.26	378	374.6	170.6	PVC/0.020
CW-1		X	374740.47	1525601.24	8	5166.4	5168.02	372	367	160	S.S./0.020

Notes:
1) S.S. = Stainless Steel

TABLE 2-2
STATUS OF GROUNDWATER MONITORING AND RECOVERY WELLS

Well Designation	Well Status	Purging/Sampling/Recovery Equipment	Approximate Pump Intake Setting	Approximate Well Packer Setting
MW-1	Plugged & Abandoned	-----	-----	-----
MW-2	Plugged & Abandoned	-----	-----	-----
MW-3	Plugged & Abandoned	-----	-----	-----
MW-4	Plugged & Abandoned	-----	-----	-----
MW-5	Plugged & Abandoned	-----	-----	-----
MW-6	Plugged & Abandoned	-----	-----	-----
MW-7	Groundwater Monitoring	-----	-----	-----
MW-8	Plugged & Abandoned	-----	-----	-----
MW-9	Groundwater Monitoring	Bladder Pump	1-foot from bottom of screen	None Present
MW-10	Plugged & Abandoned	-----	-----	-----
MW-11	Plugged & Abandoned	-----	-----	-----
MW-12	Plugged Back to UFZ, Groundwater Monitoring	-----	-----	-----
MW-13	Plugged back to UFZ, Groundwater Monitoring	Bladder Pump	1-foot from bottom of screen	None Present
MW-14	Plugged back to UFZ, Groundwater Monitoring	Bladder Pump	1-foot from bottom of screen	None Present
MW-15	Plugged back to UFZ, Dry	Bladder Pump	1-foot from bottom of screen	None Present
MW-16	Groundwater Monitoring, Samples are Bailed	None Present - Samples are Bailed	-----	-----
MW-17	Groundwater Monitoring	None Present	-----	-----
MW-18	Groundwater Recovery, Groundwater Monitoring	Pneumatic Displacement Pump	1-foot from bottom of screen	None Present
MW-19	Groundwater Monitoring	Bladder (Sampling) & Pneumatic Displacement Pump (Purging)	1-foot from bottom of screen	None Present

TABLE 2-2 (continued)
STATUS OF GROUNDWATER MONITORING AND RECOVERY WELLS

Well Designation	Well Status	Purging/Sampling/Recovery Equipment	Approximate Pump Intake Setting	Approximate Well Packer Setting
MW-20	Groundwater Monitoring	Bladder (Sampling) & Pneumatic Displacement Pump (Purging)	1-foot from bottom of screen	None Present
MW-21	Groundwater Monitoring, Samples are Bailed	None Present - Samples are Bailed	-----	-----
MW-22	Groundwater Monitoring	Bladder	1-foot from bottom of screen	None Present
MW-23	Groundwater Monitoring, Groundwater Recovery	Pneumatic Displacement	1-foot from bottom of screen	None Present
MW-24	Former Groundwater Monitoring Well, Converted to Groundwater Recovery	Pneumatic Displacement	1-foot from bottom of screen	None Present
MW-25	Groundwater Monitoring, Groundwater Recovery	Pneumatic Displacement	1-foot from bottom of screen	None Present
PW-1	Groundwater Recovery, Plugged back to UFZ	Pneumatic Displacement	1-foot from bottom of screen	None Present
P-1	Plugged & Abandoned	-----	-----	-----
MW-26	Groundwater Monitoring, Groundwater Recovery	Pneumatic Displacement	1-foot from bottom of screen	None Present
MW-27	Former Groundwater Monitoring Well Converted to Groundwater Recovery	Pneumatic Displacement	1-foot from bottom of screen	None Present
MW-28	Former Groundwater Monitoring Well Converted to Groundwater Recovery - Now Dry	Pneumatic Displacement	1-foot from bottom of screen	None Present
MW-29	Groundwater Monitoring	Bladder	1-foot from bottom of screen	None Present
MW-30	Groundwater Monitoring	Bladder	1-foot from bottom of screen	None Present
MW-31	Groundwater Monitoring	Bladder	1-foot from bottom of screen	None Present
MW-32	Groundwater Monitoring	Bladder (Sampling) & Pneumatic Displacement (Purging)	1-foot from bottom of screen	None Present
MW-33	Groundwater Monitoring	Bladder - Pump removed for water level measurements	1-foot from bottom of screen	None Present

TABLE 2-2 (continued)
STATUS OF GROUNDWATER MONITORING AND RECOVERY WELLS

Well Designation	Well Status	Purging/Sampling/Recovery Equipment	Approximate Pump Intake Setting	Approximate Well Packer Setting
MW-34	Groundwater Monitoring	Bladder	1-foot from bottom of screen	None Present
MW-35	Groundwater Monitoring	Bladder	1-foot from bottom of screen	None Present
MW-36	Groundwater Monitoring	Bladder	1-foot from bottom of screen	None Present
MW-37	Groundwater Monitoring, Samples are Bailed	None Present - Samples are Bailed	-----	-----
MW-38	Groundwater Monitoring	Bladder (Sampling) & Pneumatic Displacement (Purging)	1-foot from bottom of screen	None Present
MW-39	Groundwater Monitoring	Bladder (Sampling) & Pneumatic Displacement (Purging)	1-foot from bottom of screen	None Present
MW-40	Groundwater Monitoring	Bladder (Sampling) & Pneumatic Displacement (Purging)	1-foot from bottom of screen	None Present
MW-41	Groundwater Monitoring	Bladder (Sampling) & Pneumatic Displacement (Purging)	1-foot from bottom of screen	None Present
MW-42	Groundwater Monitoring	Bladder (Sampling) & Pneumatic Displacement (Purging)	1-foot from bottom of screen	None Present
MW-43	Groundwater Monitoring	Bladder (Sampling) & Pneumatic Displacement (Purging)	1-foot from bottom of screen	None Present
MW-44	Groundwater Monitoring	Bladder (Sampling) & Pneumatic Displacement (Purging)	1-foot from bottom of screen	None Present
MW-45	Groundwater Monitoring	Bladder (Sampling) & Pneumatic Displacement (Purging)	1-foot from bottom of screen	None Present
MW-46	Groundwater Monitoring	Bladder (Sampling) & Pneumatic Displacement (Purging)	1-foot from bottom of screen	None Present
MW-47	Groundwater Monitoring	Bladder	1-foot from bottom of screen	None Present

TABLE 2-2 (continued)
STATUS OF GROUNDWATER MONITORING AND RECOVERY WELLS

Well Designation	Well Status	Purging/Sampling/Recovery Equipment	Approximate Pump Intake Setting	Approximate Well Packer Setting
MW-48	Groundwater Monitoring	Bladder	1-foot from bottom of screen	None Present
MW-49	Groundwater Monitoring	Bladder (Sampling) & Pneumatic Displacement (Purging)	1-foot from bottom of screen	None Present
MW-50	Groundwater Monitoring, Now Dry	Bladder, Well Now Dry	1-foot from bottom of screen	None Present
MW-51	Groundwater Monitoring	Bladder	1-foot from bottom of screen	None Present
MW-52	Groundwater Monitoring	Bladder	1-foot from bottom of screen	None Present
MW-53	Groundwater Monitoring	Bladder	1-foot from bottom of screen	None Present
MW-54	Water Level Measurements	None Present	-----	-----
MW-55	Groundwater Monitoring	Bladder	center of screen	Packer set 3-feet above screen
MW-56	Groundwater Monitoring	Bladder	center of screen	Packer set 3-feet above screen
MW-57	Groundwater Monitoring	Bladder	1-foot from bottom of screen	None Present
MW-58	Groundwater Monitoring	Bladder	1-foot from bottom of screen	None Present
MW-59	Groundwater Monitoring	Bladder (Sampling) & Pneumatic Displacement (Purging)	1-foot from bottom of screen	None Present
MW-60	Groundwater Monitoring	Bladder (Sampling) & Pneumatic Displacement (Purging)	1-foot from bottom of screen	None Present
MW-61	Groundwater Monitoring	Bladder	1-foot from bottom of screen	None Present
MW-62	Groundwater Monitoring	Bladder	1-foot from bottom of screen	None Present
MW-63	Groundwater Monitoring	Bladder, pump is removed for water level measurements	1-foot from bottom of screen	None Present

TABLE 2-2 (continued)
STATUS OF GROUNDWATER MONITORING AND RECOVERY WELLS

Well Designation	Well Status	Purging/Sampling/Recovery Equipment	Approximate Pump Intake Setting	Approximate Well Packer Setting
MW-64	Groundwater Monitoring	Bladder (Sampling) & Pneumatic Displacement (Purging)	1-foot from bottom of screen	None Present
MW-PZ-1	Groundwater Monitoring	Bladder	1-foot from bottom of screen	None Present
MW-65	Groundwater Monitoring	Bladder	center of screen	Packer set 3-feet above screen
MW-66	Groundwater Monitoring	Bladder	center of screen	Packer set 3-feet above screen
MW-67	Groundwater Monitoring	Bladder	center of screen	Packer set 3-feet above screen
MW-68	Groundwater Monitoring	Bladder	center of screen	Packer set 3-feet above screen
MW-69	Groundwater Monitoring	Bladder	center of screen	Packer set 3-feet above screen
MW-70	Groundwater Monitoring	Bladder	center of screen	Packer set 3-feet above screen
MW-71	Groundwater Monitoring	Bladder	center of screen	Packer set 3-feet above screen
MW-72	Groundwater Monitoring	Bladder	1 foot from bottom of screen	None present
MW-73	Groundwater Monitoring	Bladder	1 foot from bottom of screen	None present
OB-1	Water Level Measurements	None present	-	None present
OB-2	Water Level Measurements	None present	-	None present
CW-1	Plume Containment	25 hp submersible	300 ft.	None present

Notes: UFZ = Upper Flow Zone; TOC = Top of Casing; TBD = To be Determined

TABLE 3-1
SUMMARY OF EXISTING GROUNDWATER MONITORING WELL SAMPLING PROGRAM

Monitoring Well Identification	Status	Well Location		Parameters		Frequency	
		On-Site	Off-Site	VOC's	Chromium (total)	Sampling & Analysis	Water Level Measurements
MW-1	Abandoned	X		Not Applicable		N/A	N/A
MW-2	Abandoned	X		Not Applicable		N/A	N/A
MW-3	Abandoned	X		Not Applicable		N/A	N/A
MW-4	Abandoned	X		Not Applicable		N/A	N/A
MW-5	Abandoned	X		Not Applicable		N/A	N/A
MW-6	Abandoned	X		Not Applicable		N/A	N/A
MW-7	Monitoring	X		X	X	Annual	Quarterly
MW-8	Abandoned	X		Not Applicable		N/A	N/A
MW-9	Monitoring	X		X	X	Annual	Quarterly
MW-10	Abandoned	X		Not Applicable		N/A	N/A
MW-11	Abandoned	X		Not Applicable		N/A	N/A
MW-12	Monitoring	X		X	X	Annual	Quarterly
MW-13	Monitoring	X		X	X	Annual	Quarterly
MW-14 Poor Recharge	Monitoring	X		X	X	Annual	Quarterly
MW-15 Poor Recharge	Monitoring	X		Not Applicable		N/A	Quarterly
MW-16	Monitoring	X		X	X	Annual	Quarterly
MW-17	Monitoring	X		X	X	Annual	Quarterly
MW-18	GWR/ Monitoring	X		X	X	Annual	N/A
MW-19	Monitoring	X		X	X	Annual	Quarterly
MW-20 Poor Recharge	Monitoring	X		X	X	Annual	Quarterly

TABLE 3-1 (continued)
SUMMARY OF EXISTING GROUNDWATER MONITORING WELL SAMPLING PROGRAM

Monitoring Well Identification	Status	Well Location		Parameters		Frequency	
		On-Site	Off-Site	VOC's	Chromium (total)	Sampling & Analysis	Water Level Measurements
MW-21 Poor Recharge	Monitoring	X		X	X	Annual	Quarterly
MW-22	Monitoring	X		X	X	Annual	Quarterly
MW-23	GWR/ Monitoring	X		X	X	Annual	N/A
MW-24	GWR	X		Not Applicable		N/A	N/A
MW-25	GWR/ Monitoring	X		X	X	Annual	N/A
PW-1	GWR	X		Not Applicable		N/A	N/A
P-1	Abandoned	X		Not Applicable		N/A	N/A
MW-26	GWR/ Monitoring	X		X	X	Annual	N/A
MW-27	GWR	X		Not Applicable		N/A	N/A
MW-28 Poor Recharge	GWR	X		Not Applicable		N/A	N/A
MW-29	Monitoring	X		X	X	Annual	Quarterly
MW-30	Monitoring	X		X	X	Annual	Quarterly
MW-31	Monitoring	X		X	X	Annual	Quarterly
MW-32	Monitoring	X		X	X	Annual	Quarterly
MW-33	Monitoring	X		X	X	Annual	Quarterly
MW-34	Monitoring		X	X	X	Annual	Quarterly
MW-35 Poor Recharge	Monitoring		X	X	X	Annual	Quarterly
MW-36 Poor Recharge	Monitoring		X	X	X	Annual	Quarterly
MW-37 Poor Recharge	Monitoring		X	X	X	Annual	Quarterly
MW-38	Monitoring	X		X	X	Annual	Quarterly

TABLE 3-1 (continued)
SUMMARY OF EXISTING GROUNDWATER MONITORING WELL SAMPLING PROGRAM

Monitoring Well Identification	Status	Well Location		Parameters		Frequency	
		On-Site	Off-Site	VOC's	Chromium (total)	Sampling & Analysis	Water Level Measurements
MW-39	Monitoring	X		X	X	Annual	Quarterly
MW-40	Monitoring	X		X	X	Annual	Quarterly
MW-41	Monitoring	X		X	X	Annual	Quarterly
MW-42	Monitoring	X		X	X	Annual	Quarterly
MW-43	Monitoring	X		X	X	Annual	Quarterly
MW-44	Monitoring		X	X	X	Annual	Quarterly
MW-45	Monitoring		X	X	X	Annual	Quarterly
MW-46	Monitoring		X	X	X	Annual	Quarterly
MW-47	Monitoring		X	X	X	Annual	Quarterly
MW-48	Monitoring		X	X	X	Annual	Quarterly
MW-49	Monitoring	X		X	X	Annual	Quarterly
MW-50	Monitoring		X	Not Applicable Dry		N/A	Quarterly
MW-51	Monitoring		X	X	X	Annual	Quarterly
MW-52	Monitoring		X	X	X	Quarterly	Quarterly
MW-53	Monitoring		X	X	X	Annual	Quarterly
MW-54	Monitoring		X	Not Applicable		N/A	Quarterly
MW-55	Monitoring		X	X	X	Annual	Quarterly
MW-56	Monitoring		X	X	X	Annual	Quarterly
MW-57	Monitoring		X	X	X	Quarterly	Quarterly
MW-58	Monitoring		X	X	X	Annual	Quarterly
MW-59	Monitoring		X	X	X	Annual	Quarterly
MW-60	Monitoring		X	X	X	Annual	Quarterly

TABLE 3-1 (continued)
SUMMARY OF EXISTING GROUNDWATER MONITORING WELL SAMPLING PROGRAM

Monitoring Well Identification	Status	Well Location		Parameters		Frequency	
		On-Site	Off-Site	VOC's	Chromium (total)	Sampling & Analysis	Water Level Measurements
√ MW-61	Monitoring		X	X	X	Annual	Quarterly
√ MW-62 Poor Recharge	Monitoring		X	X	X	Quarterly	Quarterly
√ MW-63	Monitoring		X	Not Applicable		N/A	Quarterly
√ MW-64	Monitoring		X	X	X	Annual	Quarterly
√ MW-PZ-1	Monitoring		X	Not Applicable		N/A	Quarterly
√ MW-65	Monitoring		X	X	X	Quarterly	Quarterly
√ MW-66	Monitoring		X	X	X	Quarterly	Quarterly
√ MW-67	Monitoring		X	X	X	Semi-Annual	Quarterly
√ MW-68	Monitoring		X	X	X	Quarterly	Quarterly
√ MW-69	Monitoring		X	X	X	Quarterly	Quarterly
√ MW-70	Monitoring	X		X	X	Annual	Quarterly
√ MW-71	Monitoring		X	X	X	Quarterly	Quarterly
√ MW-72	Monitoring	X		X	X	Semi-Annual	Quarterly
√ MW-73	Monitoring	X		X	X	Annual	Quarterly
OB-1	Monitoring		X	Not Applicable		N/A	Quarterly
OB-2	Monitoring		X	Not Applicable		N/A	Quarterly
CW-1	Plume Con tainment		X	Per State Discharge Permit			Quarterly

Notes:
GWR = Groundwater Recovery Well
CW-1 = Containment Well #1

TABLE 3-2
PROJECT-SPECIFIC MAXIMUM ALLOWABLE REPORTING LIMITS

Parameter/Analyses	Water Reporting Limit ($\mu g/L$)
Metals by U.S. EPA SW-846 6000/7000 Series	
Chromium	5
Volatile Organic Compounds by U.S. EPA SW-846 Method 8260B	
Acetone	5.0
Acetonitrile	5.0
Acrolein (Propenal)	5.0
Acrylonitrile	5.0
Benzene	1.0
Bromodicloromethane	1.0
Bromoform	1.0
Bromomethane	2.0
2-Butanone (MEK)	5.0
Carbon disulfide	1.0
Carbon tetrachloride	1.0
Chlorobenzene	1.0
Chloroethane	2.0
Chloroform	1.0
Chloromethane	2.0
1,2-Dibromo-3-chloropropane	5.0
1,2-Dibromoethane	1.0
Dibromochloromethane	5.0
Dibromomethane	1.0
Dichlorodifluoromethane	2.0
1,1-Dichloroethane	1.0
1,2-Dichloroethane	1.0
1,1-Dichloroethene	1.0
trans-1,2-Dichloroethene	1.0
trans-1,4-Dichloro-2-butene	1.0
1,2-Dichloropropane	1.0

TABLE 3-2 (continued)
PROJECT-SPECIFIC MAXIMUM ALLOWABLE REPORTING LIMITS

Parameter/Analyses	Water Reporting Limit (μg/L)
cis-1.3-Dichloropropene	1.0
trans-1.3-Dichloropropene	1.0
Ethylbenzene	1.0
2-Hexanone	5.0
Iodomethane	5.0
Methylene chloride	1.0
4-Methyl-2-pentanone (MIBK)	5.0
Styrene	1.0
1,1,1.2-Tetrachloroethane	1.0
1,1,2.2-Tetrachloroethane	1.0
Tetrachloroethene	1.0
Toluene	1.0
1,1,1-Trichloroethane	1.0
1,1,2-Trichloroethane	1.0
Trichloroethene	1.0
Trichlorofluoromethane	5.0
1,2,3-Trichloropropane	1.0
Vinyl acetate	5.0
Vinyl chloride	2.0
o-Xylene	1.0
m-Xylene	1.0
p-Xylene	1.0

TABLE 3-3
SAMPLE CONTAINERS, PRESERVATIVES AND HOLDING TIMES FOR AQUEOUS SAMPLES

Matrix	Analytical Parameter	Container[a]	Number of Containers per Sample[b]	Preservation	Holding Time[c]
Aqueous	Appendix IX Volatile Organic Compounds (VOC's)	40 mL, G vial w/Teflon-lined septa cap	3	HCl to pH <2, Ice to 4°C[d]	14 days
	Chromium, Total	1 L, P or 0.5 L, P or 0.25 L, P	1	HNO_3 to pH < 2	6 months

[a] All containers must have lids with Teflon® liners. G=Glass; P=High-Density Polyethylene.

[b] The number of containers will be three times the amount noted for samples designated for MS/MSD aqueous analyses. The number of containers will be two times the amount noted for samples designated for field duplicate analyses.

[c] When only one holding time is designated, it is the total holding time until analysis.

[d] If due to natural carbonation in the groundwater, VOC samples effervesce upon preservation, discard sample and collect non-preserved. The holding time for a non-preserved VOC's is 7 days.

TABLE 3-4
FIELD SAMPLING TEAM DOCUMENTATION OBJECTIVES TO ENSURE VALID DATA COLLECTION

Objective	Action	Responsible Person
Verify sample and location information conforms to conditions and requirements specified.	Review labeled samples and in-process samples using daily sample inventory.	Field sampling team.
Verify incoming field data and sample completeness.	Maintain daily count of incomplete items.	Field sampling team.
Verify completeness of field log books.	Review daily.	Field team leader (or designee).
Review field calibration criteria and record test calibration acceptance.	Perform as necessary.	Field team leader (or designee).
Ensure all data forms are properly completed.	Review and check off during each sample collection.	Field team leader (or designee).
Verify all field generated QC samples were collected as required.	Review requirements and confirm sample collection.	Field team leader (or designee).

TABLE 3-5
ANALYTICAL METHODS FOR AQUEOUS SAMPLES

Parameter	Published Method
Laboratory Analyses:	
Volatile Organics	SW-5030B[a] SW-8260B[a]
Chromium	SW-6010B[a]
Field Analyses:	
Temperature	E170.1[d]
Specific Conductivity	E120.1[d]
pH	E150.1[d]

(a) Test Methods for Evaluating Solid Waste, SW846, Update III, 3rd ed. (U.S. EPA, 1996).

(b) Test Methods for Evaluating Solid Waste, SW846, Update I, 3rd ed. (U.S. EPA, 1992).

(c) Test Methods for Evaluating Solid Waste, SW846, Update II, 3rd ed. (U.S. EPA, 1994).

(d) Methods for Chemical Analysis of Water and Wastes. EPA 600/4-79-020 (U.S. EPA, 1983).

TABLE 3-6
QA OBJECTIVES FOR LABORATORY MEASUREMENTS OF AQUEOUS SAMPLES

Parameter/Method (1)		**Precision**(2) **(as RPD)**	**Accuracy**(3) **(Recovery)**	**Completeness**
INORGANIC ANALYSES				
Metals	**SW 3010A/ 6010B or 6020**			
Chromium		20%/30%	80-120%	90%
ORGANIC ANALYSES				
Volatile Organics	**SW-8260B**			
Chloromethane		NPM/30%	NPM	90%
Bromomethane		NPM/30%	NPM	90%
Vinyl Chloride		NPM/30%	NPM	90%
Chloroethane		NPM/30%	NPM	90%
Methylene Chloride		NPM/30%	NPM	90%
Acetone		NPM/30%	NPM	90%
Carbon Disulfide		NPM/30%	NPM	90%
1,1-Dichloroethene		14%/30%	61-145%	90%
1,1-Dichloroethane		NPM/30%	NPM	90%
cis-1,2-Dichloroethene		NPM/30%	NPM	90%
trans-1,2-Dichloroethene		NPM/30%	NPM	90%
Chloroform		NPM/30%	NPM	90%
1,2-Dichloroethane		NPM/30%	NPM	90%
2-Butanone		NPM/30%	NPM	90%
1,1,1-Trichloroethane		NPM/30%	NPM	90%
Carbon Tetrachloride		NPM/30%	NPM	90%
Bromodichloromethane		NPM/30%	NPM	90%
1,2-Dichloropropane		NPM/30%	NPM	90%
cis-1,3-Dichloropropene		NPM/30%	NPM	90%
Trichloroethene		14%/30%	71-120%	90%
Dibromochloromethane		NPM/30%	NPM	90%

TABLE 3-6 (continued)
QA OBJECTIVES FOR LABORATORY MEASUREMENTS OF AQUEOUS SAMPLES

Parameter/Method [1]		Precision[2] (as RPD)	Accuracy[3] (Recovery)	Completeness
1,1,2-Trichloroethane		NPM/30%	NPM	90%
Benzene		11%/30%	76-127%	90%
trans-1,3-Dichloropropene		NPM/30%	NPM	90%
Bromoform		NPM/30%	NPM	90%
4-Methyl-2-pentanone		NPM/30%	NPM	90%
2-Hexanone		NPM/30%	NPM	90%
Tetrachloroethene		NPM/30%	NPM	90%
Toluene		NPM/30%	NPM	90%
1,1,2,2-Tetrachloroethane		NPM/30%	NPM	90%
Chlorobenzene		13%/30%	75-130%	90%
Ethyl Benzene		NPM/30%	NPM	90%
Styrene		NPM/30%	NPM	90%
Total Xylene		NPM/30%	NPM	90%
Acetonitrile		NPM/30%	NPM	90%
Acrolein		NPM/30%	NPM	90%
Acrylonitrile		NPM/30%	NPM	90%
1,2-Dibromo-3-chloropropane		NPM/30%	NPM	90%
1,2-Dibromoethane		NPM/30%	NPM	90%
trans-1,4-Dichloro-2-butene		NPM/30%	NPM	90%
Dichlorodifluoromethane		NPM/30%	NPM	90%
1,1,1,2-Tetrachloroethane		NPM/30%	NPM	90%
Trichlorofluoromethane		NPM/30%	NPM	90%
1,2,3-Trichloropropane		NPM/30%	NPM	90%
Vinyl acetate		NPM/30%	NPM	90%
Surrogates:				
1,2-Dichloroethane-d_4		NPM	76-114%	90%
Bromofluorobenzene		NPM	86-115%	90%
1,2-Dichlorobenzene-d_4		NPM	88-110%	90%

TABLE 3-6 (continued)
QA OBJECTIVES FOR LABORATORY MEASUREMENTS OF AQUEOUS SAMPLES

NOTES:

1. Methods

    Organics: VOC's by SW-8260B in *Test Methods for the Evaluation of Solid Waste*, SW-846, Update III, Third Edition, U.S. EPA, June 1996

    Inorganics: Metals by SW-6010B or 6020/7470A/ in *Test Methods for the Evaluation of Solid Waste*, SW-846, Updates II and III, Third Edition, U.S. EPA, 1994 and 1996.

2. Precision - Relative percent difference (RPD) between laboratory replicates/field replicate analyses with the exception of VOC's. Where one RPD is listed, it is the laboratory replicate acceptance criteria; where two numbers are listed, they are the laboratory replicate/field duplicate RPD acceptance criteria, respectively.

    Precision for VOC's is measured on a quarterly basis as the Relative Standard Deviation (RSD) of the Laboratory Fortified Blank (LFB) replicate analyses.

3. Accuracy - Acceptable matrix spike recovery range as specified by the method.

NPM Not part of method

TABLE 3-7
QA OBJECTIVES FOR FIELD MEASUREMENTS

Parameter	Method[1] Reference	Precision[2]	Accuracy[3]	Completeness
WATER				
Standing Water Levels	**Water Level Indicator**	±0.01 ft	0.005 ft	90%
Temperature	**E170.1, Mercury Thermometer or Electronic Temperature Probe**	±0.1 °C	0.05 °C	90%
Conductivity	**E120.1, Electrometric**	±20 μmho/cm^2	10 μmho/cm^2	90%
pH	**E150.1, Electrometric**	±0.1 pH units	0.05 pH units	90%

NOTES:
1. Methods: E - *Method for Chemical Analysis for Water and Wastes* (U.S. EPA, 1983).
2. Expressed as the acceptable deviation from the scale.
3. Expected based on equipment manufacturer specifications.

TABLE 3-8
QC SAMPLE TYPES, CRITERIA, AND CORRECTIVE ACTION

Type	Purpose	Frequency	Criteria	Corrective Action
Field Generated QC Samples:				
Trip Blank	Verifies no contamination during sample transport/storage	1 per cooler of VOC samples for each matrix	No compound of interest >EQL	Qualify data or resample
Equipment Blank	Verifies effective decontamination procedures used in field for Non Dedicated equipment	5% of samples collected per media	No compound of interest >EQL	Qualify data or resample
Field Duplicate	Measure sample variability (submit "blind" to lab)	5% of samples	±30% RPD[2] (aqueous)	Compare to lab replicates; check systems for possible matrix interferences or improper sample collection procedure
Laboratory Generated QC Samples:				
Matrix Spikes and Duplicates (MS/MSD)	Checks recovery from real matrix	1 per 20 samples or 1 per batch as supplied from the field	Recoveries as specified in Table 4-6	Qualify data or recalibrate, reanalyze, and document corrective action
Laboratory Control Samples (for Metals)	Verifies analyst proficiency with method and instrumentation	1 per 20 samples or 1 per batch as supplied from the field	Metals - ± 20% of true value	Check system; reanalyze all samples in batch

TABLE 3-8 (continued)
QC SAMPLE TYPES, CRITERIA, AND CORRECTIVE ACTION

Type	Purpose	Frequency	Criteria	Corrective Action
Continuing Calibration - Organics	Verifies calibration curve	≥ 1 per day of analysis	±25% initial calibration	Recalibrate; check system
Continuing Calibration - Inorganics	Verifies Calibration Curve	1 per batch(2) of ten samples	±10% of true value	Recalibrate; check system
Method Blank	Verifies clean reagents, instrument systems, and lab environment	1 per batch(2) as supplied from the field. VOC's after each GC/MS tune	No compound of interest >5 times EQL(3)	Reanalyze; if second blank exceeds criteria, clean and recalibrate system; document corrective action
Laboratory Replicates (including matrix spike duplicates)	Checks precision of analytical method	1 per 20 samples per matrix	RPD as specified in Tables 4-6 and 4-7	Compare with field duplicates; check matrix interferences
Surrogate Standards	Measures recoveries in actual sample matrices	All GC/MS and all GC samples	Recoveries as specified in the Tables 4-6	Reanalyze samples where method requires; qualify or reject data

NOTES:
1. Between duplicate measurements.
2. The term "batch" refers to samples analyzed together in a specified group using the same methods, the same types and lots of reagents, and the same time frame for analysis.
3. Validation criteria. Acetone, methylene chloride, and 2-butanone.

RPD - Relative Percent Difference

VOC - Volatile Organic Compounds

TABLE 4-1
SCHEDULE OF SAMPLE DATA AND QA REPORTS

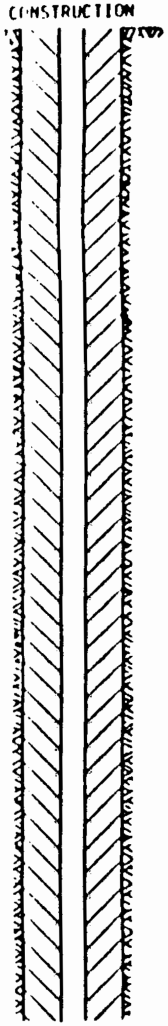
Type of Report	Frequency	Submitted by	Submitted to
Semi-Annual Progress Report	Semi-Annual	Project Coordinator	USEPA and NMED
Analytical Data Packages	21 days after sample receipt	Laboratory Project Manager	Sparton's Project Chemist or Quality Assurance Officer
Corrective Action Report	As needed, per occurrence	Personnel taking corrective action	Project Manager

APPENDICES

APPENDIX A

BORING, WELL, AND ABANDONMENT RECORDS AND LOGS

WELL CONSTRUCTION



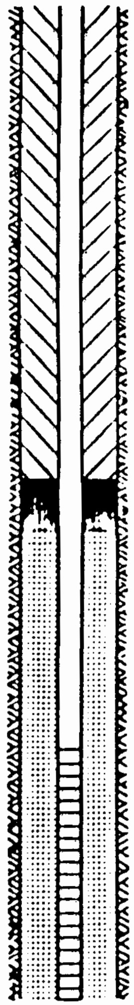
Blows/foot | Moisture Content (%) | Dry Density (pcf) | Depth (ft) | Sample

Equipment Hollow Auger

Elevation ________ Date 5/24/83

Depth (ft)	Description
0	LIGHT BROWN SAND (SP) loose, fine-grained, with trace of silt
5	medium dense, moist at 5 feet
10	
	occasional gravel to cobbles at 14 feet
15	
20	
25	BROWN SANDY GRAVEL (GP) dense, dry
	LIGHT BROWN SAND (SP) dense, fine-grained, dry
30	
	occasional gravel at 34 feet
35	
40	

WELL CONSTRUCTION



Blows/foot | Moisture Content (%) | Dry Density (pcf) | Depth (ft) | Sample

(Continuation of Log)

Depth (ft)	Description
40	
45	BROWN GRAVEL (GP) very dense, coarse, dry
50	LIGHT BROWN SAND (SP) very dense, fine-grained, moist, with occasional gravel
55	BROWN SANDY GRAVEL (GP) very dense, cobble to very coarse, interbedded with sand layers
60	
65	
70	
75	
80	

HLA Harding Lawson Associates
Engineers, Geologists & Geophysicists

LOG OF WELL P-1

SPARTON SOUTHWEST, INC.
ALBUQUERQUE, NEW MEXICO

PLATE 9

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
ARM	6310,004.12	A.R.M.	6/83		

Depth (ft)	Sample		(Continuation of Log)
80			granite fragment at 75.5 feet to 75.6 feet hard drilling to bottom of hole Note: Above 48 feet the 11.7 ev PID probe was used. Below 48 feet the 10.2 ev PID probe was used. End of Boring at 78 feet
85			
90			
95			
100			
10			
110			
115			
120			

Harding Lawson Associates
Engineers, Geologists
& Geophysicists

LOG OF BORING/MONITORING WELL MW-22 (CONT.)

Sparton Technology, Inc.
Albuquerque, New Mexico

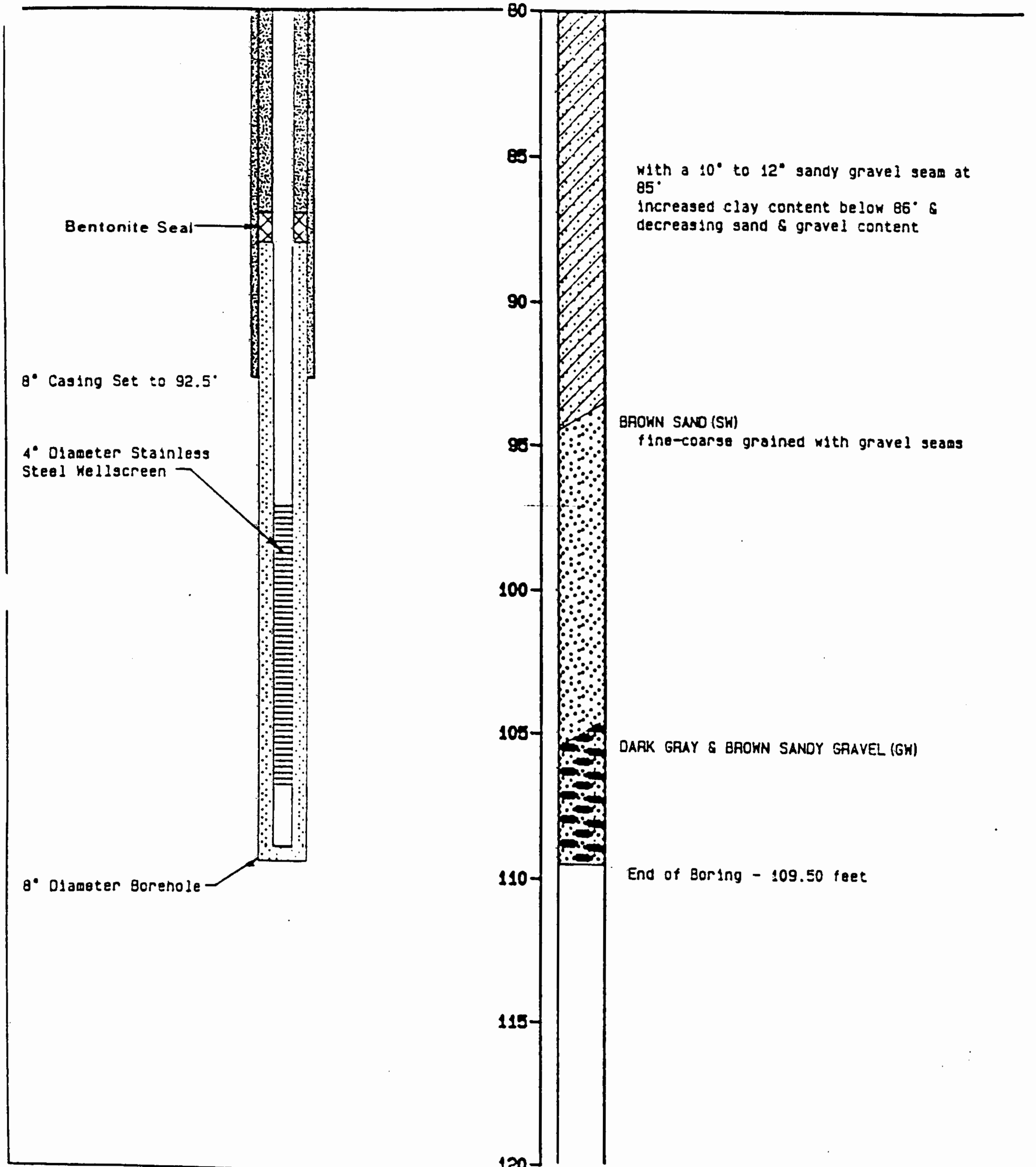
8a

6310,033.12

REC. % | PID (ppm) | Depth (ft) | Sample

Equipment Rotary Wash

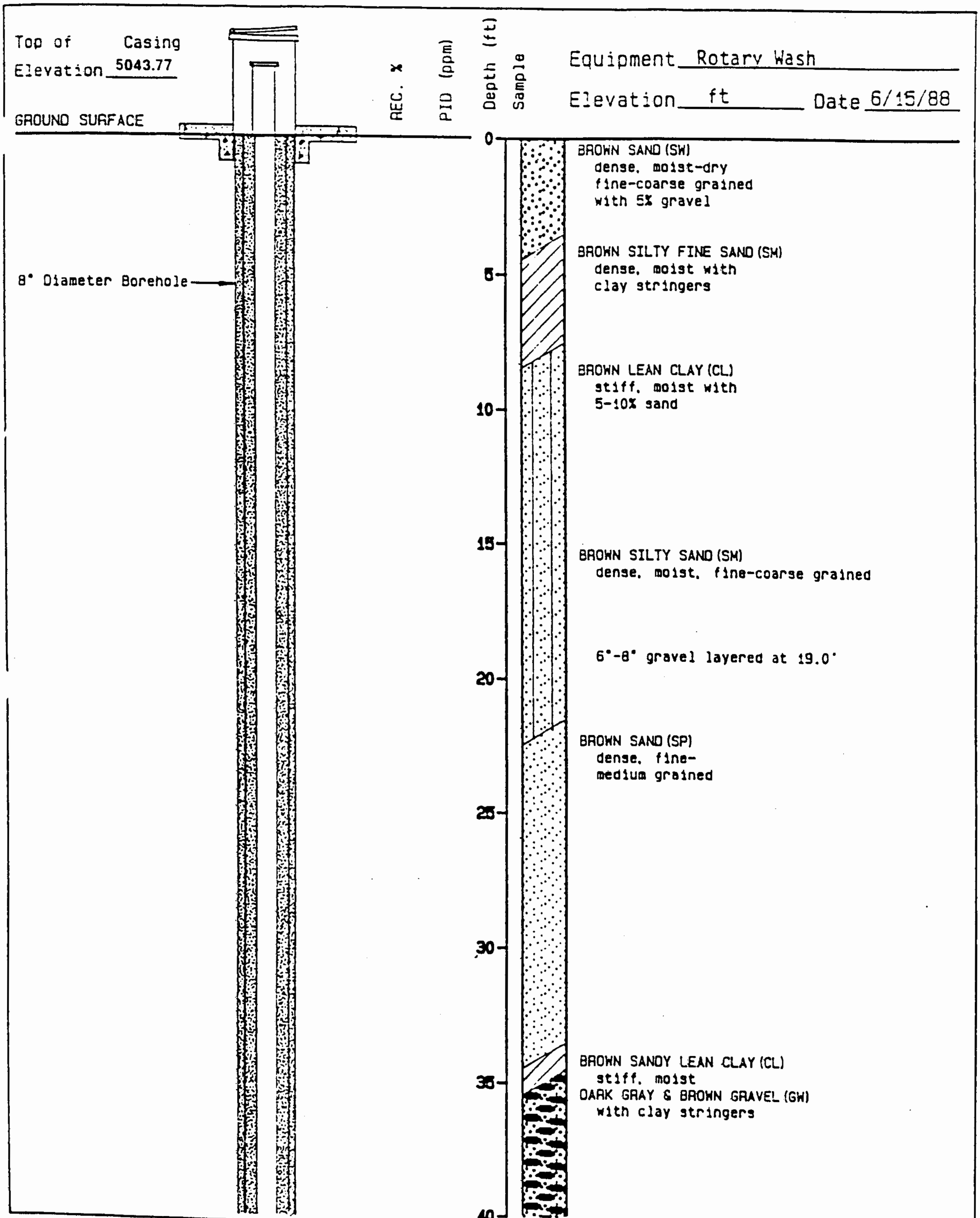
Elevation ft Date 6/17/88



Harding Lawson Associates
Engineers and Geoscientists

Log of Boring and Well Completion Detail MW-30 FIGURE
Sparton Technology Inc.
Albuquerque, New Mexico

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
M.K.	06310,039.12		9/88		



Harding Lawson Associates
Engineers and Geoscientists

Log of Boring and Well Completion Detail MW-31
Sparton Technology Inc.
Albuquerque, New Mexico

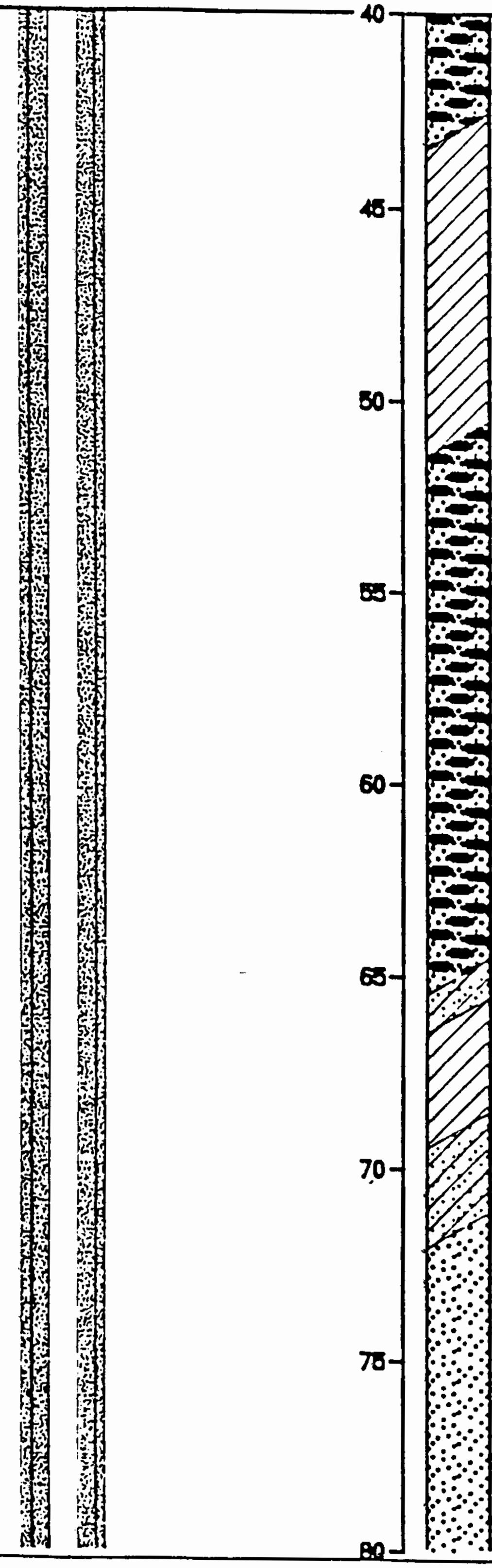
FIGURE

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
M.K.	06310.039.12		9/88		

REC. %	PID (ppm)	Depth (ft)	Sample

Equipment Rotary Wash

Elevation ft Date 6/15/88



BROWN LEAN CLAY (CL)
stiff, moist, with 15-20% sand
with 6"-8" gravel layer at 43.5'

DARK GRAY & BROWN GRAVEL (GW)
with 5-10% sand and clay
stringers

LIGHT BROWN & BROWN CLAYEY SAND (SC)
dense, moist

BROWN LEAN CLAY (CL)
stiff, moist with
5% sand to gravel

BROWN & LIGHT BROWN CLAYEY SAND (SC)
dense, fine-medium grained with
gravel and clay stringers

BROWN SAND (SW)
dense, fine-coarse
grained with gravel
and clay stringers

Harding Lawson Associates
Engineers and Geoscientists

Log of Boring and Well Completion Detail MW-31

Sparton Technology Inc.
Albuquerque, New Mexico

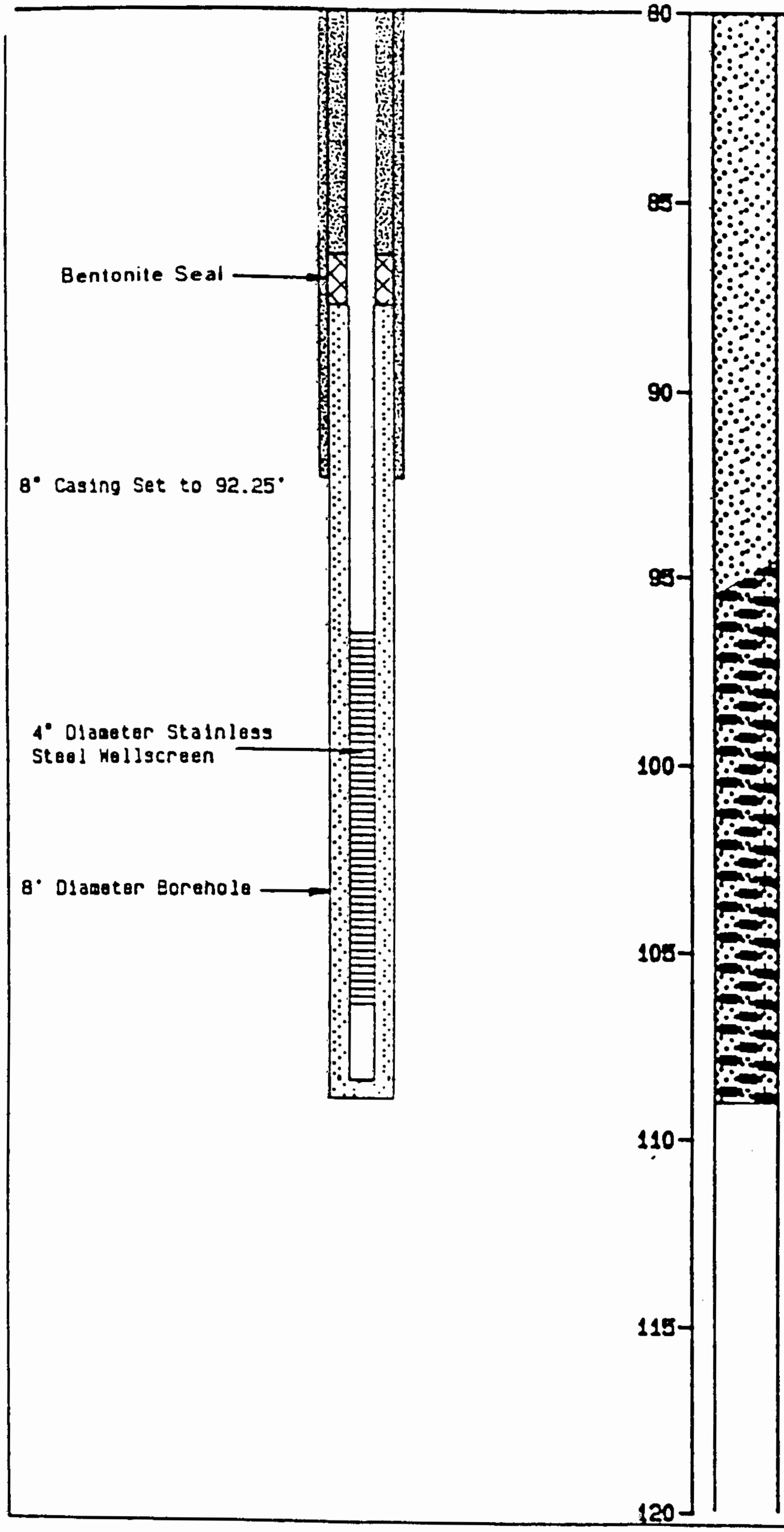
FIGURE

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
M.K.	06310.039.12		9/88		

REC. % | PID (ppm) | Depth (ft) | Sample

Equipment Rotary Wash

Elevation ft Date 6/15/88



no gravel or clay below 86.0'

SANDY GRAVEL (GW)
fine-coarse grained

End of Boring - 109.0 feet

Harding Lawson Associates
Engineers and Geoscientists

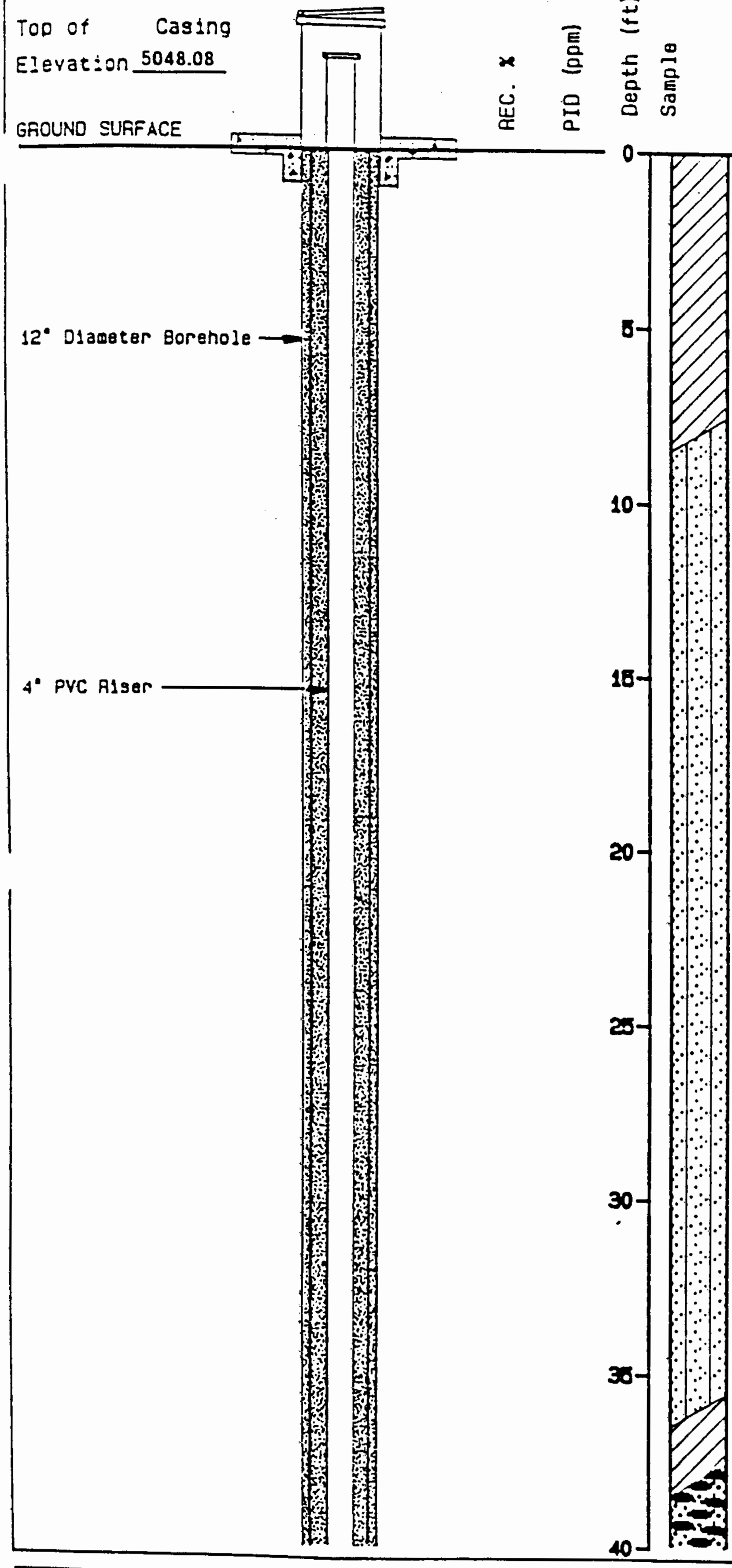
Log of Boring and Well Completion Detail MW-31 FIGURE

Sparton Technology Inc.
Albuquerque, New Mexico

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
M.K.	06310.039.12		9/88		

Top of Casing
Elevation 5048.08

GROUND SURFACE



Equipment Rotary Wash

Elevation ft Date 6/13/88

BROWN LEAN CLAY (CL)
moist, dry

BROWN SILTY SAND (SM)
moist, dry,
fine-medium grained

fine grained below 20.0'

BROWN LEAN CLAY (CL)
moist with silt and
fine grained sand
DARK GRAY & BROWN GRAVEL (GW)

Harding Lawson Associates
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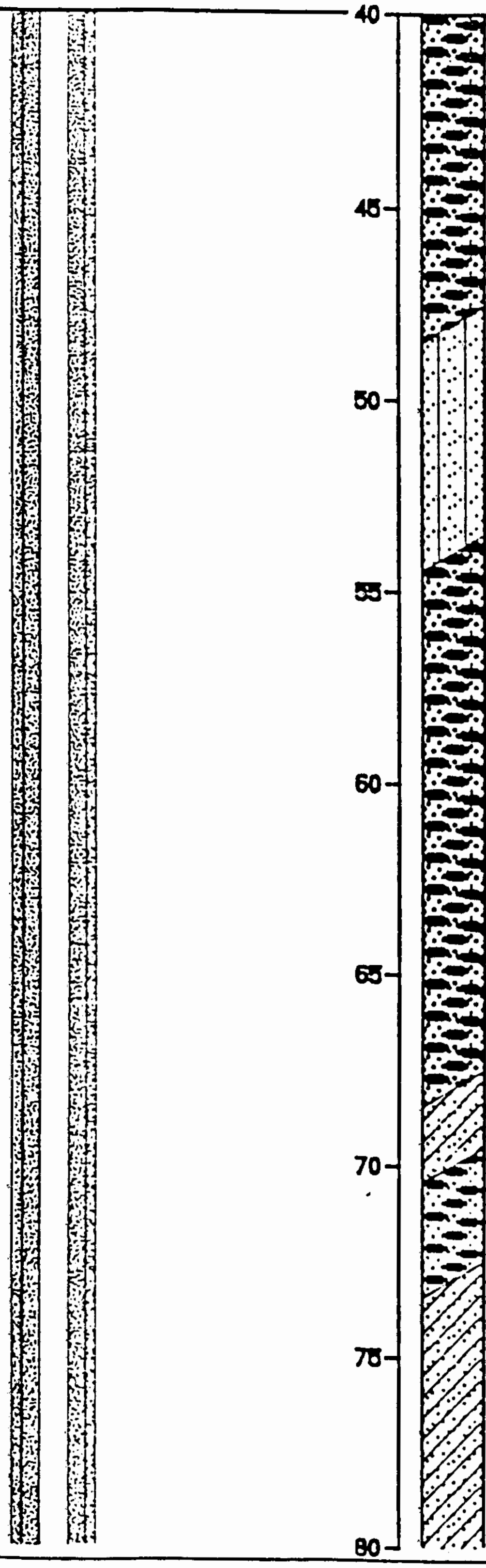
Log of Boring and Well Completion Detail MW-32
Sparton Technology Inc.
Albuquerque, New Mexico

FIGURE

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
M.K.	06310,039.12		9/88		

REC. %	PID (ppm)	Depth (ft)	Sample	Equipment Rotary Wash
				Elevation ft Date 6/13/88



BROWN SILTY SAND (SM)
medium dense,
fine grained with
clay seams

DARK GRAY & BROWN GRAVEL (GW)

BROWN CLAYEY SAND (SC)
dense, moist, fine grained

DARK GRAY & BROWN GRAVEL (GP)

6"-8" light brown sand seam at 72.0'

BROWN & LIGHT BROWN CLAYEY SAND (SC)
dense, moist to wet, fine grained,
with gravel

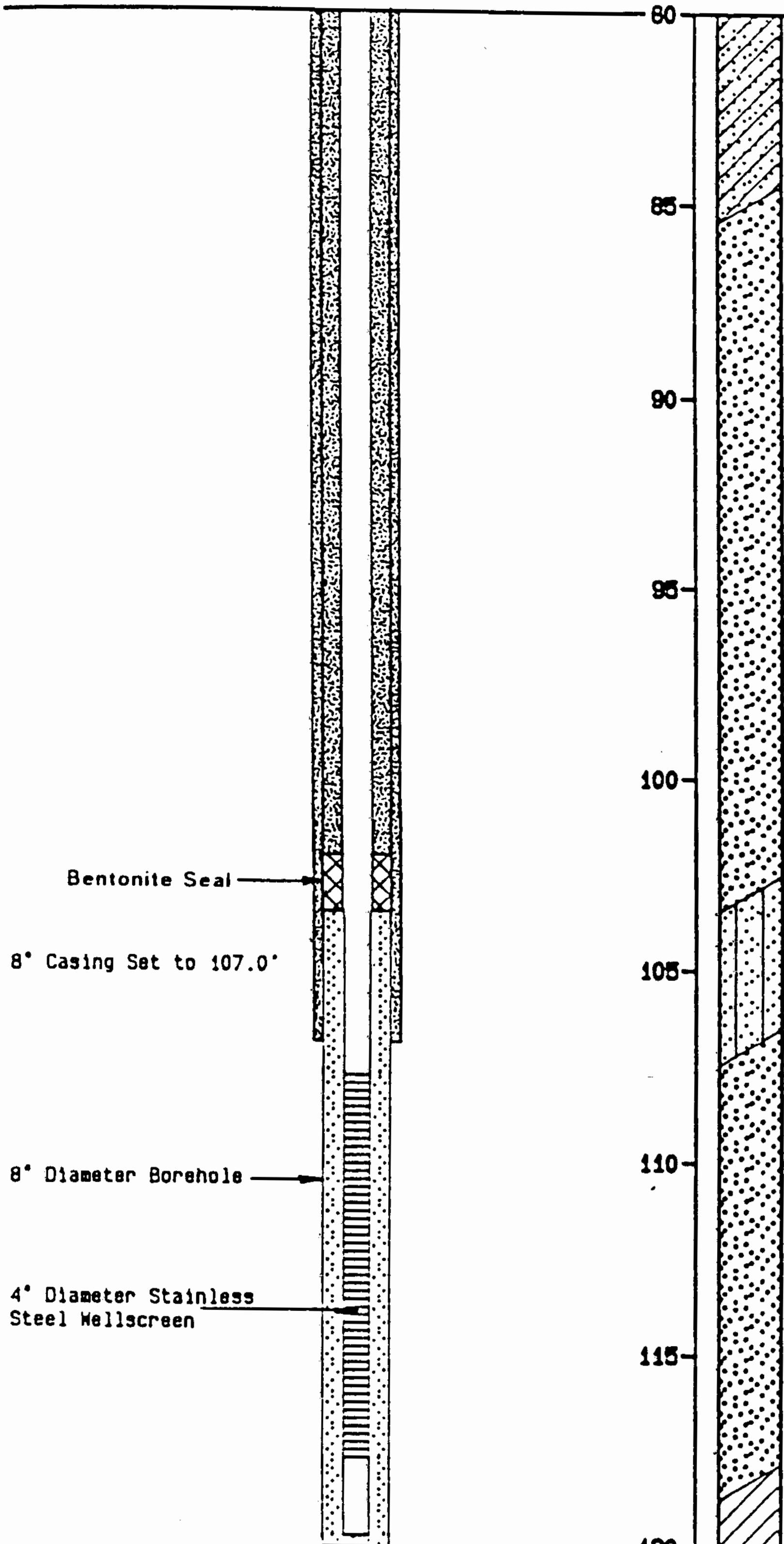
Harding Lawson Associates
Engineers and Geoscientists

Log of Boring and Well Completion Detail MW-32
Sparton Technology Inc.
Albuquerque, New Mexico

FIGURE

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
M.K.	06310.039.12		9/88		

REC. %	PID (ppm)	Depth (ft)	Sample	
				Equipment Rotary Wash
				Elevation ft Date 6/13/88



BROWN SAND (SW)
dense, fine-coarse grained

with gravel and clay below 100.0'

BROWN SILTY SAND (SM)
dense, moist to wet, fine-medium grained

BROWN SAND (SW)
dense, fine-coarse grained with gravel

BROWN LEAN CLAY (CL)
stiff, moist
End of Boring - 120.0 feet

Harding Lawson Associates
Engineers and Geoscientists

Log of Boring and Well Completion Detail MW-32
Sparton Technology Inc.
Albuquerque, New Mexico

FIGURE

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
M.K.	06310.039.12		9/88		

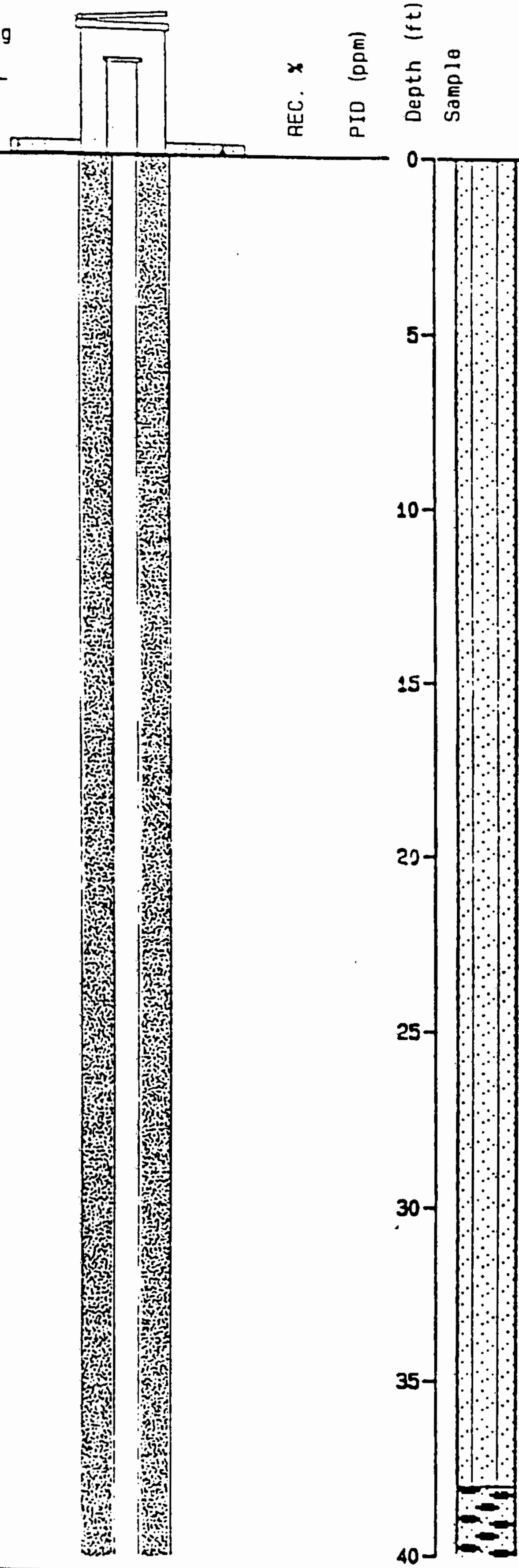
Top of Casing
Elevation 5044.36

GROUND SURFACE

REC. %
PID (ppm)
Depth (ft)
Sample

Equipment Hollow-Stem Auger

Elevation ft Date 10/17/88



BROWN FINE SILTY SAND (SM)

GRAY & BROWN GRAVEL (GP)

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Log of Boring and Well Completion Detail MW-33
Sparton Technology Inc.
Albuquerque, New Mexico

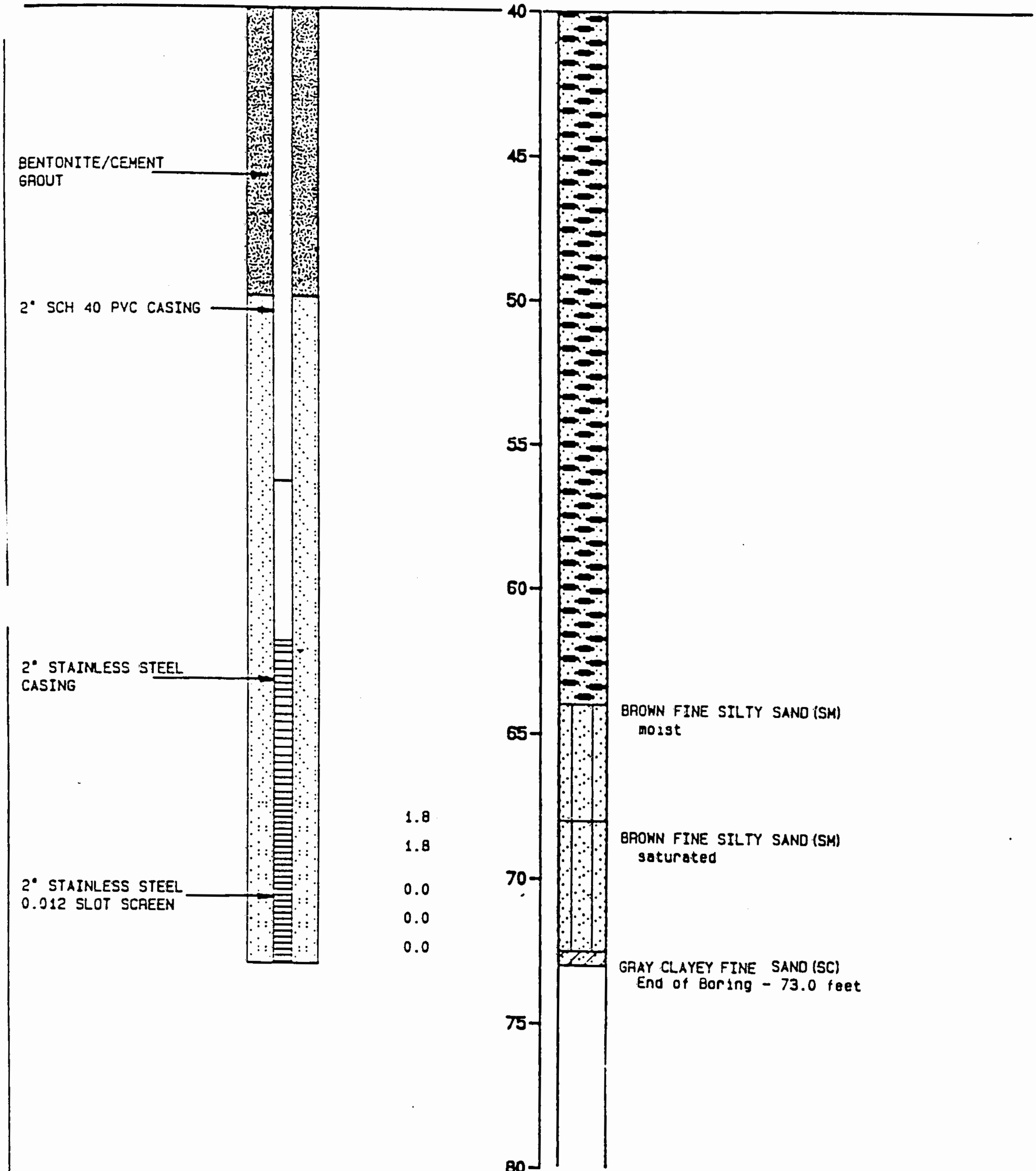
FIGURE

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	06310,039.12		10/88		

Equipment Hollow-Stem Auger

Elevation ft Date 10/17/88

REC. % | PID (ppm) | Depth (ft) | Sample

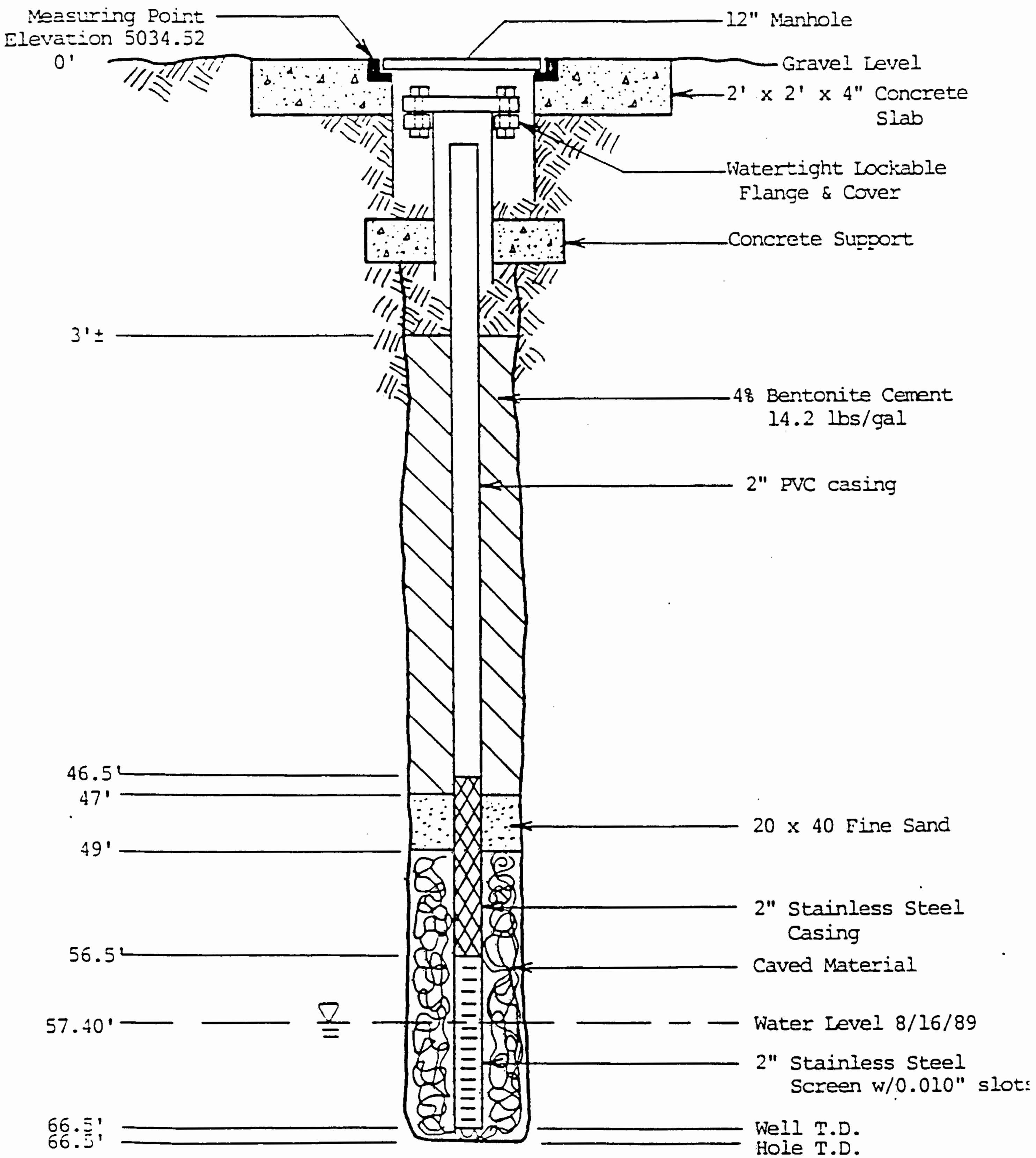


Harding Lawson Associates
Engineers and Geoscientists

Log of Boring and Well Completion Detail MW-33
Sparton Technology Inc.
Albuquerque, New Mexico

FIGURE

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	06310,039.12		10/88		



CONSTRUCTION DIAGRAM
MW-34-OS

METRIC
Corporation

SAMPLE LOG

Well Number MW-34 (OS) Well Location Off site along Irving Blvd.

Well Owner Sparton Technology, Inc.

Sample Logger Peter H. Metzner, METRIC Corporation

Driller METRIC Corporation

Drilling Medium Hollow-stem augers

Date of Completion 6-2-89 Ground Elev. 5034.52

Depth (feet)	Thickness (feet)	Stratigraphic Description
0-5	5	Moderate yellowish brown (10 YR 5/4), poorly sorted fine to very coarse-grained sand with some pebbles (SP)
5-10	5	Moderate yellowish brown (10 YR 5/4), well sorted medium-grained sand with some large pebbles (SW)
10-15	5	Moderate yellowish brown (10 YR 5/4), well sorted medium-grained sand with some granular gravel (SW)
15-20	5	Moderate yellowish brown (10 YR 5/4), well sorted medium-grained sand with pebbles to 10mm (SW)
20-30	10	Moderate yellowish brown (10YR 5/4), well sorted fine-grained sand with some granular gravel (SW)
30-35	5	Moderate yellowish brown (10 YR 5/4), well sorted fine-grained sand (SW)
35-40	5	Moderate yellowish brown (10 YR 5/4), well sorted fine-grained sand with some pebbles from 10 to 20mm (SW)
40-45	5	Moderate yellowish brown (10 YR 5/4), well sorted fine-grained sand with pebbles from 10 to 40mm (SW)

METRIC
Corporation

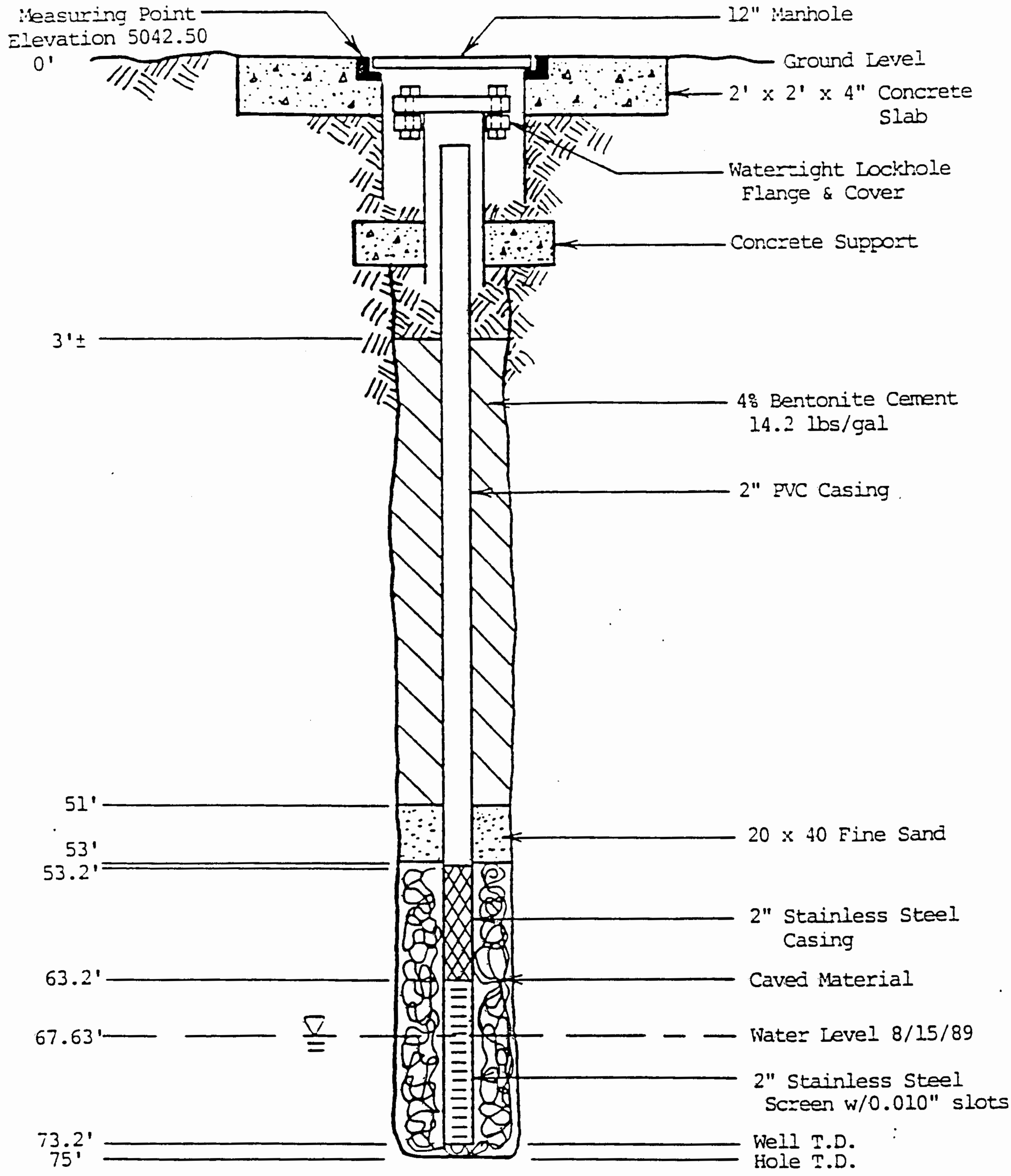
SAMPLE LOG

Continued

Well Number MW-34 (OS) Well Location Off site along Irving Blvd.

(Continued from Previous Page)

Depth (feet)	Thickness (feet)	Stratigraphic Description
45-55	10	Moderate yellowish brown (10 YR 5/4), fine-grained sand with pebbles from 10 to 50mm (SP)
55-59	4	Moderate yellowish brown (10 YR 5/4), fine-grained sand with pebbles from 4 to 70mm (SW)
59-66	7	Pale yellowish brown (10 YR 6/2), fine to medium-grained sand (SP)
66-66.5	.5	Moderate yellowish brown (10 YR 5/4), very fine-grained clayey sand (SC)



CONSTRUCTION DIAGRAM
MW-35-OS

METRIC
Corporation

SAMPLE LOG

Well Number MW-35 (OS) Well Location Off site along Irving Blvd.

Well Owner Sparton Technology, Inc.

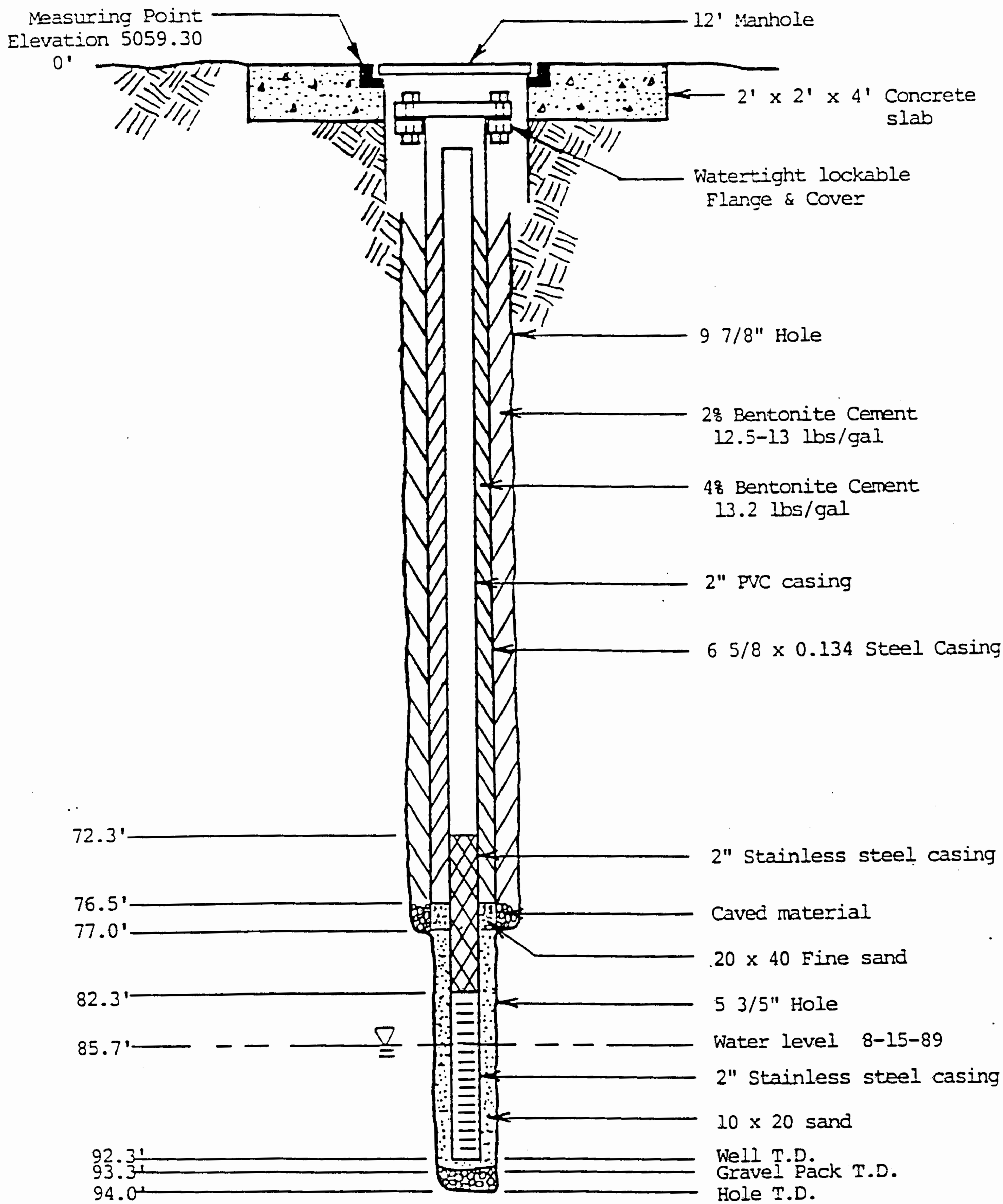
Sample Logger Peter H. Metzner, METRIC Corporation

Driller METRIC Corporation

Drilling Medium Hollow-stem augers

Date of Completion 6-9-89 Ground Elev. 5042.50

Depth (feet)	Thickness (feet)	Stratigraphic Description
0-5	5	Moderate yellowish brown (10 YR 5/4), well sorted fine-grained sand (SW)
5-10	5	Moderate yellowish brown (10 YR 5/4), well sorted fine-grained sand to silt (SM)
10-20	10	Moderate yellowish brown (10 YR 5/4), well sorted very fine-grained sand (SW)
20-25	5	Moderate yellowish brown (10 YR 5/4), well sorted very fine-grained sand with some pebbles (SW)
25-35	10	Dark yellowish brown (10 YR 4/2), well sorted fine-grained sand to silt (SM)
35-45	10	Dark yellowish brown (10 YR 4/2), fine sandy clay (CL)
45-51	6	Dark yellowish brown (10 YR 4/2), clayey fine sand (SC)
51-55	4	Dark yellowish brown (10 YR 4/2), fine-grained sand with pebbles from 5 to 30mm (SP)
55-68	13	Moderate yellowish brown (10 YR 5/4), fine to very fine-grained sand interbedded with pebbles from 10 to 70mm (SP)
68-75.5	7.5	Light brown (5 YR 6/4), fine to very fine sand (SP)



CONSTRUCTION DIAGRAM
MW-36-OS

METRIC
Corporation

SAMPLE LOG

Well Number MW-36 (OS) Well Location Off site along Irving Blvd.

Well Owner Sparton Technology, Inc.

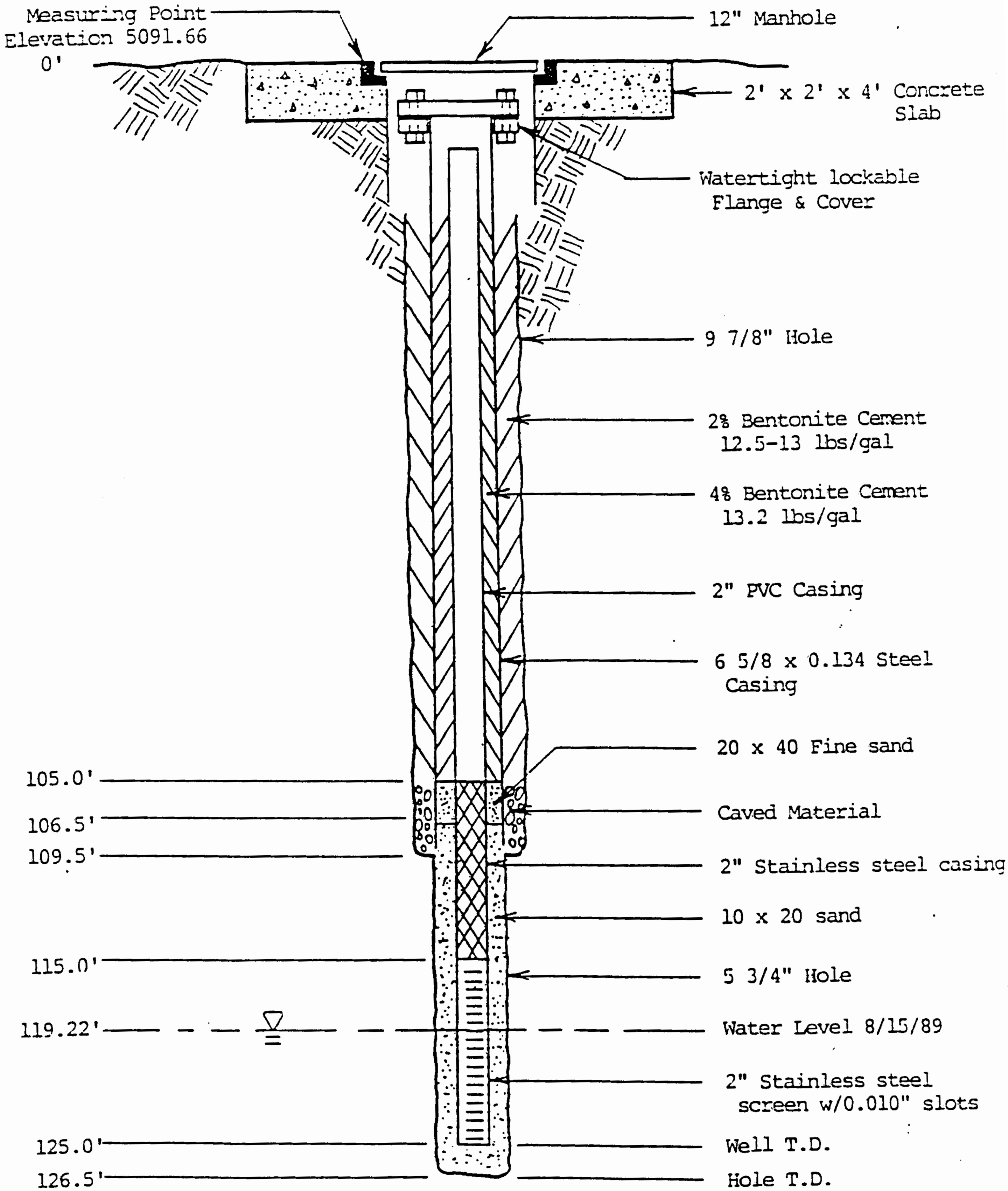
Sample Logger Peter H. Metzner, METRIC Corporation

Driller Rodgers & Company

Drilling Medium Mud rotary

Date of Completion 6-22-89 Ground Elev. 5059.30

Depth (feet)	Thickness (feet)	Stratigraphic Description
0-5	5	Moderate yellowish brown (10 YR 5/4), poorly sorted medium to very fine sand (SP)
5-11	6	Moderate yellowish brown (10 YR 5/4), slightly clayey fine sand with some granular gravel (SM)
11-55	44	Moderate yellowish brown (10 YR 5/4), sandy clay with some granular gravel (CL)
55-57	2	Moderate yellowish brown (10 YR 5/4), clay with granular gravel (CH)
57-65	8	Moderate yellowish brown (10 YR 5/4), slightly clayey very coarse sand with granular gravel (SP)
65-80	15	Medium gray (N5), medium-sorted very coarse sand to pebble gravel (SP)
80-85	5	Medium gray (N5), medium sorted coarse sand to pebble gravel (SP)
85-94	9	Pale yellowish brown (10 YR 6/2), well sorted very coarse sand to granular gravel (SW)



CONSTRUCTION DIAGRAM

MW-37-OS

METRIC
Corporation

SAMPLE LOG

Well Number MW-37 (OS) Well Location Off site along Irving Blvd.

Well Owner Sparton Technology, Inc.

Sample Logger Peter H. Metzner, METRIC Corporation

Driller Rodgers & Company

Drilling Medium Mud rotary

Date of Completion 7-1-89 Ground Elev. 5091.66

Depth (feet)	Thickness (feet)	Stratigraphic Description
0-5	5	Moderate yellowish brown (10 YR 5/4), very fine sand (SW)
5-10	5	Moderate yellowish brown (10 YR 5/4), fine sand (SW)
10-14	4	Moderate yellowish brown (10 YR 5/4), clayey fine sand (SC)
14-35	21	Pale yellowish brown (10 YR 6/2), slightly clayey well sorted medium to coarse sand (SP)
35-45	10	Moderate yellowish brown (10 YR 5/4), clayey fine sand (SC)
45-55	10	Moderate yellowish brown (10 YR 5/4), fine sandy clay (CL)
55-65	10	Moderate yellowish brown (10 YR 5/4), medium to coarse sand (SP)
65-85	20	Pale yellowish brown (10 YR 6/2), medium sorted medium to very coarse sand (SD)
85-95	10	Moderate yellowish brown (10 YR 5/4), well sorted medium to coarse-grained sand (SW)
95-100	5	Moderate yellowish brown (10 YR 5/4), slightly clayey medium-grained sand (SW)

METRIC
Corporation

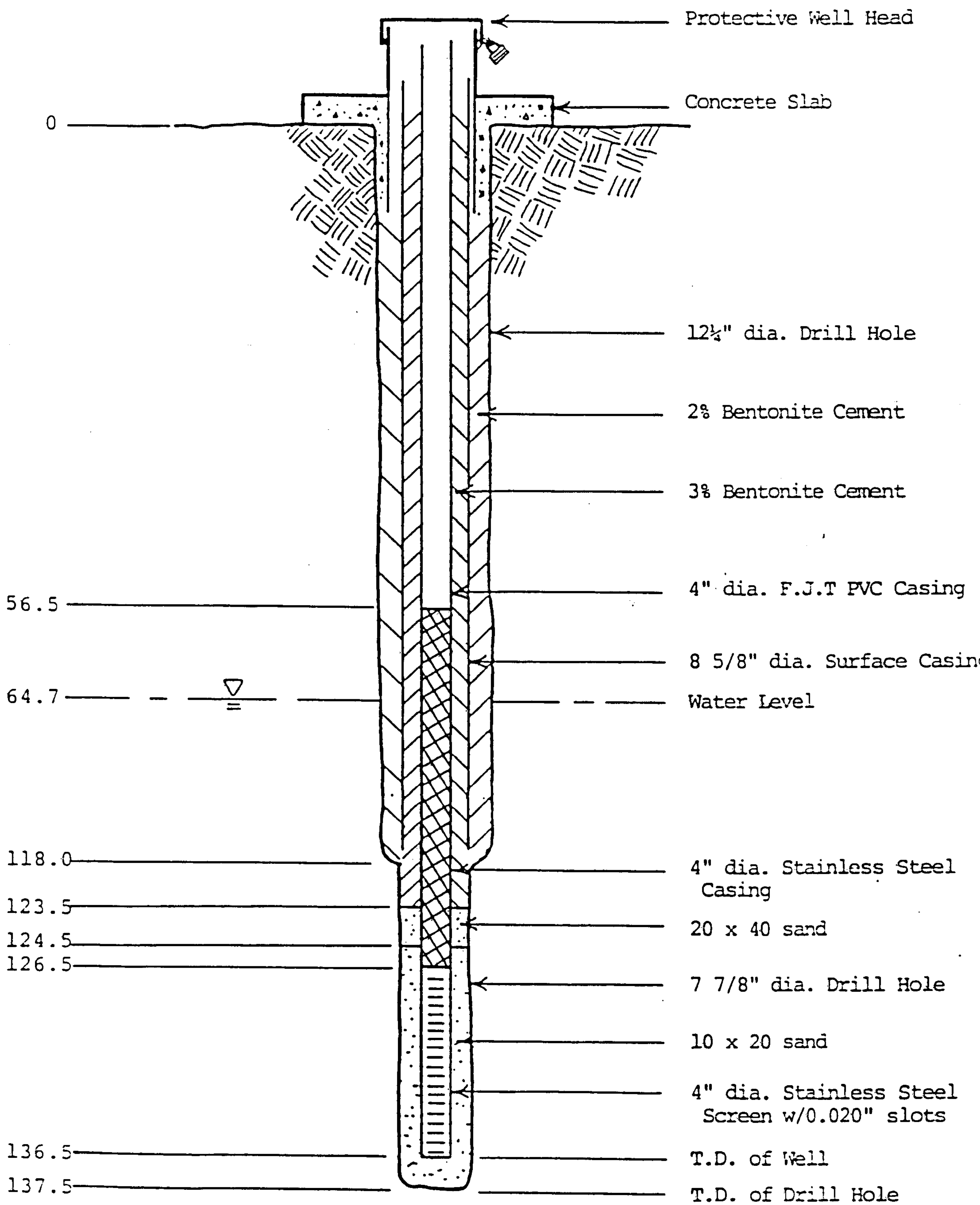
SAMPLE LOG

Continued

Well Number MW-37 (OS) Well Location Off site along Irving Blvd.

(Continued from Previous Page)

Depth (feet)	Thickness (feet)	Stratigraphic Description
100-111	11	Pale yellowish brown (10 YR 6/2), coarse sand to granular gravel (SP)
111-117	6	Medium gray (N5), pebble gravel (GP)
117-126.5	9.5	Medium gray (N5) very coarse sand to granular gravel (SP)



Construction Diagram
MW-38

METRIC
Corporation

SAMPLE LOG

Well Number MW-38 Well Location On site, South

Well Owner Sparton Technology, Inc.

Sample Logger Peter H. Metzner, METRIC Corporation

Driller Rodgers & Company

Drilling Medium Mud rotary

Date of Completion ______ Ground Elev. 5045'

Depth (feet)	Thickness (feet)	Stratigraphic Description
0-8	8	Moderate yellowish brown (10YR 5/4) fine sandy clay (CL)
8-13	5	Light brown (5YR 6/4) very coarse sand to granule gravel (SP)
13-15	2	Moderate yellowish brown (10YR 5/4) fine sandy clay and very coarse sand to granular gravel (SC)
15-20	5	Light brown (5YR 6/4) very poorly sorted coarse sand to granule gravel (SP)
20-22	2	Light brown (5YR 6/4) very coarse sand to granule gravel (GP)
22-38	16	Light brown (5YR 6/4) fine to medium clayey sand with granule and pebble gravel (SC)
38-48	10	Light brown (5YR 6/4) very fine to medium sand with some granule fragments (SP)
48-50	2	Light brown (5YR 6/4) fine to coarse sand (SP)
50-60	10	Medium gray (N5) very coarse sand to pebble gravel (SW)
60-66	6	Medium gray (N5) coarse sand to pebble gravel (SP)
66-90	24	Medium gray (N5) pebble gravel with fine clayey sand (GM)

METRIC
Corporation

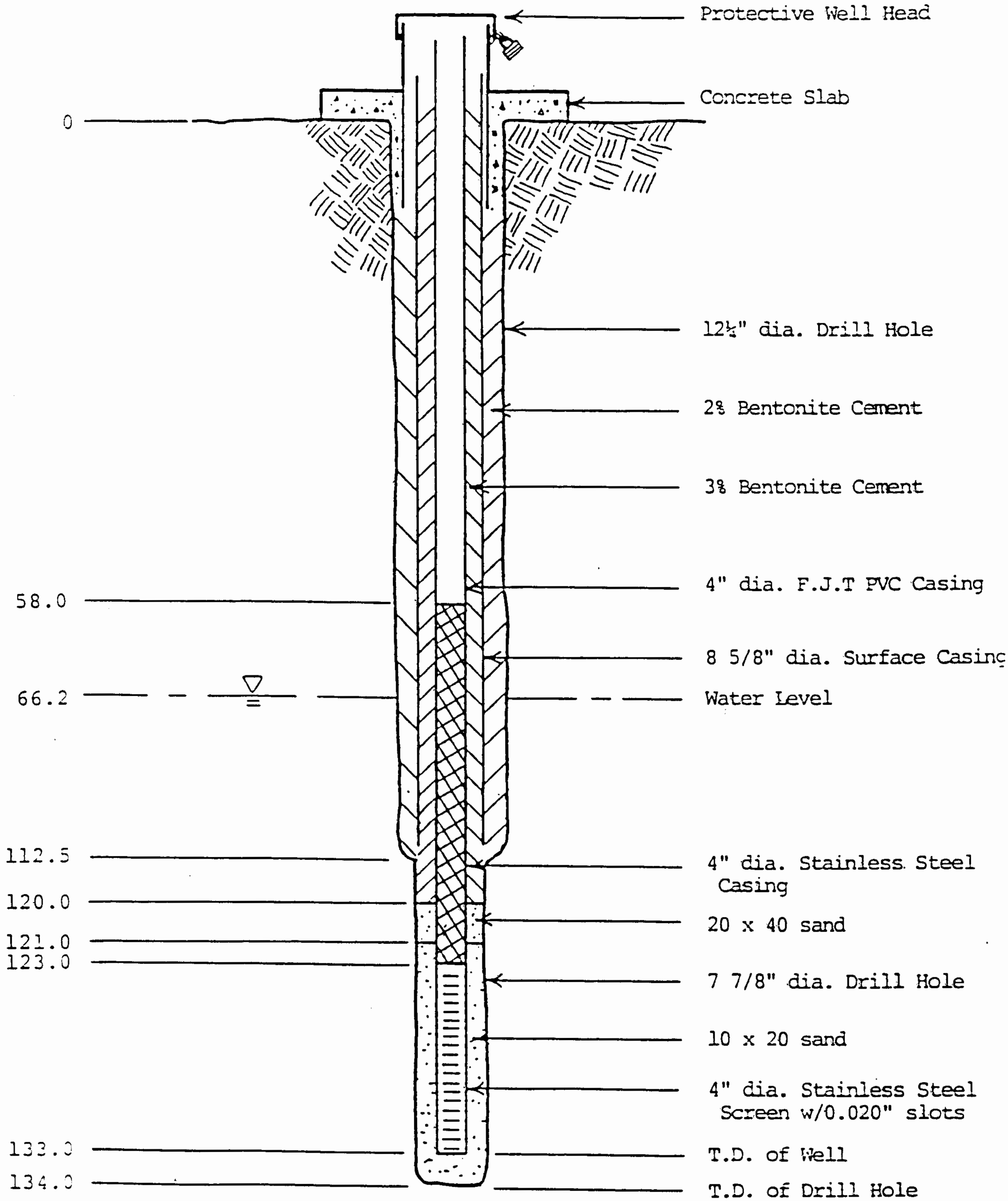
SAMPLE LOG

Continued

Well Number MW-38 Well Location ______

(Continued from Previous Page)

Depth (feet)	Thickness (feet)	Stratigraphic Description
90-101	11	Light brown (5YR 6/4) fine clayey sand with granule gravel (SC)
101-118	17	Light brown (5YR 6/4) and medium brown (N5) poorly sorted medium sand to pebble gravel (SP)
118-121	3	Light olive gray (5Y 6/1) fine to medium sand (SP)
121-126	5	Light olive gray (5Y 6/1) medium sand (SW)
126-136	10	Light olive gray (5Y 6/1) medium to coarse sand (SP)
136-137	11	Light brown (5YR 6/4) very coarse sand to granule gravel with some fine sandy clay (SC)



Construction Diagram
MW-39

METRIC
Corporation

SAMPLE LOG

Well Number MW-39 Well Location On site, South

Well Owner Sparton Technology, Inc.

Sample Logger Peter H. Metzner - METRIC Corporation

Driller Rodgers & Company

Drilling Medium Mud rotary

Date of Completion ______ Ground Elev. 5044'

Depth (feet)	Thickness (feet)	Stratigraphic Description
0-2	2	Light brown (5YR 6/4) clayey fine to coarse sand (SC)
2-15	13	Light brown (5YR 6/4) slightly clayey, silty very coarse sand to granule gravel (SM)
15-40	25	Moderate yellowish brown (10YR 5/4) clayey very fine sand (SC)
40-43	3	Pale yellowish brown (10YR 6/2) and medium gray (N5) pebble gravel (GW)
43-78	35	Pale yellowish brown (10YR 6/2) and medium gray (N5) slightly cemented pebble gravel (GW)
78-83	5	Pale yellowish brown (10YR 6/2) and medium gray (N5) slightly cemented pebble gravel with alternating clayey fine sand layers (GP)
83-93	10	Light brown (5YR 6/4) clayey very fine sand with pebble gravel (SC)
93-98	5	Light brown (5YR 6/4) fine sandy clay with pebble gravel (CL)
98-103	5	Light brown (5YR 6/4) fine sand to medium gray (N5) granule and pebble gravel (SP)
103-112	9	Medium gray (N5) light brown (5YR 6/4) and grayish orange pink (5YR 7/2) granule and pebble gravel (GP)

METRIC
Corporation

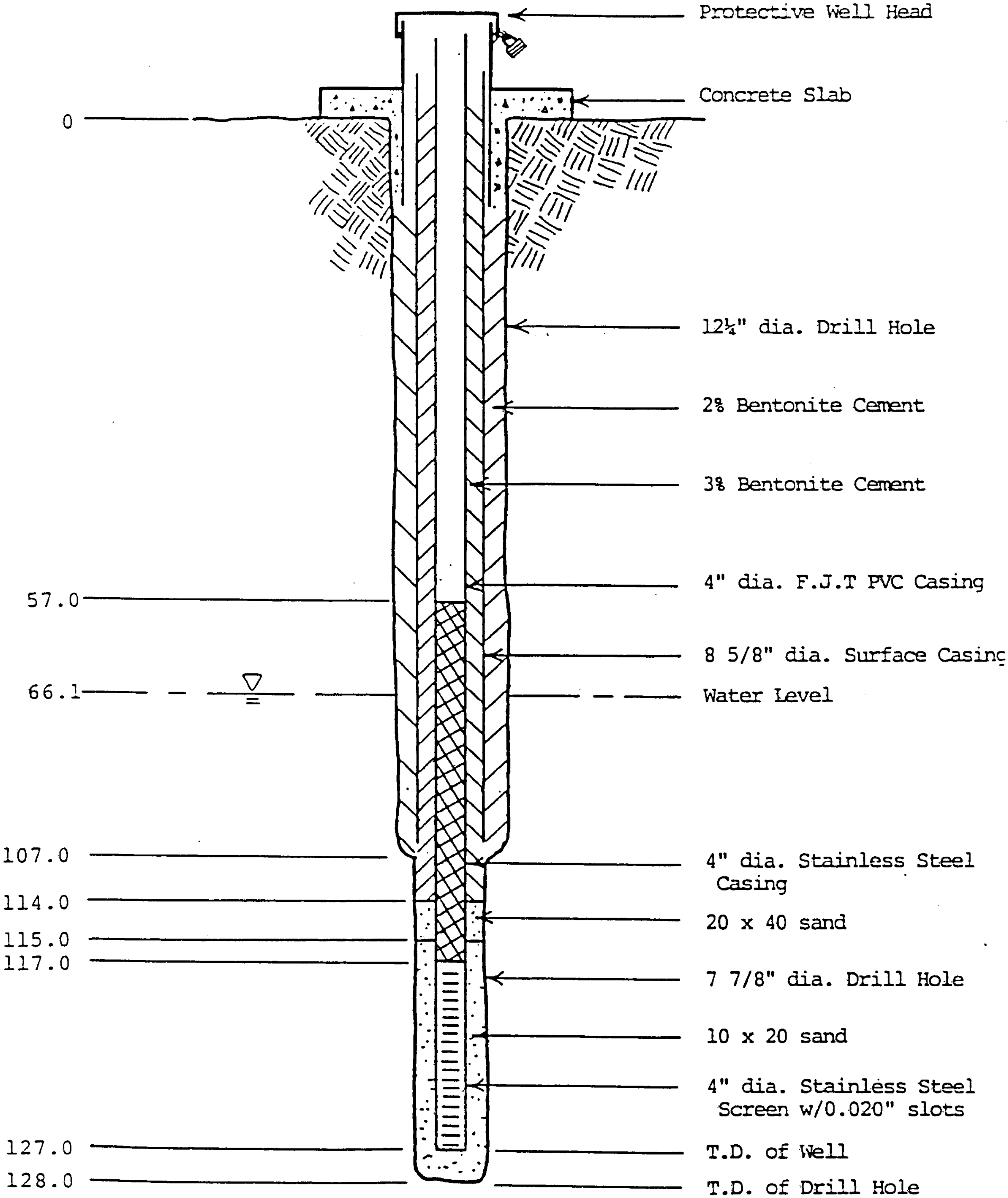
SAMPLE LOG

Continued

Well Number MW-39 Well Location ______________

(Continued from Previous Page)

Depth (feet)	Thickness (feet)	Stratigraphic Description
112-127	13	Pale yellowish brown (10YR 6/2) poorly sorted fine to very coarse sand (SP)
127-133	6	Medium gray (N5), light brown (5YR 6/4), and grayish orange pink (5YR 7/2) pebble gravel (GP)
133-134	1	Light brown (5YR 6/4) silty clay (CL)



Construction Diagram
MW-40

METRIC
Corporation

SAMPLE LOG

Well Number MW-40 Well Location On site, SW

Well Owner Sparton Technology, Inc.

Sample Logger Peter H. Metzner - METRIC Corporation

Driller Rodgers & Company

Drilling Medium Mud rotary

Date of Completion ______ Ground Elev. 5044'

Depth (feet)	Thickness (feet)	Stratigraphic Description
0-21	21	Light brown (5YR 6/4) silty clay (CL)
21-31	10	Light brown (5YR 6/4) slightly clayey very fine to coarse sand (SP)
31-38	7	Light brown (5YR 6/4) slightly clayey fine sand (SM)
38-50	12	Light brown (5YR 6/4) slightly clayey, very poorly sorted, fine sand to granule gravel (SW)
50-54	4	Light brown (5YR 6/4) slightly clayey very fine to coarse sand (SM)
54-61	7	Light brown (5YR 6/4) slightly clayey medium to very coarse sand (SM)
61-90	29	Light brown (5YR 6/4) clayey fine to coarse sand (SC)
90-107	17	Light brown (5YR 6/4) medium to very coarse sand (SP)
107-111	4	Light olive gray (5YR 6/1) fine to medium sand (SP)
111-116	5	Light brown (5YR 6/4) to light olive gray (5Y 6/1) medium to very coarse sand (SP)

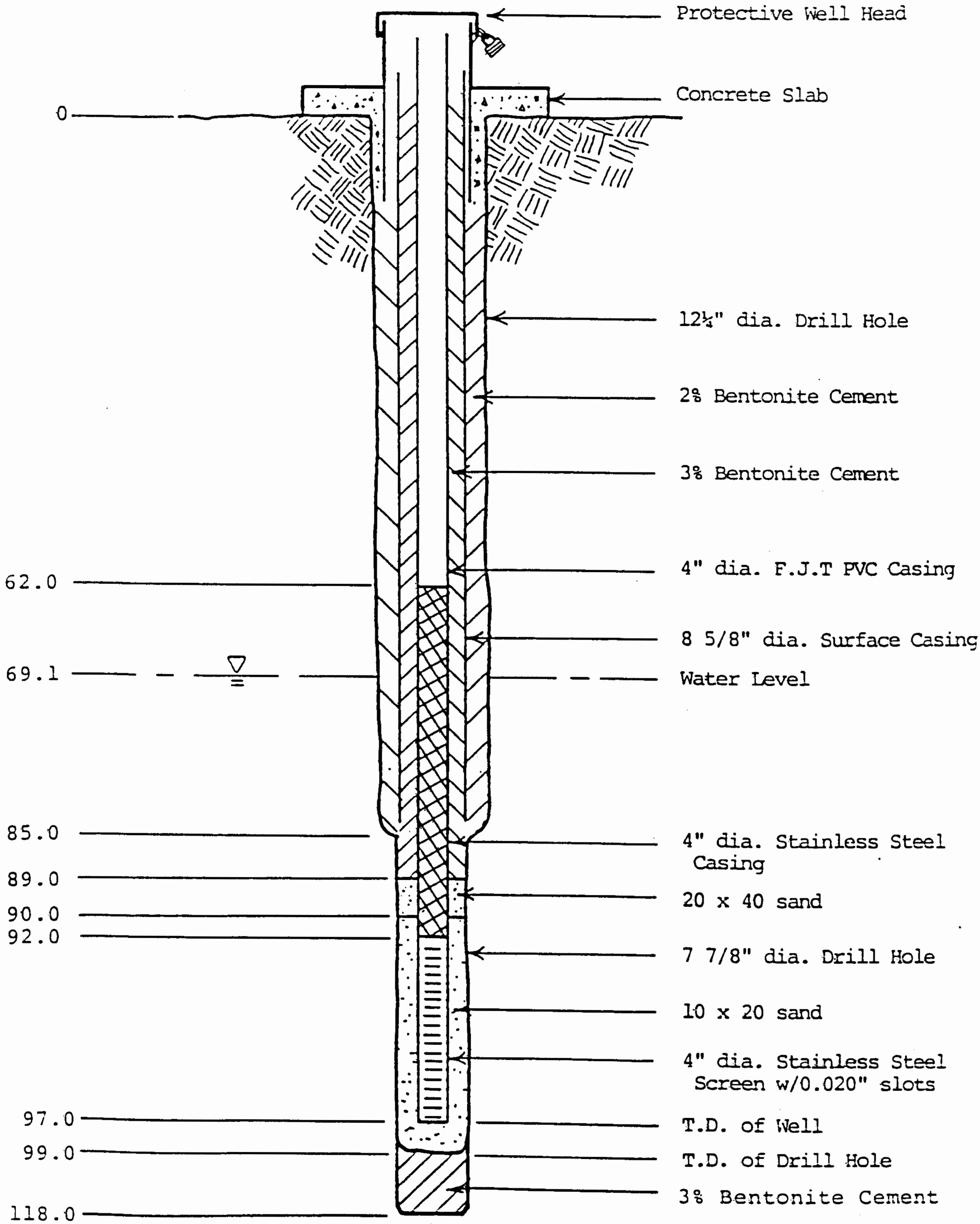
METRIC
Corporation

SAMPLE LOG
Continued

Well Number MW-40 Well Location ______

(Continued from Previous Page)

Depth (feet)	Thickness (feet)	Stratigraphic Description
116-121	5	Light brown (5YR 6/4) to light olive gray (5Y 6/1) fine to very coarse sand (SP)
121-128	7	Light brown (5YR 6/4) poorly sorted clayey, very fine to very coarse sand (SC)



Construction Diagram
MW-41

METRIC
Corporation

SAMPLE LOG

Well Number MW-41 Well Location On site, West

Well Owner Sparton Technology, Inc.

Sample Logger Peter H. Metzner - METRIC Corporation

Driller Rodgers & Company

Drilling Medium Mud rotary

Date of Completion ______ Ground Elev. 5047'

Depth (feet)	Thickness (feet)	Stratigraphic Description
0-35	35	Light brown (5YR 6/4) silty clay (CL)
35-42	7	Medium gray (N5) slightly cemented granule and pebble gravel (GP)
42-47	5	Light brown (5YR 6/4) medium to very coarse sand (SP)
47-51	4	Light brown (5YR 6/4) slightly cemented fine to coarse sand (SP)
51-77	26	Medium gray (N5) and light brown (5YR 6/4) pebble gravel (GP)
77-85	8	Medium gray (N5) slightly cemented pebble gravel (GP)
85-96	11	Pale yellowish brown (10YR 6/2) medium to coarse sand (SP)
96-106	10	Light brown (5YR 6/4) medium to coarse sand (SP)
106-116	10	Light brown (5YR 6/4) to pale wellowish brown (10YR 6/2) fine to very coarse sand (SP)
116-117	1	Light brown (5YR 6/4) to pale yellowish brown (10YR 6/2) coarse sand to granule gravel (SP)

METRIC
Corporation

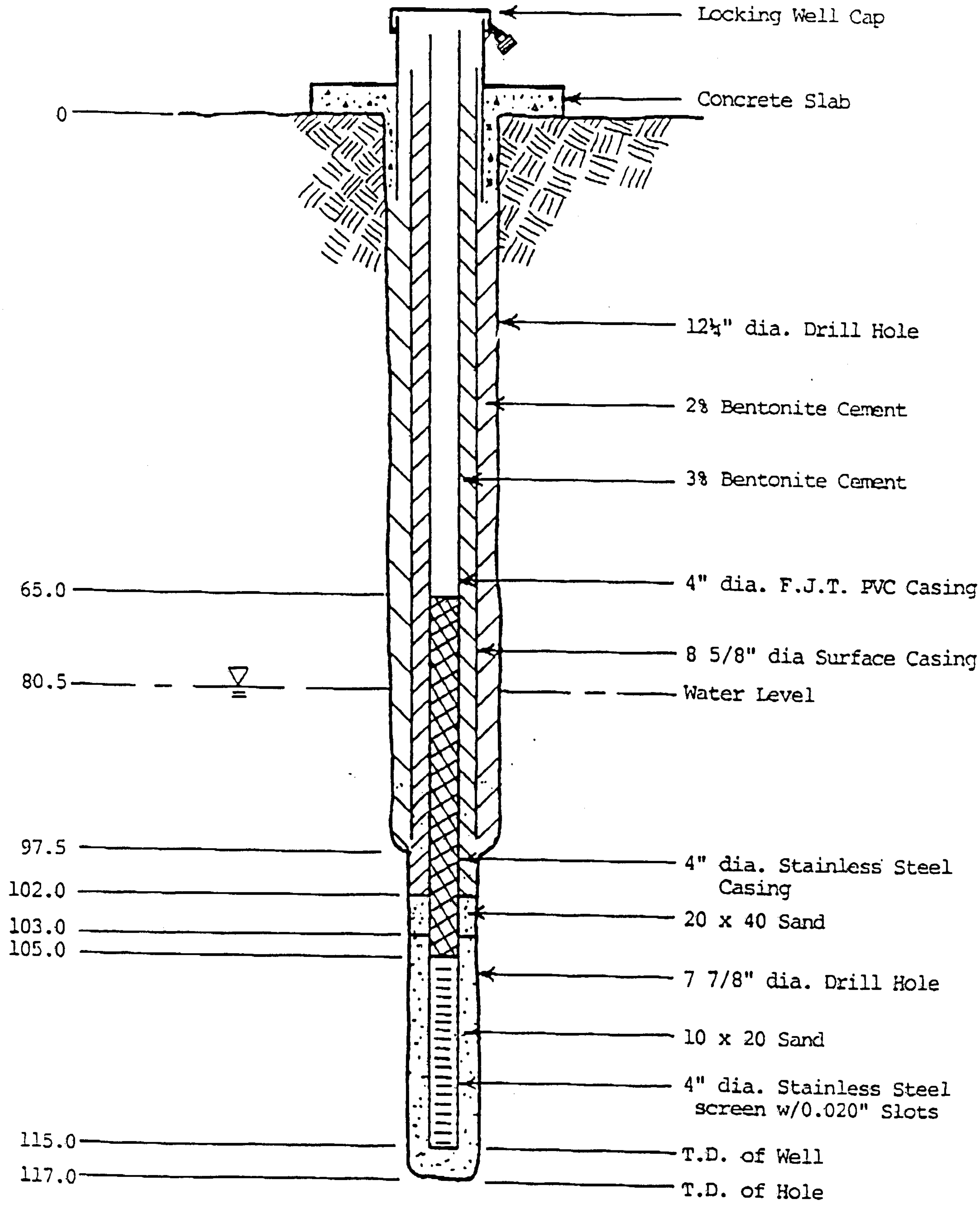
SAMPLE LOG

Continued

Well Number MW-41 Well Location ____________

(Continued from Previous Page)

Depth (feet)	Thickness (feet)	Stratigraphic Description
117-118	1	Light brown (5YR 6/4) very coarse sand and medium gray (N5) granule gravel (SP)



MW-42
CONSTRUCTION DIAGRAM

METRIC
Corporation

SAMPLE LOG

Well Number MW-42 Well Location On site, NW

Well Owner Sparton Technology, Inc.

Sample Logger METRIC Corporation, Peter H. Metzner

Driller Rodgers & Company, Inc.

Drilling Medium Mud rotary

Date of Completion 10-31-89 Ground Elev. 5055'

Depth (feet)	Thickness (feet)	Stratigraphic Description
0-10	10	Pale yellowish brown (10 YR 6/2) silt to very fine sand with some very coarse sand
10-30	20	Pale yellowish brown (10 YR 6/2) very fine to medium sand with some granule gravel
30-35	5	Pale yellowish brown (10 YR 6/2) poorly sorted, fine sand to granule gravel
35-40	5	Pale yellowish brown (10 YR 6/2) poorly sorted, medium sand to small pebble gravel
40-45	5	Moderate yellowish brown (10 YR 5/4) silt
45-50	5	Moderate yellowish brown (10 YR 5/4) silty clay
50-55	5	Medium gray (N5) to yellowish gray (5 Y 8/1) granule gravel to small pebble gravel
55-75	20	Medium gray (N5) to yellowish gray (5 Y 8/1) large pebble gravel
75-80	5	Medium gray (N5) to yellowish gray (5 Y 8/1) pebble gravel with pale yellowish brown (10 YR 6/2) clayey silt
80-95	15	Pale yellowish brown (10 YR 6/2) poorly sorted clayey very fine sand to very coarse sand, with some granule gravel

METRIC
Corporation

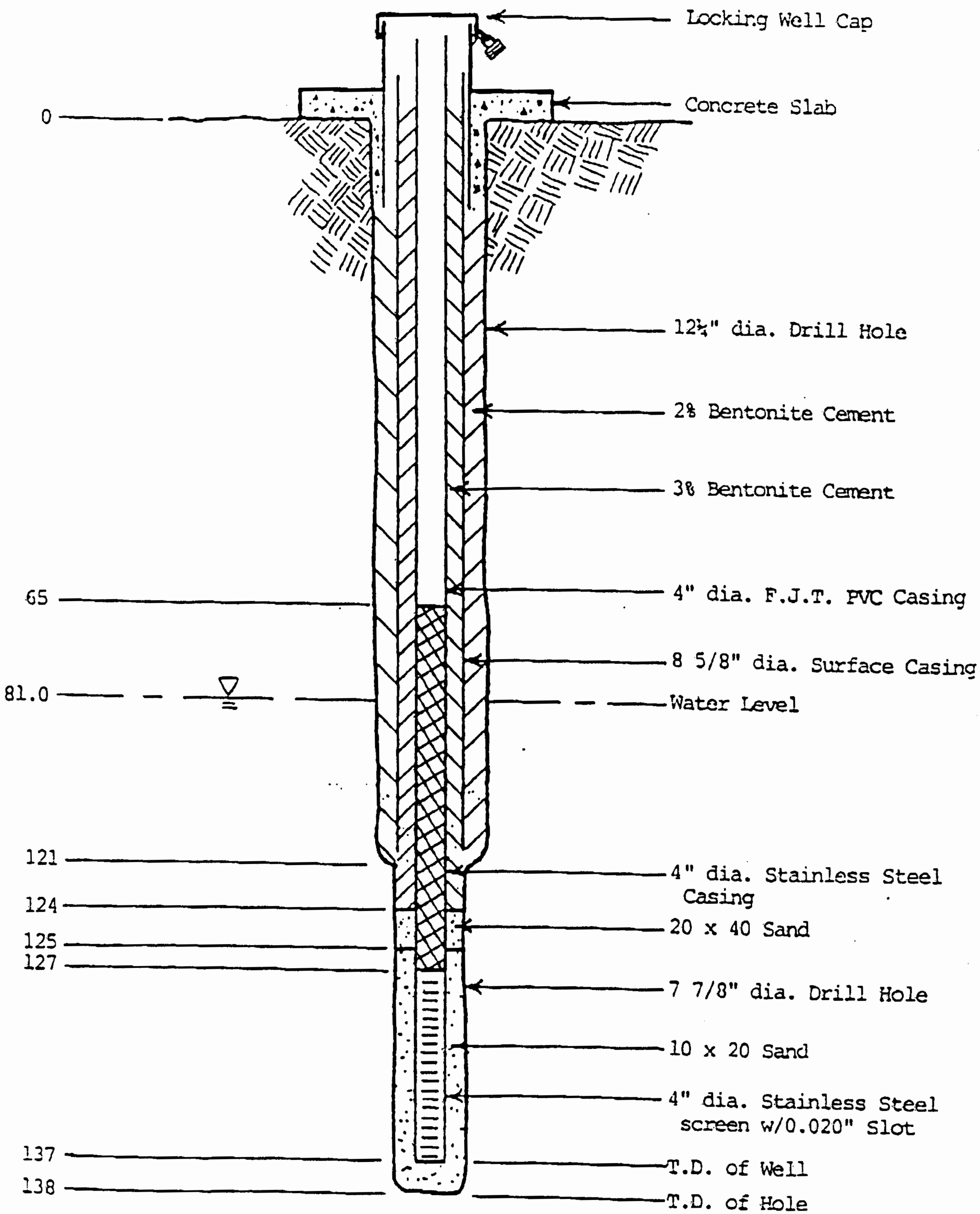
SAMPLE LOG

Continued

Well Number MW-42 Well Location On site, NW

(Continued from Previous Page)

Depth (feet)	Thickness (feet)	Stratigraphic Description
95-97	2	Pale yellowish brown (10 YR 6/2) coarse sand to pebble gravel
97-105	8	Pale yellowish brown (10 YR 6/2) coarse to very coarse sand
105-115	10	Pale yellowish brown (10 YR 6/2) coarse sand
115-117	2	Pale yellowish brown (10 YR 6/2) medium to very coarse sand



MW-43
CONSTRUCTION DIAGRAM

METRIC
Corporation

SAMPLE LOG

Well Number MW-43 Well Location On site, NW

Well Owner Sparton Technology, Inc.

Sample Logger METRIC Corporation, Peter H. Metzner

Driller Rodgers & Company, Inc.

Drilling Medium Mud rotary

Date of Completion 11-9-89 Ground Elev. 5056'

Depth (feet)	Thickness (feet)	Stratigraphic Description
0-15	15	Pale yellowish brown (10 YR 6/2) poorly sorted very fine to very coarse sand
15-35	20	Pale yellowish brown (10 YR 6/2) fine to medium sand
35-45	10	Pale yellowish brown (10 YR 6/2) very fine to fine sand
45-50	5	Moderate yellowish brown (10 YR 5/4) silty clay
50-75	25	Medium gray (N5) to yellowish gray (5 Y 8/1) pebble gravel
75-80	5	Medium gray (N5) to yellowish gray (5 Y 8/1) very coarse sand to pebble gravel
80-85	5	Pale yellowish brown (10 YR 6/2) clay with some small pebble gravel
85-90	5	Pale yellowish brown (10 YR 6/2) fine sandy clay
90-95	5	Pale yellowish brown (10 YR 6/2) fine sandy clay and medium gray (N5) to yellowish gray (5 Y 8/1) small pebble gravel
95-100	5	Medium gray (N5) to yellowish gray (5 Y 8/1) small pebble gravel

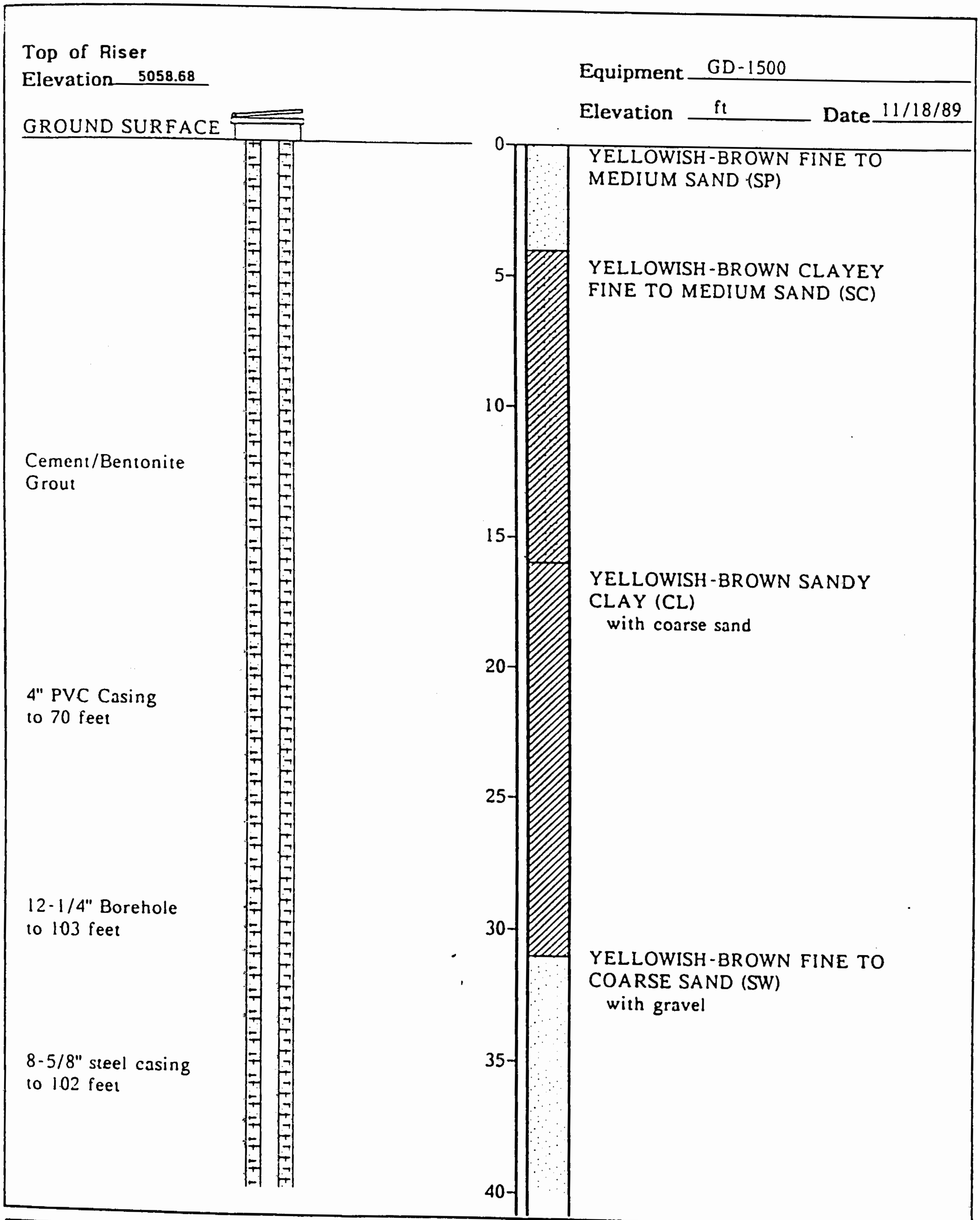
METRIC
Corporation

SAMPLE LOG
Continued

Well Number MW-43 Well Location On site, NW

(Continued from Previous Page)

Depth (feet)	Thickness (feet)	Stratigraphic Description
100-120	20	Pale yellowish brown (10 YR 6/2) fine sandy clay with granule to pebble gravel
120-124	4	Very light gray (N8) granule gravel
124-130	6	Very light gray (N8) small pebble gravel
130-136	6	Pale yellowish brown (10 YR 6/2) well sorted, coarse sand to granule gravel
136-138	2	Pale yellowish brown (10 YR 6/2) well sorted, clayey coarse sand to granule gravel



Harding Lawson Associates
Engineers and
Environmental Services

MONITORING WELL DETAIL MW-44

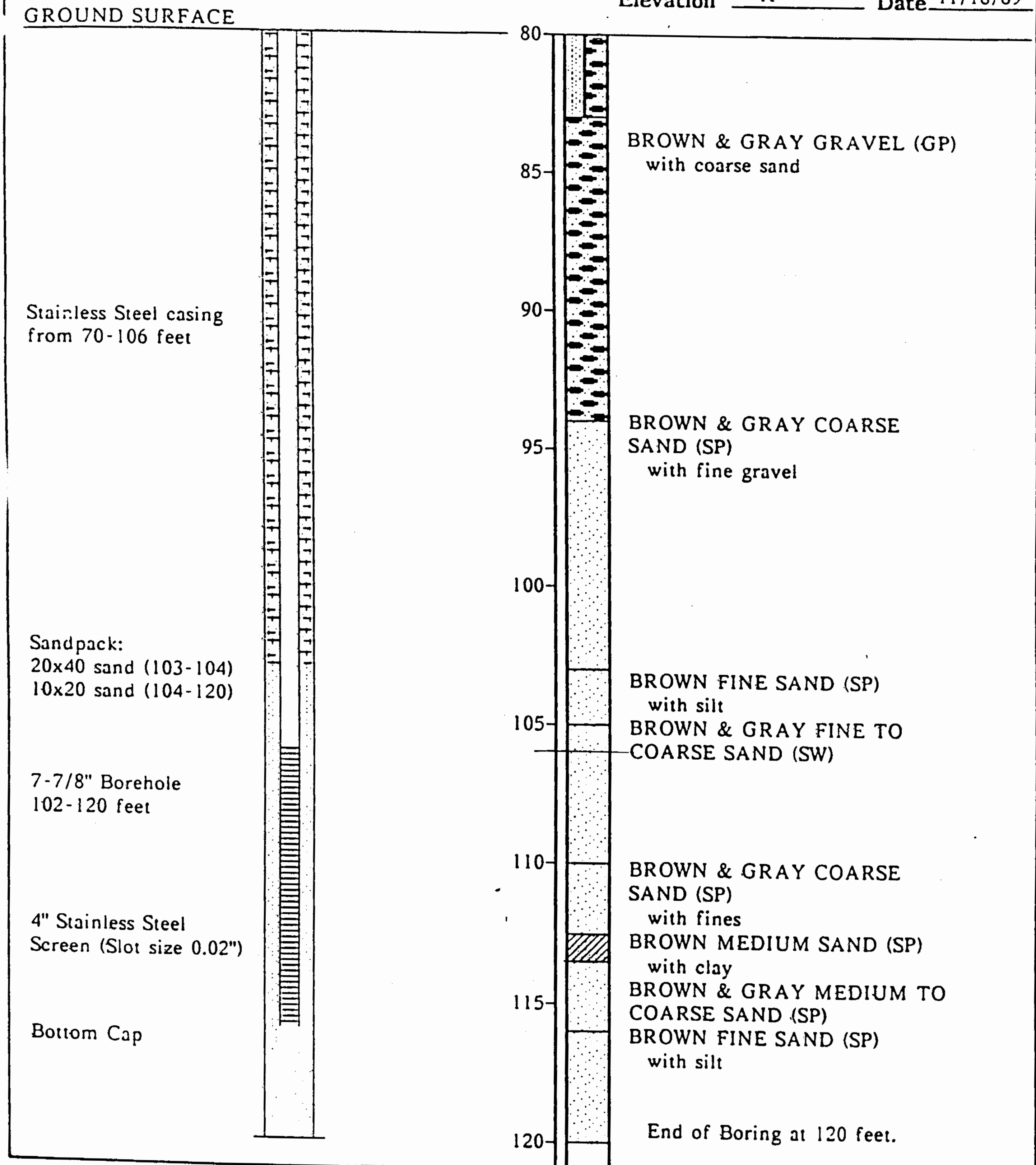
Sparton Technology Inc.
Albuquerque, New Mexico

PLATE

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	06310.039.12		3/90		

Equipment GD-1500

Elevation ft Date 11/18/89



Harding Lawson Associates
Engineers and
Environmental Services

MONITORING WELL DETAIL MW-44

Sparton Technology Inc.
Albuquerque, New Mexico

PLATE

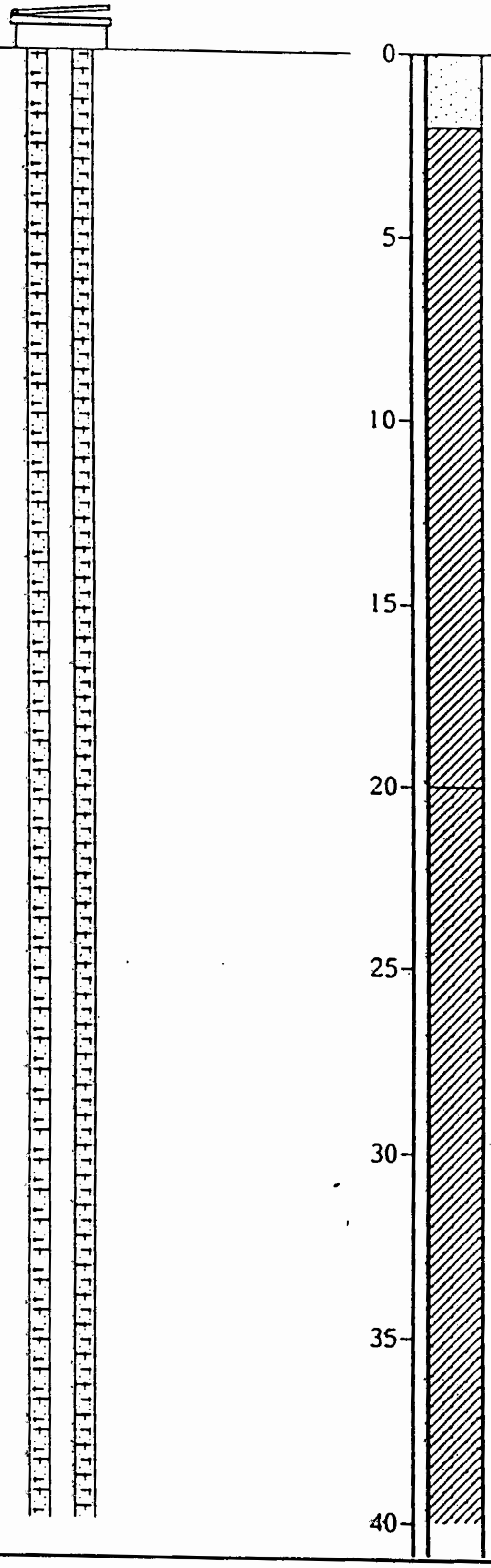
DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	06310.039.12		3/90		

Top of Riser
Elevation 5090.10

Equipment GD-1500

Elevation ft   Date 11/24/89

GROUND SURFACE



YELLOWISH-BROWN FINE SAND (SP)

YELLOWISH-BROWN SANDY CLAY (CL)

-with medium coarse sand below 15 feet

YELLOWISH-BROWN CLAYEY MEDIUM TO COARSE SAND (SC)

Cement/Bentonite Grout

4" PVC Casing to 71 feet

12-1/4" Borehole to 136 feet

8-5/8" steel casing to 135.25 feet

Harding Lawson Associates
Engineers and
Environmental Services

MONITORING WELL DETAIL MW-45

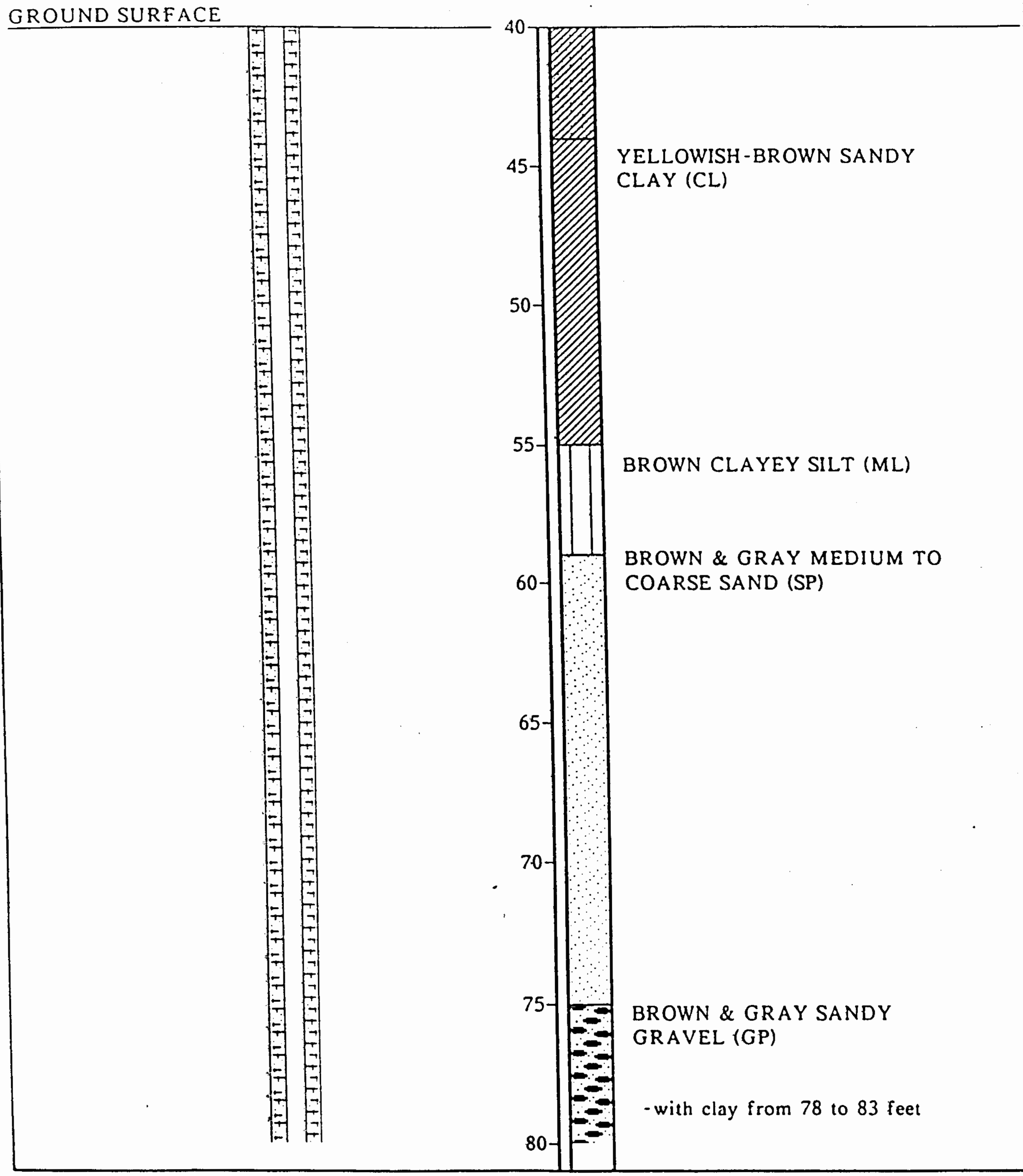
Sparton Technology Inc.
Albuquerque, New Mexico

PLATE

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	06310.039.12		3/90		

Equipment GD-1500

Elevation ft Date 11/24/89



Harding Lawson Associates
Engineers and
Environmental Services

MONITORING WELL DETAIL MW-45

Sparton Technology Inc.
Albuquerque, New Mexico

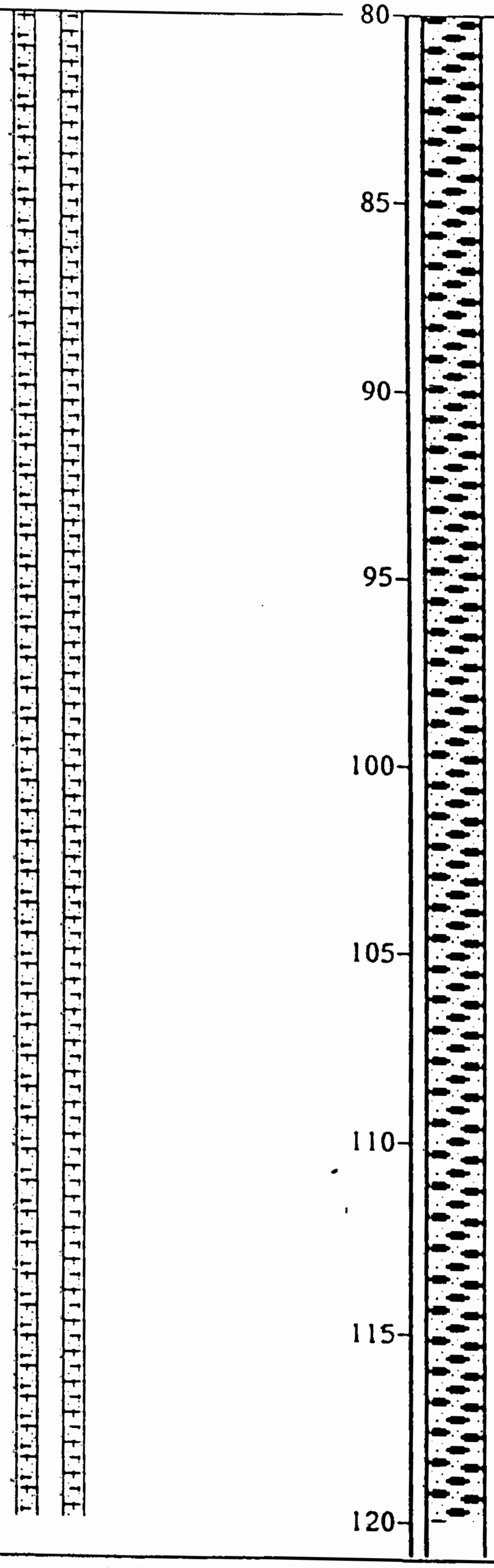
PLATE

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	06310.039.12		3/90		

Equipment GD-1500

Elevation ft Date 11/24/89

GROUND SURFACE



Stainless Steel casing
from 71-143 feet

-gray below 95 feet

Harding Lawson Associates
Engineers and
Environmental Services

MONITORING WELL DETAIL MW-45

Sparton Technology Inc.
Albuquerque, New Mexico

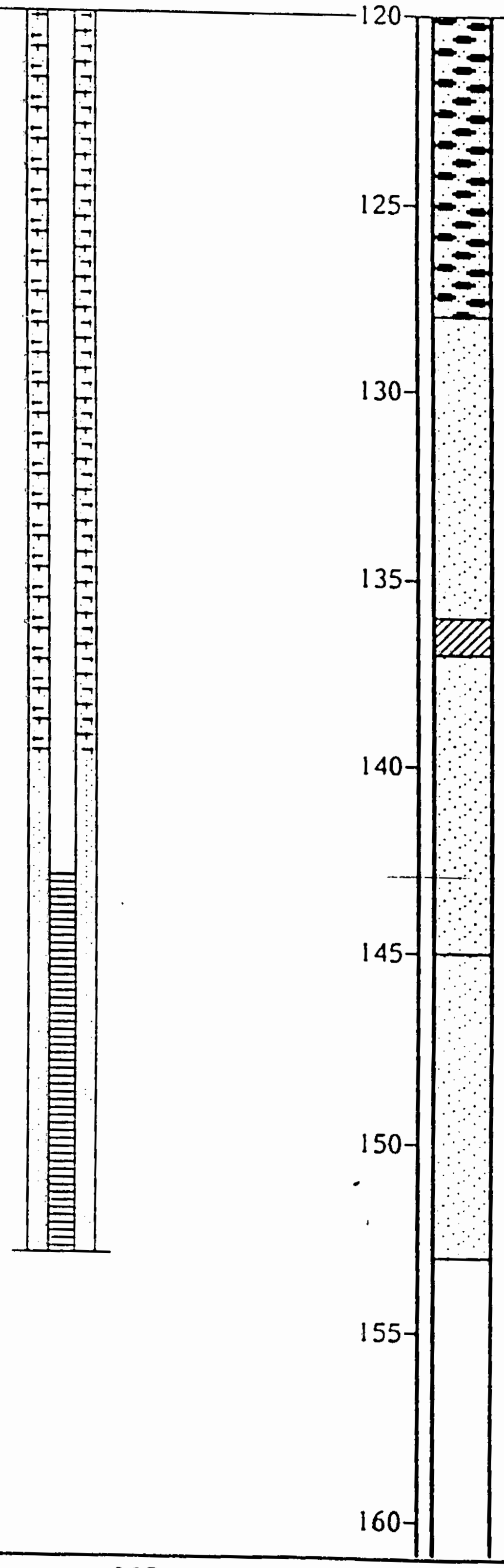
PLATE

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	06310,039.12		3/90		

Equipment GD-1500

Elevation ft Date 11/24/89

GROUND SURFACE



7-7/8" Borehole
136-153 feet

Sandpack:
20x40 sand (140-141)
10x20 sand (141-153)

4" Stainless Steel
Screen (Slot size 0.02")

Bottom Cap

BROWN & GRAY MEDIUM TO COARSE SAND (SP)
with gravel
-no gravel below 130 feet

LIGHT BROWN SILTY CLAY (CL)
BROWN & GRAY MEDIUM TO COARSE SAND (SP)

-with 3-inch clay layer from 141.5 to 141.8 feet

BROWN & GRAY FINE TO COARSE SAND (SW)

End of Boring at 153 feet.

Harding Lawson Associates
Engineers and
Environmental Services

MONITORING WELL DETAIL MW-45

Sparton Technology Inc.
Albuquerque, New Mexico

PLATE

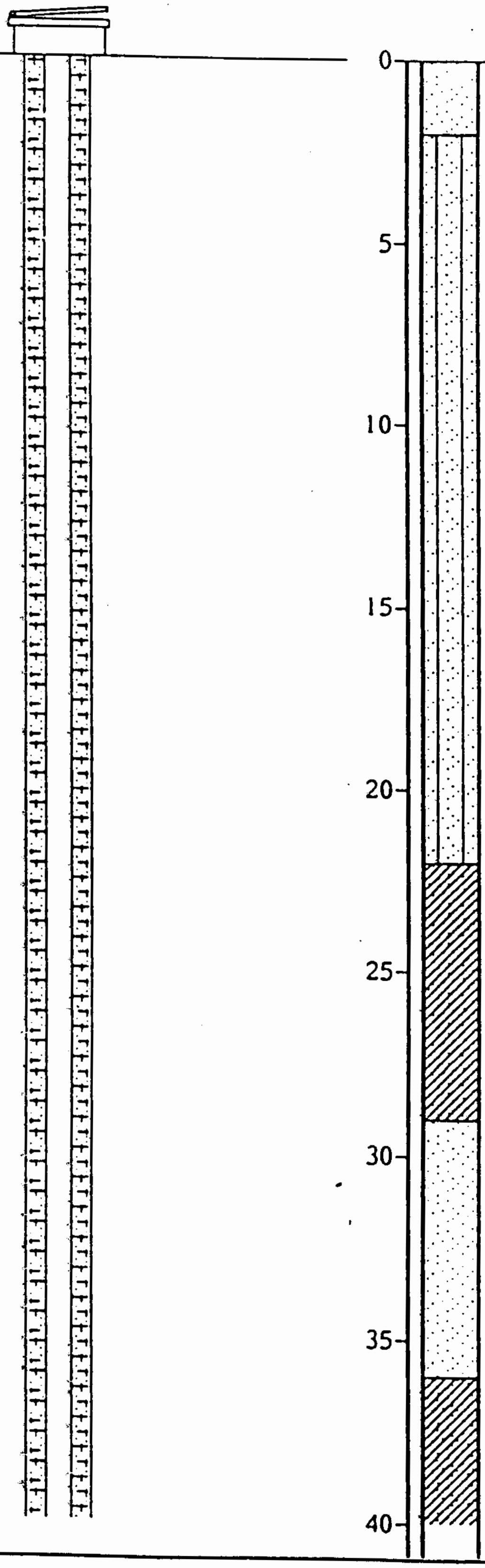
DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	06310.039.12		3/90		

Top of Riser
Elevation 5118.95

Equipment GD-1500

Elevation ft Date 11/30/89

GROUND SURFACE



YELLOWISH-BROWN FINE SAND (SP)

YELLOWISH-BROWN SILTY FINE SAND (SM)

Cement/Bentonite Grout

4" PVC Casing to 125 feet

YELLOWISH-BROWN CLAYEY FINE SAND (SC)

-with medium sand below 27 feet

12-1/4" Borehole to 165 feet

BROWN FINE TO COARSE SAND (SW)
with clay

8-5/8" steel casing to 164.25 feet

BROWN CLAYEY FINE TO MEDIUM SAND (SC)
with occasional sandy clay

Harding Lawson Associates
Engineers and Environmental Services

MONITORING WELL DETAIL MW-46

Sparton Technology Inc.
Albuquerque, New Mexico

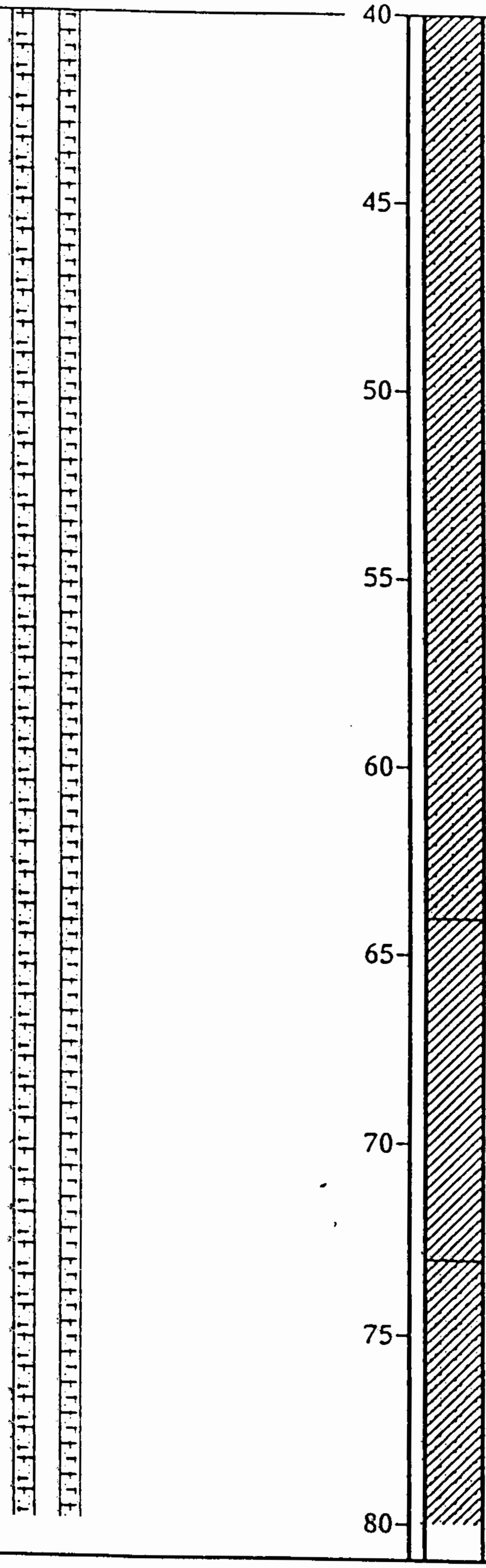
PLATE

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	06310,039.12		3/90		

Equipment GD-1500

Elevation ft Date 11/30/89

GROUND SURFACE



BROWN SANDY CLAY (CL)

BROWN CLAYEY FINE TO MEDIUM SAND (SC)
with occasional sandy clay

Harding Lawson Associates
Engineers and
Environmental Services

MONITORING WELL DETAIL MW-46

Sparton Technology Inc.
Albuquerque, New Mexico

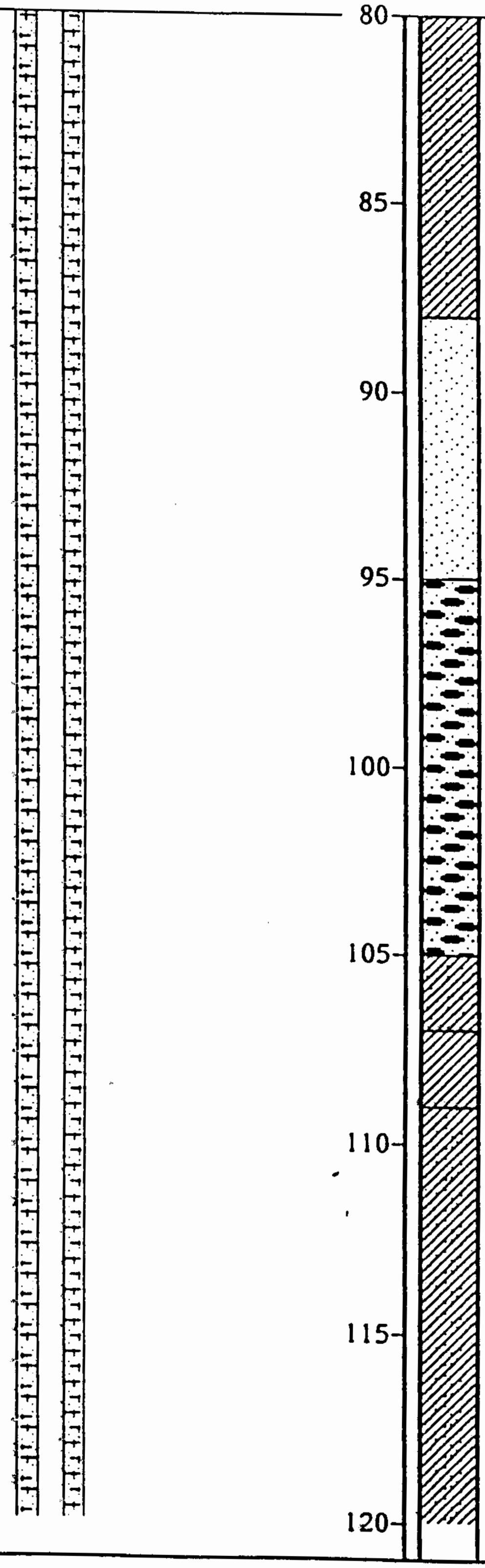
PLATE

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	06310,039.12		3/90		

Equipment GD-1500

Elevation ft Date 11/30/89

GROUND SURFACE



BROWN FINE TO COARSE SAND (SW) with gravel

BROWN & GRAY SANDY GRAVEL (GP)

BROWN CLAYEY MEDIUM TO COARSE SAND (SC)

YELLOWISH-BROWN SANDY CLAY (CL)

BROWN CLAYEY COARSE SAND (SC)

Harding Lawson Associates
Engineers and
Environmental Services

MONITORING WELL DETAIL MW-46

Sparton Technology Inc.
Albuquerque, New Mexico

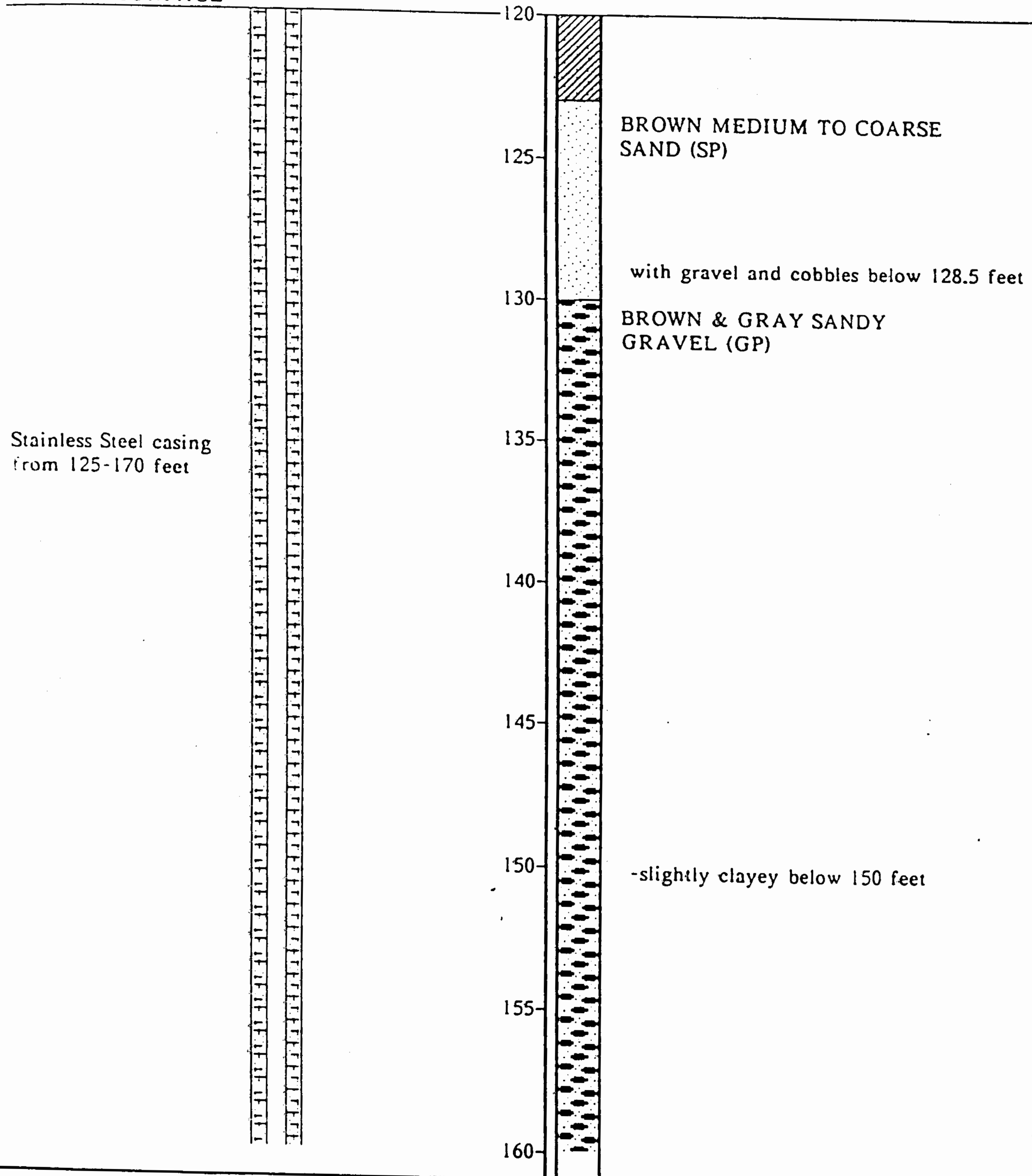
PLATE

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	06310.039.12		3/90		

Equipment GD-1500

Elevation ft Date 11/30/89

GROUND SURFACE



Harding Lawson Associates
Engineers and
Environmental Services

MONITORING WELL DETAIL MW-46

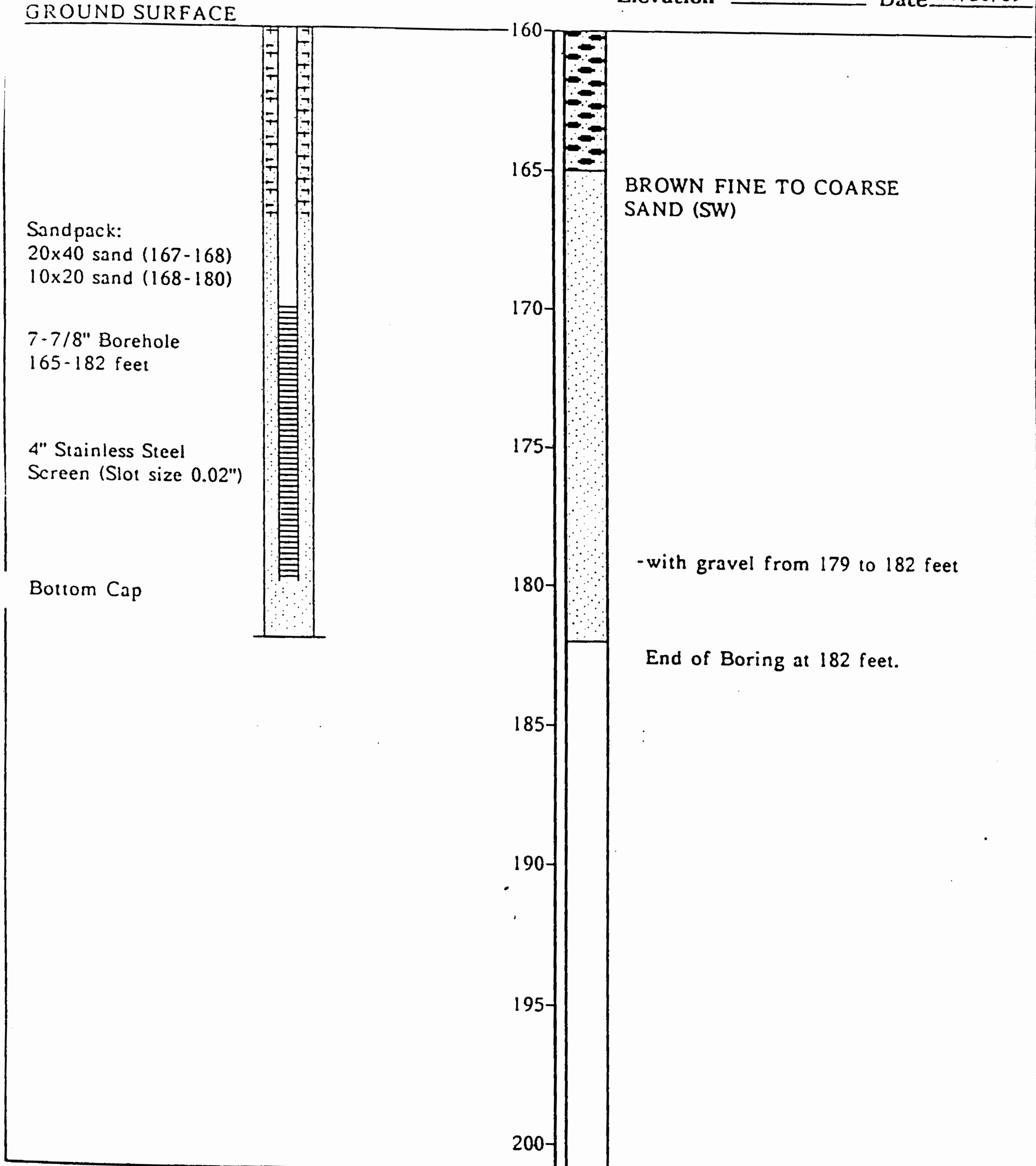
Sparton Technology Inc.
Albuquerque, New Mexico

PLATE

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	06310,039.12		3/90		

Equipment GD-1500

Elevation ft Date 11/30/89



Harding Lawson Associates
Engineers and
Environmental Services

MONITORING WELL DETAIL MW-46

PLATE

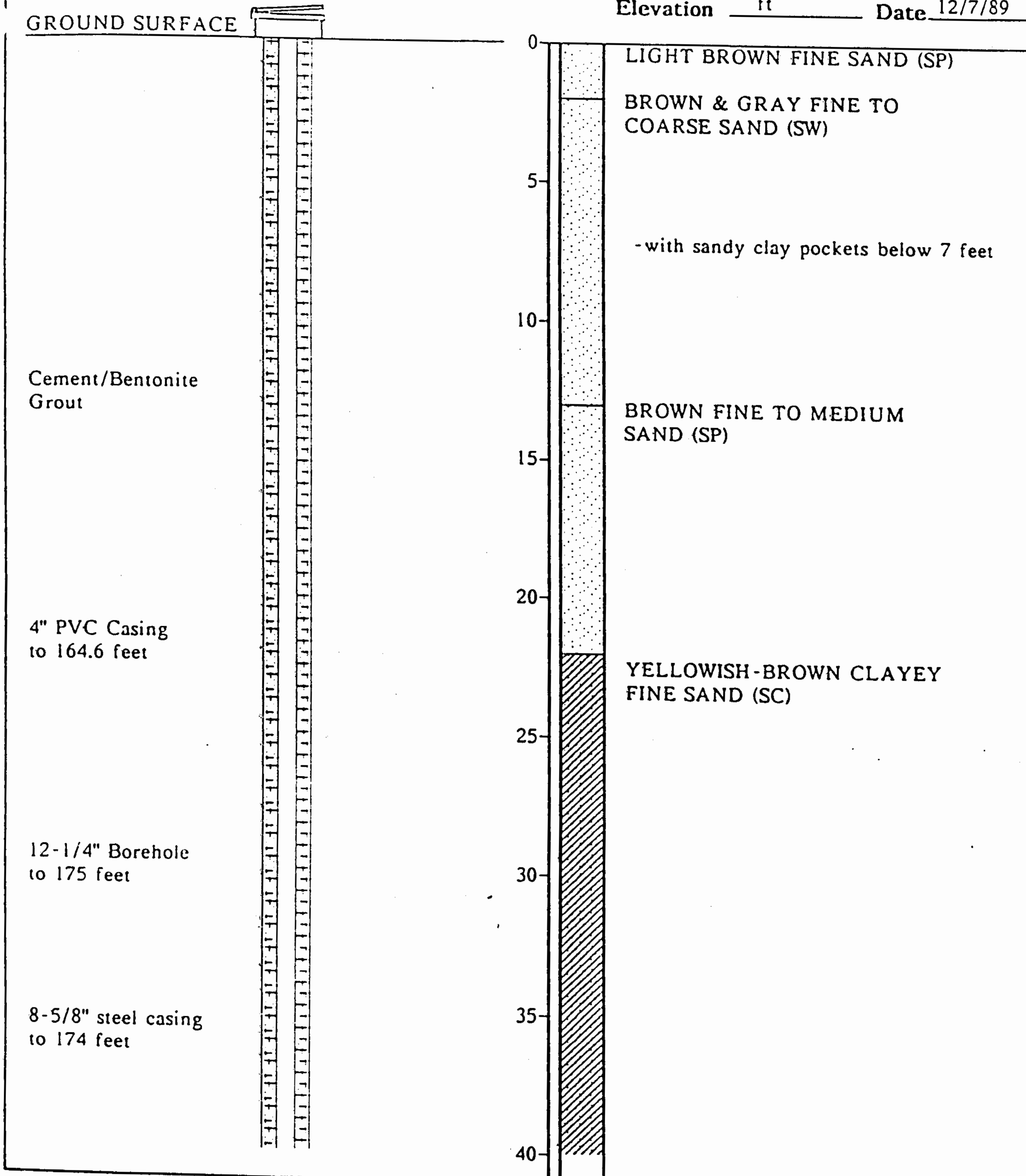
Sparton Technology Inc.
Albuquerque, New Mexico

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	06310,039.12		3/90		

Top of Riser
Elevation 5115.84

Equipment GD-1500

Elevation ft Date 12/7/89



Harding Lawson Associates
Engineers and
Environmental Services

MONITORING WELL DETAIL MW-47

Sparton Technology Inc.
Albuquerque, New Mexico

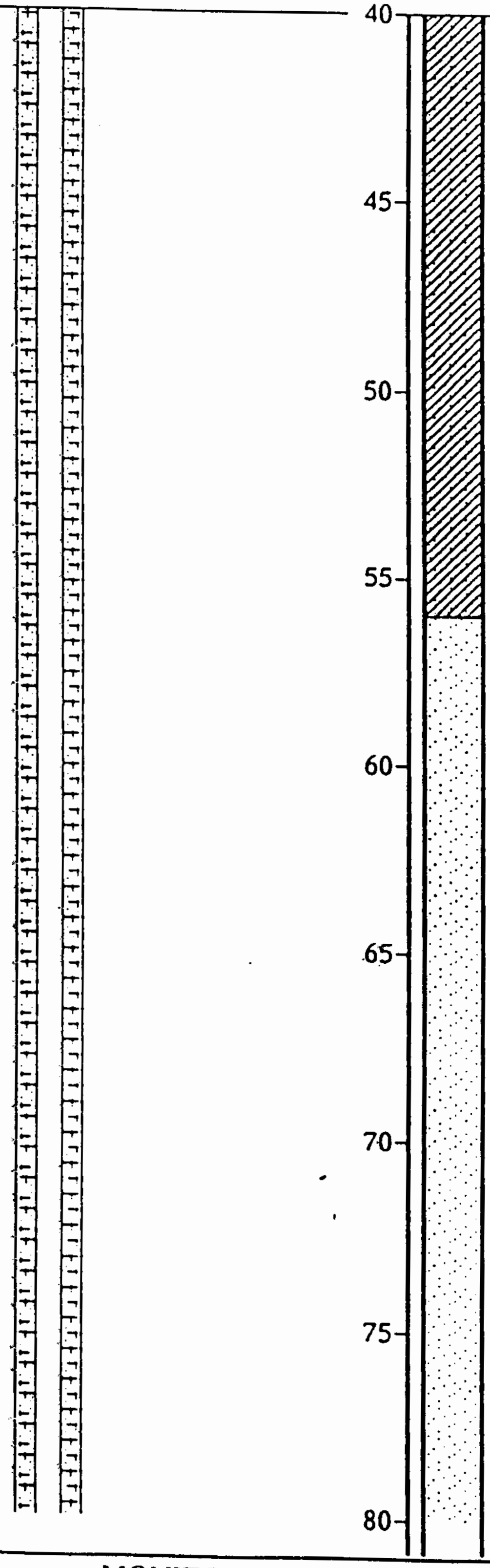
PLATE

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	06310.039.12		3/90		

Equipment GD-1500

Elevation ft Date 12/7/89

GROUND SURFACE



-with medium sand below 42 feet

BROWN & GRAY MEDIUM TO COARSE SAND (SP)
with gravel

-with occasional sandy clay pockets from 66 to 68 feet

-with occasional sandy clay pockets from 72 to 82 feet

Harding Lawson Associates
Engineers and Environmental Services

MONITORING WELL DETAIL MW-47

Sparton Technology Inc.
Albuquerque, New Mexico

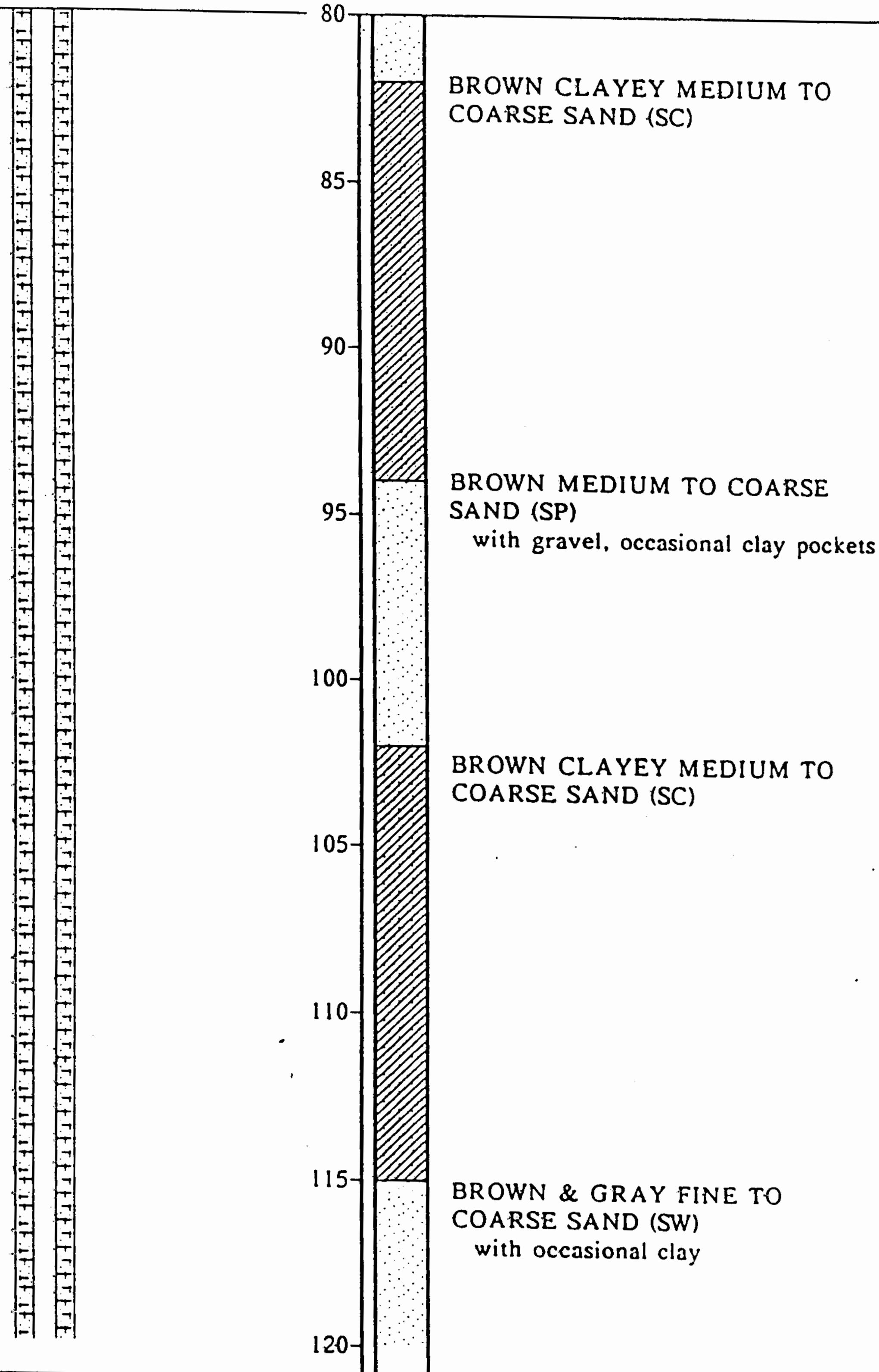
PLATE

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	06310,039.12		3/90		

Equipment GD-1500

Elevation ft Date 12/7/89

GROUND SURFACE



Harding Lawson Associates
Engineers and
Environmental Services

MONITORING WELL DETAIL MW-47

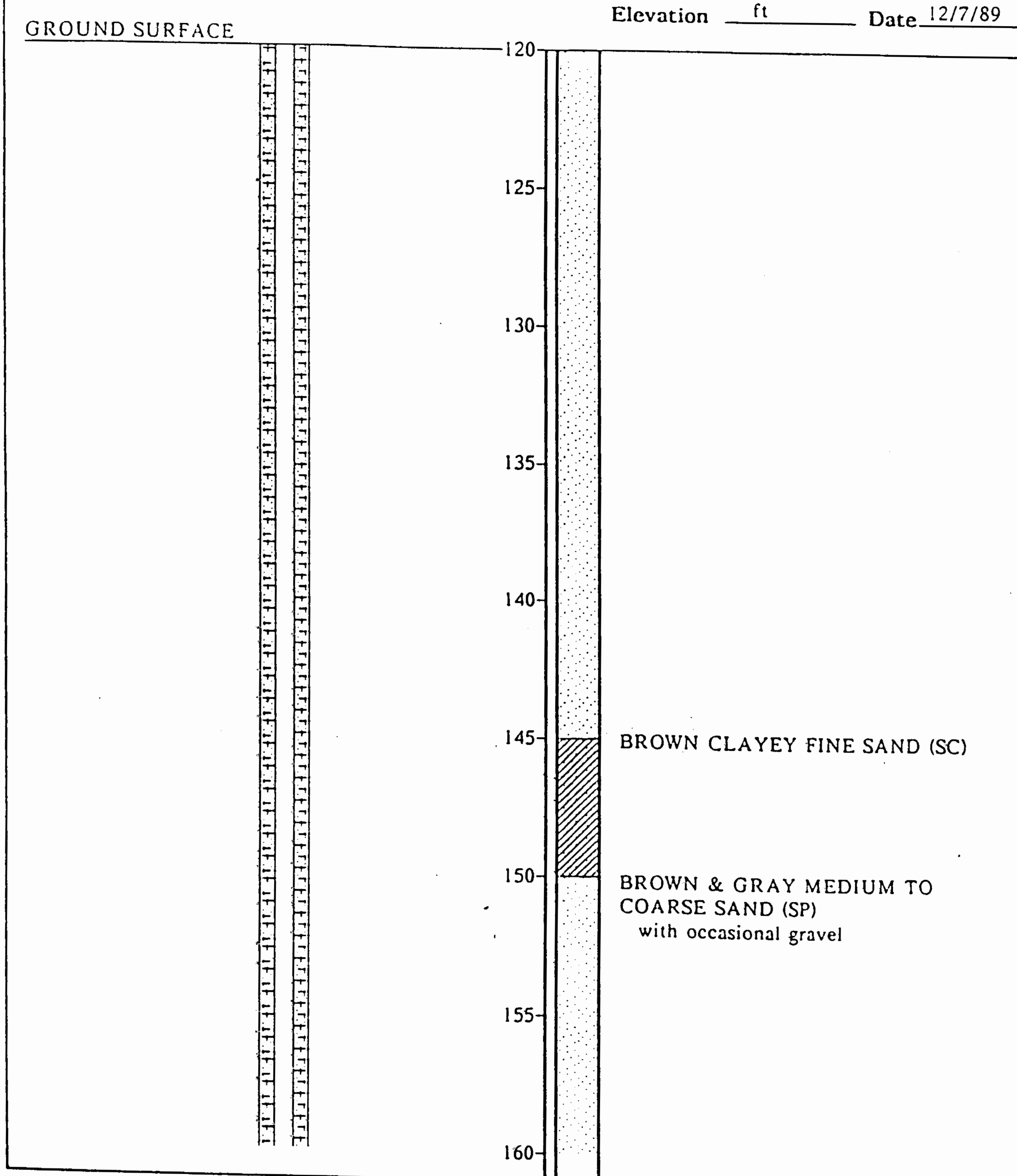
Sparton Technology Inc.
Albuquerque, New Mexico

PLATE

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	06310.039.12		3/90		

Equipment GD-1500

Elevation ft   Date 12/7/89



Harding Lawson Associates
Engineers and
Environmental Services

MONITORING WELL DETAIL MW-47

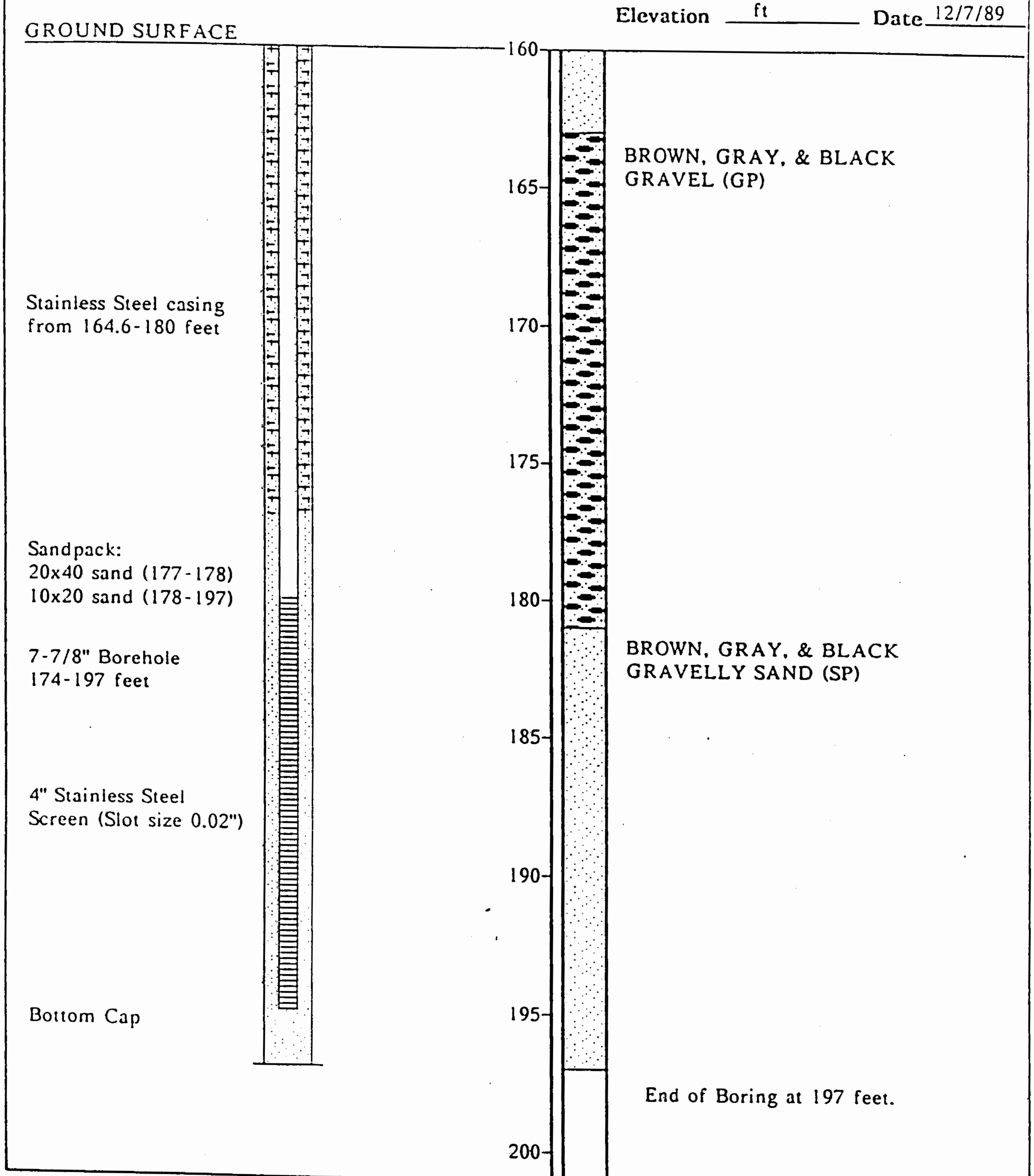
Sparton Technology Inc.
Albuquerque, New Mexico

PLATE

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	0631-0,039.12		3/90		

Equipment GD-1500

Elevation ft Date 12/7/89



Harding Lawson Associates Engineers and Environmental Services

MONITORING WELL DETAIL MW-47

Sparton Technology Inc.
Albuquerque, New Mexico

PLATE

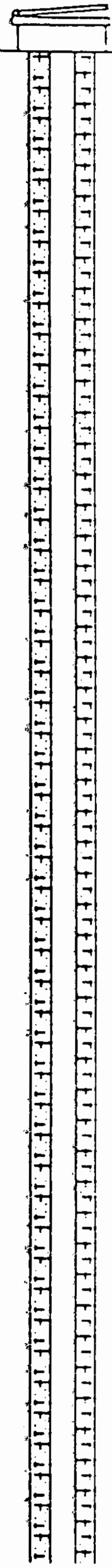
DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	06310.039.12		3/90		

Top of Riser
Elevation 5168.33

Equipment GD-1500

Elevation ft   Date 12/15/89

GROUND SURFACE

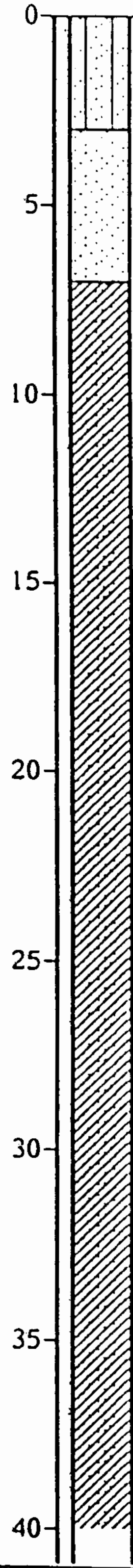


Cement/Bentonite Grout

4" PVC Casing to 180.0 feet

12-1/4" Borehole to 180 feet

8-5/8" steel casing to 187 feet



YELLOW-BROWN FINE TO MEDIUM SAND (SM)

BROWN FINE TO COARSE SAND (SW)
with occasional clay, gravel

YELLOW-BROWN CLAYEY FINE TO MEDIUM SAND (SC)

Harding Lawson Associates
Engineers and
Environmental Services

MONITORING WELL DETAIL MW-48

Sparton Technology Inc.
Albuquerque, New Mexico

PLATE

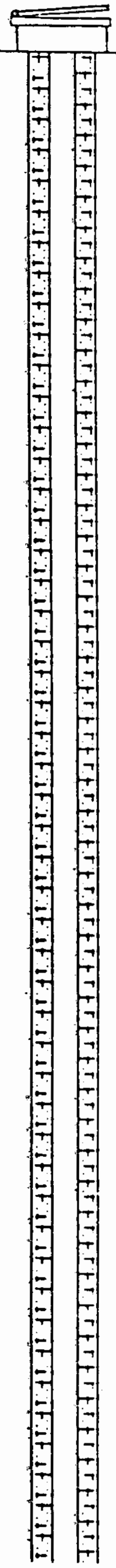
DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	06310,039.12		3/90		

Top of Riser
Elevation 5168.33

Equipment GD-1500

Elevation ft Date 12/15/89

GROUND SURFACE

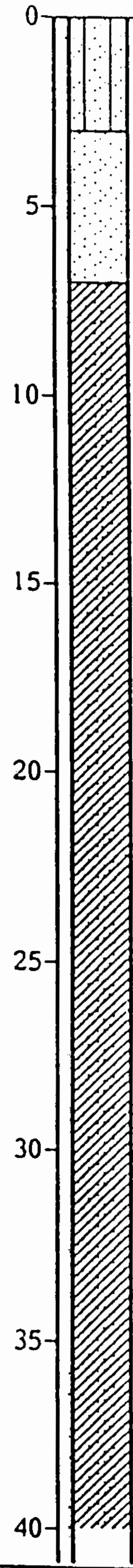


Cement/Bentonite Grout

4" PVC Casing to 180.0 feet

12-1/4" Borehole to 180 feet

8-5/8" steel casing to 187 feet



YELLOW-BROWN FINE TO MEDIUM SAND (SM)

BROWN FINE TO COARSE SAND (SW)
with occasional clay, gravel

YELLOW-BROWN CLAYEY FINE TO MEDIUM SAND (SC)

Harding Lawson Associates
Engineers and Environmental Services

MONITORING WELL DETAIL MW-48

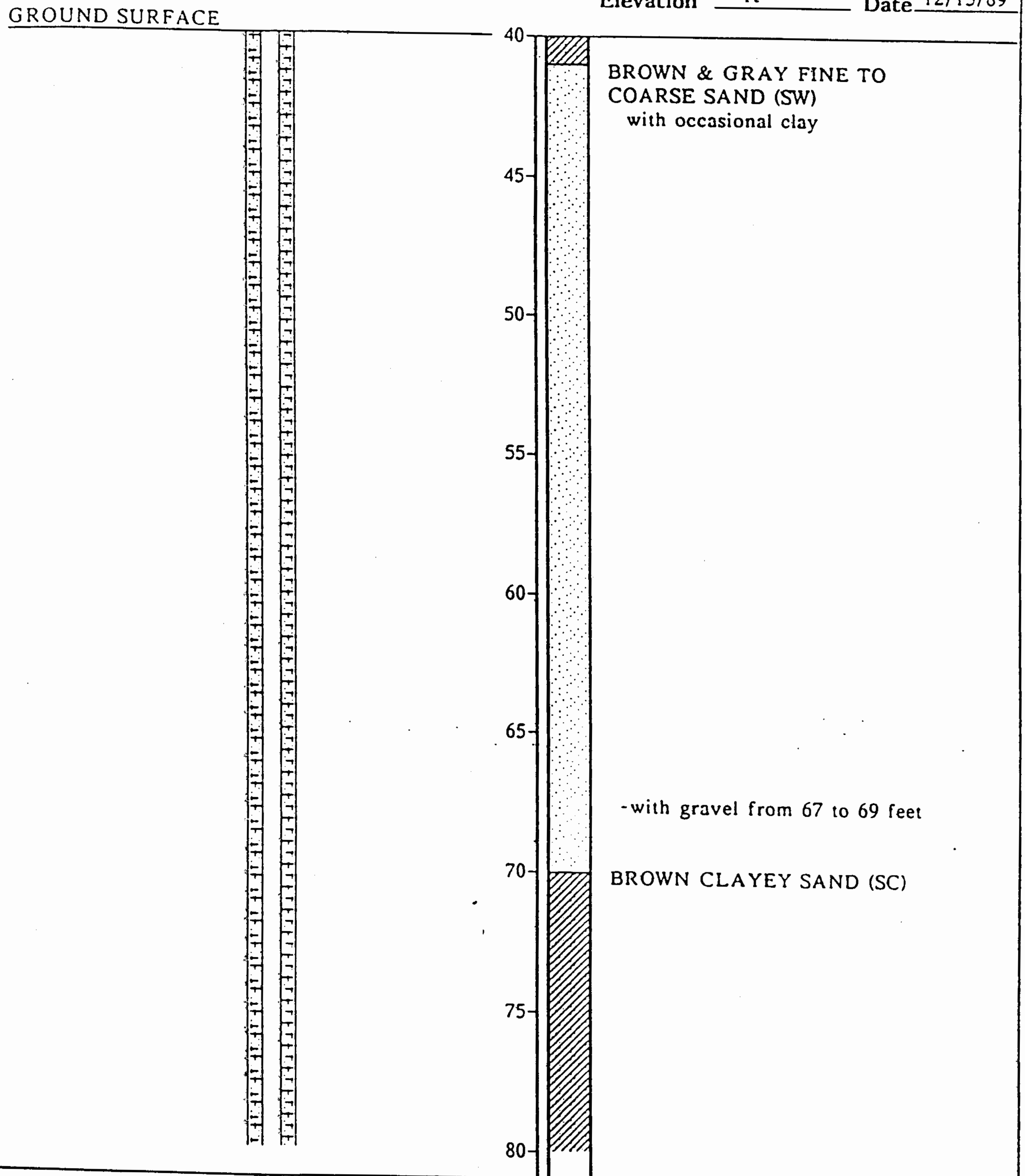
Sparton Technology Inc.
Albuquerque, New Mexico

PLATE

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	06310.039.12		3/90		

Equipment GD-1500

Elevation ft Date 12/15/89



Harding Lawson Associates
Engineers and
Environmental Services

MONITORING WELL DETAIL MW-48

Sparton Technology Inc.
Albuquerque, New Mexico

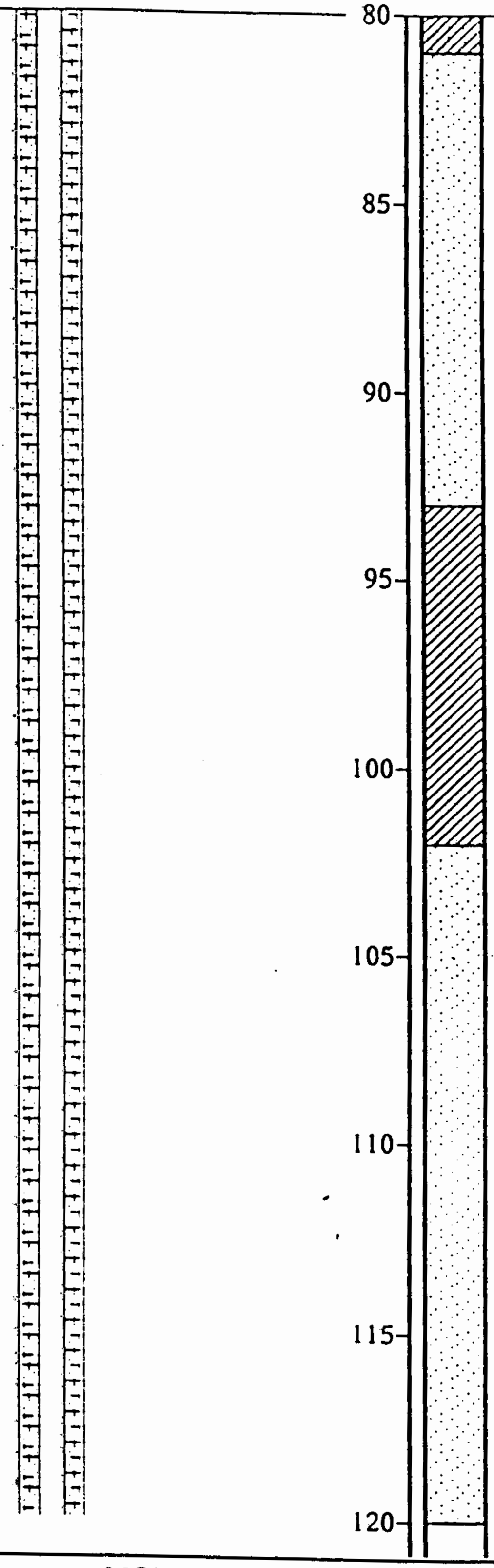
PLATE

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	06310,039.12		3/90		

Equipment GD-1500

Elevation ft Date 12/15/89

GROUND SURFACE



Harding Lawson Associates Engineers and Environmental Services

MONITORING WELL DETAIL MW-48

Sparton Technology Inc.
Albuquerque, New Mexico

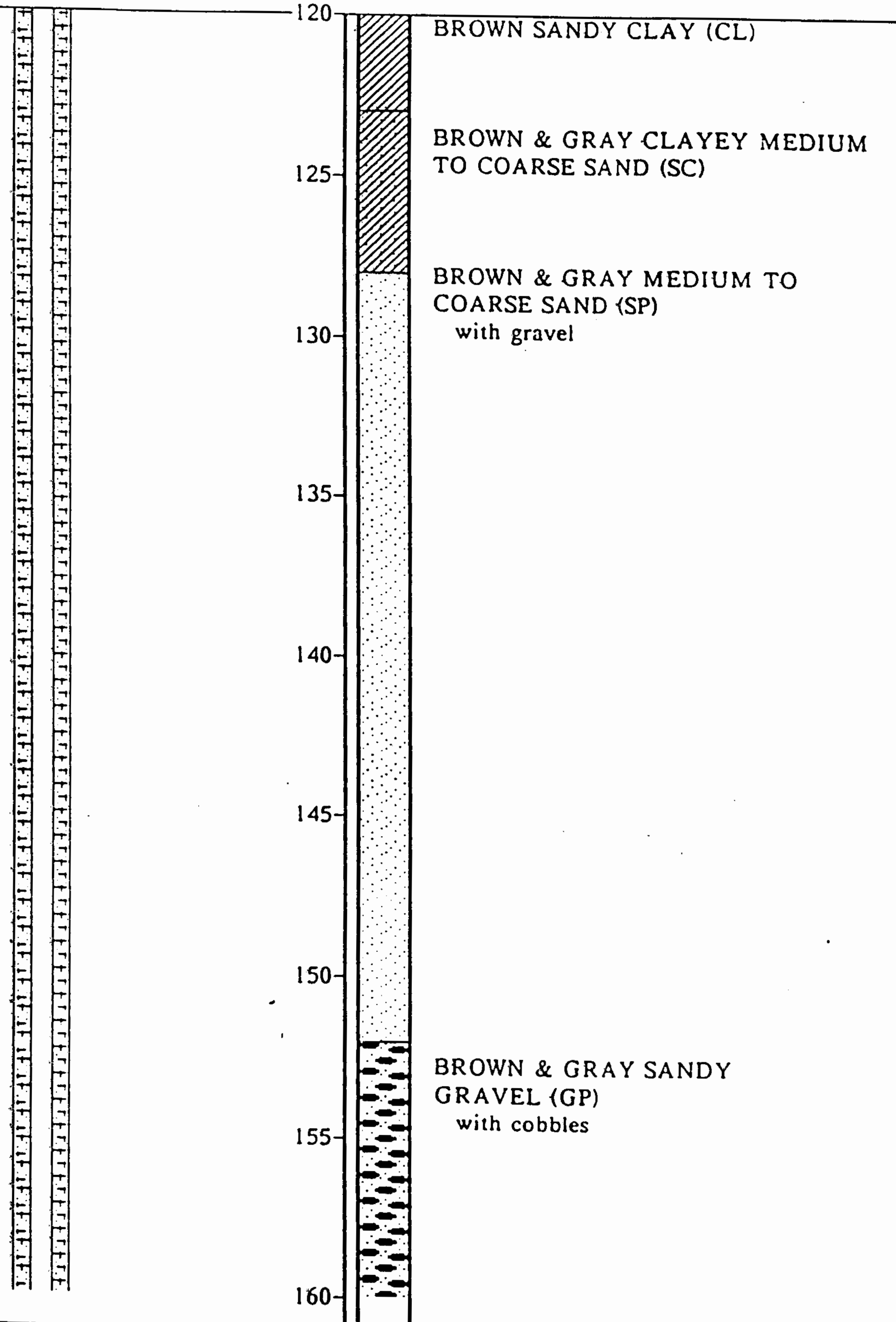
PLATE

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	06310.039.12		3/90		

Equipment GD-1500

Elevation ft Date 12/15/89

GROUND SURFACE



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Engineers and
Environmental Services

MONITORING WELL DETAIL MW-48

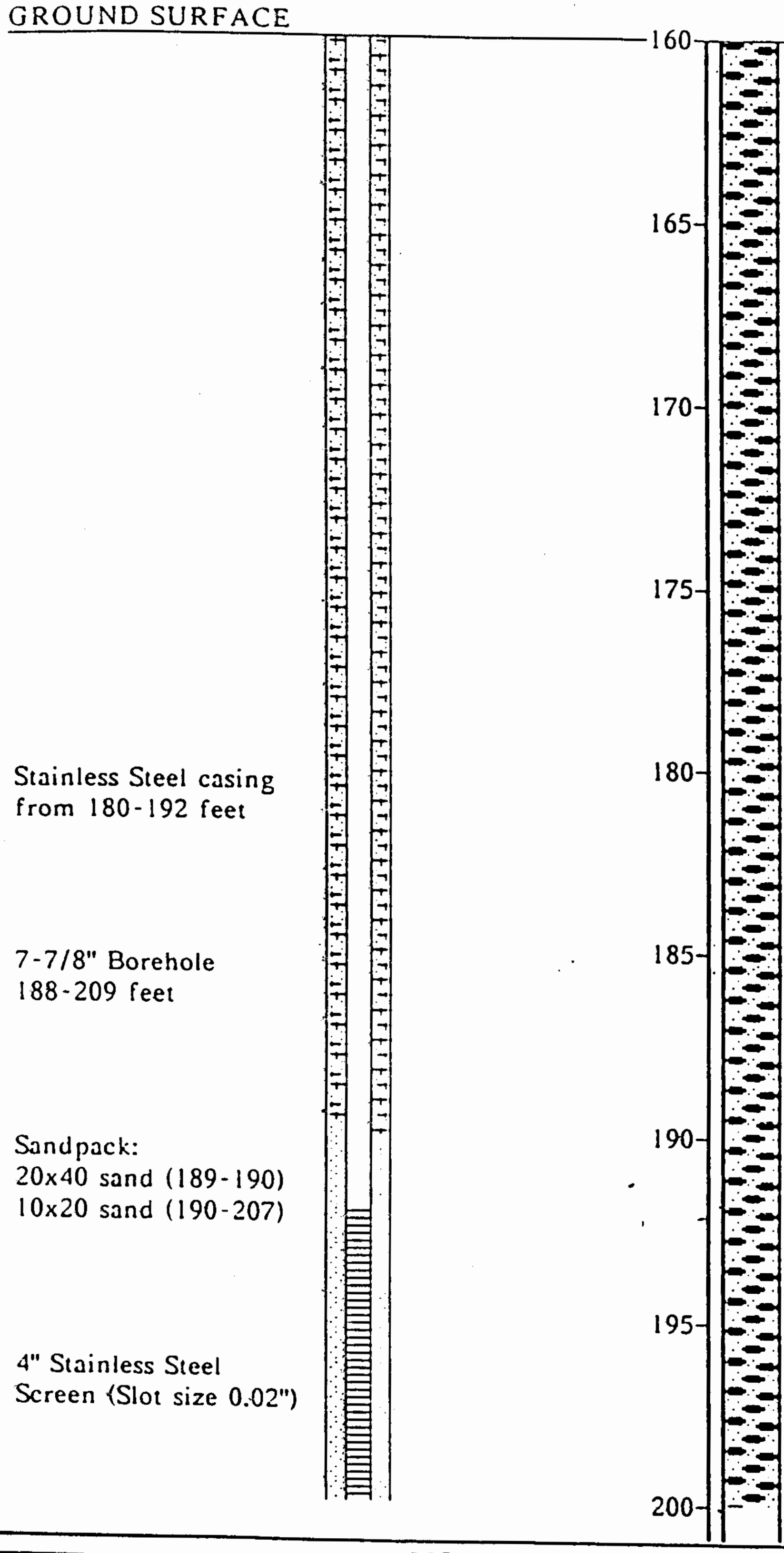
Sparton Technology Inc.
Albuquerque, New Mexico

PLATE

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	06310,039.12		3/90		

Equipment GD-1500

Elevation ft Date 12/15/89



Harding Lawson Associates
Engineers and
Environmental Services

MONITORING WELL DETAIL MW-48

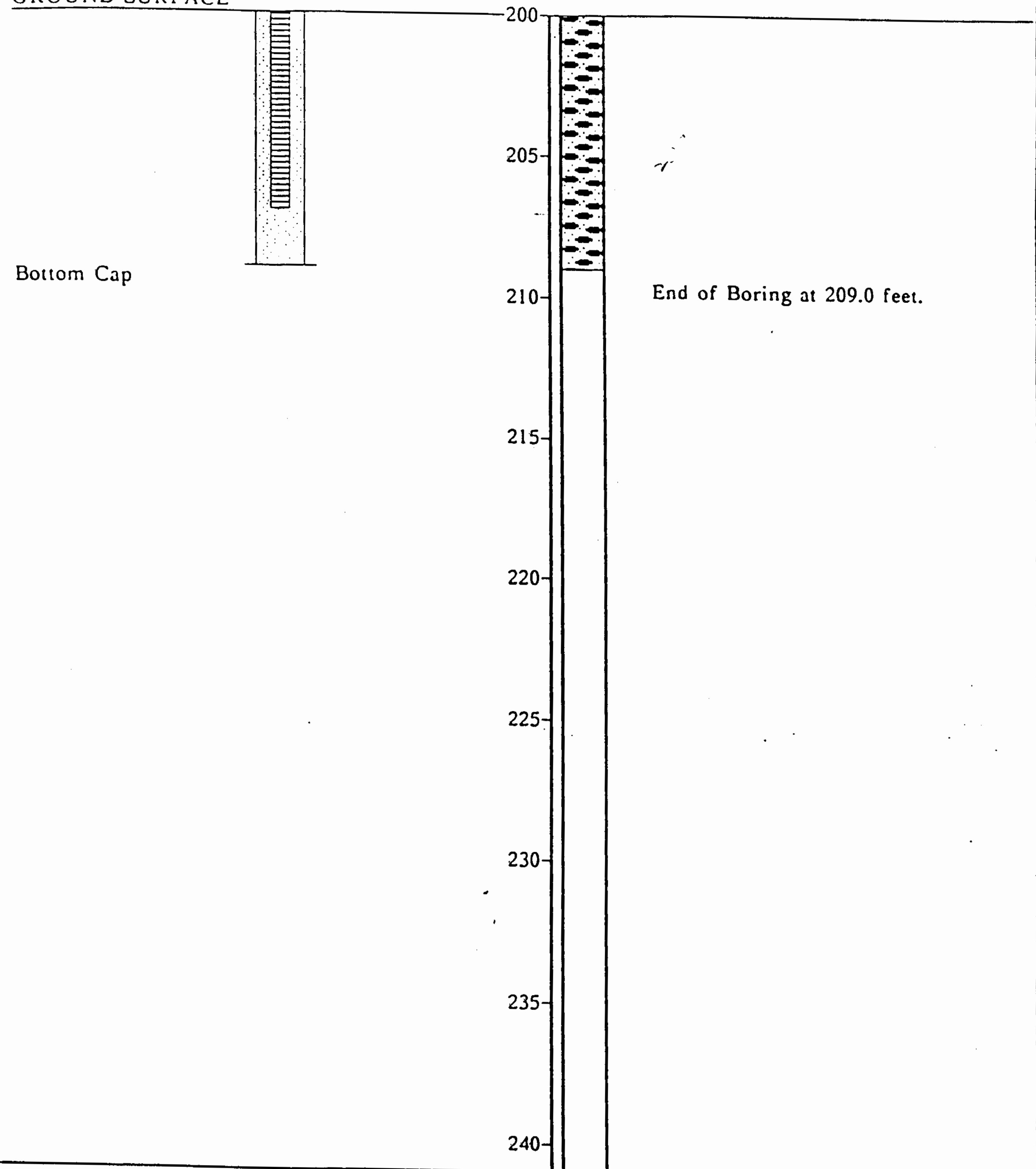
Sparton Technology Inc.
Albuquerque, New Mexico

PLATE

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	06310,039.12		3/90		

Equipment GD-1500

Elevation ft   Date 12/15/89



Harding Lawson Associates
Engineers and
Environmental Services

MONITORING WELL DETAIL MW-48

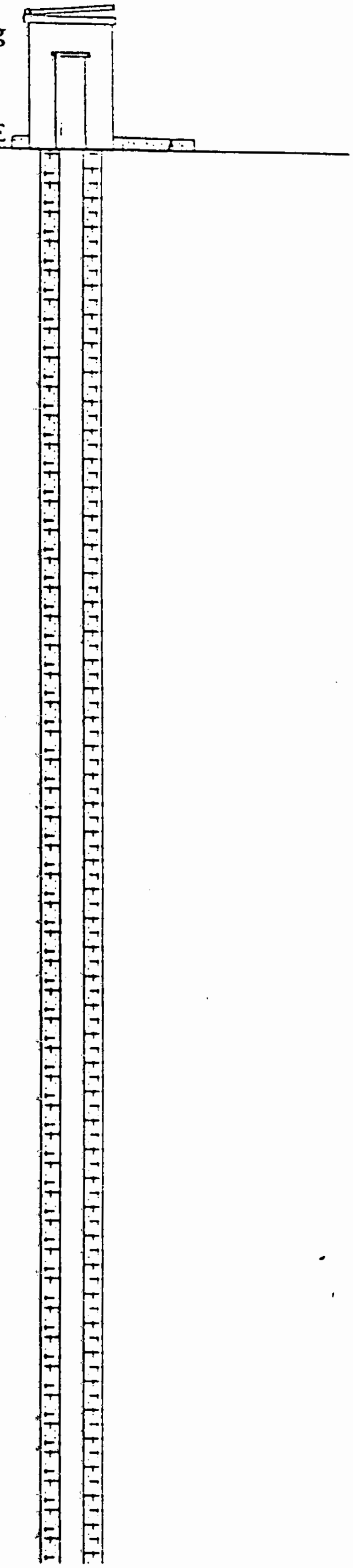
Sparton Technology Inc.
Albuquerque, New Mexico

PLATE

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	06310,039.12		3/90		

Top of Casing
Elevation 5043.68

GROUND SURFACE



Cement/Bentonite Grout

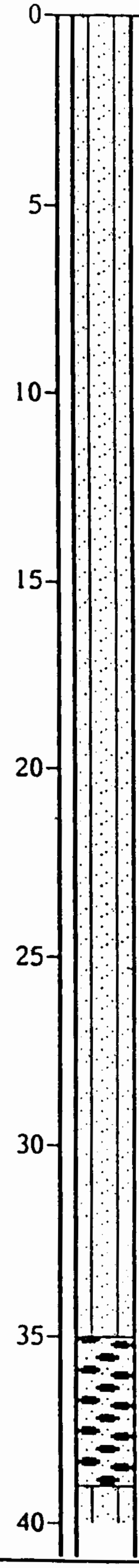
4" PVC Casing to 56.4 feet

12-1/4" Borehole to 128 feet

8-5/8" steel casing to 127.7 feet

Equipment GD-1500

Elevation ft Date 1/11/90



LIGHT BROWN SILTY FINE TO MEDIUM SAND (SM)

BROWN & GRAY SANDY GRAVEL (GP)

LIGHT BROWN SILTY FINE TO

Harding Lawson Associates
Engineers and Environmental Services

MONITORING WELL DETAIL MW-49

Sparton Technology Inc.
Albuquerque, New Mexico

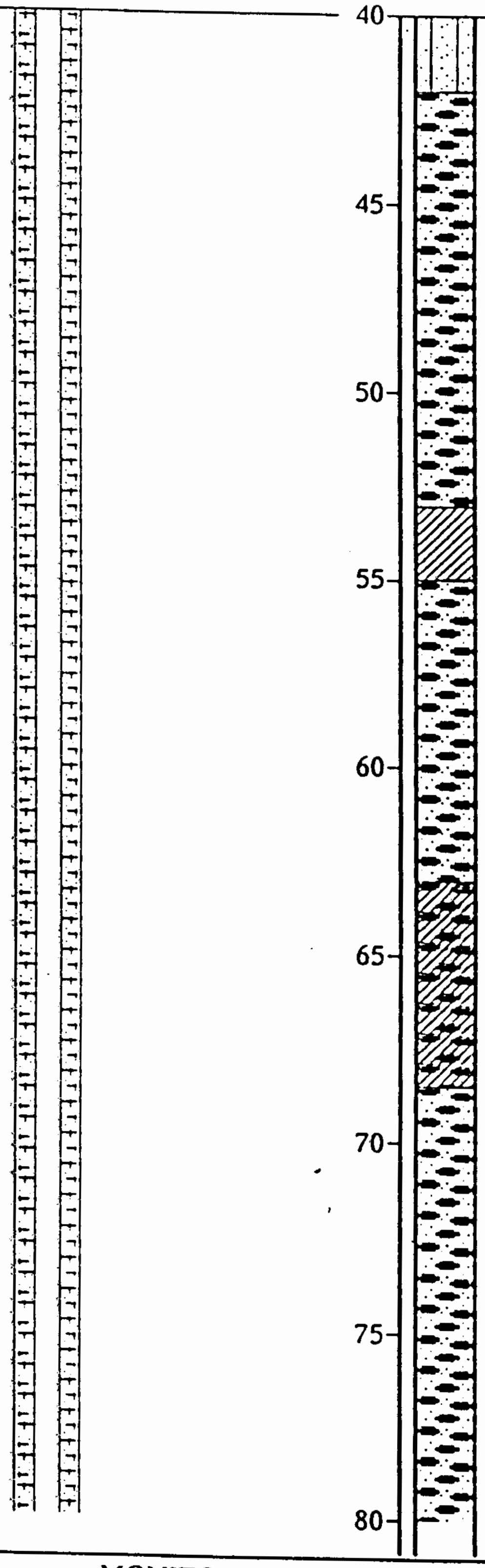
PLATE

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	06310,039.12		3/90		

Equipment GD-1500

Elevation ft Date 1/11/90

GROUND SURFACE



Harding Lawson Associates
Engineers and
Environmental Services

MONITORING WELL DETAIL MW-49

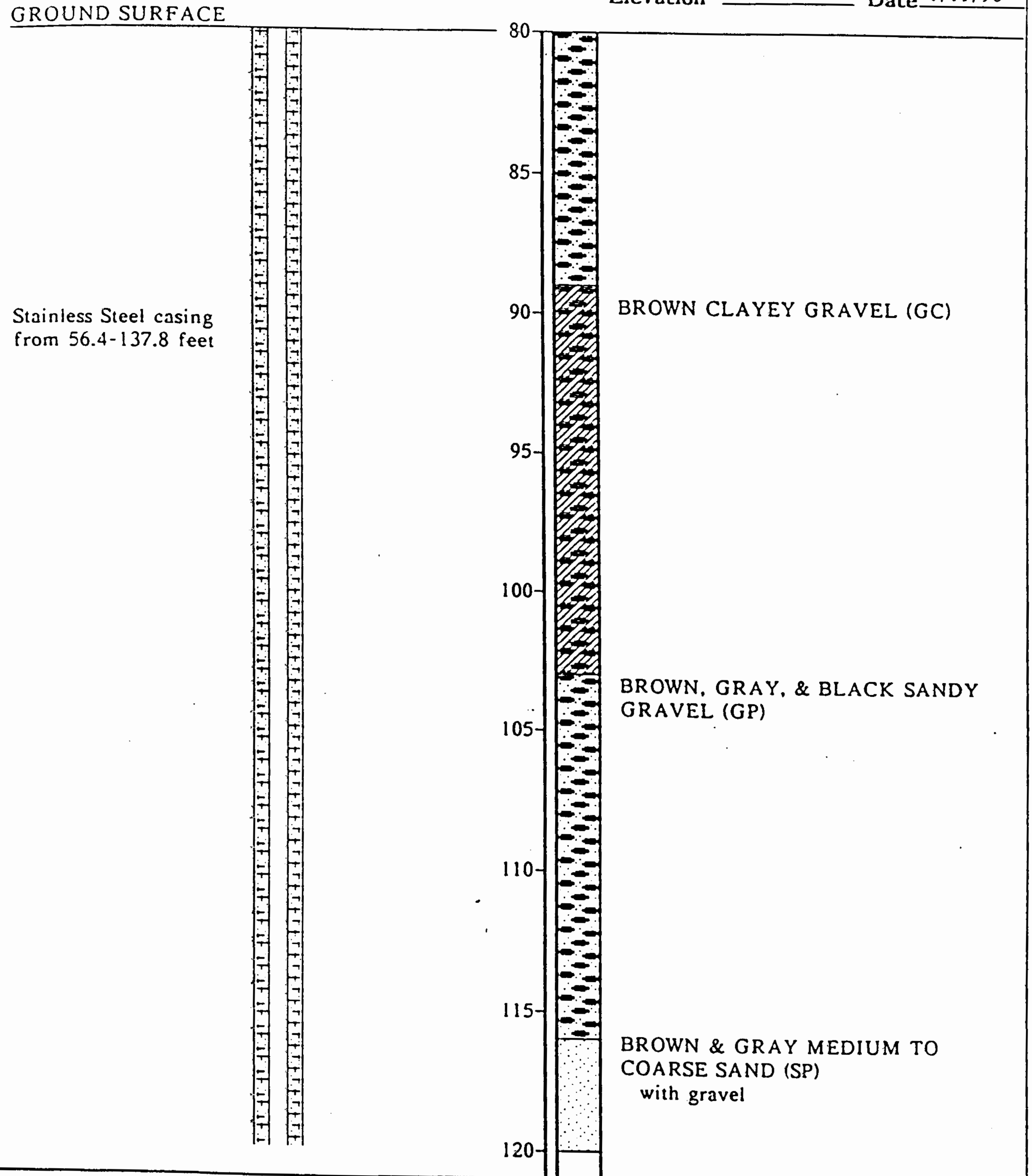
Sparton Technology Inc.
Albuquerque, New Mexico

PLATE

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	06310,039.12		3/90		

Equipment GD-1500

Elevation ft Date 1/11/90



Harding Lawson Associates
Engineers and
Environmental Services

MONITORING WELL DETAIL MW-49

Sparton Technology Inc.
Albuquerque, New Mexico

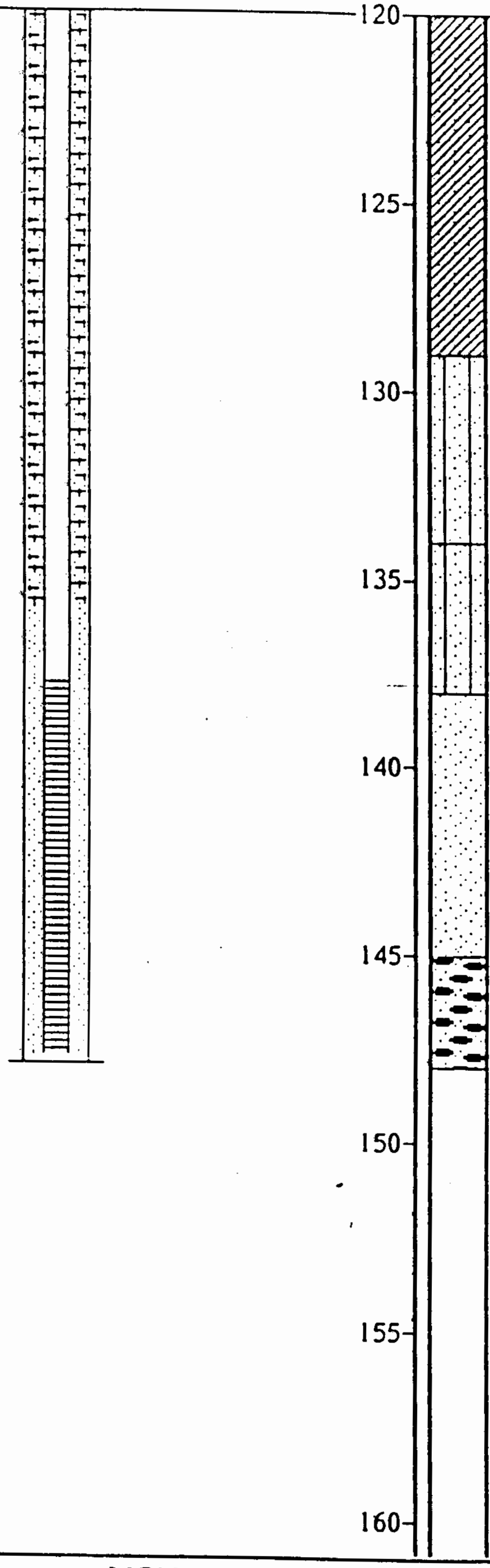
PLATE

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	06310,039.12		3/90		

Equipment GD-1500

Elevation ft Date 1/11/90

GROUND SURFACE



LIGHT BROWN CLAYEY FINE TO COARSE SAND (SC)

-loss of coarse sand from 126 to 128 feet

BROWN SILTY FINE SAND (SM)

BROWN SILTY FINE SAND (SM) with clay laminations and embedded gravel

BROWN & GRAY MEDIUM TO COARSE SAND (SP) with gravel

BROWN, GRAY, & BLACK COARSE SANDY GRAVEL (GP) with occasional sandy clay

End of Boring at 148.00 feet.

Sandpack:
20x40 sand
(134.7-135.8)
10x20 sand
(135.8-147.9)

7-7/8" Borehole from 128-148 feet

4" Stainless Steel Screen (Slot size 0.02")

Bottom Cap

Harding Lawson Associates
Engineers and Environmental Services

MONITORING WELL DETAIL MW-49

Sparton Technology Inc.
Albuquerque, New Mexico

PLATE

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	06310,039.12		3/90		

Top of PVC Casing
Elevation 5211.51

Equipment GD-1500

Elevation ft Date 4/2/90

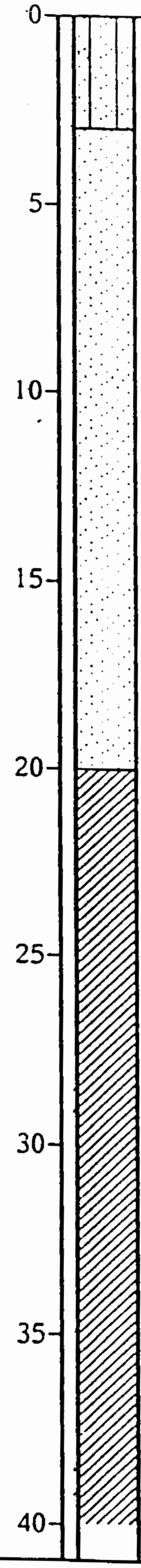
GROUND SURFACE

Cement/Bentonite Grout

4" PVC Casing to 225 feet

12-1/4" Borehole to 235 feet

8-5/8" steel casing to 234 feet



YELLOWISH-BROWN SILTY FINE TO MEDIUM SAND (SM)

YELLOWISH-BROWN SILTY FINE TO COARSE SAND (SW)

TAN SILTY CLAY (CL) with sand

-with pumice (low density), vesicular from 31 to 40 feet

Harding Lawson Associates
Engineers and Environmental Services

MONITORING WELL DETAIL MW-50

Sparton Technology Inc.
Albuquerque, New Mexico

PLATE

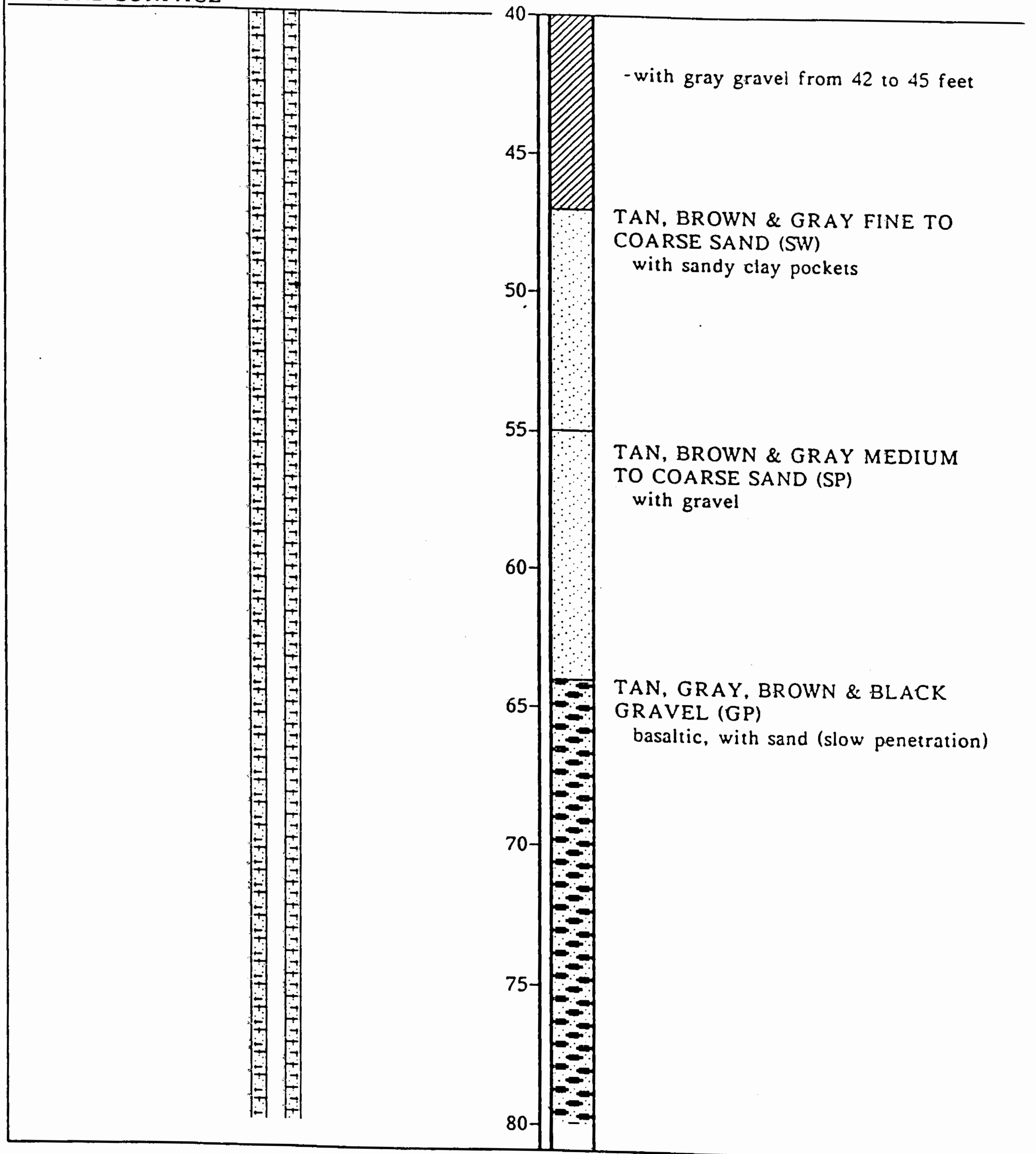
DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	06310.039.12		12/90		

Top of PVC Casing
Elevation 5211.51

Equipment GD-1500

Elevation ft Date 4/2/90

GROUND SURFACE



Harding Lawson Associates
Engineers and
Environmental Services

MONITORING WELL DETAIL MW-50

Sparton Technology Inc.
Albuquerque, New Mexico

PLATE

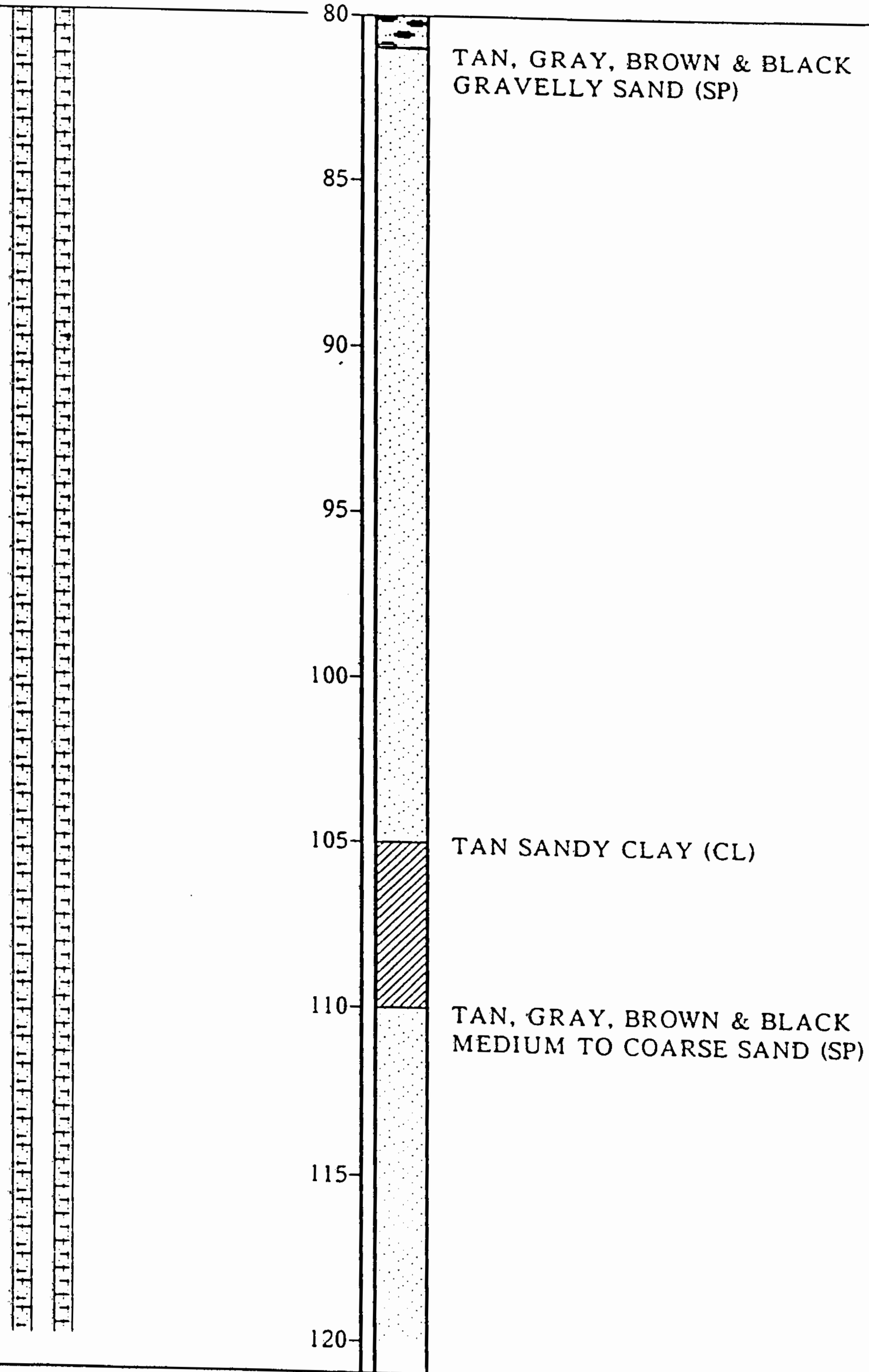
DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	06310,039.12		12/90		

Top of PVC Casing
Elevation 5211.51

Equipment GD-1500

Elevation ft Date 4/2/90

GROUND SURFACE



Harding Lawson Associates
Engineers and
Environmental Services

MONITORING WELL DETAIL MW-50

Sparton Technology Inc.
Albuquerque, New Mexico

PLATE

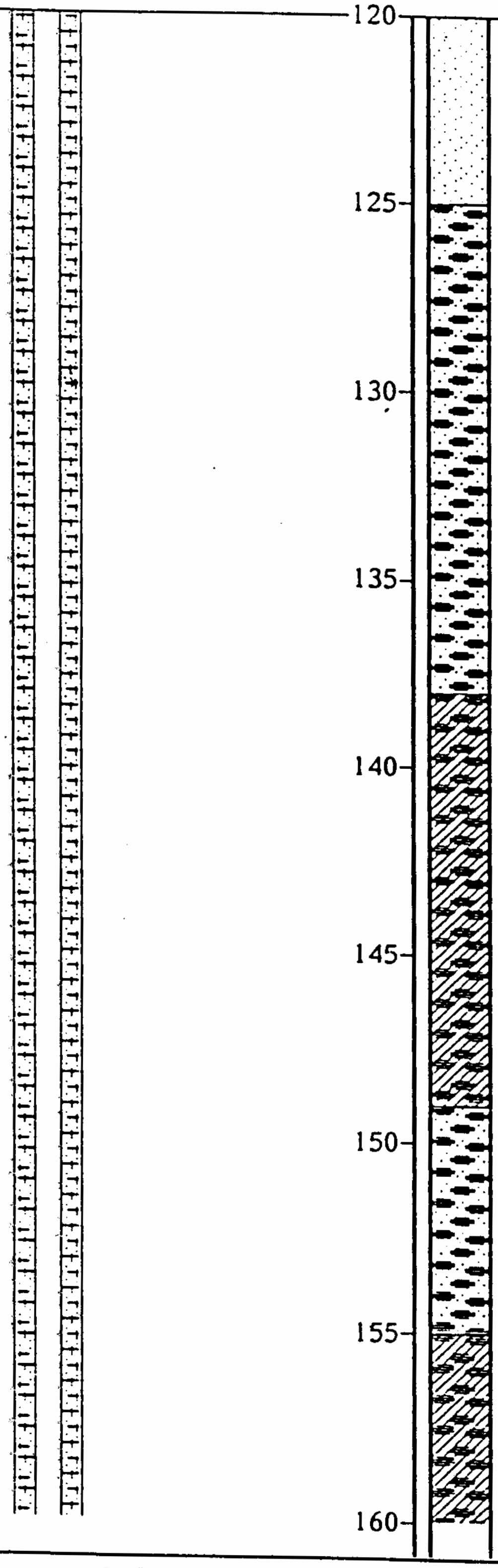
DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	06310.039.12		12/90		

Top of PVC Casing
Elevation 5211.51

GROUND SURFACE

Equipment GD-1500

Elevation ft   Date 4/2/90



TAN, BROWN, BLACK & GRAY SANDY GRAVEL (GP)

-with occasional silty clay seams from 136 to 137 feet

TAN CLAYEY GRAVEL (GC)

TAN, GRAY, BROWN & BLACK SANDY GRAVEL (GP)
with occasional clay
-with boulders from 151 to 153 feet

TAN, BROWN, GRAY & BLACK CLAYEY GRAVEL (GC)

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Environmental Services

MONITORING WELL DETAIL MW-50

Sparton Technology Inc.
Albuquerque, New Mexico

PLATE

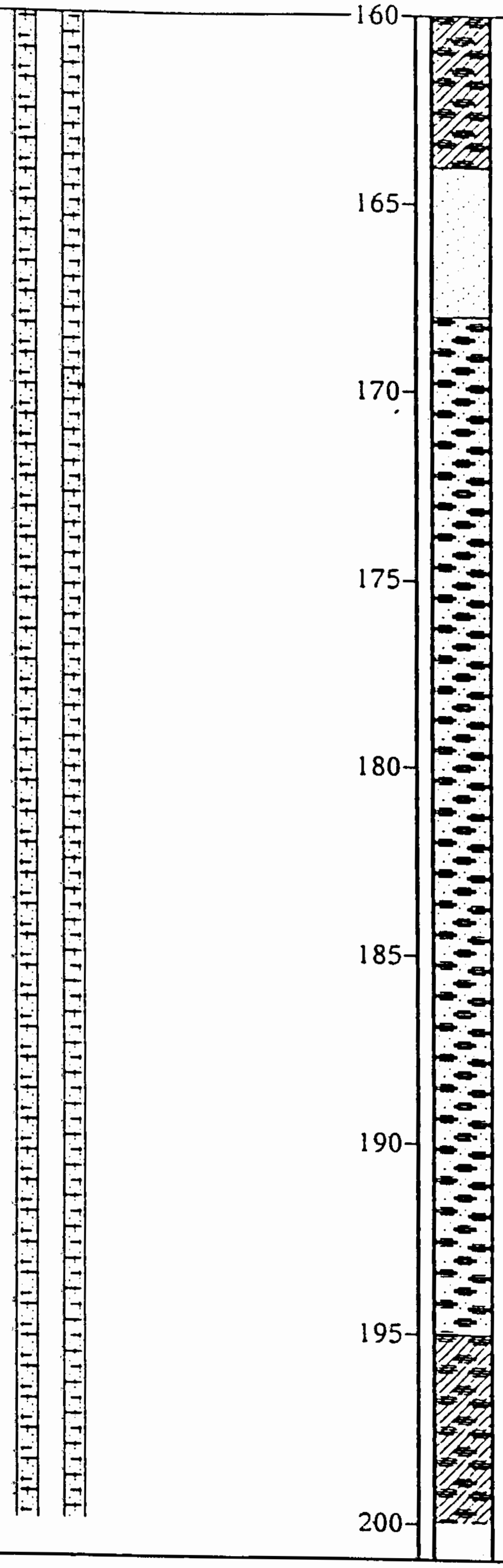
DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	06310.039.12		12/90		

Top of PVC Casing
Elevation 5211.51

Equipment GD-1500

Elevation ft   Date 4/2/90

GROUND SURFACE



TAN, GRAY, BROWN & BLACK FINE TO COARSE SAND (SW)

TAN, GRAY, BROWN & BLACK SANDY GRAVEL (GP)

-with boulders from 184 to 195 feet

TAN, BROWN & BLACK CLAYEY GRAVEL (GC)

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Environmental Services

MONITORING WELL DETAIL MW-50

Sparton Technology Inc.
Albuquerque, New Mexico

PLATE

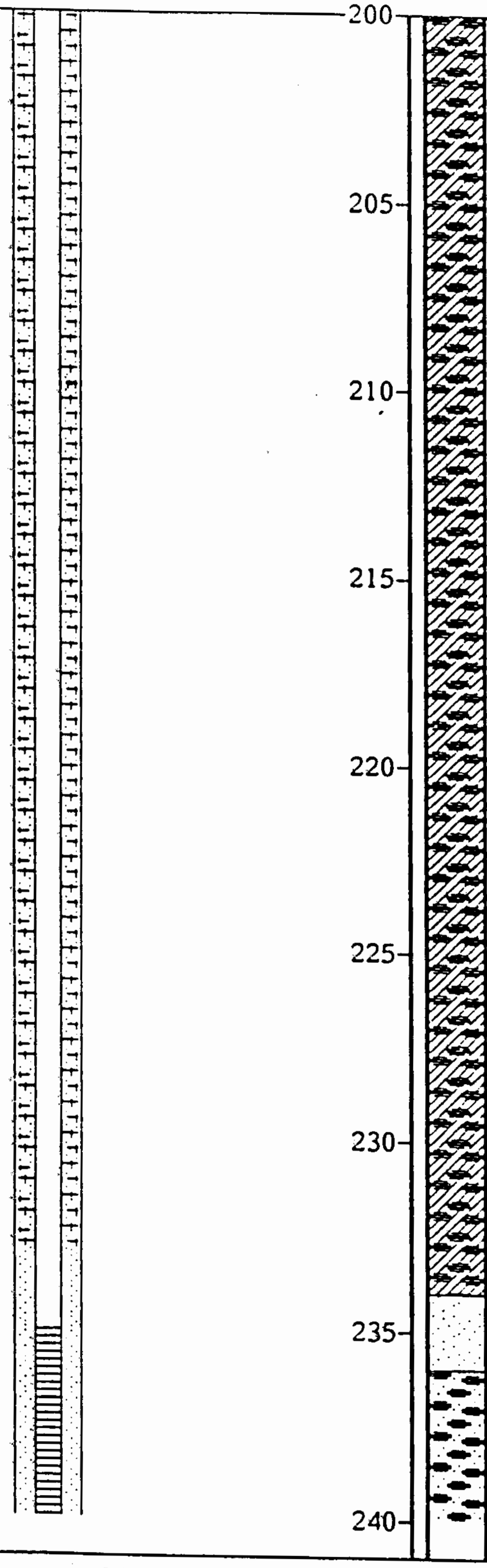
DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	06310.039.12		12/90		

Top of PVC Casing
Elevation 5211.51

Equipment GD-1500

Elevation ft Date 4/2/90

GROUND SURFACE



4" Stainless Steel casing from 225 to 235 feet

7-7/8" Borehole from 234-260 feet

BROWN, GRAY & BLACK MEDIUM TO COARSE SAND (SP)
with gravel

BROWN, GRAY & BLACK SANDY GRAVEL (GP)
with fine sand seams

Harding Lawson Associates
Engineers and
Environmental Services

MONITORING WELL DETAIL MW-50

Sparton Technology Inc.
Albuquerque, New Mexico

PLATE

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	06310,039.12		12/90		

Top of PVC Casing
Elevation 5211.51

Equipment GD-1500

Elevation ft   Date 4/2/90

GROUND SURFACE

4" Stainless Steel
Screen (Slot size 0.02")
from 235 to 250 feet

Sandpack:
20x40 sand (232-233)
10x20 sand (233-252)

Bottom Cap

Bentonite seal
(252-253)

Sandpack:
10x20 sand (253-260)

-tan sandy clay pockets from
243 to 244 feet
BROWN, GRAY & BLACK
GRAVELLY SAND (SP)

End of Boring at 260 feet.

Harding Lawson Associates
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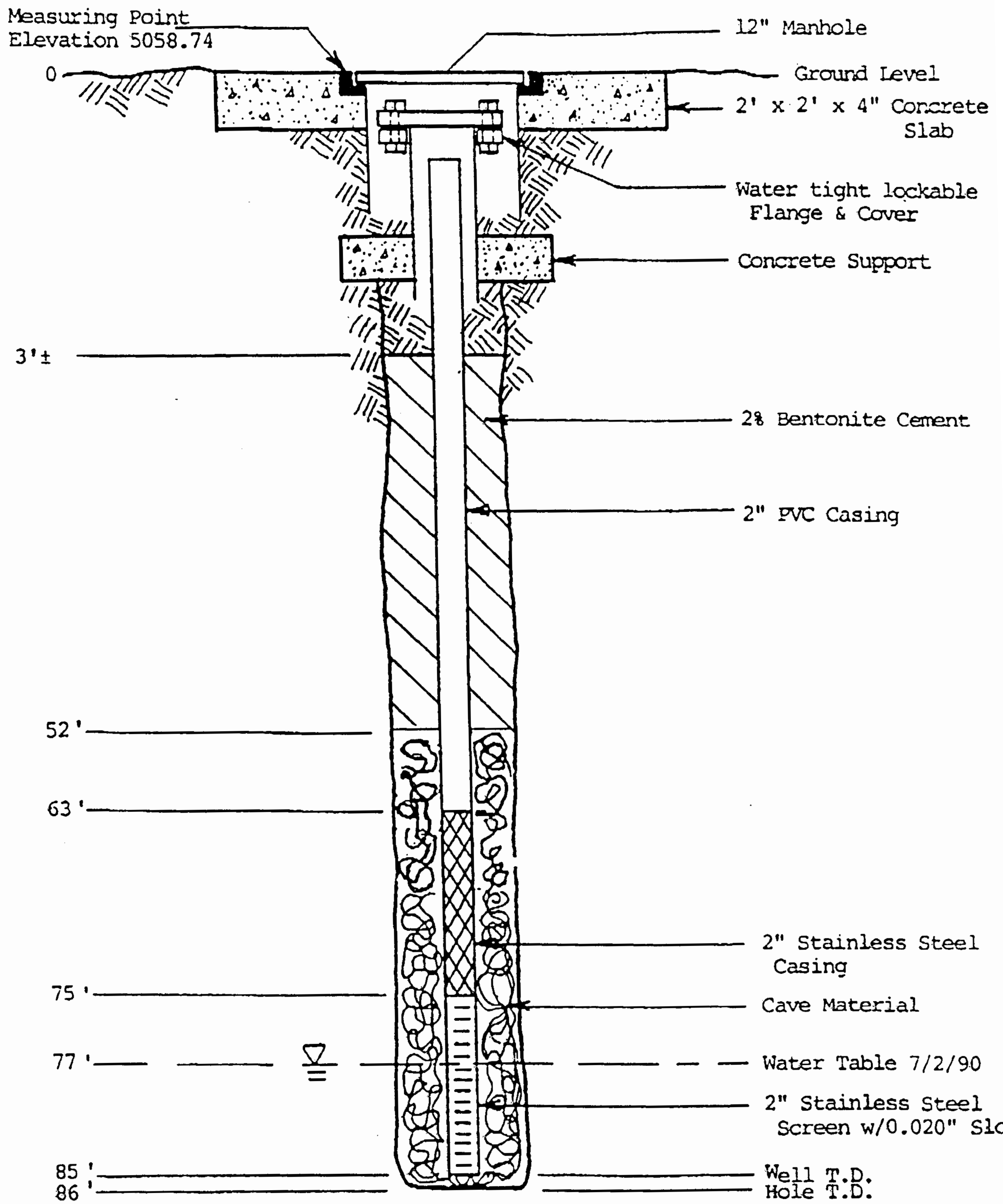
Environmental Services

MONITORING WELL DETAIL MW-50

Sparton Technology Inc.
Albuquerque, New Mexico

PLATE

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	06310.039.12		12/90		



COMPLETION DIAGRAM
MW-51

METRIC
Corporation

SAMPLE LOG

Well Number MW-51 Well Location
Well Owner Sparton Technology, Inc.
Sample Logger Peter H. Metzner, METRIC Corporation
Driller Rodgers & Company, Inc.
Drilling Medium Hollow Stem Auger

Date of Completion 5-11-90 Ground Elev. 5058.5

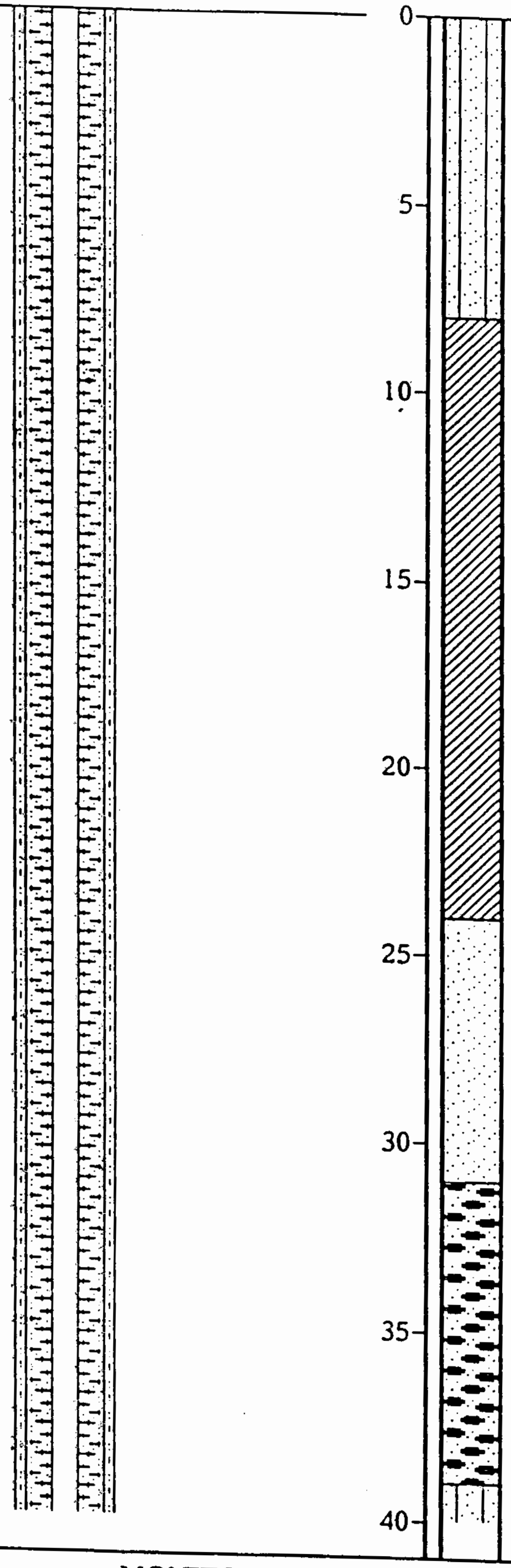
Depth (feet)	Thickness (feet)	Stratigraphic Description
0 - 20	20	Pale yellowish brown (10YR6/2) medium-sorted very fine to medium fine sand with some coarse and granule gravel
20 - 70	50	Moderate yellowish brown (10YR5/4) well-sorted very fine to fine sand
70 - 86	16	Pale yellowish brown (10YR6/2) fine to coarse sand with subangular to rounded granule to cobble gravel

Top of PVC Casing
Elevation 5165.41

Equipment GD-1500

Elevation ft   Date 6/4/90

GROUND SURFACE



Cement/Bentonite Grout

4" PVC Casing to 177 feet

12-1/4" Borehole to 188 feet

LIGHT TAN SILTY FINE TO MEDIUM SAND (SM)
slightly clayey

TAN SANDY CLAY (CL)

BROWN, BLACK, WHITE, GRAY, & TAN FINE TO COARSE SAND (SW)
with occasional gravel

BROWN, BLACK, GRAY, TAN, & WHITE SANDY GRAVEL (GP)

BROWN, BLACK, GRAY, & TAN

Harding Lawson Associates
Engineers and Environmental Services

MONITORING WELL DETAIL MW-52

Sparton Technology Inc.
Albuquerque, New Mexico

PLATE

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	06310.039.12		12/90		

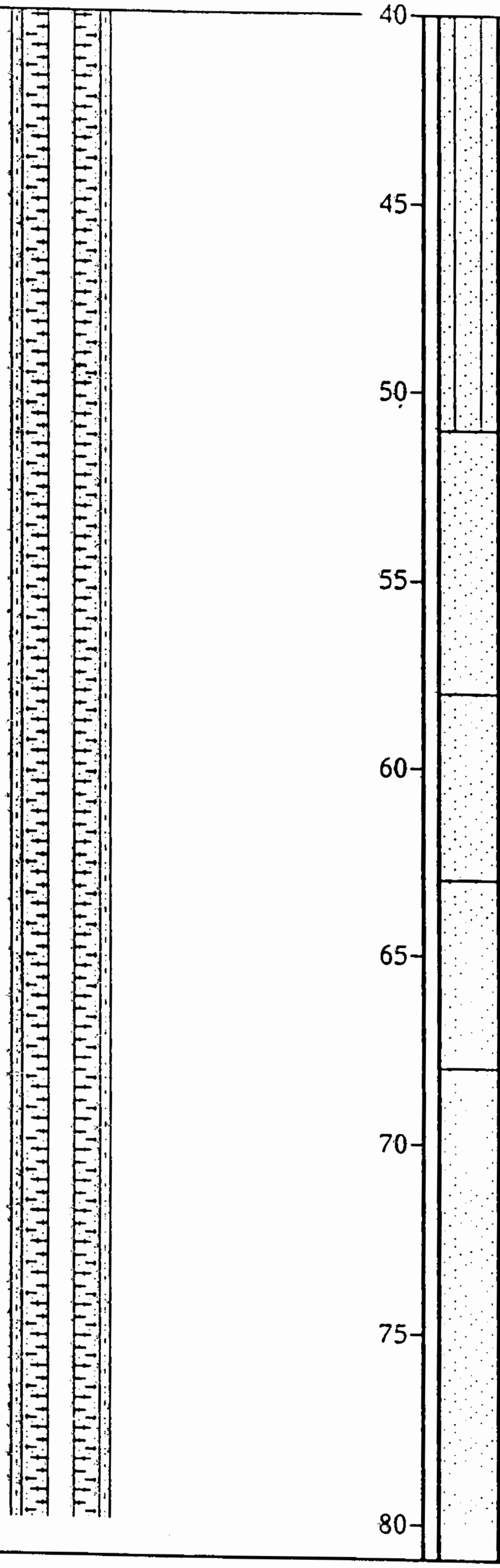
Top of PVC Casing
Elevation 5165.41

Equipment GD-1500

Elevation ft Date 6/4/90

GROUND SURFACE

8-5/8"
Steel casing
from 0 to 186.8 feet



SILTY FINE TO MEDIUM SAND (SM)
-slightly clayey

-with occasional coarse sand

BROWN, BLACK, TAN, GRAY, & WHITE MEDIUM TO COARSE SAND (SP)

TAN SILTY FINE TO COARSE SAND (SW)
with clay

TAN, BROWN, & BLACK MEDIUM TO COARSE SAND (SP)

TAN, BROWN, & BLACK SILTY FINE TO COARSE SAND (SW)

-with clay below 79 feet

Harding Lawson Associates
Engineers and
Environmental Services

MONITORING WELL DETAIL MW-52

Sparton Technology Inc.
Albuquerque, New Mexico

PLATE

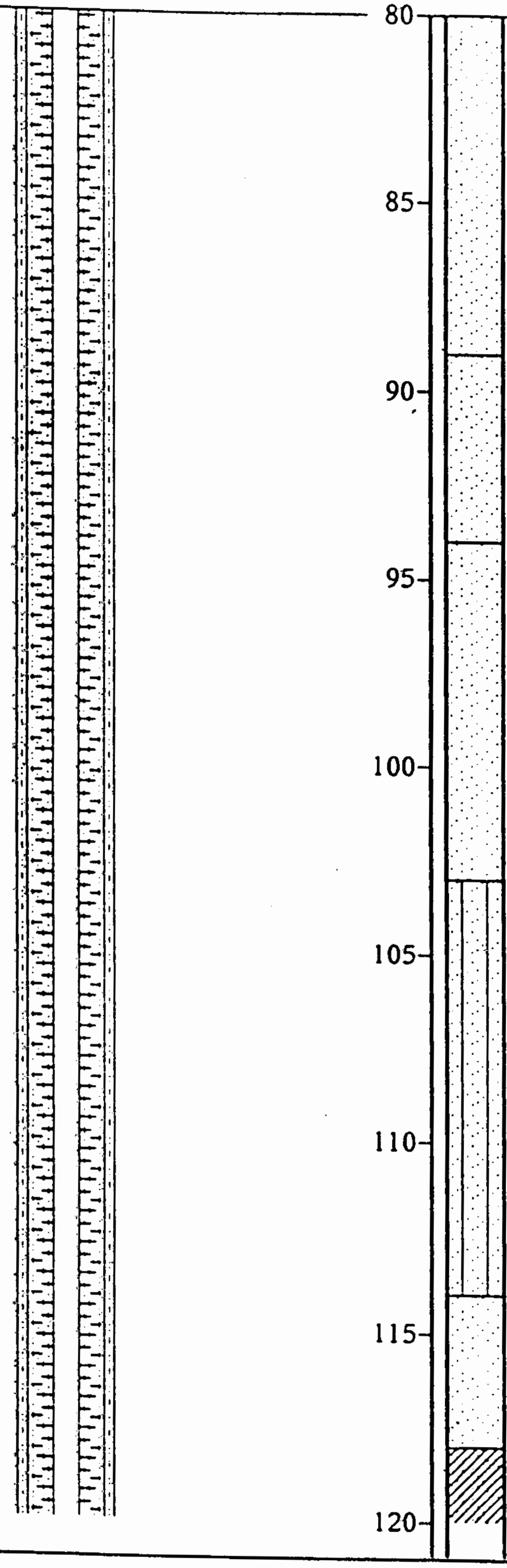
DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	06310,039.12		12/90		

Top of PVC Casing
Elevation 5165.41

Equipment GD-1500

Elevation ft   Date 6/4/90

GROUND SURFACE



BROWN, BLACK, TAN, & GRAY MEDIUM TO COARSE SAND (SP)

TAN, BROWN, & BLACK FINE TO COARSE SAND (SW)

TAN, BROWN, & BLACK SILTY FINE TO MEDIUM SAND (SM)

BROWN, BLACK, TAN, WHITE, & GRAY FINE TO MEDIUM SAND (SP) with coarse sand

BROWN & TAN CLAYEY MEDIUM TO COARSE SAND (SC)

Harding Lawson Associates
Engineers and
Environmental Services

MONITORING WELL DETAIL MW-52

Sparton Technology Inc.
Albuquerque, New Mexico

PLATE

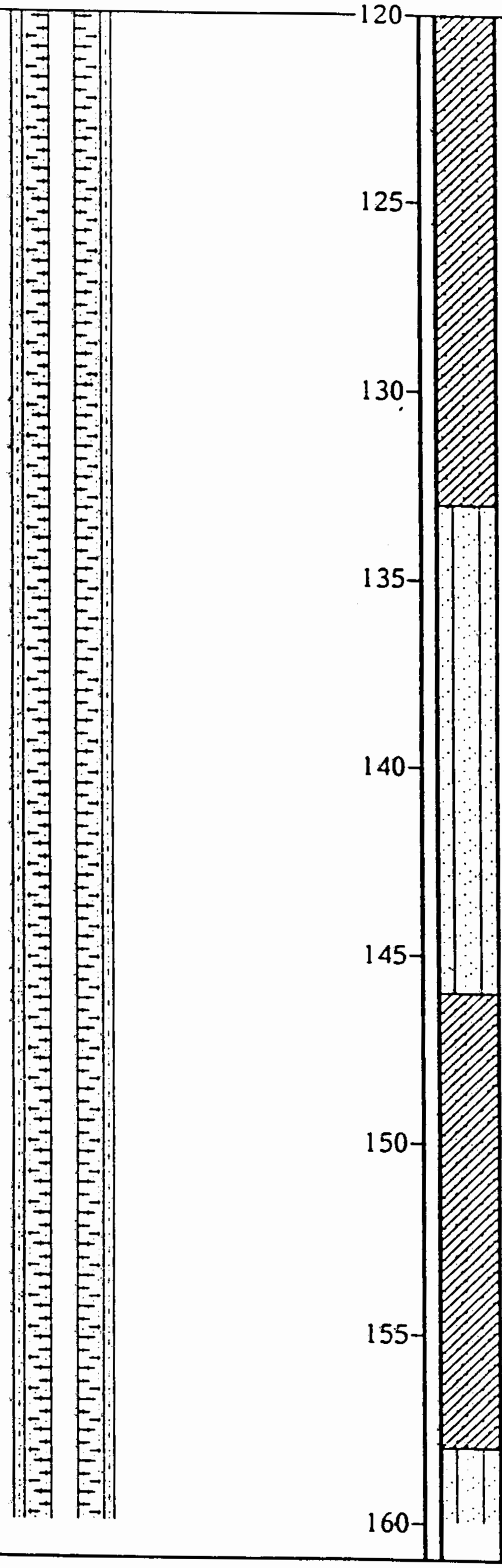
DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	06310.039.12		12/90		

Top of PVC Casing
Elevation 5165.41

Equipment GD-1500

Elevation ft   Date 6/4/90

GROUND SURFACE



BROWN, TAN, & BLACK SILTY FINE TO MEDIUM SAND (SM)

-with coarse sand below 137 feet

TAN & BROWN CLAYEY FINE TO MEDIUM SAND (SC)

BROWN, TAN, & BLACK SILTY FINE TO MEDIUM SAND (SM)

Harding Lawson Associates
Engineers and Environmental Services

MONITORING WELL DETAIL MW-52

Sparton Technology Inc.
Albuquerque, New Mexico

PLATE

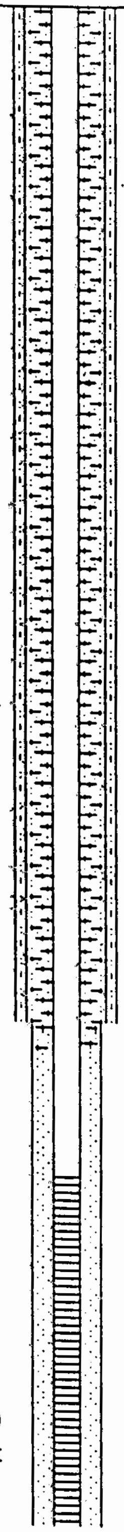
DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	06310,039.12		12/90		

Top of PVC Casing
Elevation 5165.41

Equipment GD-1500

Elevation ft Date 6/4/90

GROUND SURFACE

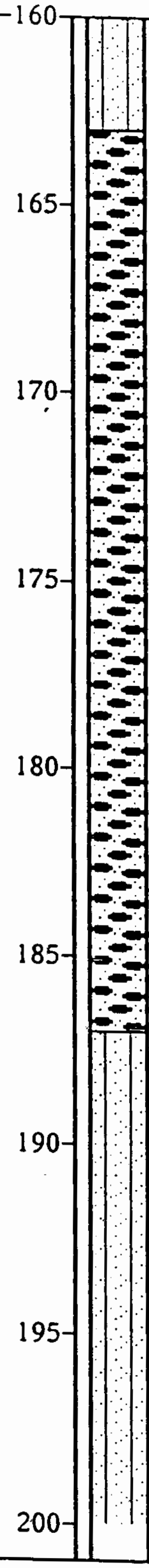


Stainless Steel casing
from 177 to 190.8 feet

Sandpack:
20x40 sand
(187.6'-188.9')
10x20 sand
(188.9'-206.5')

7-7/8" Borehole from
187 to 208 feet

4" Stainless Steel
Screen (Slot size 0.02")
from 190.8 to 206 feet



BROWN, BLACK, GRAY, WHITE,
& SANDY GRAVEL (GP)

-with decreasing sand content

TAN SILTY FINE TO MEDIUM
SAND (SM)

Harding Lawson Associates
Engineers and
Environmental Services

MONITORING WELL DETAIL MW-52

Sparton Technology Inc.
Albuquerque, New Mexico

PLATE

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	06310.039.12		12/90		

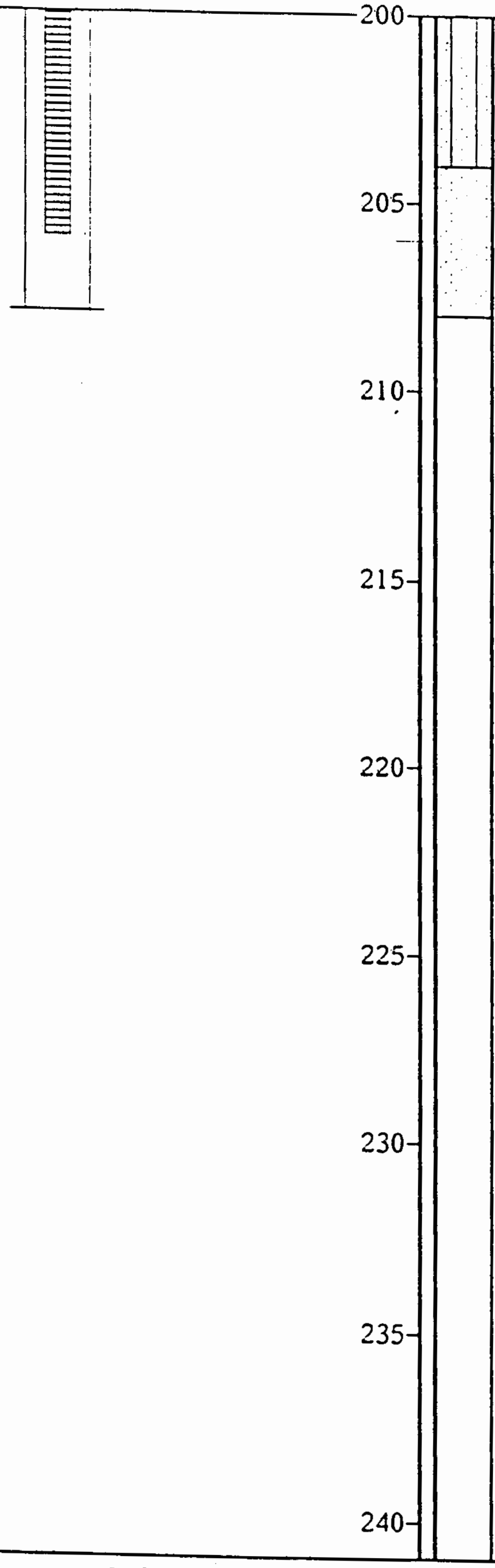
Top of PVC Casing
Elevation 5165.41

Equipment GD-1500

Elevation ft Date 6/4/90

GROUND SURFACE

Bottom Cap



TAN, BROWN, & BLACK FINE TO COARSE SAND (SW)

End of boring at 208 feet.

Harding Lawson Associates
Engineers and
Environmental Services

MONITORING WELL DETAIL MW-52

Sparton Technology Inc.
Albuquerque, New Mexico

PLATE

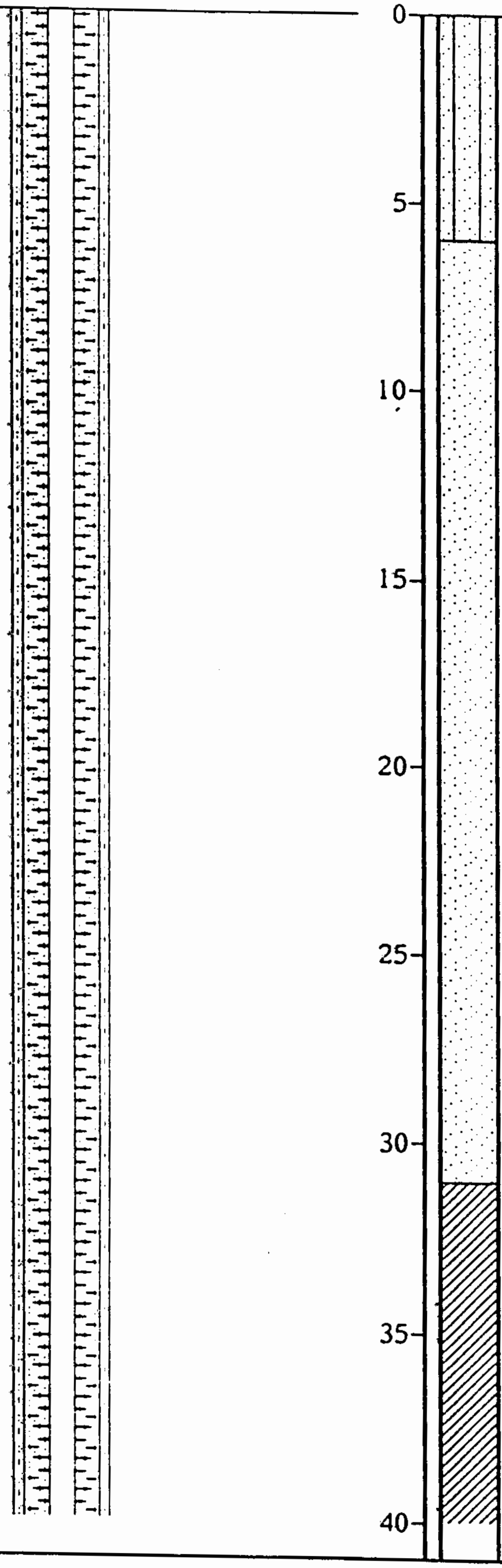
DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	06310.039.12		12/90		

Top of PVC Casing
Elevation 5163.96

Equipment GD-1500

Elevation ft   Date 6/14/90

GROUND SURFACE



Cement/Bentonite Grout

4" PVC Casing to 175 feet

12-1/4" Borehole to 186 feet

TAN SILTY FINE TO MEDIUM SAND (SM)

TAN, BROWN, & BLACK MEDIUM TO COARSE SAND (SP)

TAN SANDY CLAY (CL)

Harding Lawson Associates
Engineers and
Environmental Services

MONITORING WELL DETAIL MW-53

Sparton Technology Inc.
Albuquerque, New Mexico

PLATE

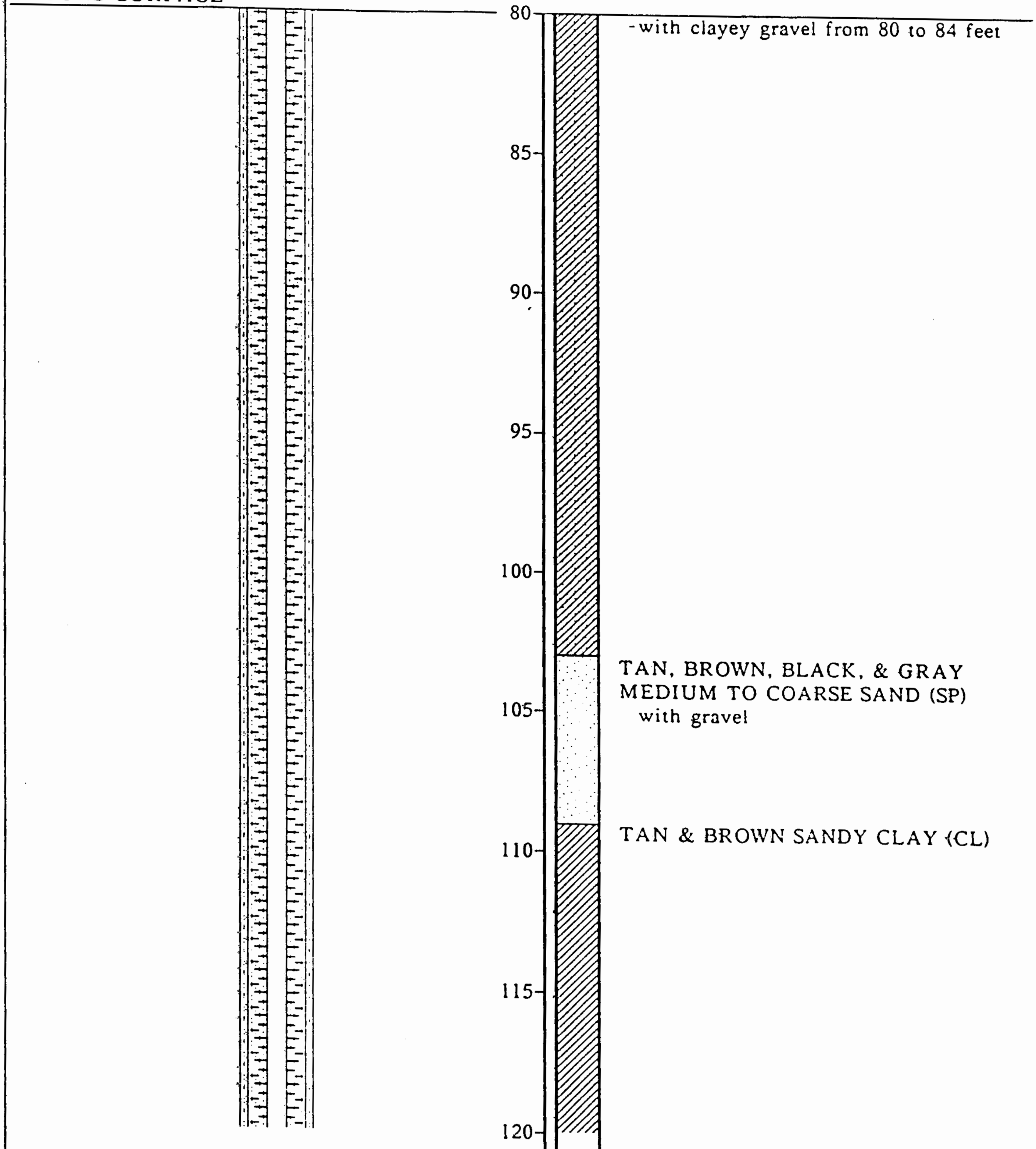
DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	06310.039.12		12/90		

Top of PVC Casing
Elevation 5163.96

Equipment GD-1500

Elevation ft Date 6/14/90

GROUND SURFACE



Harding Lawson Associates
Engineers and
Environmental Services

MONITORING WELL DETAIL MW-53

Sparton Technology Inc.
Albuquerque, New Mexico

PLATE

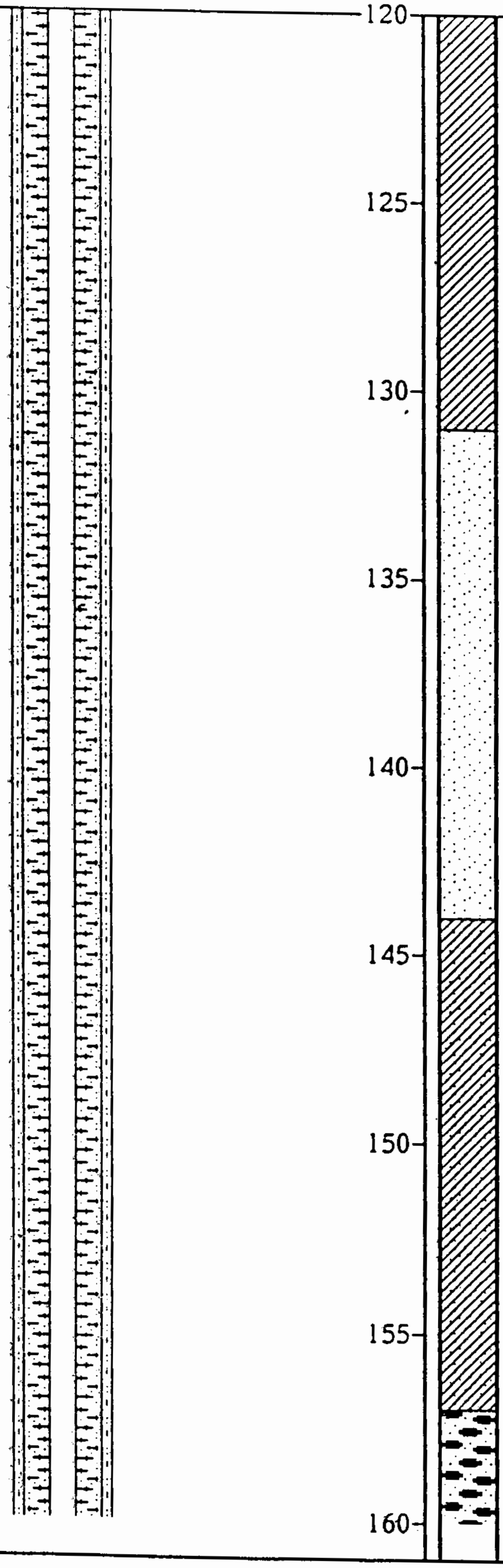
DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	06310.039.12		12/90		

Top of PVC Casing
Elevation 5163.96

Equipment GD-1500

Elevation ft Date 6/14/90

GROUND SURFACE



TAN, BROWN, BLACK, & GRAY FINE TO COARSE SAND (SW)
with occasional gravel

TAN & BROWN CLAYEY FINE SAND (SC)

BROWN, TAN, BLACK, & GRAY SANDY GRAVEL (GP)

- with cobbles at 159 feet

Harding Lawson Associates
Engineers and
Environmental Services

MONITORING WELL DETAIL MW-53

Sparton Technology Inc.
Albuquerque, New Mexico

PLATE

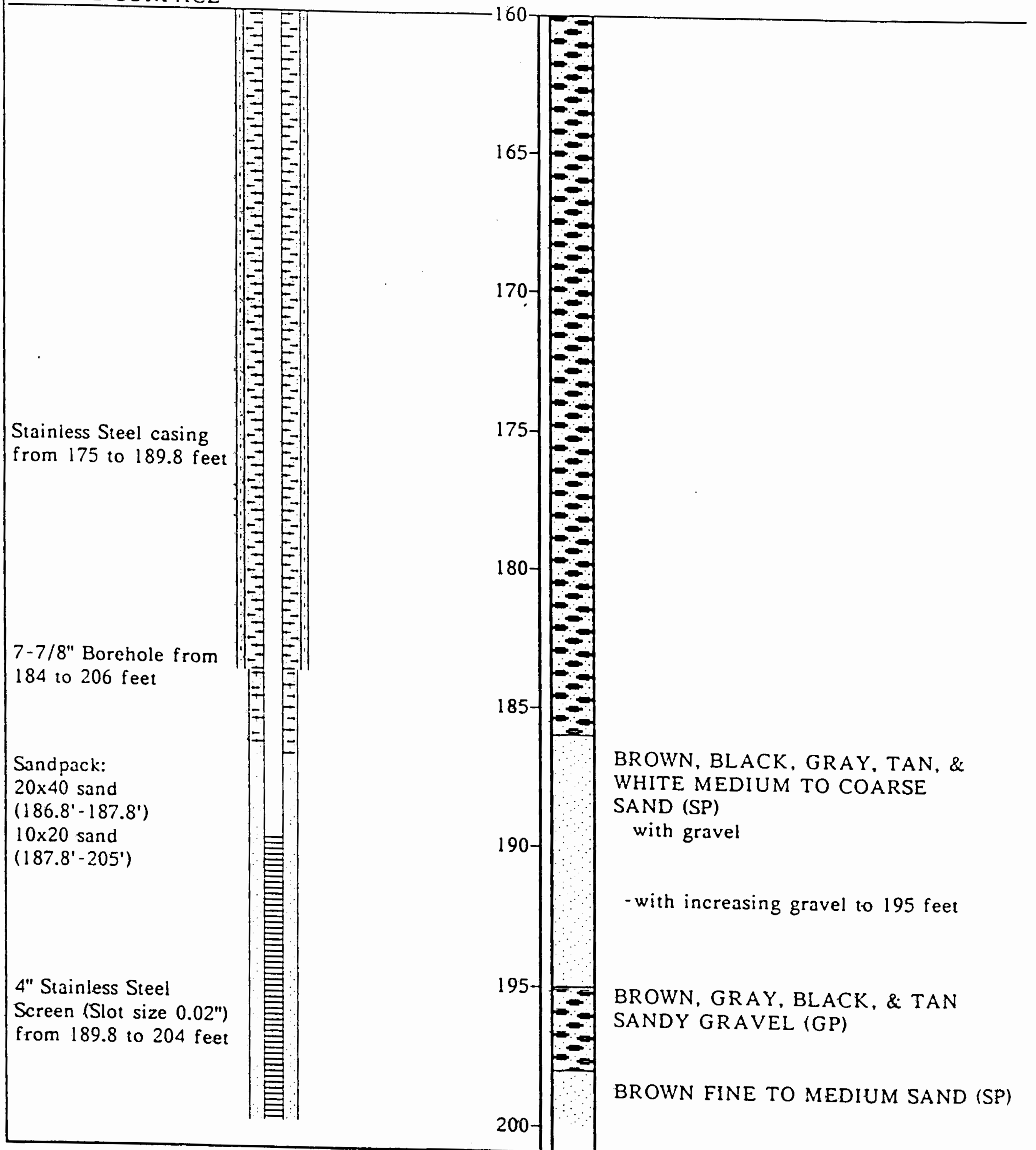
DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	06310.039.12		12/90		

Top of PVC Casing
Elevation 5163.96

Equipment GD-1500

Elevation ft Date 6/14/90

GROUND SURFACE



Harding Lawson Associates
Engineers and
Environmental Services

MONITORING WELL DETAIL MW-53

Sparton Technology Inc.
Albuquerque, New Mexico

PLATE

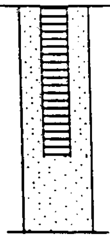
DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	06310.039.12		12/90		

Top of PVC Casing
Elevation 5163.96

Equipment GD-1500

Elevation ft Date 6/14/90

GROUND SURFACE



Bottom Cap

200
205 TAN SANDY CLAY (CL)

End of boring at 206 feet.

210
215
220
225
230
235
240

Harding Lawson Associates
Engineers and
Environmental Services

MONITORING WELL DETAIL MW-53

Sparton Technology Inc.
Albuquerque, New Mexico

PLATE

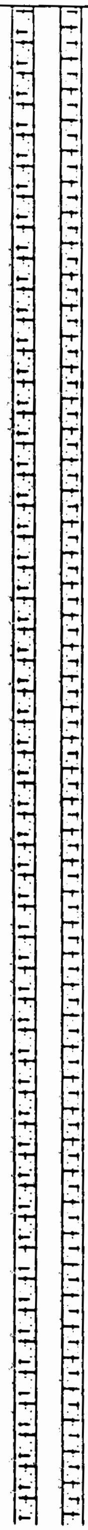
DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	06310.039.12		12/90		

Top of PVC Casing
Elevation 5097.64

Equipment GD-1500

Elevation 5097.64 ft Date 7/26/90

GROUND SURFACE

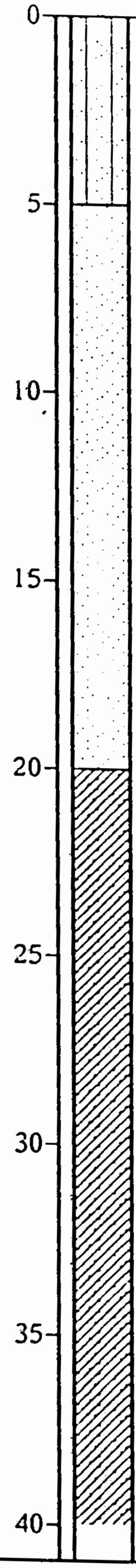


4" PVC Casing
to 107 feet

8-5/8" Steel casing
from 0 to 112 feet

12-1/4" Borehole
to 112 feet

Cement/Bentonite
Grout



TAN SILTY SAND (SM)
with occasional clay

TAN, BROWN & BLACK MEDIUM TO COARSE SAND (SP)
with occasional clay

TAN, BROWN & BLACK CLAYEY MEDIUM TO COARSE SAND (SC)
with silty seams below 57 feet

Harding Lawson Associates
Engineers and
Environmental Services

MONITORING WELL DETAIL MW-54

Sparton Technology Inc.
Albuquerque, New Mexico

PLATE

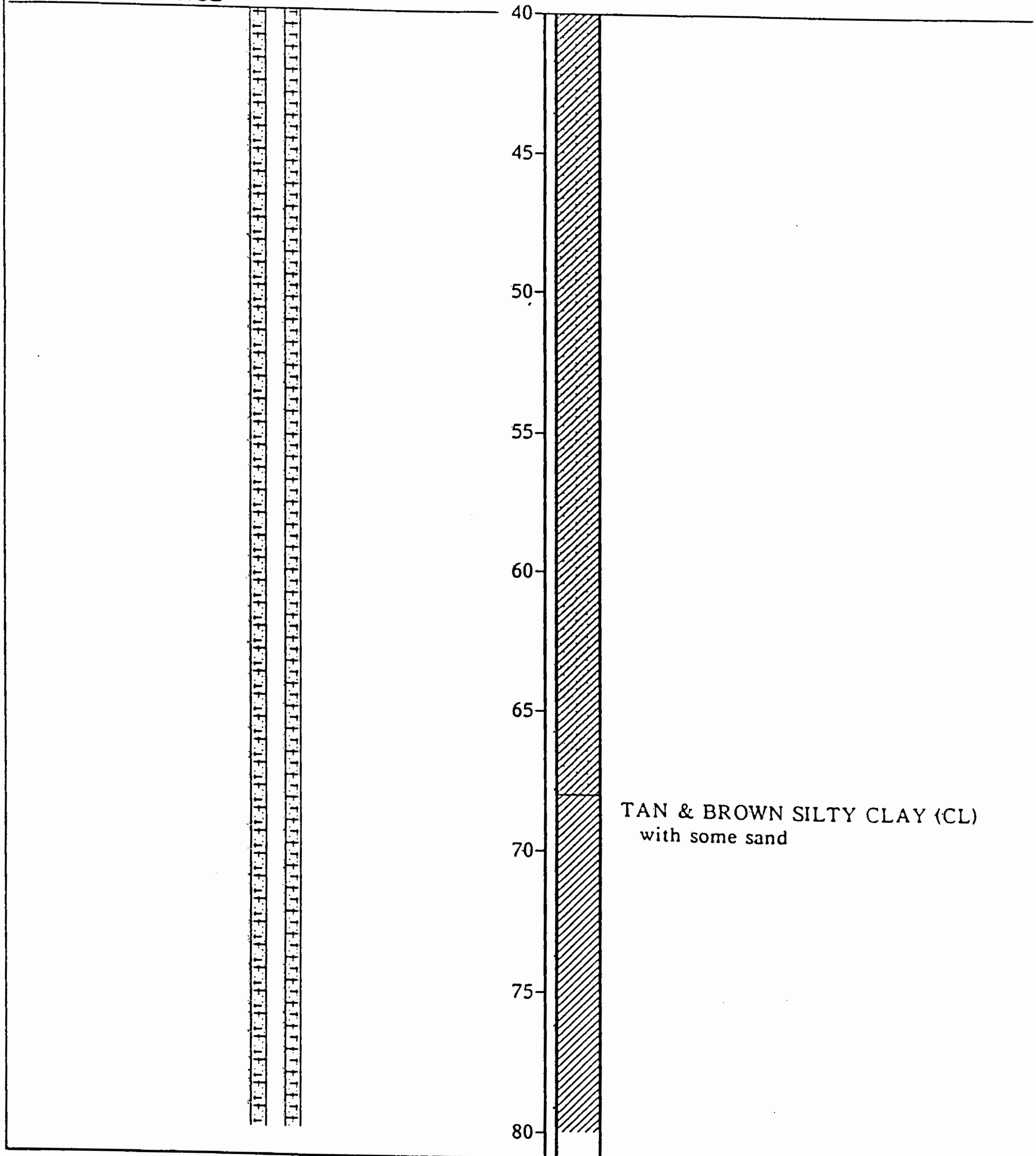
DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	06310,039.12		12/90		

Top of PVC Casing
Elevation 5097.64

Equipment GD-1500

Elevation 5097.64 ft Date 7/26/90

GROUND SURFACE



Harding Lawson Associates
Engineers and
Environmental Services

MONITORING WELL DETAIL MW-54

Sparton Technology Inc.
Albuquerque, New Mexico

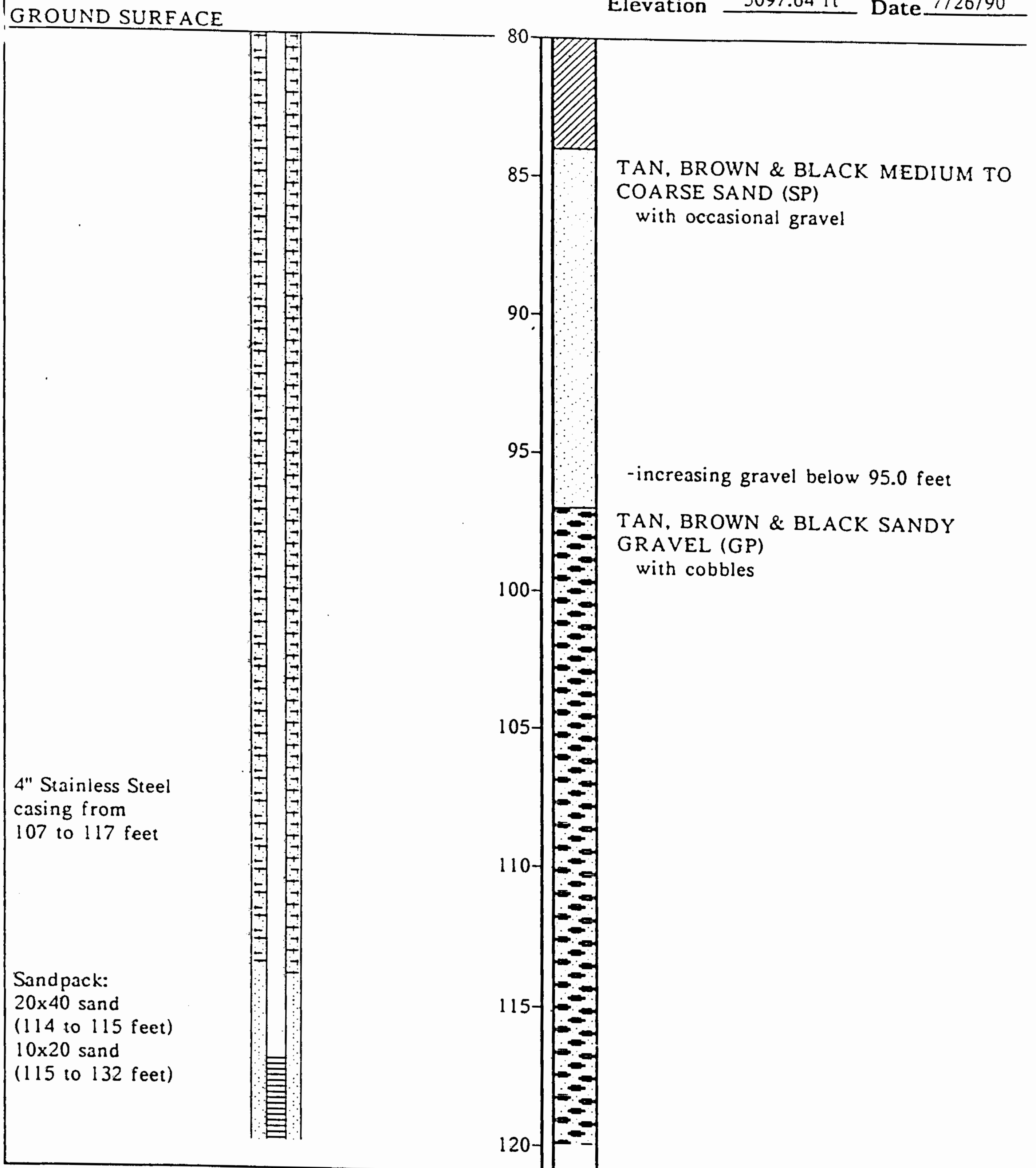
PLATE

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	06310.039.12		12/90		

Top of PVC Casing
Elevation 5097.64

Equipment GD-1500

Elevation 5097.64 ft Date 7/26/90



Harding Lawson Associates
Engineers and
Environmental Services

MONITORING WELL DETAIL MW-54

Sparton Technology Inc.
Albuquerque, New Mexico

PLATE

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	06310.039.12		12/90		

Top of PVC Casing
Elevation 5097.64

Equipment GD-1500

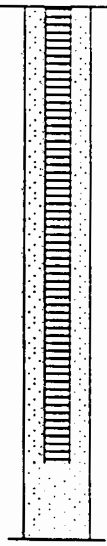
Elevation 5097.64 ft Date 7/26/90

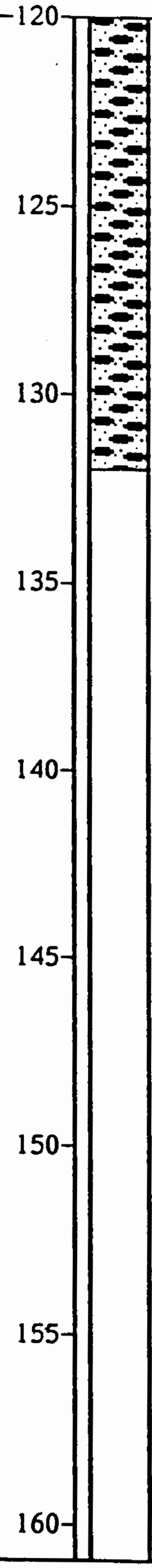
GROUND SURFACE

7-7/8" borehole from
112 to 134 feet

4" Stainless Steel
Screen (slot size 0.02")
from 117 to 132 feet

Bottom Cap





End of Boring at 132.00 feet.

Harding Lawson Associates
Engineers and
Environmental Services

MONITORING WELL DETAIL MW-54

Sparton Technology Inc.
Albuquerque, New Mexico

PLATE

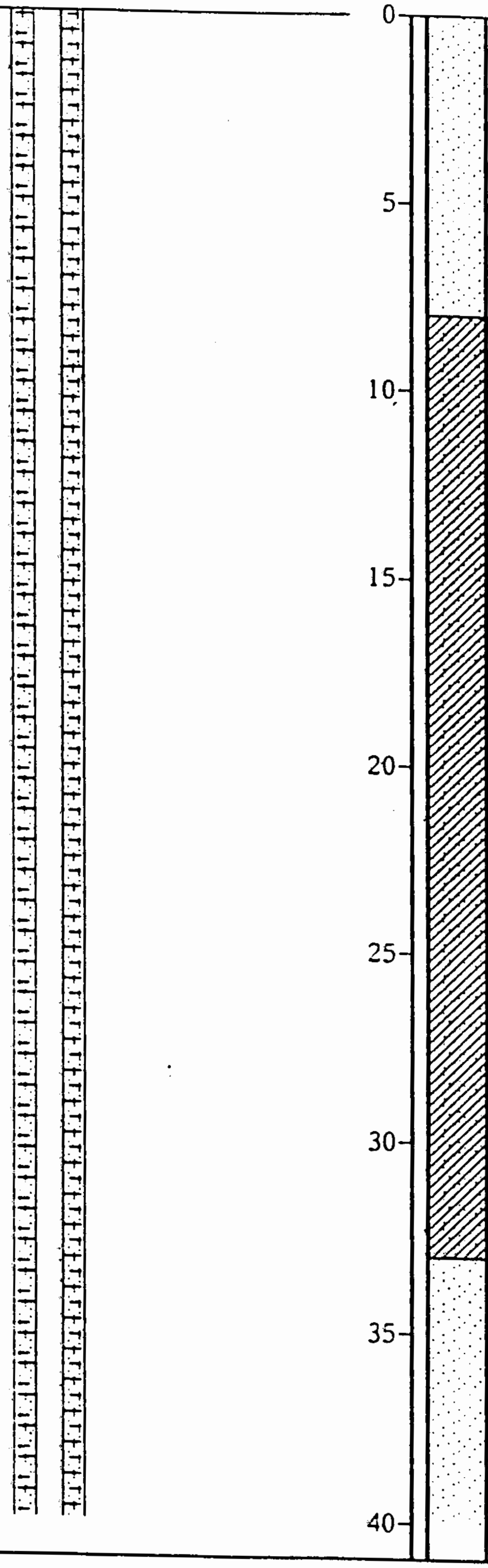
DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	06310.039.12		12/90		

Top of PVC Casing
Elevation 5168.61

Equipment GD-1500

Elevation 5168.61 ft Date 8/5/90

GROUND SURFACE



BROWN FINE TO COARSE SAND (SW)
with occasional clay and small gravel

YELLOW-BROWN CLAYEY FINE TO MEDIUM SAND (SC)

BROWN & GRAY FINE TO COARSE SAND (SW)
with occasional clay

4" PVC Casing
to 171.6 feet

8-5/8" Steel casing
from 0 to 243 feet

12-1/4" Borehole
to 244.5 feet

Cement/Bentonite
Grout

Harding Lawson Associates
Engineers and
Environmental Services

MONITORING WELL DETAIL MW-55

Sparton Technology Inc.
Albuquerque, New Mexico

PLATE

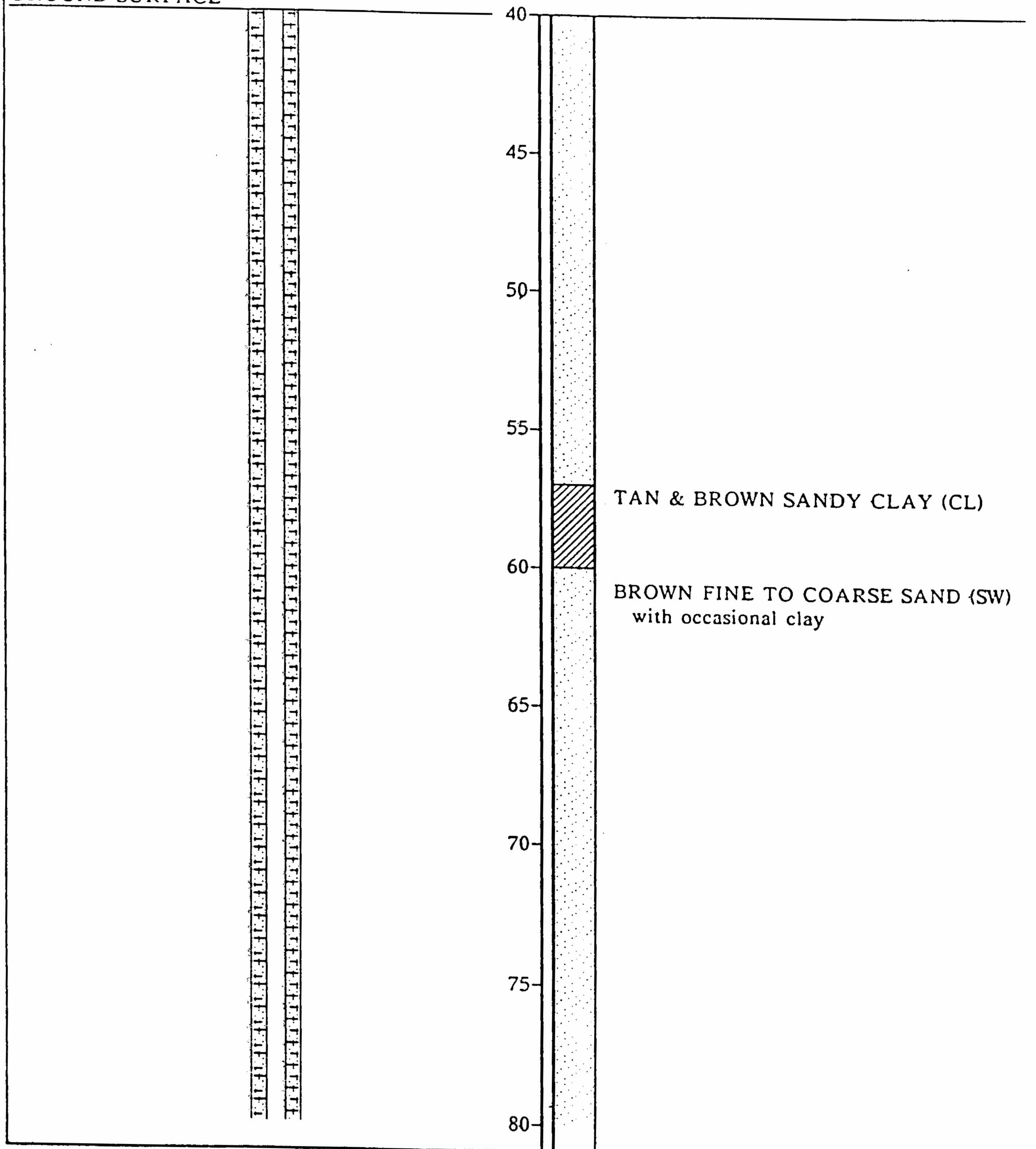
DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	06310.039.12		12/90		

Top of PVC Casing
Elevation 5168.61

Equipment GD-1500

Elevation 5168.61 ft Date 8/5/90

GROUND SURFACE



Harding Lawson Associates
Engineers and
Environmental Services

MONITORING WELL DETAIL MW-55

Sparton Technology Inc.
Albuquerque, New Mexico

PLATE

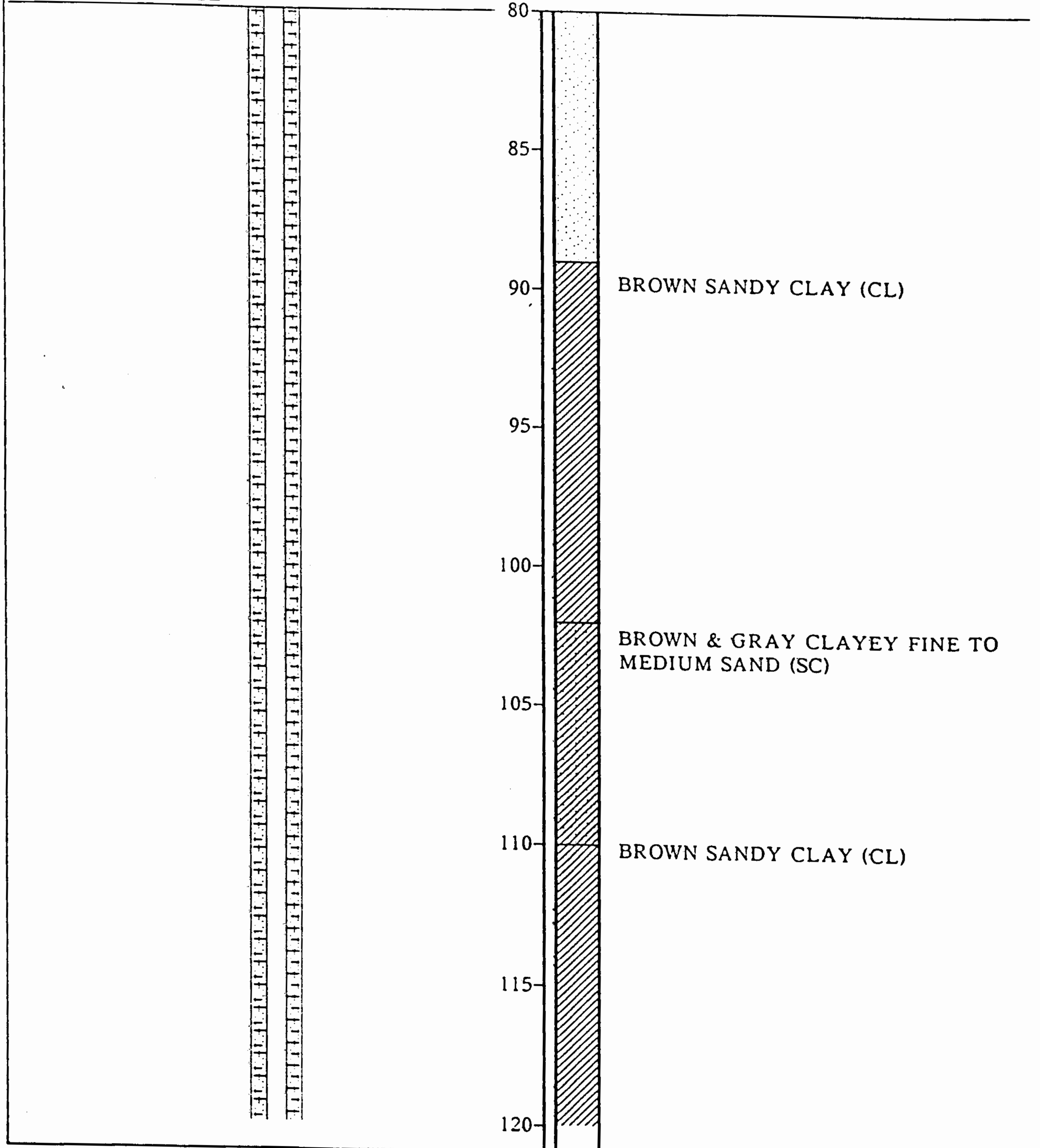
DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	06310.039.12		12/90		

Top of PVC Casing
Elevation 5168.61

Equipment GD-1500

Elevation 5168.61 ft Date 8/5/90

GROUND SURFACE



Harding Lawson Associates
Engineers and
Environmental Services

MONITORING WELL DETAIL MW-55

Sparton Technology Inc.
Albuquerque, New Mexico

PLATE

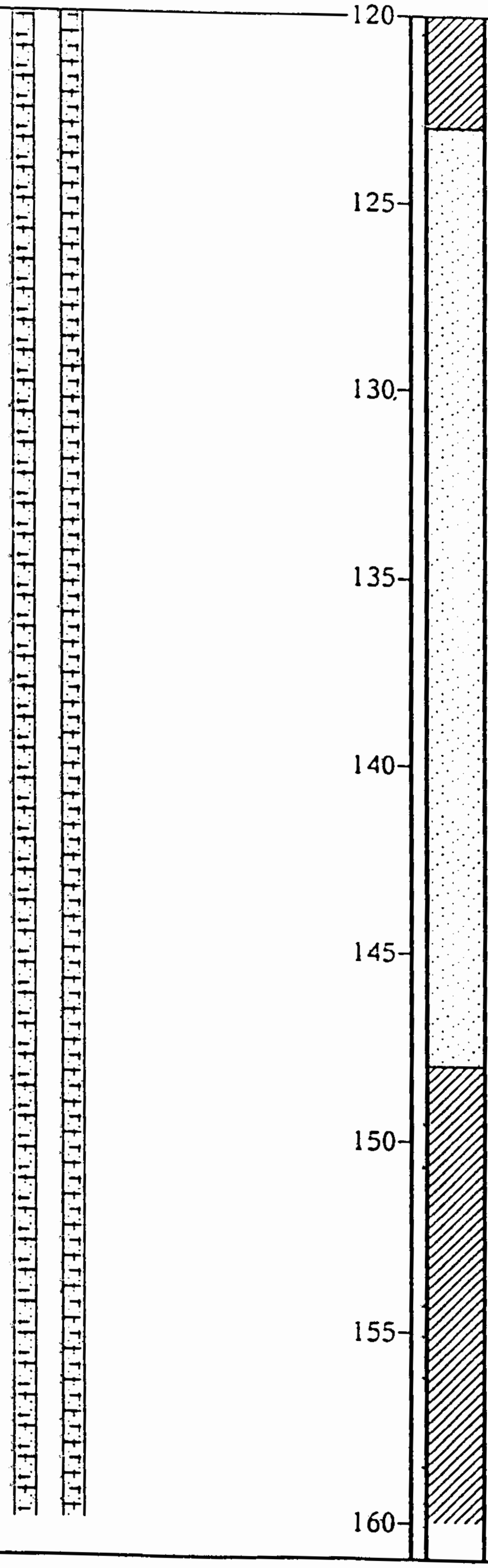
DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	06310,039.12		12/90		

Top of PVC Casing
Elevation 5168.61

Equipment GD-1500

Elevation 5168.61 ft Date 8/5/90

GROUND SURFACE



BROWN & GRAY MEDIUM TO COARSE SAND (SW) with occasional gravel

BROWN SANDY CLAY (CL)

Harding Lawson Associates
Engineers and Environmental Services

MONITORING WELL DETAIL MW-55

Sparton Technology Inc.
Albuquerque, New Mexico

PLATE

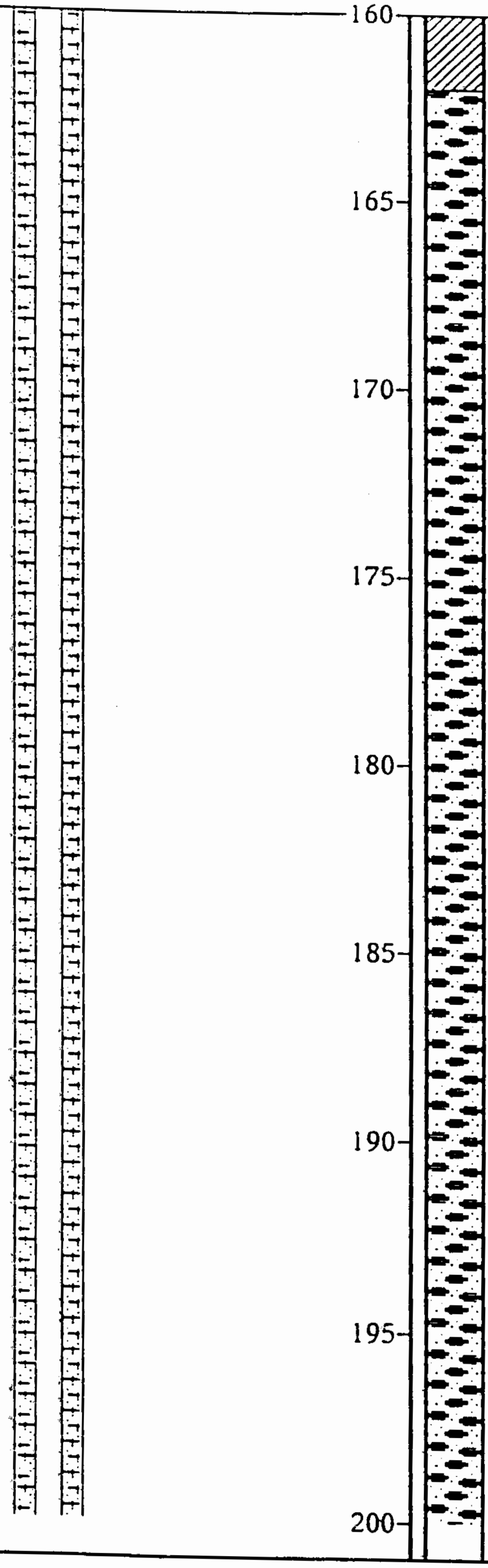
DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	06310.039.12		12/90		

Top of PVC Casing
Elevation 5168.61

Equipment GD-1500

Elevation 5168.61 ft Date 8/5/90

GROUND SURFACE



BROWN & GRAY SANDY GRAVEL (GP)

4" Stainless Steel casing from 171.6 to 255 feet

Harding Lawson Associates
Engineers and Environmental Services

MONITORING WELL DETAIL MW-55

PLATE

Sparton Technology Inc.
Albuquerque, New Mexico

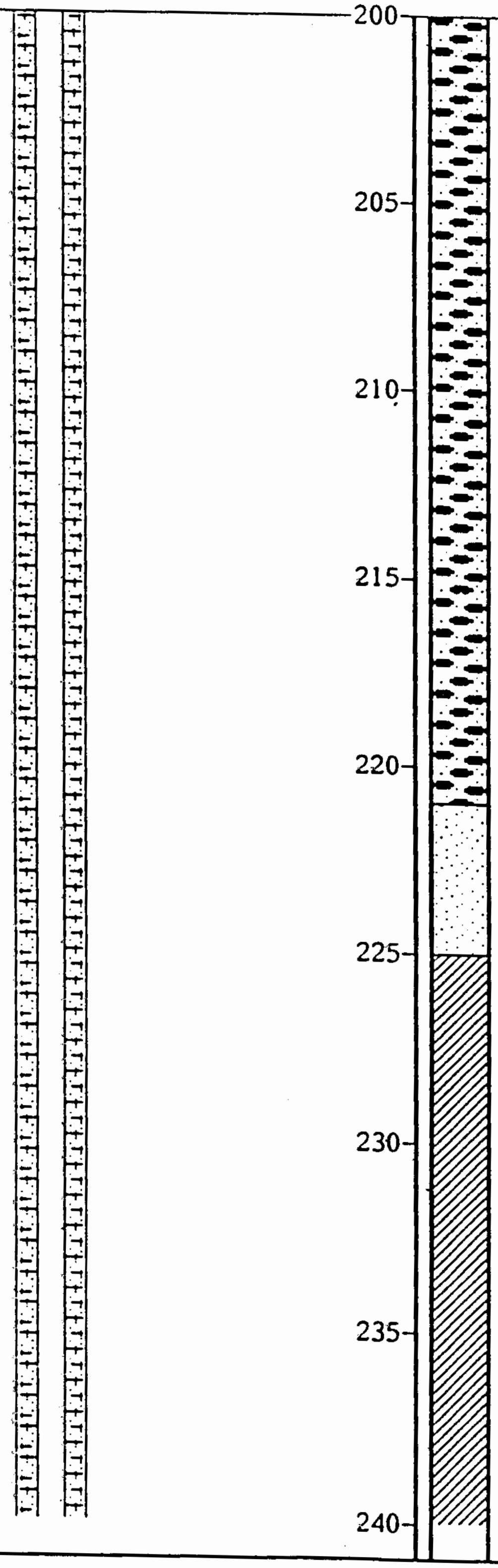
DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	06310.039.12		12/90		

Top of PVC Casing
Elevation 5168.61

Equipment GD-1500

Elevation 5168.61 ft Date 8/5/90

GROUND SURFACE



Harding Lawson Associates
Engineers and
Environmental Services

MONITORING WELL DETAIL MW-55

Sparton Technology Inc.
Albuquerque, New Mexico

PLATE

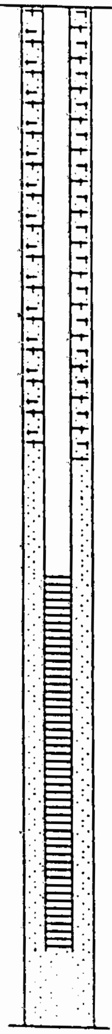
DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	06310.039.12		12/90		

Top of PVC Casing
Elevation 5168.61

Equipment GD-1500

Elevation 5168.61 ft Date 8/5/90

GROUND SURFACE



240

BROWN & GRAY FINE TO COARSE SAND (SW)

7-7/8" borehole from 243 to 267 feet

245

250

Sandpack:
20x40 sand
(252 to 253 feet)
10x20 sand
(253 to 267 feet)

255

4" Stainless Steel Screen (slot size 0.02") from 255 to 265 feet

260

Bottom Cap

265

End of boring at 267.0 feet.

270

275

280

Harding Lawson Associates
Engineers and
Environmental Services

MONITORING WELL DETAIL MW-55

Sparton Technology Inc.
Albuquerque, New Mexico

PLATE

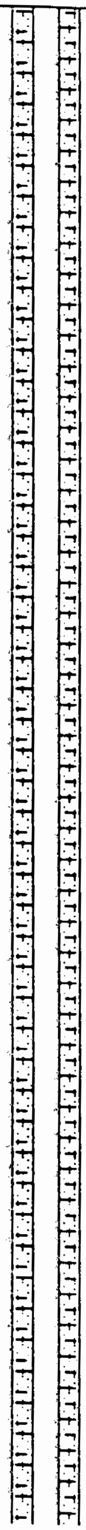
DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	06310,039.12		12/90		

Top of PVC Casing
Elevation 5168.61

Equipment GD-1500

Elevation 5168.61 ft Date 8/13/90

GROUND SURFACE

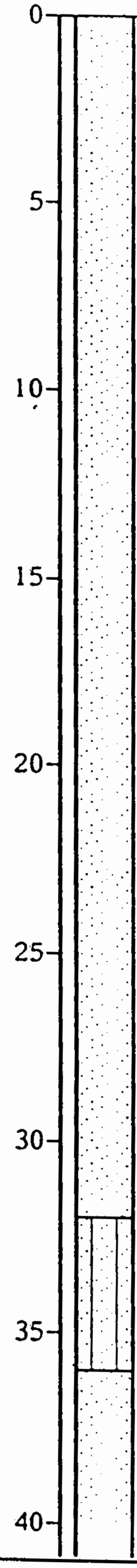


4" PVC Casing
to 190 feet

8-5/8" Steel casing
from 0 to 210 feet

12-1/4" Borehole
to 212 feet

Cement/Bentonite
Grout



BROWN MEDIUM TO COARSE SAND (SW)
with occasional silt

-fine to medium sand below 10.0 feet

BROWN FINE SILTY SAND (SM)

BROWN FINE TO MEDIUM SAND (SP)

-with silt from 38 to 48 feet

Harding Lawson Associates
Engineers and
Environmental Services

MONITORING WELL DETAIL MW-56

Sparton Technology Inc.
Albuquerque, New Mexico

PLATE

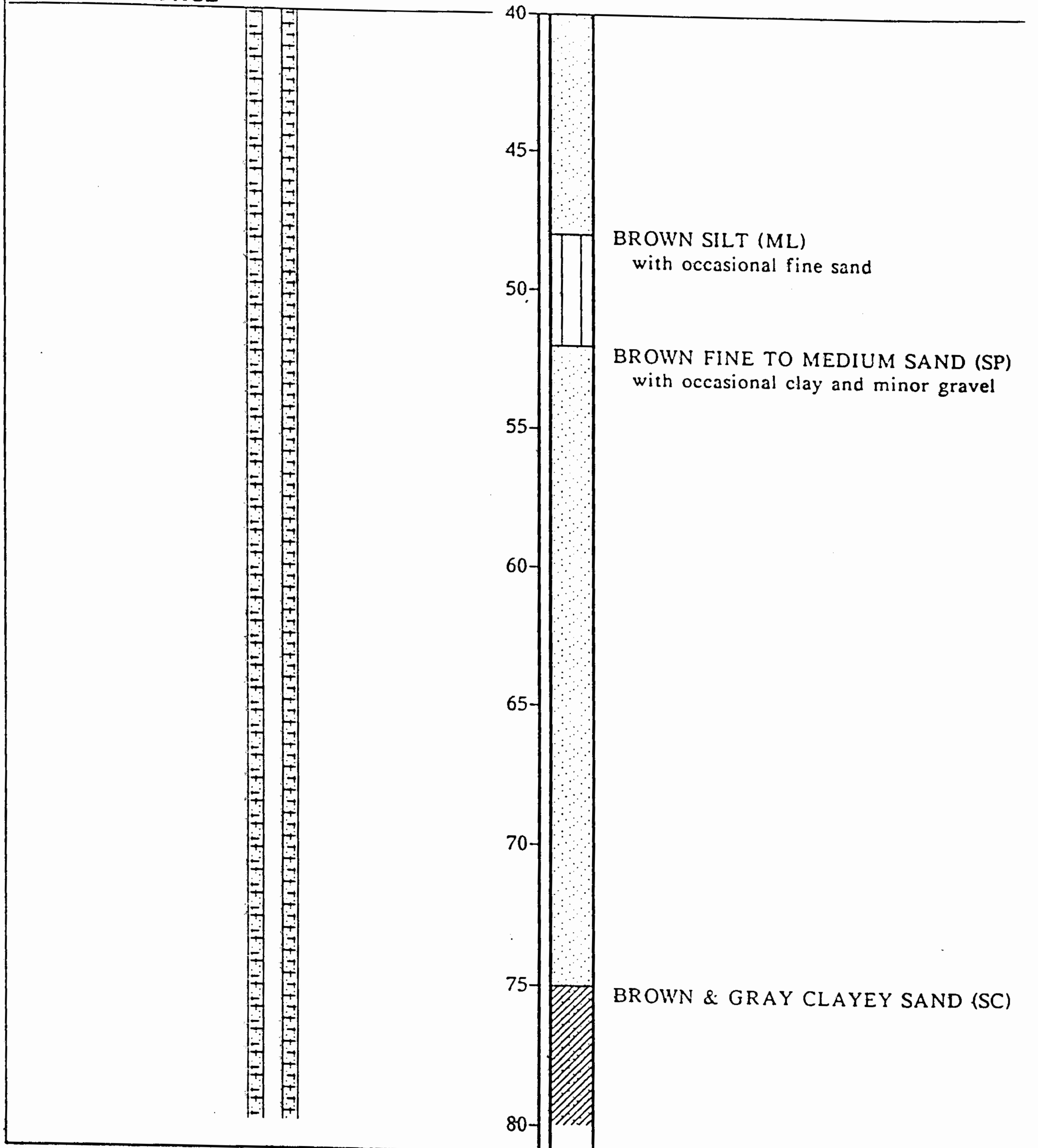
DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	06310.039.12		12/90		

Top of PVC Casing
Elevation 5168.61

Equipment GD-1500

Elevation 5168.61 ft Date 8/13/90

GROUND SURFACE



Harding Lawson Associates
Engineers and
Environmental Services

MONITORING WELL DETAIL MW-56

Sparton Technology Inc.
Albuquerque, New Mexico

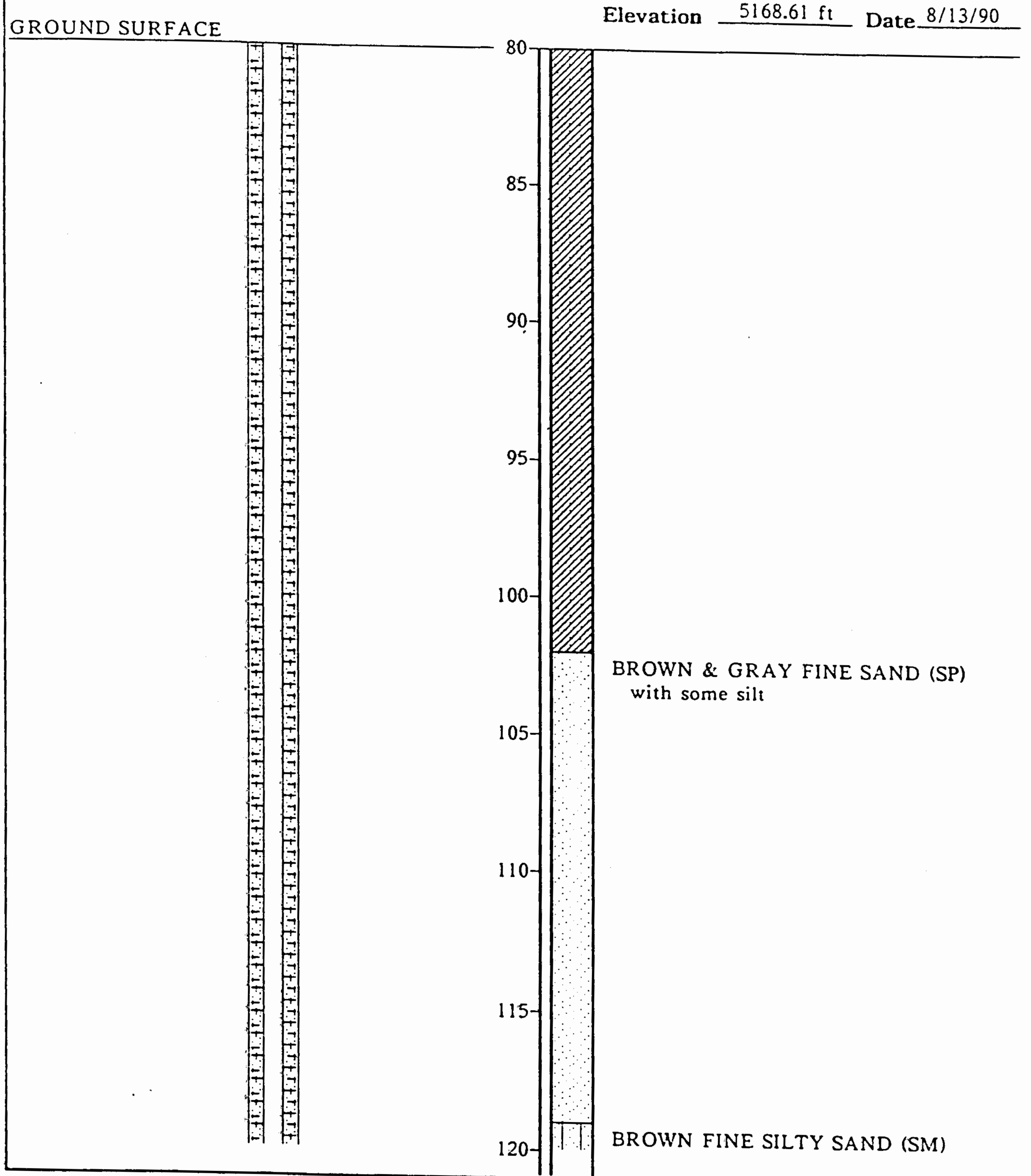
PLATE

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	06310.039.12		12/90		

Top of PVC Casing
Elevation 5168.61

Equipment GD-1500

Elevation 5168.61 ft Date 8/13/90



Harding Lawson Associates
Engineers and
Environmental Services

MONITORING WELL DETAIL MW-56

Sparton Technology Inc.
Albuquerque, New Mexico

PLATE

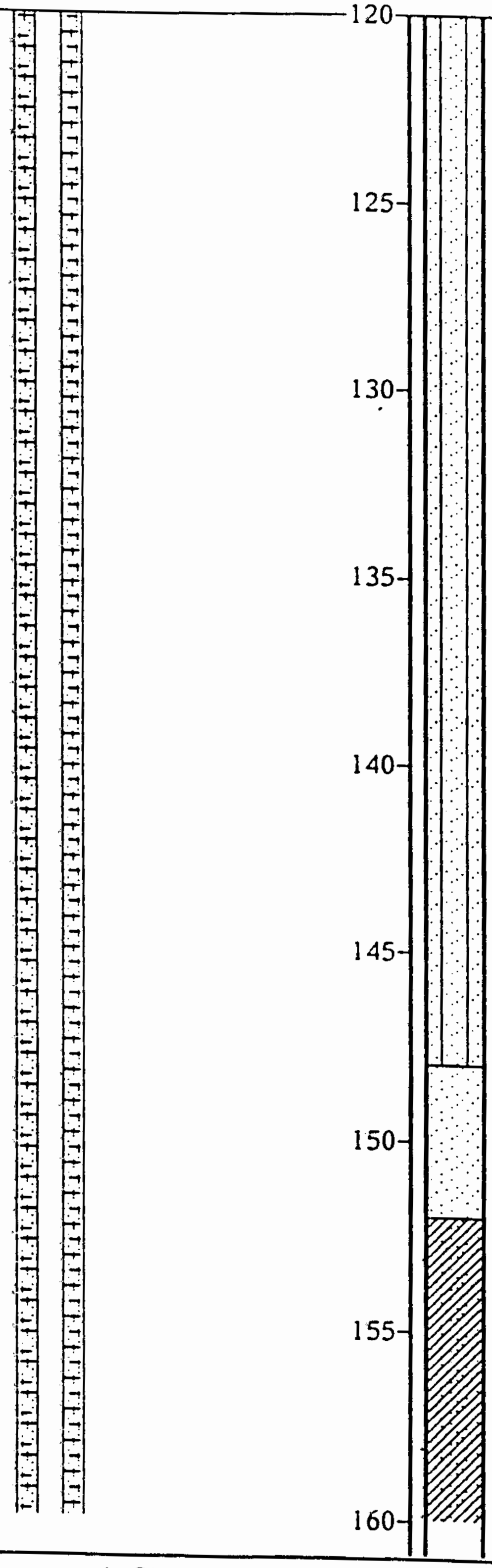
DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	06310.039.12		12/90		

Top of PVC Casing
Elevation 5168.61

Equipment GD-1500

Elevation 5168.61 ft Date 8/13/90

GROUND SURFACE



-occasional small gravel at 145 feet

BROWN & GRAY MEDIUM TO COARSE SAND (SW)

BROWN & GRAY CLAYEY SAND (SC) with some silt

Harding Lawson Associates
Engineers and
Environmental Services

MONITORING WELL DETAIL MW-56

Sparton Technology Inc.
Albuquerque, New Mexico

PLATE

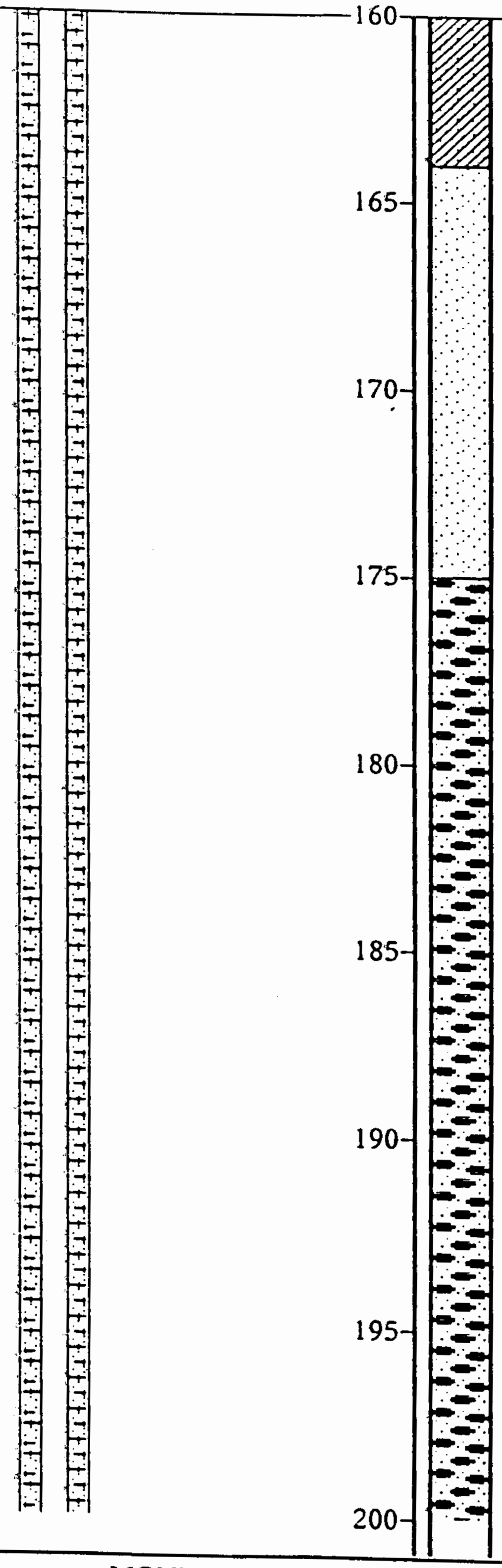
DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	06310.039.12		12/90		

Top of PVC Casing
Elevation 5168.61

Equipment GD-1500

Elevation 5168.61 ft Date 8/13/90

GROUND SURFACE



BROWN FINE TO COARSE SAND (SW) with occasional gravel, increased fine sand, decreased gravel below 165 feet

-occasional clay below 168 feet

BLACK & GRAY SANDY GRAVEL (GW)

4" Stainless Steel casing from 190 to 220 feet

Harding Lawson Associates
Engineers and
Environmental Services

MONITORING WELL DETAIL MW-56

Sparton Technology Inc.
Albuquerque, New Mexico

PLATE

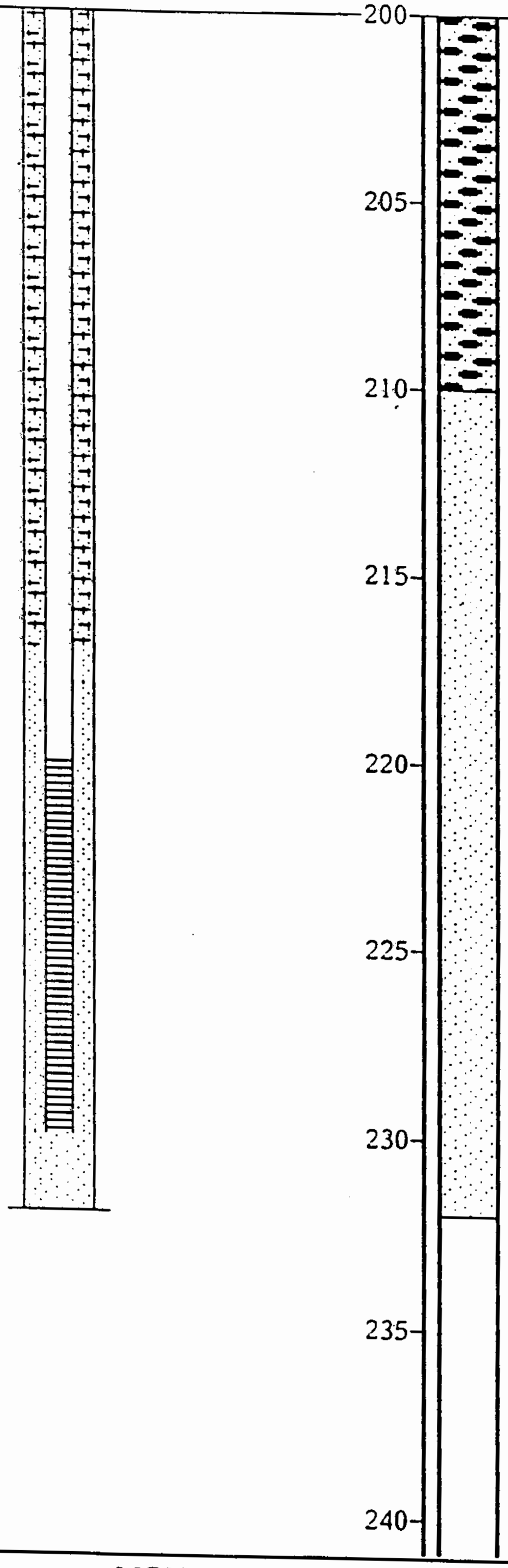
DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	06310.039.12		12/90		

Top of PVC Casing
Elevation 5168.61

Equipment GD-1500

Elevation 5168.61 ft Date 8/13/90

GROUND SURFACE



7-7/8" borehole from
210 to 232 feet

BROWN & BLACK FINE TO COARSE
SAND (SW)

Sandpack:
20x40 sand
(217 to 218 feet)
10x20 sand
(218 to 232 feet)

4" Stainless Steel
Screen (slot size 0.02")
from 220 to 230 feet

Bottom Cap

End of boring at 232.0 feet.

Harding Lawson Associates
Engineers and
Environmental Services

MONITORING WELL DETAIL MW-56

Sparton Technology Inc.
Albuquerque, New Mexico

PLATE

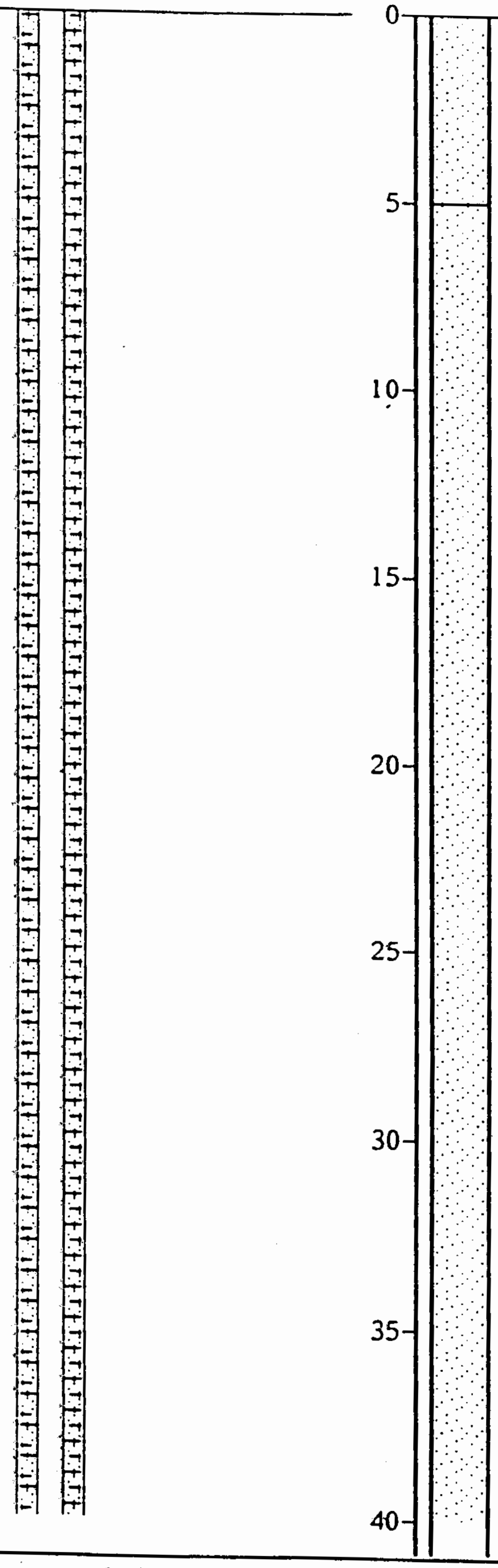
DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	06310.039.12		12/90		

Top of PVC Casing
Elevation 5103.54

Equipment GD-1500

Elevation 5103.54 ft Date 8/29/90

GROUND SURFACE



TAN FINE SAND (SP)
with silt

BROWN FINE TO COARSE SAND (SW)
with occasional clay

4" PVC Casing
to 116 feet

8-5/8" Steel casing
from 0 to 121 feet

12-1/4" Borehole
to 122 feet

Cement/Bentonite
Grout

Harding Lawson Associates
Engineers and
Environmental Services

MONITORING WELL DETAIL MW-57

Sparton Technology Inc.
Albuquerque, New Mexico

PLATE

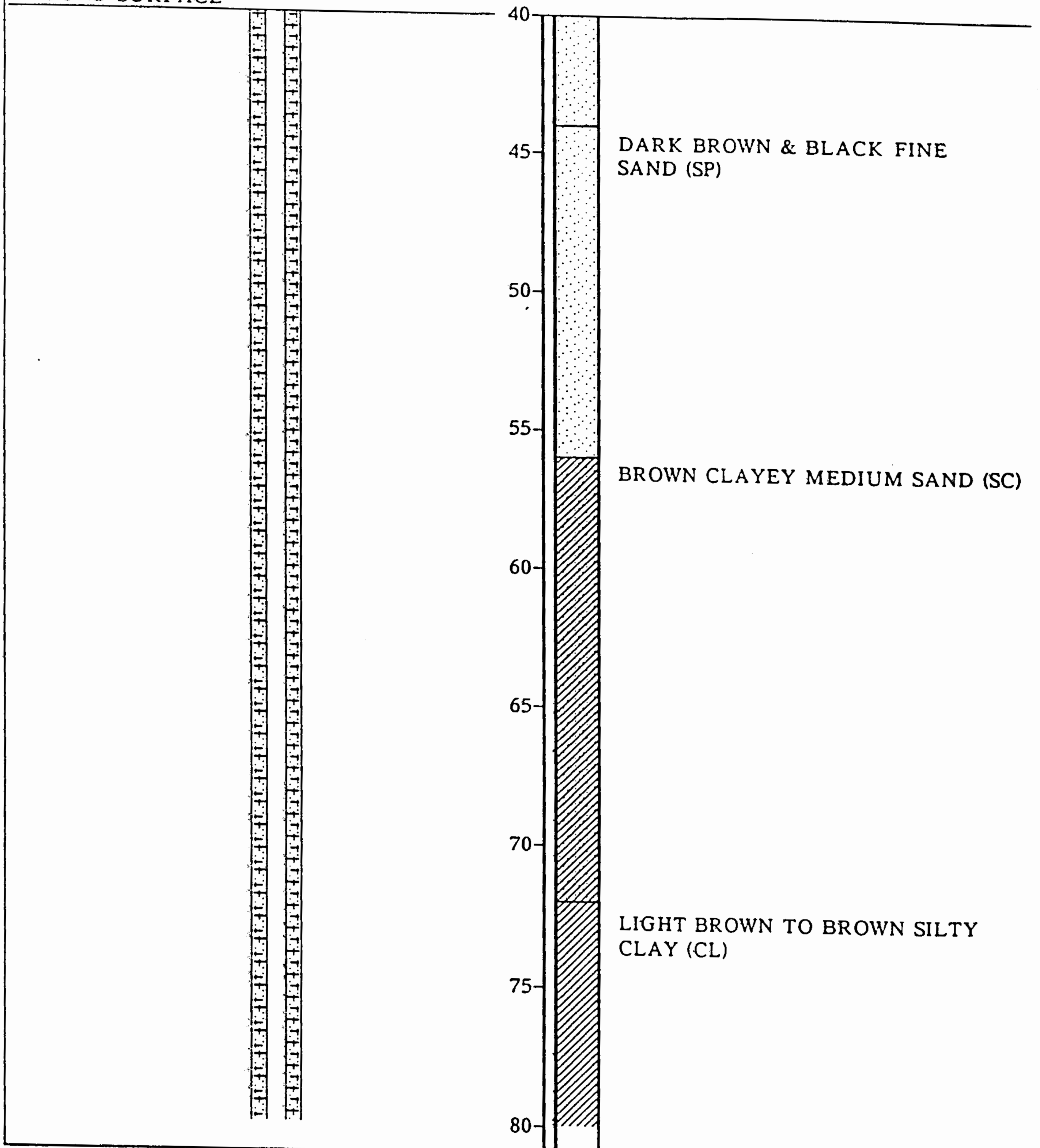
DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	06310.039.12		12/90		

Top of PVC Casing
Elevation 5103.54

Equipment GD-1500

Elevation 5103.54 ft Date 8/29/90

GROUND SURFACE



Harding Lawson Associates
Engineers and
Environmental Services

MONITORING WELL DETAIL MW-57

Sparton Technology Inc.
Albuquerque, New Mexico

PLATE

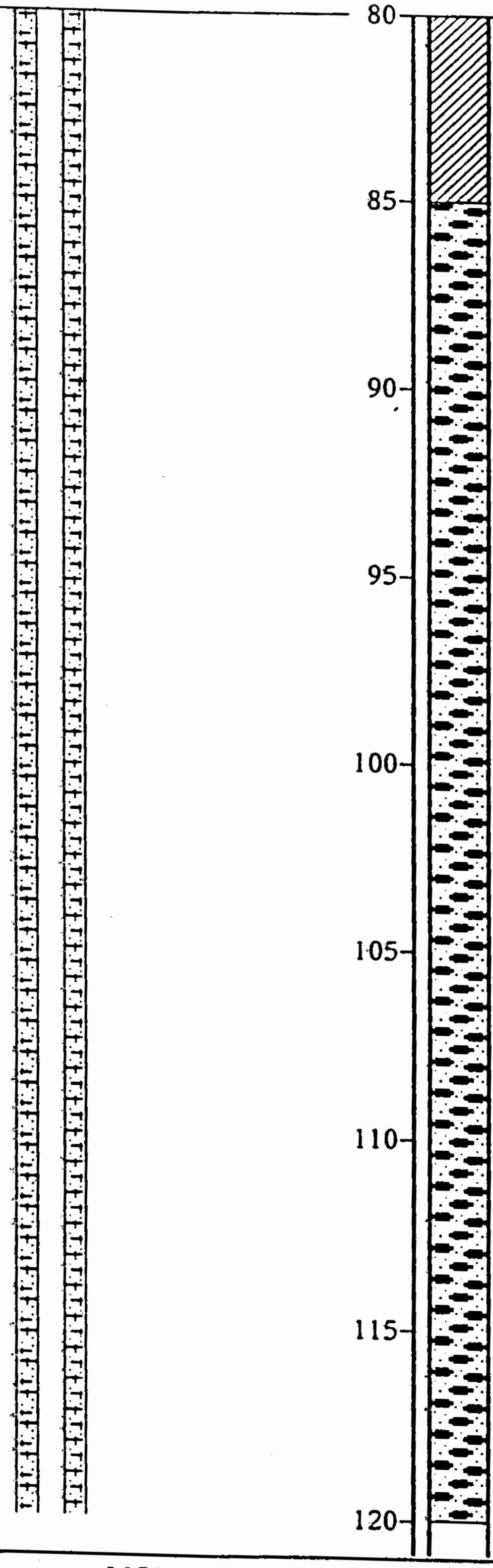
DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	06310.039.12		12/90		

Top of PVC Casing
Elevation 5103.54

Equipment GD-1500

Elevation 5103.54 ft Date 8/29/90

GROUND SURFACE



-occasional sand below 80 feet

BROWN & BLACK COARSE SANDY GRAVEL (GW)

4" Stainless Steel casing from 116 to 126 feet

Harding Lawson Associates
Engineers and
Environmental Services

MONITORING WELL DETAIL MW-57

Sparton Technology Inc.
Albuquerque, New Mexico

PLATE

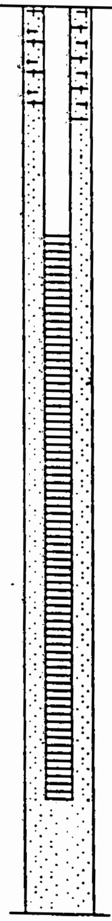
DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	06310,039.12		12/90		

Top of PVC Casing
Elevation 5103.54

GROUND SURFACE

Equipment GD-1500

Elevation 5103.54 ft Date 8/29/90

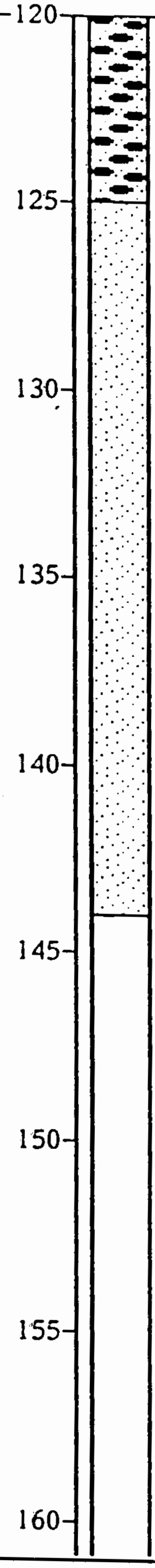


Sandpack:
20x40 sand
(123 to 124 feet)
10x20 sand
(124 to 144 feet)

7-7/8" borehole from
121 to 144 feet

4" Stainless Steel
Screen (slot size 0.02")
from 126 to 141 feet

Bottom Cap



BROWN & BLACK GRAVEL (GP)
cobble size

BLACK & GRAY FINE TO MEDIUM SAND (SP)

End of boring at 144.0 feet.

Harding Lawson Associates
Engineers and
Environmental Services

MONITORING WELL DETAIL MW-57

Sparton Technology Inc.
Albuquerque, New Mexico

PLATE

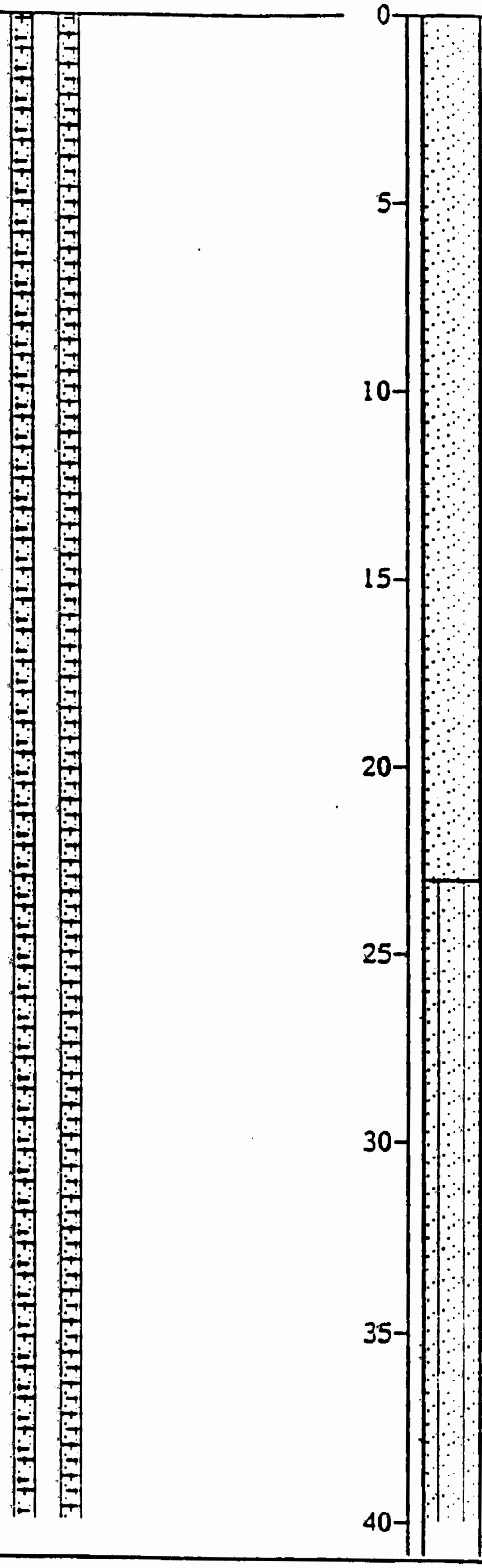
DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	06310,039.12		12/90		

Top of PVC Casing
Elevation 5168.89

Equipment GD-1500

Elevation 5168.89 ft Date 9/10/90

GROUND SURFACE



4" PVC Casing
to 182.5 feet

8-5/8" Steel casing
from 0 to 189 feet

12-1/4" Borehole
to 190 feet

Cement/Bentonite
Grout

TAN & BROWN FINE TO COARSE SAND (SW)
with occasional clay

BROWN & GRAY SILTY SAND (SM)

Harding Lawson Associates
Engineers and
Environmental Services

MONITORING WELL DETAIL MW-58

Sparton Technology Inc.
Albuquerque, New Mexico

PLATE

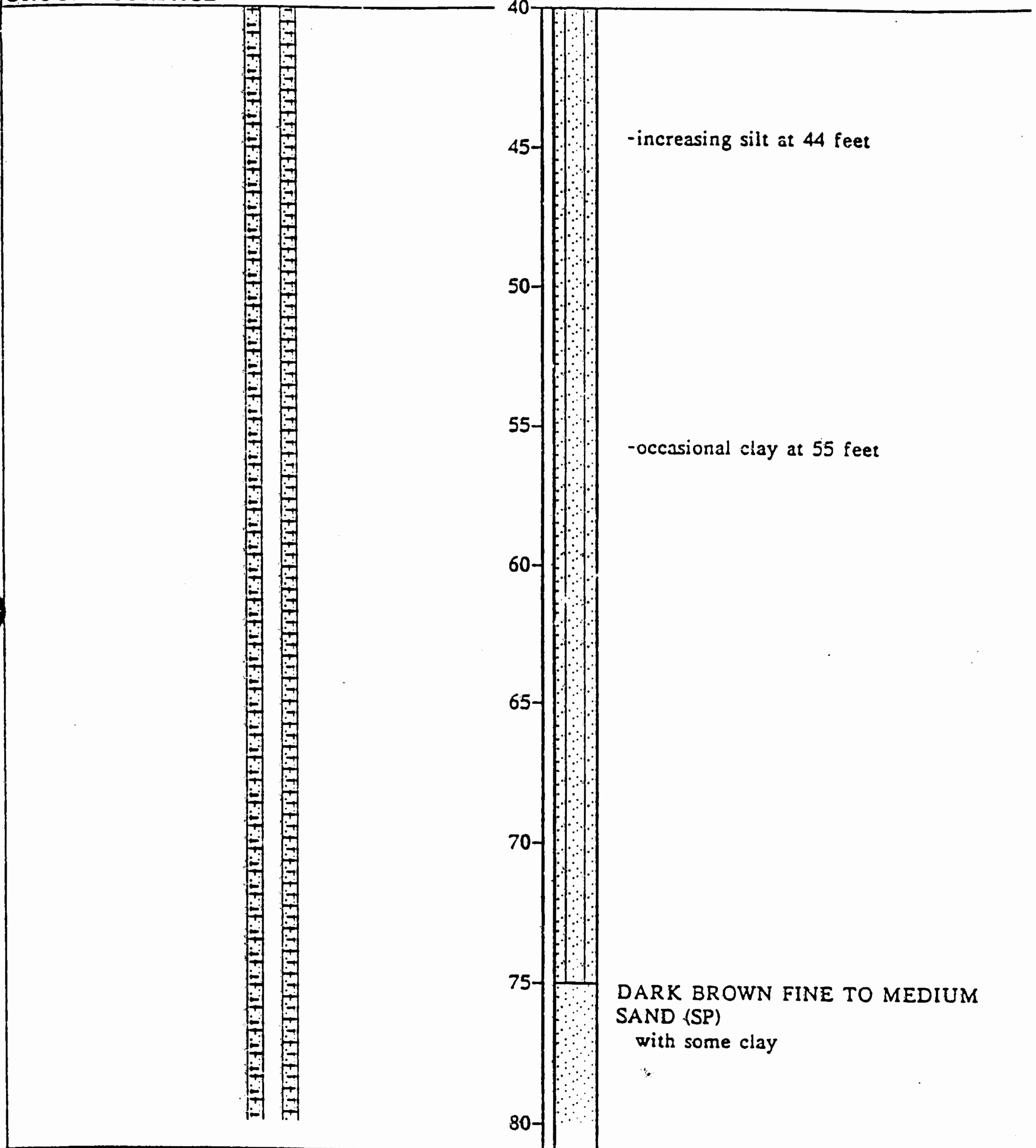
DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	06310.039.12		12/90		

Top of PVC Casing
Elevation 5168.89

Equipment GD-1500

Elevation 5168.89 ft Date 9/10/90

GROUND SURFACE



Harding Lawson Associates
Engineers and
Environmental Services

MONITORING WELL DETAIL MW-58

Sparton Technology Inc.
Albuquerque, New Mexico

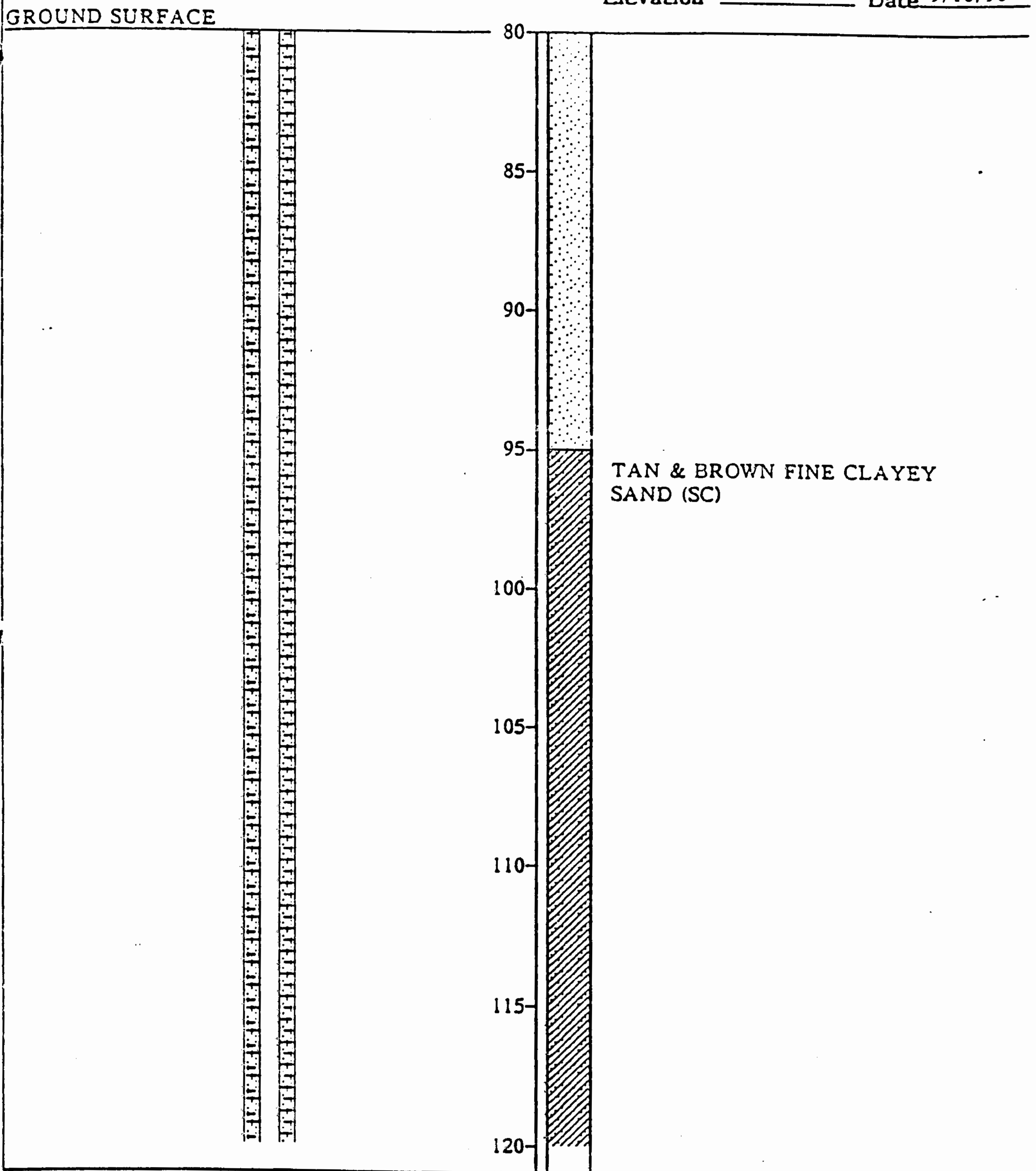
PLATE

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	06310.039.12		12/90		

Top of PVC Casing
Elevation 5168.89

Equipment GD-1500

Elevation 5168.89 ft Date 9/10/90



Harding Lawson Associates
Engineers and
Environmental Services

MONITORING WELL DETAIL MW-58

Sparton Technology Inc.
Albuquerque, New Mexico

PLATE

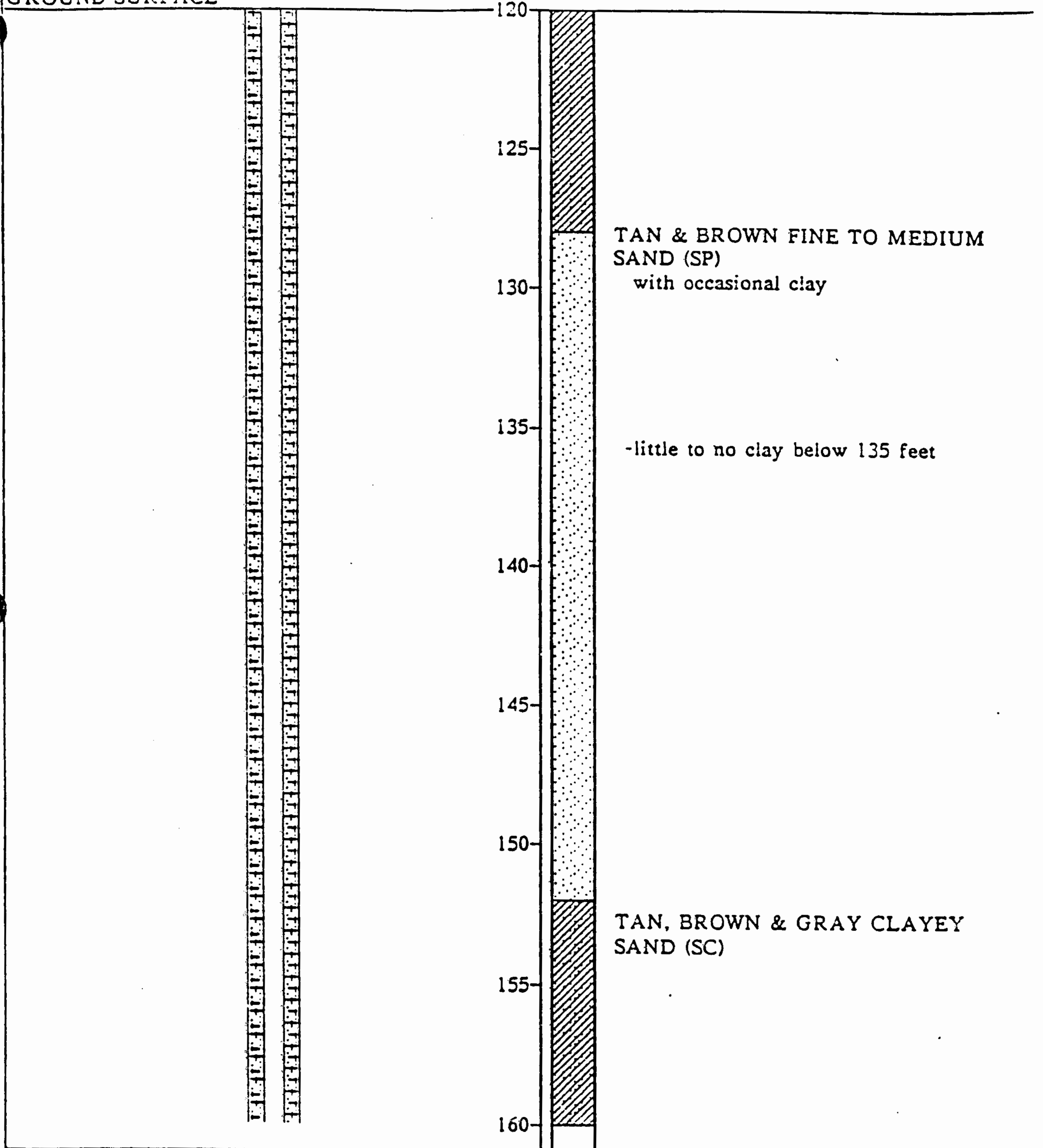
DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	06310.039.12		12/90		

Top of PVC Casing
Elevation 5168.89

Equipment GD-1500

Elevation 5168.89 ft Date 9/10/90

GROUND SURFACE



Harding Lawson Associates
Engineers and
Environmental Services

MONITORING WELL DETAIL MW-58

Sparton Technology Inc.
Albuquerque, New Mexico

PLATE

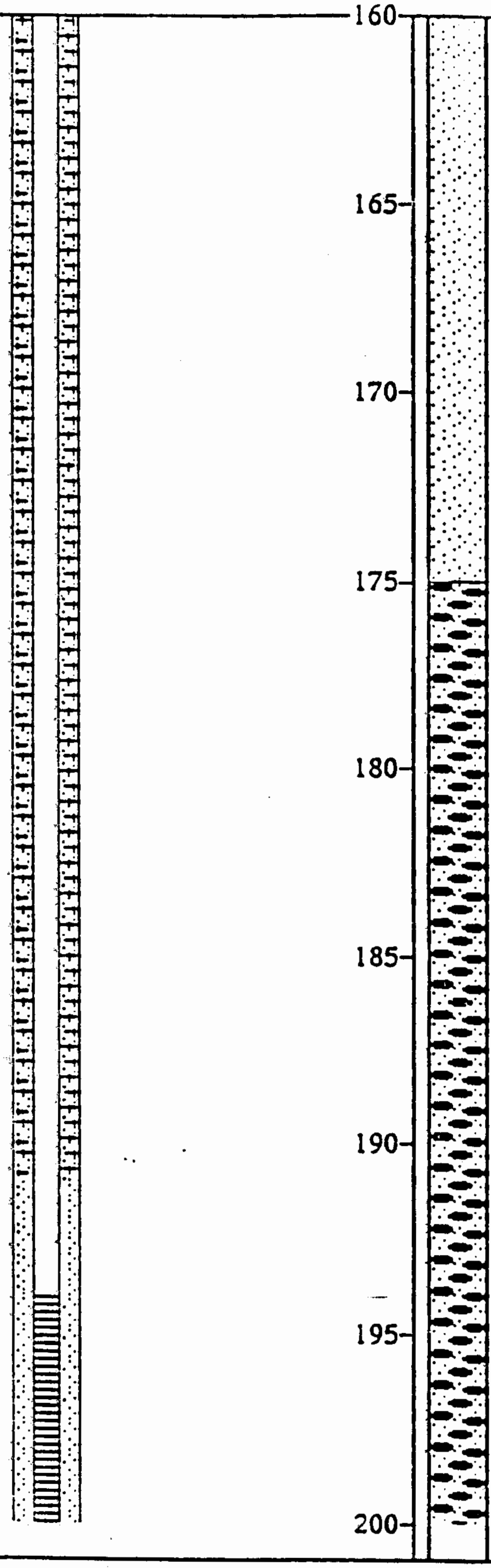
DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	06310.039.12		12/90		

Top of PVC Casing
Elevation 5168.89

Equipment GD-1500

Elevation 5168.89 ft Date 9/10/90

GROUND SURFACE



Harding Lawson Associates
Engineers and
Environmental Services

MONITORING WELL DETAIL MW-58

Sparton Technology Inc.
Albuquerque, New Mexico

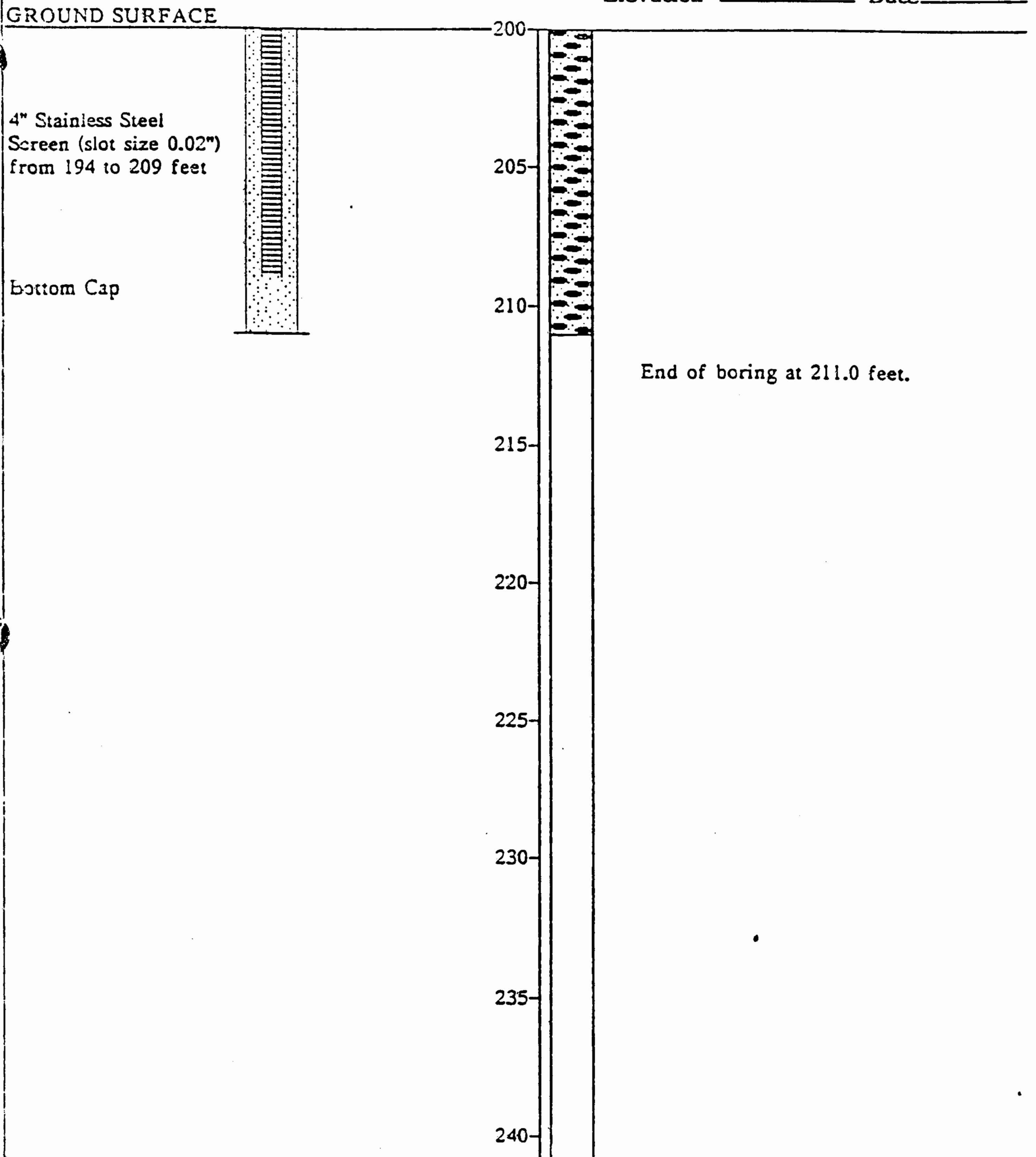
PLATE

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	06310.039.12		12/90		

Top of PVC Casing
Elevation 5168.89

Equipment GD-1500

Elevation 5168.89 ft   Date 9/10/90



Harding Lawson Associates
Engineers and
Environmental Services

MONITORING WELL DETAIL MW-58

Sparton Technology Inc.
Albuquerque, New Mexico

PLATE

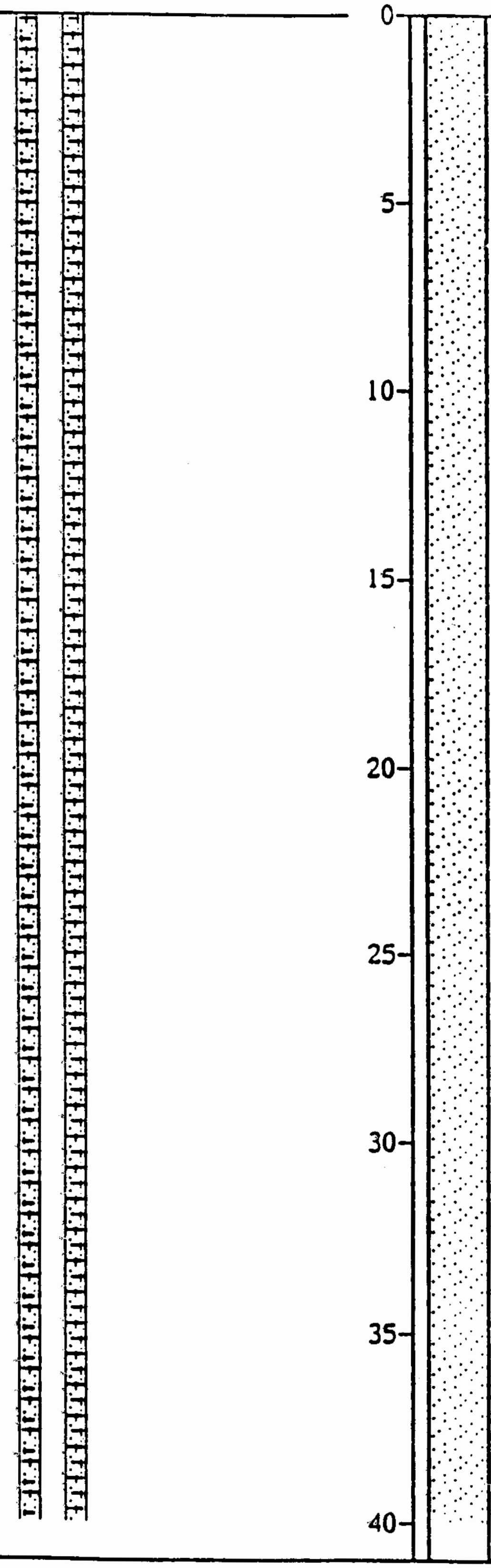
DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	06310,039.12		12/90		

Top of PVC Casing
Elevation 5059.18

Equipment GD-1500

Elevation 5059.18 ft Date 9/17/90

GROUND SURFACE



TAN & BROWN FINE TO COARSE SAND (SW)

4" PVC Casing
to 88.9 feet

8-5/8" Steel casing
from 0 to 95 feet

12-1/4" Borehole
to 97 feet

Cement/Bentonite
Grout

Harding Lawson Associates
Engineers and
Environmental Services

MONITORING WELL DETAIL MW-59

PLATE

Sparton Technology Inc.
Albuquerque, New Mexico

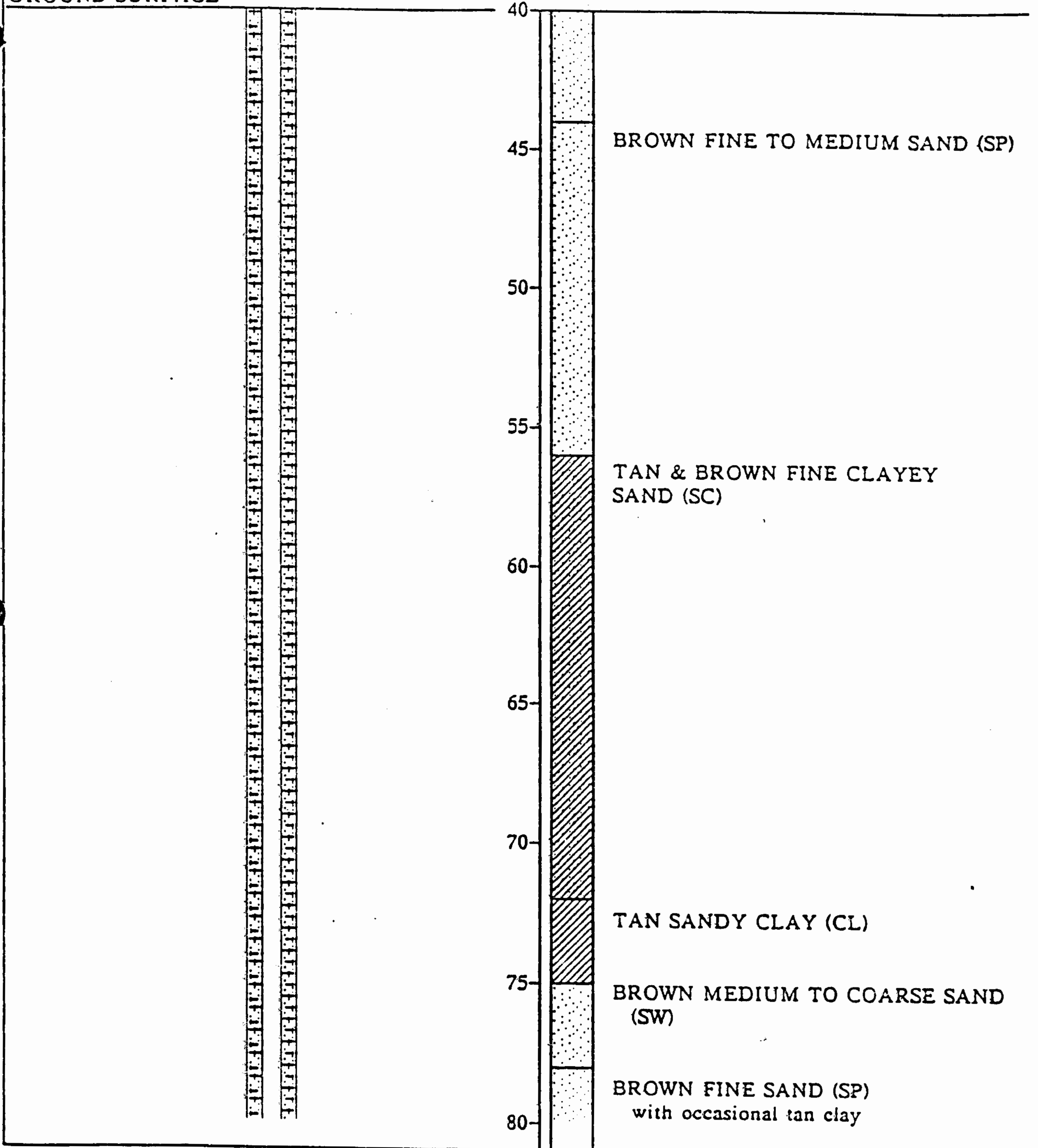
DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	06310.039.12		12/90		

Top of PVC Casing
Elevation 5059.18

Equipment GD-1500

Elevation 5059.18 ft Date 9/17/90

GROUND SURFACE



Harding Lawson Associates
Engineers and Environmental Services

MONITORING WELL DETAIL MW-59

PLATE

Sparton Technology Inc.
Albuquerque, New Mexico

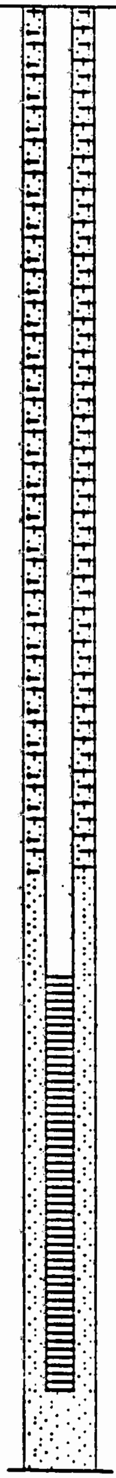
DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	06310.039.12		12/90		

Top of PVC Casing
Elevation 5059.18

Equipment GD-1500

Elevation 5059.18 ft Date 9/17/90

GROUND SURFACE



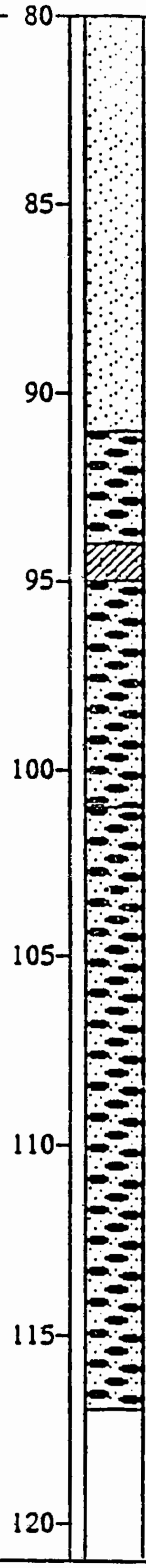
4" Stainless Steel
casing from
88.9 to 104.6 feet

7-7/8" borehole from
95 to 117 feet

Sandpack:
20x40 sand
(102 to 103 feet)
10x20 sand
(103 to 117 feet)

4" Stainless Steel
Screen (slot size 0.02")
from 104.5 to 115 feet

Bottom Cap



BROWN, GRAY & BLACK SANDY
GRAVEL (GP)

TAN CLAYEY SAND (SC)

BROWN, GRAY & BLACK SANDY
GRAVEL (GP)
occasional clayey sand from 96 to
98 feet and from 99 to 100 feet

BROWN & BLACK GRAVEL (GW)
cobble size

End of boring at 117.0 feet.

Harding Lawson Associates
Engineers and
Environmental Services

MONITORING WELL DETAIL MW-59

Sparton Technology Inc.
Albuquerque, New Mexico

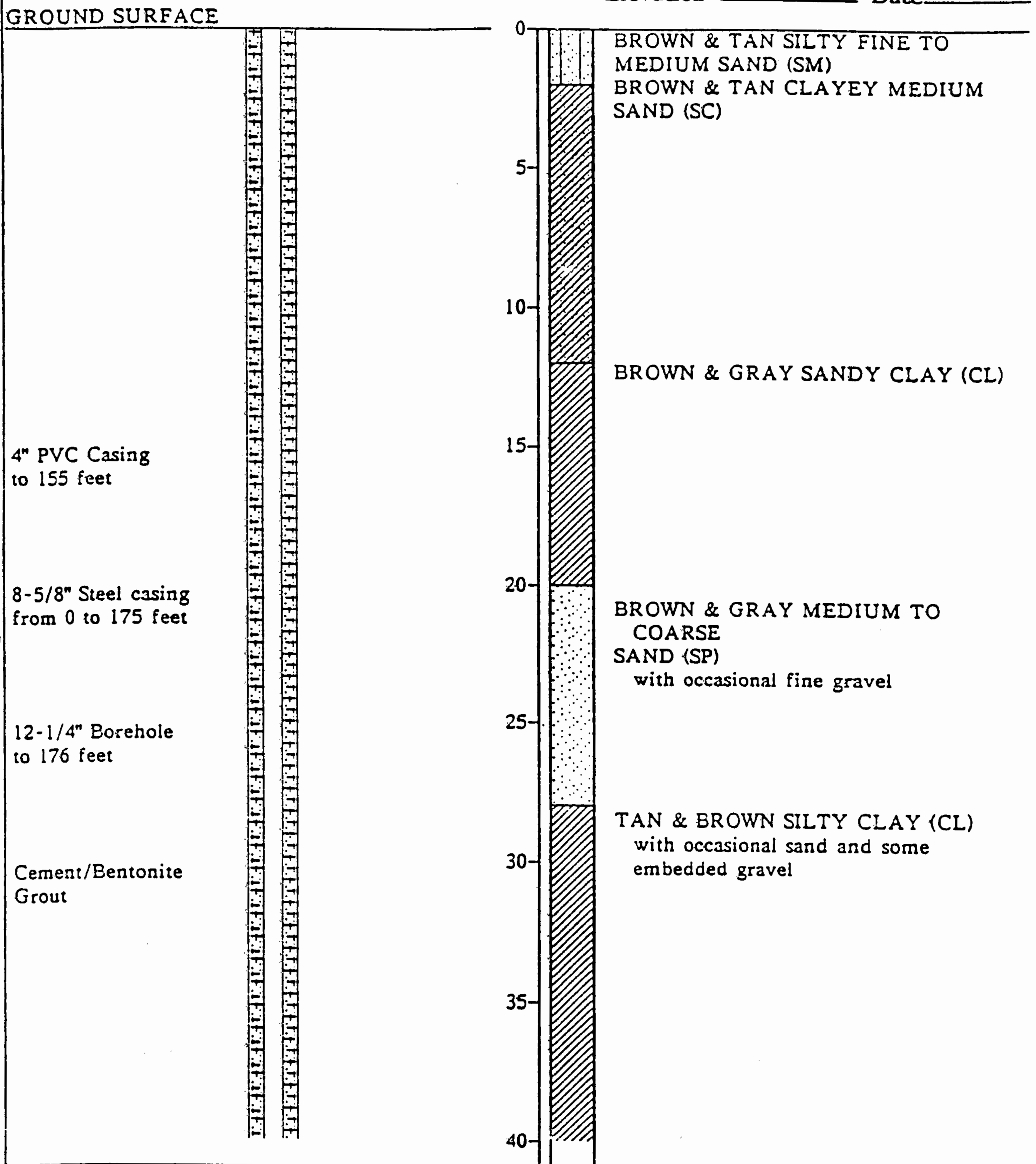
PLATE

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	06310.039.12		12/90		

Top of PVC Casing
Elevation 5133.62

Equipment GD-1500

Elevation 5133.62 ft Date 9/26/90



Harding Lawson Associates
Engineers and
Environmental Services

MONITORING WELL DETAIL MW-60

Sparton Technology Inc.
Albuquerque, New Mexico

PLATE

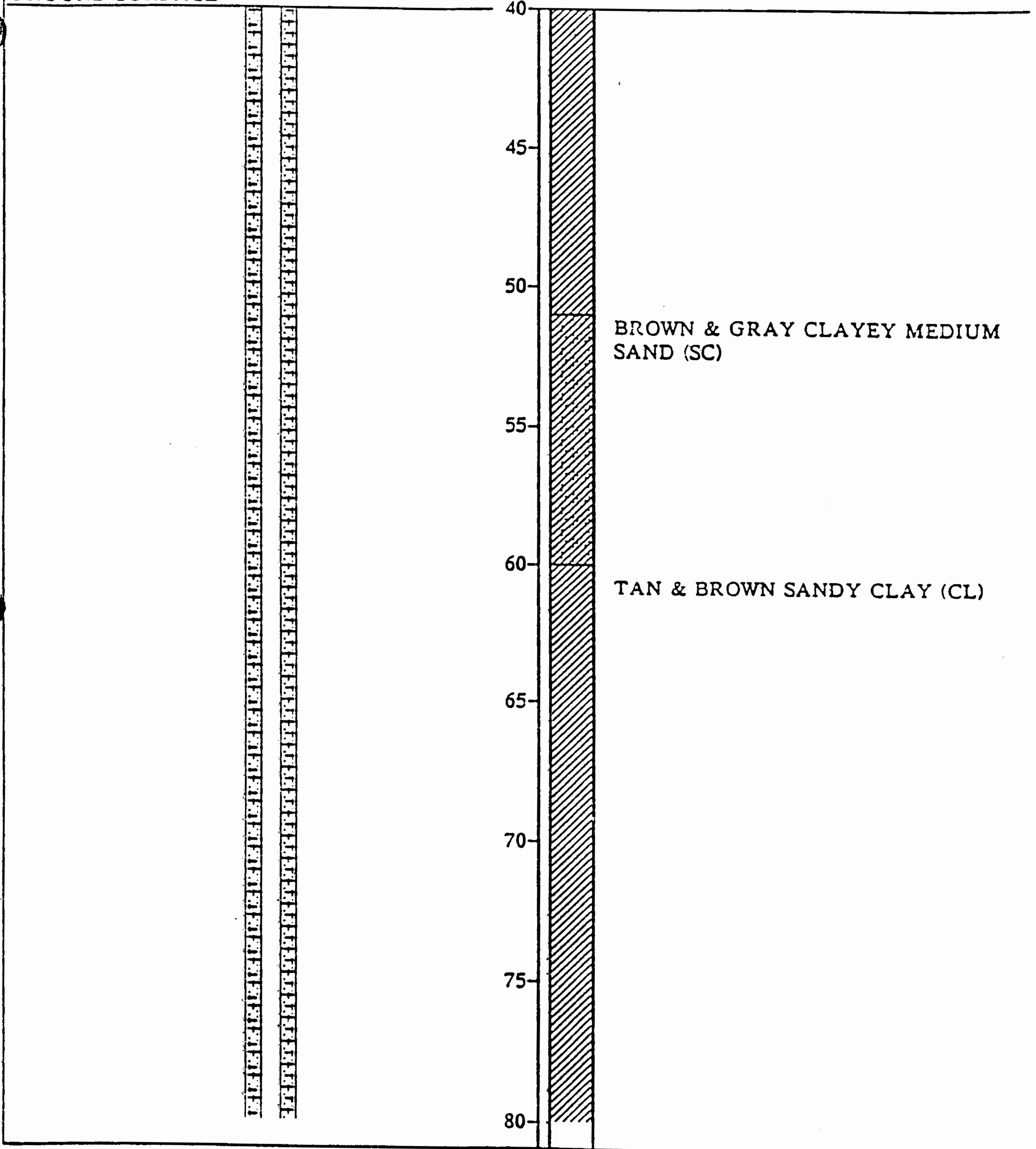
DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	06310.039.12		12/90		

Top of PVC Casing
Elevation 5133.62

Equipment GD-1500

Elevation 5133.62 ft Date 9/26/90

GROUND SURFACE



Harding Lawson Associates
Engineers and Environmental Services

MONITORING WELL DETAIL MW-60

Sparton Technology Inc.
Albuquerque, New Mexico

PLATE

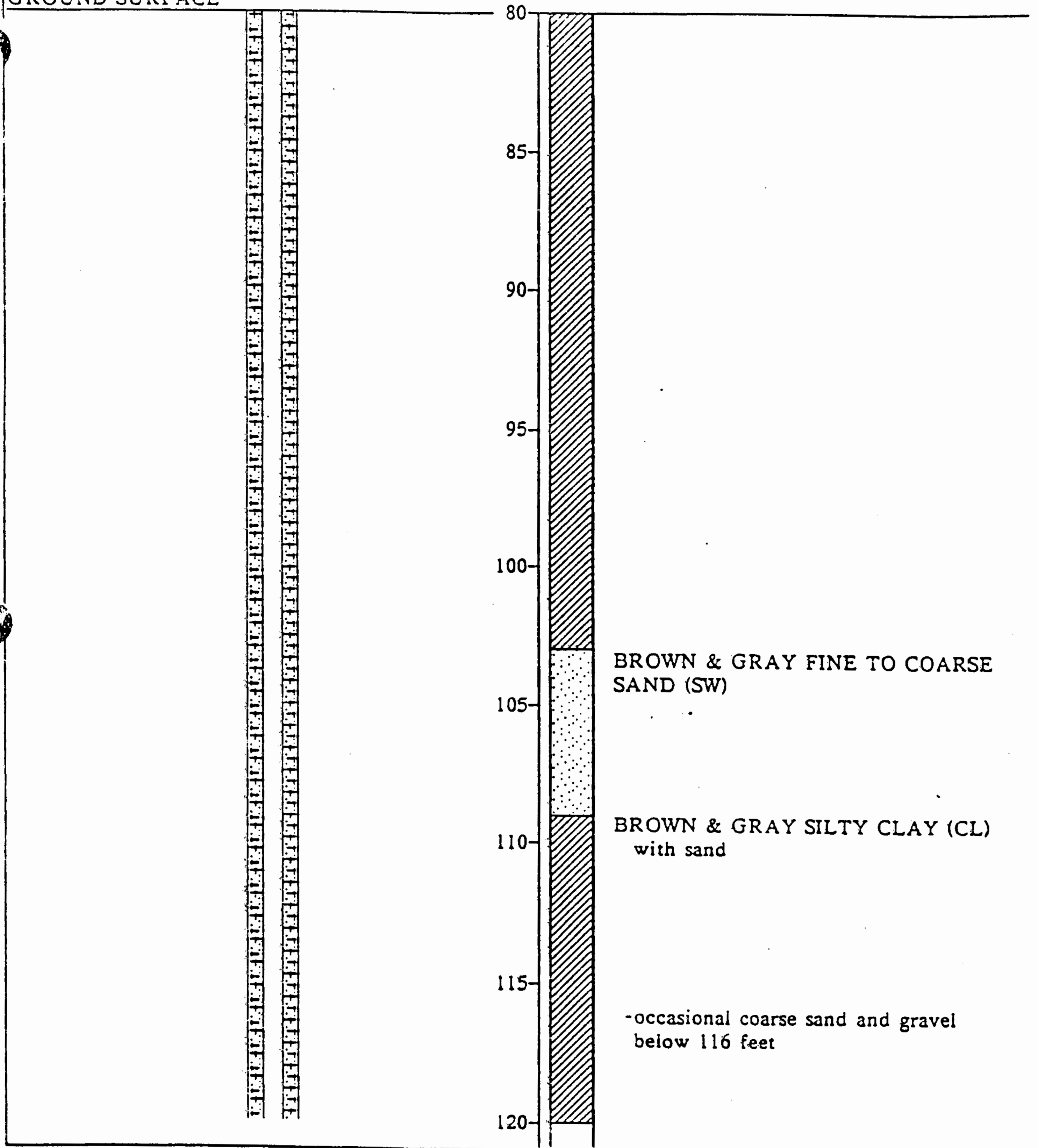
DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	06310.039.12		12/90		

Top of PVC Casing
Elevation 5133.62

Equipment GD-1500

Elevation 5133.62 ft Date 9/26/90

GROUND SURFACE



Harding Lawson Associates
Engineers and
Environmental Services

MONITORING WELL DETAIL MW-60

Sparton Technology Inc.
Albuquerque, New Mexico

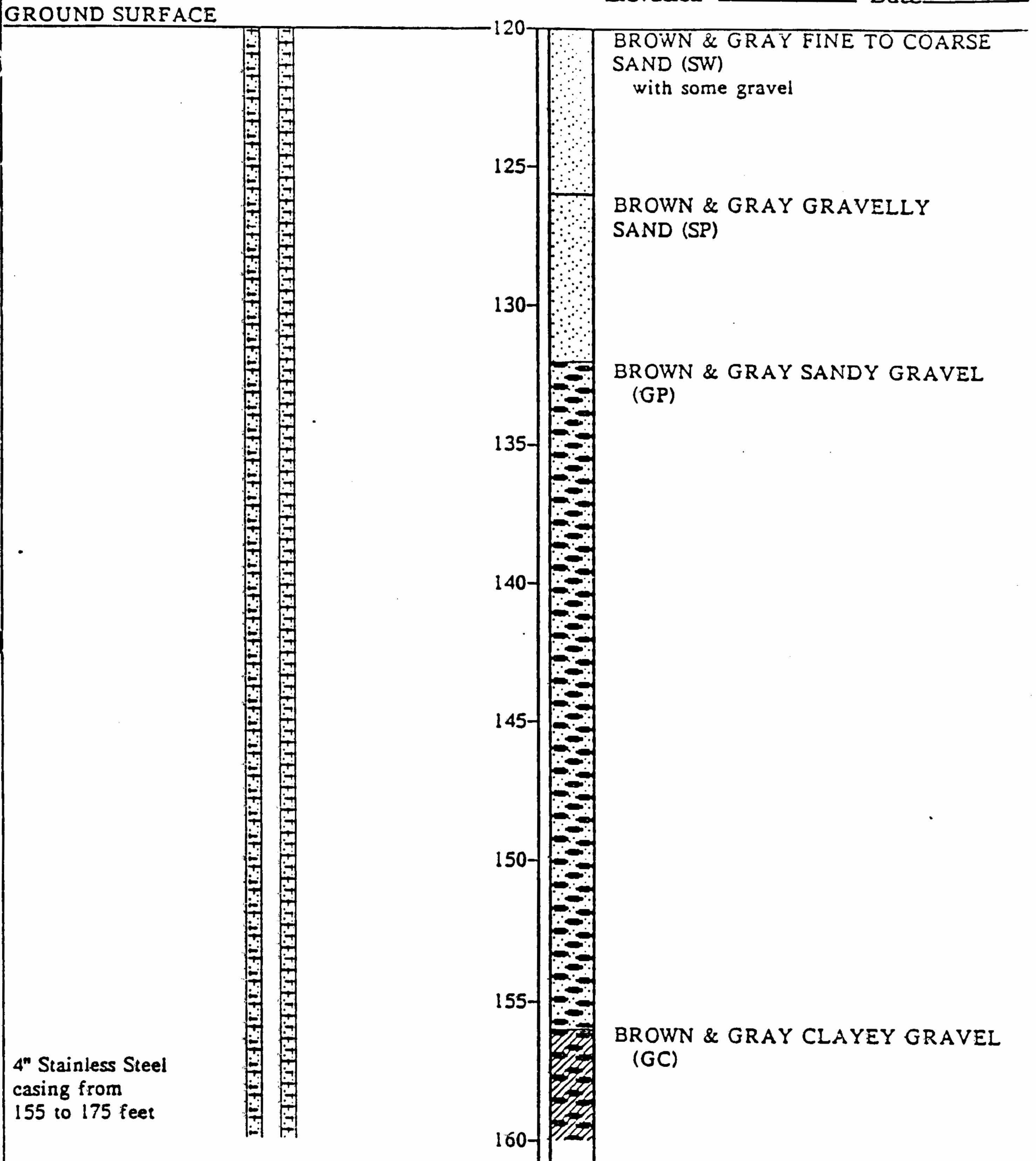
PLATE

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	06310.039.12		12/90		

Top of PVC Casing
Elevation 5133.62

Equipment GD-1500

Elevation 5133.62 ft   Date 9/26/90



Harding Lawson Associates
Engineers and
Environmental Services

MONITORING WELL DETAIL MW-60

Sparton Technology Inc.
Albuquerque, New Mexico

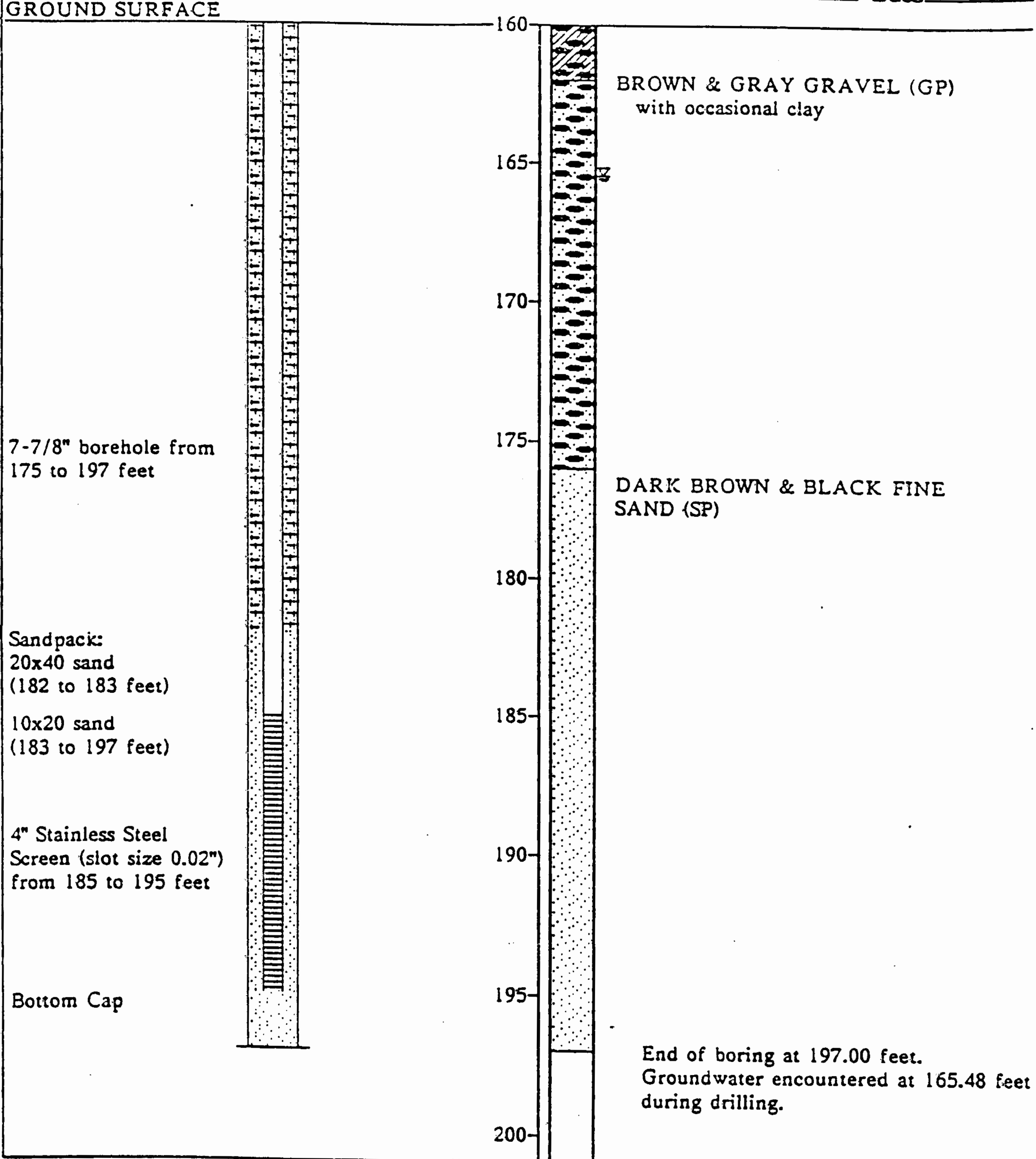
PLATE

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	06310.039.12		12/90		

Top of PVC Casing
Elevation 5133.62

Equipment GD-1500

Elevation 5133.62 ft Date 9/26/90



Harding Lawson Associates
Engineers and
Environmental Services

MONITORING WELL DETAIL MW-60

Sparton Technology Inc.
Albuquerque, New Mexico

PLATE

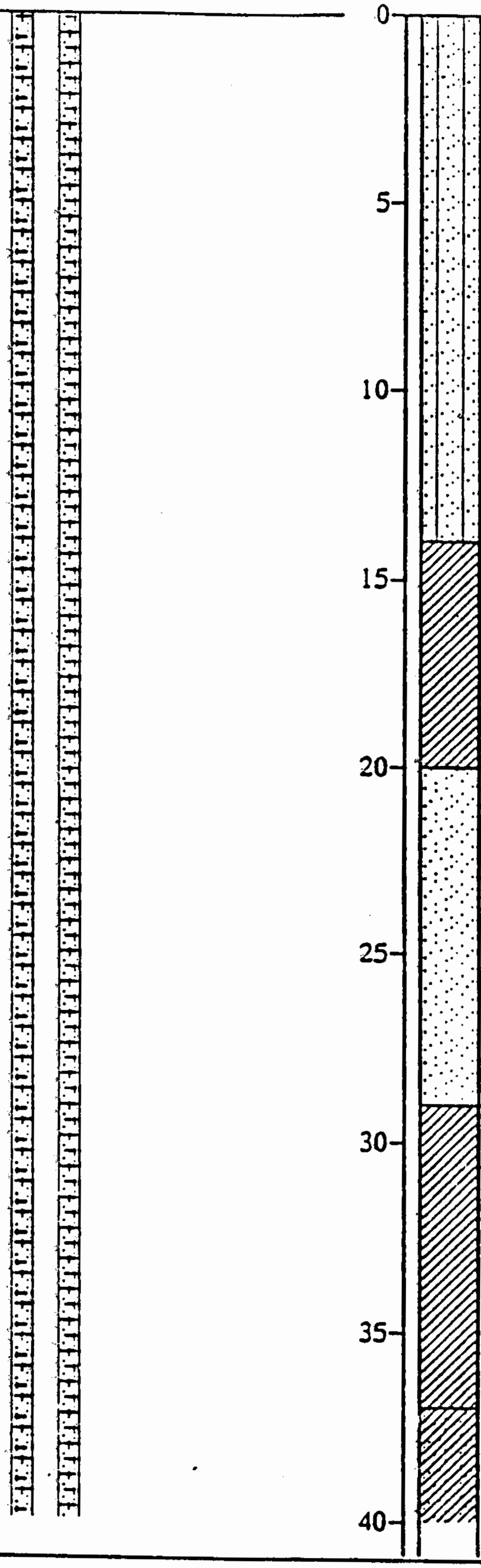
DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	06310.039.12		12/90		

Top of PVC Casing
Elevation 5133.98

Equipment GD-1500

Elevation 5133.98 ft Date 9/28/90

GROUND SURFACE



TAN SILTY FINE SAND (SM)

BROWN & TAN SANDY CLAY (CL)
with some seams of clayey sand

BROWN & GRAY GRAVELLY SAND
(SP)

TAN & BROWN SILTY CLAY (CL)
with some sand

TAN & BROWN CLAYEY SAND (SC)

4" PVC Casing
to 148 feet

8-5/8" Steel casing
from 0 to 153 feet

12-1/4" Borehole
to 154 feet

Cement/Bentonite
Grout

Harding Lawson Associates
Engineers and
Environmental Services

MONITORING WELL DETAIL MW-61

Sparton Technology Inc.
Albuquerque, New Mexico

PLATE

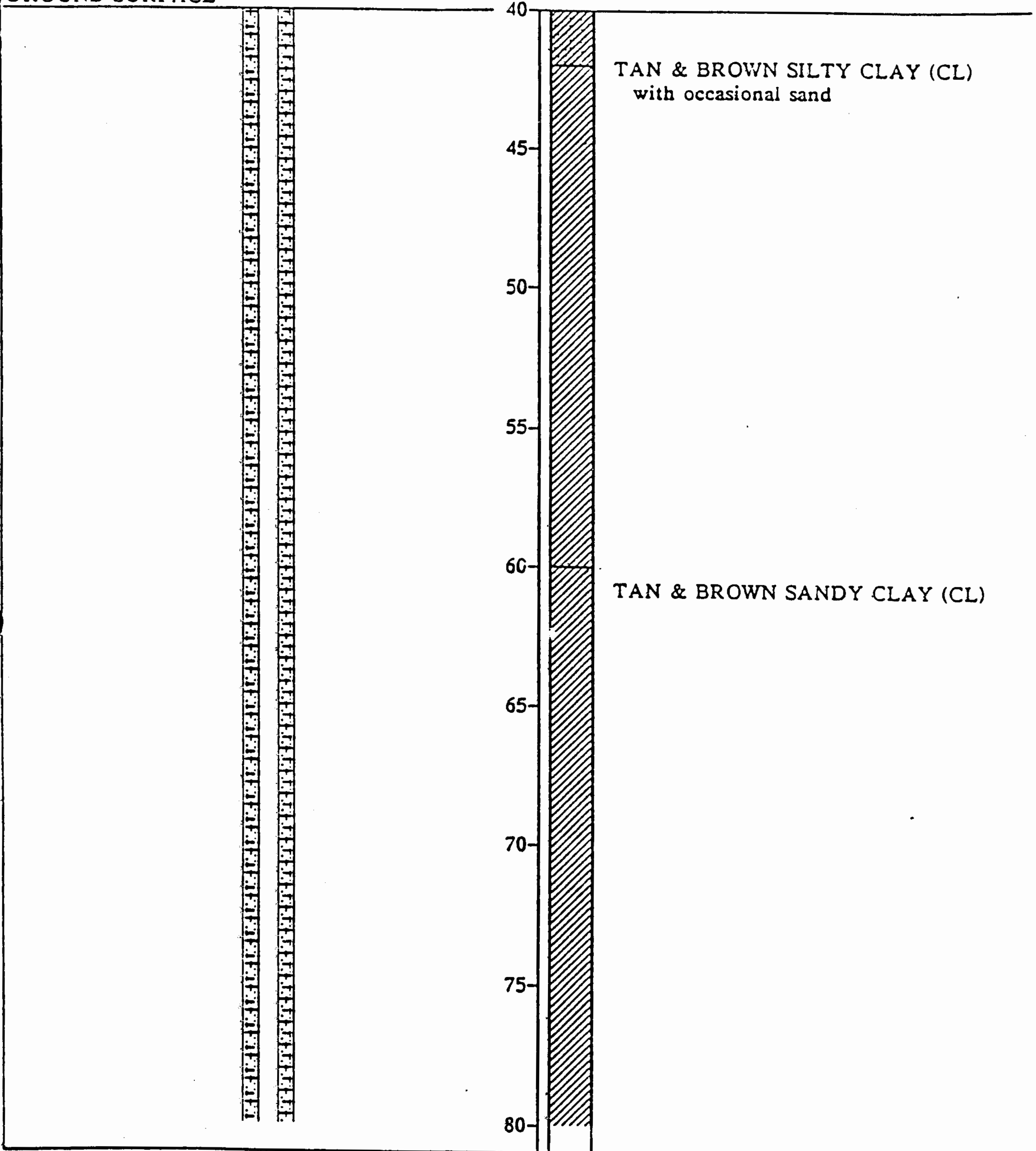
DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	06310.039.12		12/90		

Top of PVC Casing
Elevation 5133.98

Equipment GD-1500

Elevation 5133.98 ft Date 9/28/90

GROUND SURFACE



Harding Lawson Associates
Engineers and
Environmental Services

MONITORING WELL DETAIL MW-61

Sparton Technology Inc.
Albuquerque, New Mexico

PLATE

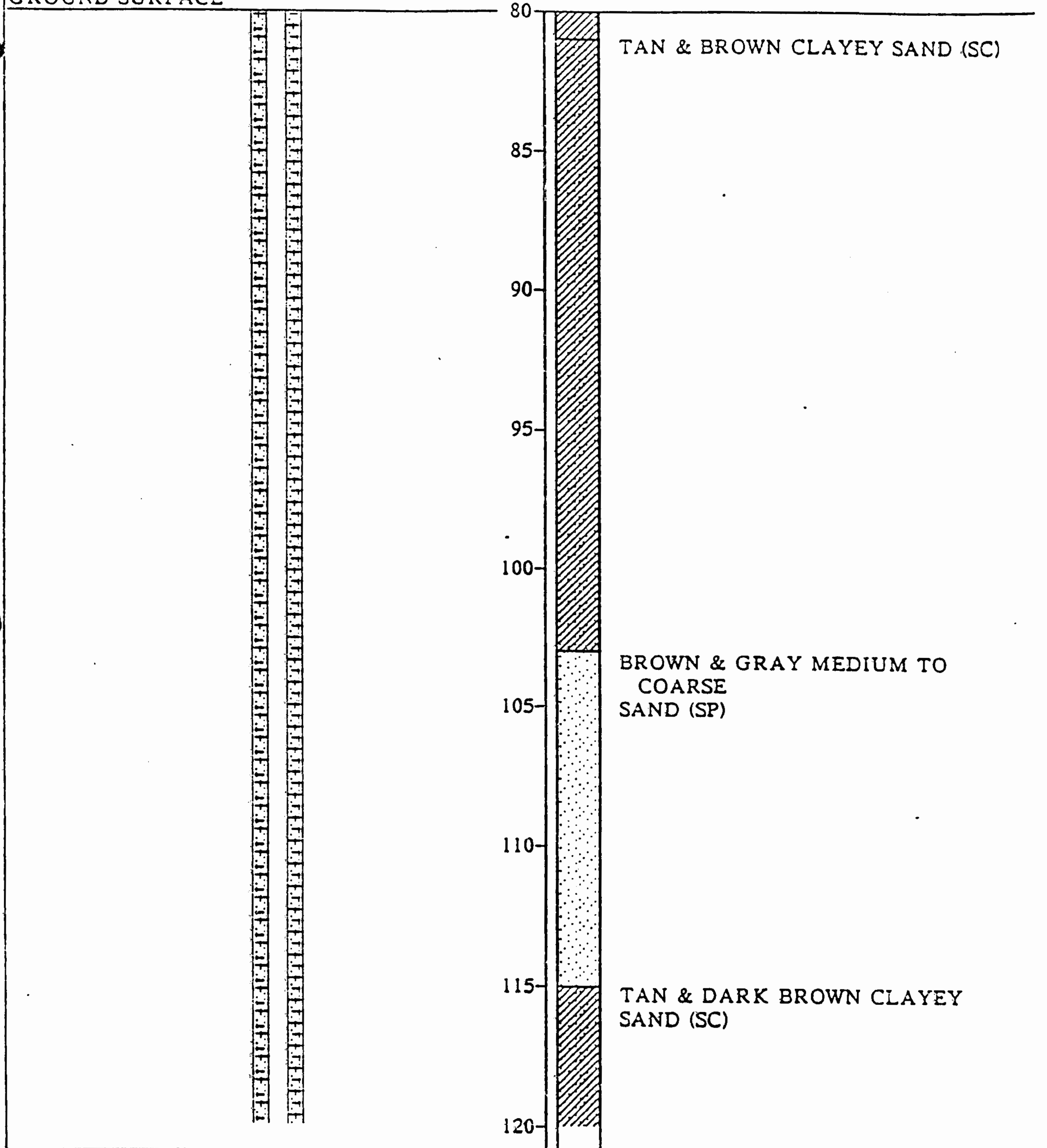
DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	06310,039.12		12/90		

Top of PVC Casing
Elevation 5133.98

Equipment GD-1500

Elevation 5133.98 ft Date 9/28/90

GROUND SURFACE



Harding Lawson Associates
Engineers and
Environmental Services

MONITORING WELL DETAIL MW-61

Sparton Technology Inc.
Albuquerque, New Mexico

PLATE

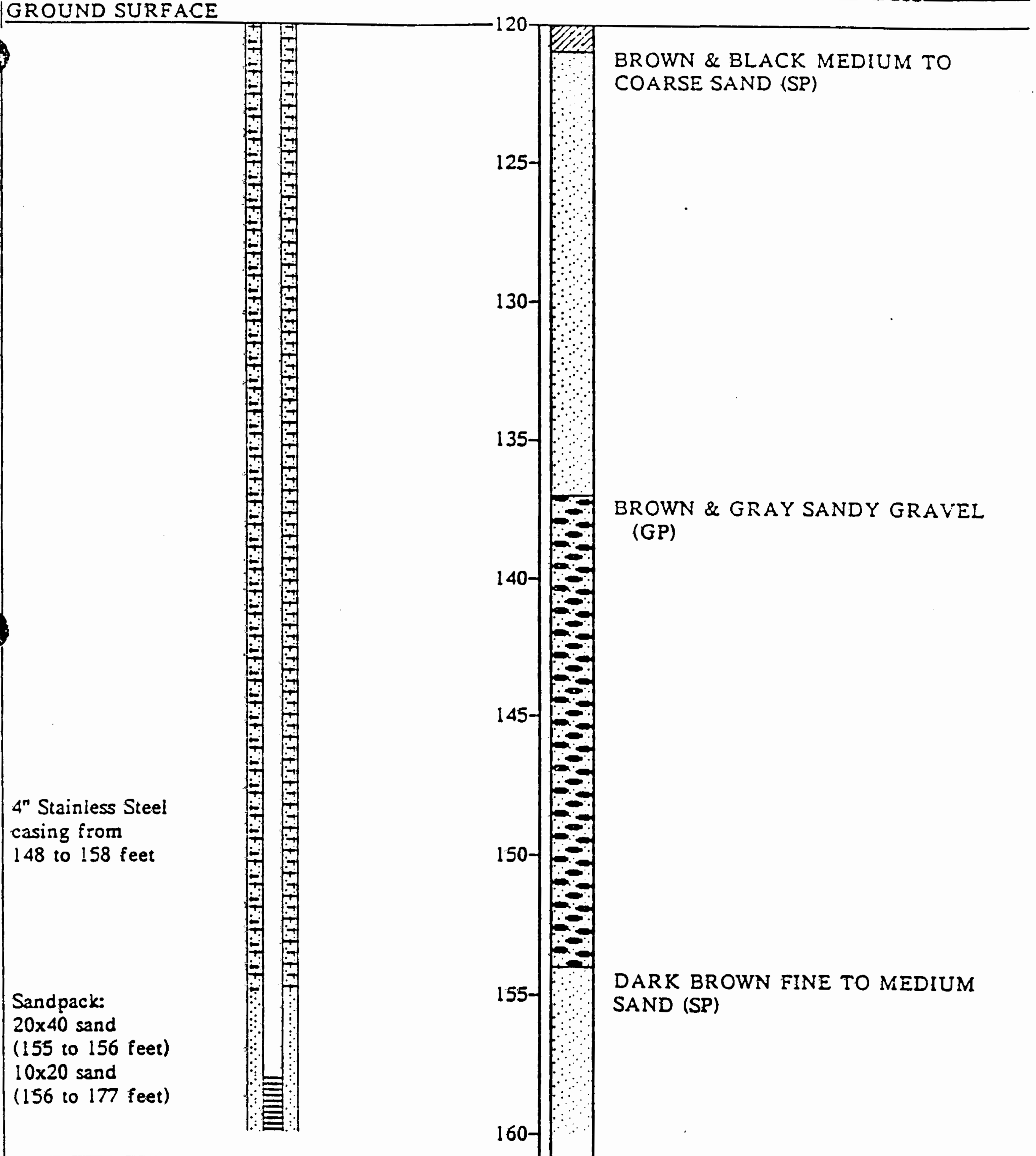
DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	06310,039.12		12/90		

Top of PVC Casing
Elevation 5133.98

Equipment GD-1500

Elevation 5133.98 ft Date 9/28/90

GROUND SURFACE



Harding Lawson Associates
Engineers and
Environmental Services

MONITORING WELL DETAIL MW-61

Sparton Technology Inc.
Albuquerque, New Mexico

PLATE

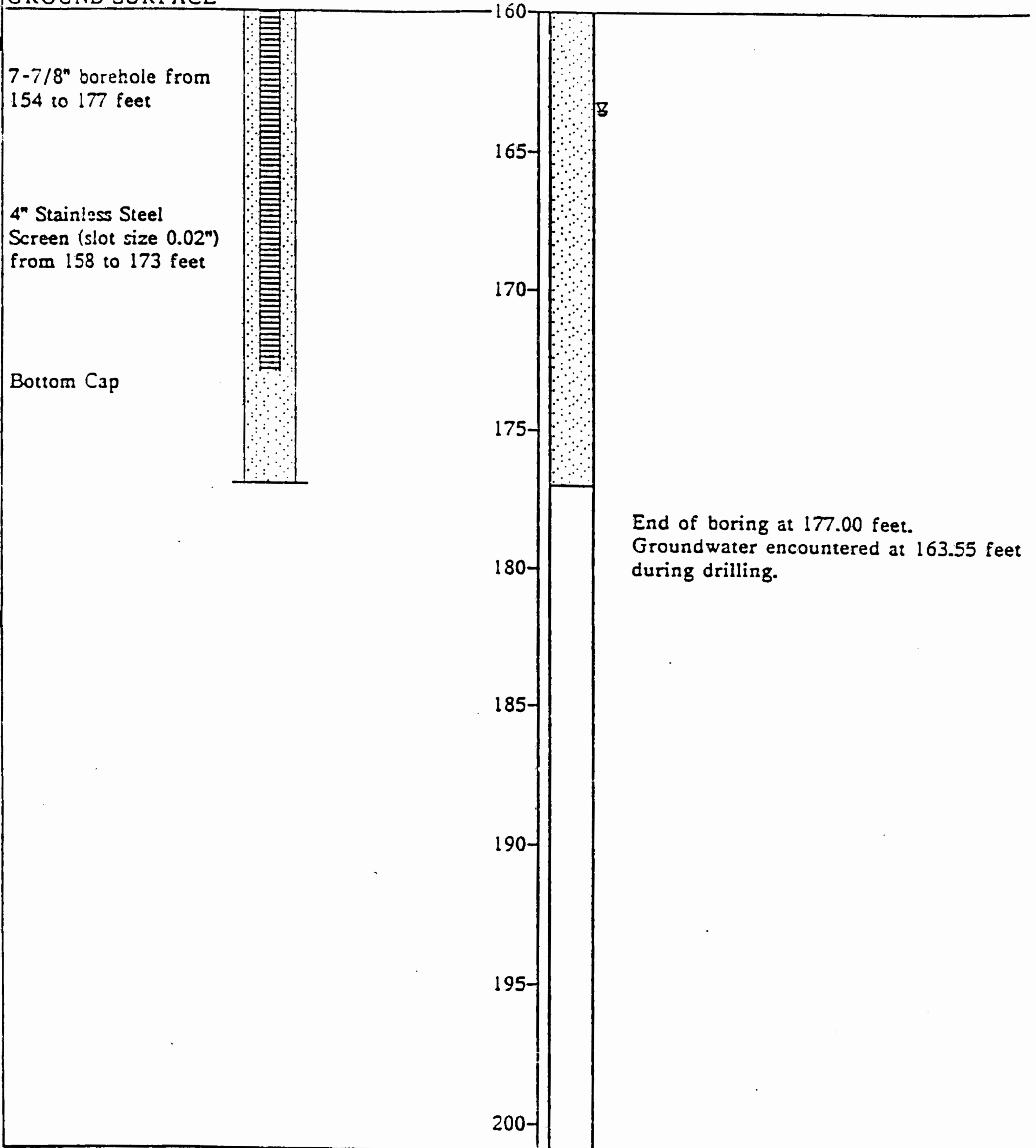
DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	06310,039.12		12/90		

Top of PVC Casing
Elevation 5133.98

Equipment GD-1500

Elevation 5133.98 ft Date 9/28/90

GROUND SURFACE



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Engineers and
Environmental Services

MONITORING WELL DETAIL MW-61

Sparton Technology Inc.
Albuquerque, New Mexico

PLATE

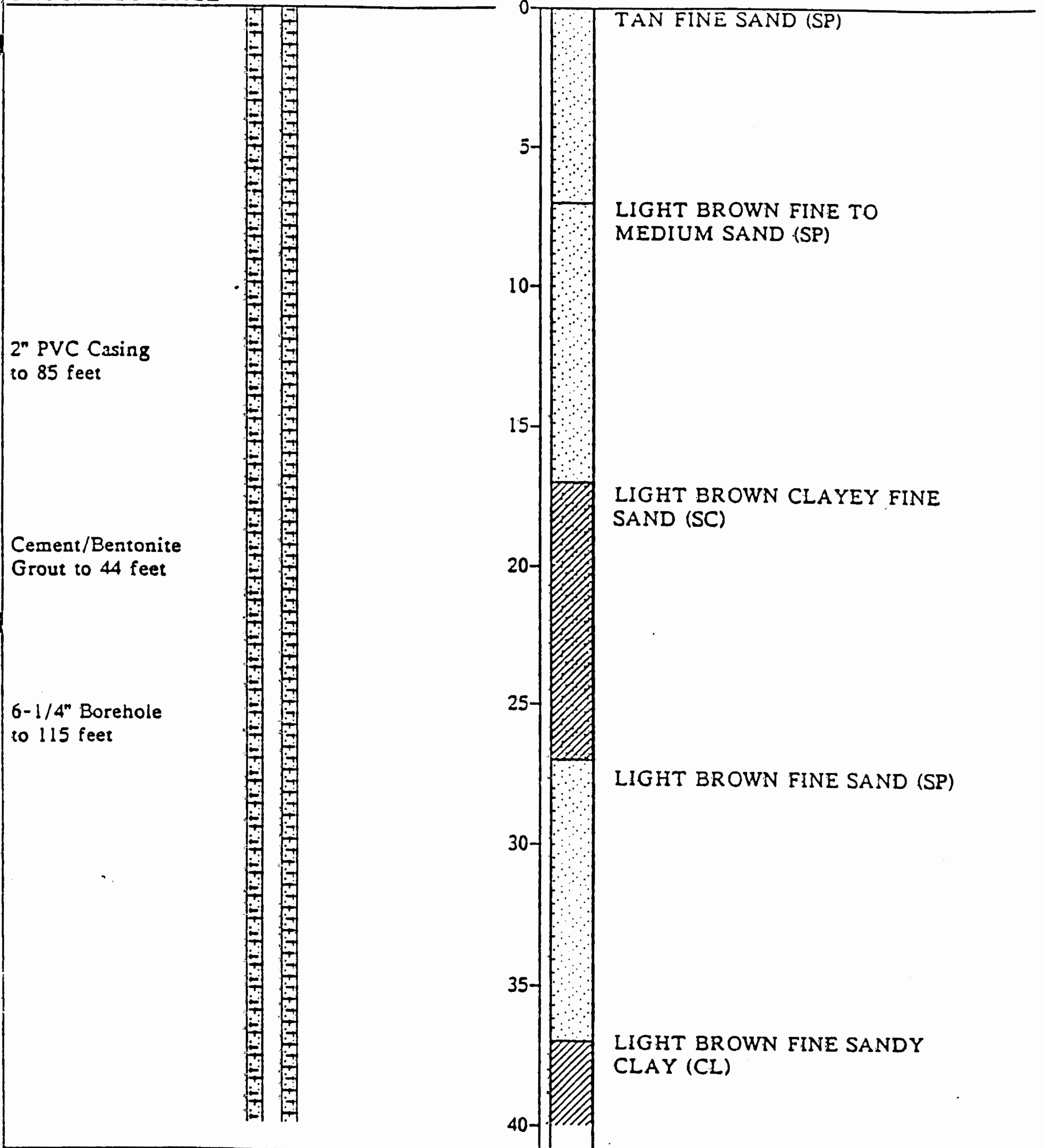
DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	06310.039.12		12/90		

Top of PVC Casing
Elevation 5075.00

Equipment GD-1500

Elevation 5075.00 ft Date 9/28/90

GROUND SURFACE



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Environmental Services

MONITORING WELL DETAIL MW-62

PLATE

Sparton Technology Inc.
Albuquerque, New Mexico

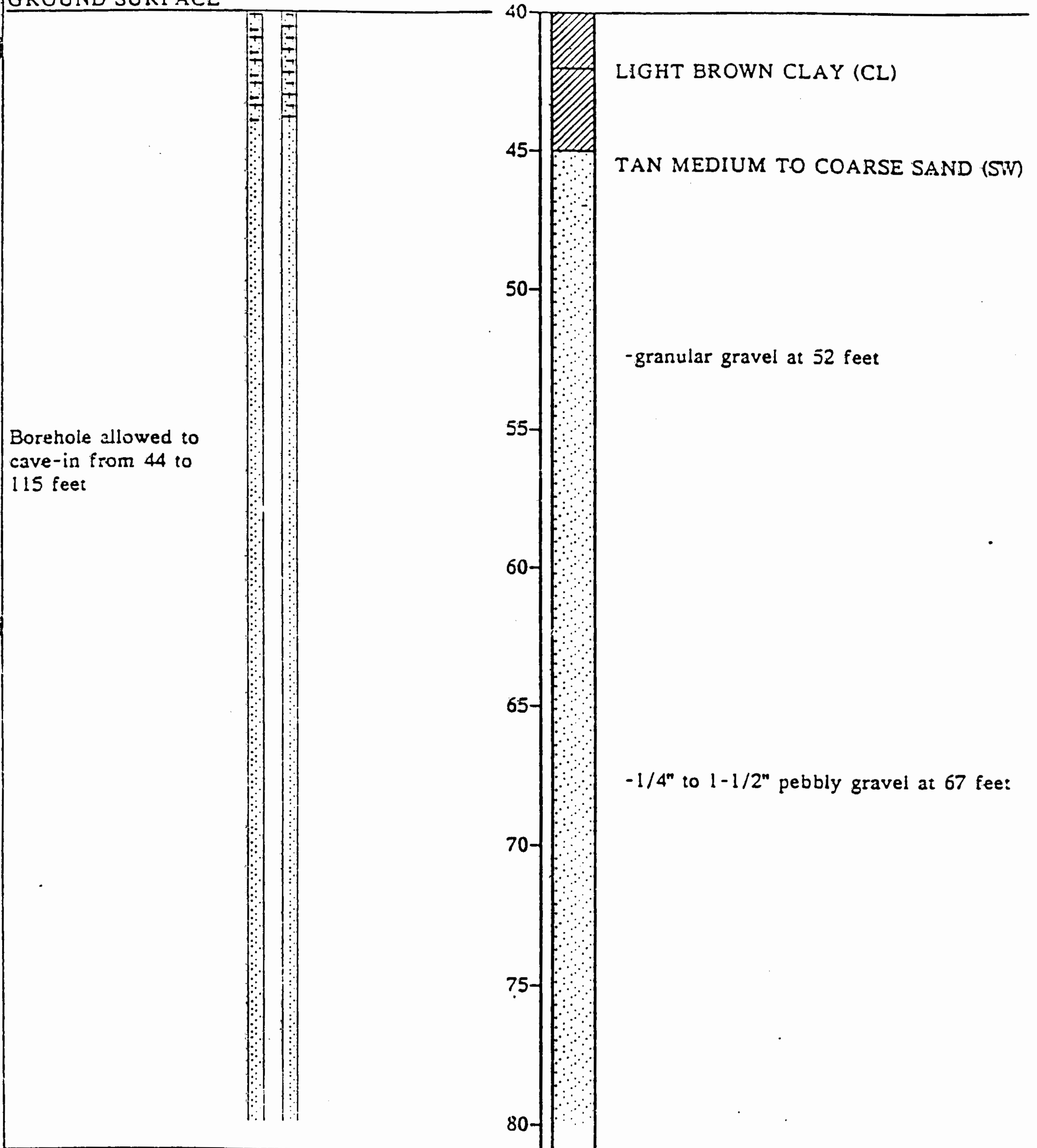
DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	06310,039.12		12/90		

Top of PVC Casing
Elevation 5075.00

Equipment GD-1500

Elevation 5075.00 ft Date 9/28/90

GROUND SURFACE



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Engineers and
Environmental Services

MONITORING WELL DETAIL MW-62

Sparton Technology Inc.
Albuquerque, New Mexico

PLATE

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	06310,039.12		12/90		

Top of PVC Casing
Elevation 5075.00

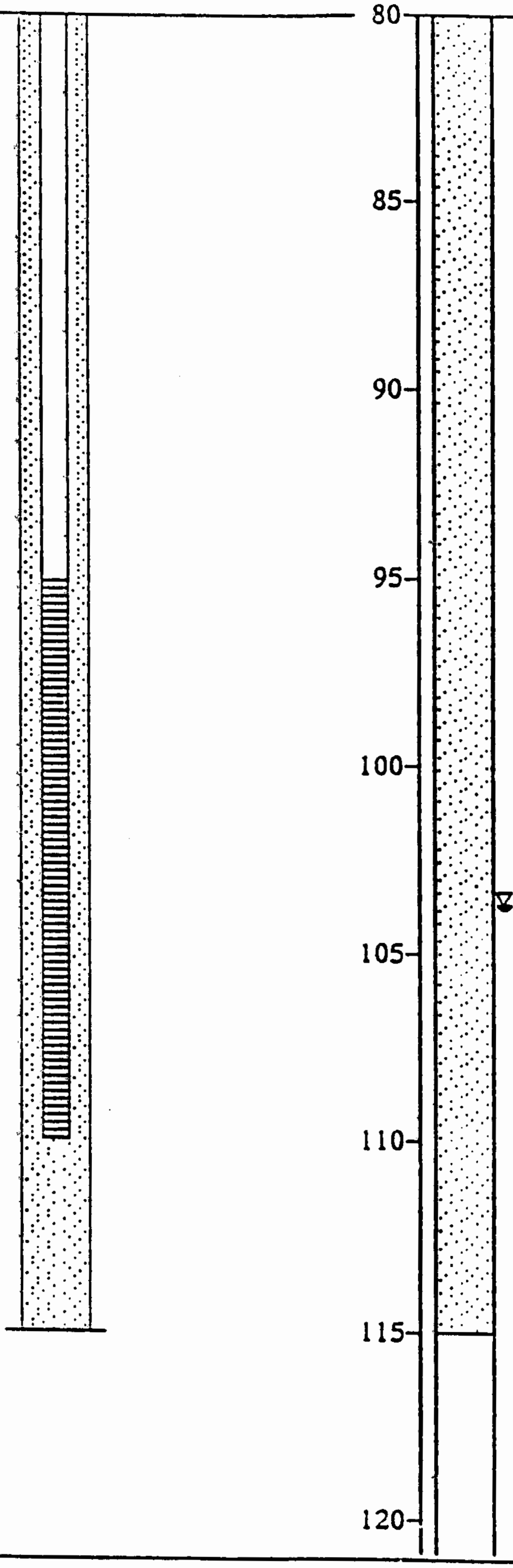
Equipment GD-1500

Elevation 5075.00 ft   Date 9/28/90

GROUND SURFACE

2" Stainless Steel
Casing from
85 to 95 feet

2" Stainless Steel
Screen (slot size 0.01")
from 95 to 110 feet



-occasional gravel at 85 feet

-1/2" gravel at 98 feet

-2" gravel at 100 feet

End of boring at 115.00 feet.
Groundwater encountered at 103.66 feet
during drilling.

Harding Lawson Associates
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Environmental Services

MONITORING WELL DETAIL MW-62

PLATE

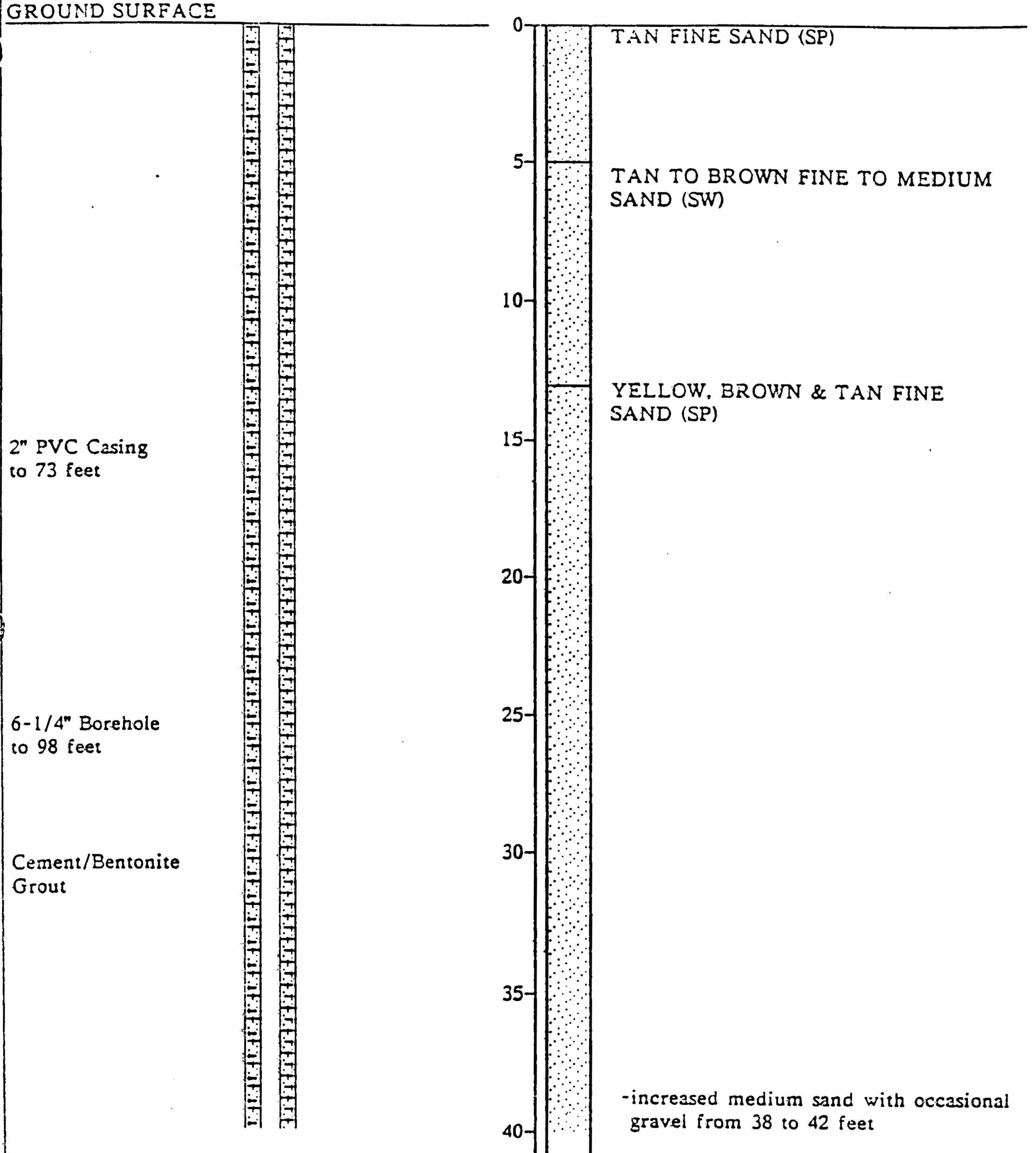
Sparton Technology Inc.
Albuquerque, New Mexico

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	06310.039.12		12/90		

Top of PVC Casing
Elevation 5065.74

Equipment GD-1500

Elevation 5065.74 ft Date 10/1/90



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MONITORING WELL DETAIL MW-63

Sparton Technology Inc.
Albuquerque, New Mexico

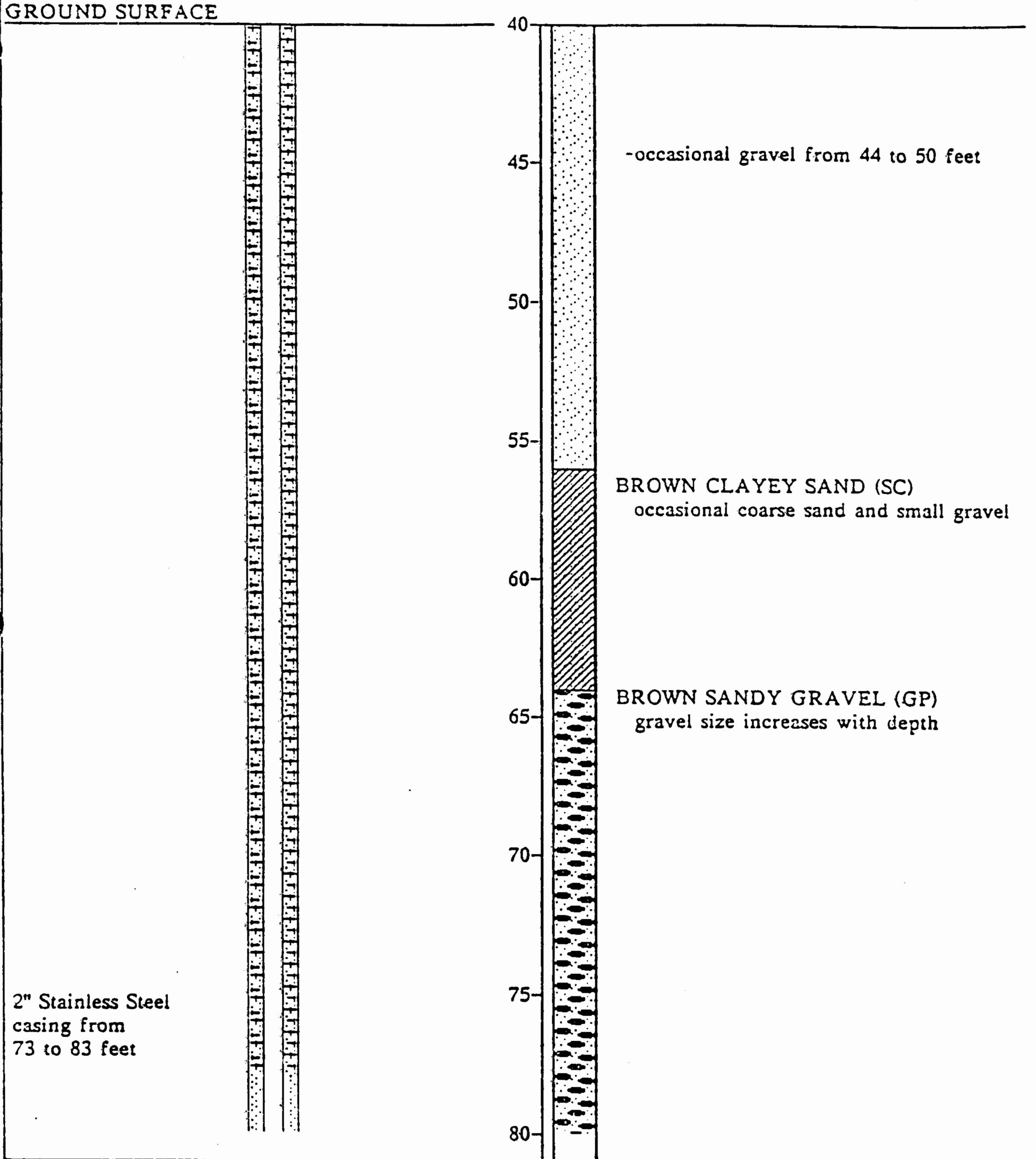
PLATE

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	06310.039.12		12/90		

Top of PVC Casing
Elevation 5065.74

Equipment GD-1500

Elevation 5065.74 ft Date 10/1/90



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MONITORING WELL DETAIL MW-63

Sparton Technology Inc.
Albuquerque, New Mexico

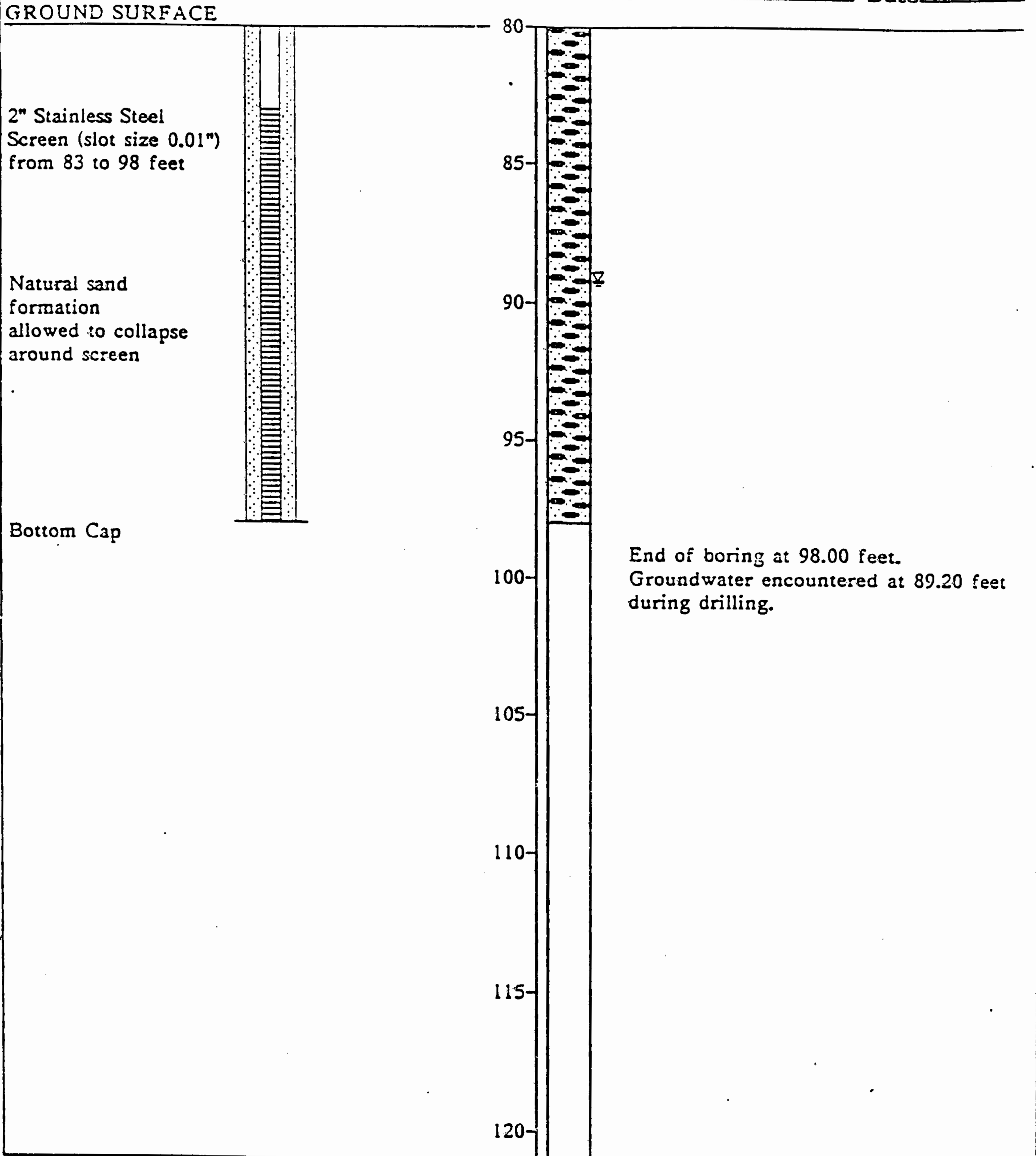
PLATE

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	06310.039.12		12/90		

Top of PVC Casing
Elevation 5065.74

Equipment GD-1500

Elevation 5065.74 ft Date 10/1/90



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Environmental Services

MONITORING WELL DETAIL MW-63

Sparton Technology Inc.
Albuquerque, New Mexico

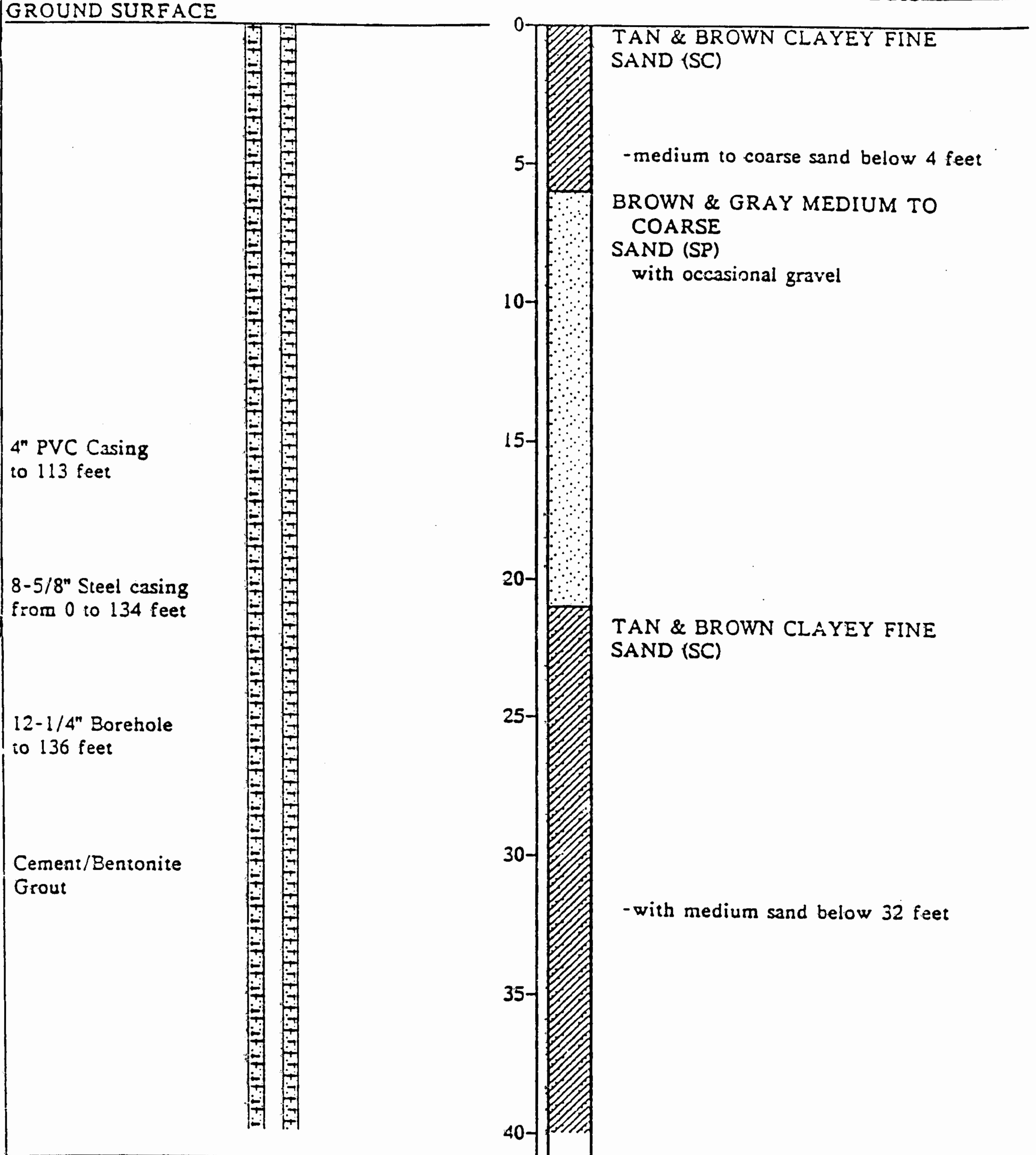
DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	06310.039.12		12/90		

PLATE

Top of PVC Casing
Elevation 5097.84

Equipment GD-1500

Elevation 5097.84 ft Date 10/3/90



Harding Lawson Associates
Engineers and
Environmental Services

MONITORING WELL DETAIL MW-64

Sparton Technology Inc.
Albuquerque, New Mexico

PLATE

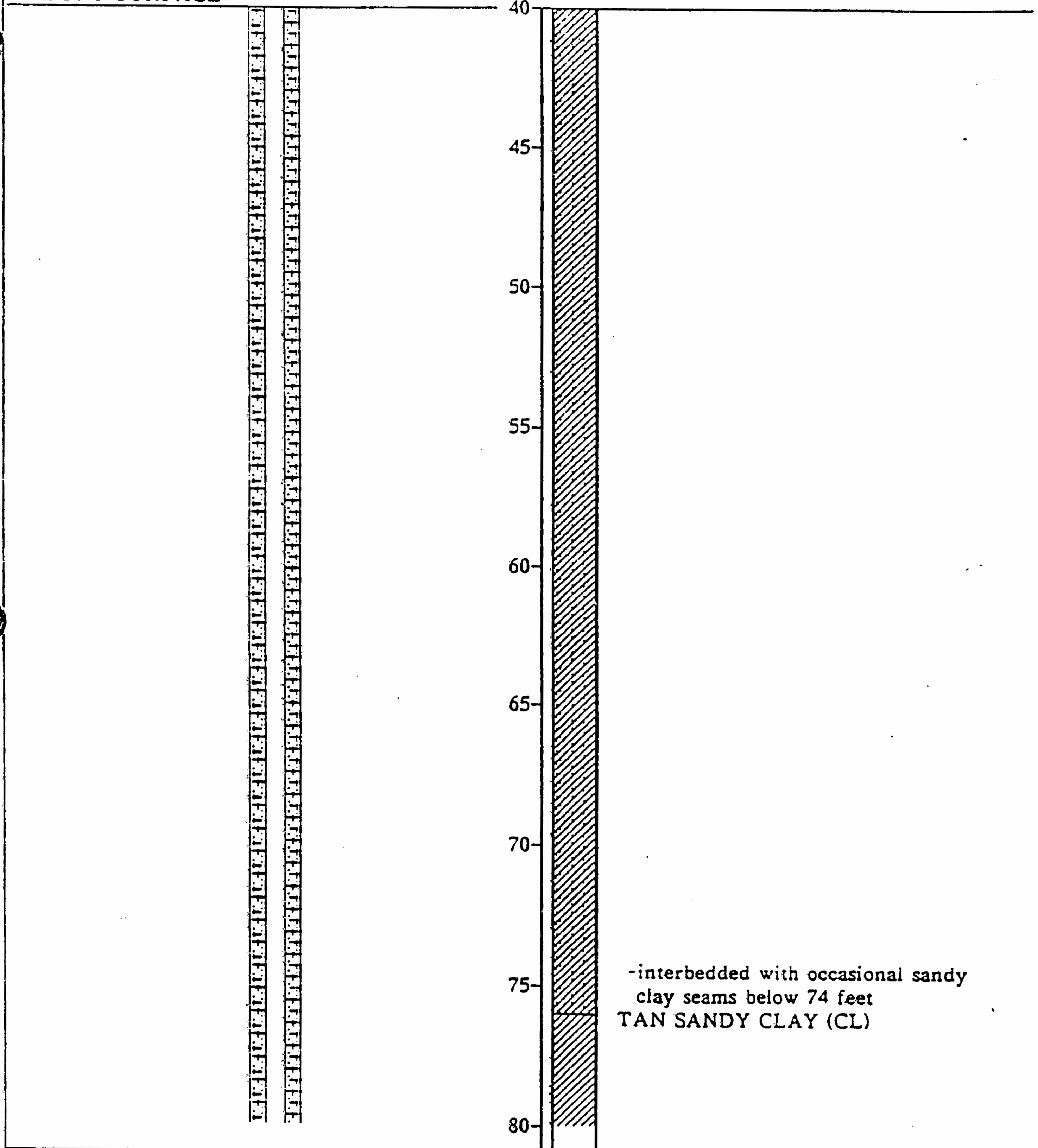
DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	06310,039.12		12/90		

Top of PVC Casing
Elevation 5097.84

Equipment GD-1500

Elevation 5097.84 ft Date 10/3/90

GROUND SURFACE



Harding Lawson Associates
Engineers and
Environmental Services

MONITORING WELL DETAIL MW-64

Sparton Technology Inc.
Albuquerque, New Mexico

PLATE

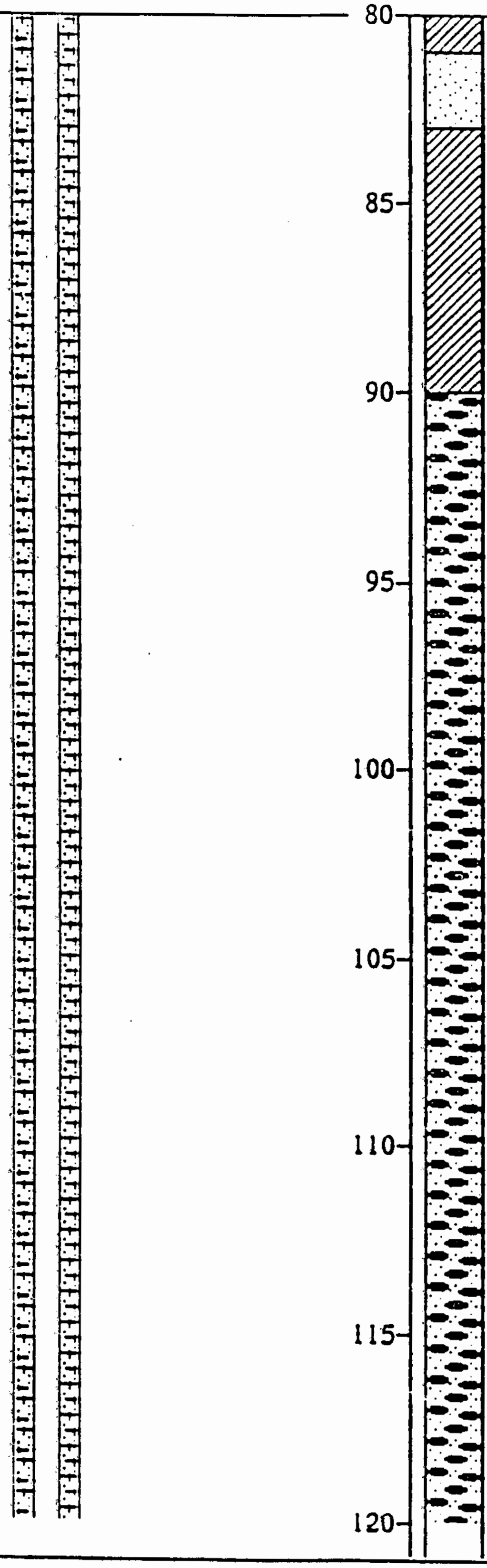
DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	06310,039.12		12/90		

Top of PVC Casing
Elevation 5097.84

Equipment GD-1500

Elevation 5097.84 ft Date 10/3/90

GROUND SURFACE



BROWN & GRAY MEDIUM TO COARSE SAND (SP)

TAN SANDY CLAY (CL)

BROWN & GRAY SANDY GRAVEL (GP)

4" Stainless Steel casing from 113 to 138'10" feet

Harding Lawson Associates
Engineers and
Environmental Services

MONITORING WELL DETAIL MW-64

Sparton Technology Inc.
Albuquerque, New Mexico

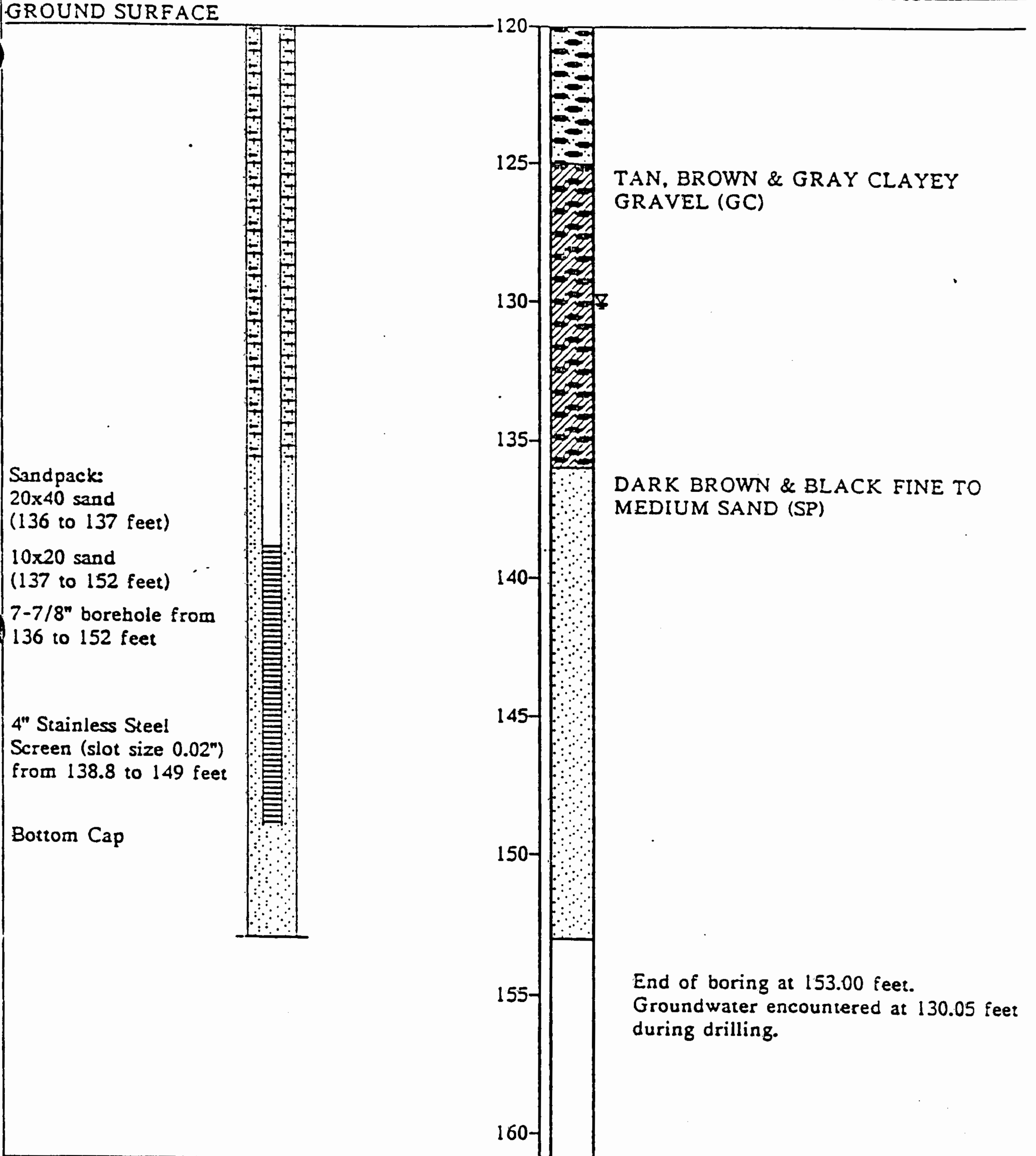
PLATE

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	06310.039.12		12/90		

Top of PVC Casing
Elevation 5097.84

Equipment GD-1500

Elevation 5097.84 ft Date 10/3/90



Harding Lawson Associates
Engineers and
Environmental Services

MONITORING WELL DETAIL MW-64

Sparton Technology Inc.
Albuquerque, New Mexico

PLATE

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	06310.039.12		12/90		

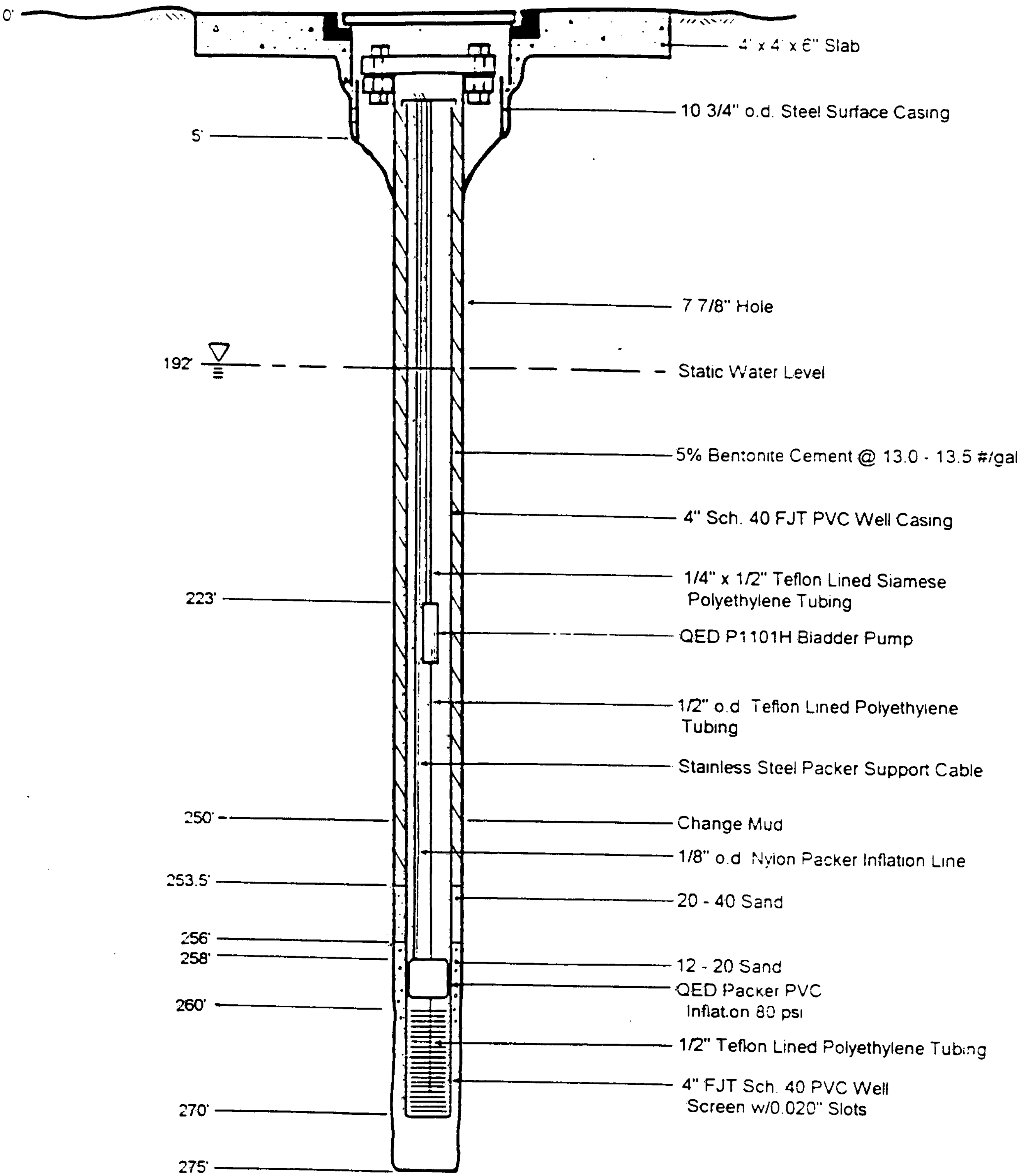


FIGURE 2

MW-65 CONSTRUCTION DIAGRAM

METRIC
Corporation

SAMPLE LOG

Borehole Number MW-65 Borehole Location N1525277.92 E374343.87

Property Owner City of Albuquerque

Sample Logger Peter H. Metzner, Metric Corporation

Driller Rodgers Environmental Services, Inc.

Drilling Medium Mud Rotary

Date of Completion 7-12-96 Ground Elevation 5156.45

Depth (feet)	Thickness (feet)	Stratigraphic Description
0 - 5	5.0	Moderate yellowish brown (10YR 5/4), medium sorted, sub-rounded to rounded, very fine sand to medium sand.
5 - 15	10.0	Moderate yellowish brown (10YR 5/4), poorly sorted, sub-rounded to rounded, fine sand to very coarse sand.
15 - 30	15.0	Pale yellowish brown (10YR 6/2), poorly sorted, sub-rounded, medium sand to granule gravel.
30 - 50	20.0	Moderate yellowish brown (10YR 5/4), poorly sorted, sub-rounded, clayey very fine sand to granule gravel.
50 - 70	20.0	Moderate yellowish brown (10YR 5/4), poorly sorted, sub-rounded, fine sand to very coarse sand.
70 - 85	15.0	Moderate yellowish brown (10YR 5/4), poorly sorted, sub-angular to sub-rounded, very fine sand to granule gravel.

METRIC
Corporation

SAMPLE LOG
Continued

Borehole Number MW-65 Borehole Location N1525277.92 E374343.87

Depth (feet)	Thickness (feet)	Stratigraphic Description
85 - 95	10.0	Pale yellowish brown (10YR 6/2), poorly sorted, sub-rounded, medium sand to granule gravel.
95 - 105	10.0	Moderate yellowish brown (10YR 5/4), poorly sorted, sub-rounded, clayey very fine sand to granule gravel.
105 - 115	10.0	Moderate yellowish brown (10YR 5/4) sandy clay.
115 - 145	30.0	Pale yellowish brown (10YR 6/2), well sorted, sub-rounded, medium sand to coarse sand.
145 - 150	5.0	Moderate yellowish brown (10YR 5/4), poorly sorted, sub-rounded, medium sand to coarse sand.
150 - 155	5.0	Pale yellowish brown (10YR 6/2), well sorted, sub-rounded, medium sand to coarse sand.
155 - 160	5.0	Pale yellowish brown (10YR 6/2), poorly sorted, sub-angular to sub-rounded, fine sand to granule gravel with some clay.
160 - 165	5.0	Pale yellowish brown (10YR 6/2), poorly sorted, sub-angular to sub-rounded, fine sand to granule gravel.
165 - 175	10.0	Pale yellowish brown (10YR 6/2), medium sorted, sub-angular to sub-rounded, very coarse sand to small pebble gravel.

METRIC
Corporation

SAMPLE LOG
Continued

Borehole Number MW-65 Borehole Location N1525277.92 E374343.87

Depth (feet)	Thickness (feet)	Stratigraphic Description
175 - 180	5.0	Pale yellowish brown (10YR 6/2) and ??N4??, well sorted, sub-angular to sub-rounded, small pebble gravel.
180 - 195	15.0	Moderate yellowish brown (10YR 5/4) clayey very fine sand and some white (N9) clay.
195 - 210	15.0	Pale yellowish brown (10YR 6/2), poorly sorted, sub-rounded, fine sand to granule gravel.
210 - 230	20.0	Pale yellowish brown (10YR 6/2), poorly sorted, sub-rounded to rounded, medium sand to small pebble gravel.
230 - 240	10.0	Pale yellowish brown (10YR 6/2), poorly sorted, sub-rounded to rounded, very fine sand to granule gravel.
240 - 245	5.0	Light brown (5YR 6/4) sandy clay.
245 - 260	15.0	Pale yellowish brown (10YR 6/2), poorly sorted, sub-rounded, fine sand to very coarse sand.
260 - 270	10.0	Pale yellowish brown (10YR 6/2), medium sorted, sub-rounded, coarse sand to small pebble gravel.
270 - 275	5.0	Pale yellowish brown (10YR 6/2), medium sorted, sub-rounded to rounded, medium sand to very coarse sand.

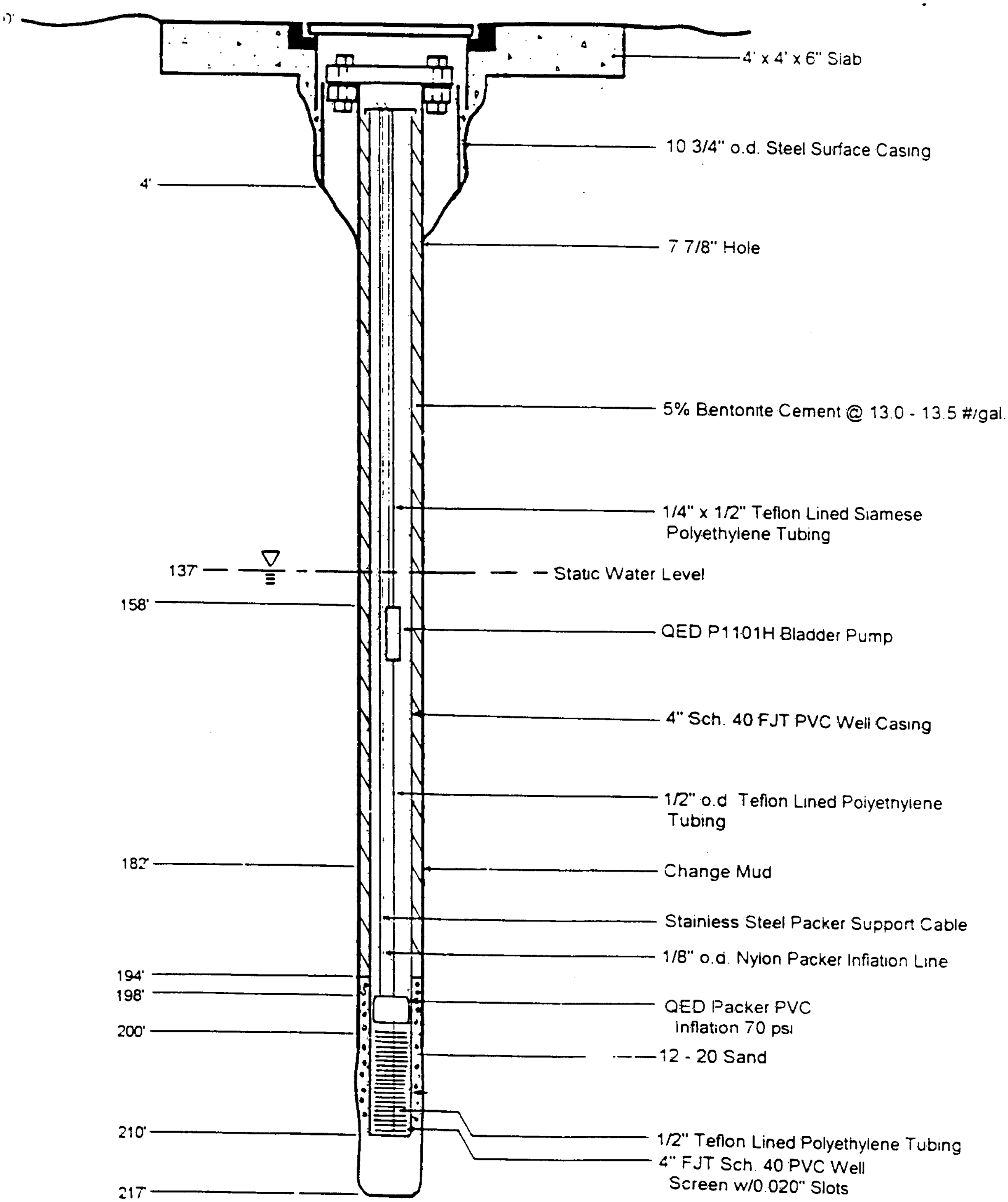


FIGURE 3

MW-66 CONSTRUCTION DIAGRAM

METRIC
Corporation

SAMPLE LOG

Borehole Number MW-66 Borehole Location N1526389.09 E375859.24

Property Owner City of Albuquerque

Sample Logger Peter H. Metzner, Metric Corporation

Driller Rodgers Environmental Services, Inc.

Drilling Medium Mud Rotary

Date of Completion 6-20-96 Ground Elevation 5103.03

Depth (feet)	Thickness (feet)	Stratigraphic Description
0 - 5	5.0	Pale yellowish brown (10YR 6/2), poorly sorted, sub-angular to sub-rounded, fine sand to very coarse sand.
5 - 15	10.0	Pale yellowish brown (10YR 6/2), poorly sorted, sub-angular to sub-rounded, fine sand to granule gravel.
15 - 20	5.0	Pale yellowish brown (10YR 6/2), medium sorted, sub-angular to rounded, medium sand to granule gravel.
20 - 35	15.0	Pale yellowish brown (10YR 6/2), poorly sorted, sub-angular, very fine sand to very coarse sand.
35 - 40	5.0	Pale yellowish brown (10YR 6/2), poorly sorted, sub-angular, very fine sand to very coarse sand with some clay.
40 - 45	5.0	Pale yellowish brown (10YR 6/2), poorly sorted, sub-angular, very fine sand to very coarse sand.

METRIC
Corporation

SAMPLE LOG
Continued

Borehole Number MW-66 Borehole Location N1526389.09 E375859.24

Depth (feet)	Thickness (feet)	Stratigraphic Description
45 - 65	20.0	Pale yellowish brown (10YR 6/2), poorly sorted, sub-angular to sub-rounded, fine sand to granule gravel.
65 - 75	10.0	Pale yellowish brown (10YR 6/2), medium sorted, sub-angular to sub-rounded, fine sand to very coarse sand.
75 - 80	5.0	Pale yellowish brown (10YR 6/2), poorly sorted, sub-angular to sub-rounded, very fine sand to granule gravel with some clay.
80 - 85	5.0	Pale yellowish brown (10YR 6/2), well sorted, sub-angular to sub-rounded, granule gravel to small pebble gravel.
85 - 100	15.0	Pale yellowish brown (10YR 6/2), poorly sorted, sub-angular, very fine sand to very coarse sand.
100 - 120	20.0	Light brownish gray (5YR 6/1), poorly sorted, angular, medium sand to pebble gravel.
120 - 135	15.0	Light brownish gray (5YR 6/1), poorly sorted, angular to sub-angular, clayey very fine sand to small pebble gravel.
135 - 145	10.0	Light brownish gray (5YR 6/1), poorly sorted, angular, very fine sand to small pebble gravel.
145 - 150	5.0	Light brownish gray (5YR 6/1), poorly sorted, angular to sub-angular, medium sand to small pebble gravel.

METRIC
Corporation

SAMPLE LOG
Continued

Borehole Number MW-66 Borehole Location N1526389.09 E375859.24

Depth (feet)	Thickness (feet)	Stratigraphic Description
150 - 160	10.0	Light brownish gray (5YR 6/1), poorly sorted, angular, very fine sand to small pebble gravel.
160 - 175	15.0	Light brownish gray (5YR 6/1), poorly sorted, sub-angular, very fine sand to granule gravel.
175 - 200	25.0	Pinkish gray (5YR 8/1), angular to sub-rounded, sandy clay and clayey very fine sand to granule gravel.
200 - 205	5.0	Light brownish gray (5YR 6/1), angular to sub-rounded, clayey very fine sand to granule gravel.
205 - 215	10.0	Light brownish gray (5YR 6/1), angular to sub-rounded, medium sand to small pebble gravel.

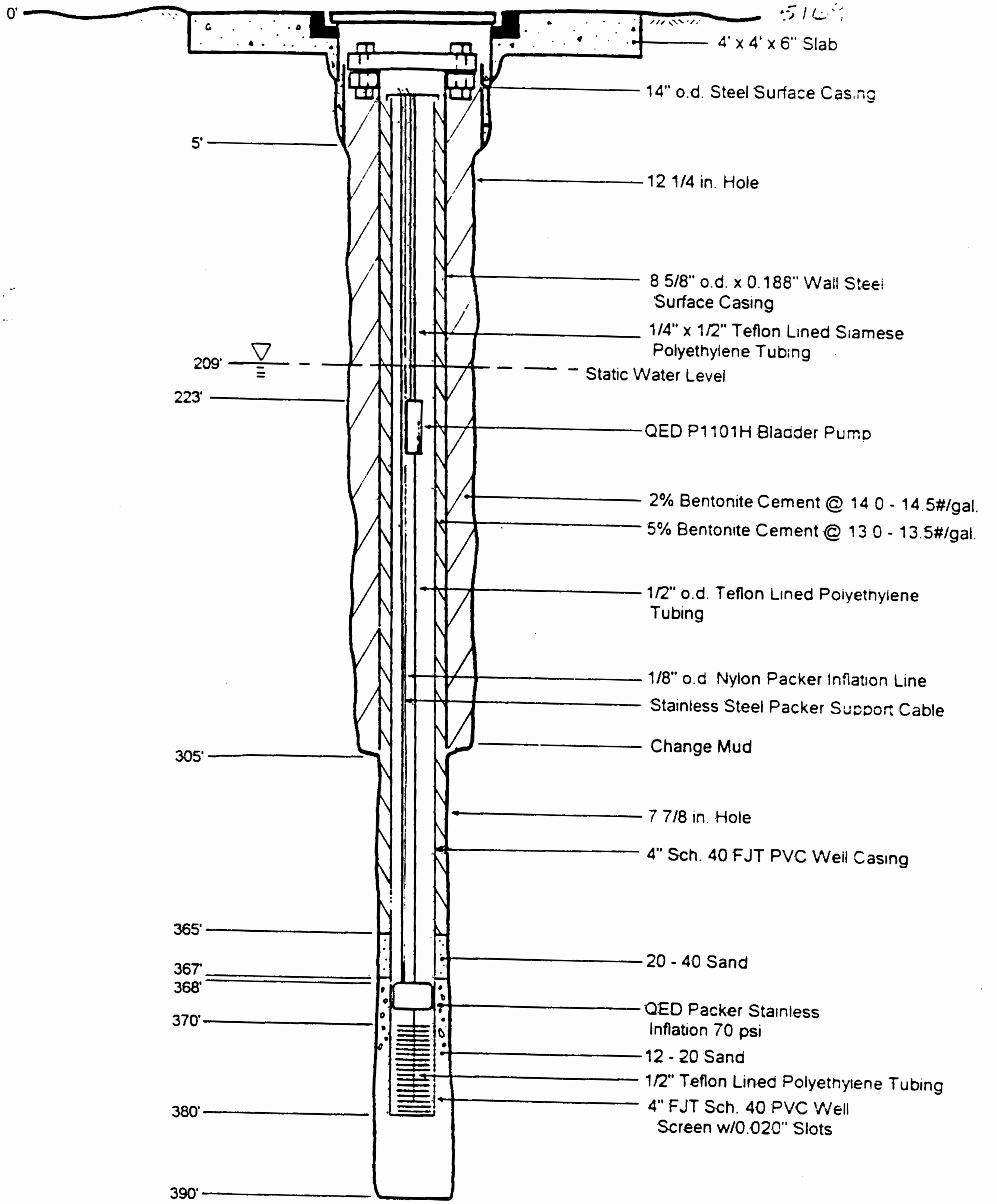


FIGURE 4

MW-67 CONSTRUCTION DIAGRAM

METRIC
Corporation

SAMPLE LOG

Borehole Number MW-67 Borehole Location N1525220.38 E375352.47

Property Owner Sparton Technology, Inc.

Sample Logger Peter H. Metzner, Metric Corporation

Driller Rodgers Environmental Services, Inc.

Drilling Medium Mud Rotary

Date of Completion 7-15-96 Ground Elevation 5169.21

Depth (feet)	Thickness (feet)	Stratigraphic Description
0 - 5	5.0	Pale yellowish brown (10YR 6/2), poorly sorted, sub-angular to sub-rounded, fine sand to small pebble gravel.
5 - 15	10.0	Pale yellowish brown (10YR 6/2), poorly sorted, sub-angular to sub-rounded, clayey very fine sand to granule gravel.
15 - 40	25.0	Pale yellowish brown (10YR 6/2), poorly sorted, sub-angular to sub-rounded, clayey very fine sand to very coarse sand with some clay..
40 - 55	15.0	Pale yellowish brown (10YR 6/2), poorly sorted, sub-angular to sub-rounded, clayey very fine sand to pebble gravel with some clay.
55 - 60	5.0	Pale yellowish brown (10YR 6/2) sandy clay.
60 - 80	20.0	Pale yellowish brown (10YR 6/2), poorly sorted, sub-angular to sub-rounded, clayey very fine sand to small pebble gravel.

METRIC
Corporation

SAMPLE LOG
Continued

Borehole Number MW-67 Borehole Location N1525220.38 E375352.47

Depth (feet)	Thickness (feet)	Stratigraphic Description
80 - 105	25.0	Pale yellowish brown (10YR 6/2), medium sorted, sub-angular to sub-rounded, clayey very fine sand to coarse sand.
105 - 110	5.0	Pale yellowish brown (10YR 6/2), medium sorted, sub-rounded, medium sand to very coarse sand.
110 - 140	30.0	Pale yellowish brown (10YR 6/2), poorly sorted, sub-angular to sub-rounded, clayey very fine sand to granule gravel and clay.
140 - 145	5.0	Pale yellowish brown (10YR 6/2), poorly sorted, sub-angular to sub-rounded, fine sand to very coarse sand.
145 - 170	25.0	Pale yellowish brown (10YR 6/2), poorly sorted, sub-angular, very fine sand to granule gravel and clay.
170 - 190	20.0	Pale yellowish brown (10YR 6/2), medium sorted, sub-angular, medium sand to very coarse sand.
190 - 200	10.0	Pale yellowish brown (10YR 6/2), medium sorted, angular to sub-angular, very coarse sand to small pebble gravel.
200 - 210	10.0	Pale yellowish brown (10YR 6/2), poorly sorted, sub-angular to sub-rounded, very fine sand to granule gravel.

METRIC
Corporation

SAMPLE LOG
Continued

Borehole Number MW-67 Borehole Location N1525220.38 E375352.47

Depth (feet)	Thickness (feet)	Stratigraphic Description
210 - 230	20.0	Pale yellowish brown (10YR 6/2), poorly sorted, sub-angular to sub-rounded, clayey very fine sand to granule gravel.
230 - 255	25.0	Pale yellowish brown (10YR 6/2), poorly sorted, sub-angular to sub-rounded, clayey very fine sand to granule gravel and clay.
255 - 275	20.0	Pale yellowish brown (10YR 6/2), poorly sorted, sub-angular, fine sand to small pebble gravel.
275 - 310	35.0	Pale yellowish brown (10YR 6/2), poorly sorted, sub-angular to sub-rounded, fine sand to small pebble gravel and clay.
310 - 320	10.0	Pinkish gray (5YR 8/1), poorly sorted, sub-angular to sub-rounded, fine sand to granule gravel.
320 - 330	10.0	Pale yellowish brown (10YR 6/2), poorly sorted, sub-angular to sub-rounded, medium sand to small pebble gravel.
330 - 360	30.0	Pale yellowish brown (10 YR 6/2), medium sorted, sub-rounded to rounded, fine sand to coarse sand.
360 - 363	3.0	Pale yellowish brown (10YR 6/2) clay.
363 - 390	27.0	Pale yellowish brown (10 YR 6/2), medium sorted, sub-rounded to rounded, fine sand to coarse sand.

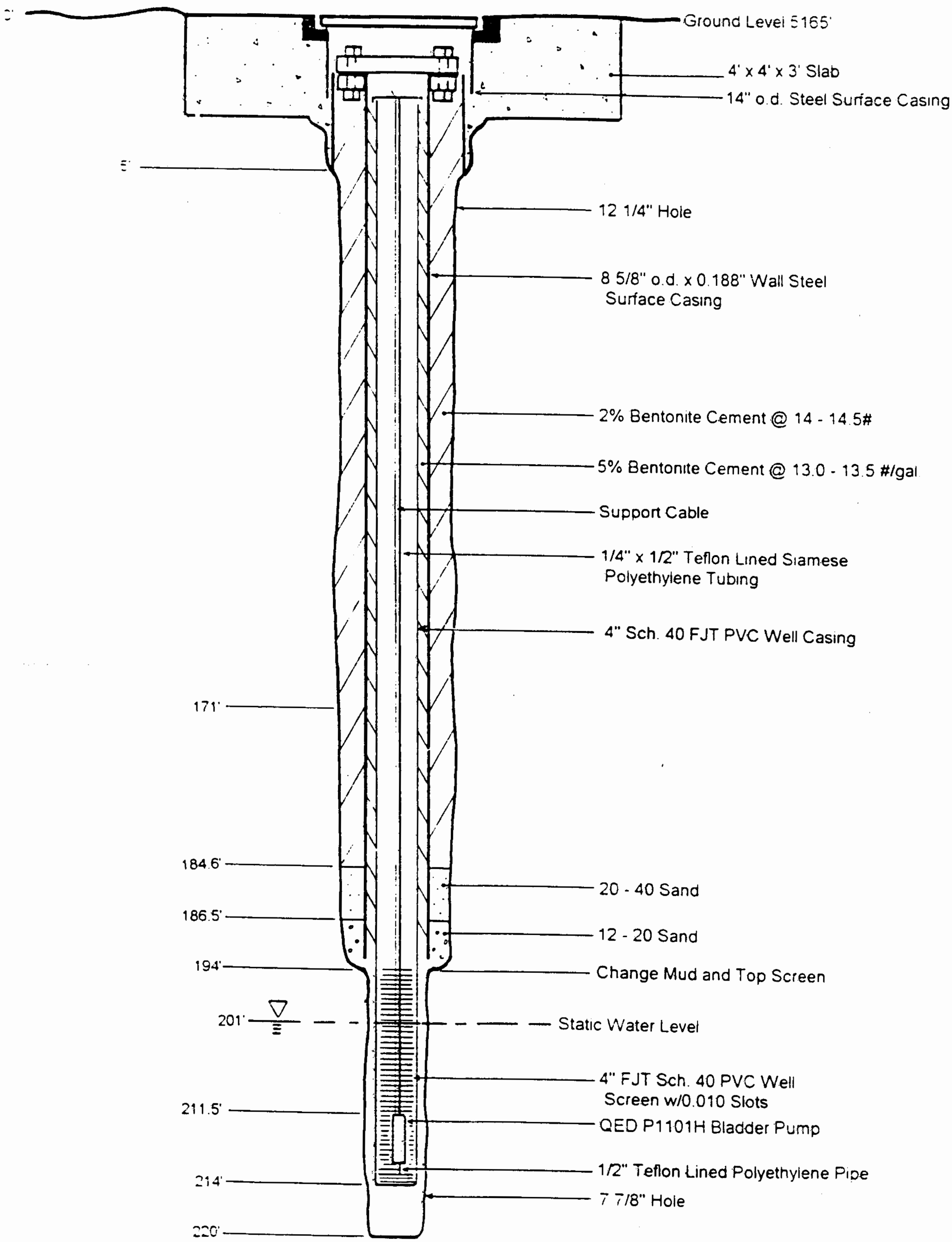


FIGURE 5

MW-68 CONSTRUCTION DIAGRAM

METRIC
Corporation

SAMPLE LOG

Borehole Number MW-68 Borehole Location N1526216.71 E374503.81

Property Owner City of Albuquerque

Sample Logger Peter H. Metzner, Metric Corporation

Driller Rodgers Environmental Services, Inc.

Drilling Medium Mud Rotary

Date of Completion 7-8-96 Ground Elevation 5165.53

Depth (feet)	Thickness (feet)	Stratigraphic Description
0 - 5	5.0	Pale yellowish brown (10YR 6/2), poorly sorted, sub-angular to sub-rounded, fine sand to granule gravel.
5 - 15	10.0	Greenish gray (5G 6/1) clay.
15 - 25	10.0	Pale yellowish brown (10YR 6/2), poorly sorted, sub-angular, very fine sand to coarse sand.
25 - 35	10.0	Pale yellowish brown (10YR 6/2), medium sorted, sub-angular to sub-rounded, very fine sand to coarse sand.
35 - 40	5.0	Pale yellowish brown (10YR 6/2), medium sorted, sub-angular to sub-rounded, fine sand to very coarse sand.
40 - 70	30.0	Pale yellowish brown (10YR 6/2), medium sorted, sub-angular to sub-rounded, fine sand to coarse sand.

METRIC
Corporation

SAMPLE LOG
Continued

Borehole Number MW-68 Borehole Location N1526216.71 E374503.81

Depth (feet)	Thickness (feet)	Stratigraphic Description
70 - 85	15.0	Pale yellowish brown (10YR 6/2), poorly sorted, sub-angular to sub-rounded, fine sand to very coarse sand.
85 - 90	5.0	Pale yellowish brown (10YR 6/2), well sorted, sub-angular to sub-rounded, coarse sand to very coarse sand.
90 - 100	10.0	Pale yellowish brown (10YR 6/2), poorly sorted, sub-angular to sub-rounded, very fine sand to very coarse sand.
100 - 110	10.0	Pale yellowish brown (10YR 6/2), well sorted, sub-angular to sub-rounded, medium sand to coarse sand.
110 - 125	15.0	Pale yellowish brown (10YR 6/2), poorly sorted, sub-angular, clayey very fine sand to granule gravel.
125 - 140	15.0	Pale yellowish brown (10YR 6/2) sandy clay.
140 - 150	10.0	Pale yellowish brown (10YR 6/2) clayey very fine sand.
150 - 160	10.0	Pale yellowish brown (10YR 6/2) sandy clay.
160 - 170	10.0	Pale yellowish brown (10YR 6/2) clayey very fine sand.
170 - 180	10.0	Pale yellowish brown (10YR 6/2), well sorted, sub-rounded, medium sand to very coarse sand.

METRIC
Corporation

SAMPLE LOG
Continued

Borehole Number MW-68 Borehole Location N1526216.71 E374503.81

Depth (feet)	Thickness (feet)	Stratigraphic Description
180 - 194	14.0	Pale yellowish brown (10YR 6/2), well sorted, sub-angular to sub-rounded, granule gravel to small pebble gravel.
194 - 210	16.0	Pale yellowish brown (10YR 6/2) sandy clay.
210 - 220	10.0	Pale yellowish brown (10YR 6/2) clayey very fine sand.

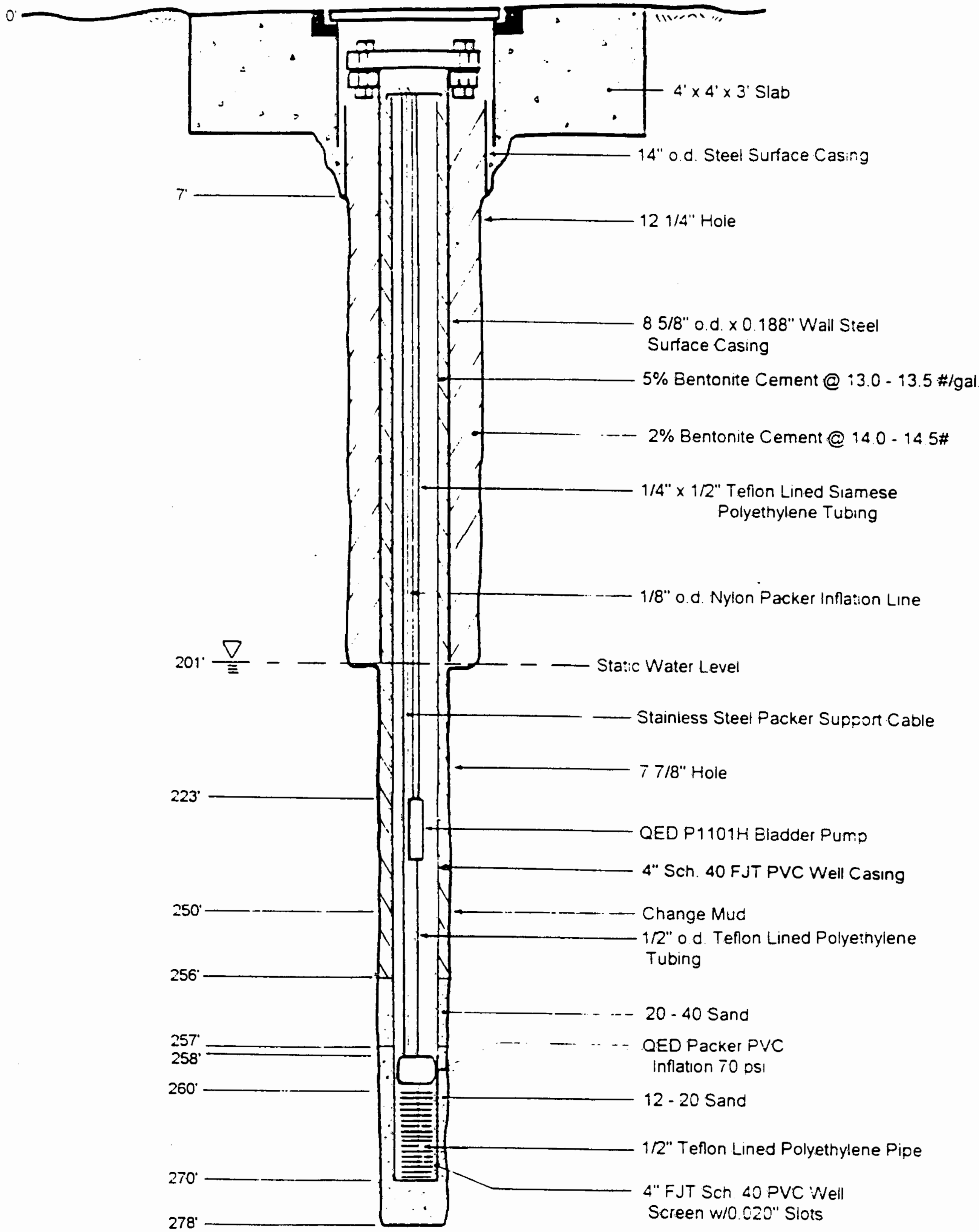


FIGURE 6

MW-69 CONSTRUCTION DIAGRAM

METRIC
Corporation

SAMPLE LOG

Borehole Number MW-69 Borehole Location N1526239.55 E374502.60

Property Owner City of Albuquerque

Sample Logger Peter H. Metzner, Metric Corporation

Driller Rodgers Environmental Services, Inc.

Drilling Medium Mud Rotary

Date of Completion 7-23-96 Ground Elevation 5165.46

Depth (feet)	Thickness (feet)	Stratigraphic Description
0 - 15	15.0	Pale yellowish brown (10YR 6/2), poorly sorted, sub-angular to sub-rounded, fine sand to granule gravel.
15 - 20	5.0	Pale yellowish brown (10YR 6/2) clayey very fine sand.
20 - 30	10.0	Pale yellowish brown (10YR 6/2), poorly sorted, sub-angular to sub-rounded, fine sand to very coarse sand
30 - 40	10.0	Pale yellowish brown (10YR 6/2), poorly sorted, sub-rounded, fine sand to very coarse sand.
40 - 45	5.0	Pale yellowish brown (10YR 6/2), medium sorted, sub-rounded, fine sand to coarse sand.
45 - 55	10.0	Pale yellowish brown (10YR 6/2), poorly sorted, sub-rounded, very fine sand to coarse sand.

METRIC
Corporation

SAMPLE LOG
Continued

Borehole Number MW-69 Borehole Location N1526239.55 E374502.60

Depth (feet)	Thickness (feet)	Stratigraphic Description
55 - 60	5.0	Pale yellowish brown (10YR 6/2), sub-rounded to rounded, medium sand to coarse sand.
60 - 65	5.0	Pale yellowish brown (10YR 6/2), poorly sorted, sub-angular to sub-rounded, very fine sand to coarse sand.
65 - 70	5.0	Pale yellowish brown (10YR 6/2), medium sorted, sub-angular to sub-rounded, medium sand to very coarse sand.
70 - 75	5.0	Pale yellowish brown (10YR 6/2), poorly sorted, sub-angular to sub-rounded, medium sand to small pebble gravel.
75 - 85	10.0	Pale yellowish brown (10YR 6/2), poorly sorted, sub-angular to sub-rounded, very fine sand to very coarse sand.
85 - 105	20.0	Pale yellowish brown (10YR 6/2), poorly sorted, sub-angular to sub-rounded, very fine sand to very coarse sand.
105 - 140	35.0	Pale yellowish brown (10YR 6/2) sandy clay.
140 - 145	5.0	Pale yellowish brown (10YR 6/2), poorly sorted, sub-angular, fine sand to very coarse sand.
145 - 155	10.0	Pale yellowish brown (10YR 6/2) sandy clay and clay.

METRIC
Corporation

SAMPLE LOG
Continued

Borehole Number MW-69 Borehole Location N1526239.55 E374502.60

Depth (feet)	Thickness (feet)	Stratigraphic Description
155 - 165	10.0	Pale yellowish brown (10YR 6/2), medium sorted, sub-angular to sub-rounded, coarse sand to very coarse sand.
165 - 170	5.0	Pale yellowish brown (10YR 6/2), medium sorted, sub-angular to sub-rounded, medium sand to very coarse sand.
170 - 185	15.0	Pale yellowish brown (10YR 6/2), medium sorted, angular to sub-angular, very coarse sand to small pebble gravel.
185 - 190	5.0	Pale yellowish brown (10YR 6/2), well sorted, angular to sub-angular, granule gravel to small pebble gravel.
190 - 200	10.0	Pale yellowish brown (10YR 6/2), poorly sorted, angular to sub-angular, clayey very fine sand to small pebble gravel.
200 - 210	10.0	Pale yellowish brown (10YR 6/2), poorly sorted, sub-angular to sub-rounded, fine sand to coarse sand with some clay.
210 - 220	10.0	Pale yellowish brown (10YR 6/2) sandy clay.
220 - 235	15.0	Pinkish gray (5YR 8/1) sandy clay with small pebble gravel.
235 - 250	15.0	Pinkish gray (5YR 8/1) sandy clay.

METRIC
Corporation

SAMPLE LOG
Continued

Borehole Number MW-69 Borehole Location N1526239.55 E374502.60

Depth (feet)	Thickness (feet)	Stratigraphic Description
250 - 270	20.0	Pale yellowish brown (10YR 6/2), poorly sorted, sub-angular to sub-rounded, medium sand to coarse sand.
270 - 278	8.0	Pale yellowish brown (10YR 6/2), poorly sorted, sub-angular to sub-rounded, slightly clayey, medium sand to coarse sand.

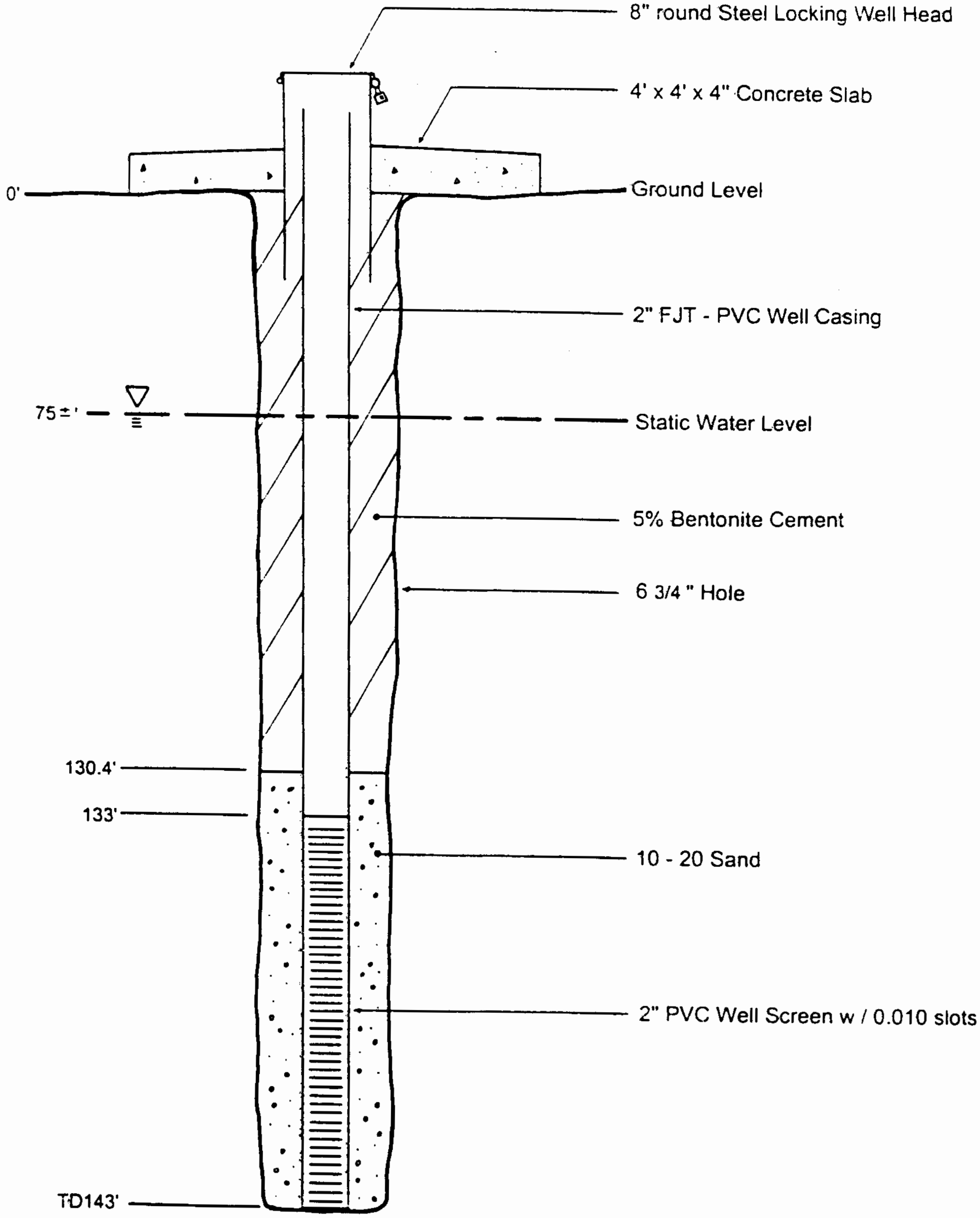


FIGURE 1
MW - 70 CONSTRUCTION DIAGRAM

METRIC
Corporation

SAMPLE LOG

Borehole Number MW-70 Borehole Location On site, west

Property Owner Sparton Technology, Inc.

Sample Logger Cindie Salisbury and Peter Metzner, METRIC Corporation

Driller Rodgers Environmental Services, Inc.

Drilling Medium Hollow stem auger

Date of Completion February 18, 1998 Ground Elevation 5043.0 ft

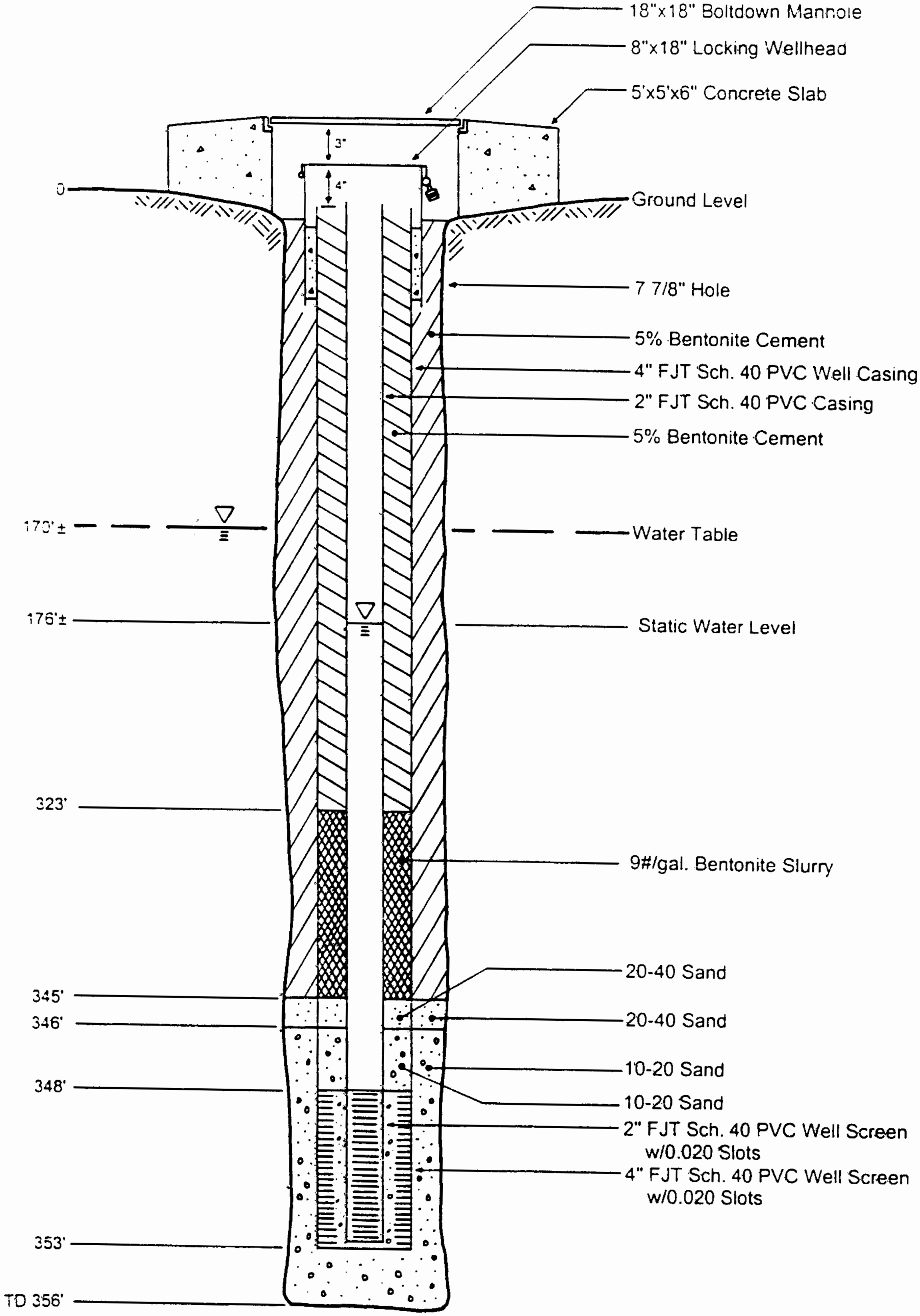
Depth (feet)	Thickness (feet)	Stratigraphic Description
0 - 5	5.0	Grayish orange (10YR 7/4), well sorted silt.
5 - 10	5.0	Grayish orange (10YR 7/4), well sorted, sub-angular to sub-rounded, very fine sand to fine sand.
10 - 15	5.0	Grayish orange (10YR 7/4), medium sorted, sub-angular to sub-rounded, very fine sand to medium sand.
15 - 35	20.0	Grayish orange (10YR 7/4), well sorted, sub-angular to sub-rounded, fine sand to medium sand.
35 - 45	10.0	Grayish orange (10YR 7/4), medium sorted, sub-angular to sub-rounded, very fine sand to medium sand.
45 - 55	10.0	Moderate yellowish brown (10YR 5/4), poorly sorted, sub-angular to sub-rounded, medium sand to fine sand with some very coarse sand to pebble gravel.
55 - 60	5.0	Moderate yellowish brown (10YR 5/4), poorly sorted, sub-angular to sub-rounded, medium sand to fine sand with some small pebble gravel to cobble.
60 - 70	10.0	Moderate yellowish brown (10YR 5/4), poorly sorted, sub-angular to sub-rounded, medium sand to very fine sand with some small pebble gravel to cobble.

METRIC
Corporation

SAMPLE LOG
Continued

Borehole Number MW-70 Borehole Location On site, west

Depth (feet)	Thickness (feet)	Stratigraphic Description
70 - 116	46.0	Moderate yellowish brown (10YR 5/4), well sorted, sub-angular to sub-rounded, medium sand to fine sand.
116 - 122	6.0	Moderate yellowish brown (10YR 5/4), medium sorted, sub-angular to sub-rounded, medium sand to fine sand with clay layers.
122 - 124	2.0	Clay.
124 - 128	4.0	Moderate yellowish brown (10YR 5/4), medium sorted, sub-angular to sub-rounded, medium sand to fine sand with clay layers.
128 - 138	10.0	Moderate yellowish brown (10YR 5/4), well sorted, sub-angular to sub-rounded, medium sand to fine sand.
138 - 143	5.0	Moderate yellowish brown (10YR 5/4), well sorted, sub-angular to sub-rounded, silty sand.



MW-71
CONSTRUCTION DIAGRAM

METRIC
Corporation

SAMPLE LOG

Borehole Number MW-71 Borehole Location Bryan Avenue

Property Owner Sparton Technology, Inc.

Sample Logger Peter Metzner/Cindie Salisbury, METRIC Corporation

Driller Rodgers Environmental, Inc.

Drilling Medium Mud Rotary

Date of Completion October 28, 1998 Ground Elevation 5134.59

Depth (feet)	Thickness (feet)	Stratigraphic Description
0 - 10	10	Grayish orange (10YR 7/4), poorly sorted, sub-angular to sub-rounded, fine to very coarse sand.
10 - 15	5	Grayish orange (10YR 7/4), poorly sorted, sub-angular to sub-rounded, slightly clayey fine to very coarse sand.
15 - 25	10	Grayish orange (10YR 7/4), poorly sorted, sub-angular to sub-rounded, fine sand to granule gravel.
25 - 30	5	Grayish orange (10YR 7/4), poorly sorted, sub-rounded, fine sand to granule gravel.
30 - 40	10	Grayish orange (10YR 7/4), poorly sorted, sub-angular to sub-rounded, very fine sand to granule gravel.
40 - 45	5	Grayish orange (10YR 7/4), poorly sorted, sub-angular to sub-rounded, very fine to very coarse sand.
45 - 50	5	Grayish orange (10YR 7/4), medium sorted, sub-angular to sub-rounded, clayey very fine to medium sand.
50 - 55	5	Grayish orange (10YR 7/4), medium sorted, sub-angular to sub-rounded, fine to coarse sand.
55 - 60	5	Grayish orange (10YR 7/4), poorly sorted, sub-angular to sub-rounded, clayey very fine to fine sand, with some very coarse sand.

METRIC
Corporation

SAMPLE LOG
Continued

Borehole Number MW-71 Borehole Location Bryan Avenue

Depth (feet)	Thickness (feet)	Stratigraphic Description
60 - 65	5	Grayish orange (10YR 7/4), medium sorted, sub-angular to sub-rounded, very fine to very coarse sand.
65 - 70	5	Grayish orange (10YR 7/4), medium sorted, sub-angular to sub-rounded, very fine to medium sand with clumps of light brown (5YR 6/4) clay.
70 - 75	5	Light brown (5YR 6/4) clay with some grayish orange (10YR 7/4), sub-angular to sub-rounded, fine to very fine sand.
75 - 80	5	Grayish orange (10YR 7/4), poorly sorted, sub-angular to sub-rounded, very fine to very coarse sand with some granule to small pebble gravel.
80 - 95	15	Grayish orange (10YR 7/4) clay with some very fine to fine sand.
95 - 100	5	Grayish orange (10YR 7/4), poorly sorted, sub-angular to sub-rounded, clayey very fine to coarse sand.
100 - 110	10	Grayish orange (10YR 7/4) clay with fine to coarse sand.
110 - 115	5	Grayish orange (10YR 7/4), poorly sorted, sub-angular to sub-rounded, clayey very fine sand to small pebble gravel.
115 - 120	5	Grayish orange (10YR 7/4), poorly sorted, sub-angular to sub-rounded, clayey very fine sand with some granule to small pebble gravel.
120 - 125	5	Grayish orange (10YR 7/4), poorly sorted, sub-angular to sub-rounded, clayey very fine sand to granule gravel.

METRIC
Corporation

SAMPLE LOG
Continued

Borehole Number MW-71 Borehole Location Bryan Avenue

Depth (feet)	Thickness (feet)	Stratigraphic Description
125 - 130	5	Grayish orange (10YR 7/4), poorly sorted, sub-angular to sub-rounded, medium sand to granule gravel.
130 - 135	5	Grayish orange (10YR 7/4), poorly sorted, sub-angular to sub-rounded, fine sand to small pebble gravel.
135 - 145	10	Grayish orange (10YR 7/4), poorly sorted, sub-angular to sub-rounded, very fine sand to small pebble gravel.
145 - 155	10	Light brownish gray (5YR 6/1), poorly sorted, sub-rounded, very fine sand to small pebble gravel.
155 - 180	25	Grayish orange (10YR 7/4), poorly sorted, sub-angular to sub-rounded, very fine sand to small pebble gravel with some clay.
180 - 195	15	Grayish orange (10YR 7/4), poorly sorted, sub-angular to sub-rounded, very fine sand to small pebble gravel.
195 - 200	5	Grayish orange (10YR 7/4), medium sorted, sub-angular to sub-rounded, very fine to medium sand.
200 - 245	45	Grayish orange (10YR 7/4), poorly sorted, sub-angular to sub-rounded, very fine to coarse sand with some granule gravel.
245 - 270	25	Grayish orange (10YR 7/4), poorly sorted, sub-rounded, clayey very fine to medium sand with some granule gravel.

METRIC
Corporation

SAMPLE LOG
Continued

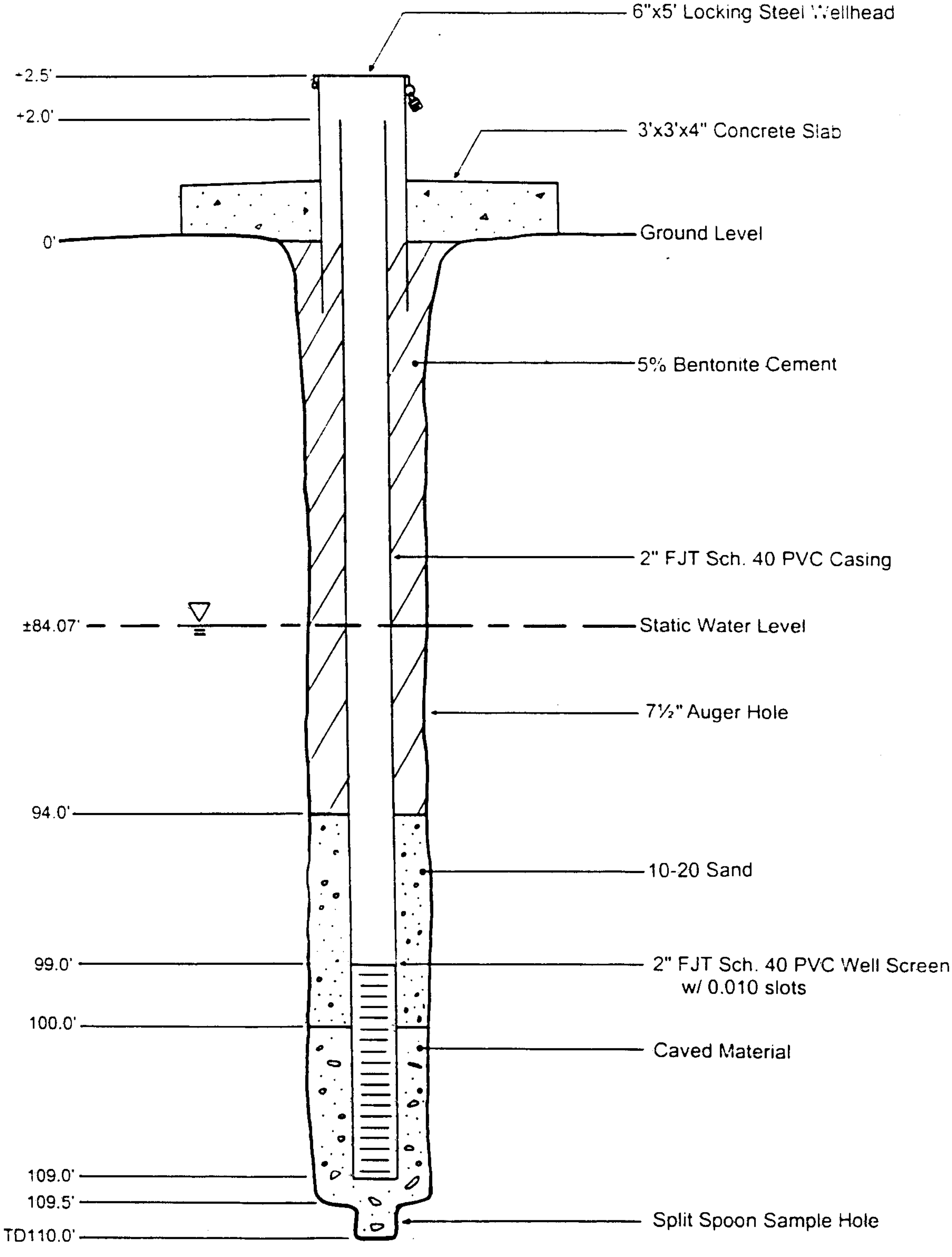
Borehole Number MW-71 Borehole Location Bryan Avenue

Depth (feet)	Thickness (feet)	Stratigraphic Description
270 - 275	5	Grayish orange (10YR 7/4), poorly sorted, sub-angular to sub-rounded, very fine to coarse sand with some granule gravel.
275 - 287	12	Light brownish gray (5YR 6/1), poorly sorted, sub-angular to sub-rounded, medium sand to small pebble gravel with some clay.
287 - 291	4	Grayish orange (10YR 7/4), poorly sorted, sub-angular to sub-rounded, clayey medium sand to small pebble gravel.
291 - 295	4	Light brownish gray (5YR 6/1), poorly sorted, sub-angular to sub-rounded, fine sand to granule gravel.
295 - 300	5	Light brownish gray (5YR 6/1), medium sorted, sub-angular to sub-rounded, medium to very coarse sand.
300 - 308	8	Grayish orange (10YR 7/4), poorly sorted, sub-angular to sub-rounded, slightly clayey medium to coarse sand.
308 - 314	6	Light brownish gray (5YR 6/1), poorly sorted, sub-rounded to sub-angular, medium sand to granule gravel.
314 - 319	5	Light brownish gray (5YR 6/1), poorly sorted, sub-angular to sub-rounded, medium sand to granule gravel with some very pale orange (10YR 8/2) clay.
319 - 327	8	Very pale orange (10YR 8/2) sandy clay.
327 - 330	3	Very pale orange (10YR 8/2) clay alternating with fine to very fine sand.

SAMPLE LOG
Continued

Borehole Number MW-71 Borehole Location Bryan Avenue

Depth (feet)	Thickness (feet)	Stratigraphic Description
330 - 334	4	Grayish orange (10YR 7/4) clay alternating with very fine to coarse sand.
334 - 335	1	Very pale orange (10YR 8/2) clay.
335 - 340	5	Grayish orange (10YR 7/4), poorly sorted, sub-angular to sub-rounded, clayey very fine to coarse sand.
340 - 342	2	Grayish orange (10YR 7/4) fine silty sand.
342 - 343	1	Grayish orange (10YR 7/4), poorly sorted, sub-angular to sub-rounded, clayey very fine to very coarse sand.
343 - 345	2	Pale reddish brown (10R 5/4) clay.
345 - 350	5	Grayish orange (10YR 7/4), poorly sorted, sub-angular to sub-rounded, very fine to medium sand.
350 - 355	5	Grayish orange (10YR 7/4), poorly sorted, sub-angular to sub-rounded, very fine to very coarse sand.
355 - 356	1	Grayish orange (10YR 7/4), poorly sorted, angular to sub-rounded, very fine to very coarse sand with light brown (5YR 6/4) clay.



MW-72
CONSTRUCTION DIAGRAM

METRIC
Corporation

SAMPLE LOG

Borehole Number	MW-72 Borehole Location On-site West Side
Property Owner	Sparton Technology, Inc.
Sample Logger	Cindie Salisbury/Peter Metzner, METRIC Corporation
Driller	Rodgers & Co., Inc.
Drilling Medium	Hollow Stem Auger
Date of Completion	March 5, 1999 Ground Elevation 5,053 feet

Depth (feet)	Thickness (feet)	Stratigraphic Description
0 - 5	5.0	Grayish orange (10YR 7/4), medium sorted, subangular to subrounded, very fine to medium sand.
5 - 15	10.0	Grayish orange (10YR 7/4), poorly sorted, subangular to subrounded, very fine to medium sand with silt layers.
15 - 45	30.0	Grayish orange (10YR 7/4), well sorted, subangular to rounded fine to medium sand.
45 - 50	5.0	Grayish orange (10YR 7/4), sandy clay with mottles.
50 - 55	5.0	Grayish orange (10YR 7/4), well sorted, subangular to subrounded, fine to medium sand.
55 - 60	5.0	Grayish orange (10YR 7/4), medium sorted, subangular to subrounded, clayey very fine to medium sand.
60 - 65	5.0	Grayish orange (10YR 7/4), well sorted, subangular to subrounded, fine to medium sand.
65 - 70	5.0	Yellowish gray (5Y 8/1), poorly sorted, subangular to subrounded, fine sand to pebble gravel.
70 - 75	5.0	No recovery.
75 - 77.5	2.5	Very pale orange (10YR 8/1), clayey silt.

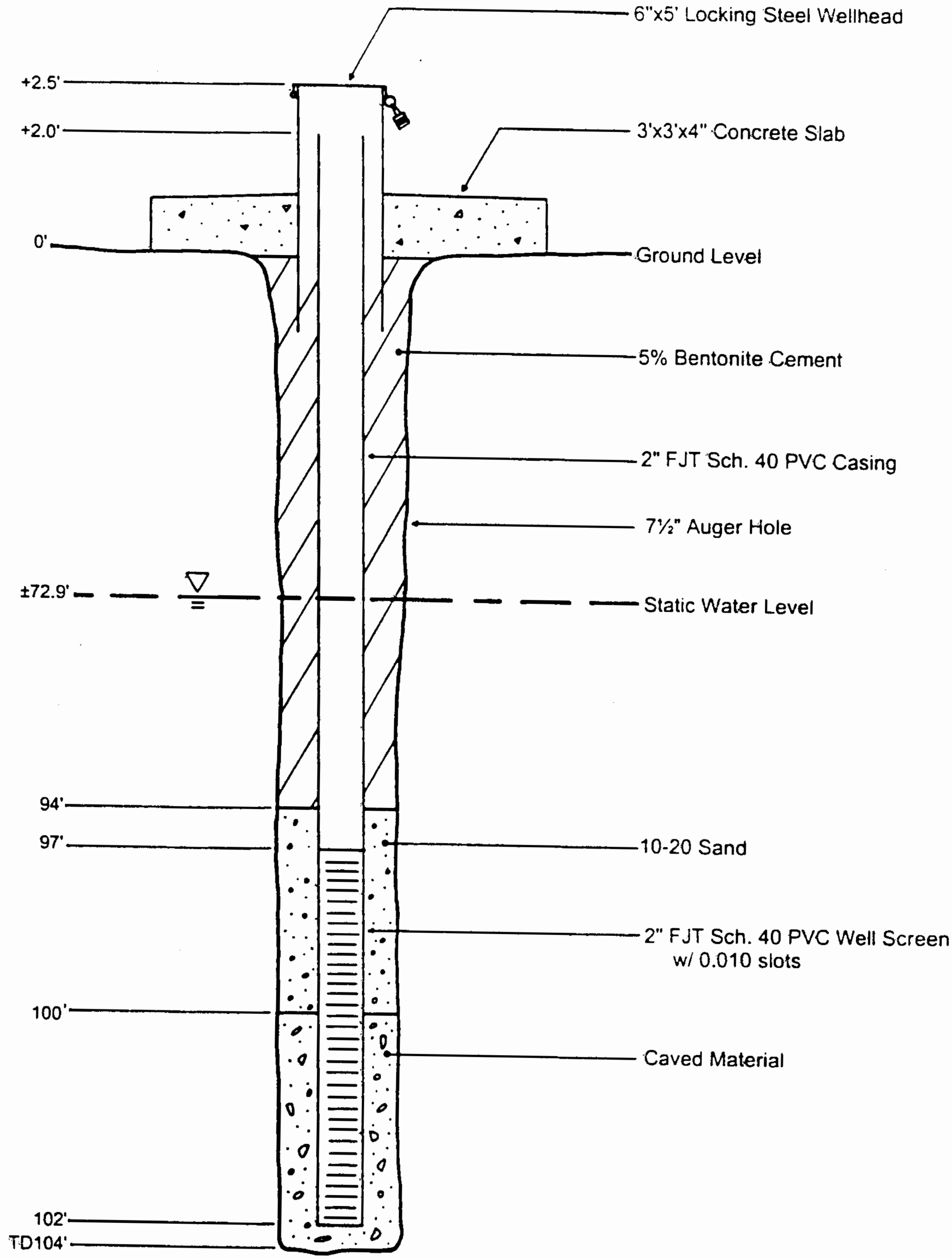
METRIC
Corporation

SAMPLE LOG

Borehole Number MW-72 Borehole Location On-site West Side

Depth (feet)	Thickness (feet)	Stratigraphic Description
77.5 - 85.5*	8.0	Sand.
85.5 - 85.6*	0.1	Firm sand.
85.6 - 102*	16.4	Sand.
102 - 102.3*	0.3	Firm sand.
102.3 - 106*	3.7	Sand.
106 - 106.2*	0.2	Firm sand.
106.2 - 109*	2.8	Sand.
109 - 109.5*	0.5	Clay.
109.5 - 110*	0.5	Cemented sandy clay.

* No cuttings were recovered after 77.5 feet. Log is based on observations on position of hexrod cross hair.



MW-73
CONSTRUCTION DIAGRAM

METRIC
Corporation

SAMPLE LOG

Borehole Number MW-73 Borehole Location On-Site

Property Owner Sparton Technology, Inc.

Sample Logger Peter H. Metzner/Cindie Salisbury, METRIC Corporation

Driller Rodgers Environmental Services, Inc.

Drilling Medium Hollow Stem Auger

Date of Completion March 2, 1999 Ground Elevation 5042.5

Depth (feet)	Thickness (feet)	Stratigraphic Description
0 - 5	5.0	Moderate yellowish brown (10YR 5/4), well sorted, sub-angular to sub-rounded, fine to medium sand.
5 - 10	5.0	Grayish orange (10YR 7/4), medium sorted, sub-rounded, silty to fine sand.
10 - 20	10.0	Grayish orange (10YR 7/4), medium sorted, sub-rounded, very fine to medium sand.
20 - 25	5.0	Moderate yellowish brown (10YR 5/4), medium sorted, sub-angular to sub-rounded, fine to medium sand with some coarse sand.
25 - 40	15.0	Moderate yellowish brown (10YR 5/4), medium sorted, sub-angular to sub-rounded, ver fine to medium sand.
40 - 55	15.0	Moderate yellowish brown (10YR 5/4), poorly sorted, sub-angular to sub-rounded, fine to very coarse sand with some small pebble gravel.
55 - 60	5.0	Moderate yellowish brown (10YR 5/4), medium sorted, sub-angular to sub-rounded, fine to coarse sand.
60 - 75	15.0	Moderate yellowish brown (10YR 5/4), poorly sorted, sub-angular to sub-rounded, fine to medium sand with pebble gravel.

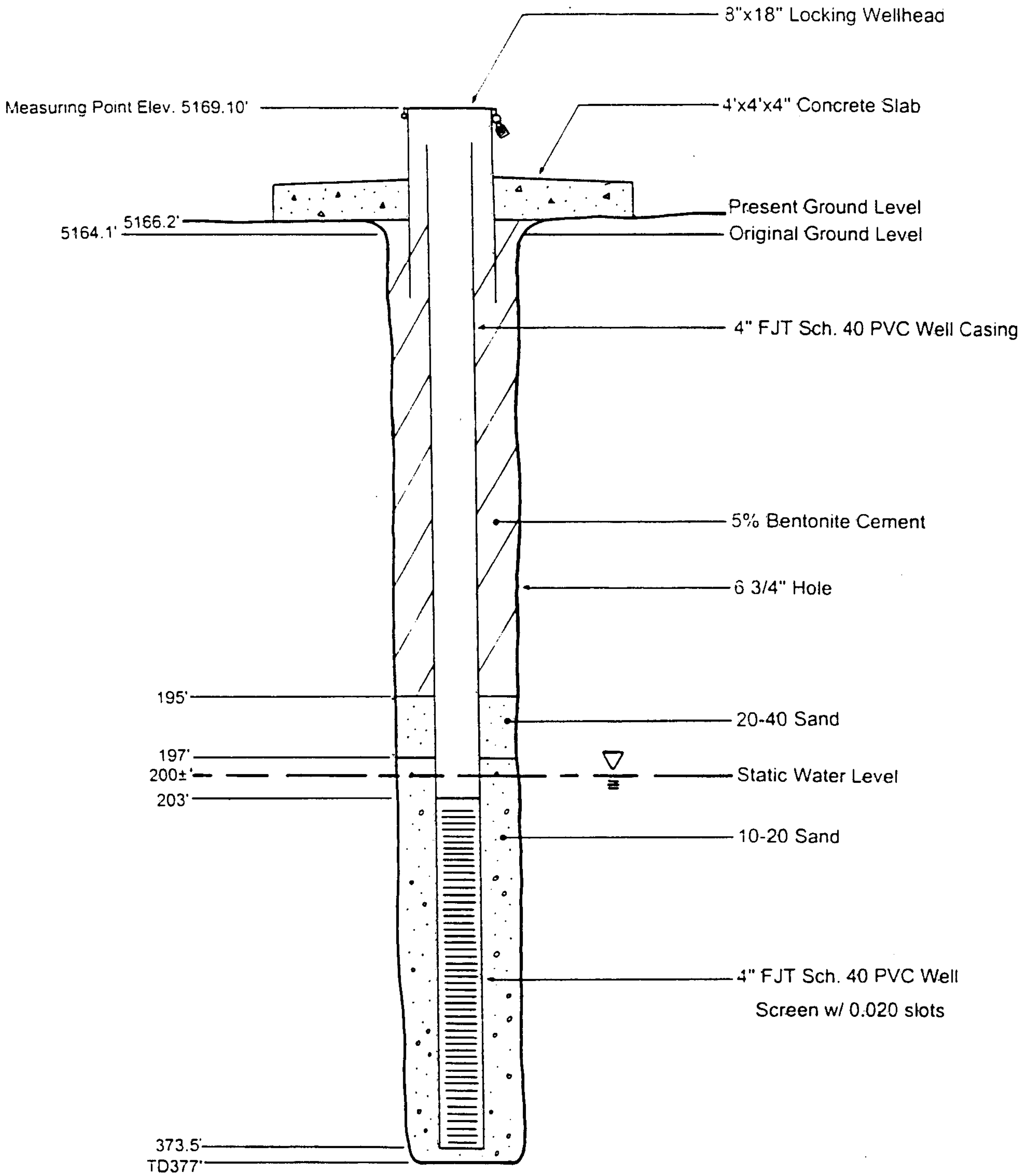
METRIC
Corporation

SAMPLE LOG
(Continued)

Borehole Number MW-73 Borehole Location On-Site

Depth (feet)	Thickness (feet)	Stratigraphic Description
75 - 83	8.0	Sand with some clay layers.
83* - 104*	21.0	Sand.

* Logged by watching position of hex rod cross bar.



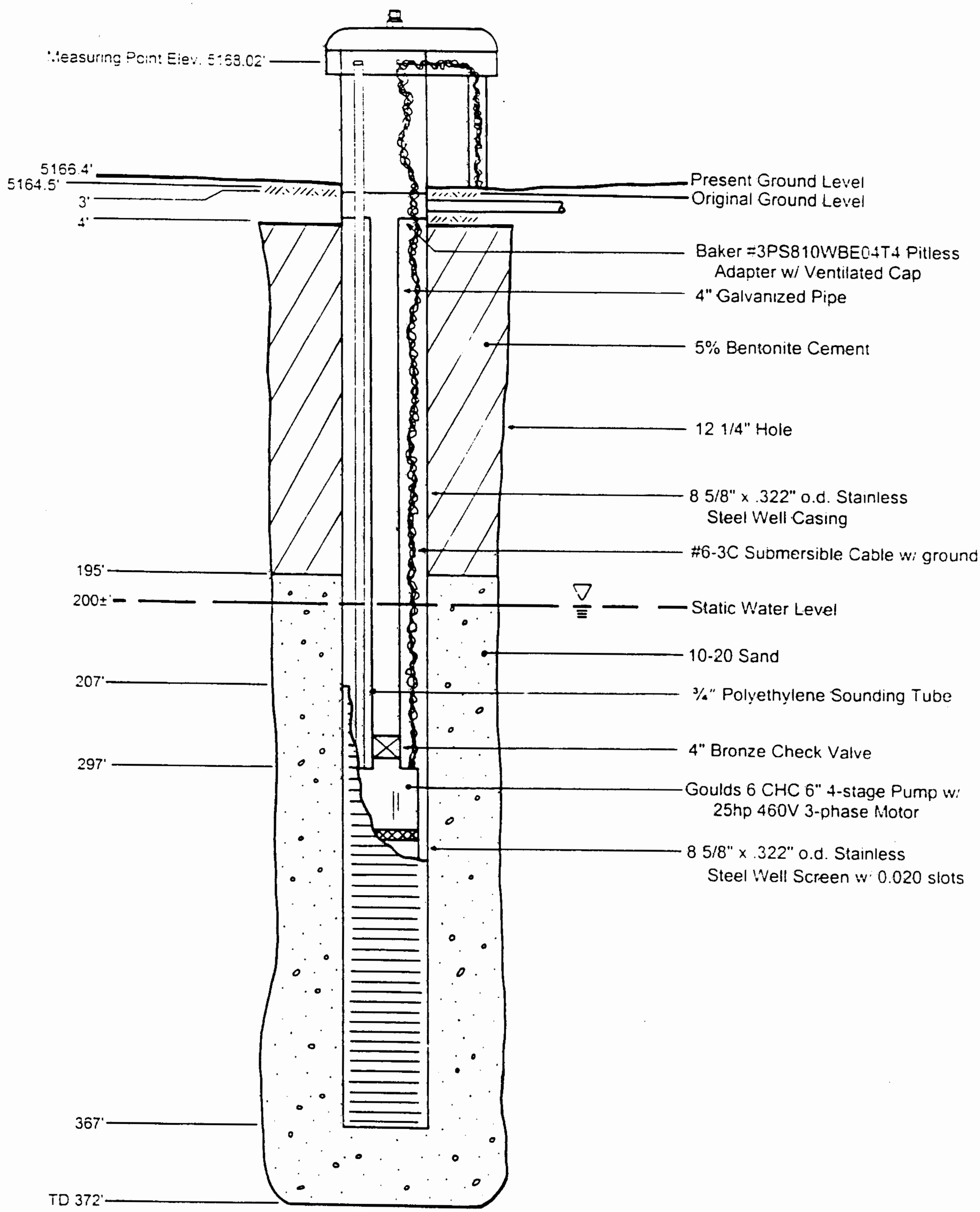
OB-1 COMPLETION DIAGRAM

METRIC
Corporation

SAMPLE LOG

Borehole Number	OB-1 Borehole Location Benton Street
Property Owner	Sparton Technology, Inc.
Sample Logger	Peter Metzner and Cindie Salisbury, METRIC Corporation
Driller	Rodgers Environmental Services
Drilling Medium	Mud Rotary
Date of Completion	August 12, 1998 Ground Elevation 5166.6 ft

Depth (feet)	Thickness (feet)	Stratigraphic Description
0 - 15	15.0	Grayish orange (10YR 7/4), well sorted, rounded to sub-angular, fine sand with some clay.
15 - 45	30.0	Grayish orange (10YR 7/4), well sorted, rounded to sub-angular, fine to coarse sand.
45 - 60	15.0	Grayish orange (10YR 7/4), medium sorted, rounded to sub-angular, clayey fine to coarse sand.
60 - 75	15.0	Grayish orange (10YR 7/4), medium sorted, rounded to sub-angular, fine to medium sand.
75 - 80	5.0	Grayish orange (10YR 7/4), poorly sorted, sub-rounded to sub-angular, medium to very coarse sand.
80 - 110	30.0	Grayish orange (10YR 7/4), poorly sorted, rounded to sub-angular, clayey very fine to coarse sand.
110 - 120	10.0	Grayish orange (10YR 7/4), poorly sorted, sub-rounded to sub-angular, clayey very fine sand to granule gravel.
120 - 130	10.0	Grayish orange (10YR 7/4), well sorted, rounded to sub-angular, medium sand to coarse sand.
130 - 140	10.0	Grayish orange (10YR 7/4), poorly sorted, sub-rounded to sub-angular, fine to very coarse sand.



CONSTRUCTION DIAGRAM
CONTAINMENT WELL CW-1
SPARTON TECHNOLOGY, INC.

METRIC
Corporation

SAMPLE LOG

Borehole Number CW-1 Borehole Location Benton Street

Property Owner Sparton Technology, Inc.

Sample Logger Peter H. Metzner, METRIC Corporation

Driller Rodgers Environmental Services, Inc.

Drilling Medium Mud rotary

Date of Completion September 1, 1998 Ground Elevation 5164.4 ft

Depth (feet)	Thickness (feet)	Stratigraphic Description
0 - 6	6.0	Grayish orange (10YR 7/4), well sorted, sub-angular to sub-rounded, coarse to very coarse sand with some small clay clumps.
6 - 13	7.0	Moderate orange pink (5 yr 8/4), poorly sorted, sub-angular to sub-rounded, very fine to coarse sand.
13 - 17	4.0	Moderate orange pink (5YR 8/4) clayey very fine to fine sand.
17 - 20	3.0	Grayish orange (10YR 7/4), poorly sorted, sub-angular to sub-rounded, very fine to coarse sand.
20 - 30	10.0	Grayish orange (10YR 7/4), poorly sorted, sub-angular to sub-rounded, very fine to very coarse sand.
30 - 33	3.0	Moderate grayish orange (5YR 8/4) to very pale orange (10YR 8/2) clay.
33 - 55	22.0	Grayish orange (10YR 7/4), poorly sorted, sub-angular to sub-rounded, clayey very fine to coarse sand.
55 - 70	15.0	Grayish orange (10YR 7/4), poorly sorted, sub-angular to sub-rounded, clayey very fine to coarse sand.
70 - 85	15.0	Grayish orange (10YR 7/4), poorly sorted, sub-angular to rounded, medium to very coarse sand.

METRIC
Corporation

SAMPLE LOG Continued

Borehole Number CW-1 Borehole Location Benton Street

Depth (feet)	Thickness (feet)	Stratigraphic Description
85 - 110	25.0	Grayish orange (10YR 7/4), well sorted, sub-angular to sub-rounded, coarse to very coarse sand.
110 - 115	5.0	Grayish orange (10YR 7/4), poorly sorted, sub-angular to sub-rounded, very fine to very coarse sand.
115 - 140	25.0	Grayish orange (10YR 7/4), medium sorted, sub-angular to rounded, clayey very fine to medium sand.
140 - 155	15.0	Grayish orange (10YR 7/4), well sorted, sub-angular to rounded, medium to coarse sand.
155 - 160	5.0	Grayish orange (10YR 7/4) sandy clay.
160 - 165	5.0	Grayish orange (10YR 7/4), well sorted, sub-angular to rounded, medium to coarse sand.
165 - 168	3.0	Grayish orange (10YR 7/4) too moderate orange pink (5YR 8/4) clayey medium to coarse sand.
168 - 175	7.0	Grayish orange (10YR 7/4), poorly sorted, sub-angular to rounded, medium to coarse sand with pebble gravel and clay.
175 - 185	10.0	Pale yellowish brown (10YR 6/4), poorly sorted, sub-angular to sub-rounded, coarse sand to pebble gravel and grayish orange (5YR 8/4) clay.
185 - 190	5.0	Moderate orange pink (5YR 8/4) clayey fine sand to granule gravel.
190 - 203	13.0	Sandy clay, ranging in color from moderate orange pink (5YR 8/4) to grayish orange (10YR 7/4) with granule to pebble gravel.

METRIC
Corporation

SAMPLE LOG Continued

Borehole Number CW-1 Borehole Location Benton Street

Depth (feet)	Thickness (feet)	Stratigraphic Description
203 - 215	12.0	Pale yellowish brown (10YR 6/2), poorly sorted, sub-angular to rounded, clayey very fine sand to granule gravel.
215 - 225	10.0	Pale yellowish brown (10YR 6/2), poorly sorted, sub-angular to sub-rounded, fine to coarse sand with reddish yellow (5YR 6/8).
225 - 247	22.0	Pale yellowish brown (10YR 6/2), poorly sorted, sub-angular to sub-rounded, fine to very coarse sand.
247 - 255	8.0	Pale yellowish brown (10YR 6/2), poorly sorted, sub-angular to sub-rounded, fine to very coarse sand with clumps of grayish orange (10YR 7/4) sandy clay.
255 - 265	10.0	Pale yellowish brown (10YR 6/2), poorly sorted, sub-angular to rounded, clayey very fine to coarse sand with some grayish orange (10YR 7/4) sandy clay.
265 - 280	15.0	Pale yellowish brown (10YR 6/2), poorly sorted, sub-angular to rounded, clayey fine to very coarse sand with light brown (5YR 6/4) clay.
280 - 300	20.0	Pale yellowish brown (10YR 6/2), poorly sorted, sub-angular to sub-rounded, clayey very fine to coarse sand.
300 - 310	10.0	Pale yellowish brown (10YR 6/2), well sorted, sub-angular to sub-rounded, medium to coarse sand.
310 - 345	35	Grayish orange (10YR 7/4), poorly sorted, sub-angular to rounded, very fine to coarse sand.
345 - 371	26.0	Pale yellowish brown (10YR 6/2), medium sorted, sub-angular to sub-rounded, clayey medium to very coarse sand.

METRIC
Corporation

SAMPLE LOG Continued

Borehole Number CW-1 Borehole Location Benton Street

Depth (feet)	Thickness (feet)	Stratigraphic Description
371 - 372	1.0	Clay, ranging in color from pale reddish brown (10R 5/4) to grayish orange (10YR 7/4).

METRIC
Corporation

SAMPLE LOG Continued

Borehole Number OB-1 Borehole Location Benton Street

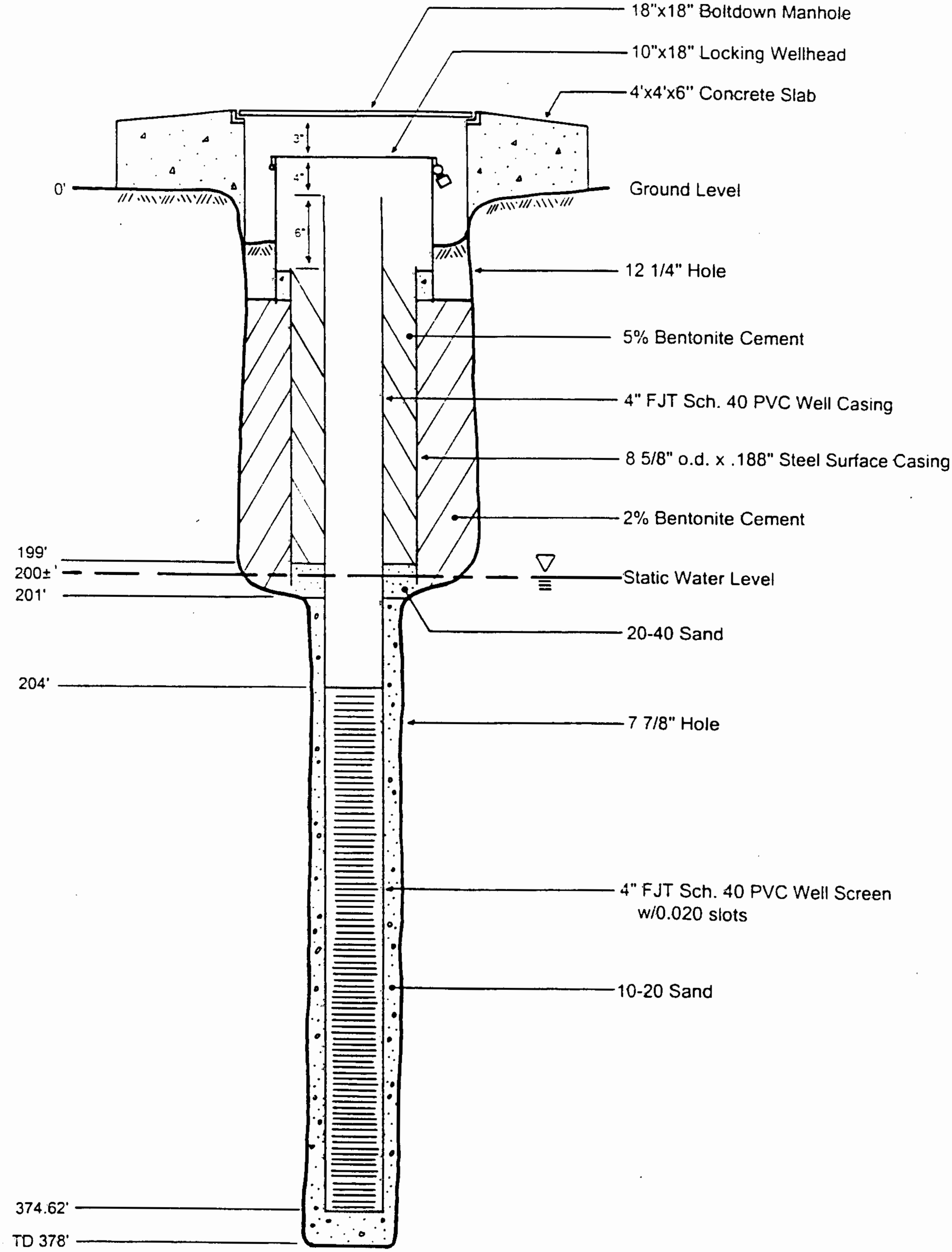
Depth (feet)	Thickness (feet)	Stratigraphic Description
140 - 160	20.0	Moderate orange pink (5YR 8/4) clay.
160 - 170	10.0	Grayish orange (10YR 7/4), poorly sorted, rounded to sub-angular, fine to very coarse sand.
170 - 175	5.0	Moderate orange pink (5YR 8/4) clay with some granule gravel.
175 - 185	10.0	Light gray (N7), well sorted, angular to sub-angular small pebble gravel.
185 - 190	5.0	Light gray (N7), poorly sorted, angular to sub-angular, coarse sand to pebble gravel.
190 - 195	5.0	Yellowish gray (5Y 8/1), poorly sorted, sub-rounded to sub-angular, clayey very fine sand to pebble gravel.
195 - 220	25.0	Yellowish gray (5Y 8/1), sandy clay with pebble gravel.
220 - 255	35.0	Grayish orange (10YR 7/4), poorly sorted, sub-rounded to sub-angular, clayey very fine to very coarse sand.
255 - 265	10.0	Grayish orange (10YR 7/4), medium sorted, rounded to sub-angular, clayey fine to coarse sand with yellowish gray (5Y 8/1) clay.
265 - 310	45.0	Grayish orange (10YR 7/4), medium sorted, rounded to sub-angular, medium to very coarse sand, with yellowish gray (5Y 8/1) clay.
310 - 315	5.0	Very pale orange (10YR 8/2), sandy clay.
315 - 335	20.0	Grayish orange (10YR 7/4), medium sorted, sub-rounded to sub-angular, clayey fine to coarse sand.

METRIC
Corporation

SAMPLE LOG Continued

Borehole Number OB-1 Borehole Location Benton Street

Depth (feet)	Thickness (feet)	Stratigraphic Description
335 - 340	5.0	Very pale orange (10YR 8/2), sandy clay.
340 - 343	3.0	Grayish orange (10YR 7/4), medium sorted, rounded to sub-angular, clayey fine to coarse sand.
343 - 344	1.0	Grayish orange (10YR 7/4), sandy clay.
344 - 349	5.0	Grayish orange (10YR 7/4), medium sorted, rounded to sub-angular, clayey fine sand to coarse sand with layers of very pale orange (10YR 8/2) clay.
349 - 355	6.0	Grayish orange (10YR 7/4), medium sorted, rounded to sub-angular, clayey fine to coarse sand.
355 - 360	5.0	Grayish orange (10YR 7/4), well sorted, rounded to sub-angular, fine to coarse sand.
360 - 376	16.0	Grayish orange (10YR 7/4), well sorted, rounded to sub-angular, fine sand to coarse sand.
376 - 377	1.0	Very pale orange (10YR 8/2), sandy clay.



OB-2 COMPLETION DIAGRAM

METRIC
Corporation

SAMPLE LOG

Borehole Number OB-2 Borehole Location Chantilly Road

Property Owner Sparton Technology, Inc.

Sample Logger Cindie Salisbury and Peter Metzner, METRIC Corporation

Driller Rodgers Environmental Services, Inc.

Drilling Medium Mud rotary

Date of Completion July 27, 1998 Ground Elevation 5165.26 ft

Depth (feet)	Thickness (feet)	Stratigraphic Description
0 - 5	5	Grayish orange (10YR 7/4), poorly sorted, sub-angular to sub-rounded, fine to very fine sand with clay and some granule gravel.
5 - 10	5	Grayish orange (10YR 7/4), poorly sorted, sub-angular to sub-rounded, very fine sand to granule gravel.
10 - 15	5	Grayish orange (10YR 7/4), poorly sorted, sub-angular to sub-rounded, very fine sand to granule gravel.
15 - 20	5	Grayish orange (10YR 7/4), poorly sorted, sub-angular to sub-rounded, clayey very fine to medium sand with some granule gravel.
20 - 25	5	Grayish orange (10YR 7/4), poorly sorted, sub-angular to sub-rounded, clayey very fine to coarse sand with some granule gravel.
25 - 40	15	Grayish orange (10YR 7/4), poorly sorted, sub-angular to sub-rounded, very fine to very coarse sand with some granule gravel.
40 - 55	15	Grayish orange (10YR 7/4), poorly sorted, sub-angular to sub-rounded, very fine sand to granule gravel.
55 - 60	5	Grayish orange (10YR 7/4), poorly sorted, sub-angular to sub-rounded, very fine to medium sand with some pebble gravel.
60 - 80	5	Grayish orange (10YR 7/4), poorly sorted, sub-angular to sub-rounded, very fine to coarse sand.

SAMPLE LOG Continued

Borehole Number OB-2 Borehole Location Chantilly Road

Depth (feet)	Thickness (feet)	Stratigraphic Description
80 - 100	20	Grayish orange (10YR 7/4), poorly sorted, sub-angular to rounded, clayey very fine to very coarse sand with some small pebble gravel.
100 - 110	5	Grayish orange (10YR 7/4), poorly sorted, sub-angular to rounded, very fine sand to coarse sand with some clay clumps.
110 - 114	4	Grayish orange (10YR 7/4), poorly sorted, sub-angular to sub-rounded, very fine sand to granule gravel with some clay.
114 - 120	6	Pale yellowish brown (10YR 6/2), clay with sub-angular to sub-rounded granule to small pebble gravel.
120 - 130	10	Grayish orange (10YR 7/4), medium sorted, sub-angular to rounded, very fine sand to medium sand with clay.
130 - 138	3	Grayish orange (10YR 7/4), poorly sorted, sub-angular to rounded, fine to very coarse sand.
138 - 139	1	Grayish orange (10YR 7/4) clay.
139 - 143	4	Grayish orange (10YR 7/4), poorly sorted, sub-angular to rounded, fine sand to very coarse sand with some clay clumps.
143 - 150	7	Grayish orange (10YR 7/4) sandy clay with sub-angular to angular small pebble gravel.
150 - 163	8	Grayish orange (10YR 7/4), poorly sorted, sub-angular to rounded, fine to coarse sand with clay ranging in color from moderate yellowish brown (10YR 5/4) to pale reddish brown (10R 5/4).

METRIC
Corporation

SAMPLE LOG Continued

Borehole Number OB-2 Borehole Location Chantilly Road

Depth (feet)	Thickness (feet)	Stratigraphic Description
163 - 165	2	Grayish orange (10YR 7/4), well sorted, sub-angular to rounded, fine to medium sand.
165 - 167	2	Grayish orange (10YR 7/4), medium sorted, sub-angular to rounded, medium to very coarse sand.
167 - 169	2	Clay ranging in color from grayish orange (10YR 7/4) to pale reddish brown (10R 5/4).
169 - 175	6	Multi-colored, poorly sorted, angular to sub-angular coarse sand to small pebble gravel ranging in color from dusky yellow (5Y 6/4) to grayish green (5G 5/2), from pale red (5R 6/2) to pale red purple (5RP 6/2) and from light gray (N7) to medium dark gray (N4).
175 - 180	5	Multi-colored, well sorted, angular to sub-angular small pebble gravel to small cobbles ranging in color from dusky yellow (5Y 6/4) to grayish green (5G 5/2), from pale red (5R 6/2) to pale red purple (5RP 6/2) and from light (N7) to medium dark gray (N4).
180 - 190	10	Light brownish gray (5YR 6/1), poorly sorted, sub-angular to sub-rounded, fine to very coarse sand with multi-colored granule to small pebble gravel.
190 - 200	10	No sample retrieved. Coarse sand and gravel.
200 - 220	10	No sample retrieved. Sand.
220 - 243	23	Light brownish gray (5YR 6/1), poorly sorted, sub-angular to rounded, very fine sand to granule gravel.
243 - 260	17	Light brownish gray (5YR 6/1), poorly sorted, sub-angular to round, fine and very coarse sand with clay.

METRIC
Corporation

SAMPLE LOG Continued

Borehole Number OB-2 Borehole Location Chantilly Road

Depth (feet)	Thickness (feet)	Stratigraphic Description
260 - 265	5	Multi-colored, angular to sub-angular, small pebble gravel ranging in color from dusky yellow (5Y 6/4) to grayish green (5G 5/2), from pale red (5R 6/2) to pale red purple (5RP 6/2) and from light (N7) to medium dark gray (N4) with light olive gray (5Y 5/2) clay.
265 - 276	11	Light brownish gray (5YR 6/1), poorly sorted, sub-angular to rounded, fine to coarse sand with some granule gravel.
276 - 281	5	Light brownish gray (5YR 6/1), poorly sorted, sub-angular to rounded, clayey fine sand to granule gravel.
281 - 290	9	Light brownish gray (5YR 6/1), poorly sorted, sub-angular to sub-rounded, clayey fine to very coarse sand.
290 - 297	2	Light brownish gray (5YR 6/1), poorly sorted, sub-angular to rounded, fine sand to granule gravel .
297 - 303	6	Light brownish gray (5YR 6/1), poorly sorted, sub-angular to rounded, clayey very fine sand to granule gravel.
303 - 315	12	Grayish orange (10YR 7/4), poorly sorted, sub-angular to sub-rounded, clayey very fine sand to small pebble gravel.
315 - 320	5	Grayish orange (10YR 7/4), poorly sorted, sub-angular to rounded, clayey very fine to coarse sand.
320 - 325	5	Grayish orange (10YR 7/4), well sorted, sub-angular to rounded, fine to medium sand.

METRIC
Corporation

SAMPLE LOG Continued

Borehole Number OB-2 Borehole Location Chantilly Road

Depth (feet)	Thickness (feet)	Stratigraphic Description
325 - 335	10	Grayish orange (10YR 7/4), poorly sorted, sub-angular to sub-rounded, very fine to very coarse sand.
335 - 345	10	Grayish orange (10YR 7/4), poorly sorted, sub-angular to sub-rounded, very fine to coarse sand.
345 - 377	33	Grayish orange (10YR 7/4), poorly sorted, sub-angular to rounded, very fine to coarse sand.
377 - 378	1	Pale reddish brown (10R 5/4), sandy clay.

PUBLIC INVOLVEMENT PLAN

FOR

CORRECTIVE MEASURE ACTIVITIES

SPARTON TECHNOLOGY, INCORPORATED

COORS ROAD PLANT

ALBUQUERQUE, NEW MEXICO

I. INTRODUCTION

This Public Involvement Plan (PIP) is being submitted to describe policy and procedures to disseminate information to the local community on corrective measure activities. The corrective measure activities were detailed in separate workplans submitted to the City, County, State, and U.S. EPA. The corrective measures include groundwater plume containment wells (together with associated treatment and disposal) and vadose zone soil vapor extraction and treatment.

II. OBJECTIVES OF THE PUBLIC INVOLVEMENT PLAN

The Public Involvement Plan (PIP) for corrective measure activities at the Sparton Coors Road Plant has three main objectives:

1) Provide the local community with specific information regarding corrective measure activities including off-site containment, on-site containment, and soil vapor extraction.
2) Respond to local community concerns and needs that arise during corrective measure activities.
3) Provide for effective management of community relations and monitoring of public involvement.

III. ELEMENTS OF THE PUBLIC INVOLVEMENT PLAN

Historically, corrective measure activities at the Coors Road Plant have been extensively communicated to the public through the active participation of the City of Albuquerque, Bernalillo County, various state agencies, U.S. EPA, New Mexico Utilities, and the Albuquerque Metropolitan Area Flood Control Authority. In addition, the corrective measure activities have been communicated through public meetings and local news media articles. Sparton will continue to participate in these activities as requested. However, this PIP focuses on making information readily accessible to local residents, businesses, and property owners in the vicinity of the Sparton plant potentially impacted by corrective measure activities.

There are four specific elements in this PIP:

1) Notification of local residents, businesses, and property owners in the immediate neighborhood about corrective measure activities. The notification would include a description of the corrective measure activities and a corrective measure activities schedule. A contact person for Sparton would be designated in each notification.
2) Preparation and distribution of brief fact sheets about the corrective measure activities status and results. The fact sheets would include a contact person for Sparton.
3) Provision for an additional public accessible repository for information and documents covering the corrective action. This repository would be located at the Taylor Ranch Public Library and would supplement the existing repositories at the City of Albuquerque Public Works Department and at the New Mexico Environment Department in Santa Fe.
4) Public meetings to provide overview/summary of corrective measure activities.

IV. NOTIFICATION

Sparton will notify local residents, businesses, and property owners situated over the TCE plume (as defined in the most current Ground Water Monitoring Program Plan Report) and that are adjacent to areas where corrective measures are planned or being implemented of the ongoing corrective measure activities. Sparton will develop the notification list within 60 days after the effective date of the Consent Decree. The mailing list will be developed by Sparton through research of local real estate, utility, and tax records. Sparton will include U.S. EPA's current notification list with the mailing.

Within 90 days after the effective date of the Consent Decree, Sparton will transmit a notification to the notification list entities which will include a brief description and location of the corrective measures and indicate further information can be obtained from either the established public-accessible repositories or by contacting either Mr. R. Jan Appel at Sparton Technology, Inc. in Jackson, Michigan, or Mr. Tony Hurst in Albuquerque. The notice will also indicate logistics concerning a public information meeting on the corrective measure activities that Sparton will conduct within 60 to 90 days after the effective date of the Consent Decree. Sparton will provide notice and will conduct a public meeting to inform the public concerning the progress of the corrective action activities within 460 and 490 days after the effective date of the Consent Decree.

The general public shall be notified through publication of a notice in the form of a display advertisement in a newspaper of general circulation in the Albuquerque metropolitan area.

V. FACT SHEETS

Sparton will prepare a fact sheet which summarizes corrective measure activities and schedules and indicates how information can be obtained through Sparton. Sparton will update this fact sheet from information contained in the site annual report described in Attachment D of the Consent Decree. This fact sheet will be transmitted on an annual frequency, after regulatory approval, to the notification list entities. Fact sheets and updates will also be available from Sparton's contacts, Mr. R. Jan Appel or Mr. Tony Hurst, upon request. These fact sheets and regular updates will provide for consistent dissemination of information on corrective measure activities.

VI. ADDITIONAL PUBLIC REPOSITORY

Sparton will establish an additional public-accessible repository at the Taylor Ranch Public Library. The Taylor Ranch Library will be added to the distribution list for all deliverables from Sparton to the City, County, State, or U.S. EPA. Sparton will further provide a notice to the Taylor Ranch Public Library that additional information and previous site history can be reviewed at existing repositories at the City of Albuquerque Public Works Department and at the New Mexico Environment Department in Santa Fe. Sparton will check annually on proper maintenance of the public-accessible repository.

VII. REGULATORY REVIEW

Notification documents, fact sheets, and any other publicly-distributed documents will be submitted to the City, State, and U.S. EPA for review and comments prior to public issuance. Fact sheets and/or updates will be submitted concurrently with required reports for each corrective action component.

ATTACHMENT C

WORK PLAN
FOR THE OFF-SITE
CONTAINMENT SYSTEM

Prepared For:

SPARTON TECHNOLOGY, INC.
Coors Road Facility
Albuquerque, New Mexico

Prepared By:

S. S. PAPADOPULOS & ASSOCIATES, INC.
Environmental & Water-Resource Consultants

7944 Wisconsin Avenue, Bethesda, Maryland 20814-3620 • (301) 718-8900

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1.0 INTRODUCTION

Sparton Technology, Inc. (Sparton) has agreed to install, test and operate an off-site containment well near the leading edge of an off-site plume of solvents thought to be associated with past operations at its Coors Road Facility in Albuquerque, New Mexico. A monitoring well for confirming the vertical extent of the plume (MW-71), the containment well (CW-1), and two observation wells (OB-1 and OB-2) that provided data during the testing of the containment well were installed in the summer of 1998, in compliance with the terms of the "Work Plan for the Installation of Additional Wells and Conducting a Pump Test in the Area of the Leading Edge of the Contaminant Plume Originating from the Sparton Technology, Inc. Coors Road Facility", effective July 7, 1998 (PI Work Plan).

A step-drawdown test and a three-day constant rate pumping test were conducted on the containment well between December 4 and 12, 1998, in accordance with the terms of the PI Work Plan. The results of these tests and data on the hydraulic gradient of the aquifer and on the extent of the plume was used to estimate the pumping rate required to contain the plume [see Interim Report on Off-Site Containment Well Pumping Rate[1] (Interim Report)]. This pumping rate was used to conduct a 30-day containment feasibility test on the well between December 31, 1998 and January 30, 1999. Since the completion of the containment feasibility test, Sparton is continuing to operate the well at the same pumping rate.

The containment well and the air stripper and infiltration gallery which will be installed to treat and discharge the pumped groundwater will constitute the off-site containment system for the

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[1] S. S. Papadopulos & Associates, Inc., 1998, *Interim Report on Off-Site Containment Well Pumping Rate*: prepared for Sparton Technology, Inc., Coors Road Facility, Albuquerque, New Mexico, December 28.

plume. Discharge from the containment system is addressed in a Ground Water Discharge Plan approved by the New Mexico Environment Department, a copy of which is attached (see Appendix).

The performance of the off-site containment system will be evaluated annually based on data to be collected in compliance with Attachment A - Ground Water Monitoring Program Plan (Monitoring Plan). During the first year, an additional evaluation will be performed after six months of continuous operation, that is, five months after the end of the 30-day feasibility test. Data for this first evaluation will also include those collected during the 30-day feasibility test in compliance with the PI Work Plan. Based on the results of this first evaluation, adjustments to the operating pumping rate of the containment well will be made, if necessary. If the well is not capable of producing the pumping rate required to achieve containment, additional extraction wells will be installed.

The purpose of this Work Plan is to describe the procedures that will be used to evaluate the performance of the off-site containment system, that is, to verify containment of the off-site plume. Issues related to the installation of the air stripper and infiltration gallery components of the off-site containment system, and the development of an Operation and Maintenance Plan are also addressed in this Work Plan.

2.0 DATA AND MONITORING REQUIREMENTS

The information needed to select the operating pumping rate for the off-site containment system and to evaluate its performance, that is, to determine whether the system provides the desired hydraulic capture of the plume, is:

1. The transmissivity of the aquifer near the leading edge of the plume;
2. The prevailing natural hydraulic gradient in the off-site area;
3. The extent of the contaminant plume;
4. The pumping rate of the containment well(s);
5. Water-levels in existing monitoring wells, the containment well, and the two observation wells during the operation of the containment system; and
6. Water-quality data collected from monitoring wells during the operation of the system.

The objective of any data collection or monitoring activities associated with the containment system performance evaluation is to provide the above listed information.

The hydrogeologic tests that were conducted as described in the PI Work Plan have provided data for determining the transmissivity of the aquifer near the leading edge of the plume.

The prevailing natural hydraulic gradient in the off-site area was determined from water-level data collected from off-site wells during the last several years, as well as additional water-level data that were collected, in compliance with the PI Work Plan and the Monitoring Plan, prior to the 30-day containment-feasibility test.

The extent of the plume was confirmed from water quality data collected from existing monitoring wells. Data collected during the last several years under the ongoing monitoring program and those that were collected under the PI Work Plan and the Monitoring Plan, prior to the containment-feasibility test, were used for this purpose. Water-quality data collected from the monitoring wells during the operation of the containment system will be used for future assessments of the performance of the containment system.

Pumping-rate and water-level data for evaluations of the containment system performance were collected in accordance with the PI Work Plan during the conduct of the 30-day containment-feasibility test, and will be collected in accordance with the Monitoring Plan during the subsequent continuous operation of the containment system.

3.0 EVALUATION OF CONTAINMENT SYSTEM PERFORMANCE

. The tasks that need to be performed to select the operating pumping rate for the off-site containment system and to evaluate the performance of the system are:

Task 1 - Determine transmissivity of the aquifer;

Task 2 - Determine prevailing off-site hydraulic gradient;

Task 3 - Confirm extent of the contaminant plume;

Task 4 - Determine pumping rate needed to achieve containment;

Task 5- Evaluate capture zone of the containment well using data from the first six months of continuous operation, including the containment-feasibility test; prepare report on results of evaluation; and

Task 6 - Evaluate capture zone after each year of continuous operation using data collected during that year, and present results in Annual Reports.

A brief description of each of these tasks is presented below.

3.1 Task 1 - Transmissivity of the Aquifer

The transmissivity of the aquifer near the leading edge of the plume was estimated from the analysis of data from the three-day constant rate pumping test that was conducted using the containment well. The results of this analysis were presented in the Interim Report which was prepared within two weeks of the end of the test and submitted prior to the beginning of the 30-day containment-feasibility test. Additional evaluations of the transmissivity will be made using data collected during the 30-day containment-feasibility test. The results of these evaluations will be presented in the Groundwater Investigation and Off-Site Containment System Design Report

(Groundwater Investigation Report) that will be prepared by the end of the seventh month of continuous operation.

3.2 Task 2 - Off-Site Hydraulic Gradient

January 1998 water-level data from off-site monitoring wells indicate that the current off-site hydraulic gradient is about 0.0025 foot per foot to the northwest. Additional evaluations were made, using historic water-level data that were collected prior to the testing program, to determine the average magnitude and direction of the hydraulic gradient. Kriging of the average water-level data and regression analyses were used for these evaluations. The results of the evaluations were included in the Interim Report that was prepared prior to the beginning of the containment-feasibility test (see Task 1).

3.3 Task 3 - Extent of the Plume

The depth of the containment well needed to capture the vertical extent of the plume has been determined from water-quality data available from deep monitoring wells including monitoring well MW-71 which was recently installed by Sparton under the terms of the PI Work Plan.

The lateral extent of the plume to be captured by the off-site containment system was confirmed prior to the containment-feasibility test using the most recent water-quality data available at that time. Trichloroethylene (TCE), the primary volatile organic constituent at the site, was used as the indicator parameter for determining the extent of the plume. Concentrations of TCE detected in monitoring wells were used to develop TCE isoconcentration maps. At monitoring well cluster locations, only the well having the highest TCE concentration (regardless of its depth) was used in this process. The isoconcentration map was developed by kriging the logarithms of measured TCE concentrations, and taking into consideration the rate and direction of groundwater flow and the past history of contamination in the off-site area. In this process, monitoring wells in which the TCE concentration reported for the most recent sampling event was less than the detection limit were treated as follows:

1. Wells in which contaminant concentrations have been historically reported as less than the detection limit, were assumed to be clean; a TCE concentration of 0.01 μg/L was used in the kriging process. (A higher concentration, equal to one-half the detection limit, was used in well MW-63 because the use of a concentration of 0.01 μg/L resulted in a plume boundary which was not consistent with the direction of groundwater flow.)
2. Wells in which low levels of contaminants have been detected in the past, were assumed to have a TCE concentration equal to one-half the detection limit; however, in well MW-57 where the highest past TCE concentration was less than one-half the detection limit, the value of this highest past concentration (0.3 μg/L) was used.

In addition to these monitoring well data, six artificial control points were used in the kriging process to maintain the plume boundary defined by this process consistent with the direction of ground-water flow. The location coordinates of these control points are given below:

Control Point	Easting	Northing
CP-1	374,680	1,524,640
CP-2	376,410	1,525,680
CP-3	377,650	1,524,700
CP-4	377,900	1,524,450
CP-5	377,750	1,524,100
CP-6	377,500	1,523,750

Control point CP-1 is to the northwest of monitoring MW-62, and control point CP-2 is at the mid-point between MW-63 and MW-64. The purpose of these two control points was to control the two sides of the plume boundary defined by the kriging process and prevent the boundary from spreading outward in a manner inconsistent with the direction of flow. A TCE concentration equal to one-half of that detected in MW-62 was used at CP-1 and a concentration equal to the average of those detected in wells MW-63 and MW-64 was used at CP-2. The remaining four control points are upgradient from the Sparton property; their purpose was to prevent the defined plume from spreading in an upgradient direction. A TCE concentration of 0.01 µg/L was used at these four points. The extent of the plume was defined by the 5 µg/L TCE isoconcentration contour. The results of this evaluation were included in the Interim Report that was prepared prior to the beginning of the 30-day containment-feasibility test (see Task 1).

Although the initial extent of the plume to be captured was based only on TCE concentrations as an indicator compound, future determinations of the extent of the plume will be based on all site-related contaminants. Isoconcentration maps for each contaminant will be developed using a process similar to that described above for TCE. The extent of the plume that needs to continue to be captured will be defined by the envelop of the isoconcentration contours corresponding to the more stringent of the Maximum Contaminant Levels (MCLs) for drinking water established under the Safe Drinking Water Act or the maximum allowable contaminant concentrations in groundwater set by the State of New Mexico Water Quality Control Commission for site-related compounds.

3.4 Task 4 - Required Pumping Rate

The transmissivity determined from the three-day constant rate pumping test (Task 1) was used in conjunction with the average hydraulic gradient in the off-site areas (Task 2) and the lateral extent of the plume (Task 3) to calculate the pumping rate that should provide hydraulic containment of the plume. The results of this calculation were included in the Interim Report that was prepared prior to the beginning of the 30-day containment-feasibility test (see Task 1). The 30-day containment-feasibility test was conducted at the calculated pumping rate. Currently, the containment well is operating at this pumping rate, and will continue to operate at this rate, unless otherwise indicated by the performance evaluation that will be conducted after six months, as discussed in Task 5.

3.5 Task 5 - Capture Zone Evaluation

Confirmation of the performance of the containment well, that is, the determination of whether the well is indeed containing the plume, will be based on water-level data that were collected from observation and monitoring wells during the conduct of the containment-feasibility test and those to be collected during the subsequent five months of continuous operation. The first step in this evaluation would be an analysis of the feasibility test data to determine whether the transmissivity from this longer test is consistent with that determined from the constant rate pumping test; any adjustments to the transmissivity that may result from this analysis will be considered in the evaluation of the system performance.

The next step of the evaluation would be to determine the capture zone of the well. Water-level data collected after water levels have stabilized, will be contoured to prepare a water-level map which is consistent with the pumping rate of the well and the transmissivity of the aquifer. Detailed information on the water levels in the vicinity of the containment well plays an important role in the preparation of this water level map. However, since the transmissivity of the aquifer has been established by the short-term testing and will be confirmed or adjusted by the results of the long-term testing conducted under the PI Work Plan, water-level conditions in the vicinity of the containment well can be accurately estimated using relatively few water-level measurements from monitoring wells. Specifically, water level measurements from a few monitoring wells surrounding the containment well will be combined with the transmissivity determined from the tests in a regression equation to calculate the shape of the water-level surface in the vicinity of the containment well.

This regression equation has the following form:

$$H_j = A + B*X_j + C*Y_j + (Q_w * \ln(r_j)) / (2T)$$

where the index j denotes a monitoring well, H is the measured water level in that well, X and Y are coordinates of that well, r is the distance between the monitoring well and the containment well, Q_w is the pumping rate of the containment well, T is the transmissivity of the aquifer and A, B, and C are regression coefficients. Once the coefficients A, B, and C have been determined from the regression analysis, the water level at several points in the immediate vicinity of the containment well will be calculated using the above regression equation. These calculated water levels will then be combined with the water-level measurements from monitoring wells and kriged to construct the water-level contour map. The resulting map will be accurate with respect to the measured water levels and the effects of pumping from the containment well.

This water-level map will then be used to calculate ground-water flow paths and determine the capture zone of the well. A particle-tracking routine, such as PATH3D[2], or equivalent, will be used for this purpose. The capture zone determined by the approach described above will then be compared to the extent of the plume, as defined in Task 3, to evaluate whether the well provides containment of the plume. In addition, water-quality data from monitoring wells will be assessed to determine whether they provide useful information in evaluating the effectiveness of the containment system. If this evaluation indicates that the capture zone is too small or too large in comparison to the extent of the plume, adjustments will be made to the pumping rate of the well to achieve containment or to avoid excessive pumping of uncontaminated water. The results of this evaluation, including any proposed adjustments to the pumping rate and/or the number of extraction wells, will be presented in the Groundwater Investigation Report that will be prepared by the end of the seventh month of continuous operation. If there are any questions as to the effectiveness of the containment system in providing full containment of the plume, additional measures will be evaluated and discussed in the Annual Report.

[2] Zheng, Chunmiao, 1992, *PATH3D 3.2, A Ground-Water Path and Travel-Time Simulator (Third Revision)*: S. S. Papadopulos & Associates, Inc., Bethesda, Maryland.

3.6 Task 6 - Annual Performance Evaluations

During the continuous operation of the containment well, annual evaluations of the capture zone will be made using an approach similar to that described in Task 5 and using water-level, pumping rate, and water-quality data collected during each year in compliance with the Monitoring Plan; adjustments to the pumping rate will be made, if necessary. The results of these evaluations will be presented in detailed Annual Reports prepared within four months after the anniversary date of the startup of the continuous system operation. In addition to the data and evaluations related to the performance of the containment system, these Annual Reports will include all other site-related data collected during the year, including interpretations and evaluations of these data, and a discussion of site operations during the year. (A list of information, data, assessments and evaluations, and specific subjects that will be presented and/or discussed in the Annual Reports is given in Attachment D - Work Plan for the Assessment of Aquifer Restoration.) These Annual Reports will be submitted for review and approval in accordance with procedures set forth in the Consent Decree.

4.0 INSTALLATION OF AIR STRIPPER AND INFILTRATION GALLERY

This section of the Work Plan summarizes documents that will be submitted by Sparton to install the air stripper and infiltration gallery for the off-site containment system.

4.1 Design Plans and Specifications

Necessary plans and specifications for components necessary to implement this Work Plan have been submitted. Construction related to the air stripper and the infiltration gallery will commence on or before February 8, 1999.

4.2 Construction Work Plan

The Construction Work Plan will be submitted on or before February 8, 1999. This Work Plan will identify the Project Manager, present the Project Schedule, and discuss construction contingency procedures. All construction work will be performed by licensed contractors, and completed in accordance with the Project Schedule.

4.3 Health and Safety Plan

Construction of the air stripper and infiltration gallery will not involve potential exposure to hazardous substances; therefore, a Health and Safety Plan is not required for this work.

4.4 Construction Completion Report

Within three weeks after completion of construction, Sparton will provide a certification from a registered professional engineer that the system has been constructed in substantial compliance with the design plans and specifications.

5.0 OPERATION AND MAINTENANCE PLAN

Sparton will prepare an Operation and Maintenance Plan (O&M Plan) which will to describe operation and maintenance management (including a thirty-day notice of any change by Sparton of personnel assigned to this matter), a complete set of "as built" drawings, normal operation and maintenance procedures, replacement schedules, waste management practices, and contingency plans in the event of breakdowns or operational failures. A preliminary O&M Plan will be submitted for review and approval, in accordance with procedures set forth in the Consent Decree, within five weeks after the beginning of treated water discharge into the infiltration gallery. The final O&M Plan will be submitted for review and approval, in accordance with procedures set forth in the Consent Decree, one year later.

A revised Health and Safety Plan will also be submitted for review and approval, in accordance with procedures set forth in the Consent Decree, with the preliminary O&M Plan to address all activities involving potential exposure to hazardous substances during the operation of the systems, as required by OSHA 29CFR1910.120.

Appendix

Ground Water Discharge Plan

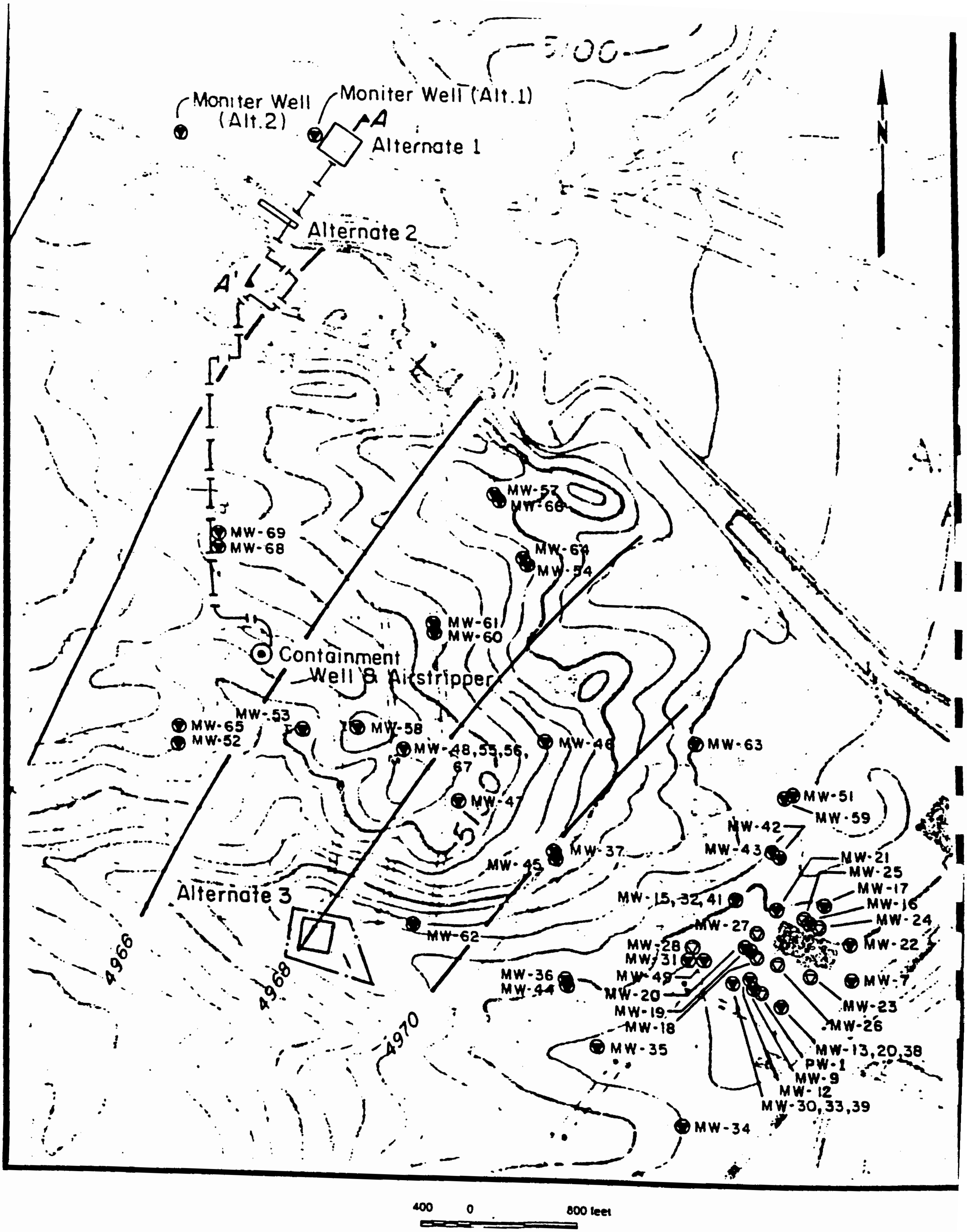


FIGURE 1

GROUNDWATER DISCHARGE LOCATION MAP

METRIC
Corporation ENVIRONMENTAL ENGINEERING AND SCIENCE

8429 WASHINGTON PLACE NE, SUITE A
ALBUQUERQUE, NEW MEXICO 87113
Phone: (505) 828-2801
Fax: (505) 828-2803

February 26, 1998

Ms. Marcy Leavitt, Bureau Chief
Attn: Victoria Maranville
Groundwater Quality Bureau
NM Environment Department
Runnels Building
1190 St. Francis Drive
Santa Fe, NM 87502

Re: DP-1184

Dear Ms. Leavitt:

On behalf of Sparton Technology, Inc., METRIC Corporation is submitting to you 3 original signed copies of the revised groundwater discharge permit application for the Coors Road Plant groundwater remediation facility, and one additional copy. Please accept the three originals for filing and return to me the additional copy, file marked, in the enclosed self-addressed and stamped envelope. The application has been revised to reflect the amendment requested January 22, 1998.

The amendment consists of the inclusion of a third alternate discharge point location beneath a stormwater detention pond site located on the south side of Congress Avenue.

If you have any questions, please contact us.

Sincerely,

METRIC Corporation

Gary L. Richardson

Gary L. Richardson, P.E.
Executive Vice President

GLR/rkh

METRIC
Corporation ENVIRONMENTAL ENGINEERING AND SCIENCE

8429 WASHINGTON PLACE NE, SUITE A
ALBUQUERQUE, NEW MEXICO 87113
Phone: (505) 828-2801
Fax: (505) 828-2803

February 27, 1998

Victoria Maranville
Groundwater Quality Bureau
New Mexico Environment Department
P.O. Box 26110
Santa Fe, NM 87502

Re: DP-1184 Status

Dear Ms. Maranville:

This memo is to confirm my understanding of the conversation we had on the telephone and in your office on February 26, 1998 and at the Sparton Coors Road facility on February 27, 1998 concerning the status of Sparton's Discharge Plan application (DP-1184).

- No additional application fee is necessary when the revised plan was submitted to you on February 26, 1998.
- The revised plan was accepted and date stamped on February 26, 1998.
- You expect to call me within 1 or 2 weeks with any questions or deficiencies you find in the revised plan.
- I will call you about once each week to inquire about the status of the plan.
- You will call us if you receive any public comments.
- You expressed concern that the monitoring well associated with Alternate 2 is located more than 400 feet from the infiltration gallery. I indicated the proposed location is about as close as we can locate the well based on the availability of well sites.

Please contact me if your understanding of our conversations varies from mine.

Sincerely,

METRIC Corporation

Gary L Richardson

Gary L. Richardson, P.E.
Executive Vice President

GLR/rkh
cc: Jim Harris

METRIC
Corporation ENVIRONMENTAL ENGINEERING AND SCIENCE

8429 WASHINGTON PLACE NE SUITE A
ALBUQUERQUE, NEW MEXICO 87113
Phone: (505) 828-2801
Fax: (505) 828-2803

March 13, 1998

Victoria Maranville
Groundwater Quality Bureau
New Mexico Environment Department
P.O. Box 26110
Santa Fe, NM 87502

Re: DP-1184 Status

Dear Ms. Maranville:

This memo is to confirm my understanding of the telephone conversation we had on March 11, 1998 concerning the status of Sparton's Discharge Plan application (DP-1184).

- You have not received any public comments as of March 11, 1998.
- You have reviewed our revised plan dated February 1998, and you plan to talk to Dale Doremus about your concerns.
- You plan to get a letter to us by the end of this week (March 13, 1998) concerning any request for additional information.
- You may want more or different monitoring wells associated with some of the alternate discharge ponds.
- The Environment Department (ED) will need for Sparton to provide a lease agreement on one of the discharge point locations before the administrative record will be considered to be complete. When the administrative record is complete, the ED has 60 days to approve the discharge plan.
- The public notice expires on March 24, 1998. You will call us on March 25, 1998 to tell us if any public comments have been received.

Please contact me if your understanding of our conversation varies from mine.

Sincerely,

METRIC Corporation

Gary L. Richardson, P.E.
Executive Vice President

GLR/rkh

cc: Jim Harris

+7 ✓ 87/Ai/OL

State of New Mexico
ENVIRONMENT DEPARTMENT
Ground Water Quality Bureau
Harold Runnels Building
1190 St. Francis Drive, P.O. Box 26110
Santa Fe, New Mexico 87502
(505) 827-2918 phone
(505) 827-2965 fax

GARY E. JOHNSON
GOVERNOR

MARK E. WEIDLER
Secretary

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

March 16, 1998

Mr. Richard D. Mico, V.P. & General Manager
Sparton Technology, Inc.
4901 Rockaway Boulevard SE
Rio Rancho, New Mexico 87124-4469

RE: Request for Additional Information, DP-1184, Sparton Technology, Inc. - Coors Road Facility.

Dear Mr. Mico:

This letter is in response to the discharge plan application received for the Sparton Technology, Inc. - Coors Road Facility ground water remediation system located northwest of Albuquerque, in projected Section 7, T11N, R3E, Bernalillo County. The discharge plan application was originally received by the New Mexico Environment Department (NMED) Ground Water Quality Bureau (GWQB), Pollution Prevention Section (PPS) on December 24, 1997. Additional information needed to make the application administratively complete was received on January 22, 1998. The application was subsequently amended by Sparton Technology, Inc. (Sparton) to include an additional alternate discharge location and re-submitted to NMED on February 26, 1998. In accordance with Water Quality Control Commission (WQCC) Regulation 3108.B and 3108.C, the required public notice for the discharge plan was published on February 25, 1998. The public comment period will end on March 25, 1998. Prior to making a decision on the discharge plan application, additional technical information is required. The following information is required in order to proceed with the discharge plan process:

1. Three alternate discharge sites are proposed in the discharge plan application. However, signed copies of lease agreements between land owners and Sparton were not included for any of the sites. NMED recognizes that Sparton is in the process of negotiating with land owners prior to choosing a discharge location or locations. In order for the administrative record to be complete, Sparton must submit signed lease

agreements to NMED before the discharge plan can be approved in accordance with WQCC Regulation 3109.B.

Please submit the signed lease agreement(s) to NMED as soon as possible.

2. The containment well is estimated to produce up to approximately 600 gallons per minute (gpm). Sparton requested a permit to discharge up to 600 gpm, however the infiltration gallery is designed for 200 gpm. If in order to contain the contaminant plume, Sparton needs to discharge greater than 200 gpm to the infiltration gallery, the infiltration gallery will need to be expanded.

   Sparton may submit a design for a phased construction to accommodate flows up to 600 gpm at this time or, prior to discharging greater than 200 gpm to the infiltration gallery, Sparton will need to submit revised plans and specifications for NMED approval for the expansion of the infiltration basin.

3. One monitor well per alternate discharge location is proposed by Sparton. NMED will require more than one monitor well per discharge location to monitor ground water quality and determine gradient in the vicinity of the proposed infiltration gallery. In addition, the proposed monitor well associated with alternate 2 discharge location is located approximately 500 feet down gradient of the proposed infiltration gallery within the Calabacillas arroyo. NMED believes the proposed alternate 2 monitor well is located too far from the infiltration gallery for timely detection of potential ground water contamination from the infiltration gallery. The down gradient monitor well must be located within 50 feet of the proposed infiltration gallery to detect potential ground water contamination as a result of your discharge Where applicable, NMED will consider use of other properly completed wells in the near vicinity of the discharge locations for the determination of ground water gradient.

   In accordance with WQCC Regulation 3107.A, please submit a revised monitoring plan which includes the following: installation of three monitor wells for each discharge location, two monitor wells must be located down gradient of the proposed infiltration gallery, and one up gradient to monitor ground water quality in the vicinity of the proposed infiltration gallery. All monitor wells must be triangulated and surveyed to common permanent bench mark to the nearest one-hundredth of a foot; located within 50 feet of the proposed infiltration gallery; and installed in accordance with NMED Guidelines for Monitor Well Construction and Abandonment (copy enclosed). In addition, please include in your amended submittal a commitment and procedure for plugging, abandoning, and replacing the monitor wells in the event that they are damaged by flooding in the arroyo.

4. The monitoring plan submitted to NMED proposes quarterly ground water monitoring for two years and semi-annually thereafter. Quarterly ground water monitoring for all monitor wells surrounding the infiltration basin will be required. Ground water monitor wells shall be sampled and analyzed prior to discharge and on a quarterly basis for the duration of the discharge permit for chlorinated solvents, and iron and manganese using EPA approved methods. NMED will consider a request for a reduction in monitoring after two (2) years for the following: 1) a reduction in monitoring frequency for up gradient wells, and 2) a reduction in monitoring frequency if no iron and manganese is detected above WQCC standards. A minimum of one down gradient well will need to be continued to be monitored quarterly for the duration of the discharge.

   The monitoring plan proposes effluent monitoring from the air stripper on a daily basis for the first week following start-up, weekly for the first month, and monthly thereafter for chlorinated solvents. In addition to the chlorinated solvents, iron and manganese will be required to be monitored on a weekly basis for the first month of operation and a monthly basis thereafter.

   In accordance with WQCC Regulation 3107.A, please incorporate the above-referenced changes into your revised monitoring plan.

5. Aqua-Mag is proposed to be added to the treated effluent prior to discharge to the infiltration gallery to prevent clogging and scale due to mineralization. Product information and concentrations of constituents to be injected are required for Aqua-Mag.

   In accordance with 3106.B, please submit detailed product information for Aqua-Mag to NMED.

6. The contingency plan submitted for the alternate discharge locations does not address measures to be taken in the event that ground water is contaminated, the infiltration gallery fails, or there is surfacing of treated effluent in the vicinity of the proposed infiltration gallery as a result of Sparton's discharge.

   In accordance with WQCC Regulation 3107.A, please submit a revised contingency plan to NMED outlining measures to be taken in the event that ground water in the vicinity of the infiltration gallery is contaminated as a result of your discharge and measures to be taken in the event there is surfacing effluent.

7. The closure plan for the proposed infiltration gallery allows for the plugging and abandonment of the infiltration gallery in place. NMED believes that it is acceptable to plug and abandon Alternate 1 site in place (dedicated park site) and Alternate 3 (City of Albuquerque storm water site). However, NMED does not believe plugging and abandoning in place to be an appropriate method of closure for the arroyo site (Alternate 2). Equipment in the arroyo must be removed following post closure monitoring in order to prevent the disposal of refuse in a watercourse as required by WQCC Regulation 2201.

   In accordance with WQCC Regulation 3107.A, please submit a revised closure plan for the Alternate 2 discharge location to include removal of the infiltration gallery equipment following the period of post closure monitoring and prior to final termination of the discharge plan.

The requested information is needed in order to complete the administrative record and proceed with the discharge plan process. Please respond to this request by April 13, 1998.

If you have any questions pertaining to the requested information, please feel free to contact me at (505) 827-0652. Please be advised that additional information may be needed in order for NMED to complete the technical review of the discharge plan application and prior to issuing approval of the proposed discharge plan.

Sincerely,

Dale M Doremus for Victoria Maranville

Victoria Maranville
Geologist
Ground Water Pollution Prevention Section

Enclosure: Discharge Plan Review Process Flow Chart, NMED Guidelines for Monitor Well Construction and Abandonment

xc: Dennis McQuillian, NMED/GWQB
Ana Marie Ortiz, Assistant General Council, NMED Office of General Council
Gary Richardson, P.E., METRIC Corporation, 8429 Washington Place NE., Albuquerque, New Mexico.

SPARTON

SPARTON TECHNOLOGY

March 20, 1998

Ms. Victoria Maranville
Groundwater Quality Bureau
New Mexico Environment Department
P.O. Box 26110
Santa Fe, NM 87502

RECEIVED
MAR 20 1998
GROUND WATER BUREAU

Re: DP-1184 Status

Dear Ms. Maranville:

Sparton Technology, Inc. (Sparton) is providing the following responses to your request for additional information dated march 16, 1998. As you suggested, we are providing the information in the form of this letter rather than revising the discharge plan. It is our understanding that you will incorporate this letter into the discharge plan approval.

Each of the seven items requested in your letter of March 16, 1998 are repeated in italics, and Sparton's response is presented below the request.

NMED Comment

1. *Three alternate discharge sites are proposed in the discharge plan application. However, signed copies of lease agreements between land owners and Sparton were not included for any of the sites. NMED recognizes that Sparton is in the process of negotiating with land owners prior to choosing a discharge location or locations. In order for the administrative record to be complete, Sparton must submit signed lease agreements to NMED before the discharge plan can be approved in accordance with WQCC Regulation 3109.B.*

   Please submit the signed lease agreement(s) to NMED as soon as possible.

Sparton Response

1. Sparton is presently negotiating with the fee owner of the land (Ron Brown) at the Alternate 2 discharge point which is located in the Calabacillas Arroyo. We will transmit the Access Agreement to you at the earliest possible date.

NMED Comment

2. *The containment well is estimated to produce up to approximately 600 gallons per minute (gpm). Sparton requested a permit to discharge up to 600 gpm,*

however the infiltration gallery is designed for 200 gpm. If in order to contain the contaminant plume, Sparton needs to discharge greater than 200 gpm to the infiltration gallery, the infiltration gallery will need to be expanded.

Sparton may submit a design for a phased construction to accommodate flows up to 600 gpm at this time or, prior to discharging greater than 200 gpm to the infiltration gallery, Sparton will need to submit revised plans and specifications for NMED approval for the expansion of the infiltration basin.

Sparton Response

2. As stated in the last paragraph of Item 16. of the Discharge Plan Application Form, "If the actual system capacity is more or less than 200 gpm, the gallery size will be increased or decreased proportionally." If the infiltration gallery must be sized for more than 200 gpm, Sparton will submit revised plans and specifications for NMED approval prior to discharging more than 200 gpm.

NMED Comment

3. *One monitor well per alternate discharge location is proposed by Sparton. NMED will require more than one monitor well per discharge location to monitor groundwater quality and determine gradient in the vicinity of the proposed infiltration gallery. In addition, the proposed monitor well associated with Alternate 2 discharge location is located approximately 500 feet down gradient of the proposed infiltration gallery within the Calabacillas Arroyo. NMED believes the proposed Alternate 2 monitor well is located too far from the infiltration gallery for timely detection of potential groundwater contamination from the infiltration gallery. The down gradient monitor well must be located within 50 feet of the proposed infiltration gallery to detect potential groundwater contamination as a result of your discharge. Where applicable, NMED will consider use of other properly completed wells in the near vicinity of the discharge locations for the determination of groundwater gradient.*

In accordance with WQCC Regulation 3107.A., please submit a revised monitoring plan which includes the following: installation of three monitor wells for each discharge location, two monitor wells must be located down gradient of the proposed infiltration gallery, and one up gradient to monitor groundwater quality in the vicinity of the proposed infiltration gallery. All monitor wells must be triangulated and surveyed to common permanent bench mark to the nearest one-hundredth of a foot; located within 50 feet of the proposed infiltration gallery; and installed in accordance with NMED Guidelines for Monitor Well Construction and Abandonment (copy enclosed). In addition, please include in your amended submittal a commitment and procedure for plugging, abandoning, and replacing the monitor wells in the event that they are damaged by flooding in the arroyo.

Sparton Response

3. With respect to Alternate 2, and based on the site visit yesterday involving Gary Richardson and yourself, Sparton will construct three new monitoring wells near the infiltration gallery as follows:

    - One down gradient monitoring well located within 50 feet of the infiltration gallery.
    - One down gradient monitoring well located within 150 feet of the infiltration gallery.
    - One up gradient monitoring well located within 250 feet of the infiltration gallery.

    Sparton will survey the locations of the three new monitoring wells, and Sparton will survey the measuring point elevations of the new monitoring wells to the nearest one-hundredth of a foot as related to a common permanent bench mark.

    Sparton will construct and abandon the proposed monitoring wells in accordance with "NMED Guidelines for Monitor Well Construction and Abandonment". As indicated in the second paragraph of Item 9. of the Discharge Permit Application Form, the monitoring wells will be screened from about 10 feet above the water table to about 20 feet below the water table.

    If any of the proposed monitoring wells are damaged by the flooding arroyo, Sparton will repair or rebuild the wells as necessary.

NMED Comment

4. *The monitoring plan submitted to NMED proposes quarterly groundwater monitoring for two years and semi-annually thereafter. Quarterly groundwater monitoring for all monitor wells surrounding the infiltration basin will be required. Groundwater monitor wells shall be sampled and analyzed prior to discharge and on a quarterly basis for the duration of the discharge permit for chlorinated solvents, and iron and manganese using EPA approved methods. NMED will consider a request for a reduction in monitoring after two (2) years for the following: 1) a reduction in monitoring frequency for up gradient wells, and 2) a reduction in monitoring frequency if no iron and manganese is detected above WQCC standards. A minimum of one down gradient well will need to be continued to be monitored quarterly for the duration of the discharge.*

    The monitoring plan proposes effluent monitoring from the air stripper on a daily basis for the first week following start-up, weekly for the first month, and monthly thereafter for chlorinated solvents. In addition to the chlorinated solvents, iron and manganese will be required to be monitored on a weekly basis for the first month of operation and a monthly basis thereafter.

In accordance with WQCC Regulation 3107.A., please incorporate the above-referenced changes into your revised monitoring plan.

Sparton Response

4. Sparton will monitor the monitoring wells associated with the infiltration gallery on a quarterly basis for two years. The samples will be analyzed for chlorinated solvents (TCE, 1,1,1-TCA, 1,1-DCE, and methylene chloride) using EPA Method 8021 HALO (formerly EPA Method 8010), and for chromium, iron and manganese using EPA Method 6010.

   Sparton may request a reduction in monitoring frequency in the up gradient well and one down gradient well after two years.

   Sparton will continue to monitor one down gradient monitoring well on a quarterly basis.

   In addition to the airstripper effluent monitoring proposed in the Discharge Permit Application Form Item 18., Sparton will analyze for iron and manganese on a weekly basis for the first month.

NMED Comment

5. *Aqua Mag is proposed to be added to the treated effluent prior to discharge to the infiltration gallery to prevent clogging and scale due to mineralization. Product information and concentrations of constituents to be injected are required for Aqua Mag.*

   In accordance with 3106.B., please submit detailed product information for Aqua Mag to NMED.

Sparton Response

5. As discussed in the third paragraph of Attachment E (Operation Plan) to our Groundwater Discharge Permit Application, Aqua Mag consists of 30% ortho phosphate and 70% poly phosphate. Additional Aqua mag product information is attached to this letter. We anticipate adding Aqua mag to the pumped water at a rate of about 4 ppm.

NMED Comment

6. *The contingency plan submitted for the alternate discharge locations does not address measures to be taken in the event that groundwater is contaminated, the infiltration gallery fails, or there is surfacing of treated effluent in the vicinity of the proposed infiltration gallery as a result of Sparton's discharge.*

In accordance with WQCC Regulation 3107.A., please submit a revised contingency plan to NMED outlining measures to be taken in the event that groundwater in the vicinity of the infiltration gallery is contaminated as a result of your discharge and measures to be taken in the event there is surfacing effluent.

Sparton Response

6. If discharge to the proposed infiltration gallery contaminates the groundwater at the discharge point, Sparton will abate any pollution of the subsurface water in accordance with Subpart IV of the New Mexico Water Quality Control Commission Regulations.

   As discussed in the second paragraph of Item 17. of the Discharge Permit Application Form, the piezometer in the infiltration gallery will be equipped with a high level shut down which will turn off the containment well pump if the water level in the infiltration gallery rises to the top of the gravel in the gallery. At this point the water level in the gallery is seven feet below the arroyo bed. This will prevent surface discharge of treated groundwater.

   Sparton will either have the containment well system checked by an operator twice per week or install an automatic alarm to notify a responsible party, to assure that the system is not shut down for an extended period of time.

   If the infiltration galley clogs, based on an estimate from a local contractor, Sparton believes that the gallery can be replaced at the same location within 6 weeks.

NMED Comment

7. *The closure plan for the proposed infiltration gallery allows for the plugging and abandonment of the infiltration gallery in place. NMED believes that it is acceptable to plug and abandon Alternate 1 site in place (dedicated park site) and Alternate 3 (City of Albuquerque storm water site). However, NMED does not believe plugging and abandoning in place to be an appropriate method of closure for the arroyo site (Alternate 2). Equipment in the arroyo must be removed following post closure monitoring in order to prevent the disposal of refuse in a watercourse as required by WQCC Regulation 2201.*

   In accordance with WQCC Regulation 3107.A., please submit a revised closure plan for the Alternate 2 discharge location to include removal of the infiltration gallery equipment following the period of post closure monitoring and prior to final termination of the discharge plan.

Sparton Response

7. For Alternate 2, Sparton will remove the perforated pipe from the infiltration gallery as part of the closure activities.

If you have any additional questions or comments, please contact us as soon as possible.

Sincerely,

Richard D. Mico

Richard D. Mico
Vice President and General Manager

RDM/rkh

The Kjell Corporation
P.O. Box 834
Beloit, WI 53512
Phone: 800-356-0422
Fax: 608-755-0538

Kjell Laboratories
5043 Hwy 51 South
Janesville, WI 53546
Phone: 608-755-0422
Fax: 608-755-1339

THE KJELL CORPORATION

AQUA MAG

Sequestrant, Scale, and Corrosion Inhibitor

Aqua Mag is a water treatment additive for potable and industrial water treatment. It is produced by thermal reaction of food-grade phosphates into a liquid concentrate of exceptional purity, clarity, and stability. Aqua Mag contains all available species of phosphate compounds, for better sequestration and corrosion control.

SEQUESTRATION

Reduction of:

- *Iron and Manganese stains*
- *Calcium deposits*
- *Chlorine demand*

CORROSION CONTROL

Reduction of:

- *Lead and Copper leaching*
- *Iron tuberculation in distribution pipes*
- *Microbial Influenced Corrosion (MIC)*

CERTIFICATIONS

USEPA, USDA, NSF International, UL, ANSI/NSF Std. 60 and Kosher approved

PROPERTIES

- *Clear homogeneous liquid*
- *Viscosity 1.008 cps at 70°F*
- *Ratio ortho/complex polyphosphate 30/70*
- *No heavy metals available*
- *Freezing point <38°F*
- *Shelf life (neat) >2 years*
- *Spec. Gravity 1.367 +/- 0.01*
- *% Total Phosphate 34.5 +/- 1.0*
- *pH neat 5.2 +/- 0.5*
- *Totally soluble and freeze/thaw stable*
- *11.4 lbs. per gallon*

SHIPPING & HANDLING

Aqua Mag is packaged in 1-5-15-30 & 55 gallon containers and bulk quantities from the manufacturing facility, local warehouses, and bulk terminals. The product is shipped in safety-sealed, food-grade, labeled containers or food-grade certified tankers. Each container is identified by lot number.

APPLICATION RATE

Aqua Mag is applied using a chemical metering pump. In most applications, Aqua Mag is fed as a concentrate without the necessity of dilution. For Aqua Mag dosage rates or answers to technical questions, contact the technical assistance department of The Kjell Corporation.

[redacted]

Rev. 2/22/96

[redacted]

MATERIAL SAFETY DATA SHEET

THE KJELL CORPORATION
P.O. BOX 834
BELOIT, WISCONSIN 53512-0834
(800) 356-0422 (608) 755-0422

Product Name: **AQUA MAG**

Date Prepared: June 18, 1986

Last Revision: March 5, 1996

PRODUCT INFORMATION

Synonyms:	Blended sodium phosphate
Chemical Family:	Liquid phosphate blend
Formula:	Proprietary
Maximum Use:	23.4 mg/L

Note: Use of an asterisk (*) or other designation indicates that there may be chronic health effects present. See safety file on the product.

HAZARD RATINGS AND PROTECTION INDEXES APPEAR IN APPROPRIATE BOXES.

HAZARD RATING

0 - MINIMAL HAZARD 1 - SLIGHT HAZARD
2 - MODERATE HAZARD 3 - SERIOUS HAZARD
4 - SEVERE HAZARD

PROTECTION INDEX

A - EYES B - HANDS
C - RESPIRATORY D - BODY

PRECAUTIONARY INFORMATION

Precautionary Statement (As defined by OSHA Hazard Communications Standard)	No significant health effects reported from manufacturing locations

INGREDIENTS / COMPONENTS

Chemical Identity:	Sodium ortho/polyphosphate blend
OSHA PEL:	Not listed
ACGIH TLV:	Not listed
CAS #:	68915-31-1
Hazard Class:	None

PHYSICAL DATA

Boiling Point:	Above 100° C.
Melting Point:	Not applicable
Vapor Pressure:	Not applicable
Vapor Density (Air = 1):	Not applicable
Specific Gravity (H_2O = 1):	1.367 ± 0.01
Evaporation Rate (Butyl Acetate = 1):	Non-volatile
Solubility in Water by Weight:	Complete
pH (neat):	5.2 ± 0.5
Appearance:	Clear liquid
Odor:	Slight

FIRE AND EXPLOSION DATA

Flash Point:	Non-combustible
Flammable Limits	
Upper:	Not applicable
Lower:	Not applicable
Extinguishing Media:	Not applicable
Special Fire Fighting Procedures:	Not applicable
Unusual Fire & Explosion Hazards:	None

REACTIVITY DATA

Stability:	Stable
Incompatibility:	Concentrated chlorine and concentrated mineral acids
Hazardous Polymerization:	Will not occur
Conditions to Avoid:	Direct mixing of concentrates of chlorine and mineral acids
Hazardous Decomposition By-products:	Heat, chlorine, and sulfur dioxide

HEALTH HAZARD DATA

Routes of Exposure	
Eyes:	No published data
Skin Contact:	No published data
Skin Absorption:	No published data
Inhalation:	No published data
Ingestion:	No published data
Effects of Overexposure	
Acute Exposure:	No published data
Chronic Exposure:	When good industrial hygiene practices are followed, no significant inhalation hazard or skin irritation.
Other Health Effects	
Medical Conditions:	
Aggravated by Exposure:	None known
Carcinogenic Potential:	
NTP Annual Report:	Not listed
IARC Monographs:	Not listed
OSHA 29CFR Part 1910 Sub z:	Not listed
Additional Regulatory Information	
FDA:	GRAS list: permitted in food
USDA:	Listed as acceptable if followed by a potable water rinse
NSF International:	Certified to meet ANSI/NSF Standard 60
Underwriters Laboratories:	Certified to meet ANSI/NSF Standard 60

Emergency and First-Aid Procedures

Eyes:	Flush with water. If irritation occurs seek medical attention.
Skin:	Wash with water. If irritation occurs seek medical attention.
Inhalation:	Remove from exposure.
Ingestion:	Rinse mouth and dilute stomach contents with water or milk if available.
Decontamination Procedure:	Wash with water.
Notes to Physician:	Large doses may cause nausea and diarrhea.

STORAGE AND HANDLING

Spill or Leak Procedures:	Material should be wiped up for salvage or disposal. Flush with water.
Waste Disposal Method:	If not salvaged, dispose in a landfill in accordance with local, state, and federal regulations.
Precautions in Storing:	Should be stored in clean area for quality assurance. Keep container closed when not in use. Protect from freezing and extreme heat.

SPECIAL PROTECTION

Respiratory:	None required
Eye:	Not mandatory
Protective Gloves:	Not mandatory
Clothing & Equipment:	No special requirements
Ventilation Requirements:	No special requirements
Work/Hygiene Practices:	No special requirements. Follow good industrial hygiene practices.

TRANSPORTATION DATA

DOT Proper Shipping Name:	Sodium phosphate solution
DOT Classification:	Not regulated
DOT Labels:	Not required
DOT Placards:	Not required
Emergency Accident Precautions & Procedures:	Not hazardous. See instructions above for release or spill.

MANUFACTURER'S DISCLAIMER

While The Kjell Corporation will make every effort to insure the validity of this information, we must rely on the information given to us by our suppliers, and thus make no warranty, express or implied, as to the validity of this data.

Any use of this product or method of application which is not described in the Product Data Sheet is the responsibility of the user.

Environmental:

Degradability/Aquatic Toxicity	Aqua Mag constituents have been tested to be barely to non-toxic according to current classification levels.

< 1 ppm	Highly or strongly toxic
1-10 ppm	Toxic
10-100 ppm	Moderately toxic
100-1000 ppm	Slightly toxic
> 1000 ppm	Barely toxic to non-toxic

48-hr LC 50%	Daphne magna	3580 ppm*	
48-hr LC 50%	Lymnaea sp	2954 ppm*	
48-hr LC 50%	Fish	1650 ppm (n.n. orfe)	10,000 ppm @ pH 7**
25-hr/50-HR LC 50%	Daphne magna	1154 ppm/1089 ppm**	
0.5-hr EC 50%	Pseudomonas putida	1000-1500 ppm**	

EPA hazardous substance? No 40CFR116-117

Waste Disposal Methods: Must comply with all federal, state, and local disposal/discharge laws

RCRA Status of Unused Material: Non-hazardous 40CFR261

* Dowden, B.F., Bennett, H.J., "Toxicity of Selected Chemicals to Certain Animals," Journal WPCF, Sept. 1965, pp. 1308-1316.

**Schoeber, I.P., Huber, L., "Ecologically Relevant Data of Nonsurfactant Components of Detergents and Cleaners," Tenside Surfactants Detergents, 25, 99-107, (1988).

Appendix B

STORAGE AND COMPATIBLE MATERIALS

Minimum Tank Ratings:
Holds liquid weighing 12 lb/gal (1.44 kg/L) minimum
Handles liquid temperatures up to 130° F (49° C)
Storage temperature range in container of 45°- 75° F (7°- 24° C)
Temperature regulate the indoor storage of drums/bulk tanks, or insulate and heat outdoor tanks.
Prevent indoor drum/tank exposure to cold flooring by elevating with pallets or insulation.

Compatible Storage/Plumbing/Pumping Materials:
High-medium density polyethylene, cross-linked polyethylene, fiberglass, reinforced plastic, 316 Stainless Steel, glass lined/epoxy lined steel tanks; Schedule 80 PVC/CPVC piping, clear PVC and white polyethylene tubing; Ceramic, teflon, viton, hypalon, and PVC liquid end pump materials.

Materials to Avoid in storage/plumbing:
Black iron, mild steel, galvanized, aluminum, zinc, copper, lead, brass, bronze, and tin.

Metering equipment:
Diaphragm, and peristaltic type metering pumps.

SPARTON

SPARTON TECHNOLOGY

March 23, 1998

Victoria Maranville
Groundwater Quality Bureau
New Mexico Environment Department
P.O. Box 26110
Santa Fe, NM 87502

Re: DP-1184 March 20, 1998 letter to Victoria Maranville

Dear Ms. Maranville:

In response to your conversation earlier today with our consultant, Gary Richardson, we wish to revise the last paragraph of our response to Comment 4 of your letter dated March 16, 1998 to read as follows:

> In addition to the airstripper effluent monitoring proposed in the Discharge Permit Application Form Item 18., Sparton will analyze for iron and manganese on a weekly basis for the first month, and monthly thereafter.

If you have any additional questions or comments, please contact us as soon as possible.

Sincerely,

SPARTON TECHNOLOGY, INC.

Richard D. Mico

Richard D. Mico
Vice President and General Manager

File Sparton

State of New Mexico
ENVIRONMENT DEPARTMENT
Ground Water Quality Bureau
Harold Runnels Building
1190 St. Francis Drive, P.O. Box 26110
Santa Fe, New Mexico 87502
(505) 827-2918 phone
(505) 827-2965 fax

GARY E. JOHNSON
GOVERNOR

MARK E. WEIDLER
Secretary

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

March 24, 1998

Mr. Richard D. Mico, V.P. & General Manager
Sparton Technology, Inc.
4901 Rockaway Boulevard SE
Rio Rancho, New Mexico 87124-4469

RE: Response to Submittal of Additional Information, DP-1184, Sparton Technology, Inc. - Coors Road Facility.

Dear Mr. Mico:

The New Mexico Environment Department (NMED) Ground Water Quality Bureau (GWQB), Pollution Prevention Section (PPS) has reviewed Sparton Technology, Inc's. response to additional information dated March 20 and March 23, 1998. NMED/GWQB requested additional information from Sparton Technology, Inc. (Sparton) on March 16, 1998, in order to proceed with the discharge plan process for the Sparton - Coors Road Facility (DP-1184) ground water remediation system. The proposed discharge location is located northwest of Albuquerque, in projected Section 7, T11N, R3E, Bernalillo County. It is NMED's understanding from discussion with Gary Richardson that Sparton is pursuing the Alternate 2 (Calabacillas arroyo site) discharge location, therefore the following comments pertain only to the Alternate 2 discharge location.

1. NMED is aware that Sparton is currently in the process of negotiating with the fee owner of the land (Ron Brown) at the proposed Alternate 2 discharge location (Calabacillas arroyo site) and Sparton has committed to provide a signed lease agreement to NMED as soon as possible. Sparton must submit a signed lease agreement to NMED before the discharge plan can be approved in accordance with WQCC Regulation 3109.B. Upon receipt of a signed lease agreement, NMED will issue the discharge plan within 2 weeks.

2. The information submitted by Sparton regarding the expansion of the infiltration gallery, the monitoring plan, product information, the contingency plan, and the closure plan satisfies NMED's request for additional information in accordance with WQCC Regulation 3107.

The public comment period for the DP-1184 will end on March 25, 1998. If there are no public comments received and there is no significant public interest to warrant a public hearing, NMED will continue to process the discharge plan application in accordance with New Mexico Water Quality Control Commission Regulations for the Alternate 2 location.

Thank you for your prompt response to NMED's request for information. If you have any questions pertaining to the discharge plan application or the discharge plan approval process, please feel free to contact me at (505) 827-0652.

Sincerely,

V Maranville

Victoria Maranville
Geologist
Ground Water Pollution Prevention Section

xc: Dennis McQuillan, NMED/GWQB
Ana Marie Ortiz, Assistant General Counsel, NMED Office of General Counsel
Gary Richardson, P.E., METRIC Corporation, 8429 Washington Place NE., Albuquerque, NM 87113

GROUNDWATER DISCHARGE PERMIT APPLICATION
FOR
COORS ROAD PLANT
GROUNDWATER REMEDIATION FACILITY
BERNALILLO COUNTY, NEW MEXICO
(DP-1184)

RECEIVED

FEB 26 1998

GROUND WATER BUREAU

SUBMITTED BY

SPARTON TECHNOLOGY, INC.
RIO RANCHO, NEW MEXICO

PREPARED BY

METRIC CORPORATION
ALBUQUERQUE, NEW MEXICO

DECEMBER 1997
Revised to Reflect Amendments Requested
January 22, 1998

FEBRUARY 1998

TABLE OF CONTENTS

INTRODUCTION

Sparton Technology, Inc. is submitting an application for a permit to discharge treated groundwater to infiltration galleries located in or adjacent to the Calabacillas Arroyo in Bernalillo County, New Mexico. The source of the treated water to be discharged is from groundwater recovery well(s).

The discharge permit application is prepared in accordance with the form provided by the New Mexico Environment Department, in order to ensure completeness of this submittal.

NEW MEXICO ENVIRONMENTAL DEPARTMENT
GROUNDWATER DISCHARGE PERMIT APPLICATION FORM

Name of facility: Coors Road Plant Groundwater Remediation Facility

Name, Title, and address of person(s) legally responsible for discharge:

Richard D. Mico, Vice President and General Manager
Sparton Technology, Inc.

Telephone No.: (505) 892-5300
FAX No.: (505) 892-5515

Owner of Facility
Owner's address:

Sparton Technology, Inc.
4901 Rockaway Blvd. SE
Rio Rancho, New Mexico 87124-4469

Telephone No: (505) 892-5300
FAX No.: (505) 892-5515

Name, title and address of local representative or contact person at the facility (if different than the responsible person), and consultant if consultant used:

Facility Representative

John M. Wakefield
Sparton Technology, Inc.

Consultant

METRIC Corporation
Attn.: Gary L. Richardson, P.E.
8429 Washington Place NE
Albuquerque, NM 87113

1. **Type of facility or operation (dairy, municipality, mining, etc.):** Discharge will result from a groundwater remediation operation in the vicinity of Sparton's Coors Road Plant electronics manufacturing facility.

2. **Proposed method(s) of treatment, storage, and/or disposal of effluent or leachate (Package plant-lagoon-leachfield, wetlands-infiltration gallery, air stripper-injection well, etc.):** Groundwater from recovery well(s) will be treated by an air stripper to remove volatile chlorinated solvents. Treated groundwater will be discharged to infiltration galleries in or adjacent to the nearby Calabacillas Arroyo (Alternates 1 and 2) or south of Congress Avenue (Alternate 3).

Discharge Characteristics

3. **Quantity:**

   a. **Design discharge rate in gallons per day (gpd): up to** 864,000 gpd
   b. **Gallons per day computed on an annual basis: up to** 315,360,000 gpy
   c. **Number of days per year facility will be discharging:** 365 days

4. **Method used to meter or calculate the discharge rate:**
Mechanical totalizing flow meter.

5. **Flow characteristics. Describe if flow is:**

   a. **Daily (five or seven days per week) or seasonal (give months):**
   Discharge is planned for as many as 365 days per year

   b. **Continuous or intermittent:** Flow is planned to be continuous but may on occasion be intermittent

6. **Discharge Quality. List the concentrations of contaminants and toxic pollutants generally associated with the type of facility or operation. The contaminants of concern are those listed in Section 3-103 of the NM Water Quality Control Commission (WQCC) Regulations and total nitrogen (nitrate + total Kjeldahl nitrogen). The toxic pollutants are listed in WQCC Regulation 1101-TT.**

Contaminant	Max. daily value	Average daily value
	Concentration	
Trichloroethylene (TCE)	0.100 µg/l	0.050 µg/l
1.1.1.-Trichloroethane (TCA)	0.060 µg/l	0.030 µg/l
1.1-Dichloroethylene (DCE)	0.005 µg/l	0.0025 µg/l
Methylene Chloride	0.100 µg/l	0.050 µg/l
Chromium, total	0.050 mg/l	0.050 mg/l

Location Information

7. **Location of discharge site (see FIGURE 1):**
County: Bernalillo
Township: 11 North **Range:** 3 East **Section:** 7 (proj.)
Latitude/Longitude: Lat. 35° 12' / Long. 106° 40'

   Please provide a copy of a State of New Mexico road map with the property clearly outlined.
   The discharge site location is indicated on FIGURE 1.

8. **Location of any water supply wells, injection wells, seeps, springs, bodies of water or water courses within one mile of the outside perimeter of the discharge site. These items must be plotted on a copy of the pertinent USGS topographic map(s) or an aerial photograph. Include the name(s) of the USGS topographic map(s).** Water supply wells, water courses, and water bodies are indicated in FIGURE 1. No seeps, springs, or injection wells are present in the area. Water supply well data is outlined in ATTACHMENT B.

9. **Give the location of any proposed or existing wells to be used for monitoring the groundwater quality.** If Alternate 1 is selected, a groundwater monitoring well will be installed about 25 feet northwest of the infiltration gallery (see ATTACHMENT E, FIGURE 2). The depth to the water table is about 145 feet at the monitoring well location. The monitoring well would be screened from about 10 feet above the water table to about 20 feet below the water table.

If Alternate 2 is selected, a groundwater monitoring well will be installed about 600 feet northwest of the infiltration gallery (see ATTACHMENT E, FIGURE 2). The depth to the water table is about 160 feet at the monitoring well location. The monitoring well would be screened from about 10 feet above the water table to about 20 feet below the water table.

If Alternate 3 is selected, a groundwater monitoring well will be installed about 25 feet northwest of the infiltration gallery (see ATTACHMENT E, FIGURE 2). The depth to the water table is about 110 feet at the monitoring well location. The well would be screened from about 10 feet above the water table to about 20 feet below the water table.

Groundwater Conditions

10. a. **The depth (feet) to groundwater below the discharge site:**
The depth to groundwater at discharge Alternates 1, 2, and 3 are estimated as 144', 119', and107' respectively, using topographic surface contours and the water table contours provided in FIGURE 1.

b. **The flow direction of groundwater below the site:**
The flow direction of groundwater in the vicinity of the discharge sites is northwest (FIGURE 1).

c. **The gradient of the groundwater below the site:**
The groundwater gradient in the vicinity of the discharge sites is 0.002 ft/ft.

d. **Reference or source of information for 10.a, b, c, above:**
Groundwater depth is estimated from FIGURE 1 by comparison of USGS quadrangle topographic contours with interpolations of plotted groundwater contours. Groundwater flow direction is derived from groundwater contours developed from monitor well sounding during July 1996. Groundwater gradient is estimated from groundwater contours in the vicinity of the discharge site, as shown on FIGURE 1.

11. a. **The Total Dissolved Solids (TDS) concentration (mg/l) of the groundwater:**
TDS locally ranges from 430 to 460 mg/l.

b. **Reference or source of information:**
Results of sampling of February 3, 1997 and general chemistry analyses for wells MW-32, MW-51, MW-60, and MW-61.

Flooding Potential

12. **Describe the flooding potential of the discharge site based on the latest Federal Emergency Management Agency flood plain information or site specific analysis:**

    Alternate 1 is located outside of but adjacent to the Calabacillas Arroyo floodway, as delineated by the U.S. Department of HUD, Federal Emergency Management Agency, October 14, 1983, Flood Boundary and Floodway Map, City of Albuquerque, NM Community Panel No. 350002 0002.

    Alternate 2 is located within the Calabacillas Arroyo floodway.

    Alternate 3 is located beneath a Cit of Albuquerque storm water detention pond site.

13. **Describe the methods used to control flooding of the discharge site (berms, diversion channel, etc.):**
    Since Alternate 1 is outside the flood boundary. No flood control measures are necessary.

    Alternate 2 is located within the Calabacillas Arroyo floodway. If this alternative is selected, the infiltration gallery will be buried 7.0 feet below the arroyo bottom to prevent it from being exposed by scour during passage of the 100-year storm (see ATTACHMENT E)

    Alternate 3 is located beneath a City of Albuquerque storm water detention pond site. If this alternative is selected, the infiltration gallery will be buried 5.0 feet below the pond bottom to minimize infiltration of storm water into the infiltration gallery.

Soil and Geologic Information

14. **Attach a copy of the USDA Soil Conservation Service soil survey map and descriptive information for soil(s) associated with the discharge site.**
    A soil map and soil description are presented in ATTACHMENT C.

15. **Describe the lithology and thickness of each geologic unit below the discharge site. Please indicate which units are water bearing. This information may be obtained from driller's logs or geologic reports.**
    Sample logs are presented in ATTACHMENT D for monitor wells MW-62 and MW-66 (FIGURE 1) which describe lithology and thickness of geologic units below the discharge site. The ground elevation at MW-66 is 5103'. Ground elevations at Alternates 1 and 2 are estimated, from USGS topographic contours, at 5109' and 5080', respectively. The ground elevation at MW-62 is 5073. Ground elevation at Alternate 3 is estimated from USGS topographic contours at 5075.

Operational Plan

16. An operational plan must be attached which describes how the system(s) for the collection, treatment, distribution and disposal of waste waters or other discharges will be operated and maintained.

The leading edge plume containment system (see FIGURE 1) consists of 1) one or more containment well(s) producing up to 600 gpm (864,000 gpd) of groundwater, 2) an airstripper to remove VOC's from the water, 3) a pipeline leading from the well and airstripper location to the infiltration gallery, and 4) one or more infiltration galleries located either in the dedicated park area located on the north bank of the Calabacillas Arroyo (Alternate 1) or within the Calabacillas Arroyo Channel (Alternate 2) or at the storm water detention pond site located south of Congress Avenue (Alternate 3). A detailed explanation of the design and operation of the leading edge plume containment system is presented in ATTACHMENT E.

The containment system is planned to have a capacity between 50 gpm and 600 gpm. The actual system capacity will be determined by analysis of a series of pumping tests conducted on the installed containment well.

This application contains three alternate infiltration gallery locations. The actual location of the gallery will be based on the outcome of Sparton's ongoing negotiations with landowners and easement holders of the alternative sites. Alternate 1 is on land (a park site) owned by the City of Albuquerque. Alternate 2 is on land under private ownership and within a drainage easement held by Albuquerque Metropolitan Arroyo Flood Control Authority (AMAFCA). Alternate 3 is on land (a floodwater detention pond site) owned by the City of Albuquerque.

The infiltration gallery designs presented in ATTACHMENT E are sized for 200 gpm. If the actual system capacity is more or less than 200 gpm, the gallery size will be increased or decreased proportionally.

Contingency Plan

17. A contingency plan must be attached which describes actions to be taken in the event that spills or failures occur or ground water standards are threatened.

In order to prevent discharge of untreated water to the infiltration gallery, the system will be equipped with a shutdown which will turn off the containment well pump if the airstripper blower fails. Additionally, the quality of the effluent from the airstripper will be monitored on a regular basis, as described in item 18. below, to provide early warning if the treatment efficiency of the airstripper is declining for any reason.

The infiltration gallery will be equipped with a piezometer to allow monitoring of the water level in the gallery. This will provide early warning if the infiltration gallery is clogging and allow time for scheduling maintenance or repair. Additionally, the piezometer will be equipped with a high level shutdown which will turn off the containment well pump if the water level in the infiltration gallery rises to the top of the gravel in the gallery. This will prevent possible surface discharge of the treated groundwater.

Monitoring Plan

18. A monitoring plan must be attached which outlines the proposed sampling point locations (monitoring wells, outfalls, etc.), sampling protocols (bailers, pumps, etc.), sampling frequency (monthly, yearly, etc.), chemical parameters to be analyzed for (TDS, nitrate, etc.), static water levels, discharge rates (gpd), etc.

Effluent from the airstripper will be monitored daily for the first week following start up, then weekly for the first month, and monthly thereafter. To ensure compliance with the New Mexico Water Quality Control Commission Regulations, Section 3-103, Water samples will be analyzed for trichloroethylene (TCE), 1,1,1-trichloroethane (TCA), 1,1-dichloroethylene (DCE), methylene chloride and chromium.

The water level in the piezometer in the infiltration gallery will be measured on a weekly basis. If the water level approaches the top of the gravel in the gallery, maintenance will be scheduled.

A groundwater monitoring well will be installed down gradient from the infiltration gallery (see item 9 above). The monitoring well location for each infiltration gallery alternate location is shown on FIGURE 1. The well will be equipped with a dedicated sampling pump. It will be sampled on a quarterly basis for the first two years and then semi-annually. Following cessation of the discharge, the well will be sampled quarterly for two years. The samples will be analyzed for trichloroethylene (TCE), 1,1,1-trichloroethane (TCA), 1,1-dichloroethylene (DCE), methylene chloride, and chromium. The water level will be measured prior to each sampling event.

Closure Plan

19. A closure plan must be attached for system components that are likely to be discontinued during the term of the permit. The closure plan must address the reclamation and post-operational monitoring of groundwater at the site, as appropriate. Also the plan shall provide for plugging and abandonment of all monitor wells, after groundwater quality meets the WQCC Regulations.

When the leading edge plume containment system has achieved its objective, the airstripper will be removed and sold for scrap. The containment well(s) will be plugged and abandoned according to WQCC regulations. The pipeline from the containment well to the infiltration gallery will be capped on both ends and abandoned in place. The inlet piping to the infiltration gallery will be grouted with cement to prevent unauthorized discharge to the system. The gallery itself will be abandoned in place.

The monitoring well associated with the infiltration gallery will be retained until eight consecutive quarters of monitoring data have shown that the infiltration gallery has not caused contamination of the groundwater beneath the gallery site.

Signature(s)

20. Enclose a signed copy of the lease agreement between you and the owner of the property on which the proposed discharge will occur. Lease agreement should be valid for the duration of the discharge plan or until the discharge plan is modified.

It is recognized that an agreement between the owner of the land where the infiltration gallery is to be located and Sparton is required prior to NMED approval of this discharge permit. As discussed in item 16 above, negotiations with the landowners of the alternate sites are underway, and Sparton will forward agreement(s) to NMED as soon as they are completed.

21. I certify that I am familiar with the information contained in the application and that to the best of my knowledge and belief such information is true, complete and accurate.

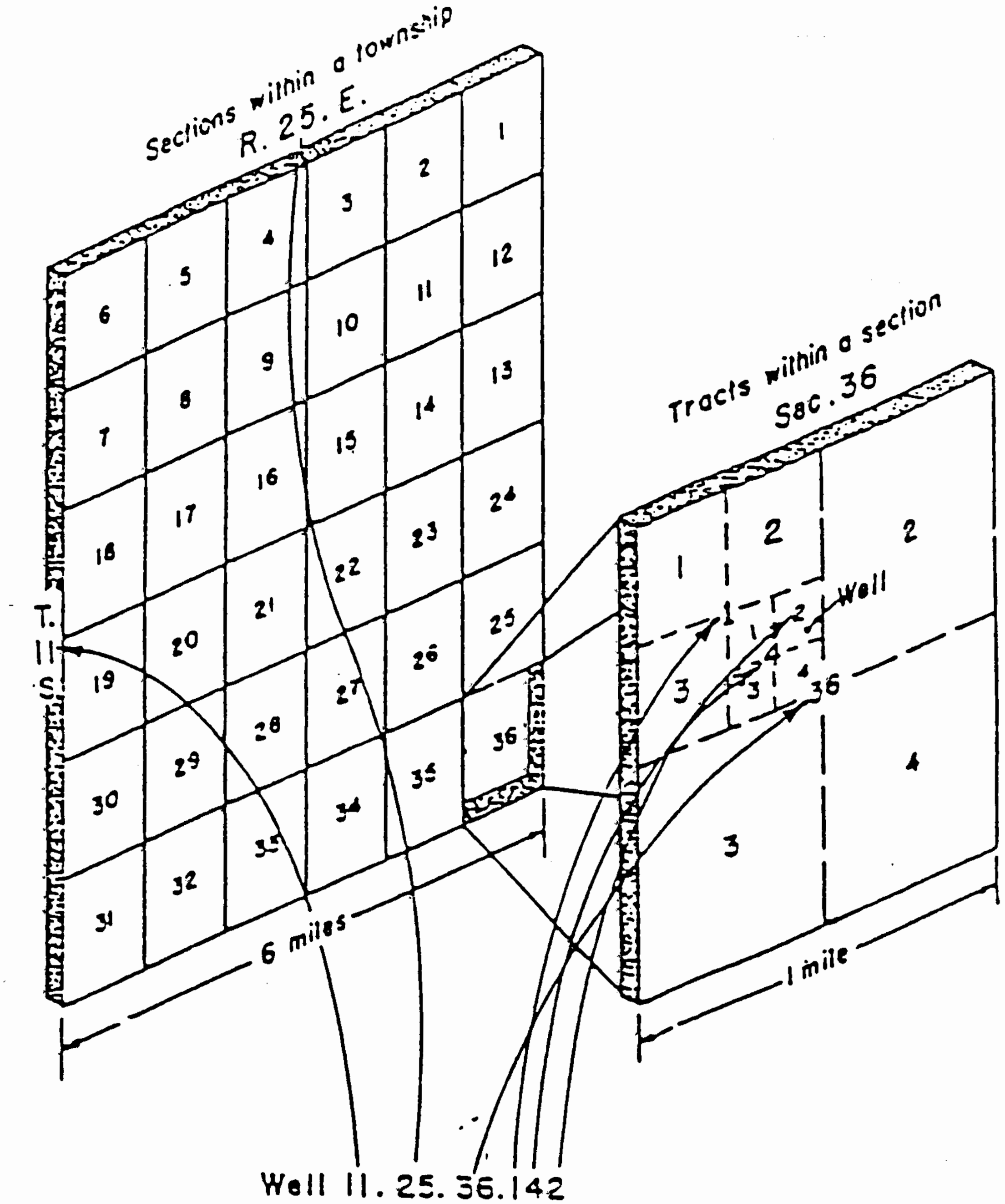
[signature]	VP & GM	2/26/98
Signature of person legally responsible for the discharge	Title	Date

ATTACHMENT A

WELL LOCATION SYSTEM

ATTACHMENT A DETERMINING WELL AND SITE LOCATIONS

USING TOWNSHIP, RANGE AND SECTION



ATTACHMENT B

WELL DATA IN
DISCHARGE SITE VICINITY

TABLE 1

WELLS IN VICINITY OF COORS ROAD PLANT DISCHARGE SITES #1, #2, AND #3
SPARTON TECHNOLOGY, INC., ALBUQUERQUE, NEW MEXICO

Well No.	Owner	SEO File No.	Location T. R. Sec.	Year Comp.	Depth of Well (ft)	Static Water Level (ft)	Date Meas.	Use of Water *	Remarks
W-1	Marion Davis	RG-55450	11.03.06.313	1993	280	180	02/19/93	D	
W-2	Albert J. Black	RG-3664	11.03.08.134	-	200	56	-	D	destroyed
W-3	Albert J. Black	RG-6095	11.03.08.134	-	200	47	-	D	destroyed
W-4	Robert B. Briscoe	RG-5774	11.03.03.140	1963	123	6	-	D	
W-5	Manual Sandoval	RG-59010	11.03.08.144	1994	180	28	02/17/94	D	
W-6	Clair or Rosemary Le Capitan	RG-9807	11.03.08.314	1995	210	30	10/27/95	D	
W-7	Lenny Poper	RG-60062	11.03.08.322	1994	225	12	09/27/94	D	
W-8	Ron Bohannan	RG-58707	11.03.08.330	1994	50	22	01/29/94	D	
W-9	Robert Briscoe	RG-12467	11.03.08.330	-	152	-	-	D	
W-10	Rick Schalk	RG-27958	11.03.08.330	-	149	56.25	-	D	
W-11	Robert J. Bickerstaff	RG-64774	11.03.08.332	1996	65	15	06/24/96	D	
W-12	Tom Clark	RG-64571	11.03.08.332	1996	30	10	07/12/96	D	
W-13	Robert Briscoe	RG-55957	11.03.08.333	1992	135	60	09/18/92	D	
W-14	Robert B. Briscoe	RG-5774	11.03.08.333	-	140	55	-	D	
W-15	Robert Floerchinger	RG-59857	11.03.08.334	1994	50	9	10/08/94	D	
W-16	Dana C. Wood	RG-65160	11.03.08.334	1996	75	15	06/27/96	D	
W-17	A. F. Black	RG-5711	11.03.17.100	-	68	16	-	D	
W-18	Skip Kruzich	RG-65858	11.03.17.110	1996	130	21	09/17/96	D	
W-19	Gilbert Sanchez	RG-64429	11.03.17.111	1996	75	20	11/03/96	D	
W-20	Dan Dickerson	RG-64790	11.03.17.111	1996	38	12	05/24/96	D	
W-21	Robert Res	RG-65085	11.03.17.112	1996	48	15	06/24/96	D	
W-22	Rutledge Hanes	RG-63991	11.03.17.114	1996	40	15	02/12/96	D	
W-23	Alicia Martinez	RG-67856	11.03.17.132	1996	38	15	09/19/96	D	
W-24	Frank Mann	RG-19912	11.03.18.413	1971		8	12/30/71	D	
W-25	River Pointe Group	RG-21704	11.03.18.413	1972	95	6	11/06/72	D	abandoned
W-26	Frank Mann	RG-2222	11.03.18.413	1958	86	-	-	D	
W-27	Ernest M. Baca	RG-57103	11.03.18.423	1993	220	10	04/15/93	D	
W-28	Patrick Glennon	RG-49098	11.03.18.423	1988	100	6	06/28/88	D	
W-29	Robert B. Duran	RG-50544	11.03.18.423	1988	204	-	-	D	
W-30	Robert Misurch	RG-35879	11.03.18.423	1981	114	9	04/01/81	D	

TABLE 1

WELLS IN VICINITY OF COORS ROAD PLANT DISCHARGE SITES #1, #2, AND #3
SPARTON TECHNOLOGY, INC., ALBUQUERQUE, NEW MEXICO

Well No.	Owner	SEO File No.	Location T. R. Sec.	Year Comp.	Depth of Well (ft)	Static Water Level (ft)	Date Meas.	Use of Water *	Remarks
W-31	Michael or Judith Graham	RG-50051	11.03.18.423	1988	200	16	11/15/88	D	
W-32	Tom David	RG-38495	11.03.18.423	1982	116	10	08/17/82	D	
W-33	George Everage	RG-42482	11.03.18.424	1984	90	-	-	D	
W-34	Gary Eyster	RG-48686	11.03.18.424	1987	80	6	07/11/86	D	
W-35	Mary Shalk	RG-39493	11.03.18.424	1983	113	12	04/05/83	D	
W-36	C. R. Peterson	RG-45840	11.03.18.424	1986	75	-	-	D	
W-37	Richard Chavez	RG-51406	11.03.18.441	1989	190	10	09/08/89	D	
W-38	Bryan Brennan	RG-33058	11.03.18.441	1979	137	9	09/19/79	D	
W-39	Pat Chapman	RG-38109	11.03.18.441	1982	97	11	10/12/82	D	
W-40	Del Gutierrez	RG-34878	11.03.18.441	1980	125	120	09/13/80	D	
W-41	Guy W. Berger	RG-45521	11.03.18.441	1986	105	8	04/24/86	D	
W-42	Alan Reeves	RG-43969	11.03.18.441	1985	100	6	05/22/85	D	
W-43	Tom Contieras	RG-46116	11.03.18.441	1986	124	-	-	D	
W-44	Jim Etre	RG-56244	11.03.18.442	1992	220	16	10/20/92	D	
W-45	Greg Moody	RG-36063	11.03.18.442	1981	120	10	06/04/81	D	

*** Water Use Symbols**
D = Domestic

ATTACHMENT C

DISCHARGE SITE SOIL DESCRIPTION

ATTACHMENT C
DISCHARGE SITE SOIL DESCRIPTION

According to the SCS soil survey which covers the alternate discharge sites, all of the sites are located within the Bluepoint Series. The Bluepoint Series consists of deep, somewhat excessively drained soils that formed in sandy alluvial and eolian sediments on alluvial fans and terraces. Slopes are generally 1 to 15 percent for the series.

Permeability is rapid. Available water capacity is 4 to 5.5 iches. Effective root depth is 60 inches or more.

A soil profile representative of the series is provided below:

A1 0 to 8 inches, pale brown (10YR 6/3) loamy fine sand, brown (10YR 5/3) moist; single grained; loose; many fine and very fine roots and interstitial pores; slightly calcareous; mildly alkaline; clear, wavy boundary.

C1 8 to 20 inches, pale brown (10YR 6/3) loamy sand, brown (10YR 5/3) moist; massive; slightly hard, few fine and very fine roots, very friable; many very fine intestitial pores; slightly calcareous; moderately alkaline; clear, wavy boundary.

C2 20 - 60 inches, light yellowish brown (10YR 6/4) loamy sand, dark yellowish brown (10YR 4/4) moist; massive; slightly hard, very friable; few fine and very fine roots; many very fine interstitial pores; slightly calcareous in spots; mildly alkaline.

The three alternate discharge sites are located within two mapping units of the Bluepoint Series as outlined below:

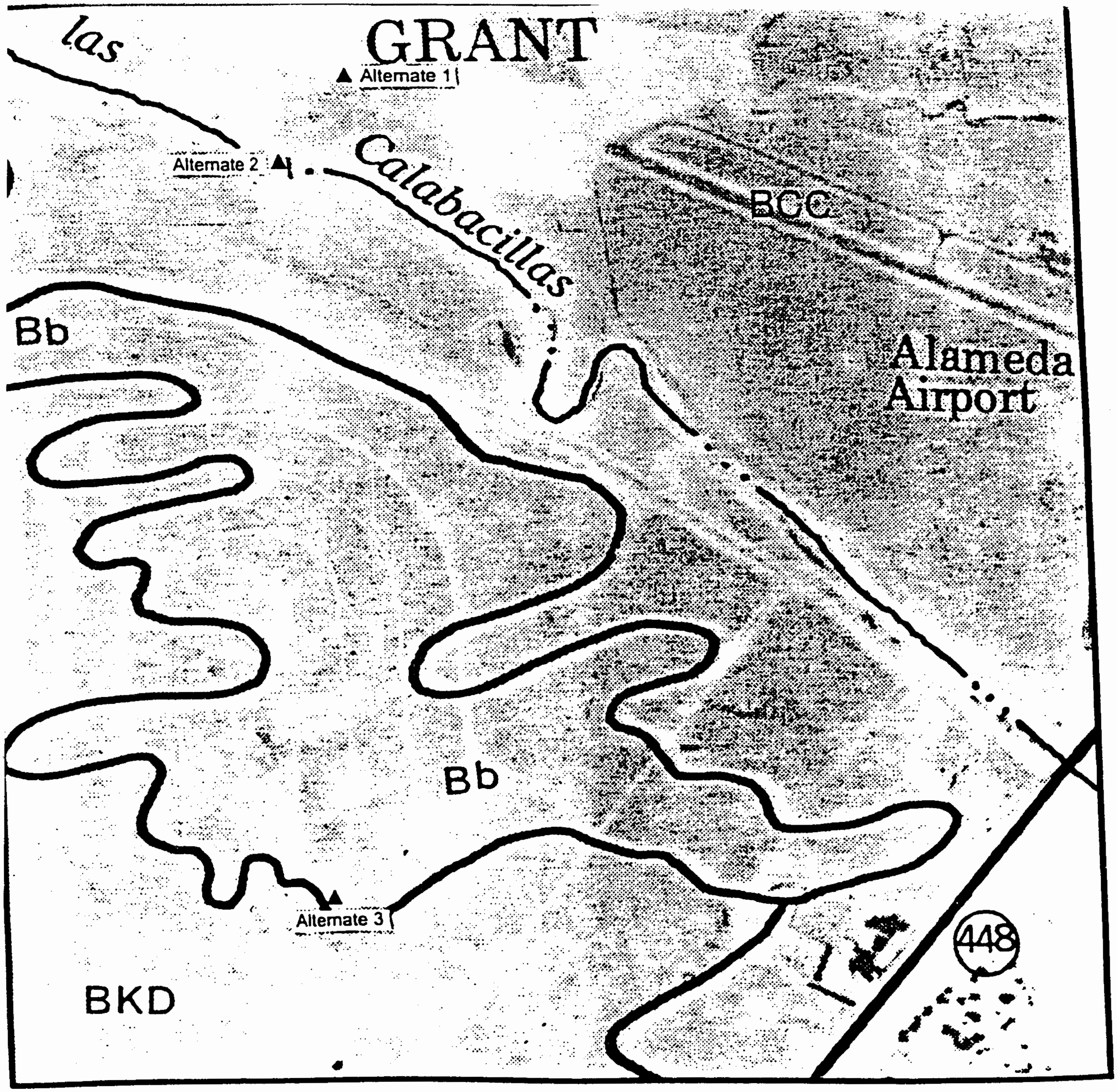
BCC: Bluepoint loamy fine sand, 1 to 9 percent slopes.
Alternate discharge sites 1 and 2 are located within the BCC mapping unit indicated on the accompanying soil map. This soil is nearly level to moderately sloping. It has the

profile described as representative of the Bluepoint Series, but on about 10 percent of the acreage the surface layer is sand. Runoff is slow, and the hazard of blowing sand is severe.

Bb: Bluepoint find sand, hummocky.

Alternate discharge site 3 is located within the Bb mapping unit. This gently rolling to rolling soil is in areas near the basalt flows. The soil unit occurs as low dunes 8 to 50 feet high of reworked sand. Areas are generally 15 to 100 acres in size. The soil has a profile similar to that described as representative of the series, but the surface layer differs in texture. Runoff is slow. The hazard of soil blowing is severe.

Source: USDA, Soil Conservation Service. June 1977. Soil Survey of Bernalillo County and Parts of Sandoval and Valencia Counties, New Mexico.



Source: USDA SCS, June 1997 Soil Survey of Bernalillo County and parts of Sandoval and Valencia Counties, New Mexico. Map Sheet #10.

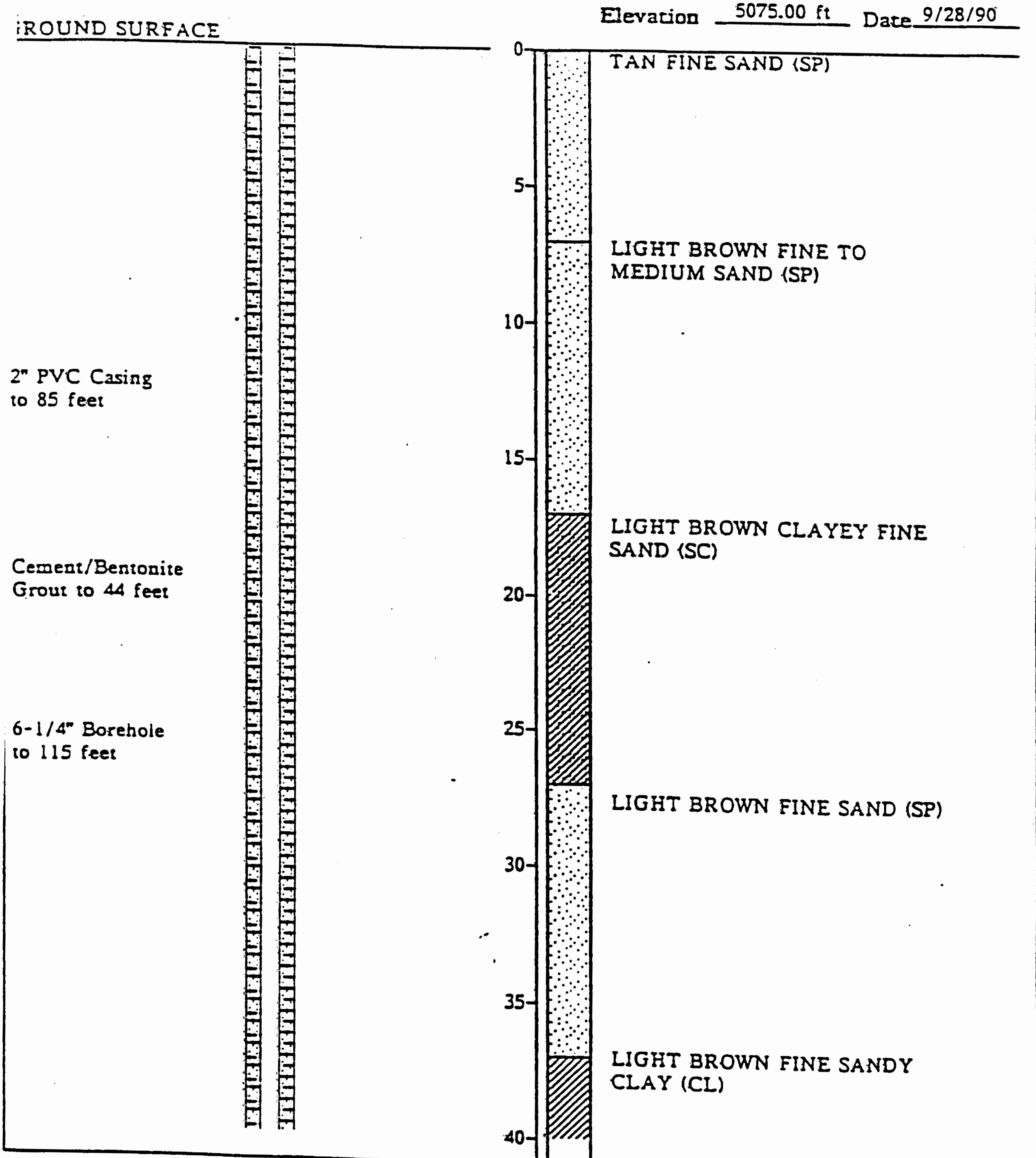
1500 0 3000 feet

SOIL SURVEY MAP
DISCHARGE LOCATION VICINITY
SPARTON TECHNOLOGY, INC.
BERNALILLO COUNTY, NEW MEXICO

ATTACHMENT D

LITHOLOGIC SAMPLE LOGS
FOR MW-62 AND MW-66

Elevation 5075.00 ft Date 9/28/90



Harding Lawson Associates
Engineers and
Environmental Services

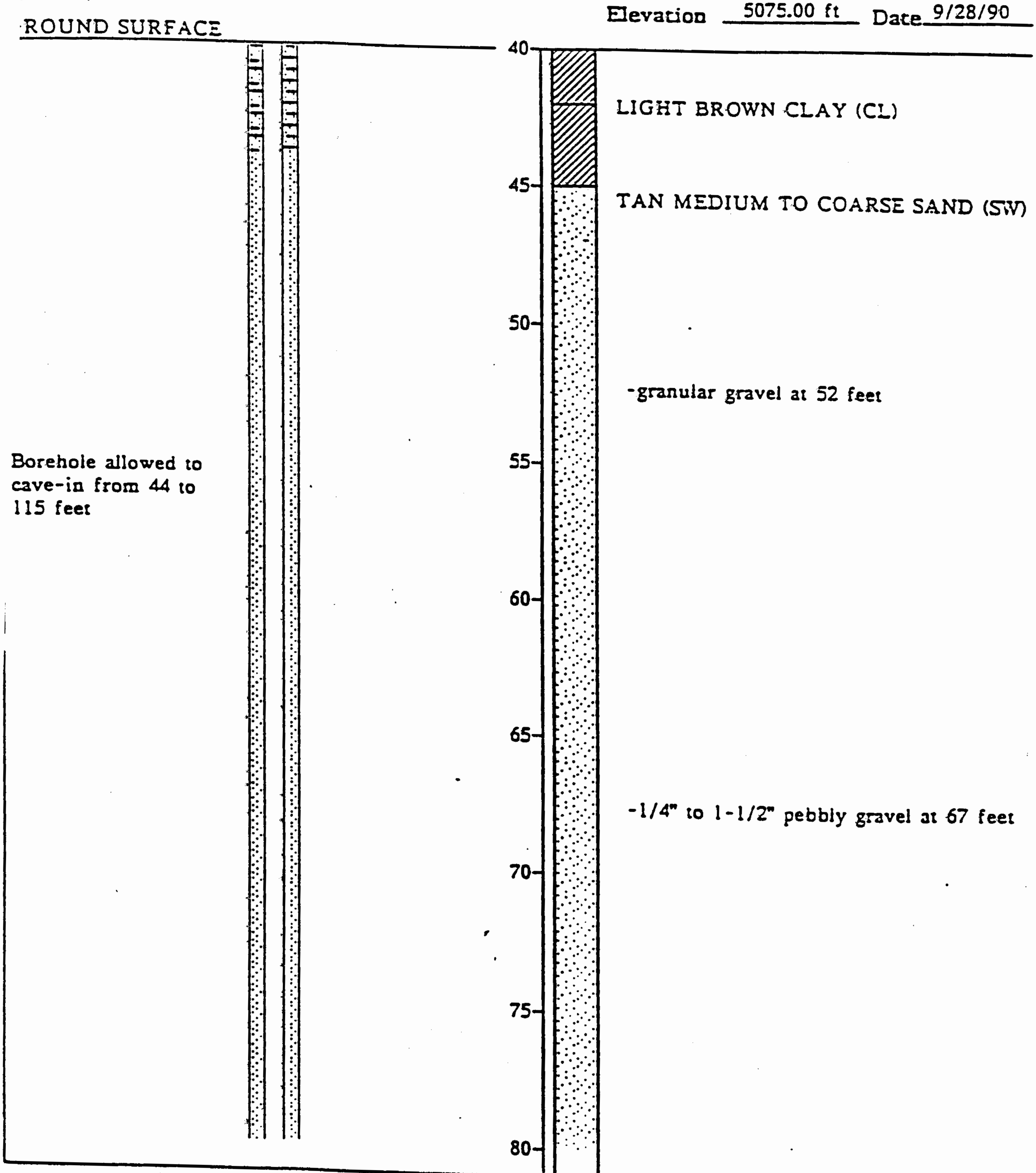
MONITORING WELL DETAIL MW-62

Sparton Technology Inc.
Albuquerque, New Mexico

PLATE

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	06310.039.12		12/90		

levation



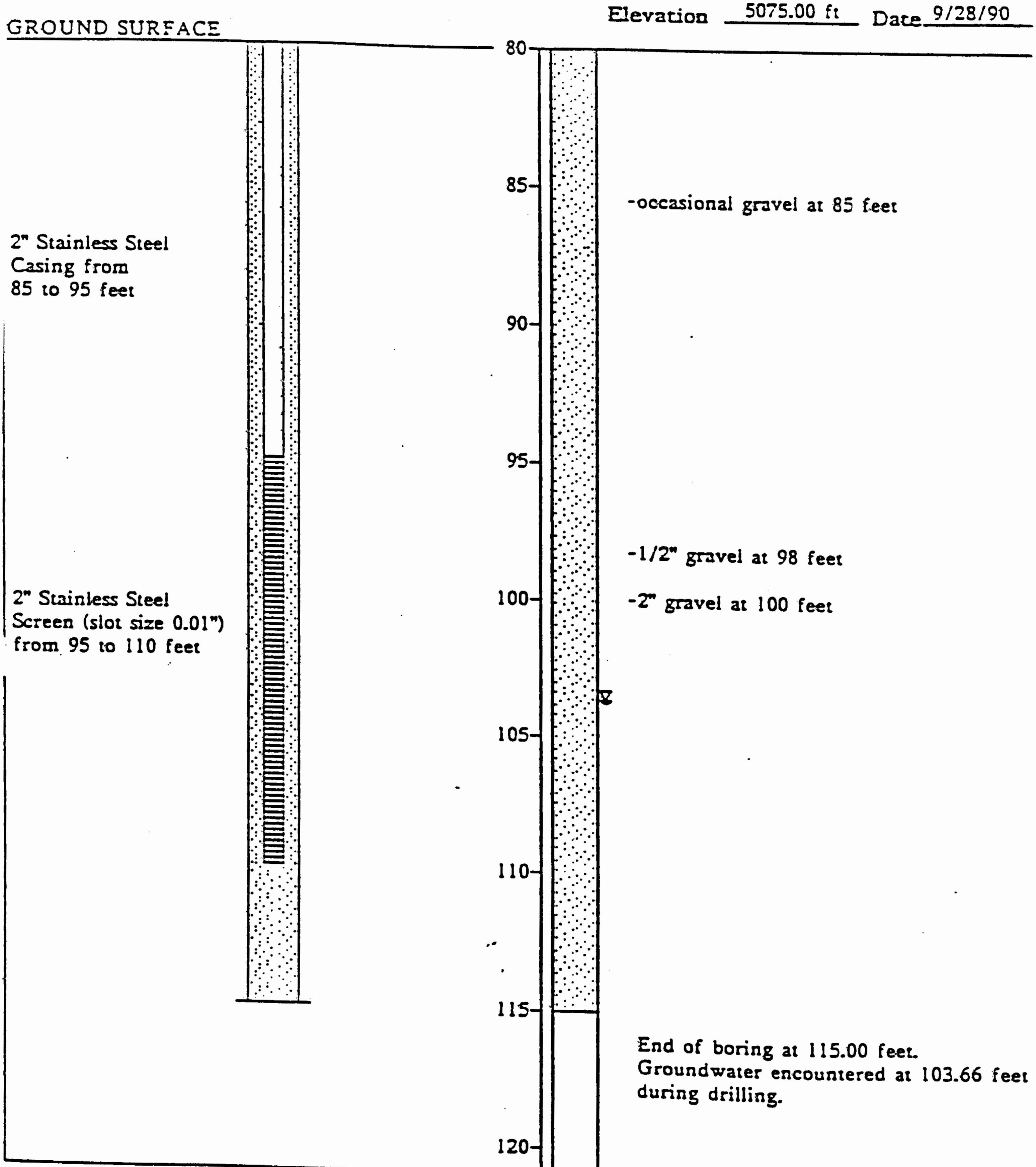
Harding Lawson Associates
Engineers and
Environmental Services

MONITORING WELL DETAIL MW-62

Sparton Technology Inc.
Albuquerque, New Mexico

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	06310.039.12		12/90		

Elevation 5075.00 ft Date 9/28/90



Harding Lawson Associates
Engineers and
Environmental Services

MONITORING WELL DETAIL MW-62

Sparton Technology Inc.
Albuquerque, New Mexico

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	06310.039.12		12/90		

PLAT

METRIC
Corporation

SAMPLE LOG

Borehole Number MW-66 Borehole Location N1526389.09 E375859.24

Property Owner City of Albuquerque

Sample Logger Peter H. Metzner, Metric Corporation

Driller Rodgers Environmental Services, Inc.

Drilling Medium Mud Rotary

Date of Completion 6-20-96 Ground Elevation 5103.03

Depth (feet)	Thickness (feet)	Stratigraphic Description
0 - 5	5.0	Pale yellowish brown (10YR 6/2), poorly sorted, sub-angular to sub-rounded, fine sand to very coarse sand.
5 - 15	10.0	Pale yellowish brown (10YR 6/2), poorly sorted, sub-angular to sub-rounded, fine sand to granule gravel.
15 - 20	5.0	Pale yellowish brown (10YR 6/2), medium sorted, sub-angular to rounded, medium sand to granule gravel.
20 - 35	15.0	Pale yellowish brown (10YR 6/2), poorly sorted, sub-angular, very fine sand to very coarse sand.
35 - 40	5.0	Pale yellowish brown (10YR 6/2), poorly sorted, sub-angular, very fine sand to very coarse sand with some clay.
40 - 45	5.0	Pale yellowish brown (10YR 6/2), poorly sorted, sub-angular, very fine sand to very coarse sand.

METRIC
Corporation

SAMPLE LOG
Continued

Borehole Number MW-66 Borehole Location N1526389.09 E375859.24

Depth (feet)	Thickness (feet)	Stratigraphic Description
45 - 65	20.0	Pale yellowish brown (10YR 6/2), poorly sorted, sub-angular to sub-rounded, fine sand to granule gravel.
65 - 75	10.0	Pale yellowish brown (10YR 6/2), medium sorted, sub-angular to sub-rounded, fine sand to very coarse sand.
75 - 80	5.0	Pale yellowish brown (10YR 6/2), poorly sorted, sub-angular to sub-rounded, very fine sand to granule gravel with some clay.
80 - 85	5.0	Pale yellowish brown (10YR 6/2), well sorted, sub-angular to sub-rounded, granule gravel to small pebble gravel.
85 - 100	15.0	Pale yellowish brown (10YR 6/2), poorly sorted, sub-angular, very fine sand to very coarse sand.
100 - 120	20.0	Light brownish gray (5YR 6/1), poorly sorted, angular, medium sand to pebble gravel.
120 - 135	15.0	Light brownish gray (5YR 6/1), poorly sorted, angular to sub-angular, clayey very fine sand to small pebble gravel.
135 - 145	10.0	Light brownish gray (5YR 6/1), poorly sorted, angular, very fine sand to small pebble gravel.
145 - 150	5.0	Light brownish gray (5YR 6/1), poorly sorted, angular to sub-angular, medium sand to small pebble gravel.

METRIC
Corporation

SAMPLE LOG
Continued

Borehole Number MW-66 Borehole Location N1526389.09 E375859.24

Depth (feet)	Thickness (feet)	Stratigraphic Description
150 - 160	10.0	Light brownish gray (5YR 6/1), poorly sorted, angular, very fine sand to small pebble gravel.
160 - 175	15.0	Light brownish gray (5YR 6/1), poorly sorted, sub-angular, very fine sand to granule gravel.
175 - 200	25.0	Pinkish gray (5YR 8/1), angular to sub-rounded, sandy clay and clayey very fine sand to granule gravel.
200 - 205	5.0	Light brownish gray (5YR 6/1), angular to sub-rounded, clayey very fine sand to granule gravel.
205 - 215	10.0	Light brownish gray (5YR 6/1), angular to sub-rounded, medium sand to small pebble gravel.

ATTACHMENT E

OPERATION PLAN

ATTACHMENT E
OPERATIONAL PLAN

The leading edge plume containment system (see FIGURE 2) consists of 1) one or more containment wells producing up to 600 gpm (864,000 gpd) of groundwater, 2) an airstripper to remove VOC's from the water, 3) a pipeline leading from the well and airstripper location to the infiltration gallery, and 4) one or more infiltration galleries located either in the dedicated park area located on the north bank of the Calabacillas Arroyo (Alternate 1), within the Calabacillas Arroyo Channel (Alternate 2), or beneath the floodwater detention pond site located south of Congress Avenue.

The containment well will consist of at least a 6 inch diameter steel cased well. The depth to water at the well site is about 200 feet. The well is planned to have about 100 feet of wire wound stainless steel screen extending from the water table to 100 feet below the water table. The well will be operated at a rate sufficient to produce a capture zone as wide as the contaminant plume (see FIGURE 2).

The airstripper, which will be located at the well head, will be sized to treat the flow from the well to achieve the WQCC standards for the VOC's identified in the application. Additionally, the groundwater will be treated at the well head with "Aqua Mag" to inhibit precipitation of calcium carbonate and other scaling compounds in the pipeline and infiltration gallery. "Aqua Mag" is a product of Kjell which is located in Janesville, Wisconsin. The product consists of 30% ortho phosphate and 70% poly phosphate.

The treated groundwater will be conveyed from the well head through an underground 6" plastic (PVC or PE) pipeline along public rights-of-way to the infiltration gallery site (see FIGURE 2).

Three alternative infiltration gallery sites are being considered as shown on FIGURE 2. The final gallery location will be based on Sparton's ability to gain access to one of the sites. In either case, the infiltration gallery was sized for 200 gpm based on the

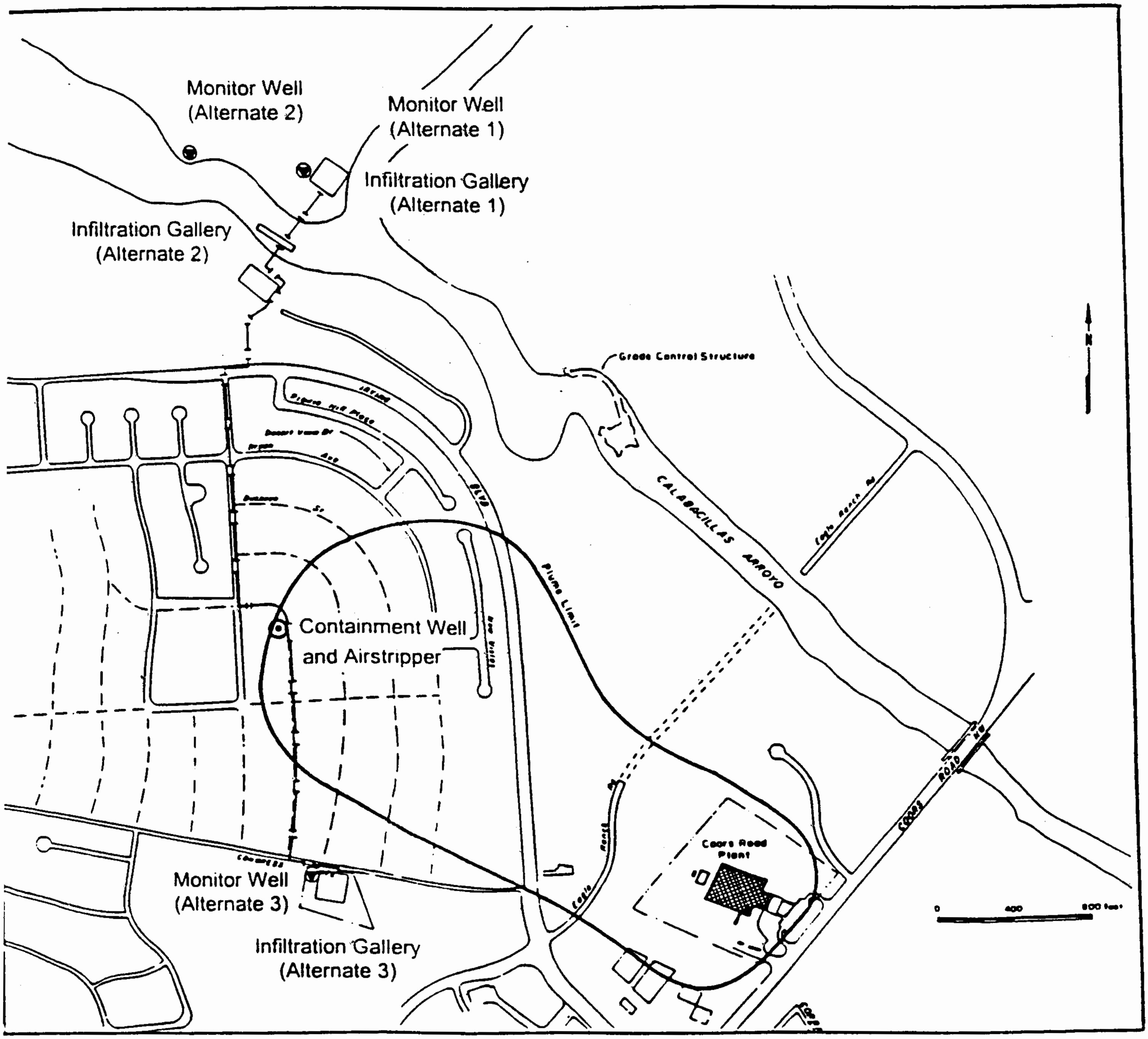


FIGURE 2

PLUME CONTAINMENT SYSTEM

experience at the Van Waters and Rogers (VWR) remediation site located in Albuquerque's South Valley. The VWR system is believed to be sized as follows:

Size = 12' x 225' = 0.052 Ac

Capacity = 120 gpm

The system for Sparton was sized by adjusting the VWR system for the ratios of vertical hydraulic conductivity and capacity for the two sites as follows:

$$0.062 \text{ Ac} \times \frac{2472 \text{ ft/yr}}{814 \text{ ft/yr}} \times \frac{200 \text{ gpm}}{120 \text{ gpm}} = 0.3 \text{ Ac}$$

Alternate 1 is located in an undeveloped park site on the north bank of Calabacillas Arroyo (see FIGURE 2). If the infiltration gallery is constructed at this site, it will be recessed below the arroyo bottom elevation , as shown in FIGURE 3, to prevent the possibility of water seeping out of the arroyo bank. Details of Alternate 1 design are presented in FIGURE 4.

Alternate 2 is located in the bottom of the Calabacillas Arroyo (see FIGURE 2). If the infiltration gallery is located at this site, it will be placed deep enough to prevent scour in the arroyo channel from exposing it (see FIGURE 3). A scour analysis was conducted to estimate the total long term degradation plus local scour depth such that the infiltration gallery can be placed deep enough to prevent the gallery from being destroyed during its useful life, which is assumed to be 4 years. Two primary references were used in determining a reasonable depth to bury the proposed infiltration gallery to be built in the Calabacillas Arroyo bottom. The two cited references are as follows:

Mussetter Engineering, Inc. December 1996. Draft Report Calabacillas Arroyo Prudent Line Study and Related Work. Prepared for AMAFCA.

Mussetter, K. A., Lagasse, P. F., Harvey, M. D. November 1994, Sediment and Erosion

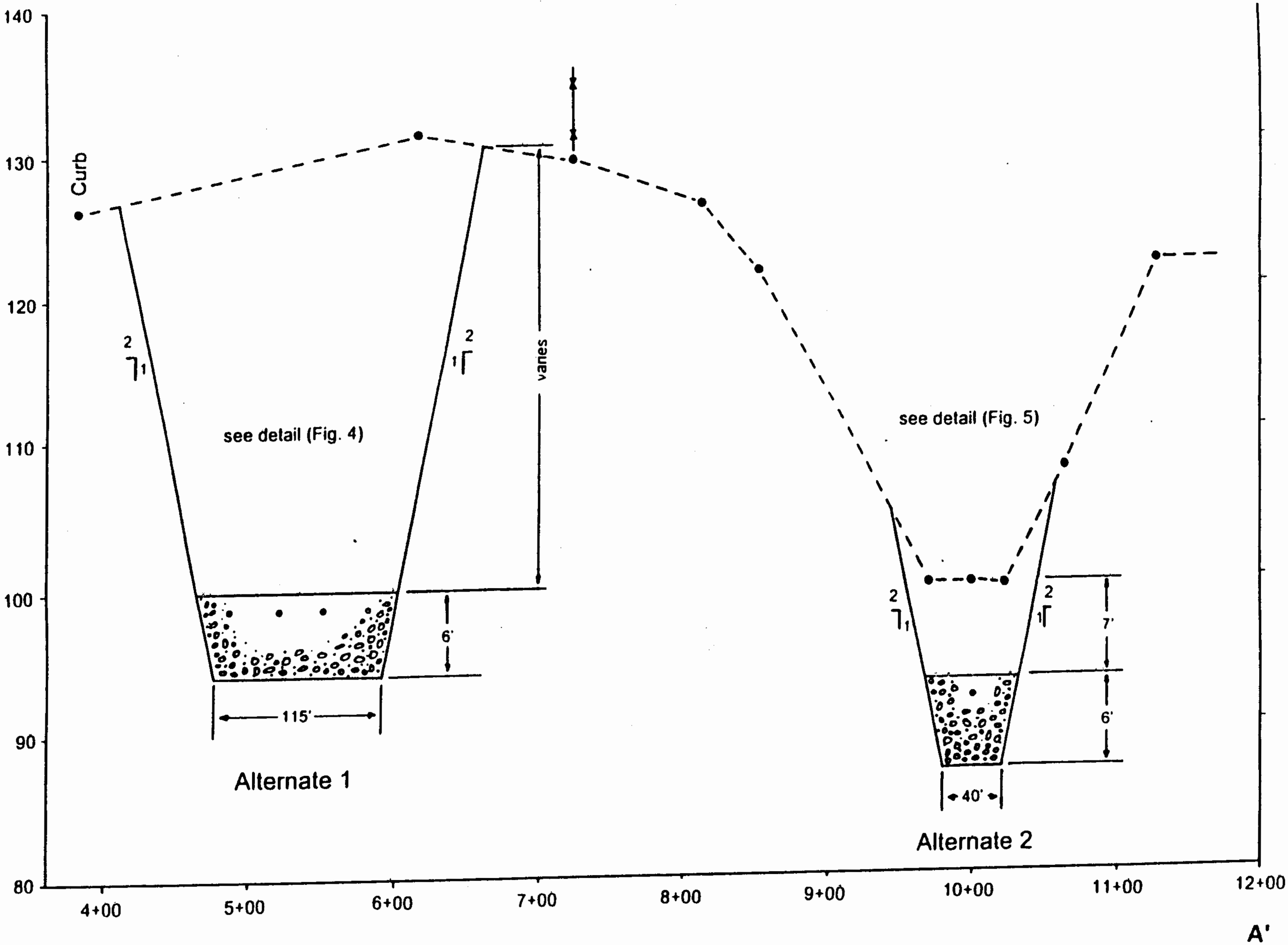


FIGURE 3

CROSS SECTION A-A'

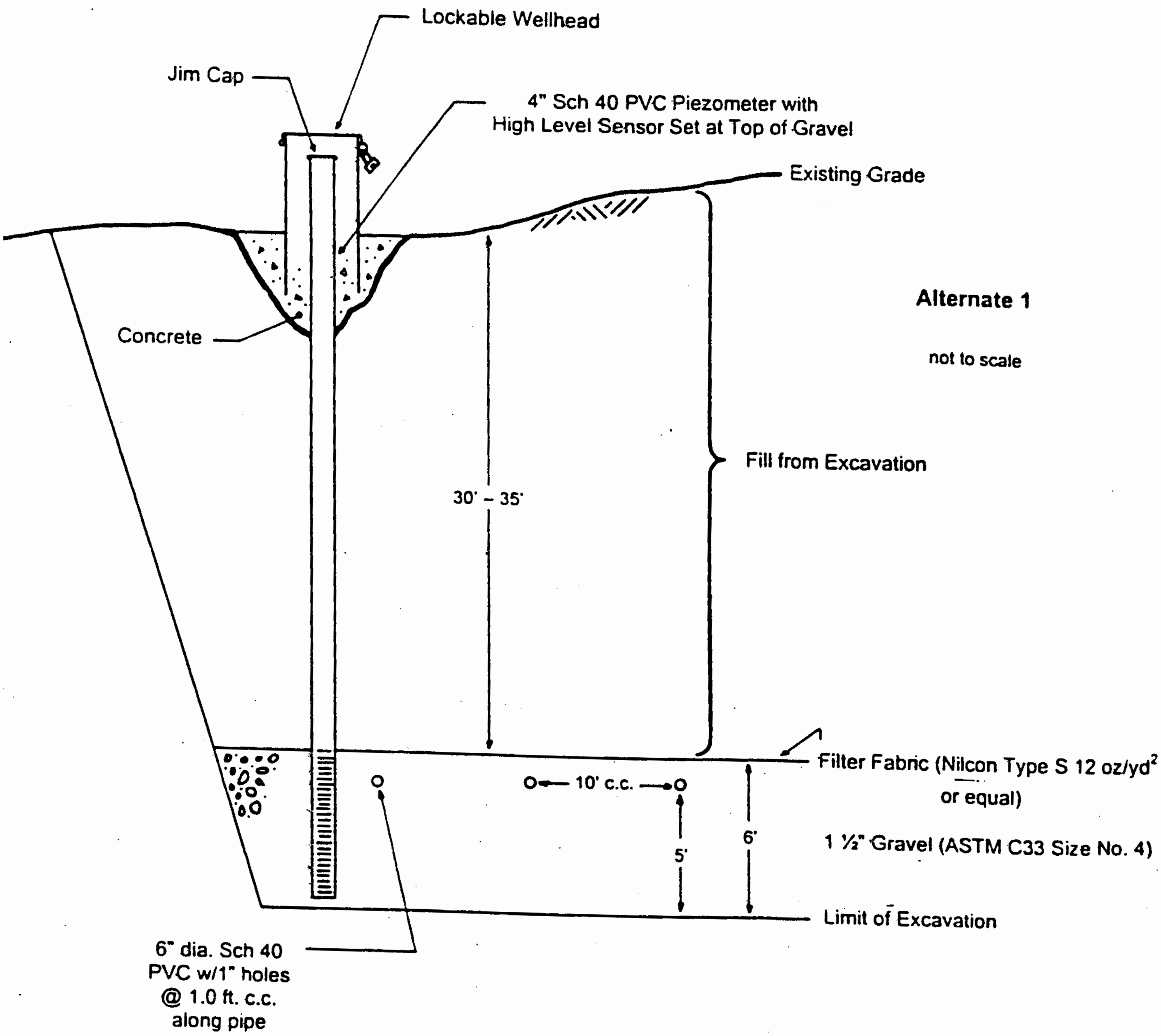


FIGURE 4

ALTERNATE 1
INFILTRATION GALLERY DETAILS

Design guide. Prepared for AMAFCA.

The Mussetter, December 1996 report provides design flows, hydraulic variables and maximum long term degradation values for the arroyo reaches. The maximum degradation was assumed to occur at the upstream end reach. The scour at a particular station was assumed to vary linearly with distance.

Equation 3.90 from Mussetter et al, November 1994, allows calculation of local scour as follows:

$$\frac{y_s}{y_1} = \underbrace{(0.73 \text{ Cos } \theta)}_{\text{Flood Wall Scour}} + \underbrace{(0.14 \pi Fr^2) \text{ Cos } \theta}_{\text{Antidune Scour}} + \underbrace{4 Fr^{0.33} \text{ Sin } \theta}_{\text{Impingement Scour}}$$

TABLE 1 shows scour calculations for Station 68+00. The calculations indicate that 7.0 feet of cover will protect the infiltration gallery from the expected scour with a significant safety factor. Each time the gallery is rebuilt, it will be constructed to a total depth of 13.0 feet below the arroyo bottom that exists at the time of reconstruction. This will result in the gallery being constructed at lower and lower elevations as time passes if the arroyo bed is continuing to degrade. Details of the Alternate 2 design are presented in FIGURE 5.

Alternate 3 is located beneath the bottom of the floodwater detention pond located south of Congress Avenue (see FIGURE 2). If the infiltration gallery is constructed at this site, it will be buried 5.0 feet below the pond bottom to minimize infiltration of storm water into the infiltration gallery. Details of Alternate 3 are presented in FIGURE 6.

All three alternates are equipped with a piezometer to monitor the water level within the gravel such that maintenance can be scheduled if the gallery is clogging.

It is believed that the life of the infiltration gallery will be limited by clogging of the infiltration interface, and clogging rate is proportional to infiltrated volume per unit area.

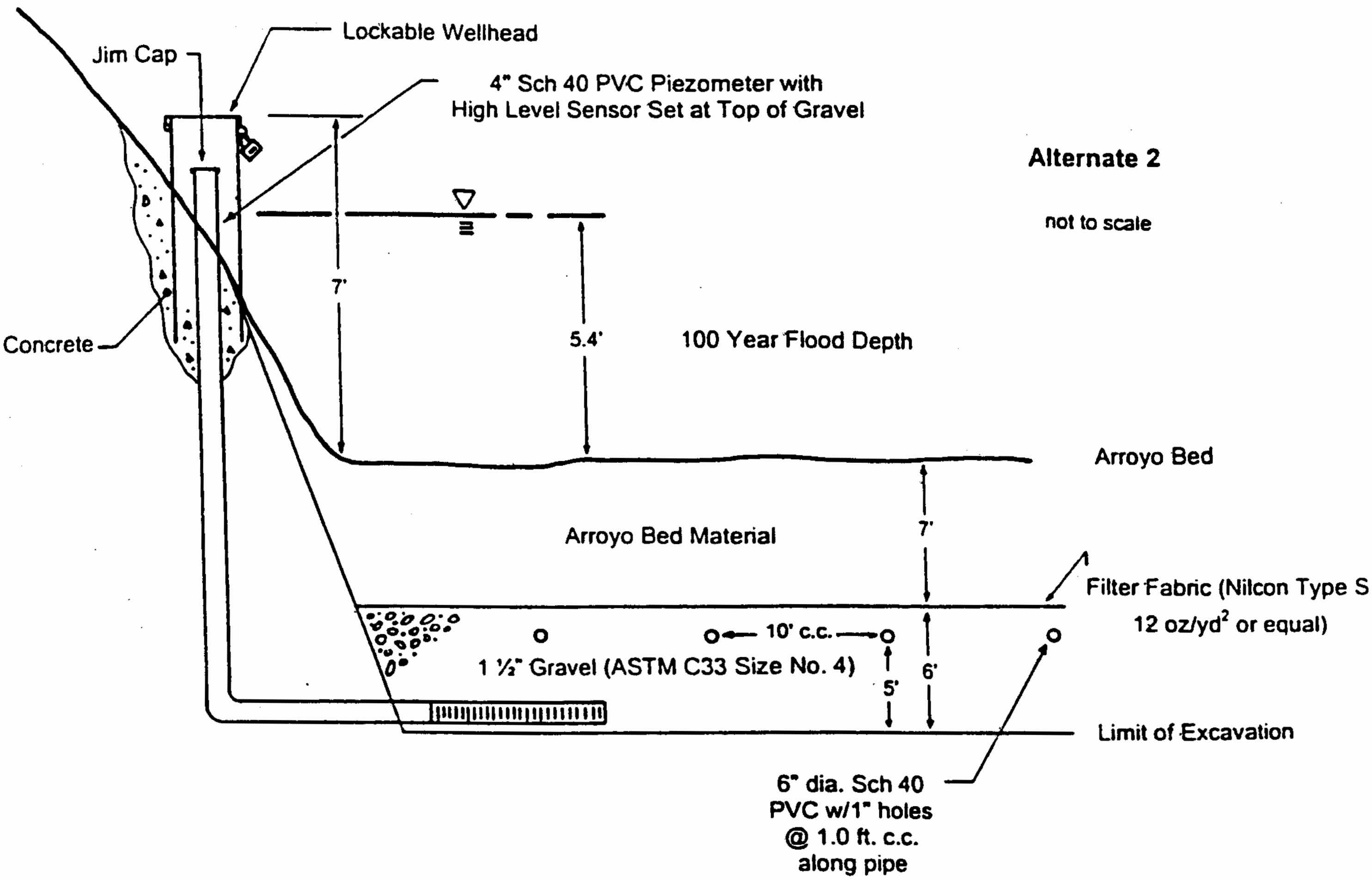


FIGURE 5

ALTERNATE 2
INFILTRATION GALLERY DETAILS

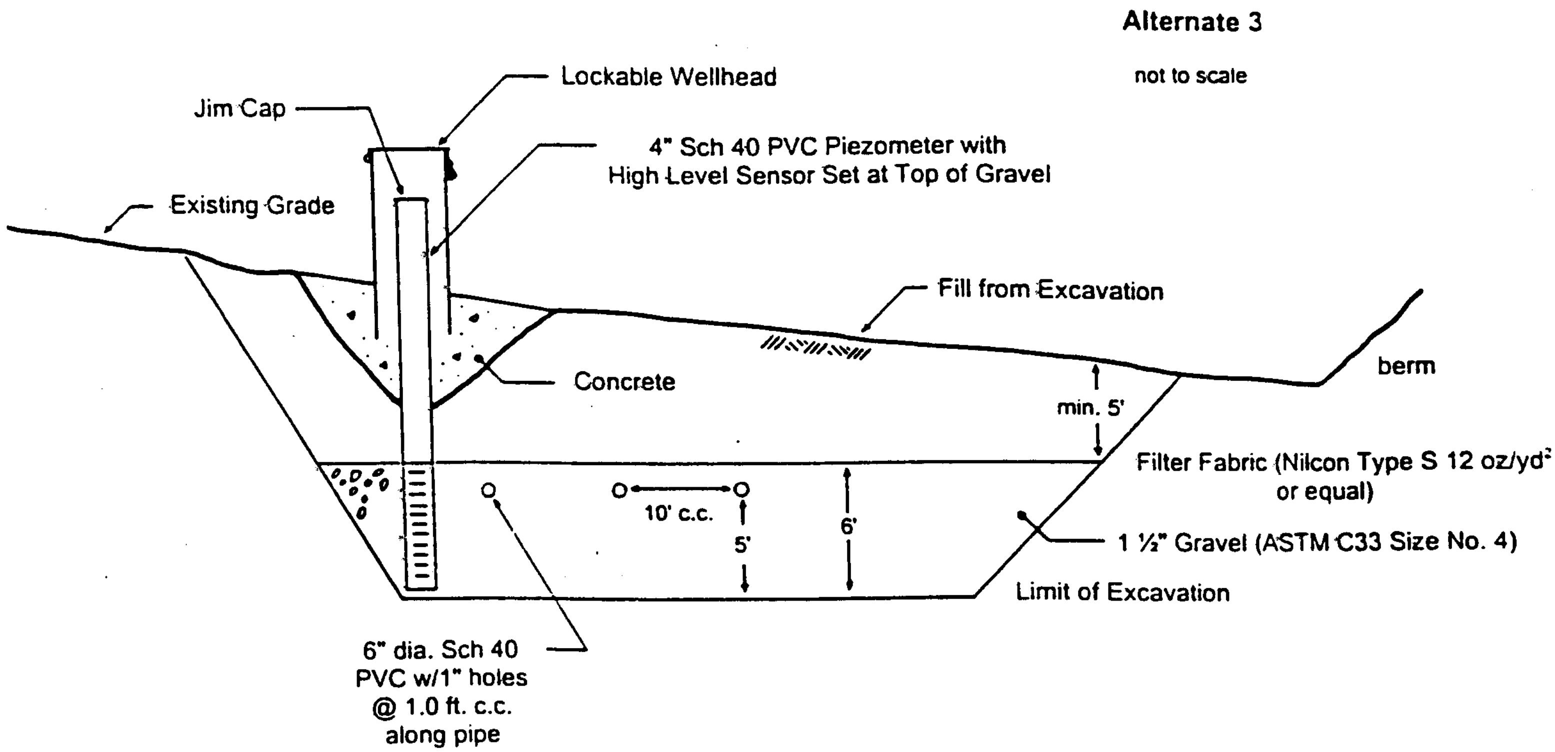


FIGURE 6

ALTERNATE 3
INFILTRATION GALLERY DETAILS

The water will be pretreated with "Aqua Mag", as is the case at the VWR site. The predicted lifespan for the Sparton Coors Road infiltration gallery is calculated as follows:

VWR Wetted Area (120 gpm)

$= 12' \times 225' + 6(2)(12+225)$

$= 5544\ ft^2$

VWR Wetted Area (200 gpm)

$= 5544 \times \frac{200}{120}$

$= 9240\ ft^2$

Sparton Wetted Area (200 gpm)

$= 0.3 \times 43{,}560 + 6(4)[\sqrt{0.3(43{,}560)}]$

$= 15{,}811\ ft^2$

$$\text{Life Sparton Site} = \frac{\text{Area Sparton (200 gpm)}}{\text{Area VWR (200 gpm)}} \times \text{Life VWR Site}$$

$$= \frac{15{,}811}{9{,}240} \times 2.5\ \text{yr.} = 4.2\ \text{yr.}$$

Use 4.0 yr.

When the infiltration gallery clogs, the system will be shut down and the infiltration gallery will be excavated and reconstructed at the same location.

Groundwater extraction combined with airstripper treatment is considered a best demonstrated available technology for volatile organic constituents (VOC) such as TCE and TCA. Further, 9 ½ years of successful experience with the current on-site system, consisting of groundwater extraction and airstripper treatment system confirms the applicability of the technology to the Sparton site. The success provides the basis for the plan to utilize airstripper treatment technology in the offsite plume leading edge vicinity. The containment well (FIGURE 2) planned near the plume leading edge will be screened to the deeper of: (1) deepest contamination detected at well cluster #9 (MW-48, 55, 56, and 67) or (2) the elevation at which less than 50 ppb TCE is first detected in new MW-70 to provide effective vertical capture. In addition, previous pumping tests and a number of recent studies/investigations show that a single well should have a horizontal capture exceeding the current width of the plume. However, horizontal and vertical capture of the containment well will be verified by extended demonstration. Long-term performance of the containment well will be monitored by means of the existing groundwater monitoring network (FIGURE 1).

TABLE 1

SCOUR CALCULATIONS INFILTRATION GALLERY AT Sta. 68+00 (Upstream from Blacks Arroyo) (Reach 7, $\theta = 0°$)

Design Storm	10-yr	100-yr
Peak Flow (Existing conditions) (CFS)	4,210	10,340
Velocity (V) (FPS)	10.0	13.2
Hydraulic Depth (D) (FT)	3.1	5.4
$Fr = v/\sqrt{gD}$	1.00	1.00
Max. Degradation (After 10 yr, Exist. Cond.) (FT)	8.1	8.1
Degradation @ Sta. 68+00 (3/17 x 8.1) (FT)	1.4	1.4
Antidune Scour Y_1 ($0.14\pi Fr^2$) Cos θ (FT)	1.4	2.4
Total Scour (FT)	2.8	3.8

ATTACHMENT F

DISCHARGE SITE APPROVAL DOCUMENTATION

Arrangements are being negotiated with the City of Albuquerque, Albuquerque Metropolitan Arroyo flood Control Authority, and the owner of the Calabacillas Arroyo. Final documents will be provided when available.

METRIC
Corporation ENVIRONMENTAL ENGINEERING AND SCIENCE

8429 WASHINGTON PLACE NE, SUITE A
ALBUQUERQUE, NEW MEXICO 87113
Phone: (505) 828-2801
Fax: (505) 828-2803

October 22, 1998

Mr. James B. Harris
Thompson & Knight
1700 Pacific Ave., Suite 3300
Dallas, TX 75210

Dear Jim:

Enclosed is a copy of the quality assurance and quality control plan for Pinnacle Laboratories. Stavros and Pierce both indicated that you were going to compile the submittal, so you will need this document. Also enclosed is FIGURE 3, Additional Vadose Zone Investigation and Robust SVE Implementation Schedule.

If you have questions please contact me.

Sincerely,

METRIC Corporation

Gary L. Richardson, P.E.
Executive Vice President

GLR/rkh

cc: Stavros Papadopulos
Pierce Chandler
Jan Appel

4' Span

State of New Mexico
ENVIRONMENT DEPARTMENT
Ground Water Quality Bureau
Harold Runnels Building
1190 St. Francis Drive, P.O. Box 26110
Santa Fe, New Mexico 87502
(505) 827-2900 phone
(505) 827-2965 fax

GARY E. JOHNSON
GOVERNOR

MARK E. WEIDLER
Secretary

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

June 26, 1998

Mr. Richard D. Mico, V.P. & General Manager
Sparton Technology, Inc.
4901 Rockaway Boulevard SE
Rio Rancho, New Mexico 87124-4469

RE: **Discharge Plan Approval, DP-1184, Sparton Technology, Inc. - Coors Road Facility**

Dear Mr. Mico:

Pursuant to Water Quality Control Commission (WQCC) Regulation 3109, the discharge plan application for DP-1184, submitted by Mr. Richard D. Mico for the discharge of up to 864,000 gallons per day (gpd) of treated contaminated ground water from the Sparton Technology, Inc. - Coors Road Facility (Sparton) ground water remediation system is hereby approved, subject to the conditions listed below. The facility is located in northwest Albuquerque in projected Section 7, T11N, R3E, Bernalillo County. In approving this discharge plan, the New Mexico Environment Department (NMED) has determined that the requirements of WQCC Regulation 3109.C have been met.

The approved Sparton treatment and disposal system is briefly described as follows:

Contaminated ground water will be pumped from one extraction well to an air stripper to remove volatile chlorinated solvents. Treated ground water will be piped to an infiltration gallery located beneath the Calabacillas Arroyo channel (projected Section 7.14, T11N, R3E) for infiltration. Ground water below the infiltration site is at a depth of approximately 119 feet and has a total dissolved solids concentration of approximately 400 to 500 milligrams per liter.

The approved discharge plan consists of the materials submitted by Sparton and METRIC Corporation dated December 23, 1997, January 22, February 26, March 20, and March 23, 1998. The discharge shall be managed in accordance with the approved plan and is subject to the conditions listed below.

However, approval of this discharge plan does not relieve you of your responsibility to comply with the New Mexico Water Quality Act, WQCC Regulations, any other applicable federal, state and/or local laws and regulations, such as zoning requirements and nuisance ordinances.

CONDITIONS FOR APPROVAL

This discharge plan approval is subject to the following conditions for the following reasons:

1. Sparton shall meter the volume of treated effluent discharged and remediation enhancement solution injected monthly and report the volumes of each to NMED in the quarterly reports as described in Condition #3 (below).

   The reason for this condition is to provide a mechanism for monitoring the volume of treated effluent discharged in accordance with WQCC Regulation 3107.A.1.

2. Sparton shall sample the newly installed ground water monitor wells located in the vicinity of the infiltration gallery (Specific Requirement #3) within 30 days of installation and development, and prior to discharging treated effluent to the infiltration gallery, and shall submit the results to NMED within 60 days of well installation. The monitor wells shall be sampled and analyzed for the following parameters: chlorinated solvents (trichloroethylene, 1,1,1-trichloroethane, 1,1-dichloroethylene, and methylene chloride) using EPA Method 8021 HALO (formerly EPA 8010), total dissolved solids (TDS), and for chromium, iron and manganese using EPA Method 6010 or equivalent methods.

   The reason for this condition is to establish water quality in the vicinity of the infiltration gallery prior to Sparton beginning discharge, in accordance with WQCC Regulation 3107.A.8.

3. Sparton shall submit quarterly monitoring reports to NMED. Quarterly monitoring reports shall be received by the Ground Water Pollution Prevention Section (GWPPS) no later than January 31, April 30, July 31, and October 31 of each year.

   Monitoring reports shall include the following: monthly effluent discharge volumes and monthly effluent quality analyses, quarterly water levels and analytical results for all monitor wells used to monitor ground water quality in the vicinity of the infiltration gallery, weekly measurements of water levels in the piezometer, and a summary of system operation and maintenance performed during the quarter.

The reason for this condition is to provide a monitoring plan to ensure that ground water quality standards are not exceeded as a result of your discharge in accordance with WQCC Regulation 3106, 3107.A.5., and 3107.A.8.

4. If the effluent quality of the discharge does not meet WQCC standards, Sparton shall immediately shut down the remediation system until the sample results are confirmed. A confirmation sample shall be collected from the treated effluent within 48 hours of receipt of the initial analytical results. The system will remain de-activated for the shortest practical time, until the problem can be remedied and the treated effluent quality does not exceed WQCC standards.

   The reason for this condition is to provide a contingency plan to address failure of the treatment system in accordance with WQCC Regulation 3107.A.8, and 3107.A.10.

5. In the event of a spill or discharge of contaminated water at the well head, piping, or infiltration gallery, Sparton shall shut down the remediation system, determine the quantity, extent, and impact of the spill or discharge, and implement corrective action. Sparton shall inform GWPPS verbally within 24 hours of the spill or discharge event. Within seven (7) days of the spill or discharge event, Sparton shall submit to GWPPS a written explanation of the cause of the spill or discharge and remedial action taken. In addition, Sparton will also notify Surface Water Quality Bureau (SWQB) within 24-hours in the event of a spill or discharge to the arroyo.

   The reason for this condition is to provide a mechanism for dealing with unauthorized spills and system failure in accordance with WQCC Regulation 1203.A, and 3107.A.10.

SPECIFIC REQUIREMENTS

The terms and conditions of this approval contain specific requirements which are summarized below.

1. Sparton is authorized to discharge up to 864,000 gpd of treated contaminated ground water which has been treated using an air stripping process to below WQCC standards, into an infiltration gallery located beneath the Calabacillas Arroyo channel (projected Section 7.14, T11N, R3E).

2. Sparton will install the top of the infiltration gallery a minimum of seven (7) feet

below the arroyo bottom that exists at the time of construction to prevent scour in the arroyo channel from exposing the infiltration gallery.

3. Sparton will install three ground water monitor wells near the infiltration gallery prior to effluent being discharged into the infiltration gallery. The monitor wells will be located as follows: one down gradient monitor well will be located within 50 feet down gradient of the infiltration gallery; one down gradient monitor well will be located within 150 feet down gradient of the infiltration gallery; and one up gradient monitor well will be located within 250 feet up gradient of the infiltration gallery.

   All newly installed monitor wells used to monitor ground water quality in the vicinity of the infiltration gallery will be surveyed to common permanent bench mark to the nearest one-hundredth of a foot.

   All monitor wells will be installed according to NMED Guidelines for Monitor Well Construction and Abandonment (copy enclosed). Monitor wells will be screened with 30 feet of well screen, screened from 10 feet above the static water level (as indicated during monitor well installation), and 20 feet below the water table.

   If any monitor well is destroyed or damaged during flooding of the arroyo, Sparton will repair or replace the monitor well as necessary and within a reasonable period of time.

4. Sparton will design and construct the infiltration gallery for a discharge of 200 gpm. However, if the infiltration gallery must be sized greater than 200 gpm, Sparton will submit revised plans and specifications for system modification to NMED for approval prior to discharging more than 200 gpm.

5. Sparton is authorized to add approximately 4 parts per million of liquid nutrients (Aqua Mag) to the injection water at the wellhead to inhibit precipitation of calcium carbonate and other scaling compounds in the pipeline and infiltration gallery.

6. Sparton will install an automatic shutdown switch to turn off the containment well pump in the event the air stripper blower fails. In addition, the infiltration gallery will be equipped with a piezometer to monitor the water level in the infiltration gallery. The piezometer will be equipped with a high water level shut down system which will shut down the containment well pump if the water level within the infiltration gallery rises to the top of the gravel in the infiltration gallery. Sparton will either have the containment well checked by an operator twice per week or install an automatic shut off alarm to notify a responsible person in the event of a

system shut down to prevent the system from being shut down for an extended period of time.

7. Sparton will sample effluent from the air stripper system after start-up daily for the first week, weekly for the first month, and monthly thereafter. Samples will be analyzed for chlorinated solvents (trichloroethylene, 1,1,1-trichloroethane, 1,1-dichloroethylene, and methylene chloride) using EPA Method 8021 HALO (formerly EPA 8010), and for chromium using EPA Method 6010. In addition, the air stripper effluent will be sampled on a weekly basis for the first month of operation, and monthly thereafter for iron and manganese using EPA Method 6010.

8. Sparton will sample all monitor wells associated with the infiltration gallery on a quarterly basis for the following parameters: chlorinated solvents using EPA Method 8021 HALO, and for chromium, iron, and manganese using EPA Method 6010. NMED will consider a request for a reduction in the monitoring after two years of system operation for the following: 1) a reduction in monitoring frequency for the up gradient well, and 2) a reduction in monitoring frequency for iron and manganese if these constituents are not detected above WQCC standards. A minimum of one down gradient monitor well will be monitored on a quarterly basis for the duration of the discharge.

9. In the event the infiltration gallery fails or clogs, Sparton will replace the infiltration gallery at the same location within 6 weeks of system failure. Each time the infiltration gallery is rebuilt, the bottom of the infiltration gallery will be constructed to a total depth of thirteen (13) feet below the existing arroyo bottom as determined at the time of construction.

10. In the event that ground water is contaminated in the vicinity of the infiltration gallery as a result of Sparton's discharge, Sparton will abate any resulting ground water contamination in accordance with 3109.E and Subpart IV of the New Mexico Water Quality Control Commission Regulations.

11. When the Sparton site is closed, Sparton will monitor the ground water in the vicinity of the infiltration gallery for eight consecutive quarters for the following parameters: chlorinated solvents (trichloroethylene, 1,1,1-trichloroethane, 1,1-dichloroethylene, and methylene chloride) using EPA Method 8021 HALO (formerly EPA 8010), and for chromium using EPA Method 6010. If WQCC ground water quality standards are not exceeded after 8 consecutive quarters, Sparton shall implement the Closure Plan as stated in the amended discharge plan application dated February 26, 1998 and the supplement to the discharge plan dated March 20, 1998. The closure plan

includes: removal of the air stripper, capping and abandoning in-place the pipeline leading from the containment well to the infiltration gallery, plugging and abandonment of all monitor wells associated with the infiltration gallery according to NMED Guidelines for Monitor Well Construction and Abandonment (copy enclosed), and removal and proper off-site disposal of all perforated pipe from the infiltration gallery.

GENERAL DISCHARGE PLAN REQUIREMENTS

In addition to any other requirements provided by law, approval of discharge plan, DP-1184, is subject to the following general requirements:

Monitoring and Reporting

Monitoring and reporting shall be as specified in the discharge plan and supplements thereto. These requirements are summarized on the attached sheet(s). Any inadvertent omissions from this summary of a discharge plan monitoring or reporting requirement shall not relieve you of responsibility for compliance with that requirement.

Record Keeping

1. The discharger shall maintain at the facility, a written record of ground water and wastewater quality analyses.

The following information shall be recorded and shall be made available to the NMED upon request.

a. The dates, exact place and times of sampling or field measurements.

b. The name and job title of the individuals who performed the sampling or measurements.

c. The dates the analyses were performed.

d. The name and job title of the individuals who performed the analyses.

e. The analytical techniques or methods used.

f. The results of such analyses, and

g. The results of any split sampling, spikes or repeat sampling.

2. The discharger shall maintain a written record of any spills, seeps, and/or leaks of effluent, leachate and/or process fluids not authorized by this discharge plan.

3. The discharger shall maintain a written record of the operation, maintenance and repair of facilities/equipment used to treat, store and/or dispose of wastewater; to measure flow rates; and/or to monitor water quality. This will include repairs, replacement or calibration of any monitoring equipment and repairs or replacement of any equipment used in Sparton's waste or wastewater treatment and disposal system. .

4. The discharger shall maintain a written record of the amount of effluent discharged.

Inspection and Entry

In accordance with § 74-6-9.B & E NMSA 1978 and WQCC Regulation 3107.D., the discharger shall allow the Secretary or his authorized representative, upon the presentation of credentials, to:

1. Enter at regular business hours or at other reasonable times upon the discharger's premises or where records must be kept under the conditions of this discharge plan.

2. Inspect and copy, during regular business hours or at other reasonable times, any records required to be kept under the conditions of the discharge plan.

3. Inspect, at regular business hours or at other reasonable times, any facility, equipment (including monitoring and control equipment), practices or operations regulated or required under this discharge plan.

4. Sample or monitor, at reasonable times for the purpose of assuring discharge plan compliance or as otherwise authorized by the New Mexico Water Quality Act, any effluent at any location before or after discharge.

Duty to Provide Information

In accordance with § 74-6-9.B NMSA 1978 and WQCC Regulation 3107.D., the discharger shall furnish to the NMED, within a reasonable time, any relevant information which it may request to determine whether cause exists for modifying, terminating and/or renewing this discharge plan or to determine compliance with this plan. The discharger shall furnish to the NMED, upon request, copies of records required to be kept by this discharge plan.

Spills, Leaks and Other Unauthorized Discharges

This approval authorizes only those discharges specified in the discharge plan. Any unauthorized discharges violate WQCC Regulation 3104, and must be reported to the NMED and remediated as required by WQCC Regulation 1203. This requirement applies to all seeps, spills, and/or leaks discovered from the treatment and disposal system.

Retention of Records

The discharger shall retain records of all monitoring information, including all calibration and maintenance records, copies of all reports required by this discharge plan, and records of all data used to complete the application for this discharge plan, for a period of at least five years from the date of the sample collection, measurement, report or application. This period may be extended by request of the Secretary at any time.

Enforcement

Failure to grant the Secretary or his authorized representative access to the records required to be kept by this discharge plan or to allow an inspection of the discharge facilities or to the collection of samples is a violation of this discharge plan and the WQCC Regulations. Such violations as well as other violations of the discharge plan or WQCC Regulations, may subject the discharger to a compliance order, a compliance order assessing a civil penalty or an action in district court pursuant to § 74-6-10 NMSA 1978, and/or modification or termination of this discharge plan pursuant to § 74-6-5.L NMSA 1978. Penalties assessed as part of a compliance order shall not exceed $15,000 per day for violations of the terms of this permit or the requirements of § 74-6-5 NMSA 1978, and shall not exceed $10,000 per day for violations of other sections of the Water Quality Act.

Modifications and/or Amendments

The discharger shall notify NMED, pursuant to WQCC Regs. 3107.C, of any modifications or additions to the Sparton's wastewater disposal system, including any increase in wastewater flow rate or wastewater storage and disposal management changes to the system as approved under this discharge plan. The discharger shall obtain NMED's approval, as a discharge plan modification, prior to any increase in the quantity or concentration of constituents in the leachate above those approved in this plan. Please note that WQCC Regs. 3109.E and F provide for possible future amendment of the plan.

Other Requirements

Please be advised that the approval of this plan does not relieve Sparton of liability should your operation result in actual pollution of surface or ground water which may be actionable under other laws and/or regulations.

RIGHT TO APPEAL

If Sparton is dissatisfied with this action taken by NMED, Sparton may file a petition for hearing before the WQCC. This petition shall be in writing to the Water Quality Control Commission within thirty (30) days of the receipt of this letter. Unless a timely request for hearing is made, the decision of the NMED shall be final.

TRANSFER OF DISCHARGE PLAN

Pursuant to WQCC Regulation 3111, prior to any transfer of ownership, the discharger shall provide the transferee a copy of the discharge plan, including a copy of this approval letter and shall document such to the NMED.

PERIOD OF APPROVAL

Pursuant to WQCC Reg. 3109.G.4., this discharge plan approval is for a period of 5 years. This approval will expire on June 26, 2003, and you must submit an application for renewal at least 120 days before that date.

Sincerely,

Marcy Leavitt, Chief
Ground Water Quality Bureau

ML:VM

Enclosures: NMED Monitor Well Construction and Abandonment Guidelines, DP Summary

xc: Dennis McQuillan, NMED/GWQB
Ana Marie Ortiz, Assistant General Counsel, NMED Office of General Counsel
L. William Bartels, Dist. Manager, NMED Dist. 1
NMED Albuquerque Field Office
Gary O'Dea, Esq., City of Albuquerque

Michael Donnellan, Esq., US Department of Justice
Charlie DeSaillan, Esq., NM Office of Attorney General and ONRT, P.O. Box. 1508, Santa Fe, New Mexico 87504
Gary Richardson, P.E., METRIC Corporation, 8429 Washington Place NE., Albuquerque, NM 87113

Discharge Plan Number..... 1184
Date Report Generated..... 26-JUN-98
Staff Reviewer............ VICTORIA MARANVILLE

Legally Responsible Party. RICHARD MICO VP&GM (505)892-5300
Owner..................... RICHARD D MICO
4901 ROCKAWAY BLVD SE
RIO RANCH NM 87124-4469

Facility.................. SPARTON TECHNOLOGY INC

Primary Waste Type........ INDUSTRIAL OTHER
Treatment................. HYDROCARBON REMEDIATION AIR STRIPPER
Discharge................. INFILTRATION BASIN
Discharge Location........ CALABACILLAS ARROYO (PROJECTED SECTION 7.14, T11N, R3E)

Application Received...... 24-DEC-97 | Discharge Volume.....864000 gpd
Public Notice Published... 26-FEB-98 | Depth to GW....... 119 feet
Discharge Plan Approved... 26-JUN-98 | TDS................ 400 mg/l
Discharge Plan Expires.... 26-JUN-03

Monitoring Reports due...: 31-JAN 30-APR 31-JUL 31-OCT

Sampling Category	Annual Frequency	No. of Sites	Sampling Description
2	12	1	Monthly meter readings of treated effluent discharged.
12	12	1	Monthly volumes of remediation enhancement solution injected.
6	4	3	Quarterly sampling and analysis for all monitor wells used to monitor ground water in the vicinty of the infiltration gallery for: chlorinated solvents using EPA Method 8021 HALO, and chromium using EPA Method 6010.
6	12	1	Airstripper effluent shall be sampled daily for the first week, weekly for the first month, and monthly thereafter for the following: chlorinated solvents and chromium.
12	12	1	Air stripper effluent shall also be sampled for iron and manganese weekly for the first month of system operation and monthly thereafter.

_____ If this space is checked, monitoring requirements are summarized or explained in more detail on the attached sheet. Any inadvertent omission from this summary does not relieve the discharger of responsiblility for compliance with that requirement.

Send All monitoring reports or correspondence to: VICTORIA MARANVILLE

Prevention Section
Environment Department
P.O. Box 26110
Santa Fe NM 87502
(505) 827-2900

ATTACHMENT D

WORK PLAN
FOR THE ASSESSMENT OF AQUIFER RESTORATION

Prepared For:

SPARTON TECHNOLOGY, INC.
Coors Road Facility
Albuquerque, New Mexico

Prepared By:

S. S. PAPADOPULOS & ASSOCIATES, INC.
Environmental & Water–Resource Consultants

7944 Wisconsin Avenue, Bethesda, Maryland 20814–3620 • (301) 718–8900

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1.0 INTRODUCTION

Sparton Technology, Inc. (Sparton) has agreed to install, test and operate an off-site containment well near the leading edge of an off-site plume of solvents thought to be associated with past operations at its Coors Road Facility in Albuquerque, New Mexico. The containment well (CW-1) and two observation wells (OB-1 and OB-2) were installed in the summer of 1998; a step-drawdown test and a three-day constant-rate test were conducted on the well between December 4 and 12, 1998, in compliance with the terms of the "Work Plan for the Installation of Additional Wells and Conducting a Pump Test in the Area of the Leading Edge of the Contaminant Plume Originating from the Sparton Technology, Inc. Coors Road Facility", effective July 7, 1998 (PI Work Plan).

The results of these tests and data on the hydraulic gradient of the aquifer and on the extent of the plume was used to estimate the pumping rate required to contain the plume (see Interim Report on Off-Site Containment Well Pumping Rate[1]). This pumping rate was used to conduct a 30-day containment-feasibility test on the well between December 31, 1998 and January 30, 1999, in accordance with the terms of the PI Work Plan. Since the completion of this test, Sparton is continuing to operate the well at the same pumping rate, and will conduct an evaluation of its performance after six months of continuous operation [see Attachment C - Work Plan for the Off-Site Containment System (Off-Site Containment Plan)].

Sparton is also proposing to install and operate a source containment well immediately downgradient of its Coors Road Facility [see Attachment F - Work Plan for the Installation of a

[1] S. S. Papadopulos & Associates, Inc., 1998, *Interim Report on Off-Site Containment Well Pumping Rate*: prepared for Sparton Technology, Inc., Coors Road Facility, Albuquerque, New Mexico, December 28.

Source Containment System (Source Containment Plan)]. Groundwater pumped by the well will be treated at an on-site air-stripper and it is anticipated it will be returned to the aquifer through a series of on-site infiltration ponds. This proposed well will address potential on-site sources as discussed in the Source Containment Plan.

In addition, Sparton operated an on-site soil vapor extraction (SVE) system between April and October 1998 to reduce contaminant concentrations in the vadose zone, and has recently proposed additional investigations aimed at obtaining data for implementing a modified SVE system (see Attachment E - Vadose Zone Investigation Workplan).

The goal of these corrective measure activities is to restore the contaminated groundwater to its beneficial use. Specifically, the goal is to reduce groundwater contamination to the more stringent of either the federal drinking water standards (Maximum Contaminant Levels, or MCLs, established under the Safe Drinking Water Act) or the maximum allowable concentrations in ground water set by the New Mexico Water Quality Control Commission (NMWQCC). If it is determined that such goal is technically impracticable or technically infeasible, as determined from all relevant data including information obtained during the operation of the off-site containment and the on-site source containment systems, and subject to all necessary regulatory requirements, alternate cleanup standards may be submitted for approval.

The purpose of this Work Plan is to describe the procedures that will be used to assess progress in aquifer restoration, evaluate alternate remedial measures, and determine the feasibility of restoring the aquifer to beneficial use.

2.0 DATA AND MONITORING REQUIREMENTS

To assess progress in aquifer restoration, evaluate alternate remedial measures, and determine the feasibility of restoring the aquifer to beneficial use, the following data will be needed:

1. Hydrogeologic data on the lithology and stratigraphy of the aquifer, on transmissivity, recharge, water levels, and pumping rates;
2. Water-quality data from monitoring and containment wells, and/or the influent to the treatment facilities;
3. Data on the fate and transport properties of the aquifer and of the constituents of concern;
4. Operational data from the containment systems; and
5. Data on alternate remedial technologies.

Data on the lithology and stratigraphy of the aquifer are available from regional studies, from reports that have been prepared on site conditions, and from the logs of wells that have been drilled at the site and its vicinity. Information on the aquifer transmissivity is available from an on-site test and from the off-site tests that were conducted under the terms of the PI Work Plan; additional information will be obtained from the effects of the continuous operation of the off-site and source containment systems. Information on regional recharge rates is available from regional groundwater studies, and recharge rates from the proposed on-site infiltration ponds and the off-site infiltration gallery will be estimated as part of the evaluations to be conducted under this Work Plan.

Operational data from the source and off-site containment systems, data on fate and transport properties, and on alternate remedial technologies will be developed during the evaluations that will be conducted under this Work Plan.

Data on water-levels and water-quality in monitoring wells have been collected in the past under ongoing monitoring programs; these data will continue to be collected in compliance with Attachment A - Ground Water Monitoring Program Plan (Monitoring Plan). Data on the off-site containment well pumping rate and water quality were collected during the 30-day containment-feasibility test and continue to be collected during the current continuous operation of the well. After the air stripper and the infiltration gallery for the off-site system have been installed and begin operating, data on treatment plant influent and effluent quality will also be collected in compliance with the Monitoring Plan. Similarly, after the source containment system is installed and begins operating, data on the source containment well pumping rate and water quality, and treatment plant influent and effluent quality will be collected in compliance with the Monitoring Plan.

3.0 ASSESSMENT OF AQUIFER RESTORATION

The tasks that will be performed to assess progress in the restoration of the aquifer, evaluate alternate remedial measures, and determine the feasibility of restoring the aquifer to beneficial use will be:

Task 1 - Assemble and evaluate hydrogeologic data;

Task 2 - Evaluate water-quality data and assess progress in restoration;

Task 3 - Develop groundwater flow and contaminant transport model;

Task 4 - Prepare Annual Reports.

Each of these is briefly discussed below.

3.1 Task 1 - Hydrogeologic Data Evaluation

Available regional and site-specific reports on the lithology and stratigraphy and the overall hydrogeologic setting of the site and its vicinity will be assembled, reviewed and evaluated to determine the conceptual framework that would be appropriate for use in developing a model needed for predicting future progress in aquifer restoration and for evaluating alternate remedial measures. This task will also include the assembly of data on transmissivity, water levels, and containment well pumping rates that will be collected and evaluated under the terms of other data collection and evaluation programs (PI Work Plan, Monitoring Plan, Off-Site Containment Plan, Source Containment Plan). Operational data on the treatment systems will be evaluated to estimate recharge through the infiltration gallery and ponds. The evaluation of hydrogeologic data will be completed within the first year of off-site containment system operation, and the results will be reported in the first Annual Report. Adjustments to these results, if any, that may be indicated by subsequent data will be reported in subsequent Annual Reports.

3.2 Task 2 - Water-Quality Data Evaluation

Water-quality data from monitoring wells, from the containment wells, and/or from the influent to the treatment systems, which will be collected in compliance with the Monitoring Plan, will be reviewed and evaluated. Data from monitoring wells will be used to prepare annual isoconcentration maps for constituents of concern, maps of concentration changes from the previous year, and plots of concentration against time for wells within and in the vicinity of the plume. Spatial changes and temporal trends in the concentrations of the constituents of concern, determined from these maps and plots, and United States Environmental Protection Agency (USEPA) guidance documents[2,3] will be used to assess progress in the restoration process for each year.

Water-quality data from the containment wells and/or from the influent to the treatment systems will be used to calculate constituent mass removal rates. Plots of monthly removal rates for each year of operation, and of cumulative removal rates since the beginning of operations will be prepared to evaluate trends in mass removal rates.

The results of these evaluations will be annually reported in the site's Annual Report which will also include all other site-related data and evaluations.

---

[2] USEPA, 1994, *Methods for Monitoring Pump-and-Treat Performance*: EPA/600/R-94/123.

[3] USEPA, 1992, *Methods for Evaluating the Attainment of Cleanup Standards, Volume 2: Ground Water*: EPA/230/R-92/014.

3.3 Task 3 - Flow and Transport Model Development

A numerical groundwater flow and contaminant transport model of the aquifer system underlying the site and its vicinity will be developed using the hydrogeologic and water-quality information assembled and evaluated in Tasks 1 and 2. The groundwater flow component of the model will be based on the MODFLOW[4] simulation code developed by the U. S. Geological Survey. This flow model will be calibrated against water-level data from periods prior to and after the beginning of pumping from the source and off-site containment wells.

The flow model will be coupled with the solute transport simulation code MT3D$^{\underline{96}}$[5] to develop a model capable of simulating the migration of constituents of concern in the aquifer underlying the site. These simulations will be initially limited to trichloroethylene (TCE) the most dominant constituent at the site; however, other constituents may also be considered for simulation in later years if warranted by the evaluations of progress in aquifer restoration. Initial estimates of the transport parameters for the model will be based on data available in the literature for aquifer materials similar to those underlying the site. TCE concentrations detected prior to the operation of the source and off-site containment wells will be input into the model as initial concentrations and the model will be operated to simulate the effects of the source and off-site containment wells and

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[4] McDonald, M. G. and A. W. Harbaugh, 1988, *A Modular Three-Dimensional Finite-Difference Ground-Water Flow Model*: Techniques of Water Resource Investigations of the U. S. Geol. Survey, Book 6, Chapter A1.

[5] S. S. Papadopulos & Associates, Inc., 1996, *"MT3D$^{\underline{96}}$": A Modular Three-Dimensional Transport Model for Simulation of Advection, Dispersion and Chemical Reactions of Contaminants in Ground-Water Systems*: Documentation & Input Instructions.

predict spatial and temporal changes in concentration. Model predicted concentrations and changes in concentration will be compared to actual data from the site, and adjustments to transport parameters will be made to minimize the difference between the computed and observed results.

Development of the initial flow and transport model will be completed during the first year of operation of the source and off-site containment systems; it is estimated that this development will take approximately four months. The structure of the model and the results of the initial model calibration will be reported in the first Annual Report of the site. This first Annual Report will also include predictions on water-quality conditions at the end of the second year of containment system operation. At the end of the second year, actual conditions will be compared to the predicted conditions, and adjustments to the model and model parameters will be made as necessary; predictions will again be made for conditions at the end of the next year. Starting with this second year, an assessment will be made to determine the reliability of the model in making long-term predictions of plume behavior and in evaluating the need for additional remedial measures. This assessment will also include an evaluation of whether additional data are necessary to improve the model and increase its reliability because the process of aquifer restoration may be long term and information obtained over the short term may not provide a sufficient basis for predicting longer term aquifer response. The results of this assessment will be reported in the second Annual Report. If any additional data needs have been identified, a Groundwater Investigation Work Plan will be prepared to implement a data collection program. This process will be repeated at the end of each subsequent year and the results will be reported in the Annual Report of each year, until all data necessary for developing the model have been collected and the model has been deemed capable of making reliable predictions of future conditions.

3.4 Task 4 - Preparation of Annual Reports

Reference has been made to the site's Annual Reports in this Work Plan and in both the Off-Site Containment Plan and the Source Containment Plan. The purpose of these Annual Reports will be to present within a single report all data that have been collected during each year of containment system operation and any data interpretations and evaluations that have been conducted during the year. These Annual Reports will be submitted for review and approval in accordance with procedures set forth in the Consent Decree. The information to be presented in the Annual Reports will include the following:

- Background information on the site and a brief description of the remedial measures that have been implemented;
- Estimates of the initial pore volume of contaminated water and of the contaminant mass in place;
- Operational data on the containment and treatment systems; hours of operation versus hours available during the year; problems and their resolution;
- Operational data on the SVE system; hours of operation versus hours available during the year; problems and their resolution;
- Operational data on any other remedial systems that may be implemented in the future;
- Containment well flow rates; treatment system influent and effluent rates;
- SVE system air flow rates;
- Water-level data from monitoring, containment and observation wells;
- SVE system pressure measurements;

- Water-quality data from monitoring and containment wells, and comparison of these data with media standards (the more stringent of MCLs for drinking water or the maximum allowable concentrations in ground water set by NMWQCC);
- Water-quality data from the influent to and effluent from the treatment systems;
- Air-quality data from the SVE system;
- Pertinent data from any other remedial systems that may be implemented in the future;
- Plots of monthly extraction rates and of cumulative volume of water pumped, and comparison with the contaminant pore volume;
- Evaluation of water-level data; maps showing water levels and the capture zones of the containment wells and interpretation of these maps with respect to the performance of the containment systems; if capture of the off-site plume or of on-site source areas is not achieved, a discussion of additional measures that may be required to achieve capture;
- Plots of monthly mass removal rates and of cumulative removal of constituents of concern, and comparison with the mass in place;
- Isoconcentration and change in concentration maps for constituents of concern; plots of constituent concentration against time in monitoring wells; interpretation of these maps and plots with respect to progress in remediation;
- If the monitoring well to be installed on-site (see Source Containment Plan) is completed as monitoring well MW-72 (rather than a piezometer), evaluation of water-quality data from this well with respect to the performance goal of the source containment well (during the first four years of operation); at the five year mark, an

evaluation of whether any source areas remain uncaptured based upon all available data; if such source areas are identified, proposals for specific measures to define and/or to capture those areas;

- Evaluation of data from any other remedial systems that may be implemented in the future;
- Discussion of any adjustments to the pumping rates of the containment wells; reason for such adjustments and expected results;
- Interpretation of flow rate, air-quality and pressure data from the SVE system with respect to the performance goals of the system;
- Modifications to the SVE system; reason for such adjustments and expected results;
- Compliance with site permits; problems, if any, and their resolution;
- Summary of contacts during the year with representatives of the local community, public interest groups, and state and federal parties;
- Summary of progress in aquifer restoration;
- Discussion of whether reliable predictions of future conditions can be made, and if not, discussion of the reasons; and
- Conclusions and plans for next year.

During the early years of operation, when model development is in progress, and alternate remedial systems and/or technologies are being evaluated for potential implementation at the site, the Annual Reports will also include the following information:

- Description of progress in developing the flow and transport model;
- Detailed description of data inputs required to develop the flow and transport model, and discussion of any identified additional data needs;

- A plan and schedule for the collection of needed data, if any;
- Documentation of the flow and transport model;
- Model predictions for the next year, and discussion of the reliability of the model in predicting future conditions;

If reliable predictions of future conditions can be made, additional evaluations will be conducted, and the Annual Report will, therefore, also include the following results of these evaluations:

- Predicted future progress in restoration and projected restoration time with the existing containment systems, and discussion of the feasibility of restoration within a reasonable time period;
- Evaluation of alternate remedial systems involving groundwater extraction (e.g., center of mass extraction), the estimated time in which each alternative remedial system will achieve the restoration goal, and a discussion of its effectiveness, including cost-effectiveness, in accelerating aquifer restoration;
- Evaluation of alternate technologies, other than groundwater extraction, and discussion of their applicability to aquifer restoration at the site;
- Detailed discussion of any alternate remedial system, or technology, proposed for implementation at the site;
- If an alternate system or technology is not proposed for implementation, detailed discussion of the reasons why an alternative system or technology cannot be effectively implemented at the site; and
- Conclusions and recommendations for future actions, including an evaluation of whether attainment of cleanup standards is technically impracticable, as defined in

federal regulations or guidance documents, or technically infeasible as defined under state regulations or guidance documents, or the necessity and appropriateness of seeking alternate abatement standards from NMWQCC.

VADOSE ZONE INVESTIGATION AND IMPLEMENTATION WORKPLAN

FOR

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

PREPARED BY
PIERCE L. CHANDLER, JR.

VADOSE ZONE INVESTIGATION AND IMPLEMENTATION WORKPLAN
(ADDITIONAL SOIL GAS CHARACTERIZATION)

PURPOSE

The purpose of this workplan is to establish investigative procedures for confirming the limits of soil gas constituent concentrations above 10 ppm_v and implementation procedures for a "robust" soil vapor extraction (SVE) system that will remove contaminants from the vadose zone.

PREVIOUS CHARACTERIZATION

Soil gas characterization has been an ongoing activity at the Sparton site since Spring 1984. The previous investigations and reports are summarized in the following discussion:

1) In Spring of 1984, Tracer Research Corporation conducted a limited soil gas survey. Over 50 sampling points were utilized on-site and 9 sampling points were utilized along Irving Boulevard south of the property. Highest constituent concentrations were observed in the sampling transect nearest the pond/sump area (near current monitoring well MW-17). Soil gas TCE concentrations ranged from 720 ug/l (161 ppm_v) to less than 0.25 ug/l. TCA concentrations ranged from 440 ug/l (97 ppm_v) to less than 0.25 ug/l (RFI, Attachment 7, Appendix B). Results were also included in Appendix 2 of the CMS Report.

2) In September 1985, a vadose zone investigation was conducted on site--primarily in the pond/sump area. At EPA's request, a report containing the results and discussion of this investigation was not included in the RFI; however, boring logs and analytical results were included in Attachment 6 of the RFI. A total of 13 borings (including groundwater monitoring well MW-18) were used. Soil samples were obtained at approximately 5-foot intervals. These samples were screened using a PID to select samples for laboratory testing. A total of 126 soil samples were subsequently analyzed for TOX. The 21 samples with positive TOX detection were further tested for target VOC previously identified in groundwater samples. VOC was detected in 6 of these samples (RFI, p.82-83). Concentration isopleths were centered on the pond/sump area where most of the borings had been placed.

3) In July 1987, an extensive soil gas survey of over 100 sampling points was made. The purpose of the soil gas survey was to determine the extent and magnitude of groundwater impacts--particularly off-site (At this point in time, 25 groundwater monitoring wells had been installed on-site). The 1987 study is included in Attachment 7 of the RFI and Appendix 2 of the CMS.

4) A third soil gas survey using 63 sampling points was conducted in June 1991. The 1991 investigation covered approximately the same area as the 1987 survey. A report was included in Attachment 9 to the RFI Report and the results were included in Appendix 2 of the CMS Report. Results were discussed in the RFI, p.97 and CMS p. III-28 and III-29. The concentration pattern was consistent with previous work.

5) In April 1996, soil gas data was obtained from 13 monitoring wells screened across the water table. Soil gas samples were obtained from the monitoring wells and analyzed for VOC. The soil gas results were consistent with previous investigations. Highest soil gas concentration occurred on-site near the pond/sump area. Soil gas concentration decreased rapidly moving away from the source area and concentrations were negligible off-site. (CMS, p.III-29 - p.III-30, Appendix 2).

6) In June 1996, a vapor probe cluster was installed in the immediate vicinity of the solvent sump area. This was the first intrusive investigation in the source area since the pond/sump area had been closed and capped with pavement in 1986. The vapor probe cluster consisted of six individual probes screened at approximately 10-foot intervals down to just above the water table. Subsurface materials ranged from clay and very fine sand to scattered cobble gravel. Soil gas constituent concentrations were very high, ranging from 24,000 to 27,000 ug/l TCE (5376 to 6048 ppm_v)in a clayey zone at 30 feet bgs to approximately 9,000 ug/l (2016 ppm_v) in fine sand to cobble gravel zone at 60 feet (Soil Gas Report, p.14 & Appendix 2). These results were consistent with previous data.

7) In February 1997, 5 vapor recovery wells were installed in and around the pond/sump area. Recovery well VR-1 was installed through the center of the original solvent sump and the remaining wells were installed at varying radial distances up to 100 feet. All wells were screened from 10 feet bgs to just above the water

table (approximately 55-foot screen). During installation, headspace soil gas readings were obtained from soil samples at 5-foot intervals. Well VR-1 had the highest headspace readings of 280 ppm with the higher readings corresponding to silt/clay zones. In the remaining wells, headspace readings were in the single digit to fractional ppm range. Subsequent sampling and analysis gave consistent information with the established pattern. VOC concentrations were highest at VR-1 and dropped off an order of magnitude at a radial distance of 100 feet from the sump location (Soil Gas Report, pp.1-7, Appendix 1).

8) A soil vapor extraction (SVE) pilot test was conducted onsite in February 1997. The pilot test was conducted in VR-1 in a step manner up to a flow of 65 cfm and an extraction well vacuum of five inches of water. (Soil Gas Report, pp. 16-21, Appendix 3).

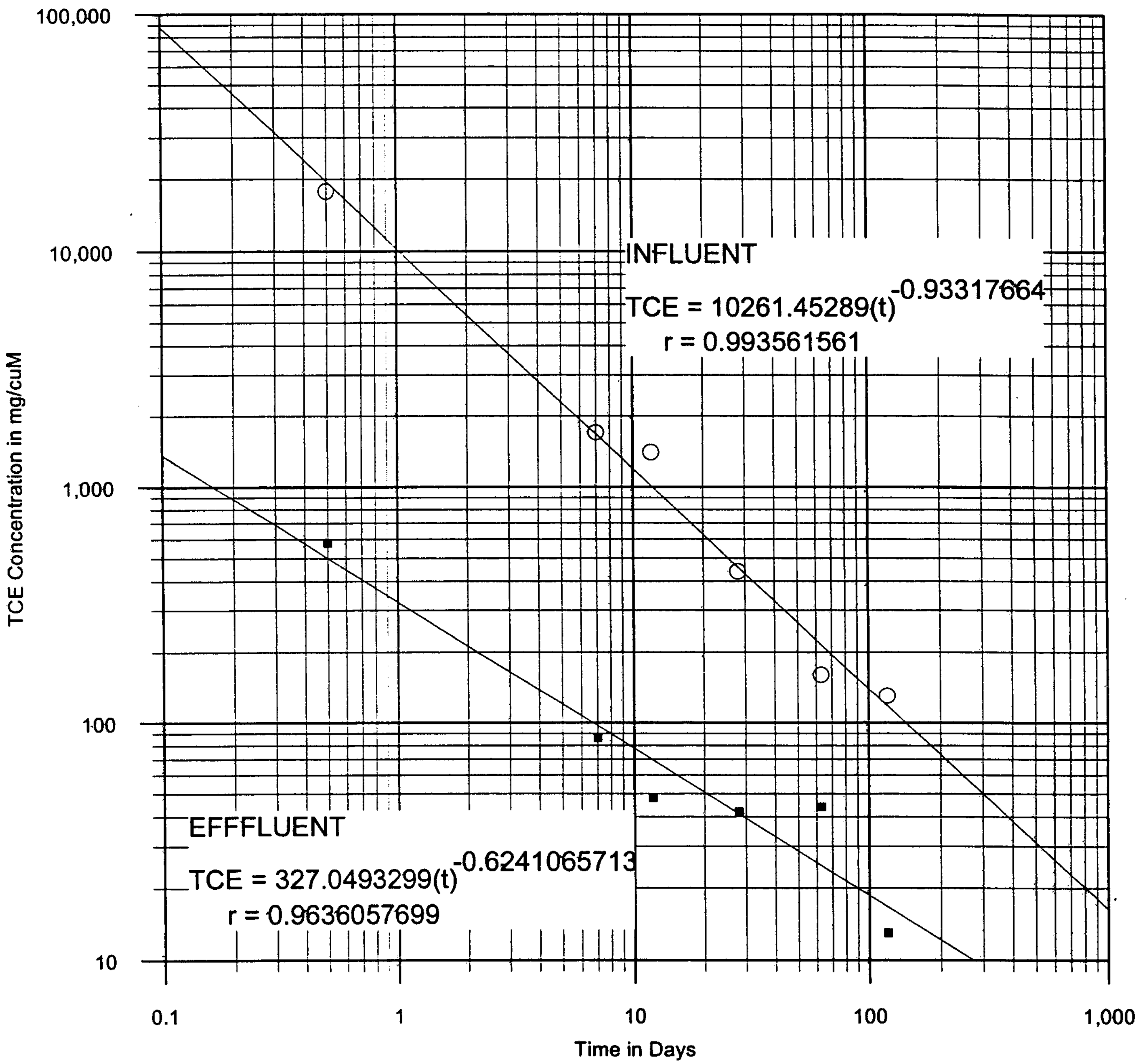
9) The RCRA Facility Investigation Report (RFI) provided a detailed soil gas characterization based on investigations completed through 1991. The RFI soil gas characterization was updated through April 1996 in the Corrective Measures Study Report (CMS). The soil gas characterization was further detailed in the June 1997 Report on Soil Gas Characterization and Vapor Extraction System Pilot Testing (Soil Gas Report) and included all soil gas information generated from 1984 through March 1997. The characterization in the latter two reports was consistent with the RFI in terms of horizontal and vertical extent; however soil gas concentration had generally decreased.

10) An AcuVac SVE system began extraction from VR-1 on April 8, 1998 at a rate of 50 cubic feet per minute (cfm). Influent sampling through August 5, 1998 showed that constituent concentrations had dropped over 2 orders of magnitude with a corresponding TCE removal rate of approximately 290 pounds. Influent constituent concentrations have dropped off exponentially with continued operation (See Figure 1). Emissions to the atmosphere were approximately 20 pounds of TCE over the same operating period.

FIGURE 1

SPARTON SVE PERFORMANCE

APRIL 8, 1998 TO AUGUST 8, 1998



ROBUST SVE SYSTEM DESIGN

Previous characterization and operation of the AcuVac SVE system to date indicate that a higher extraction rate or "robust" SVE system at well VR-1, discharging directly to the atmosphere (without treatment) can meet prevailing City/County emission requirements. AcuVac system operation at VR-1 has reduced influent concentration to the point where higher extraction can be initiated without exceeding Sparton's current air permit requirements.

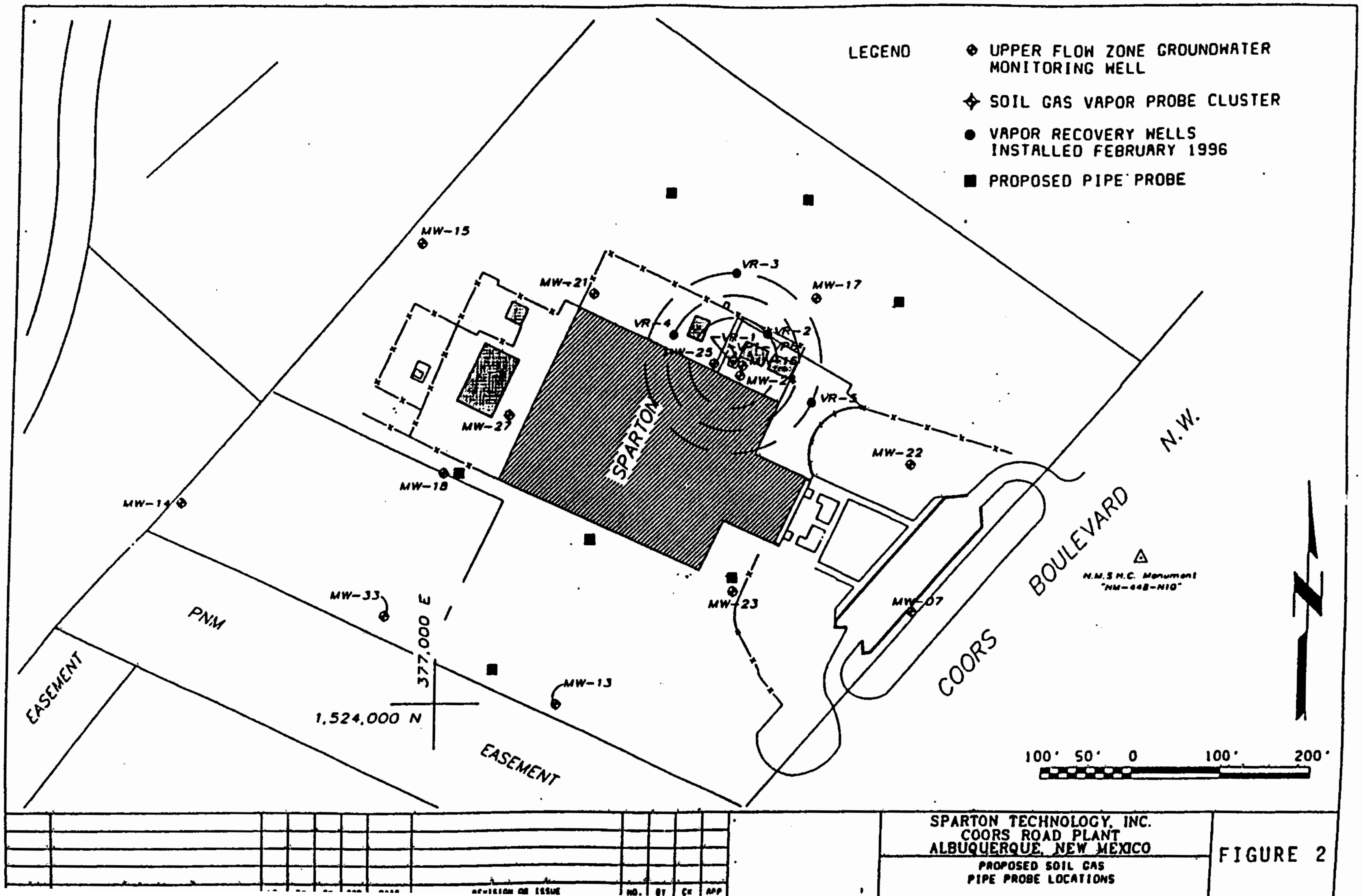
The "robust" SVE design will consist of a "packaged" blower system located at VR-1. This system will have a design flow capacity of 400 cfm at a vacuum of three inches of mercury. The system will be located close to VR-1 to minimize unnecessary friction loss. The system will be operated at either the 400-cfm flow capacity limit or the three-inches-of-mercury vacuum limit, whichever is obtained first.

Sparton may install and operate additional packaged systems at VR-1 or other locations to remediate vadose zone contamination. If locations other than VR-1 are used, the AcuVac system could be operated until influent concentrations would meet direct discharge requirements.

ADDITIONAL CHARACTERIZATION

Location. Additional characterization of soil gas will be conducted using pipe probe methodology at locations shown in Figure 2. The three probe locations north of the building are of an approximately 200-foot radial distance from the solvent sump (VR-1). The three probe locations immediately south of the building will be near existing groundwater monitoring well MW-18 and previous monitoring well MW-4 and in an accessible location near the middle of the building. A seventh probe will be located along the south property line at the 1984 Tracer Soil gas probe SG-50 location. An eighth probe will be located inside the plant building at a location approved by the EPA. The actual location of the eighth probe will be based on analyses of results, from outside the building footprint, subject to restrictions posed by current operations such as the machine shop, etc.

Figure 2


LEGEND
UPPER FLOW ZONE GROUNDWATER MONITORING WELL
SOIL GAS VAPOR PROBE CLUSTER
VAPOR RECOVERY WELLS INSTALLED FEBRUARY 1996
PROPOSED PIPE PROBE
MW-15
MW-21
VR-3
MW-17
VR-4
VR-2
MW-25
MW-24
VR-5
MW-27
SPARTON
MW-22
MW-18
MW-14
N.W.
BOULEVARD
COORS
N.M.S.H.C. Monument "NM-448-N10"
MW-33
PNM
377,000 E
MW-23
MW-07
EASEMENT
MW-13
1,524,000 N
EASEMENT
100' 50' 0 100' 200'
SPARTON TECHNOLOGY, INC.
COORS ROAD PLANT
ALBUQUERQUE, NEW MEXICO
PROPOSED SOIL GAS
PIPE PROBE LOCATIONS
FIGURE 2
REVISION OR ISSUE
NO.
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APP

Sampling/Purging. Pipe probe sampling will utilize conventional soil gas exploration methodology. A 1-1/4 inch schedule 80 steel pipe with a disposable steel drive point will be pushed or driven into the subsurface using either a 140-pound slide hammer or pneumatically driven jackhammer. Pipe-threaded couplings with teflon sealant will be used to connect pipe sections. Sampling will be conducted beginning at the ten-foot bgs, and each additional five-foot depth interval thereafter down to probe penetration refusal. If refusal occurs before thirty feet bgs, an offset location within fifteen horizontal feet of the original location will be attempted. If refusal again occurs before thirty feet bgs, a second offset will be attempted. If the second offset pipe probe installation is unable to reach thirty feet bgs, the following alternatives will be used:

- For the four locations south of the building, hollow-stem auger procedures will be used to sample to the thirty-foot depth.

- For the three locations north of the building, pipe probe data will be evaluated by Sparton, the USEPA, and NMED to see if additional measures are warranted.

- For the location inside the building, at least one soil gas sample from either the greatest depth attained or from the highest concentration depth at this location will be submitted to the laboratory. No additional measures will be taken; however, a permanent monitoring probe will be installed at the greatest depth or from the highest concentration depth reached at this location.

The drive point utilizes a commercial 1-1/4-inch drive point as commonly used to construct wellpoint water wells. The drive point is modified by installing a 1-1/4-inch by 3/4-inch bushing and a four to six-inch long 3/4-inch pipe nipple. The drive point is attached by slip-fitting the nipple into the tip of the one-and-one-quarter-inch pipe probe. After driving to the desired sampling depth, the pipe probe is retracted approximately one-inch back to allow extraction of soil gas through the end of pipe. At each sampling depth, the pipe will be purged of at least three pipe volumes. Sampling/purging procedures will be similar to that described in the Corrective Measures Study (CMS) Report, Appendix 2(b) with the exception that a second vacuum gauge will be installed at the top of the pipe probe. A copy of the procedure is included in Appendix A of this workplan. Flow rate will be adjusted at the rotameter to purge the pipe probe in approximately five to ten minutes. During purging, the extracted well gas will be screened periodically using a PID (Hnu with 10.2 eV lamp or comparable unit) calibrated in accordance with the manufacturer's procedures in Appendix B of this workplan. Probe vacuum and flow rates along with PID readings will be recorded during purge activities. At the completion of purging, a vacuum box will be used to obtain replicate samples of soil gas using new one liter tedlar bags. If conditions such as excessive vacuum and/or widely fluctuating PID measurements are encountered, sampling will be postponed until the cause has been identified and corrected. The purging/sampling procedure will be repeated at five-foot intervals down to the depth of pipe probe refusal. If field screening results are at nominal background level, no samples will be taken at that depth interval; however, at least one sample will be obtained at each probe location.

As the pipe probe is withdrawn, a relatively permanent soil gas monitoring probe will be installed at the depth corresponding to the highest field screening value. The permanent soil gas monitoring probes will consist of ½-inch Schedule 40 PVC screen and riser. If the formation does not cave around the screen, the screen will be sandpacked using a manufactured sand. Any interval below the screen will be sealed with hydrated granular bentonite. The remaining vertical interval above the screen will be sealed with 5% bentonite-cement grout to insure monitoring of a discrete depth interval. The permanent probes will be maintained until soil gas remediation goals have been met. If field screening results indicate soil gas concentrations less than 10 ppm_v, a long-screen vacuum measurement probe will be installed over all but the uppermost five feet of the penetrated interval at that location.

All investigations will be conducted in accordance with the site Health and Safety Plan.

Soil gas investigations generate little, if any, contaminated material requiring treatment/disposal. Decontamination of vapor phase generally requires only adequate purging to obtain representative samples. However, to ensure representative sample information, all pipe probe and permanent monitoring probe materials will be decontaminated prior to installation using, as a minimum, detergent wash and potable water rinse. Non-dedicated equipment, such as the steel drive pipe, will be decontaminated between each use. Materials and/or equipment outside or downstream of the pipe probe/sampling train will not require decontamination. Decontamination wash water will be either processed through the onsite air stripper system or evaporated.

<u>Sample Analysis</u>. At the completion of sampling at a given probe location, the field screening results will be reviewed. The two samples corresponding to the highest field screening results will be submitted under standard SW-846 chain-of-custody procedures to a local laboratory for analysis. If field screening results do not indicate a second vertical interval with soil gas concentration above 10 ppm_v, only the gas sample with the highest concentration will be analyzed. At least one replicate sample will be analyzed from each pipe probe showing elevated soil gas concentration. Other replicate samples will be provided to regulatory agency representatives on request.

All soil gas samples will be analyzed in the laboratory using EPA Method 8260 with constituent detection limits of 10 ug/l or less (approximately 2 ppm). Higher detection limits will be used for high-concentration samples. ~~A copy of the laboratory's QAPP is provided in Appendix C~~. QUALITY ASSURANCE PROCEDURES WILL BE IMPLEMENTED PURSUANT TO PARAGRAPH 99 OF THE CONSENT DECREE.

REPORTS

In accordance with the City Air Permit, Sparton will furnish quarterly reports on the operation of the SVE system. Information on vadose zone characterization obtained under this workplan will be combined with historical data to define the areal extent of elevated soil gas concentrations above 10 ppm_v. All soil gas results, copies of field reports, and probe installation data will be provided in a Vadose Zone Investigation Report. The report will include a mapping of the limits of elevated soil gas concentration relative to existing site features and monitoring points. Within four weeks of completion of the Vadose Zone Investigation activities, Sparton will submit the report for review and approval in accordance with the terms and conditions of the Consent Decree.

SCHEDULE

The "robust" SVE system will be installed and operated within 90 days after the effective date of the Consent Decree and will be operated for a total combined actual operating time of one year. The total combined operating time of one year shall be completed within eighteen months of initial startup. After completion of one year of actual operation, the "robust" system will be shut off for a period of three months. After the three-month shutoff period, two consecutive months of performance monitoring sampling will be conducted to determine if the 10 ppm_v level has been achieved. The following soil gas probes and groundwater monitoring wells will be utilized for performance monitoring sampling:

Soil gas probes VR-1, VR-2, VR-4, VR-5, VP-1, VP-2, VP-3, VP-4, VP-5, VP-6, VP-8, VP-9, VF-10, VP-11, and VP-14.

Groundwater monitoring wells MW-7, MW-13, MW-15, MW-17, MW-18, and MW-21.

If VR-3, VP-7, VP-12 and/or VP-13 have not been removed by the construction of the Rapid Infiltration Ponds at the time of the first or second performance monitoring sampling event, they will also be sampled.

If the soil gas concentration in samples from groundwater monitoring wells can be demonstrated to represent "off-gassing" from the water table surface, the data will not be included in the 10 ppm_v performance level evaluation.

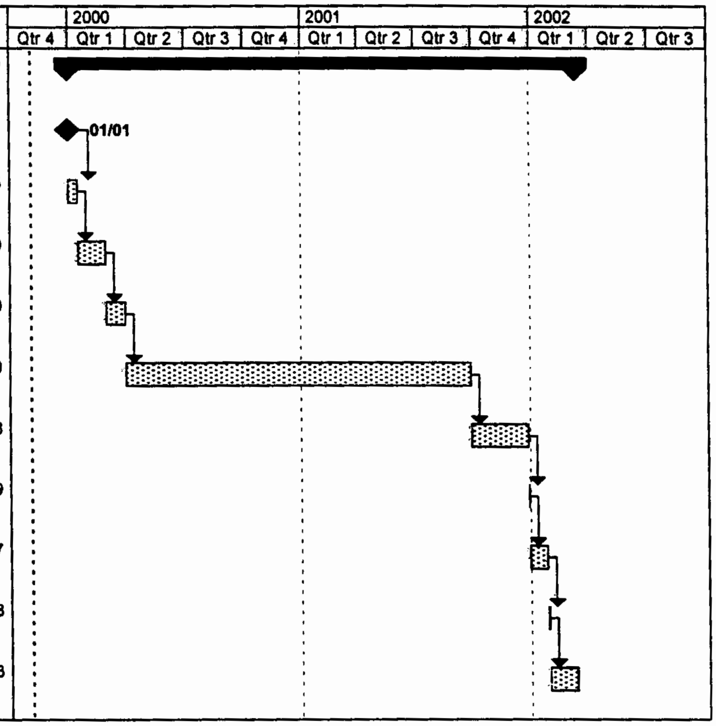
A report containing the performance monitoring sampling results shall be submitted to EPA and NMED in accordance with the Consent Decree within 45 days after the last performance monitoring sampling event. If any monitoring points indicate contaminant levels above 10 ppm_v, the above report shall contain a plan which will propose a schedule of additional SVE operation.

A schedule for conducting the additional vadose zone characterization and for designing and implementing the "robust" SVE system modifications is given in Figure 3.

FIGURE 3

Soil Vapor Extraction Schedule

ID		Task Name	Dur	St	fin
1		**Soil Vapor Extraction System**	**803 d**	**01/01**	**03/13**
2		Consent Decree Signed	0 d	01/01	01/01
3		Approve Eqpt. Order	15 d	01/01	01/15
4		Procure Eqpt	45 d	01/16	02/29
5		Install Blower and Test	30 d	03/01	03/30
6		Operate 400 CFM on VR-1	548 d	03/31	09/29
7		Let System Equilibriate	90 d	09/30	12/28
8		First Soil vapor sample	1 d	12/29	12/29
9		Let System Equilibriate	29 d	12/30	01/27
10		Second soil vapor sample	1 d	01/28	01/28
11		Prepare Performance Monitoring Report	44 d	01/29	03/13



APPENDIX A

Pipe Probe Vapor Sampling Procedure

PIPE PROBE VAPOR SAMPLING PROCEDURE

Calibrate PID in accordance with the manufacturer's procedure. Test and/or calibrate PID between probes. Record background level at each probe location prior to purging/sampling.

After the probe has been retracted to expose the end of the pipe for purging/sampling, install the probehead fitting (vacuum gauge (0-60 inches water), 1/8-inch hose barb and control valves). Connect the hose barb to the vacuum sampling box inlet with new vinyl tubing. The vacuum box outlet will be connected to a vacuum source. Flow through the sampling train will be controlled by a regulating valve and rotameter type flow meter down stream of the vacuum box. The sampling train components will be arranged in similar fashion to that previously used for monitor well and vapor probe sampling--see accompanying sketch.

A bentonite slurry seal will be placed at the ground surface while soil vapor probes are being purged and sampled. The slurry will prevent the potential for atmospheric air being drawn into the sampling train during purging and sampling. The placement of the slurry seal is noted in the attached figure.

During initial stages of purging, the sampling train will be leak tested by closing the probehead valves and verifying that the rotameter flow rate drops to zero and vacuum increases.

PID readings will be obtained by periodically closing the rotameter valve and opening the valve at the PID sampling port. Rotameter flow rates, vacuum readings, purge duration, purge volume, and PID readings will be recorded.

When at least three probe volumes have been purged and PID readings are relatively stable, sampling will be commenced. If conditions such as excessive vacuum and/or widely fluctuating PID measurements are encountered, sampling will be postponed until the cause has been identified and corrected. The probehead valve will be closed and the 1/8-inch vinyl sampling tubing will be crimped to prevent backflow and a new 1-liter Tedlar bag will be connected inside the vacuum sampling box. The crimping of the vinyl tube will allow only about three-inches of 1/8-inch tubing to be exposed to atmosphere while attaching the bag. This is a minuscule amount compared to the volume of the bag. The box will be closed, probehead valve opened, and vacuum applied to the outlet to fill the Tedlar bag. After the Tedlar bag is filled, it will be removed from the vacuum sampling box, labeled, and placed in a cooler. The probehead fitting will be decontaminated with detergent wash and potable water rinse and the vinyl sampling tube disposed.

Owner SPARTON TECHNOLOGY, INC Computed By PLC
Plant ALBUQUERQUE Unit COORS Date 11/25 1998
Project No. File No. Verified By
Title Date 19
Page 1 of 2

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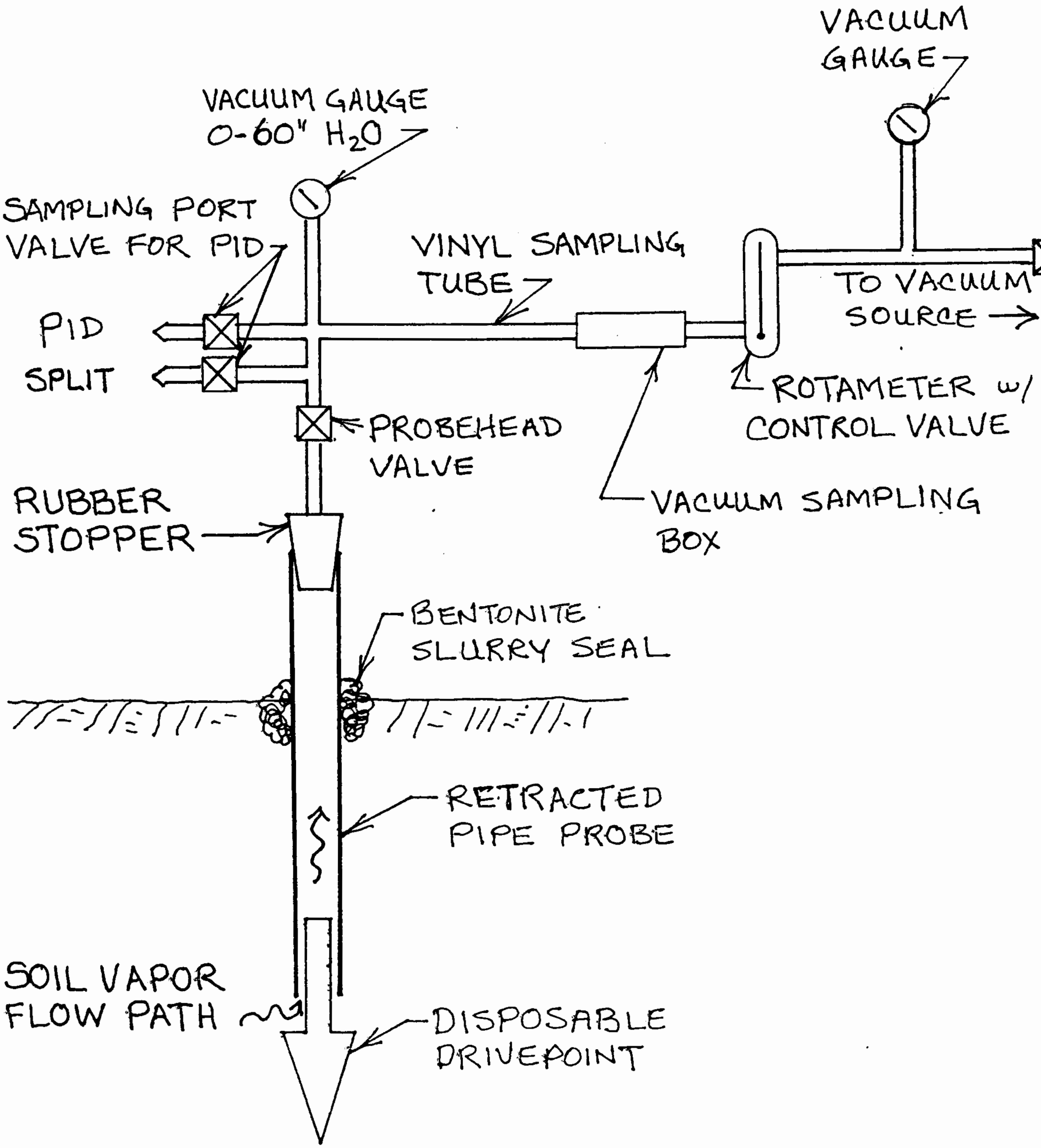
PIPE PROBE VAPOR SAMPLING TRAIN



PGN-172B

REVISED, SUPERSEDED, AND VOID CALCULATIONS MUST BE CLEARLY IDENTIFIED

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Owner SPARTON TECHNOLOGY INC Computed By PLC

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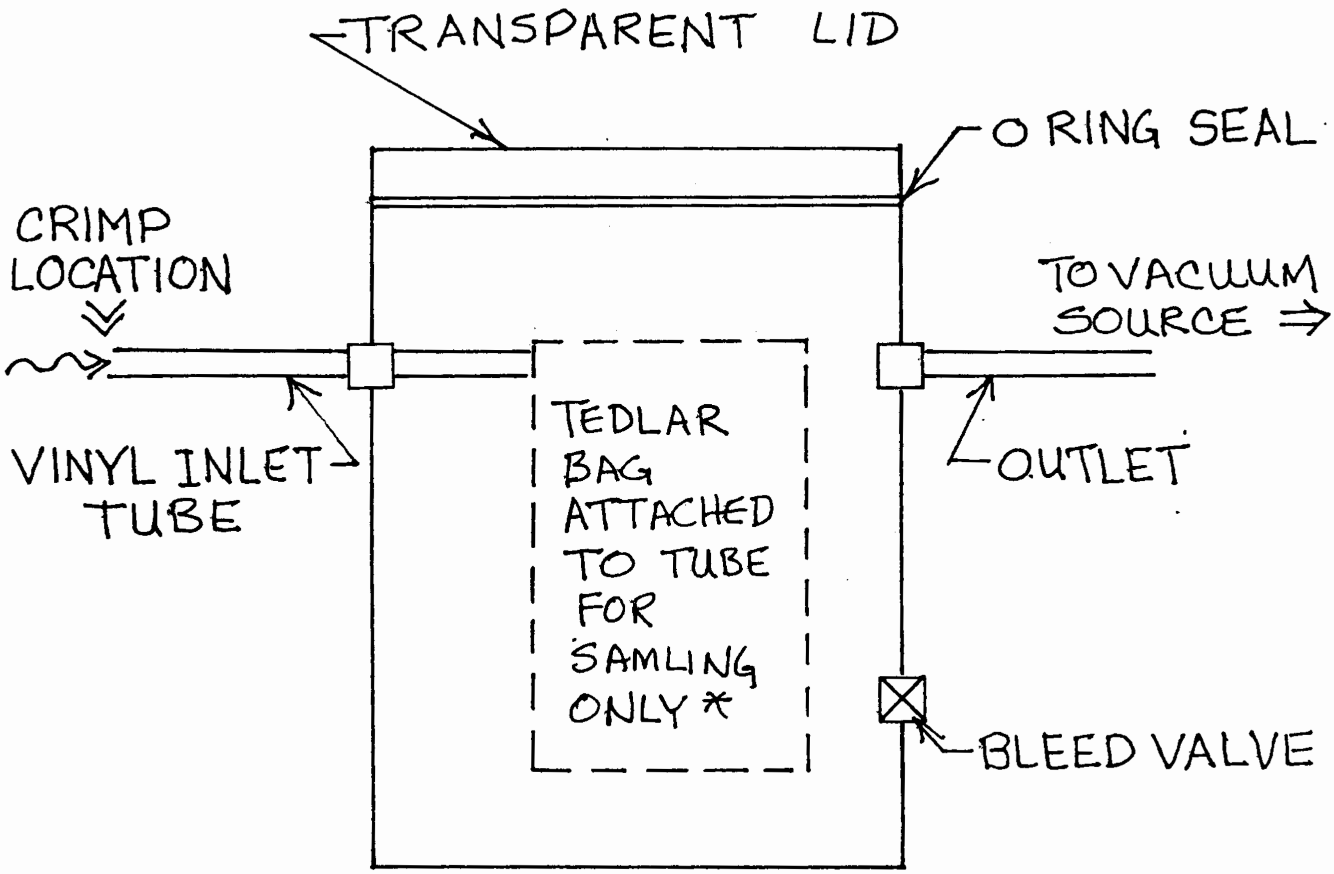
VACUUM BOX DETAIL



* NOTE: DURING PURGING, FLOW IS THROUGH BOX

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APPENDIX B

PID Calibration Procedure

INSTRUCTION MANUAL S/N 701346

5.0

Hess

MODEL PI 101

Portable Photoionization Analyzer

hnu

SECTION 3

CALIBRATION

3.1 INTRODUCTION

The PI 101 Analyzer is designed for trace gas analysis in ambient air and is calibrated at HNU with certified standards of benzene, vinyl chloride and isobutylene. Other optional calibrations are available (e.g., ammonia, ethylene oxide, H2S, etc.). Calibration data is given in the data sheet. If a special calibration has been done, the data is given in the Application Data Sheet, which notes the sample source, type of calibration (see Section 8, Appendix), and other pertinent information.

Good instrumentation practice calls for calibration on the species to be measured in the concentration range to be used. This procedure assures the operator that the analyzer is operating properly and will generate reliable data.

Some general points to consider when calibrating the PI 101 are that the analyzer is designed for operation at ambient conditions and therefore the gas standards used for calibration should be delivered to the analyzer at ambient temperatures and pressure and at the proper flow rates.

WARNING:

The PI 101 is a non-destructive analyzer; calibrations using toxic or hazardous gases must be done in a hood.

The frequency of calibration should be dictated by the usage of the analyzer and the toxicity of the species measured. If the analyzer has been serviced or repaired, calibration should be done to verify operation and performance. It is recommended that calibration be checked frequently at first (daily or every other day) and then regularly based on the confidence level developed.

The normal meter scaleplate is 0 to 20. If the scaleplate is different, refer to the Application Data Sheet. If there are questions, consult the HNU representative before proceeding with calibration check.

An accurate and reliable method of calibration check is to use an analyzed gas cylinder in a test setup as shown in Figure 3-1 and described below. Additional material on calibration is given in Section 8, Appendix.

3.2 ANALYZED GAS CYLINDER

a. Concentration - The calibration gas cylinder is to contain the species of interest made up in an air matrix at or near the concentration to be analyzed. If the component is unstable in air, another matrix is to be used. The final calibration mixture should be similar to the sample the PI 101 will analyze. If the expected concentration is not known then a concentration should be chosen that will cause a scale displacement of 50 to 80% on the X10 range. Calibration on X10 range will provide accurate values on the X1 range as well.

For use on the 0-2000 range, a two-standard calibration is preferred: one at 70 to 85% of the linear range and the other at 25 to 35% of the linear range. With the linear range of approximately 600 ppm for most compounds these points would lie between 420 to 510 ppm and 150 to 210 ppm, respectively.

b. Stability - The calibration gas must be stable within the cylinder during the period of use. If the calibration is required in the field, then use of a small cylinder is recommended. In addition, the choice of cylinder material in contact with the gas must be considered (steel, aluminum or teflon). If there are any questions, the operator should request stability and usage information from the gas supplier.

WARNING

Extreme care must be taken in the handling of gas cylinders. Contents are under high pressure. In some cases, the contents may be hazardous. Many gas suppliers will provide data sheets for the mixtures upon request.

c. Delivery - The cylinder containing the calibration mixture must be connected to a proper regulator.

WARNING

Never open the valve on a gas cylinder container without a regulator attached.

Leak test all tank/regulator connections as well as the main cylinder valve to prevent toxic or hazardous materials from leaking into the work area. Care must be taken that the materials of construction of the regulator will not interact with the calibration gas.

One method of sampling the calibration gas is illustrated in Figure 3-1. Connect the cylinder to one leg of the tee, a flow meter to the opposite leg, and the probe to the third leg. The flow meter does not require a valve. If there is a valve, it must be left wide open. the flowmeter is only to indicate excess flow. Adjust the flow from the regulator such that only a little excess flow is registered at the flowmeter.

This insures that the PI 101 sees the calibration gas at atmospheric pressure and ambient temperature.

d. Usage - Generally, a gas cylinder should not be used below 200-300 psi as pressure effects could cause concentration variations. The cylinder should not be used past the recommended age of the contents as indicated by the manufacturer. In case of difficulty, verify the contents and concentration of the gas cylinder.

e. Alternate means of calibration are possible. For more information, contact the HNU Service Department.

3 PROBE

a. Identify the probe by the lamp label. If a question exists, disassemble the probe and inspect the lamp. The energy of the lamp is etched into the glass envelope.

b. Connect the probe to the readout assembly, making sure the red interlock switch is depressed by the ring on the connector.

c. Set the SPAN pot to the proper value for the probe being calibrated. Refer to the calibration memo accompanying the probe.

d. Check the Ionization Potential (IP) of the calibration gas to be used. The IP of the calibration gas must be at or below the IP of the lamp.

e. Proceed with the calibration as described in Section 3.4. Check the calibration memo for specific data. If any questions develop, call the HNU representative.

f. NOTE: The 11.7eV lamp has a special cleaning compound. Do not use water or any other cleaning compound with the 11.7 eV lamp. Do not interchange ion chambers, amplifier boards or lamps between probes. (See Section 5.2).

.4 PROCEDURE

a. Battery check - Turn the function switch to BATT. The needle should be in the green region. If not, recharge the battery.

b. Zero set - Turn the function switch to STANDBY. In this position the lamp is OFF and no signal is generated. Set the zero point with the ZERO set control. The zero can also be set with the function switch on the X1 position and using a "Hydrocarbon-free" air. In this case "negative" readings are possible if the analyzer measures a cleaner sample when in service.

c. 0-20 or 0-200 range - For calibrating on the 0-20 or 0-200 range only one gas standard is required. Turn the function switch to the range position and note the meter reading. Adjust the SPAN control setting as required to read the ppm concentration of the standard. Recheck the zero setting (step b.). If readjustment is needed, repeat step c. This gives a two-point calibration; zero and the gas standard point. Additional calibration points can be generated by dilution of the standard with zero air if desired (see Section 8).

d. 0-2000 range - For calibrating on the 0-2000 range, use of two standards is recommended as cited in Section 3.2a. First calibrate with the higher standard using the SPAN control for setting. Then calibrate with the lower standard using the ZERO adjustment. Repeat these several times to ensure that a good calibration is obtained. The analyzer will be appoximately linear to better than 600 ppm, (see Figure 3-2). If the analyzer is subsequently to be used on the 0-20 or 0-200 range, it must be recalibrated as described in steps b. and c. above.

e. Lamp cleaning - If the span setting resulting from calibration is 0.0 or if calibration cannot be achieved, then the lamp must be cleaned (see Section 5.2).

f. Lamp replacement - If the lamp output is too low or if the lamp has failed, it must be replaced (see Section 5.3).

3.5 CALIBRATION CHECKING

Rapid calibration checking in the field can be accomplished by use of a small disposable cylinder containing isobutylene. Immediately after a calibration has been completed, a reading is taken on a special isobutylene standard. This provides a reference concentration measurement for later checking in the field. This can be done at any time with a portable cylinder containing this same special standard, using this reference reading as a check, and making adjustments to the analyzer if necessary. In effect, this is an indirect method of calibration, one maintaining the calibration to give direct readings for the original gas mixture, but using the portable isobutylene cylinder. Details are given in Section 8.2 of the Appendix.

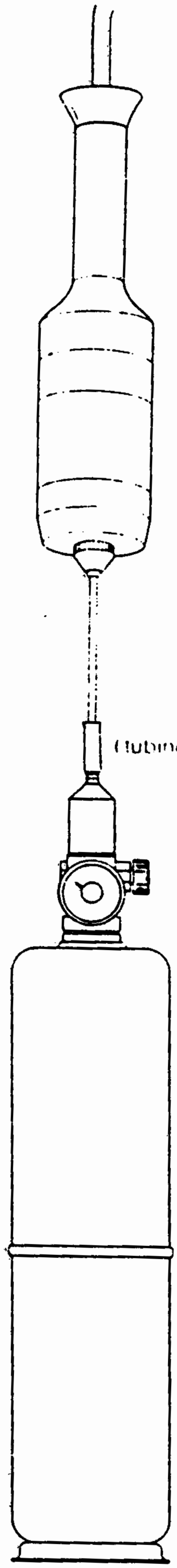
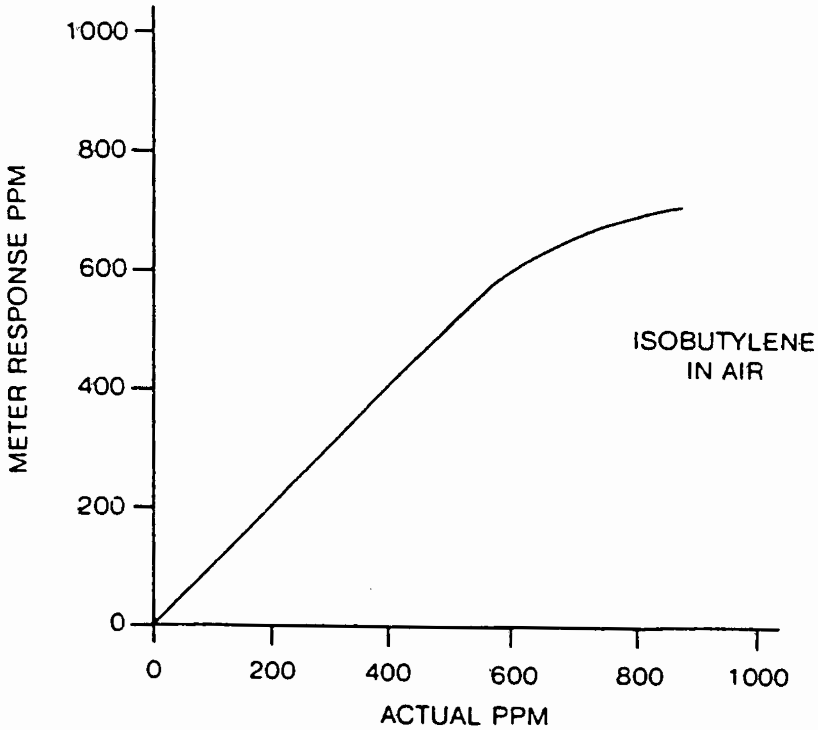


FIGURE 3-1
CALIBRATION TEST SET UP


1000
800
600
400
200
0
METER RESPONSE PPM
ISOBUTYLENE
IN AIR
0
200
400
600
800
1000
ACTUAL PPM

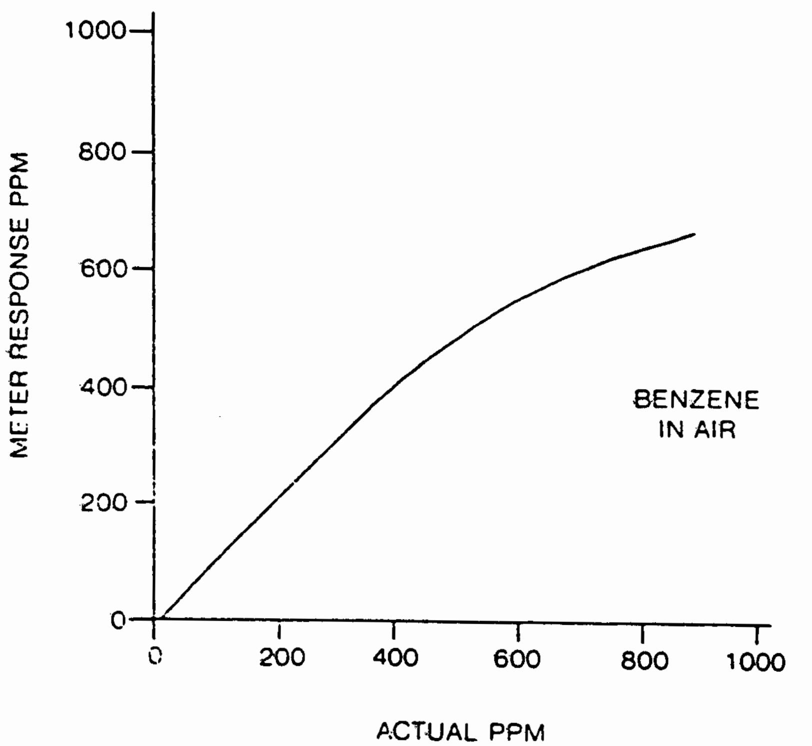

1000
800
600
400
200
0
METER RESPONSE PPM
BENZENE
IN AIR
0
200
400
600
800
1000
ACTUAL PPM

FIGURE 3-2

ATTACHMENT F

WORK PLAN
FOR THE INSTALLATION OF
A SOURCE CONTAINMENT SYSTEM

Prepared For:

SPARTON TECHNOLOGY, INC.
Coors Road Facility
Albuquerque, New Mexico

Prepared By:

S. S. PAPADOPULOS & ASSOCIATES, INC.
Environmental & Water-Resource Consultants

7944 Wisconsin Avenue, Bethesda, Maryland 20814-3620 • (301) 718-8900

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LIST OF FIGURES

1.0 INTRODUCTION

Sparton Technology, Inc. (Sparton) is currently operating an on-site groundwater recovery system at its Coors Road Facility in Albuquerque, New Mexico. The system consists of eight shallow monitoring wells completed across the water table (referred to as the Upper Flow Zone or UFZ) and which were converted to recovery wells; the water recovered from these wells is treated by an on-site air stripper and the treated water is discharged into the City of Albuquerque sewer system. In addition, Sparton operated an on-site soil vapor extraction (SVE) system between April and October, 1998 to reduce contaminant concentrations in the vadose zone, and has recently proposed additional investigations aimed at obtaining data for implementing a modified SVE system (see Attachment E - Vadose Zone Investigation Workplan).

In this Work Plan, Sparton proposes to replace these eight shallow on-site recovery wells with a deeper source containment well installed immediately downgradient of the site and pumping at a rate of 50 gallons per minute (gpm). The water pumped by the well will be treated in an air stripper to be installed on-site and it is anticipated it will be returned to the aquifer through a series of rapid infiltration ponds.

The purpose of this Work Plan is to present details on the design of this source containment system, to describe a groundwater investigation that will be conducted to confirm that all on-site sources are contained by the system, and to describe the procedures that will be used to determine the capture zone of the source containment well.

2.0 SITE CONDITIONS

Trichloroethylene (TCE) is the primary volatile organic constituent at the site, and it can be used as an indicator parameter to determine the extent and distribution of contaminants at the site. The distribution of TCE concentrations on the Sparton property, based on a current evaluation of available water-quality data, is shown in Figure 1. This figure was prepared by interpolating logarithmically the TCE concentrations measured in monitoring and recovery wells in January and February 1998; for wells which were not sampled at that time, the most recent available measurement prior to that time was used. The figure represents an horizontal projection of the TCE distribution based on data from wells open either to the UFZ or to the LFZ; at monitoring well cluster locations, data from the well with the highest concentration at that cluster was used, regardless of its depth. As shown in Figure 1, near the center of the property there is an area where TCE concentrations exceed 5,000 μg/l. The concentrations in monitoring wells within this area are close to one percent of the effective solubility of TCE, and suggest the potential presence of sources within this area[1].

The vertical distribution of TCE concentrations near the northwestern boundary of the Sparton property, also based on a current evaluation of available January and February, 1998 water-quality data, is shown in Figure 2. As shown on this figure, TCE concentrations along the northwestern property boundary are relatively low near the water table; the highest concentrations, and hence the greatest mass discharge across this boundary, occur at depths of about 20 to 40 feet below the water table.

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[1] Pankow, J. F. and J. A. Cherry, 1996, *Dense Chlorinated Solvents and other DNAPLs in Groundwater:* Waterloo Press, Portland, Oregon.

Water-level contours, based on January 1998 measurements in wells open to the LFZ, and the average direction of groundwater flow across the Sparton property are shown in Figure 3. The hydraulic gradient across the property, calculated from these contours, is 0.00465 foot per foot. The transmissivity of the aquifer underlying the property has been previously estimated to be 18,000 gallons per day per foot (gpd/ft), or 2,400 feet squared per day (ft^2/d), from a pumping test conducted on well PW-01 (see Figure 3 for well locations).

As stated earlier, the water pumped by the proposed 50-gpm source containment well will be treated and it is anticipated it will be returned to the aquifer through a series of rapid infiltration ponds. To obtain data for the design of these ponds, a series of vertical permeability tests were recently conducted by Metric Corporation[2]; the tests were conducted at a depth of 1.5 feet near the northeastern boundary of the Sparton property using the "Designation E-18" method of the Bureau of Reclamation[3]. The results of these tests indicate an average vertical hydraulic conductivity of about 180 feet per year (0.5 feet per day).

These available data were used in the design of the proposed source containment well and of the associated rapid infiltration ponds.

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[2] Gary L. Richardson of Metric Corporation, personal communication, July 21, 1998.

[3] U. S. Department of Interior, Bureau of Reclamation, 1974, *Earth Manual*: A Water Resources Technical Publication, Second Edition.

3.0 SOURCE CONTAINMENT WELL AND ASSOCIATED FACILITIES

The proposed location of the source containment well is shown in Figure 4. This proposed location is within an 80-foot easement on a property owned by Adobe Wells Partnership; therefore, installation of the well at this location is subject to reaching an agreement with Adobe Wells Partnership on an easement to install the well and a pipeline between the well and the treatment facilities on the Sparton property. Sparton will make best efforts, including the payment of reasonable sums of money, to obtain the required access from the Adobe Wells Partnership within 30 days of the effective date of the Consent Decree. If Sparton is unable to obtain the required access within 30 days, it will promptly notify the Plaintiffs in writing. This notification will include a summary of the steps Sparton has taken in attempting to obtain access, and will request Plaintiffs assistance in obtaining the required access. Plaintiffs may, as they deem appropriate, assist Sparton in obtaining access. If Plaintiffs assist Sparton in obtaining access, Sparton will reimburse Plaintiffs for all reasonable costs, direct or indirect, incurred by Plaintiffs in obtaining such access, including, but not limited to, the cost of attorney time and the amount of monetary consideration or just compensation paid. If Plaintiffs give notice to Sparton that they have not obtained access, then, no later than 30 days after receiving such notice, Sparton will submit to Plaintiffs for review an alternate method of source containment which is feasible in light of the inability to access the Adobe Wells Partnership property.

The proposed source containment well will be completed with 4-inch nominal diameter casing and screen; the screened interval will extend from the water table to a depth of 50 feet below the water table.

It is anticipated that after treatment, the water pumped from the source containment well will be discharged into three of six rapid infiltration ponds located within an approximately 3.6-acre fenced area within and along the northeastern boundary of the Sparton property (see Figure 4). The six ponds cover an area of about 2.2 acres and each pond is designed to accept one third of the 50-gpm discharge of the source containment well, or about 17 gpm; thus, at any given time three ponds will be utilized to discharge the treated-water. This six-pond design provides flexibility for switching between ponds for rehabilitation, maintenance and repair operations. To allow for the potential partial clogging of the pond bottoms during the operation of the ponds, a vertical hydraulic conductivity equal to 20 percent of the field-determined value was assumed in their design[3]. As also shown in Figure 4, the air stripper (a new 50-gpm air stripper) will be installed within the fenced area and the existing control building will also be moved into this area.

4.0 PREDICTED CAPTURE ZONE OF THE SOURCE CONTAINMENT WELL

The predicted areal limit of the capture zone of the proposed 50-gpm source containment well is shown in Figure 5. As its name implies, the goal of the proposed source containment well is to contain potential on-site sources, by substantially achieving the capture zone depicted in Figure 5, and eliminate the continuous release of contaminants from these potential source areas. With the potential sources under control, constituents remaining outside the limit of the capture zone will be flushed out by naturally flowing groundwater and by water infiltrating from the ponds, and will eventually be captured by the off-site containment well.

The depicted capture zone of the well was predicted using the transmissivity and hydraulic gradient values mentioned in Section 2.0 and the software AqModel[4]. The effects of the infiltration ponds were incorporated into this analysis by simulating each pond by multiple injection wells. Based on pan evaporation data from the Los Lunas Experiment Farm near Albuquerque, the evaporation rate from the ponds was calculated as 4.3 feet per year[5]; this approximately corresponds to a five percent evaporation loss[6] from the ponds and it was taken into account in simulating the pond effects. As shown in Figure 5, the analysis indicates that recharge from the infiltration ponds will cause the capture zone to be somewhat skewed with respect to the average direction of groundwater flow. It is also predicted that there will be a slight change in the limit of the capture as discharge of the treated water is switched from one three-pond set to the other; however, the width of the capture zone along the northwestern property boundary will remain essentially the same,

[4] O'Neill, G. T., 1992, *AqModel Version 2.1 User's Manual*: WellWare™, 3160 Woods Circle, Davis, California 95616

[5] Gary L. Richardson of Metric Corporation, personal communication, July 22, 1998.

[6] Sparton is currently evaluating cost-effective ways to further reduce this evaporative loss.

about 480 feet. The vertical projection of this predicted width of the capture zone along the property boundary is shown in Figure 6, superimposed on the current vertical distribution of TCE concentrations. Based on these TCE concentrations, the mass of TCE to be captured by the source containment well is calculated to be about 85 percent of the TCE mass currently leaving the Sparton property across this boundary.

The predicted horizontal and vertical extent of the capture zone presented in Figures 5 and 6 are based on calculations that assume a well fully penetrating the saturated interval corresponding to the transmissivity of 18,000 gpd/ft (2,400 ft^2/d). Because the proposed source containment well will be partially penetrating this interval, its capture zone could be wider and shallower[7].

After the source containment well is put into operation, pumpage from the existing on-site shallow recovery wells will be discontinued. Recovery wells, and/or shallow monitoring wells, which become dry due to the lowering of the water table, and are not useful as monitoring or extraction locations for the SVE system, will be plugged and abandoned in accordance with Attachment A - Ground Water Monitoring Program Plan (Monitoring Plan), or in accordance with other applicable regulations.

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[7] Bair, Scott E. and Terry D. Lahm, 1996, *Variations in Capture-Zone Geometry of a Partially Penetrating Pumping Well in an Unconfined Aquifer*, Ground Water, v. 34, no. 5, pp 842-852.

5.0 EVALUATION OF CONTAINMENT SYSTEM PERFORMANCE

The criteria and procedures that will be used to evaluate the performance of the source containment system will be similar to those that have been proposed for the evaluation of the performance of the off-site containment system (see Attachment C). Pumping-rate and water-level data for these evaluations will be collected in accordance with the Monitoring Plan. The capture zone of the well will be determined from water-level data and will be compared to the predicted capture zone (see Figure 5) and the extent of the potential source areas. Water-quality data will be also evaluated to determine whether they provide information on the performance of the containment system. If the actual capture zone is smaller or oriented differently than the predicted capture zone, an evaluation will be made to determine whether any potential sources exist outside the capture zone of the well. If there are potential sources outside the capture zone of the well, then an evaluation will be made to assess whether additional measures are required. Notwithstanding the extent of the source areas, the pumping rate of the well will be at least 50 gpm, unless the concentration of site-related contaminants within the capture zone are reduced below the more stringent of the Maximum Contaminant Levels (MCLs) for drinking water established under the Safe Drinking Water Act or the maximum allowable concentrations in groundwater set by the New Mexico Water Quality Control Commission (NMWQCC) or such alternate clean-up standards as may be approved by the United States Environmental Protection Agency (USEPA) or NMWQCC.

After the start-up of the source containment system, Sparton will evaluate the performance of the system at six months, one year, and annually thereafter. The results of these evaluations will be reported in the site's Annual Reports which will also include all other site-related data and evaluations. (A list of information, data, assessments and evaluations, and specific subjects that will be presented and/or discussed in the Annual Reports is given in Attachment D - Work Plan for the Assessment of Aquifer Restoration.)

6.0 GROUNDWATER INVESTIGATION

The proposed source containment system has been designed to contain all potential on-site source areas that have been defined on the basis of the available water-quality data. To confirm that there are no other on-site sources outside the capture zone of the containment system, additional groundwater investigation will be conducted. This groundwater investigation will consist of the installation and sampling of a new monitoring well. The new monitoring well will be located along the northwest boundary of the Sparton property, at the midpoint between existing monitoring wells MW-15 and MW-42/43, as shown in Figure 7.

The well will be installed by drilling a 7.5-inch hole to the top of a clayey, finer-material layer that has been encountered in monitoring wells MW-49 and MW-70 at a depth of about 120 feet. The drill cuttings will be examined to identify the most permeable materials within 30 feet above the top of the clayey layer and within 40 feet below the water table, and a 10-foot interval will be selected across these most permeable materials for the completion of the well. If this interval is above the top of the clayey layer, and the clayey layer has not been breached during drilling, the hole will be backfilled to the bottom of the completion interval with 3/4-inch granular bentonite. If the clayey layer has been breached, the hole will be grouted with a bentonite/cement grout, and a new hole will be drilled nearby to the bottom of the completion interval, as determined from the first hole. A 2-inch nominal diameter casing and screen assembly, with 10-foot screen, will be installed into the hole, the well will be naturally or artificially gravel packed across the screened interval, and completed by filling the annular space above the gravel pack with a bentonite/cement grout to the land surface.

After completion and development, the well will be surveyed to determine its location coordinates and the elevation of the top of casing, and will be sampled using the procedures specified in the Monitoring Plan. The sample will be analyzed for VOC's, particularly TCE, using the analytical method specified in the Monitoring Plan. The results of this initial sampling event will be reported in a letter report which will be prepared within four weeks after the sampling of the well. In addition to the results of the sampling and supporting documentation, this report will include the drilling and completion log of the well, a revised TCE isoconcentration cross-section along the northwest boundary of the site and a revised TCE isoconcentration map for the on-site area and its vicinity, and the action that will be taken in response to the sampling results.

The action to be taken in response to the sampling results will be as follows. If the TCE concentration in the sample is less than or equal to 1,000 μg/l, the well will be designated as a piezometer (PZ-2); the Monitoring Plan will be updated to include this piezometer in the list of wells that will be monitored quarterly for water levels (see Table 4-1 of Monitoring Plan). No further sampling of the well will be required. However, if the TCE concentration in the sample from the well is higher than 1,000 μg/l, the well will be designated as a monitoring well (MW-72), and in addition to being monitored quarterly for water levels, it will be sampled semi-annually for a period of five years. The samples will be analyzed for VOC's, and the Monitoring Plan will be updated to reflect the above stated sampling frequency and period, and the analytical constituents for this monitoring well.

The water quality data to be collected from the well, and annual evaluations of these data will be included in the site's Annual Reports. After five years of data collection, Sparton will submit a Source Containment Investigation Report presenting the results of the investigation and discussing whether the source containment system needs to be modified.

7.0 INSTALLATION OF SOURCE CONTAINMENT SYSTEM

The source containment well and the new monitoring well will be installed in accordance with the design presented in this Work Plan, following procedures similar to those employed for the installation of the off-site containment well and of other monitoring wells at the site and its vicinity. Drill cuttings and liquid wastes will be disposed of in accordance with the RCRA Facility Investigation Work Plan[8]. Implementation of this Work Plan will begin immediately upon the effective date of the Consent Decree. The installation of the source containment well is included in the existing Health and Safety Plan; the plan will be revised, however, to include also the installation of the new monitoring well.

Documents related to the installation of the source containment system are discussed in the following sections.

7.1 Design Plans and Specifications

Site plans, architectural plans (where appropriate) for the source containment system, specifications for equipment and materials as needed for the construction of this system by licensed contractors, description of necessary permits, schedule for obtaining the necessary permits, and copies of applications for necessary permits will be submitted within three months of the effective date of the Consent Decree. Appendices will include design data (tabulations of significant data used in the design effort), equations (sources for major equations used in the design process will be listed and described), sample calculations, and laboratory or field test results. Sparton will be solely

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[8] Harding Lawson Associates, 1988, *RCRA Facility Investigation Work Plan, Sparton Technology, Inc., Coors Road Facility, Albuquerque, New Mexico*: December 29, revised March 3, 1989.

responsible for the performance of the source containment system and for obtaining and maintaining all required permits and authorizations. If Sparton does not obtain the necessary permits to implement the source containment system within the time provided in the schedule, which is estimated to be twelve months, Sparton will propose an alternative method for disposing of the treated water. The alternative method which will be proposed by Sparton will be one which will minimize any delay in construction and operation of the source containment system.

7.2 Construction Work Plan

A Construction Work Plan will be submitted, within three months after the issuance of all permits necessary for the source containment system, for review and approval in accordance with procedures set forth in the Consent Decree. This Work Plan will identify the Project Manager, present the Project Schedule, and discuss construction contingency procedures. All construction work will be performed by licensed contractors and completed in accordance with the Project Schedule.

7.3 Health and Safety Plan

Construction of the source containment system, other than the containment well, will not involve potential exposure to hazardous substances; therefore, a Health and Safety Plan is not required for this work.

7.4 Construction Completion Report

Within three weeks after completion of construction, Sparton will provide a certification from a registered professional engineer that the system has been constructed in substantial compliance with the design plans and specifications.

8.0 OPERATION AND MAINTENANCE PLAN

Sparton will prepare an Operation and Maintenance Plan (O&M Plan) which will to describe operation and maintenance management (including a thirty-day notice of any change by Sparton of personnel assigned to this matter), a complete set of "as built" drawings, normal operation and maintenance procedures, replacement schedules, waste management practices, and contingency plans in the event of breakdowns or operational failures. A preliminary O&M Plan will be submitted for review and approval, in accordance with procedures set forth in the Consent Decree, within four weeks after the beginning of continuous operation of the source containment system. The final O&M Plan will be developed during the first year of operation, and will be submitted for review and approval, in accordance with procedures set forth in the Consent Decree, at the end of the first year.

A revised Health and Safety Plan will also be submitted for review and approval, in accordance with procedures set forth in the Consent Decree, with the preliminary O&M Plan to address all activities involving potential exposure to hazardous substances during the operation of the systems, as required by OSHA 29CFR1910.120.

FIGURES

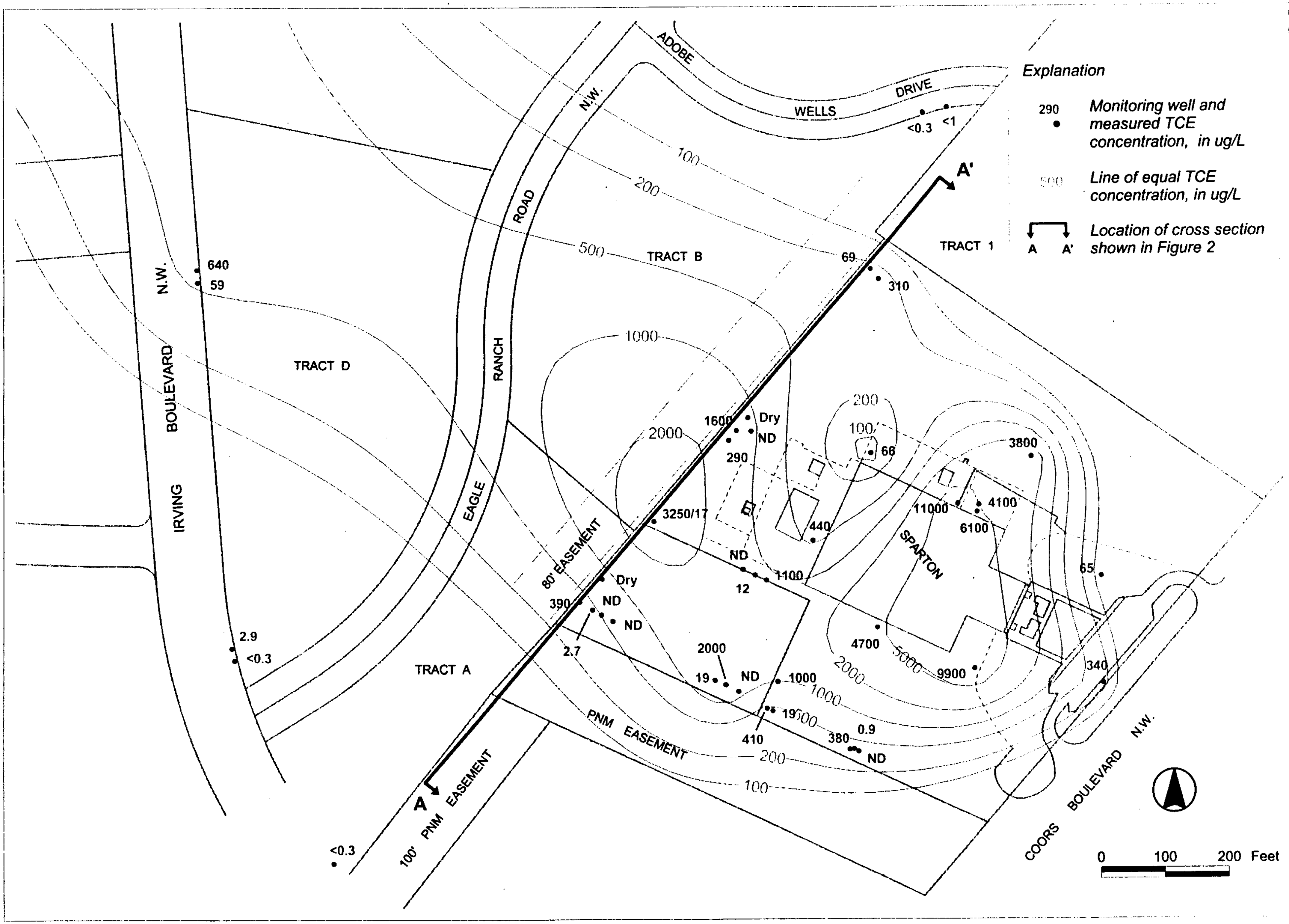


Figure 1 Distribution of TCE Concentrations at the Sparton Property and Vicinity

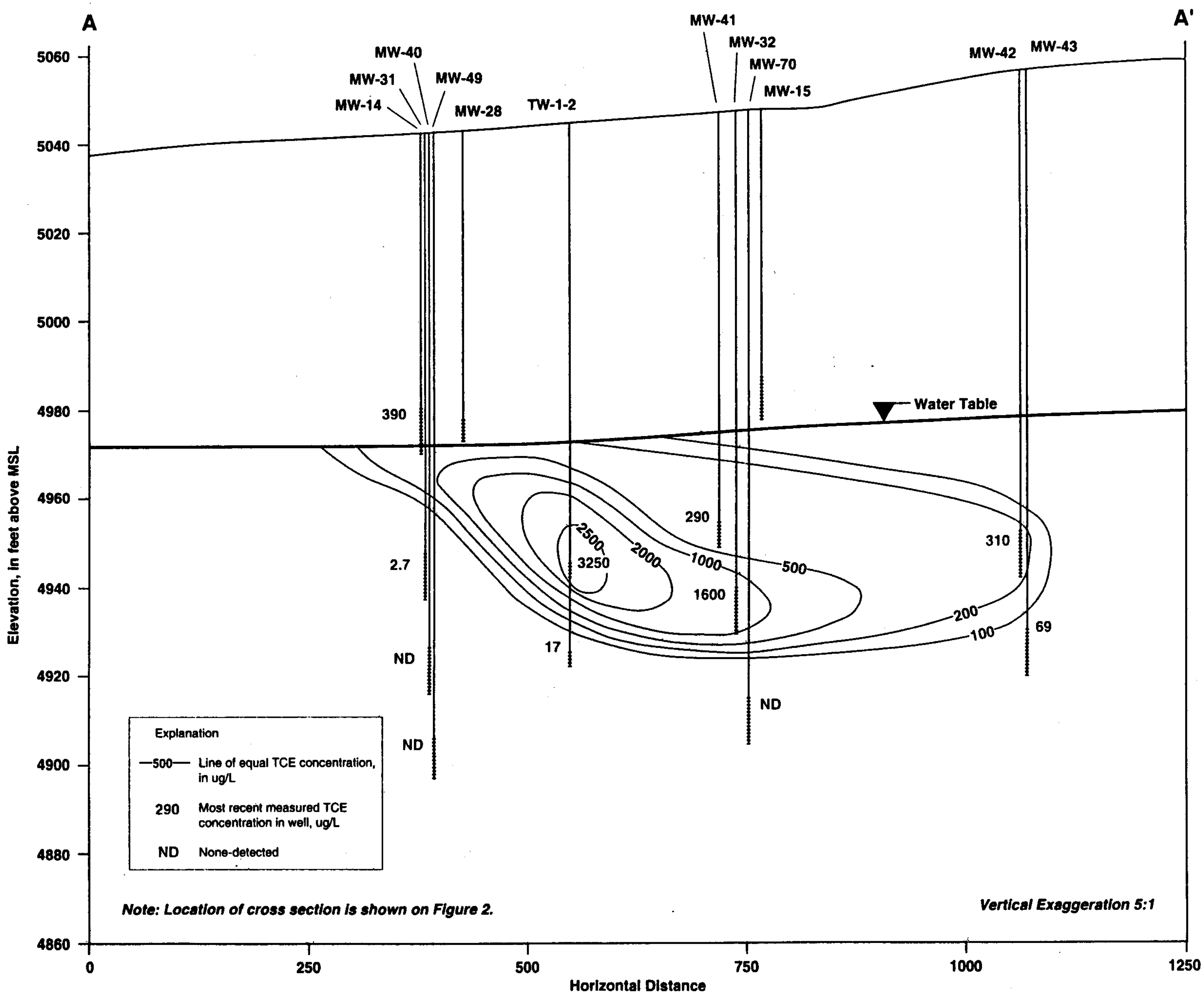


Figure 2 Vertical Distribution of TCE Concentrations along the Northwestern Property Boundary

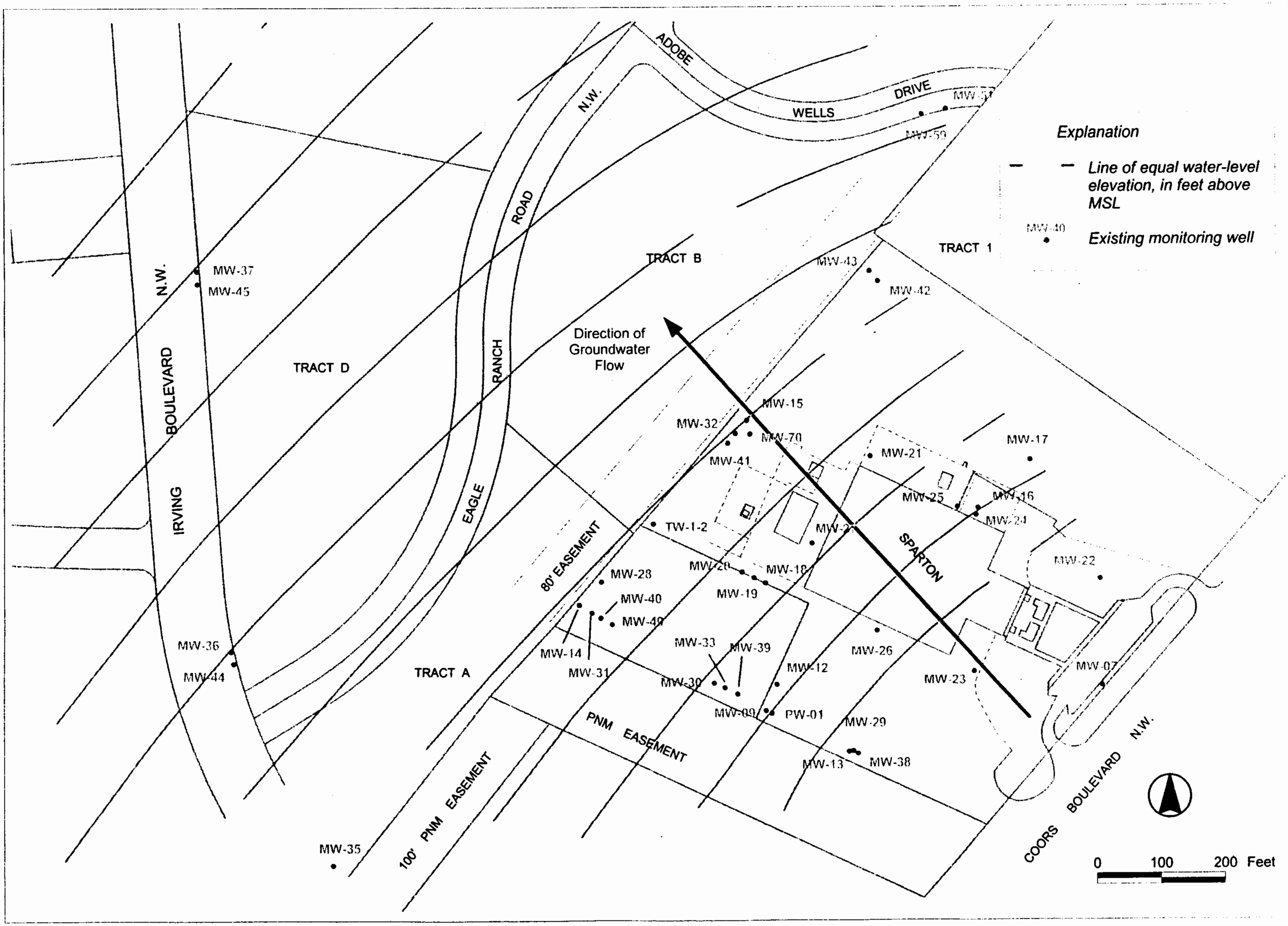


Figure 3 Water Levels and Direction of Groundwater Flow in the Lower Flow Zone

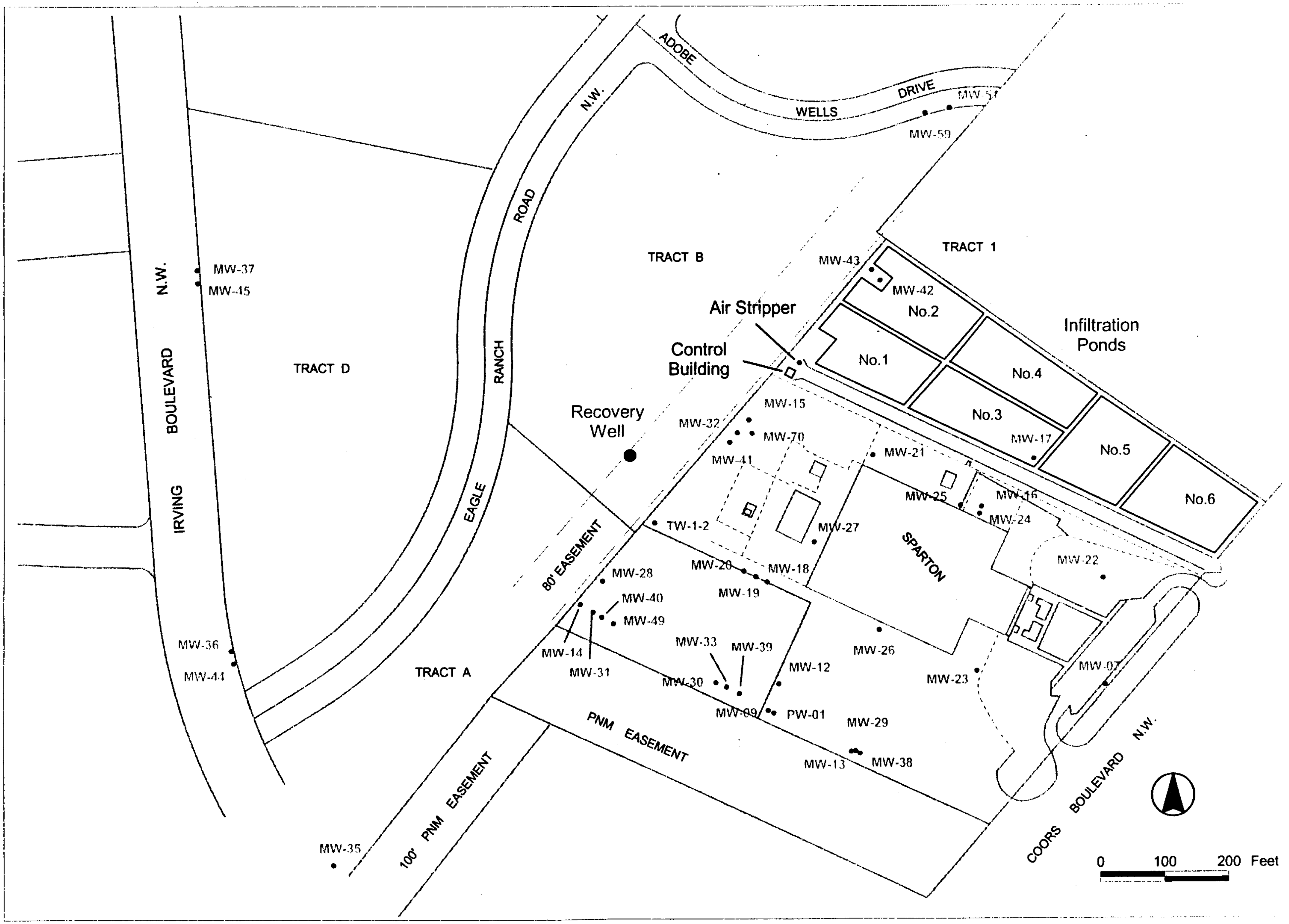


Figure 4 Proposed 50-gpm Recovery Well and Associated Facilities

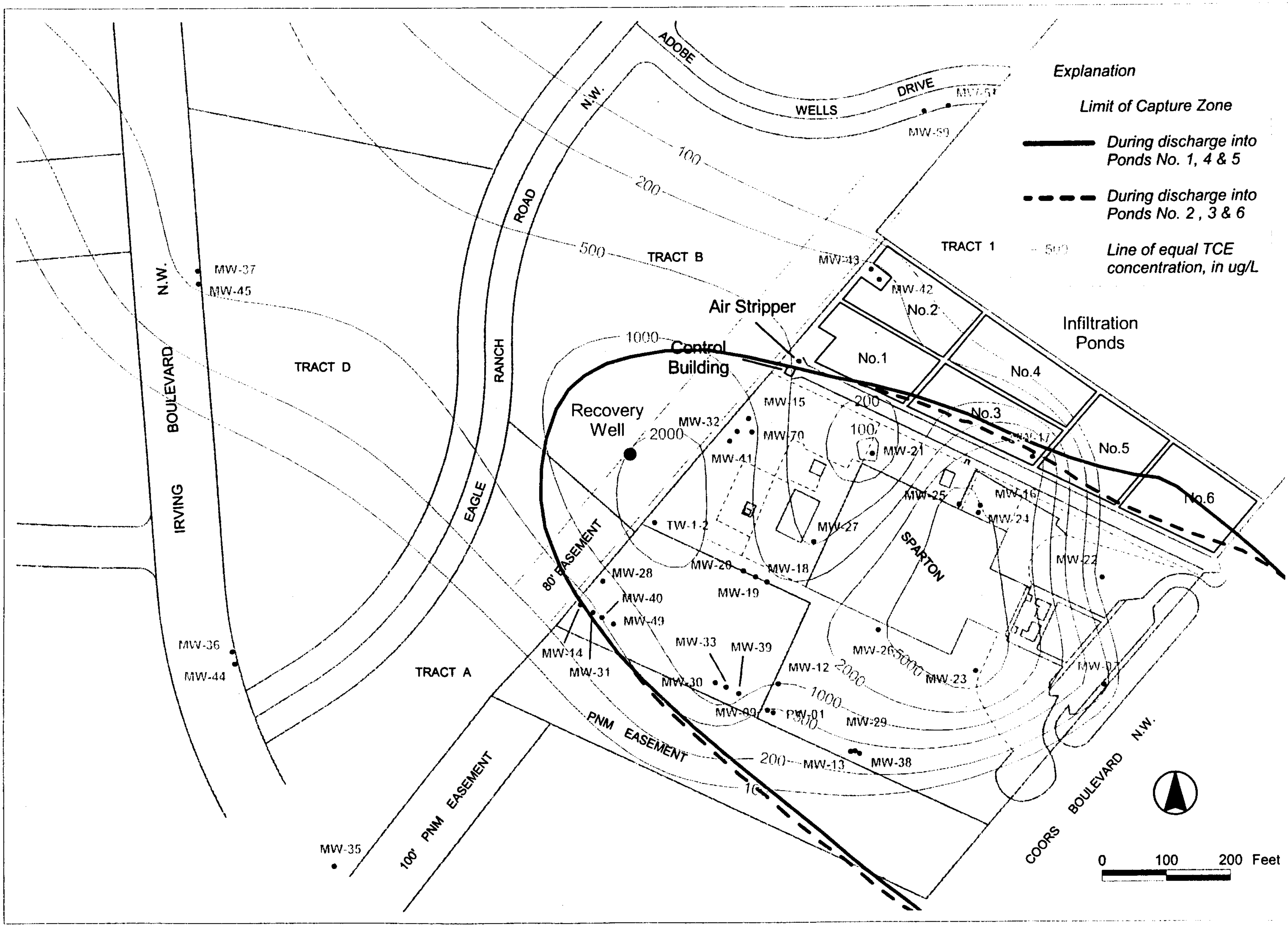


Figure 5 Areal Limit of the Capture Zone of the Proposed 50-gpm Recovery Well

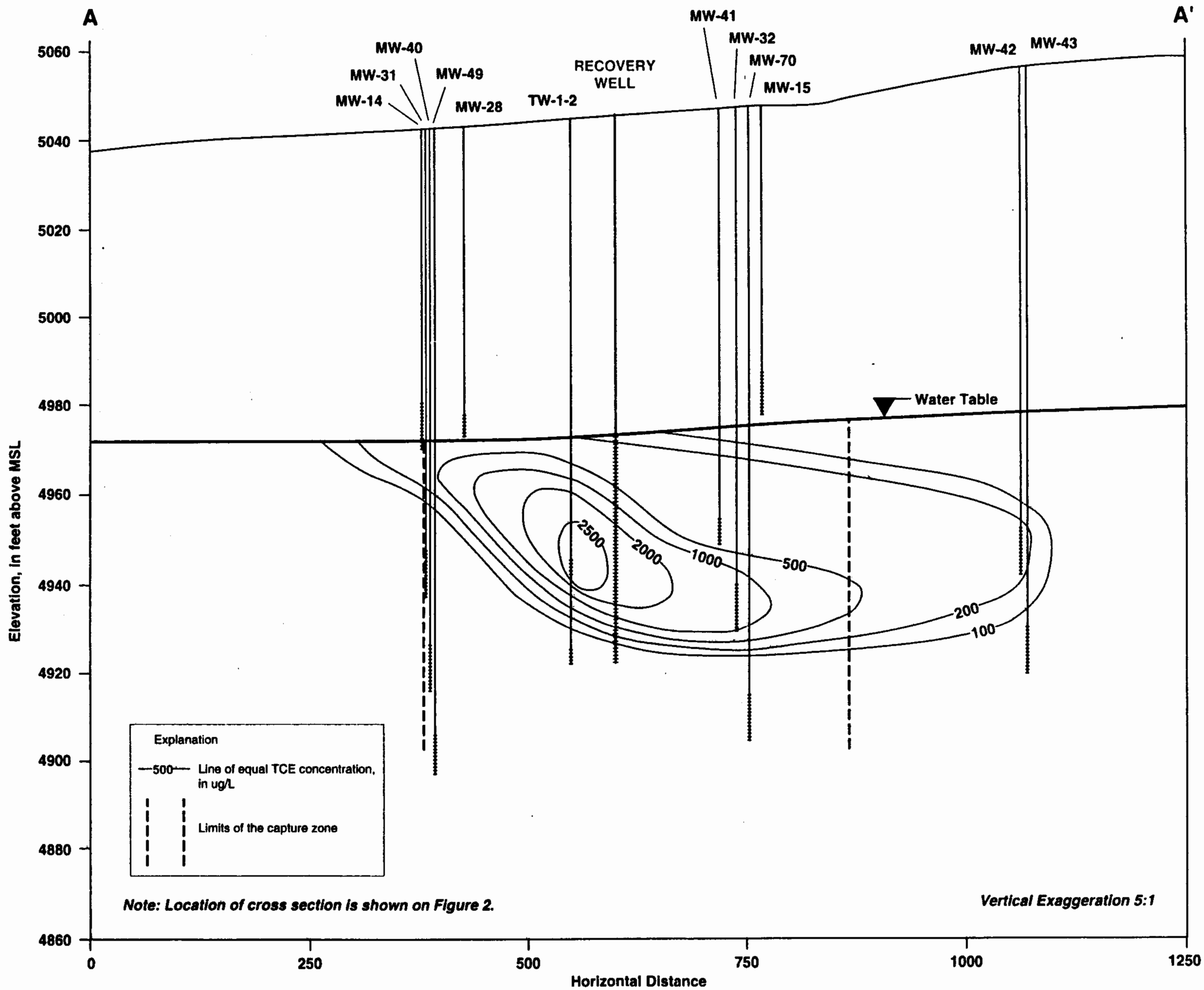
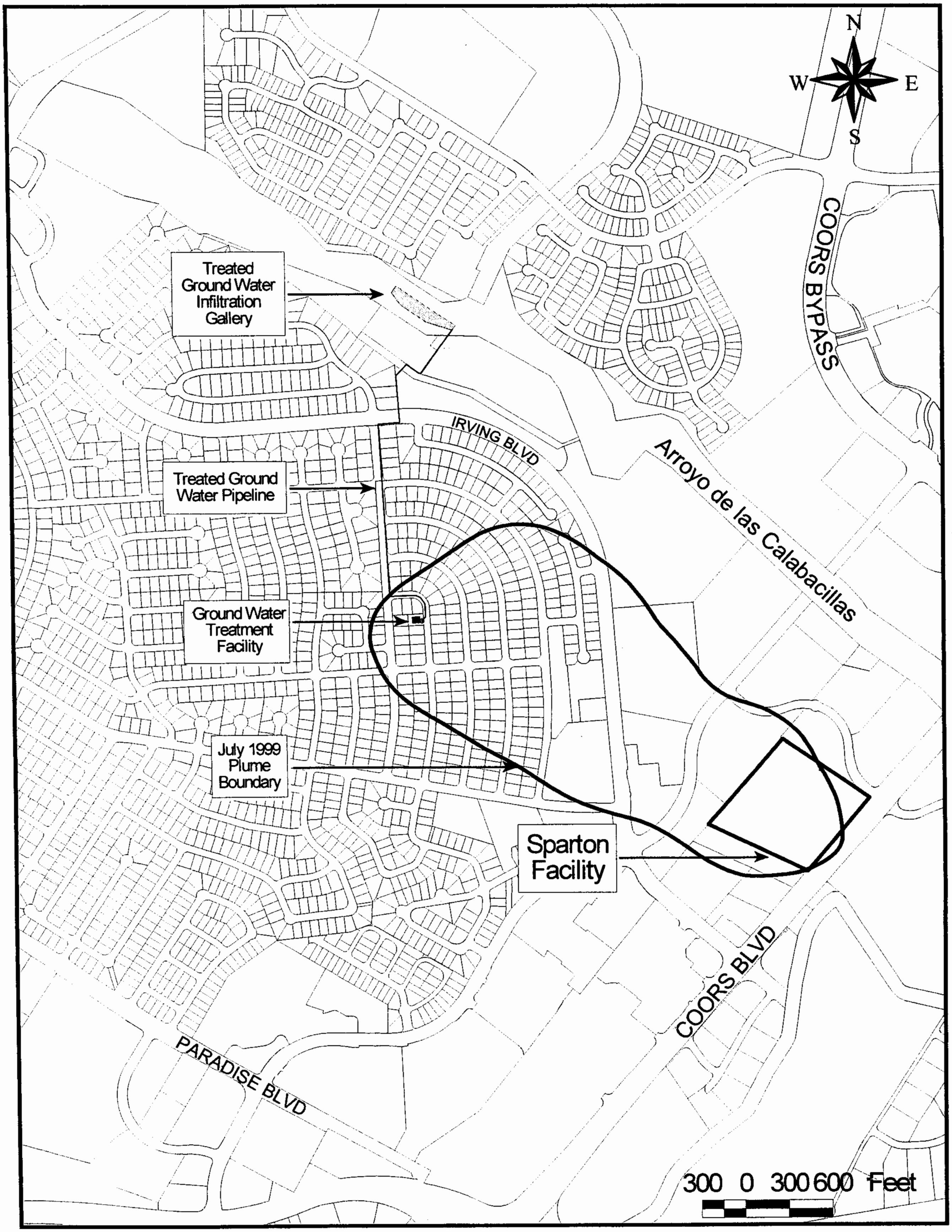


Figure 6 Vertical Limit of the Capture Zone of the Proposed 50-gpm Recovery Well



SPARTON SITE
ATTACHMENT G

ATTACHMENT I

Selection of a Mediator and Ground Rules for the Mediation

In the event that mediation provisions of Section XIII (Dispute Resolution) of the Consent Decree are invoked, this attachment governs the process of selecting a Mediator and reaching agreement on the ground rules for the mediation process.

1. EPA, NMED, and Sparton ("the Parties to the Mediation") shall select a Mediator by unanimous consent. The process for selecting the Mediator shall be as follows:

a. Within five (5) days after the mediation is invoked, the Parties to the Mediation may each propose up to three candidates for Mediator. Each candidate must have appropriate qualifications to perform the mediation. The Parties to the Mediation will immediately work together to narrow this pool of mediators to a pool of candidate mediators, not to exceed three (3) in number, all of whom the Parties to the Mediation deem acceptable. The Parties to the Mediation shall first make best efforts to select a Mediator from this final pool of mediators by unanimous consent within ten (10) days after mediation is invoked.

b. In the event that unanimous consent is not achieved within ten (10) days after mediation is invoked, the Parties to the Mediation agree to jointly submit to the Court a list of three (3) candidate mediators qualified to perform the mediation and request the Court to select the Mediator from amongst the three candidates.. The request shall be submitted within fifteen (15) days after mediation is invoked, unless otherwise agreed by the Parties to the Mediation. The Court may seek views of the Parties to the Mediation on the appropriate mediator and shall select the Mediator from the list proposed by the Parties to the Mediation.

c. The Parties to the Mediation agree that, after selection of the Mediator, the EPA and NMED shall have an opportunity to seek the necessary approval within the United States and NMED to fund EPA's and NMED's share of the Mediator's fees and expenses. EPA and NMED will not unreasonably withhold its approval or funding of the Mediator.

d. The selected Mediator must have appropriate training, experience, and expertise to conduct the Mediation Process, must not be biased, must be available for the duration of the Mediation Process, and must charge reasonable fees.

2. The Mediator shall conduct the dispute resolution process in accordance with written procedures agreed to and approved by the Parties to the Mediation . In the event the Parties to the Mediation, after good faith efforts, are unable to agree upon mediation procedures,

the parties shall work with the mediator to reach agreement on those procedures. The written procedures for mediation shall in all cases include as a minimum:

(a) an appropriate time, date and location for the mediation;

(b) an appropriate schedule for the mediation if it is expected to take more than one day to resolve the matter (the initial schedule may be amended, as necessary and in consultation with all parties, to accommodate the needs of the parties);

(c) the necessary participants to the mediation;

(d) the identification of the mediator and the agreement with respect to payment for the mediator;

(e) the expectations of the Parties to the Mediation with respect to the confidentiality of the mediation process (at a minimum, the agreement will be consistent with the confidentiality requirements set forth in the Consent Decree);

(f) the expectations of the Parties to the Mediation with respect to the appropriate process for the mediation, including the following:

(i) the mediation shall be a process to assist the Parties to the Mediation in reaching their own agreement and the mediator shall conduct the mediation in a fair and neutral manner to facilitate the resolution of the dispute between the the Parties to the Mediation ;

(ii) the mediator shall work for the benefit of the Parties to the Mediation and be guided by the provisions of the mediation agreement;

(iii) each Party to the Mediation shall have a reasonable opportunity during the mediation process to present its position or information, orally and/or in writing, concerning issues in mediation to the mediator and the other Parties to the Mediation process;

(iv) the mediator shall also ensure that each Parties to the Mediation has a reasonable amount of time to provide a response to other parties' position(s);

(v) the mediator may hold private sessions with one or more Party to the Mediation (and counsel) and/or face-to-face joint sessions to assist the Parties to the Mediation in trying to find a mutually acceptable resolution of the dispute;

(vi) the mediator will confer with the participants, review written information submitted by the Parties to the Mediation and counsel, and may request position papers from each Party to the Mediation outlining the legal and factual issues in the dispute;

(vii) the mediator shall act as a third-party neutral in a process in which the Parties to the Mediation, with the assistance of the mediator, collaboratively and collectively seek to identify issues; develop potential alternatives and approaches to resolve issues necessary for the parties to reach a mutually acceptable agreement; and resolve issues necessary for the parties to reach agreement to resolve the dispute.

3. In the event of a conflict between the Decree and this Attachment, the Decree shall control.

	A	B	C	D	E
235	Sparton	1	Preliminary PCCP	Feb-95	1
236			RFI Vol 1	May-92	1
237			RFI Vol 2	May-92	1
238			EPA Administrative Record	Aug-80	1
239		2	Draft Final CMS RPT	May-95	1
240			Reference Final Decision	Sep-96	1
241			Final Decision	Jun-96	1
242			Soil Investigation	1986	1
243			Definition of GW	1988	1
244			CMS RPT	Jul-87	1
245			Pond & Drum Storage Areas	Dec-85	1
246			Final RFI RPT	1992	1
247			Effectiveness of GW Recovery Well	Oct-89	1
248			Comprehensive GW Monitoring	Jul-89	1
249			Off-site Investigation	Oct-87	1
250			Draft CMS RPT	Nov-92	1
251			RPT of Effectiveness of GW Recovery Well	Aug-92	1
252		3	Monthly RPTs		1
253			Monthly RPTs	Apr-90	1
254			""	Jun-90	1
255			""	Nov-90	2
256			""	Jan-90	1
257			""	Feb-90	1
258			""	Sep-90	1
259			""	Oct-90	1
260			"	Feb-91	1
261			GW Well Data Summary	1991	1
262			Annual GW Monitoring RPT	1992	1
263			""	1993	1
264			""	1994	1
265		4	""	Jan-98	1
266			Alternate GW Monitoring Program	1996	1
267			""	1995	1
268			3rd Quarter 98 Annual GW Monitoring RPT	1998	1
269			Quarterly GW RPT	1992	1
270			"	1993	1

	A	B	C	D	E
271			Quarterly GW RPT	1995	1
272			""	1996	1
273			"	1997	1
274		5	Hydrological Evaluation & Pumping Test	1986	1
275			3008 Order	Sep-80	1
276			Administrative Order	Feb-98	1
277			GW Monitoring Plan	May-98	1
278			Admin Record vol 20		1
279		6	Admin Record vol 1		1
280			Admin record vol 2		1
281			" vol 3		1
282			" vol 21		1
283			" vol 22		1
284		7	"" vol 4		1
285			" vol 5		1
286			" vol 6		1
287			" vol 7		1
288		8	" vol 8		1
289			" vol 9		1
290			" vol 10		1
291			" vol 11		1
292		9	" vol 12		1
293			" Vol 13		1
294			" Vol 14		1
295			" Vol 15		1
296		10	" vol 16		1
297			" Vol 17		1
298			" Vol 18		1
299			" Vol 19		1

Correspondence Report

Facility	Date on Correspondance	From	To	Subject	Site	AR/Invoice Number
Sparton		EPA/Brown	Sparton/Mico	EPA Completed Review of Draft RPT on Effectiveness of GW Recovery Well System		
Sparton		NMED OGC	NMED	Fax: Agreement in Principle		
Sparton		BB & B/Chandler	Beall Law Firm	Fax: Declaration		
Sparton			EPA	Fax: Regarding Contamination Plume		
Sparton			NMED	Fax: Civil Action No. 97-0208JC - Answer of Defendent		
Sparton		OGC	NMED	Fax: Civil Action No. 97-0210M/DJS - Defendent's Brief in Support of Motion		
Sparton			NMED	Fax: Sampling Results		
Sparton		Secretary of	NMED	Identification of Witnesses		
Sparton		Secretary of	NMED	Motion for Continuance of Hearing		
Sparton		Hearing Officer/Orth	NMED	Order for Continuance of Hearing		
Sparton		Hearing Officer/Orth	NMED	Order for Continuance		
Sparton				Form 10-Q		
Sparton	9/13/1991	EPA/Malott	NMED/Kern	Phase II Environmental Site Assessment Eagle Ranch Development/Adobe Wells		
Sparton	2/18/1992	NMED/Horst	Sparton/Mico	Annual Groundwater Monitoring RPT		
Sparton	5/14/1992	NMED HRMB/Garcia	Perma-Fix/Kimball	Documentation for 90-day Treatment in Tanks		
Sparton	6/15/1992	HDR/Chandler	EPA/Phillips	Final RFI RPT		

Correspondence Report

Facility	Date on Correspondance	From	To	Subject	Site	AR/Invoice Number
Sparton	6/19/1992	Sparton/Wakefield	NMED/Collins	Letter Regarding Requested Information		
Sparton	6/26/1992	EPA/Brown	Sparton/Mico	RFI RPT Submitted under Civil Action Consent Decree		
Sparton	7/1/1992	EPA/Phillips	Sparton/Mico	RFI RPT Submitted Under Civil Action Consent Decree		
Sparton	7/16/1992	Sparton/Mico	NMED/Collins	Pond Closure Cap has 2 cracks in the Wear Surface		
Sparton	7/23/1992	NMED/Horst	Sparton/Mico	Letter Regarding Repairing 2 Cracks in Pond Closure Cap		
Sparton	8/25/1992	NMED/Sides	EPA/Mayer	Pre-Draft Post-Closure Permit		
Sparton	8/28/1992	Sparton/Mico	NMED/Collins	Letter Regarding Sampling Event		
Sparton	9/3/1992	Sparton/Mico	NMED/Horst	Extension Request: Groundwater Sampling		
Sparton	9/10/1992	NMED/Horst	Sparton/Mico	Extension Request Approval: Groundwater Sampling		
Sparton	9/25/1992	Dolan & Domenici/Remke	NMED/Collins	Document Review		
Sparton	3/4/1993	Sparton/Mico	NMED/Horst	Repairing 2 Cracks in the Pond Closure Cap		
Sparton	3/8/1993	Sparton/Mico	NMED/Horst	Request a Change in Methods used for Volatile Organics Analysis		
Sparton	3/31/1993	NMED/Horst	Sparton/Mico	Approval: Request a Change in Methods used for Volatile Organics Analysis		
Sparton	4/6/1993	Sparton/Mico	NMED/Horst	Sampling Notification Requirements		
Sparton	4/16/1993	NMED/Horst	Sparton/Mico	Regarding Repairs to the Cap over the Ponds & Sump		
Sparton	4/21/1993	NMED/Horst	EPA/Phillips	Regarding Incomplete document File		

Correspondence Report

Facility	Date on Correspondance	From	To	Subject	Site	AR/Invoice Number
Sparton	6/22/1993	NMED/Horst	Sparton/Mico	Rescheduling Sampling Event		
Sparton	7/8/1993	Sparton/Mico	NMED/Horst	Concerning Comprehensive GW Monitoring Evaluation		
Sparton	7/15/1993	NMED/Alexander	Sparton/Mico	Comprehensive GW Monitoring Evaluation		
Sparton	8/23/1993	NMED/Alexander	Sparton/Mico	Split Sampling from Comprehensive GW Monitoring Evaluation Conducted July 26-27/1993		
Sparton	8/26/1993	Sparton/Mico	NMED/Alexander	CME Lab RPTS		
Sparton	9/17/1993	Sparton/Mico	NMED/Horst	Sampling Notification; 4th Quarter 93		
Sparton	10/20/1993	Sparton/Mico	NMED/Alexander	Lab RPT for Additional Sampling		
Sparton	11/18/1993	Sparton/Mico	NMED/Alexander	Special GW Sampling Notification		
Sparton	1/13/1994	Sparton/Mico	NMED/Alexander	GW Sampling Notification		
Sparton	4/11/1994	Sparton/Wakefield	NMED/Alexander	Failure to Notify Upcoming Sampling Event		
Sparton	4/14/1994	Sparton/Mico	NMED/Alexander	Quarterly RPT, GW Monitoring Program, 1st Quarter '94		
Sparton	4/14/1994	NMED/Sides	Sparton/Appel	Haz Waste Permit		
Sparton	4/20/1994	NMED/Sisneros	Sparton/Mico	Updated Post-Closure Permit Application		
Sparton	6/4/1994	Sparton/Appel	NMED/Sides	Scheduled Meeting Regarding Updated Post-Closure Permit Application		
Sparton	7/11/1994	Sparton/Mico	NMED/Kern	3rd Quarter Sampling Notification		
Sparton	7/11/1994	NMED/Sides	Metric Corp/Metzner	Post-Closure Permit Application Guidance		

Correspondence Report

Facility	Date on Correspondance	From	To	Subject	Site	AR/Invoice Number
Sparton	8/4/1994	City of Alb/Bowman	Sparton/Wakefield	GW Remediation/Wastewater Discharge		
Sparton	9/21/1994	Metric Corp/Richardson	NMED/Sides	Draft Post-Closure Permit Application		
Sparton	9/22/1994	Sparton/Mico	NMED/Kern	4th Quarter Sampling Notification		
Sparton	9/25/1994	Albuquerque Journal	NMED/Kern	Corrective Action Site Open house		
Sparton	9/28/1994	Sparton/Mico	NMED/Kern	4th Quarter Sampling date moved		
Sparton	9/29/1994	NMED/Kern	Sparton/Mico	Approval: Sampling date moved		
Sparton	10/13/1994	Sparton/Mico	NMED/Kern	3rd Quarter GW Monitoring Program RPT		
Sparton	10/17/1994	Sparton/Mico	NMED/Kern	4th Quarter Sampling Notification		
Sparton	10/20/1994	NMED/Sisneros	EPA/Davis	Draft CMS RPT		
Sparton	11/3/1994	NMED/Sisneros	EPA/Davis	Draft CMS RPT		
Sparton	11/14/1994	Sparton/Appel	NMED/Kern	Copies of GW Monitoring Program, Alternative GW Monitoring Program & Letters		
Sparton	11/30/1994	Sparton/Appel	NMED/Hoditschek	Post Closure Care Permit Application		
Sparton	12/15/1994	Sparton/Appel	NMed/Hoditschek	Recieving Comments on CMS		
Sparton	12/22/1994	Sparton/Mico	NMED/Walker	Notification of Regulated Waste Activity		
Sparton	12/27/1994	EPA/Brown	Sparton/Mico	Analytical Results from GW Split Sampling Event		
Sparton	1/3/1995	NMED/Walker	EPA/Nelson	Notification Forms		

Correspondence Report

Facility	Date on Correspondance	From	To	Subject	Site	AR/Invoice Number
Sparton	1/6/1995	Sparton/Appel	NMED/Leavitt	Requirements for Characterization of Contamination		
Sparton	1/11/1995	NMED/Hositschek	Sparton/Appel	Post Closure Permit Application		
Sparton	1/13/1995	Sparton/Mico	EPA/Brown	RPT on the Effectiveness of the GW Recovery Well System in the Upper Flow Zone		
Sparton	1/23/1995	Sparton/Mico	NMED/Kern	1st Quarter 95 Sampling Notification		
Sparton	1/24/1995	Taichert, Wiggins, Virtue &	NMED/Hositschek	Comments from EPA on CMS not Recieved		
Sparton	1/30/1995	Taichert, Wiggins, Virtue &	NMED/Hositschek	Post-Closure Care Permit Application		
Sparton	2/28/1995	Black & Veatch	EPA/Crossland	Revisions to RPT on the Effectiveness of the GW Recovery Well System in the Upper Flow Zone		
Sparton	3/10/1995	Taichert, Wiggins, Virtue &	NMED/Leavitt	Characterization of Contamination		
Sparton	3/31/1995	NMED HRMB/Garcia	Sparton/Mico	Post-Closure Permit Application		
Sparton	3/31/1995	NMED/Leavitt	Sparton/Appel	Characterization of Contamination		
Sparton	4/4/1995	Sparton/Mico	NMED/Kern	95 2nd Quarter Sampling		
Sparton	4/4/1995	ONRT/Cary	Sparton/Appel	Letter Regarding Assessment of Injuries to Natural Resources		
Sparton	5/5/1995	Taichert, Wiggins, Virtue &	NMED/Kelley	Additional Monitoring Wells		
Sparton	5/9/1995	Sparton/Mico	NMED HRMB/Garcia	Post-Closure Permit Application - Administrative Completeness Review		
Sparton	6/2/1995	Rob Pine	OGC/Hughes	Memo: Response to Pierce Chandler's Comments on NMED's March 31, 1995 Letter		
Sparton	6/7/1995	NMED/Hositschek	Sparton/Mico	Post-Closure Permit Application Administrative Completeness		

Correspondence Report

Facility	Date on Correspondance	From	To	Subject	Site	AR/Invoice Number
Sparton	6/14/1995	OGC/Hughes	Taichert, Wiggins, Virtue &	Corrective Action Process		
Sparton	6/14/1995	EPA/Davis	NMED/Kelley	Groundwater Investigation Required by EPA		
Sparton	6/14/1995	EPA/Davis	Mayor of	Groundwater Investigation Required by EPA		
Sparton	6/14/1995	EPA/Davis	ONRT/Cary	Groundwater Investigation Required by EPA		
Sparton	7/18/1995	ONRT/Cary	Sparton/Appel	Natural Resource Assessment		
Sparton	7/20/1995	City of Albuquerque/Guame	EPA/Davis	Regarding GW Ivestigation Required by EPA		
Sparton	7/20/1995	Sparton/Mico	NMED/Kern	95 3rd Quarter Sampling		
Sparton	8/7/1995	EPA/Crouther	Sparton/Mico	EPA Completion of Statement of Basis		
Sparton	8/22/1995	NMED/Kern	EPA/Malott	Response to Request for NM Regulations		
Sparton	8/22/1995	Sparton/Mico	EPA/ Coleman & Saginaw	EPA Docket No		
Sparton	9/7/1995	EPA/Coleman	Sparton/Mico	Response to Letter Requesting Cancelation of Public Meeting & Comment Period		
Sparton	9/12/1995	City of Albuquerque/Chavez	EPA/Saginaw	Cleanup of GW Contamination		
Sparton	9/22/1995	City of Albuquerque/Guame	NMED/Kern	Fax: Cleanup of GW Contamination		
Sparton	10/2/1995	Sparton/Mico	NMED/Kern	95 4th Quarter Sampling		
Sparton	10/3/1995	EPA/Crouther	Sparton/Mico	Comments on Draft CMS RPT		
Sparton	10/10/1995	Thompson & Knight	NMED/Kern	Fax: Information Request		

Correspondence Report

Facility	Date on Correspondance	From	To	Subject	Site	AR/Invoice Number
Sparton	10/12/1995	NMED/Kern	Taichert, Wiggins, Virtue &	FOIA Response		
Sparton	10/12/1995	NMED/Kern	Thompson & Knight	FOIA Response		
Sparton	10/17/1995	EPA/Coleman	City of Albuquerque/Chavez	Fax: Suspension of Public Comment Period		
Sparton	11/2/1995	Sparton	NMED	Background Information on Sparton		
Sparton	11/6/1995	Thompson & Knight	EPA/Crouther	Responses to Draft CMS RPT		
Sparton	11/13/1995	City of Albuquerque/Guame	NMED/Weidler	GW Contamination		
Sparton	11/28/1995	Black & Veatch/Chandler	NMED/Weidler	Additional Information Request		
Sparton	12/1/1995	NMED/Weidler	William Turner	Haz Waste Emergency Fund		
Sparton	12/8/1995	NMED/Kern	David Clarke	Statement of Basis		
Sparton	12/8/1995	Sparton/Hockenbrocht	NMEd/Weidler	Fax: Follow up Letter Regarding Remediation Action		
Sparton	12/18/1995	EPA/Crouther	Sparton/Mico	EPA Revision of Statement of Basis		
Sparton	1/3/1996	Sparton/Mico	NMED/Kern	96 Split Sampling Event 1st Quarter		
Sparton	1/11/1996	KDA/Suarez	NMED/Kern	Information Request		
Sparton	1/18/1996	NMED/Kern	KDA/Suarez	Response to Information Request, Enclosed Statement of Basis		
Sparton	1/25/1996	Sparton/Mico	NMED/Kern	Data Generated from an Internal Well Monitoring Program		
Sparton	1/29/1996	NMED/Kelley	Senator Joseph Carraro	Statement of Basis for Corrective Action		

Correspondence Report

Facility	Date on Correspondance	From	To	Subject	Site	AR/Invoice Number
Sparton	2/8/1996	Attorney Generals	EPA/Malott	Corrective Action		
Sparton	2/8/1996	City of Albuquerque/Guame	EPA/Malott	GW Contamination & Cleanup Alternatives		
Sparton	2/8/1996	Thompson & Knight/Harris	EPA/Crouther	Concerns about EPA		
Sparton	2/20/1996	EPA/Crouther	Sparton/Mico	Response to Concerns the NFA is needed		
Sparton	2/26/1996	Sparton/Mico	NMED/Kern	95 Annual GW RPT		
Sparton	2/27/1996	EPA/Crouther	Sparton/Mico	Request for Information		
Sparton	3/1/1996	EPA/Crouther	Sparton/Mico	EPA Comments for CMS		
Sparton	3/1/1996	Sparton/Mico	NMED/Pine	96 1st Quarter Split Sampling Event		
Sparton	3/1/1996	EPA/Pierson	Thompson & Knight/Harris	Regarding Administrative Record		
Sparton	3/4/1996	KDA/Waybright	NMED/Kern	Requesting Sampling Results		
Sparton	3/8/1996	NMED/Kern	KDA/Waybright	Analytical Data		
Sparton	3/8/1996	NMED/Kern	Shomaker &	Analytical Data		
Sparton	3/11/1996	Sparton/Mico	EPA/Crossland	Response to EPA's Request for Information		
Sparton	3/12/1996	KDA/Waybright	NMED/Kern	Enclosed check for Coping Charges		
Sparton	3/12/1996	Sparton/Hockenbrocht	NMED/Weidler	Fax: Battelle Investigation		
Sparton	3/20/1996	EPA/Crouther	Sparton/Mico	Fax: Regarding Sparton Responding to EPA's Comments		

Correspondence Report

Facility	Date on Correspondance	From	To	Subject	Site	AR/Invoice Number
Sparton	3/20/1996	Black & Vetch/Chandler	Sparton/Appel	Fax: 60-day Response Extension		
Sparton	3/25/1996	Sparton/Mico	EPA/Crouther	Fax: Response to Information Request		
Sparton	3/26/1996	NMED/Kelley	EPA/Crouther	Extension Request Denied: submission of Final CMS		
Sparton	3/29/1996	EPA/Crouther	Sparton/Mico	EPA Granted 60-day Extension		
Sparton	4/5/1996	EPA/Crouther	NMED/Kelley	EPA Granted 60-day Extension		
Sparton	4/12/1996	NMED/McQuillan	Sparton/Appel	Split Soil-Vapor Samples		
Sparton	4/16/1996	Sparton/Mico	NMED/Kern	96 1st Quarter GW RPT		
Sparton	4/16/1996	Sparton/Mico	NMED/Kern	96 2nd Quarter GW Sampling		
Sparton	4/17/1996	EPA/Crouther	Sparton/Mico	Sparton Formally Invoked the Dispute Resolution Provisions		
Sparton	4/18/1996	Sparton/Mico	NMED/Kern	96 2nd Quarter GW Sampling		
Sparton	4/24/1996	OGC/Ortiz	EPA/Pearson	NMED Comments on EPA's Proposed AOC		
Sparton	5/1/1996	Sparton/Appel	EPA/Coleman	Fax: Regarding Conference Regarding Submission of Final CMS		
Sparton	5/3/1996	EPA/Coleman	Sparton/Appel	Extension Request Approval: 7-day Extension for Submission of Final CMS		
Sparton	5/3/1996	NMED/McQuillan	Black & Vetch/Chandler	Regarding Conversion Calculations for Soil-Vapor Units		
Sparton	5/10/1996	NMED/McQuillan	Sparton/Appel	Source Area Investigation		
Sparton	5/14/1996	Sparton/Appel	NMED/Ortiz	Responseto Additional Soil Vapor Investigations		

Correspondence Report

Facility	Date on Correspondance	From	To	Subject	Site	AR/Invoice Number
Sparton	5/16/1996	NMED/Weidler	Sparton/Appel	Modification to Closure Plan		
Sparton	5/21/1996	NMED/Kern	Aaron Garcia	Statement of Basis		
Sparton	5/22/1996	Aaron Garcia	Dave Huhn	Concerning New Vistas Subdivision		
Sparton	5/22/1996	OGC/Ortiz	Sparton/Appel	Conditional Approval on Proposal to Install Additional Monitoring Wells		
Sparton	5/29/1996	Black & Vetch/Chandler	NMED/McQuillan	Fax: Additional Monitoring Well Installation		
Sparton	5/30/1996	Sparton/Appel	NMED/Weidler	Copy of RPT of the Battelle RPT		
Sparton	6/4/1996	NMED/Kern	Dave Huhn	Statement of Basis		
Sparton	6/6/1996	NMED/McQuillan	Black & Vetch/Chandler	Installation of a Single Nest of Vapor Probes		
Sparton	6/6/1996	NMED/Weidler	Sparton/Mico	Notice of Imminent & Substantial Endangerment		
Sparton	6/10/1996	Black & Vetch/Chandler	NMED/McQuillan	Fax: Vapor Probe Nest Installation		
Sparton	6/10/1996	ONRT/Cary	EPA/Malott	Comments on Draft CMS RPT		
Sparton	6/17/1996	OGC/Ortiz	Sparton/Appel	Installation of Additional GW Monitor Wells		
Sparton	6/24/1996	EPA/Coleman	Sparton	Final Decision Corrective Action		
Sparton	7/2/1996	NMED/Pine	Dave Huhn	GW Contamination		
Sparton	8/22/1996	Black & Vetch/Chandler	OGC/Ortiz	Calculations of Hydraulic Influence GW Containment Wells		
Sparton	9/12/1996	OGC/Ortiz	Thompson & Knight/Jim	Regarding Written Proposals		

Correspondence Report

Facility	Date on Correspondance	From	To	Subject	Site	AR/Invoice Number
Sparton	9/18/1996	Black & Vetch/Chandler	OGC/Ortiz	Corrective Action Proposals		
Sparton	9/20/1996	Sparton/Mico	NMED HRMB/Garcia	96 4th Quarter GW Sampling Event		
Sparton	10/17/1996	OGC/Ortiz	Thompson & Knight/Harris	Fax: Requirements for Approval of Revised Interim Corrective Action Proposals		
Sparton	10/29/1996	Thompson & Knight/Harris	OGC/Ortiz	Fax: Response to Letter, 10/17/1996		
Sparton	11/18/1996	Thompson & Knight/Harris	OGC/Ortiz	Response to Rrequirements for Approval of Revised Interim Corrective Action Proposals		
Sparton	12/2/1996	OGC/Ortiz	Thompson & Knight/Harris	Response to letter, 11/21/96		
Sparton	12/7/1996	Thompson & Knight/Harris	OGC/Ortiz	Proposals for: Aquifer Ttest/Extraction Demonstration/Additions to Monitoring Network, Vapor		
Sparton	12/17/1996	OGC/Ortiz	Thompson & Knight/Harris	Response to Letter, 12/9/1996		
Sparton	1/3/1997	OGC/Ortiz	Thompson & Knight/Harris	Response to Proposals		
Sparton	1/17/1997	Thompson & Knight/Harris	OGC/Oritz	Response to Comments		
Sparton	1/21/1997	Sparton/Mico	NMED HRMB/Garcia	97 1st Quarter GW Sampling Event		
Sparton	1/28/1997	Thompson & Knight/Harris	DOJ/Fischal	Fax: Follow-up to Settlement Discussion		
Sparton	2/6/1997	OGC/Oritz	Thompson & Knight/Harris	Response to Letter dated 1/17/97		
Sparton	02/19/97		NMED	Civil Action No. 97-0208JC - Complaint		
Sparton	02/19/97			Civil Action No. 97-0210M		
Sparton	02/21/97	The Observer	NMED	Newspaper - Headlines regarding Public Suit		

SPECIAL WARRANTY DEED

HUNING LIMITED PARTNERSHIP, a New Mexico limited partnership ("Grantor"), for consideration paid, grants to SPARTON TECHNOLOGY, INC., a New Mexico corporation ("Grantee"), whose address is 2400 E. Ganson Street, Jackson, MI 49202-0000, the following described real estate in Bernalillo County, New Mexico (the "Property"):

> Tract B-2, Adobe Wells Subdivision, as the same is shown and designated on the plat of said subdivision recorded on DEC. 8TH, 1999 in Map Book 99C, Page 329, records of Bernalillo County, New Mexico,

SUBJECT TO taxes for 1999 and subsequent years and all easements, covenants, restrictions, and encumbrances of record;

SUBJECT TO the following covenant, which is solely for the benefit of all present and future owner(s) of land sharing a common boundary with the Property. This covenant may be modified, waived or terminated by written agreement signed by the then current owner(s) of the land sharing a common boundary with the Property: Any activity on the property related to environmental remediation will be limited to the installation and use of groundwater wells and connecting pipelines, all located below ground surface level. This shall be a covenant running with the land enforceable against the Grantee, its successors and assigns.

With special warranty covenants.

WITNESS its hand and seal this 29th day of OCTOBER, 1999.

HUNING LIMITED PARTNERSHIP,
a New Mexico limited partnership

By John L Huning
John L. Huning, General Partner

By Louis F Huning
Louis F. Huning, as Personal Representative of the Estate of Fred D. Huning, Jr., Deceased, General Partner

STATE OF NEW MEXICO)
) ss.
COUNTY OF BERNALILLO)

This instrument was acknowledged before me on OCTOBER 29, 1999 by John L. Huning and Louis F. Huning, as Personal Representative of the Estate of Fred D. Huning, Jr., Deceased, as General Partners of Huning Limited Partnership, a New Mexico limited partnership.

Notary Public

My commission expires:
9/29/2000

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S. S. PAPADOPULOS & ASSOCIATES, INC.
ENVIRONMENTAL & WATER-RESOURCE CONSULTANTS

S. S. PAPADOPULOS
S. P. LARSON
C. B. ANDREWS

SEP 2000
RECEIVED

September 28, 2000

United States Environmental Protection Agency (3 copies)
Region VI - Technical Section (6EN-HX)
Compliance Assurance & Enforcement Division
1445 Ross Avenue
Dallas, TX 75202
Attn: Sparton Technology, Inc. Project Coordinator Michael Hebert

Director (1 copy)
Water & Waste Management Division
New Mexico Environment Department
1190 St. Francis Drive, 4th Floor
Santa Fe, NM 87505

Chief (1 copy)
Hazardous & Radioactive Materials Bureau
New Mexico Environment Department
1190 St. Francis Drive, 4th Floor
Santa Fe, NM 87505

Chief (1 copy)
Groundwater Bureau
New Mexico Environment Department
1190 St. Francis Drive, 4th Floor
Santa Fe, NM 87505

Subject: Sparton Technology, Inc. Coors Road Plant Remedial Program
Response to EPA/NMED Comments on 1999 Annual Report

Gentlemen:

On behalf of Sparton Technology, Inc. (Sparton), S. S. Papadopulos & Associates, Inc. (SSP&A) is pleased to submit the attached document with Sparton's response to the August 9, 2000 comments by the United States Environmental Protection Agency (EPA) and the New Mexico Environment Department (NMED) on the 1999 Annual Report for remedial activities associated with its Coors Road Plant in Albuquerque, New Mexico. The response document states each comment and provides Sparton's response to that comment. Responses to some comments include attachments with suggested revisions to specific sections of the 1999 Annual Report, and suggested new figures or appendices.

7944 Wisconsin Avenue, Bethesda, Maryland 20814-3620 • Tel. (301) 718-8900 Fax (301) 718-8909

Upon approval of the suggested revisions and additions, a final 1999 Annual Report will be issued. Due to the addition of several figures and appendices, the numbers of some figures and the labels of appendices in the final report would be different than those in the June 1, 2000 draft version. Revised report sections that are included in the response document refer to these figures and appendices with their new numbers and labels. To facilitate the review of the document these changes in figure numbers and appendix labels are listed in Attachment A to this letter.

The response document was prepared by SSP&A in cooperation with Metric Corporation, Inc. and Pierce L. Chandler, Jr., PE. I certify under penalty of law that the document and all attachments were prepared under my direction and supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based upon my inquiry of either the person or persons who manage the system and/or the person or persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I further certify, to the best of my knowledge and belief, that this document is consistent with the applicable requirements of the Consent Decree entered among the New Mexico Environment Department, the U.S. Environmental Protection Agency, Sparton Technology, Inc., and others in connection with Civil Action No. CIV 97 0206 LH/JHG, United States District Court for the District of New Mexico. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

If you have any questions concerning the document, please contact me.

Sincerely,

S. S. PAPADOPULOS & ASSOCIATES, INC.

Stavros S. Papadopulos, PhD, PE
Chairman, Board of Directors

cc: Secretary, Sparton Technology, Inc., w/ 1 copy
Mr. R. Jan Appel, w/1 copy
Mr. James B. Harris, w/1 copy
Mr. Tony Hurst, w/2 copies
Mr. Gary L. Richardson, w/1 copy
Mr. Pierce L. Chandler, Jr., w/1 copy

ATTACHMENT A

Changes in Figures:

Figure 5.13	Will be revised to include total chromium and will become Figure 5.21 (copy included in response).
Figure 5.14a	Will become Figure 5.13.
Figure 5.14b	Will become Figure 5.14.
Figure 5.21	Will be eliminated.
Figure 5.22	Will be revised and will become Figure 5.24 (copy included in response).
Figure 5.23	Will become Figure 5.25.
Figure 6.4	Will be revised to add November 1998 TCE plume, and will become Figure 6.4a (copy included in response).
Figure 6.5	Will be revised to add November 1998 TCE plume, and will become Figure 6.5a (copy included in response).
Figure 6.6	Will be revised to add November 1998 TCE plume, and will become Figure 6.6a (copy included in response).

Five new figures will be added:

Figure 5.22	Will show monthly contaminant mass removal rates by CW-1 (copy included in response).
Figure 5.23	Will show cumulative contaminant mass removal by CW-1 (copy included in response).
Figure 6.4b	Same as Figure 6.4a with November 1999 TCE plume (copy included in response).
Figure 6.5b	Same as Figure 6.5a with November 1999 TCE plume (copy included in response).
Figure 6.6b	Same as Figure 6.6a with November 1999 TCE plume (copy included in response).

Changes in Appendices:

Appendix A	A new appendix on the areal extent of the 4970-foot silt/clay (copy included in response).
Appendix B	A new appendix on the November 1998 TCE plume extent in the UFZ, ULFZ, LLFZ and Top of the 4800-foot clay (copy included in response).
Appendix C	Old Appendix A – CW-1 flow data
Appendix D	Old Appendix B – Monitoring well WQ data
Appendix E	Old Appendix C – Influent/Effluent WQ data
Appendix F	A new appendix with the AcuVac operating logs (copy included in response).
Appendix G	A new appendix with the Roots blower operating logs (copy included in response).

Response to the August 9, 2000 Comments by USEPA and NMED on the "Sparton Technology Inc. Coors Road Plant Remedial Program - 1999 Annual Report" Dated June 1, 2000

Introductory Comment:

An independent evaluation and detailed review of the referenced document (report) was conducted to determine if the technical issues in the "Work Plan for the Assessment of Aquifer Restoration", Attachment D of the March 3, 2000, Sparton Consent Decree (Work Plan) were addressed. Four primary tasks were described in the Work Plan and are listed below.

Task 1 - Assemble and evaluate hydrogeologic data
Task 2 - Evaluate water-quality data and assess progress in restoration
Task 3 - Develop groundwater flow and contaminant transport model
Task 4 - Prepare Annual Reports

The report upon which this comment document is based is intended to fulfill the requirements of the fourth task. Below is a general comment and specific comments regarding the report.

Response:

Please note the following statements from Attachment D of the Sparton Consent Decree:

Section 3.1 Task 1, p. 5 – "The evaluation of hydrogeologic data will be completed within the first year of off-site containment system operation, and the results will be reported in the first Annual Report."

Section 3.2 Task 2, p.6 – "The results of these evaluations will be annually reported in the site's Annual Report which will also include all other site-related data and evaluations."

Section 3.3 Task 3, p10 – "The structure of the model and the results of the initial model calibration will be reported in the first Annual Report of the site. This first Annual Report will also include predictions on water-quality conditions at the end of the second year of containment system operation."

The 1999 Annual Report includes all this information. It does, therefore, fulfill the requirements not only of the fourth task but of all the tasks listed in Attachment D of the Consent Decree.

General Comments

1. *Section 3.4 Task 4 - Preparation of Annual Reports of the Work Plan specifies certain items will be conducted and included as part of the annual report. In general, the report is well written and includes the necessary detail. The report addresses a majority of the required items with a few*

exceptions related to the SVE system operating data. Several comments are provided below regarding the model and its treatment of specific site data.

Response:

No response required.

2. *Please provide in appropriate sections of the report the estimated mass in place as specified in Section 3.4, p.9 of Attachment D of the Consent Decree.*

Response:

A new section (section 2.6.1.4) will be added to the final report to discuss the initial mass in place. A copy of this section is included in Attachment 1. Note, however, that an estimate of the initial TCE mass in place was given on the table presented in pages 6-9 and 6-10 of the report.

3. *Please provide in appropriate sections of the report a comparison of water quality data from monitoring and containment wells to media standards (the more stringent of MCLs for drinking water or the maximum allowable concentrations in ground water set by NMWQCC) as specified in Section 3.4, p. 10 of Attachment D of the Consent Decree.*

Response:

Concentrations that exceed media standards will be highlighted on Tables 2.5, 4.3 and 4.4, and in Appendix B (now Appendix D). Sections 2.6.1.2, 4.1.3.1, and 4.1.3.2 have been revised to reflect these changes on the tables and in the appendix. The revised sections, tables and Appendix D are presented in Attachment 2.

4. *In appropriate sections of the report, please provide plots of monthly mass removal rates and cumulative removal rates of chemicals of concern and compare these with the contaminant mass in place as specified in Section 3.4, p. 10 of Attachment D of the Consent Decree.*

Response:

Section 5.1.3 (incorrectly numbered as 5.1.2 in the draft report) has been reorganized and a section on contaminant mass removal has been added (Section 5.1.3.3). The monthly mass removal rates presented in Table 5.1 will be plotted and introduced in this section as Figure 5.22; a plot of cumulative removal rates (Figure 5.23) and comparisons with the mass in place will also be included. (Report figures will be renumbered to accommodate these new figures). Copies of this section and Figures 5.22 and 5.23 are presented in Attachment 3.

5. *Please provide a summary of the annual progress in aquifer restoration in terms of the percentage mass removal (i.e., annual removal of mass at CW-1 in comparison to the estimated mass of contaminants present in the aquifer), and in terms of the estimated percentage change in the volume of groundwater with contaminant concentrations above media standards (the more stringent*

of MCLs for drinking water or the maximum allowable concentrations in ground water set by NMWQCC).

<u>Response</u>:

The first full paragraphs of page ES-2 and of page 7-2 (after the bulleted paragraph) address this comment in terms of the percentage of the pumped water to the initial pore volume, and in terms of the percentage of the removed TCE mass to the initial dissolved TCE mass. The percentage of the pumped water to the pore volume is also discussed in "Section 5.1.2 Flow Rates". Percentages of the total mass removed and of the TCE and DCE mass removed to the estimates of the initial mass in place are also discussed in the new "Section 5.1.3.3 Contaminant Mass Removal" (see Attachment 3).

By using an approach similar to that using the initial pore volume (see Attachment 1), the pore volume of the November 1999 plume was estimated to be 1.01 billion gallons. The initial (November 1998) pore volume was 1.13 billion gallons; therefore, the volume of water contaminated above MCLs was reduced by about 10 percent during 1999.

<u>Specific Comments</u>

1. *Executive Summary, p. ES-2, second full paragraph. "The total mass of TCE removed by the soil vapor extraction systems was about 4.5 kg in 1999." Please provide data and calculation methods used to determine this mass of TCE. If the data are estimated and the methodology is not well supported, please provide a range of possible values rather than a single estimated number.*

<u>Response</u>:

The statement, which is also repeated on p. 7-2, second full paragraph (after the bulleted paragraph), will be changed to read "The total mass of TCE removed by the soil vapor extraction system in 1999 was estimated to be about 4 kg." This removal rate is based only on the operation of the Roots blower system. The mass removal rate of about 1 kg that was estimated for the 1999 operation of the AcuVac system will not be included in the report since the influent concentration at the end of this operation was an estimate rather than an actual measurement. Reference to this estimated influent concentration will also be eliminated from the report (see revised Section 4.2.3 in Attachment 4 and revised Section 5.2 in Attachment 5). The method used for calculating mass removal rates is also discussed in the revised Section 5.2.

We note that this comment, as well as several other comments presented later, pertain to the issue of whether the data collected during the 1999 SVE operations are adequate for making reliable estimates of the mass removed during these operations. We hope that the responses we are providing to these comments are satisfactory to the reviewers. However, we would also like to remind the reviewers, that under the terms of the Consent Decree, the robust 400 cfm system that began operating in April 2000 is to be operated for an aggregate period of one year over 18 months. The criteria for terminating the system are based on soil gas concentrations measured three and four months after shut-down. There are no provisions in the Consent Decree for terminating the system after a shorter period of operation because mass removal rates have reached a very low level; in fact, the system has to be operated for an aggregate period of one year even if the mass removal rate has become zero. Under these circumstances, it appears to us that mass removal rates, and whether data are adequate or inadequate for determining them is a moot question. All Sparton has to do is to make sure that the system is operating at 400 cfm and that two rounds of sampling are conducted after shut-down; there is no reason for Sparton to make any other measurements during this SVE operation.

2. *Section 1, p. 1-1. The third paragraph in this section should also mention that implementation of the public involvement plan was also part of the agreed settlement between Sparton and the various governments.*

<u>Response</u>:

Item "(f) the implementation of a public involvement plan" will be added to the list in this paragraph. Also, Section 5.4 will be modified to report progress in the implementation of the public involvement plan (see Attachment 6).

3. *Section 2.4, p. 2-5, 3rd full paragraph. "The results of the tests indicated a radius of influence of 175 to 200 feet." This report (and previous reports) has not provided sufficient data and calculations to support this estimated radius of influence. Please provide such data and calculations in this report, or remove the reference to radius of influence.*

<u>Response</u>:

This sentence will be deleted.

4. *Section 2.5, p. 2-6. Sparton should include in the first paragraph of this section that implementation of a public involvement plan and a restoration work plan were remedial measures included in the March 3, 2000 Consent Decree.*

<u>Response</u>:

The purpose of this paragraph is to list "remedial measures" that are specifically aimed at remediating the soil and groundwater contamination at the Sparton site. The implementation of a public involvement plan and the assessment of aquifer restoration are other actions that Sparton agreed to take under the terms of the Consent Decree, but they are not specifically aimed at remediation. They are listed in Section 1, p. 1-1, third paragraph (now modified as stated in the response to Specific Comment 2 above), but we do not believe that they need to be also listed as "remedial measures" in Section 2.5.

5. *Section 2.6.1.3, p. 2-9, 2nd and 3rd paragraphs and included bullets. The maps for the UFZ, ULFZ, and LLFZ, the estimated impacted areas, and the calculations used to estimate the volume of impacted groundwater should be incorporated into this report or included as an appendix. Please provide this information.*

Response:

See revised Section 2.6.1.3 in Attachment 1, and Appendix B, with Figures B-1 through B-4, which is included in Attachment 1.

6. *Section 3.3, page 3-2, paragraph 1. The second sentence states "Monitoring data indicated that influent constituent concentrations had dropped to the range where treatment was no longer required." For clarification, please restate the sentence to read "Influent air concentration data for air entering the AcuVac SVE system from VR-1 indicated that the concentration was sufficiently low as to not need treatment prior to discharge to the atmosphere."*

Response:

This revision will be made in the final report.

7. *Section 4.2.1, p. 4-3". The report states "The AcuVac system was operated from May 12 to June 23, 1999 (42 days) at 50 cfm. The Roots blower system was operated from June 28 to August 25, 1999 (58 days) at 200 cfm." Please provide a reference to the document where the actual flow rate data can be found and provide the flow rate data in an appendix to this document.*

Response:

Section 4.2.1 will be revised to address this comment (see Attachment 4). As indicated in this revised section, data collected during the 1999 operation of the AcuVac and of the Roots blower systems will be presented in Appendices F and G which are included in Attachment 4.

8. *Section 4.2.2, p. 4-3. "The AcuVac system operated at a vacuum of 6.0 inches of water, and the Roots blower operated at 24.5 inches of water." Please provide a reference to the document where the actual vacuum data can be found and provide the vacuum data in an appendix.*

Response:

As indicated in the revised Section 4.2.2 (see Attachment 4), these data are reported in Appendices F and G which will be added to the final report.

9. *Section 4.2.3, p. 4-3. Please provide the data and calculations used to estimate the 7.5 mg/m3 at the end of the period of AcuVac operation. An exponential decline in the concentration of volatile compounds is frequently observed in extracted soil gas in the initial stages of soil vapor extraction (SVE) operation. In later stages of SVE operation, relatively flat and linear concentration decline curves are commonly observed. Please provide justification for the relationship shown between the initial data point and the estimated point provided in Figure 5.21 (and Figure 5.22).*

Response:

Section 4.2.3 has been revised to indicate that only one measurement of influent TCE concentration was made during (the beginning) the 1999 AcuVac operation (see Attachment 4). Reference to this estimated concentration has been eliminated in this revised section. Section 5.2 has also been revised (see Attachment 5) to eliminate Figure 5.21 and mass removal calculations for the 1999 AcuVac operation. For the 1999 Roots blower operation, the relationship (linear in a log-log plot) shown between the initial and final point in Figure 5.22 (now revised as Figure 5.24 and included in Attachment 5) is supported by the data collected during the 1998 AcuVac operation; influent concentrations which were measured frequently during this operation show a linear relationship in a log-log plot of the data (see Figure 2.8). Although the relationship is linear on a log-log plot of the data, a linear plot of the relationship (see unnumbered figure included in Attachment 5) clearly displays the behavior mentioned in this comment.

10. *Section 5.1.2, Water Quality, page 5-2. This section should be revised to reflect the observed increase in chromium concentrations since initiation of the off-site system. In addition this section or Section 7 should be revised to incorporate recommendations concerning these increases in the chromium concentrations.*

Response:

Section 5.1.3 Water Quality (incorrectly numbered as 5.1.2 in the draft report) has been revised (see Attachment 3). The revised Section 5.1.3.2 discusses increases in chromium concentrations. Table 4.4 has also been revised to include influent and effluent chromium concentrations (see Attachment 2). The last sentence of the revised Section 5.1.3.2 states that a chromium reduction process will be added to the treatment system in 2000. A similar statement is made on the first paragraph of Section 7.2. As these statements indicate, Sparton has already received and acted upon the recommendation to implement a chromium reduction process to the treatment plant.

11. *Section 5.1.2.2, (general). Please provide discussion regarding the continuing presence of TCE in well MW-71 in the fourth quarter 1998 and fourth quarter 1999 data presented in Tables 2.5 and 4.3. Also the annual report should include a discussion on the potential for the existing containment system to capture impacted groundwater from this zone.*

Response:

The revised Section 5.1.3.1 (see Attachment 3) provides a discussion of the presence of contaminants in well MW-71. Despite its recompletion, the well is clearly continuing to leak contaminated water from shallow zones into the DFZ. As stated in the revised Section 5.1.3.1 Sparton will seek agency approval to overdrill, plug, and abandon this well. A paragraph to that effect is also added to Section 7.2 (see Attachment 7, paragraph 3).

We do not believe that it is necessary to discuss in the Annual Report the potential for the existing system to capture impacted groundwater from the DFZ: clearly, the off-site containment well was not designed to capture water from the DFZ. Leakage prior to the recompletion of MW-71 was removed from the DFZ by the pumping of about 20,000 gallons. The maximum contaminant concentrations observed before and after recompletion clearly indicate that leakage since recompletion is at a much smaller rate. It is anticipated that 10,000 to 20,000 gallons will also be pumped from the well after overdrilling and before plugging and abandoning. There are no deep production wells in the immediate vicinity of the site, and production wells in the Albuquerque area have screened intervals that are about a thousand feet long. Any contamination that may remain in the DFZ after the abandonment of the well would be of a very limited extent and would not be expected to have any significant effect on production wells in the area.

12. *Section 5.2, p. 5-4, 1st paragraph, p. 5-4. Please provide the flow rate data and methodology for estimating the final soil gas concentration as also discussed in Comments 7 and 9 above.*

Response:

See response to comments 7 and 9 above.

13. *Please provide the evidence (e.g., high to low range) to support the graphical relationship between the two data points presented in Figure 5.22 in the calculation of mass removal by the SVE system (see Comment 9).*

Response:

See response to Comment 9 above.

14. *Section 5.2, p. 5-4, last paragraph. Please provide the calculations to support the statements regarding the percent of the phase equilibrium concentration at MW-18, and justification for why soil gas at MW-18 would be at phase-equilibrium.*

Response:

Based on Henry's Law and using published Henry's Law constant for TCE (Mercer et al., 1990), the relationship between soil gas concentrations at phase equilibrium with groundwater concentrations is:

Soil gas concentration in ppmv = 0.069 x Groundwater concentration in µg/L

Thus, for the groundwater concentration of 980 µg/L observed in MW-18 the phase equilibrium concentration in soil gas would be about 68 ppmv. The observed soil gas concentration at MW-18 was 27 ppmv, that is, about 40 percent of the phase equilibrium concentration (the 34 percent reported in the cited paragraph is an error and will be corrected in the final report).

No claim is made in the cited paragraph that soil gas at MW-18 should be at phase equilibrium with groundwater concentrations. Rather, the expected phase equilibrium concentration in soil gas is used as a criterion for assessing whether contaminant flux is from the soil gas into the groundwater or from the groundwater into the soil gas. Clearly, since the soil gas concentration is less than the phase equilibrium concentration the flux is from groundwater into the soil gas. A soil gas concentration higher than the phase equilibrium concentration would have been expected if the flux was from the soil gas into the groundwater.

15. *Section 6.1.1, Hydraulic Properties, p. 6-3 2nd paragraph. Please provide more explanation for the selection of 0.114 ft/day as the vertical hydraulic conductivity of the sand unit and recent Rio Grande deposits. The ratio of horizontal to vertical hydraulic conductivity is 219, based on this selection. This appears to be a very high ratio. Please provide justification for this high of a ratio in these types of deposits.*

Response:

The vertical hydraulic conductivity of the sand unit and recent Rio Grande deposits was estimated from the observed water-level decline in the sand unit and the observed vertical hydraulic gradient in the sand unit. The water table in the sand unit has been, and is, declining at about 0.65 per year as the result of pumping from deeper aquifer units primarily for municipal uses. The vertical hydraulic gradient that occurs in the sand unit, as a result of the release of water from storage due to the lowering of the water table, provides information for estimating the vertical hydraulic conductivity. The vertical hydraulic conductivity was calculated from the following equation:

$$K_v = S_y \, \Delta h/\Delta t \, / \, i$$

where K_v is the vertical hydraulic conductivity, S_y is the specific yield, i is the vertical hydraulic gradient, and $\Delta h/\Delta t$ is the water-table decline. The derivation of this equation is shown in Attachment 8.

Using the observed water level decline (0.65 ft/yr), the observed vertical hydraulic gradient (0.002), and a specific yield of 0.15 (the specific yield is incorrectly stated as 0.2 on page 6-3 of the report), the vertical hydraulic conductivity should have been calculated as of 0.133 ft/d. Unfortunately, a mistake was apparently made in this calculation resulting in a vertical hydraulic conductivity of 0.114 ft/d. This estimated vertical hydraulic conductivity was not varied during the model calibration process. The flow and transport models are not sensitive to reasonable changes in vertical hydraulic conductivity, and the error in estimating it is not expected to have a significant effect on the modeling results presented in the report; however, it will be corrected during the re-evaluation of the model in the coming year.

The horizontal to vertical hydraulic conductivity ratio of 219 (or of 188 for the corrected estimate) for the sand unit is consistent with the ratio of 200 used in the USGS groundwater models of the Albuquerque basin (Kernodle and others 1995, Kernodle 1998).

16. *Section 6.1.1, Hydraulic Properties, p. 6-3 1st paragraph. Please provide data, including boring log data to support the areal extent of the 4970-foot clay, provided in Figure 6.3.*

Response:

An appendix (Appendix A) to support the areal extent of the 4970-foot silt/clay unit will be included in the final report. A copy of this appendix is presented in Attachment 9.

17. *Section 6.1.1, Sources and Sinks, p. 6-4, 2nd full paragraph. Please provide justification for the recharge rates applied to the Arroyo, canal and irrigated fields. The text states that the rates were estimated based on the model calibration. Explain whether the estimated recharge rates are consistent with recharge rates used in other modeling efforts completed on the aquifer systems in the Albuquerque area. If the estimated recharge rates are consistent with recharge rates used in other modeling efforts, please explain whether these recharge rates are supported by actual field demonstration data in the Albuquerque area. Provide the net-flux rates from these sources.*

Response:

The recharge rates used in the calibrated groundwater flow model were: 10 ft/yr in the Arroyo de las Calabacillas, 10 ft/yr from the irrigation canals, and 1 ft/yr on the irrigated fields. The total recharge fluxes from the arroyo, canals, and irrigated fields in the groundwater flow model are 141 gpm, 8 gpm, and 24 gpm, respectively.

The recharge rates used in the groundwater model for the arroyo, canal and the irrigated fields are consistent with those used in USGS model of the Albuquerque basin (Kernodle and others, 1995). The USGS model specifies an explicit recharge rate only for irrigated fields. The USGS model uses an irrigation recharge rate of 1 acre-foot per year per irrigated acre based upon studies conducted in the Albuquerque area (Wilson 1992). For arroyo and canals, the USGS model calculates recharge rates based on duration of flow, arroyo or canal streambed conductance, assumed thickness of streambed, and duration of flow. For a typical canal, the calculated recharge rate in the USGS model is about 30 feet per year, three times that used in the Sparton groundwater model. For an arroyo, with a streambed conductance of 1 foot per day, and a flow duration of 10 days per year, the recharge rate in the USGS model is about 10 feet per year, similar to the value used in the Sparton model.

Detailed infiltration studies were conducted in the Arroyo de las Calabacillas in conjunction with the design of the infiltration gallery. The vertical hydraulic conductivity of the streambed deposits were estimated on the basis of infiltration tests to be about 2 ft/day. In addition, when 203 gpm were discharged for a 24-hour period into the arroyo as part of an infiltration test in November 1996, it was noted that the water rapidly infiltrated into the streambed.

18. *Section 6.1.2, Model Calibration, p. 6-5 table. The values used for hydraulic conductivity for the sand units were not changed as a result of the model calibration. Provide a discussion regarding whether or not the adjustment of these parameters was a part of the calibration procedure and whether there were any other parameters calibrated other than those listed in the model.*

Response:

The report states clearly on page 6-4 that "... the input parameters that were adjusted during model calibration included the hydraulic conductivity of the 4970-foot silt/clay unit and the 4800-foot clay unit, the head drop across the 4800-foot clay unit, and the recharge rate along the arroyo." No other parameters were varied during the calibration of the groundwater flow model.

The hydraulic conductivity of the sand unit was not estimated in the model calibration process because the hydraulic conductivity of this unit was estimated by a rigorous analysis of the water-level data from October 1999 in the vicinity of CW-1. This analysis considered the measured water levels at all wells within 1000 feet of CW-1. The first step of the analysis was to determine the regional water-level trend. This trend was then subtracted from the measured water levels to produce the effect due to the pumping of CW-1. A parameter estimation routine, that incorporates the effects of pumping at CW-1, was then used to determine the transmissivity in the vicinity of CW-1 that produces the smallest residual in water levels at the monitoring wells. The transmissivity calculated using this procedure is 4040 ft^2/day. The calculated hydraulic conductivity, assuming a saturated thickness of 160 feet for the sand unit, is 25 feet/day.

19. *The text in Section 2 lists the hydraulic conductivity of the aquifer as a range from 25 to 30 ft/day. A hydraulic conductivity of 30 ft/day appears to match the steady state drawdown in wells OB-1 and OB-2 better than 25 feet per day, but it results in a smaller capture area. The model match presented in Table 6.2 indicates the model is over predicting the drawdown at OB-1 and OB-2. Explain whether the hydraulic conductivity of the sand units varied as a part of the calibration procedure. Could an alternative model match be generated that matches the hydraulic head data as well with a hydraulic conductivity of 30 ft/day?*

Response:

The data listed on Table 6.2 do not provide the information required to determine whether or not the groundwater model overestimates or underestimates drawdowns at OB-1 and OB-2. Only observed and simulated hydraulic heads, not drawdowns, are listed on Table 6.2.

An estimate of the observed drawdowns at OB-1 and OB-2 was calculated using the procedure described in the response to comment 18. These data were subsequently used to estimate the hydraulic conductivity in the vicinity of CW-1, and this estimate was used in the groundwater model. As a result, the use of a hydraulic conductivity of 25 ft/day in the groundwater will produce a better simulation of drawdowns in the vicinity of CW-1 than any other value of hydraulic conductivity. The model, though, has not been used to simulate drawdowns in October 1999 at OB-1 and OB-2 from the operation of CW-1. These drawdowns could be calculated by simulating the period September 1998 to October 1999 with no pumping at CW-1 and then subtracting the hydraulic heads from this simulation from those listed on Table 6.2.

The data on Table 6.2 do show, though, that the groundwater model underestimates water levels of OB-1, OB-2, and at most other monitoring wells in the vicinity of CW-1. This underestimation occurs, most likely, because of errors in estimating the constant heads imposed on the northwest boundary of the groundwater model domain. The errors in estimating the specified boundary heads are believed to be small, and such small errors have a negligible effect on the calculated zones of capture. Nevertheless, the effects of these boundary heads on calculated water levels will be further evaluated as the model is improved in the coming years.

20. *Section 6. Please provide a figure that compares the capture area predicted by the model with the TCE plume shown in other figures (for November 1998 and October 1999).*

Response:

Figures 6.4a through 6.6a, and Figures 6.4b through 6.6b presented in Attachment 10 provide this comparison. Note that Figures 6.4a and 6.5a suggest that the leading edge of the November 1998 plume may be outside the model calculated capture zone in the UFZ and ULFZ. This is misleading. The 1998 and 1999 plume maps that were used in preparing these figures were based on a combination of data from monitoring wells of different depth. The leading edge of the 1998 plume is based on data from well MW-65, an LLFZ well. UFZ well MW-52 at this location is clean; the leading edge of the1998 plume is therefore in the LLFZ where it lies within the model calculated capture zone (see Figure 6.6a). This is illustrated in Figures 6.4c through 6.6c of Attachment 10 which compare the model calculated capture zones in the UFZ, ULFZ, and LLFZ with the extent of the November 1998 plume in the UFZ, ULFZ, and LLFZ (see Figures B-1 through B-4 presented in Attachment 1).

While the model results confirm the effectiveness of the containment well in containing the plume, it should be pointed out that in the Annual Report the evaluation of the capture zone of the containment well is based on the analysis of water-level data from monitoring wells (Figures 5.1 through 5.12 of the draft report) rather than the model results.

21. *Section 6. There is no information regarding whether the model was run in transient mode and compared to the data from the short and long term pumping tests of CW-1. In addition, provide a discussion indicating whether this was a part of the calibration procedure.*

Response:

The groundwater flow model was run in transient mode to simulate groundwater conditions from November 1998 to October 1999, and from October 1999 to November 2000. These simulations are described on page 6-10 of the report.

The model was used to simulate the operation of CW-1 from January through October 1999. No model parameters were adjusted as the result of this simulation. The transient analysis was not part of the calibration process because there essentially was no information available from the change in water levels during the simulation period that provided new information on aquifer parameters. The hydraulic conductivity in the vicinity of CW-1 was estimated from a rigorous analysis of the water level data from October 1999 as described in the response to comment 18 and the model boundary conditions were specified on the basis of measured water levels, which essentially used all of the available information. No formal attempt was made to use the groundwater flow model to simulate the pumping tests at CW-1 because the analysis of the October 1999 water levels, which reflects nearly 10 months of operation of CW-1, provides the best estimate of the hydraulic conductivity of the sand unit.

22. *Section 6. There is no information regarding whether a sensitivity analysis has been performed on the groundwater flow model. If this analysis was conducted, please present the results. If it was not, please explain why this is not considered necessary. Given the apparent desire to provide a capture zone that provides just minimal capture of the plume, testing the sensitivity of the assumptions that are used in the hydraulic analysis of the aquifer would seem appropriate. The flow model is an excellent tool for accomplishing this.*

Response:

A discussion of the sensitivity analysis issue is presented below. As it was pointed out earlier, however, the evaluation of the capture zone of the containment well is based on analyses of water-level data from monitoring wells (Figures 5.1 through 5.12) rather than model results.

Sensitivity analyses of groundwater models are a powerful technique for gaining an understanding of how changes in model parameters affect the simulated hydraulic heads and directions of groundwater flow. An analysis of the sensitivity of the various model parameters in the groundwater flow model of the Sparton site was conducted as part of the model calibration process. This analysis indicated that the simulated hydraulic heads are very sensitive to the hydraulic conductivity of the 4970-foot silt/clay unit, the hydraulic conductivity of the 4800-foot clay unit, and the recharge rate along the arroyo when these parameters were varied within reasonable ranges. The groundwater flow model is not sensitive to changes in the hydraulic conductivity of the sand unit, when this parameter is varied within reasonable ranges. The reasons that the model is not sensitive to changes in the hydraulic conductivity of the sand unit are: 1) the reasonable range for this parameter has been determined by analysis of pumping test data and long-term system performance data to be small, and 2) constant head boundary conditions are imposed on the southeast and northwest boundaries of the model.

The three parameters identified in the sensitivity analysis as sensitive parameters were subsequently varied in the model calibration process to minimize the residuals between observed and simulated water levels. Only one combination of these model parameters was identified that minimized the residuals. A sensitivity analysis could have subsequently been performed by varying the values of these parameters, but each realization in the sensitivity analysis would have had residuals that were larger than those shown on Table 6.2. This was judged not to be a fruitful exercise.

The simulated capture zone of CW-1 was determined to not be very sensitive to variations in the model parameters that were adjusted in the model calibration process. The simulated capture zone is mainly a function of the horizontal hydraulic conductivity of the sand unit. As noted in the responses to many of the comments, this parameter has been accurately estimated using detailed analyses of the water-level data during operation of CW-1.

23. *Section 6. Please provide the approximate travel time from the Sparton Facility to well CW-1 (based on the flow model or based on the aquifer analysis provide in previous sections of the report).*

Response:

The travel time from the facility to CW-1, calculated by applying the particle-tracking program PATH3D to the 1999 water-level conditions computed by the groundwater flow model, is about 20 years. Note that this calculation assumes that the containment well is operating continuously and that water levels remain at their 1999 conditions throughout the 20-year travel period.

24. *Section 6.2.1, Transport Parameters, p. 6-7, last full sentence. Please provide the data that support the use of 0.01 percent as the organic carbon content of the aquifer. In addition provide a discussion of how sensitive the model is to the choice of organic carbon content and whether future runs of the model will include retardation.*

Response:

The organic-carbon content of the sand unit has not been measured at the Sparton site. A low value for the organic carbon content was assumed based on our experiences at other sites in the southwest with relatively coarsed-grained alluvial sediments. The model is not very sensitive to the organic-carbon content for the simulations that were described in the report. It is not very sensitive because of the short-time periods that were simulated.

Our experience is that the long-term fate of chlorinated volatile organic compounds in groundwater is very sensitive to the amount of interaction that occurs between the organic compound and the aquifer matrix, and the amount of diffusion that occurs from fine-grained units into coarser grained units. Both of these parameters produce an effect that can be simulated with an effective retardation coefficient, but because the latter process can not be measured with simple tests and is often the dominant process, measuring the fraction-organic carbon content usually does not provide much useful information for predicting the long-term fate of organic compounds in groundwater. Our experience is that the best method for estimating the effective retardation coefficient is to observe the long-term changes in concentration that occur during aquifer remediation, and this is our proposed approach for the Sparton site. The groundwater model will be updated as additional information becomes available.

25. *Section 7.1, Summary and Conclusions, p. 7-2, 1st full paragraph (also see Section 5.1.2 and Executive Summary, page ES-2). The text indicates that 115 million gallons of groundwater have been pumped at the off-site containment well in 1999 and indicates that this represents 10 percent of the volume of contaminated groundwater. Not all of the groundwater pumped by CW-1 comes from the contaminated groundwater plume. Please provide an estimate of what percentage of the pumped groundwater was derived from the volume of contaminated groundwater and what percentage of the total volume this represents. This issue should also be addressed in Section 5.1.2 and Executive Summary, page ES-2.*

Response:

As shown in Figures B-1 through B-4 of Appendix B (see Attachment 1) essentially all of the water pumped from CW-1 during the first year of operation came from the contaminated groundwater plume. During the first year of pumping approximately 115 million gallons of groundwater was removed. This groundwater represents water that was in storage in the vicinity of CW-1; in fact, it represents the amount of water that was in storage in a cylindrical volume with a radius of about 320 feet and a height equal to the saturated thickness of the aquifer above the 4800-foot clay. Because of the regional groundwater gradient, CW-1 is not at the center of the cylinder, it is off-centered toward the downgradient side of the cylinder. The horizontal extent of this cylinder shown in the figures of Appendix B was estimated using the particle-tracking program PATH3D.

References

Kernodle, J.M., D.P. McAda, and C. R. Thorn, 1995, Simulation of Ground-Water Flow in the Albuquerque Basin, Central New Mexico, 1901-1994, with Projections to 2020. U.S. Geological Survey, Water-Resources Investigations Report 94-4251.

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Mercer, J. W., D. C. Skipp, and Daniel Giffin, 1990, Basics of Pump-and-Treat – Ground-Water Remediation Technology, EPA/600/8-90/003, USEPA, Robert S. Kerr Environmental Research Laboratory, Ada, OK 74820.

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ATTACMENT 1

2.6.1.3 Pore Volume of Plume

TCE is the predominant contaminant at the Sparton site and has the largest plume. Calculation of the volume of water contaminated above MCLs, referred to as the pore volume of the plume, was therefore based on the horizontal and vertical extent of the TCE plume.

In preparing the plume maps presented in the previous section (Figures 2.4 through 2.16), the completion zone of monitoring wells was not considered; that is, data from an UFZ well at one location was combined with data from an ULFZ or LLFZ well at another location. At well cluster locations, the well with the highest concentration was used, regardless of its completion zone. As such, the horizontal extent of the TCE plume shown in Figure 2.14 represents the envelop of the extent of contamination at different depths, rather than the extent of the plume at a specific depth within the aquifer.

To estimate the pore volume of the plume, the horizontal extent of the TCE plume was separately determined for the UFZ, the ULFZ and LLFZ by preparing plume maps based on data from monitoring wells completed within each of these zones. The concentrations measured in the fully penetrating containment well CW-1 and observation wells OB-1 and OB2 were assumed to represent average concentrations present in the entire aquifer above the 4800-foot clay, and these data were used in preparing all three maps. A rough estimate of the horizontal extent of TCE contamination at the top of the 4800-foot clay was also made using the data from the containment well and the two observation wells, and data from two temporary wells that obtained samples from about 30-35 feet above the top of the clay during the construction of DFZ wells MW-67 (July 1996) and MW-71 (June 1998). The resulting horizontal extent of the TCE plume in each of these four zones is shown in Figures B-1 through B-4 presented in Appendix B.

The extent of the plume in the UFZ was assumed to represent conditions at the water table; based on the elevation of the screened intervals in ULFZ and LLFZ wells (see Figure 2.4), the extent of the plume in the ULFZ was assumed to represent conditions at an elevation of 4940 ft, and that of the LLFZ conditions at an elevation of 4900 ft. The extent of the plume at the top of the clay was assumed to represent conditions at an elevation of 4800 ft. The area of the TCE plumes at each of these four horizons was calculated. Using these areas, the thickness of the interval between horizons, and a porosity of 0.3, the pore volume was estimated to be approximately 150 million cubic feet (ft^3), or 1.13 billion gallons, or 3450 acre-ft.[1]

2.6.1.4 Dissolved Contaminant Mass

To estimate the mass of dissolved contaminants present in the surficial aquifer prior to the operation of the off-site containment system, an attempt was first made using an approach similar to that used in estimating the pore volume of the plume, and based on the concentration distributions in plumes maps that were developed using monitoring well data. This approach resulted in an estimated total dissolved mass of about 675 kilograms (kg), or 1490 pounds (lbs) consisting of about 620 kg (1370 lbs) of TCE, 38 kg (80 lbs) of DCE, and 17 kg (40 lbs) of TCA.

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[1] The features of the commercially available mapping program Surfer 7.0 (copyright © 1999, Golden Software, Inc.) were used in generating the plume maps and in calculating plume areas and pore volumes.

The TCE and DCE concentrations observed during 1999 in the water pumped by the containment well (see Section 5.1.3.2 and Table 4.4), however, indicate that the initial concentrations of these compounds in areas upgradient from the containment well, or at least within the area from which water was removed in 1999 (see Appendix B, Figures B-1 through B-4), are significantly higher than those expected from the plume maps (Figures 2.14 and 2.15, and B-1 through B-4) that were developed from monitoring well data. It was, therefore, concluded that the approach used above underestimates the mass of contaminants present within the aquifer.

The calibration of the numerical transport model that was developed for the site and its vicinity (see Section 6) provides a more reliable estimate of the initial contaminant mass. During the calibration process of this model, the initial TCE concentration distribution within each model layer was adjusted, in a manner consistent with the concentrations observed in monitoring wells, until computed concentrations of TCE in the pumped water closely matched the observed concentrations. This process resulted in an initial dissolved TCE mass of about 2,180 kg (4,810 lbs). Based on this result, and the ratios of TCE mass to DCE and TCA mass in the plume-map based estimates discussed above, the initial masses of DCE and TCA are estimated to be approximately 140 kg (310 lbs) and 70 kg (155 lbs), respectively. Thus, the total mass of dissolved contaminants is estimated to be about 2,400 kg (5,300 lbs).

Clearly, these are rough estimates of the dissolved contaminant mass, but they provide a preliminary basis of comparison for the mass removal rates of the operating and of the to-be-installed containment systems. As model calibration improves during the coming years, and DCE and TCA transport, if required, is included in the model, these estimates will also be refined.

APPENDIX B

HORIZONTAL EXTENT
OF THE TCE PLUME
AT DIFFERENT DEPTH INTERVALS
NOVEMBER 1998

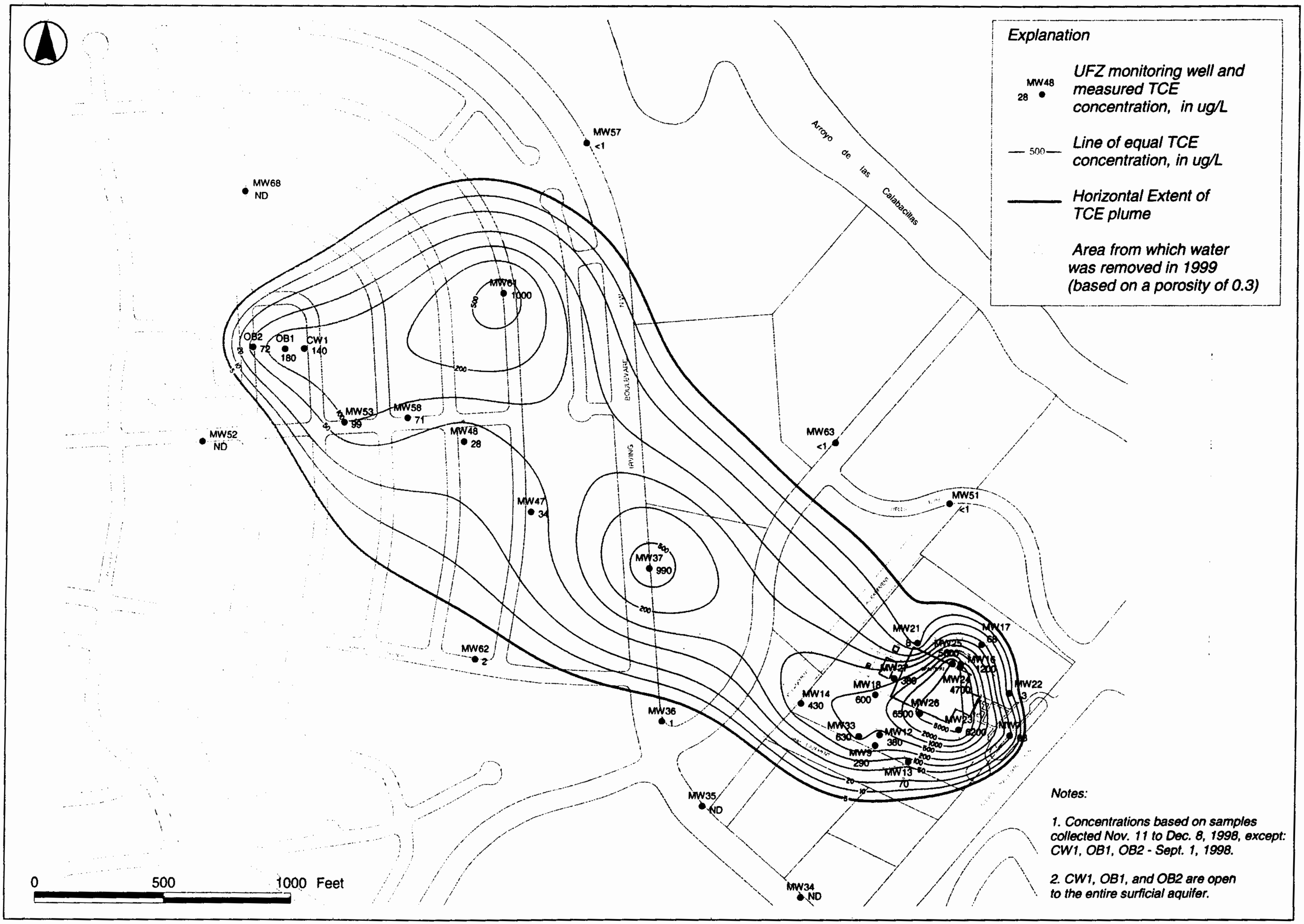

Figure B-1 Horizontal Extent of TCE Plume at the Water Table (UFZ) prior to the Operation of the Off-Site Containment Well

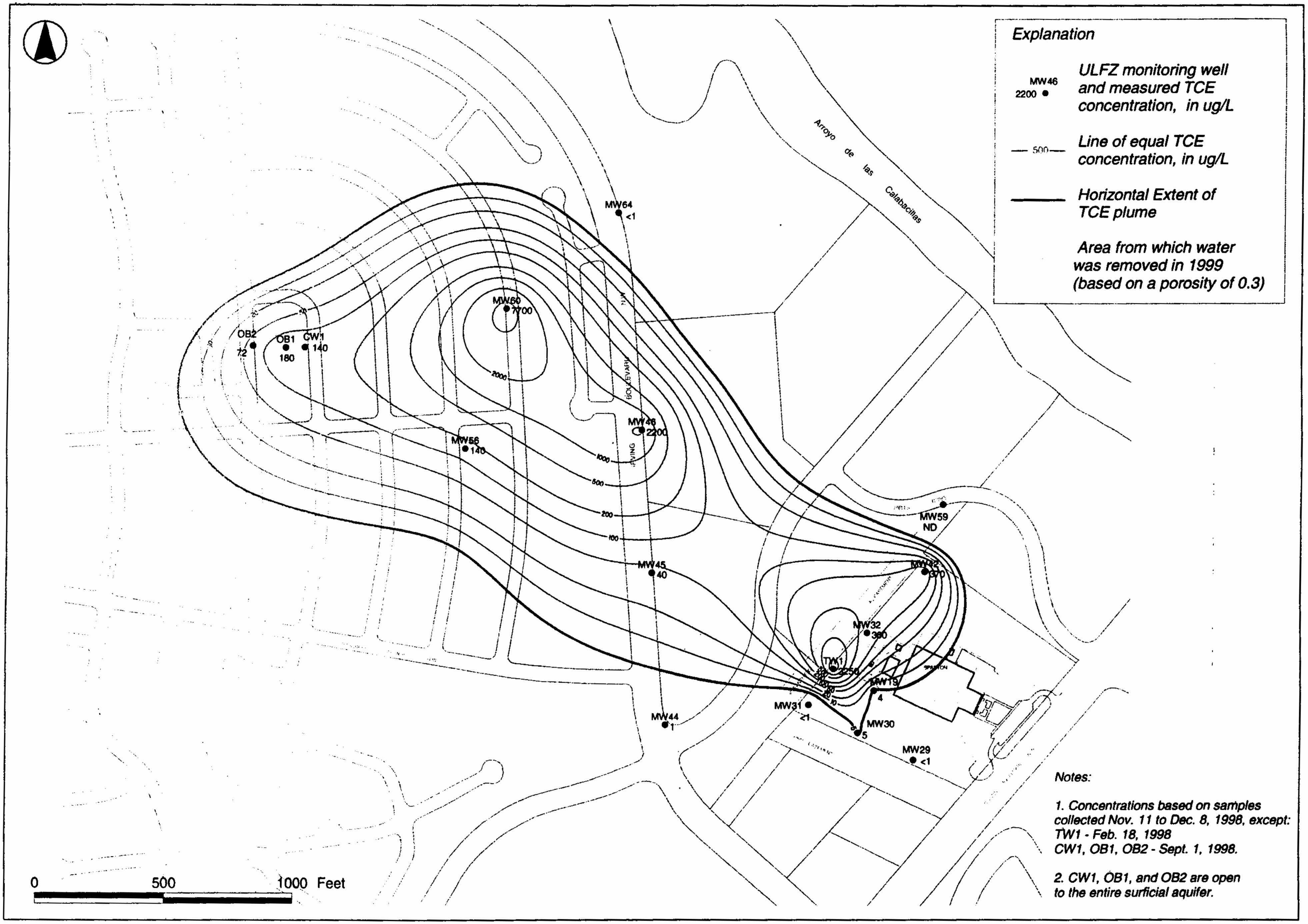

Figure B-2 Horizontal Extent of TCE Plume at the ULFZ prior to the Operation of the Off-Site Containment Well

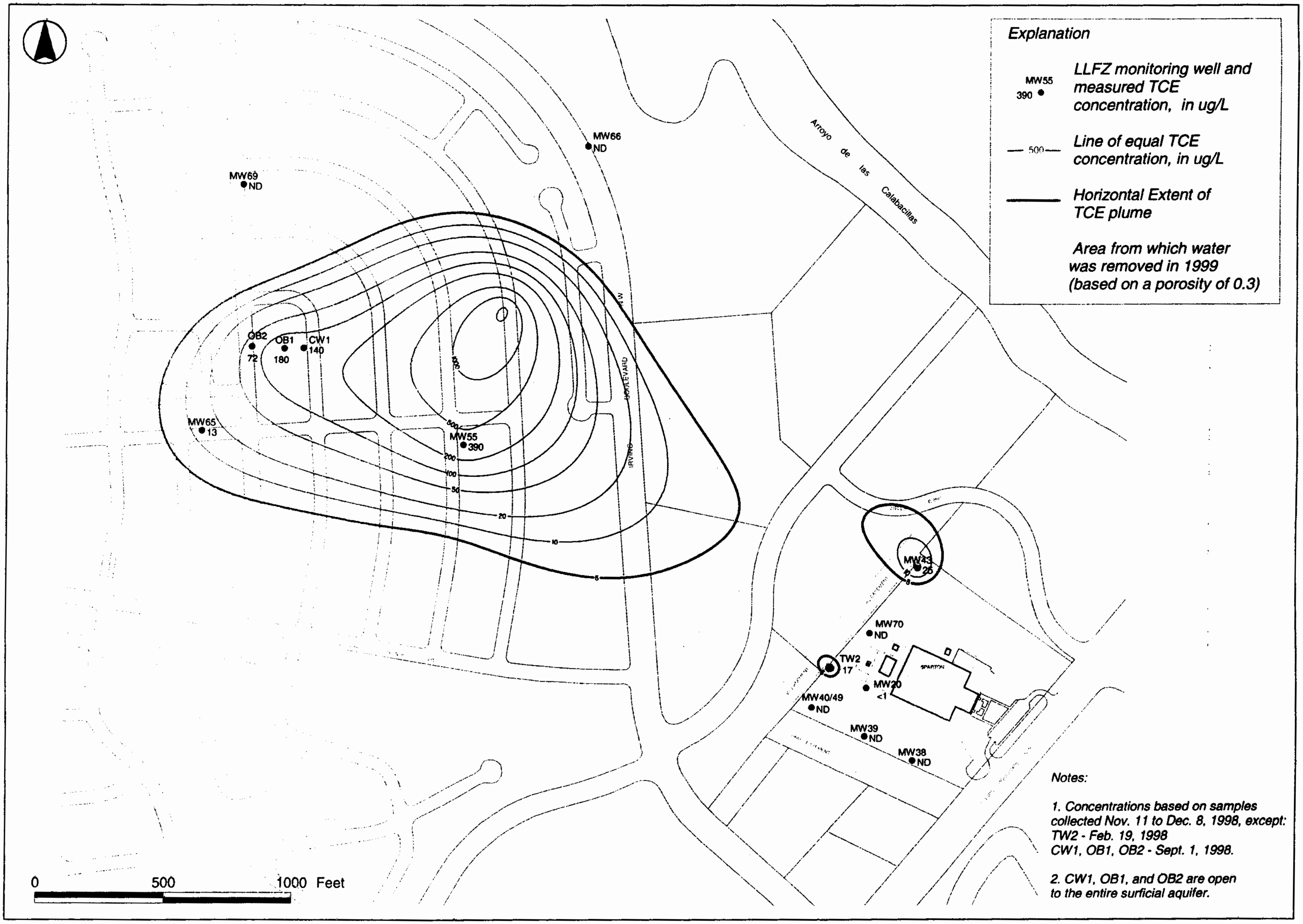

Figure B-3 Horizontal Extent of TCE Plume at the LLFZ prior to the Operation of the Off-Site Containment Well

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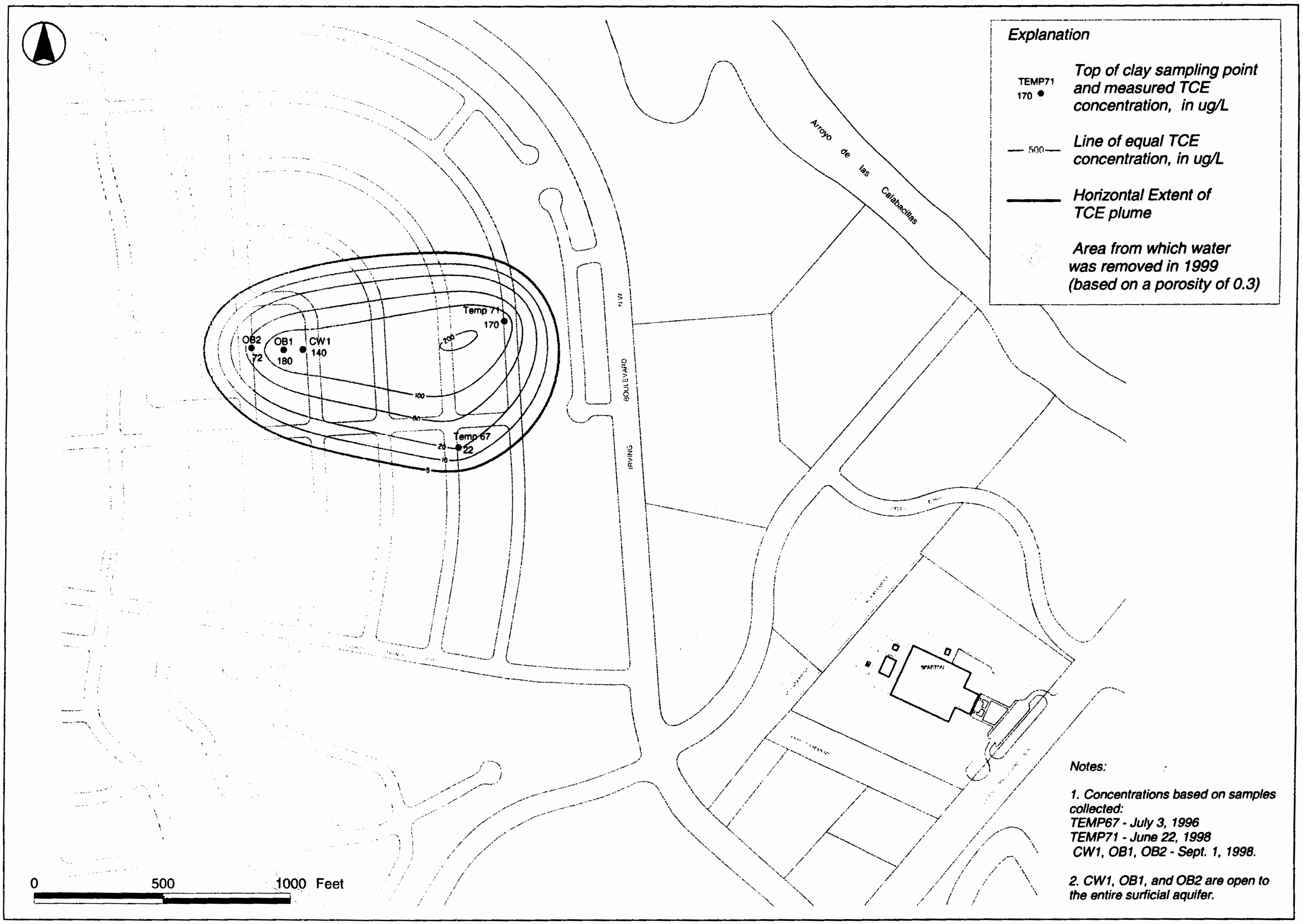

Figure B-4 Horizontal Extent of TCE Plume at the Top of the 4800-foot Clay - prior to the Operation of the Off-Site Containment Well

ATTACHMENT 2

2.6.1.2 Groundwater Quality

The concentrations of TCE, DCE, and TCA in groundwater samples obtained from monitoring wells during the Fourth Quarter 1998 sampling event are summarized on Table 2.5. Also included on this table are data obtained on September 1, 1998 from the off-site containment well, CW-1, and the nearby observation wells, OB-1 and OB-2, and from temporary wells, TW-1 and TW-2, drilled in early 1998 at the current location of MW-73 and sampled on February 18 and 19, 1998, respectively. For each of the compounds reported on Table 2.5, concentrations that exceed the more stringent of its Maximum Contaminant Level (*MCL)* for drinking water or its maximum allowable concentration in groundwater set by the New Mexico Water Quality Control Commission (*NMWQCC*) are highlighted.

These concentration data were used to prepare maps showing the horizontal extent of the TCE, DCE and TCA plumes as they existed in November 1998, prior to the beginning of pumping from the off-site containment well. The procedures presented in the Work Plan for the Off-Site Containment System were used in preparing these maps (SSP&A, 2000a). The horizontal extent of the TCE plume (in November 1998) is shown in Figure 2.14 and the extent of the DCE and TCA plumes is shown in Figures 2.15 and 2.16, respectively. The extent of these plumes forms a basis for evaluating the effectiveness of the remedial actions that have been or are about to be implemented at the site.

4.1.3.1 Monitoring Wells

Monitoring wells were sampled at the frequency specified in the Groundwater Monitoring Program Plan (Attachment A to Consent Order). The samples were analyzed for volatile organic compounds (primarily for determination of TCE, DCE, and TCA concentrations), and for total and hexavalent chromium (both filtered and unfiltered samples). The results of monitoring well sample analyses performed in 1999 are presented in Appendix D. Data on TCE, DCE and TCA concentrations, in samples collected during the Fourth Quarter of 1999 (November 1999), are summarized on Table 4.3. For each of the compounds reported on Table 4.3 and in Appendix D, concentrations that exceed the more stringent of its MCL for drinking water or its maximum allowable concentration in groundwater set by NMWQCC are highlighted.

4.1.3.2 Influent and Effluent

Sampling of the influent began upon the completion of the containment well in late August 1998. Samples were collected at the end of well development and during the testing of the well in December 1998. In 1999, several samples were collected during the 30-day feasibility test of the well (the first 30 days of operation at a rate intended to contain the plume). After the end of this test, the influent was not sampled until the testing of the air stripper during the last week of April 1999. Several samples of the influent to and the effluent from the stripper were collected during this week. After the resumption of pumping on May 6, 1999, the influent to and the effluent from the air stripper were sampled frequently until mid-June. At the beginning of July 1999, the sampling frequency of the influent and effluent became monthly.

All samples were analyzed for volatile organic compounds (primarily for determination of TCE, DCE, and TCA concentrations). In addition, samples collected between the end of development and the end of the 30-day feasibility test were analyzed for total and hexavalent chromium, arsenic, lead, total dissolved solids (TDS), total alkalinity and hardness; the sample collected at the end of the feasibility test was also analyzed for iron and manganese. After the beginning of the complete system operation on May 6, 1999, effluent samples were also analyzed for total chromium, iron, and manganese under the requirements of the permit that controls the discharge of the treated water into the infiltration gallery; both influent and effluent samples were analyzed for these metals between August and December, 1999.

The results of these influent and effluent sample analyses are presented in Appendix E. Concentrations of TCE, DCE, and total chromium in samples collected during 1999 are summarized on Table 4.4. For each of the three compounds shown on Table 4.4, concentrations that exceed the more stringent of its MCL for drinking water or its maximum allowable concentrations in groundwater set by NMWQCC are highlighted. Because concentrations of TCA in influent, and consequently in effluent samples have been below detection limits throughout 1999, TCA is not reported in Appendix E or on Table 4.4. Note that, when both influent and influent samples were analyzed for chromium, the concentrations were essentially the same (except for the December 1, 1999 sample). This is to be expected as chromium concentrations are not significantly affected by air stripping.

Table 2.5

Water-Quality Data - Fourth Quarter 1998[a]

Well ID	Sampling Date	Concentration, in µg/L		
		TCE	DCE	TCA
CW1	9/1/98	140	2.9	<20
OB1	9/1/98	180	3.6	<20
OB2	9/1/98	72	1.7	<20
PW1	12/4/98	48	1	2.2
MW7	12/1/98	63	15	12
MW9	12/3/98	290	19	18
MW12	12/7/98	380	26	18
MW13	12/1/98	70	3.2	8
MW14	12/1/98	430	24	4.2
MW16	12/8/98	1200	30	170
MW17	12/1/98	68	3.5	13
MW18	12/2/98	600	50	42
MW19	11/23/98	4.2	<1.0	<1.0
MW20	11/23/98	<1.0	<1.0	<1.0
MW21	12/2/98	7.5	<1.0	1.1
MW22	11/19/98	13	2	4.6
MW23	12/3/98	6200	400	720
MW24	12/8/98	4700	74	480
MW25	12/8/98	5600	73	540
MW26	12/3/98	6500	590	550
MW27	12/2/98	380	24	90
MW29	11/19/98	<1.0	<1.0	<1.0
MW30	11/23/98	5.4	<1.0	<1.0
MW31	11/23/98	<1.0	<1.0	<1.0
MW32	11/30/98	550	96	30
MW33	12/2/98	630	53	28
MW34	11/18/98	<1.0	<1.0	<1.0
MW35	12/8/98	<1.0	<1.0	<1.0
MW36	12/7/98	1.4	<1.0	<1.0
MW37	12/3/98	990	48	<5
MW38	11/19/98	<1.0	<1.0	<1.0
MW39	11/23/98	<1.0	<1.0	<1.0
MW40	11/30/98	<1.0	<1.0	<1.0

Well ID	Sampling Date	Concentration, in µg/L		
		TCE	DCE	TCA
MW41	11/19/98	170	26	<15
MW42	11/19/98	370	48	21
MW43	11/19/98	25	5.1	5.4
MW44	11/18/98	1.3	<1.0	<1.0
MW45	11/18/98	40	1.7	<1.0
MW46	11/19/98	2200	130	2.3
MW47	11/17/98	34	1.2	<1.0
MW48	11/17/98	28	1	<1.0
MW49	11/23/98	<1.0	<1.0	<1.0
MW51	11/18/98	<1.0	<1.0	<1.0
MW52	11/30/98	<1.0	<1.0	<1.0
MW53	11/16/98	99	3.4	<1.0
MW55	11/16/98	390	10	<1.0
MW56	11/16/98	140	4.7	<1.0
MW57	12/8/98	<1.0	<1.0	<1.0
MW58	11/16/98	71	2.5	<1.0
MW59	11/18/98	<1.0	<1.0	<1.0
MW60	11/17/98	7700	350	52
MW61	12/7/98	1000	54	11
MW62	12/7/98	2	6.6	4.8
MW63	12/2/98	<1.0	<1.0	<1.0
MW64	11/17/98	<1.0	<1.0	<1.0
MW65	11/16/98	13	<1.0	<1.0
MW66	11/17/98	<1.0	<1.0	<1.0
MW67	11/17/98	<1.0	<1.0	<1.0
MW68	11/12/98	<1.0	<1.0	<1.0
MW69	11/12/98	<1.0	<1.0	<1.0
MW70	11/23/98	<1.0	<1.0	<1.0
MW71	11/17/98	56	1.6	<1.0
TW1	2/18/98	3100	280	180
TW1 Dup.		3400	270	170
TW2	2/19/98	18	<1.0	<1.0
TW2 Dup.		16	<1.0	<1.0

[a] Includes 2/18/98 data from temporary well TW1/2 which was drilled at the current location of well MW73, and 9/1/98 data from the containment well CW1, and observation wells OB1 and OB2.

Note: Shaded cells indicate concentrations which exceed MCLs based on the more stringent of the drinking water standards or the maximum allowable concentrations in groundwater set by the NMWQCC (5 µg/L for TCE and DCE, and 60 µg/L for TCA).

Table 4.3

Water-Quality Data - Fourth Quarter 1999

Well ID	Sampling Date	Concentration, in µg/L TCE	DCE	TCA
CW1	11/3/99	1000	37	<20
MW7	11/16/99	84	16	8.8
MW9	11/5/99	220	16	14
MW12	11/18/99	230	25	10
MW13	11/15/99	57	3.8	5.7
MW16	11/18/99	46	3.5	6.9
MW17	11/16/99	21	1.5	3.4
MW18	11/19/99	980	180	60
MW19	11/8/99	2.4	<1.0	<1.0
MW20	11/8/99	<1.0	<1.0	<1.0
MW21	11/18/99	1.7	<1.0	<1.0
MW22	11/9/99	7	1.3	2.7
MW23	11/18/99	1300	110	120
MW25	11/19/99	210	13	20
MW26	11/19/99	3900	400	380
MW29	11/5/99	<1.0	<1.0	<1.0
MW30	11/8/99	3.4	<1.0	<1.0
MW31	11/9/99	<1.0	<1.0	<1.0
MW32	11/10/99	710	200	24
MW33	11/16/99	320	46	19
MW34	11/4/99	<1.0	<1.0	<1.0
MW35	11/16/99	<1.0	<1.0	<1.0
MW36	11/15/99	1	<1.0	<1.0
MW37	11/16/99	910	58	2.9
MW38	11/5/99	<1.0	<1.0	<1.0
MW39	11/8/99	<1.0	<1.0	<1.0
MW40	11/9/99	<1.0	<1.0	<1.0
MW41	11/10/99	450	100	25
MW42	11/10/99	360	49	16

Well ID	Sampling Date	Concentration, in µg/L TCE	DCE	TCA
MW43	11/9/99	36	7.2	5.3
MW44	11/4/99	<1.0	<1.0	<1.0
MW45	11/4/99	26	<1.0	<1.0
MW46	11/4/99	880	82	12
MW47	11/3/99	42	2	<1.0
MW48	11/3/99	34	1.3	<1.0
MW49	11/10/99	<1.0	<1.0	<1.0
MW51	11/9/99	<1.0	<1.0	<1.0
MW52	11/12/99	<1.0	<1.0	<1.0
MW53	11/12/99	62	2.5	<1.0
MW55	11/2/99	260	10	<5
MW56	11/2/99	53	2	<1.0
MW57	11/15/99	<1.0	<1.0	<1.0
MW58	11/15/99	26	<1.0	<1.0
MW59	11/10/99	<1.0	<1.0	<1.0
MW60	11/3/99	11000	480	<100
MW61	11/3/99	200	12	<5
MW62	11/12/99	2.5	7.4	4.5
MW64	11/4/99	5.4	<1.0	<1.0
MW65	11/4/99	<1.0	<1.0	<1.0
MW66	11/4/99	<1.0	<1.0	<1.0
MW67	11/3/99	<1.0	<1.0	<1.0
MW68	11/2/99	<1.0	<1.0	<1.0
MW69	11/2/99	<1.0	<1.0	<1.0
MW70	11/9/99	<1.0	<1.0	<1.0
MW71	11/3/99	65	1.8	<1
MW72	11/9/99	1200	200	100
MW73	11/9/99	4100	770	190

Note: Shaded cells indicate concentrations which exceed MCLs based on the more stringent of the drinking water standards or the maximum allowable concentrations in groundwater set by the NMWQCC (5 µg/L for TCE and DCE, and 60 µg/L for TCA).

Table 4.4

Off-Site Containment System Influent and Effluent Quality - 1999[a]

Sampling Date	Concentration, in µg/L						Remarks
	Influent			Effluent			
	TCE	DCE	Cr Total	TCE	DCE	Cr Total	
12/31/98	190	4.6	23				Beginning of 30-day Feasibility Test
1/7/99	150	<1	23				During 30-day Feasibility Test
1/15/99	164	3.65	24				During 30-day Feasibility Test
1/21/99	150	4.2	24				During 30-day Feasibility Test
2/1/99	170	5.3	35				End of 30-day Feasibility Test
4/23/99	900	38		<1.0	<1.0		Air Stripper testing
4/27/99	840	38		<1.0	<1.0		Air Stripper testing
4/29/99	850	38		<1.0	<1.0		Air Stripper testing
5/6/99	1000	45		<0.3	<0.2	62	Beginning of complete system operation
5/7/99	1000	46		<0.3	<0.2	110	System operation
5/8/99	840	37		0.3	<0.2	49	System operation
5/9/99	920	40		0.4	<0.2	42	System operation
5/10/99	940	41		0.3	<0.2	37	System operation
5/11/99	950	41		<0.3	<0.2	49	System operation
5/12/99	850	34		<0.3	<0.2	53	System operation
5/18/99	920	43		0.4	<0.2	56	System operation
5/25/99	1000	45		0.3	<0.2	<50	System operation
6/1/99	940	43		<0.3	<0.2	49	System operation
6/10/99	1000	46		<0.3	<0.2	51	System operation
7/1/99	940	49		<0.3	<0.2	49	System operation
7/28/99			48			48	System operation
8/2/99	1200	48	48	<0.3	<0.2	49	System operation
9/10/99	1200	73	48	<0.3	<0.2	49	System operation
10/6/99	890	35	49	<0.3	<0.2	44	System operation
11/3/99	1000	37	52	0.7	<0.2	52	System operation
12/1/99	920	47	81	0.5	<0.2	51	System operation
1/3/00	860	41		0.4	<0.2	53.4	System operation

[a] Note that data from 12/31/98 and 1/3/00 has been included to show conditions at the beginning and end of the year.

Note: Shaded cells indicate concentrations which exceed MCLs based on the more stringent of the drinking water standards or the maximum allowable concentrations in groundwater set by the NMWQCC (5 µg/L for TCE and DCE, and 50 µg/L for total chromium).

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Well ID	Sample Date	TCE ug/L	DCE ug/L	TCA ug/L	Unfiltered Cr Total mg/L	Unfiltered Cr +6 mg/L	Filtered Cr Total mg/L	Filtered Cr +6 mg/L
MW-7	11/16/99	84	16	8.8	0.027	NA	0.011	NA
MW-9	05/26/99	270	17	15	<0.05	<0.01		
	11/05/99	220	16	14	0.007	NA	NA	NA
MW-12	11/18/99	230	25	10	0.031	NA	0.022	NA
MW-13	11/15/99	57	3.8	5.7	0.013	NA	0.0055	NA
MW-14	10/28/99	DRY						
MW-15	02/16/99	DRY						
	05/13/99	DRY						
	10/28/99	DRY						
MW-16	05/25/99	280	12	48	0.308	0.06	<0.005	0.04
	11/18/99	46	3.5	6.9	0.55	NA	0.13	NA
MW-17	11/16/99	21	1.5	3.4	0.031	NA	<0.005	NA
MW-18	11/19/99	980	180	60	0.012	NA	0.012	NA
MW-19	05/20/99	5.5	<1.0	<1.0	0.007	<0.01		
	11/08/99	2.4	<1.0	<1.0	<0.005	NA	NA	NA
MW-20	05/20/99	<1.0	<1.0	<1.0	0.007	<0.01		
	11/08/99	<1.0	<1.0	<1.0	0.005	NA	NA	NA
MW-21	05/13/99	DRY						
	11/18/99	1.7	<1.0	<1.0	0.044	NA	0.005	NA
MW-22	05/19/99	21	2.7	5.6	<0.005	<0.01	NA	NA
	11/09/99	7	1.3	2.7	<0.005	NA	NA	NA
MW-23	11/18/99	1300	110	120	0.073	NA	0.03	NA
MW-25	11/19/99	210	13	20	0.005	NA	0.33	NA
MW-26	11/19/99	3900	400	380	0.45	NA	0.07	NA
MW-28	02/16/99	NA	NA	NA	NA	NA	NA	NA
	05/13/99	DRY						
MW-29	11/05/99	<1.0	<1.0	<1.0	<0.005	NA	NA	NA
MW-30	11/08/99	3.4	<1.0	<1.0	0.042	NA	NA	NA
MW-31	11/09/99	<1.0	<1.0	<1.0	0.0065	NA	NA	NA
MW-32	11/10/99	710	200	24	<0.005	NA	NA	NA
MW-33	11/16/99	320	46	19	1.9	NA	0.006	NA
MW-34	02/18/99	NA	NA	NA	0.1	<0.01	<0.005	<0.01
	11/04/99	<1.0	<1.0	<1.0	0.033	NA	NA	NA
MW-35	11/16/99	<1.0	<1.0	<1.0	0.1	NA	0.052	NA
MW-36	11/15/99	1	<1.0	<1.0	0.084	NA	0.045	NA
MW-37	11/16/99	910	58	2.9	0.25	NA	0.007	NA
MW-38	11/05/99	<1.0	<1.0	<1.0	0.0077	NA	NA	NA
MW-39	02/18/99	NA	NA	NA	0.054	0.06	0.054	0.06
	11/08/99	<1.0	<1.0	<1.0	0.034	NA	NA	NA
MW-40	11/09/99	<1.0	<1.0	<1.0	0.0069	NA	NA	NA
MW-41	11/10/99	450	100	25	<0.005	NA	NA	NA
MW-42	05/19/99	270	40	17	<0.005	<0.01	NA	NA
	11/10/99	360	49	16	<0.005	NA	NA	NA
MW-43	05/19/99	40	7.2	5.8	<0.005	<0.01	NA	NA
	11/09/99	36	7.2	5.3	<0.005	NA	NA	NA
MW-44	11/04/99	<1.0	<1.0	<1.0	<0.005	NA	NA	NA
MW-45	11/04/99	26	<1.0	<1.0	0.061	NA	NA	NA
MW-46	05/18/99	2000	120	18	<0.005	<0.01	NA	NA

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	11/04/99	880	82	12	0.014	NA	NA	NA
MW-47	11/03/99	42	2	<1.0	0.019	NA	NA	NA
MW-48	05/18/99	28	1.1	<1.0	0.055	0.05	NA	NA
	11/03/99	34	1.3	<1.0	0.051	NA	NA	NA
MW-49	11/10/99	<1.0	<1.0	<1.0	<0.005	NA	NA	NA
MW-50	10/28/99	DRY						
MW-51	11/09/99	<1.0	<1.0	<1.0	<0.005	NA	NA	NA
MW-52	02/22/99	<1.0	<1.0	<1.0	0.035	0.01	0.014	<0.01
	05/24/99	<1.0	<1.0	<1.0	<0.05	<0.01	<0.005	0.01
	08/17/99	<1.0	<1.0	<1.0	0.072	<0.01	0.014	0.01
	11/12/99	<1.0	<1.0	<1.0	0.016	NA	0.012	NA
MW-53	05/25/99	40	1.5	<1.0	0.0633	0.08	<0.05	0.06
	11/12/99	62	2.5	<1.0	0.073	NA	0.065	NA
MW-55	02/18/99	NA	NA	NA	0.15	0.14	0.12	0.14
	05/18/99	310	11	<5	<0.005	<0.01	NA	NA
	08/17/99	300	12	<1	0.13	0.12	NA	NA
	11/02/99	260	10	<5	0.14	NA	NA	NA
MW-56	05/19/99	90	3.2	<1.0	0.062	0.06	NA	NA
	11/02/99	53	2	<1.0	0.056	NA	NA	NA
MW-57	02/22/99	<1.0	<1.0	<1.0	0.042	0.08	<0.005	<0.01
	05/24/99	<1.0	<1.0	<1.0	<0.05	<0.01	<0.05	<0.01
	08/18/99	<1.0	<1.0	<1.0	0.026	<0.01	<0.005	<0.01
	11/15/99	<1.0	<1.0	<1.0	0.021	NA	<0.005	NA
MW-58	05/25/99	32	1.2	<1.0	0.167	0.02	<0.05	0.06
	11/15/99	26	<1.0	<1.0	0.38	NA	0.065	NA
MW-59	11/10/99	<1.0	<1.0	<1.0	<0.005	NA	NA	NA
MW-60	05/17/99	10000	490	<100	0.012	0.02	NA	NA
	11/03/99	11000	480	<100	0.016	NA	NA	NA
MW-61	02/19/99	NA	NA	NA	0.076	0.08	0.076	0.08
	05/17/99	410	20	<10	0.065	0.04	NA	NA
	11/03/99	200	12	<5	0.03	NA	NA	NA
MW-62	02/18/99	1.6	6.1	3.9	0.034	<0.01	0.006	<0.01
	05/24/99	1.8	5.7	4	<0.05	0.02	<0.05	<0.01
	08/19/99	2.2	7.4	5.5	0.03	<0.01	0.0056	<0.01
	11/12/99	2.5	7.4	4.5	0.03	NA	0.008	NA
MW-63	02/22/99	NA	NA	NA	0.014	0.03	<0.005	<0.01
MW-64	05/17/99	1.8	<1.0	<1.0	<0.005	<0.01	NA	NA
	11/04/99	5.4	<1.0	<1.0	<0.005	NA	NA	NA
MW-65	02/17/99	7	<1.0	<1.0	<0.005	<0.01	NA	NA
	05/17/99	1.9	<1.0	<1.0	<0.005	<0.01	NA	NA
	08/23/99	<1.0	<1.0	<1.0	<0.005	<0.01	NA	NA
	11/03/99	<1.0	<1.0	<1.0	<0.005	NA	NA	NA
	11/04/99	<1.0	<1.0	<1.0	<0.005	NA	NA	NA
MW-66	02/17/99	<1.0	<1.0	<1.0	<0.005	<0.01	NA	NA
	05/18/99	<1.0	<1.0	<1.0	<0.005	<0.01	NA	NA
	08/23/99	<1.0	<1.0	<1.0	<0.005	<0.01	NA	NA
	11/04/99	<1.0	<1.0	<1.0	<0.005	NA	NA	NA
MW-67	02/18/99	<1.0	<1.0	<1.0	<0.005	<0.01	NA	NA
	05/18/99	<1.0	<1.0	<1.0	0.13	<0.01	NA	NA
	08/17/99	<1.0	<1.0	<1.0	<0.005	<0.01	NA	NA
	11/03/99	<1.0	<1.0	<1.0	<0.005	NA	NA	NA
MW-68	02/17/99	<1.0	<1.0	<1.0	<0.005	0.01	NA	NA

Appendix D

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	05/17/99	<1.0	<1.0	<1.0	<0.005	0.01	NA	NA
	08/18/99	<1.0	<1.0	<1.0	<0.005	<0.01	NA	NA
	11/02/99	<1.0	<1.0	<1.0	<0.005	NA	NA	NA
MW-69	02/17/99	<1.0	<1.0	<1.0	<0.005	<0.01	NA	NA
	05/17/99	<1.0	<1.0	<1.0	<0.005	<0.01	NA	NA
	08/18/99	<1.0	<1.0	<1.0	<0.005	<0.01	NA	NA
	11/02/99	<1.0	<1.0	<1.0	<0.005	NA	NA	NA
MW-70	02/17/99	<1.0	<1.0	<1.0	<0.005	<0.01	NA	NA
	05/19/99	<1.0	<1.0	<1.0	<0.005	<0.01	NA	NA
MW-70	08/19/99	<1.0	<1.0	<1.0	<0.005	<0.01	NA	NA
	11/09/99	<1.0	<1.0	<1.0	<0.005	NA	NA	NA
MW-71	02/17/99	35	1	<1.0	<0.005	<0.01	NA	NA
	05/17/99	42	1.1	<1.0	<0.005	0.01	NA	NA
	08/19/99	46	1.2	<1.0	<0.005	<0.01	NA	NA
	11/03/99	65	1.8	<1.0	<0.005	NA	NA	NA
MW-72	03/05/99	1800	220	99	NA	NA	NA	NA
	05/19/99	1800	230	98	0.15	0.12	NA	NA
	11/09/99	1200	200	100	0.16	NA	NA	NA
MW-73	03/05/99	4000	520	240	NA	NA	NA	NA
	05/19/99	4400	780	220	0.1	0.04	NA	NA
	11/09/99	4100	770	190	0.1	NA	NA	NA
MW-74	11/04/99	0.06	<0.2	<1.0	0.041	NA	NA	NA
MW-75	11/04/99	0.7	<0.2	<1.0	0.041	NA	NA	NA
MW-76	11/04/99	0.6	<0.2	<1.0	0.049	NA	NA	NA

Note: Shaded cells indicate concentrations which exceed MCLs based on the more stringent of the drinking water standards or the maximum allowable concentrations in groundwater set by the NMWQCC (5 µg/L for TCE and DCE, 60 µg/L for TCA, and 50 µg/L for total chromium).

ATTACHMENT 3

5.1.3 Water Quality

5.1.3.1 Groundwater Quality

Plots of TCE, DCE, and TCA concentrations were prepared for a number of on-site and off-site wells to evaluate long-term water-quality changes at the Sparton site. Plots for on-site wells are shown in Figure 5.13 and plots for off-site wells in Figure 5.14. The concentrations in the on-site wells (Figure 5.13) indicate a general decreasing trend; in fact, the data from wells MW-9 and MW-16, which have the longest record, suggest that this decreasing trend may have started before 1983. A significant decrease in concentrations occurred in wells MW-16 and MW-21 during the last year and a half. These two wells are located near the area of the SVE system operations and it is apparent that they have been influenced by the 1998 and 1999 SVE operations.

A plot for well MW-72 is also included in Figure 5.13. Well MW-72 (see Figure 2.3 for well location) was installed in late February 1999 to provide a means for assessing whether source areas exist outside the capture zone of the source containment well that will be installed downgradient from the Sparton property. The well was sampled three times, in March, May, and November 1999; the TCE concentrations were 1800, 1800, and 1200 μg/L, respectively. With these limited data, it is premature to reach any conclusions concerning the potential presence of unknown sources on the Sparton property.

The concentrations in most off-site wells (see Figure 5.14) also had a decreasing trend during the last three to five years. Concentrations in wells MW-55, MW-56, MW-58 and MW-61 appear to have peaked between 1995 and 1997, and are declining currently. Concentrations in well MW-60, however, increased significantly during the last seven years. The concentration of TCE in this well increased from low μg/L levels in 1993 to 11,000 μg/L in November 1999. Although the concentrations of all three constituents, TCE, DCE, and TCA, in this well appear to be leveling off, the well may have not yet reached its peak concentration.

One of the two DFZ wells, MW-67 of the MW-48/55/56/67 cluster, continued to be free of any contaminants as it has been since its installation in July 1996. The other DFZ well, MW-71 of the MW-60/61/71 cluster, contained 56 μg/L of TCE and 1.6 μg/L of DCE in November 1998, and 65 μg/L of TCE and 1.8 μg/L of DCE in November 1999. Similar levels of these contaminants were also detected during the quarterly sampling of the well in 1999 (see AppendixD). This well was installed in June 1998. The first two DFZ samples from well, obtained during installation and after completion, had 1.3 μg/L and 1.8 μg/L of TCE, respectively. When next sampled on September 2, 1998, the well had 1700 μg/L of TCE and 72 μg/L of DCE. Testing conducted on September 17 indicated that the well casing was leaking and that, therefore, contaminated water from shallower zones was entering the DFZ through the well. To mitigate this condition, about 10,000 gallons of water were pumped from the well in late September, and again in early October. At the end of the second pumping, the TCE concentration was 4.7 μg/L, and DCE was not detected. The well was recompleted in late October 1998 by installing a 2-inch casing and screen assembly within the original 4-inch casing and screen, sand packing between the screens followed by a bentonite slurry plug and 5 percent bentonite cement between the casings. However, after recompletion contaminant concentrations in the well began again rising. (TCE concentrations rose above 100 μg/L by early 2000). This continuing increase in contaminant concentrations indicates that contaminated water from the shallower zones continues to leak into the DFZ. Apparently, either the recompletion of the well was not totally successful or there are other leaks through the bentonite cement seal outside the outer casing. To eliminate this continuing leakage, Sparton will seek in 2000 the approval of the regulatory agencies to overdrill, plug, and abandon this well.

The Fourth Quarter 1999 water-quality data presented in Table 4.3 were used to prepare concentration distribution maps showing conditions near the end of 1999. The horizontal extent of the TCE, DCE and TCA plumes, and the concentration distribution within the plumes in November 1999 are shown in Figures 5.15, 5.16, and 5.17, respectively. Changes in concentrations between November 1998 (Figures 2.14, 2.15 and 2.16) and November 1999 are shown in Figures 5.18, 5.19, and 5.20. Also shown on these figures is the trace of the November 1998 extent of the plumes. The change in concentration maps show that concentrations of all three constituents have decreased on the Sparton facility. Concentrations of TCE and DCE also appear to have decreased near the center of the plume (in the off-site area, TCA does not occur above MCLs). The absence of TCE in well MW-65, causes the leading edge of the 1999 TCE plume to be narrower, well within the capture zone of the off-site containment system. Increases in TCE and DCE concentration have occurred downgradient from the Sparton facility and in the vicinity of well MW-60 and the containment well.

5.1.3.2 <u>Influent and Effluent Quality</u>

The 1999 concentrations of TCE, DCE, and total chromium in the influent to and effluent from the air stripper are presented on Table 4.4. A plot of the TCE, DCE, and total chromium concentrations in the influent is presented in Figure 5.21. In preparing this plot, total chromium concentrations in the influent were assumed to be the same as those in the effluent for sampling events when only the effluent sample was analyzed for chromium.

As shown in Figure 5.21, the concentrations of TCE, DCE, and chromium in the influent increased considerably during the year. The influent concentration of TCE remained below 200 μg/L through February 1, 1999. When the influent was sampled again in late April, the TCE concentration was close to 1000 μg/L and remained in the 800 to 1200 μg/L range through the remainder 1999. The concentration of DCE increased from less than 5 μg/L at the beginning of 1999 to about 40 μg/L in April, and remained at 40 to 50 μg/L through the end of 1999, with one exception of 73 μg/L reported in September. Chromium concentrations also followed a similar pattern. During the 30-day feasibility test that was conducted between December 31, 1999 and February 1, 2000, chromium concentrations ranged from 23 μg/L at the beginning of the test to 35 μg/L at the end of the test. Based on the effluent samples that were collected at the beginning of the complete system operation in early May, influent concentrations of chromium had increased above 50 μg/L between February and May and fluctuated around this value through the remainder of the year.

Except for a few detections of TCE at less than 1 μg/L, the concentrations of TCE and DCE in the air stripper effluent have been below detection limits of 0.3 and 0.2 μg/L, respectively, throughout the period of operation of the air stripper (see Table 4.4). As a consequence of the increases in the influent chromium concentrations, however, the chromium concentrations in the effluent occasionally exceeded the 50 µg/L maximum allowable concentration in groundwater set by NMWQCC, which is a requirement of the discharge permit for the infiltration gallery. To monitor chromium concentrations more closely, the frequency of effluent sampling for chromium analysis was increased to weekly in late December 1999, and a chromium-reduction process will be added to the treatment system in 2000 to mitigate this potential problem.

5.1.3.3 Contaminant Mass Removal

The monthly mass removal rates of TCE and DCE by the off-site containment system during the 1999 operating year were estimated using the concentration of these compounds shown on Table 4.4 and the monthly discharge volumes presented on Table 4.1. These monthly removal rates are summarized on Table 5.1 and plotted in Figure 5.22. A plot showing the cumulative mass removal by the off-site containment system, including 1.3 kg (3 lbs) removed during the December 1998 testing of the containment well, is presented in Figure 5.23. As shown in this figure, by the end of 1999 the off-site containment system had removed approximately 375 kg (825 lbs) of contaminants, consisting of approximately 360 kg (790 lbs) of TCE and 15 kg (35 lbs) of DCE. This represents about 16 percent of the total dissolved contaminant mass, or about 17 percent of the TCE and about 11 percent of the DCE mass, roughly estimated to be present in the aquifer prior to the testing and operation of the off-site containment system (see Section 2.6.1.4).

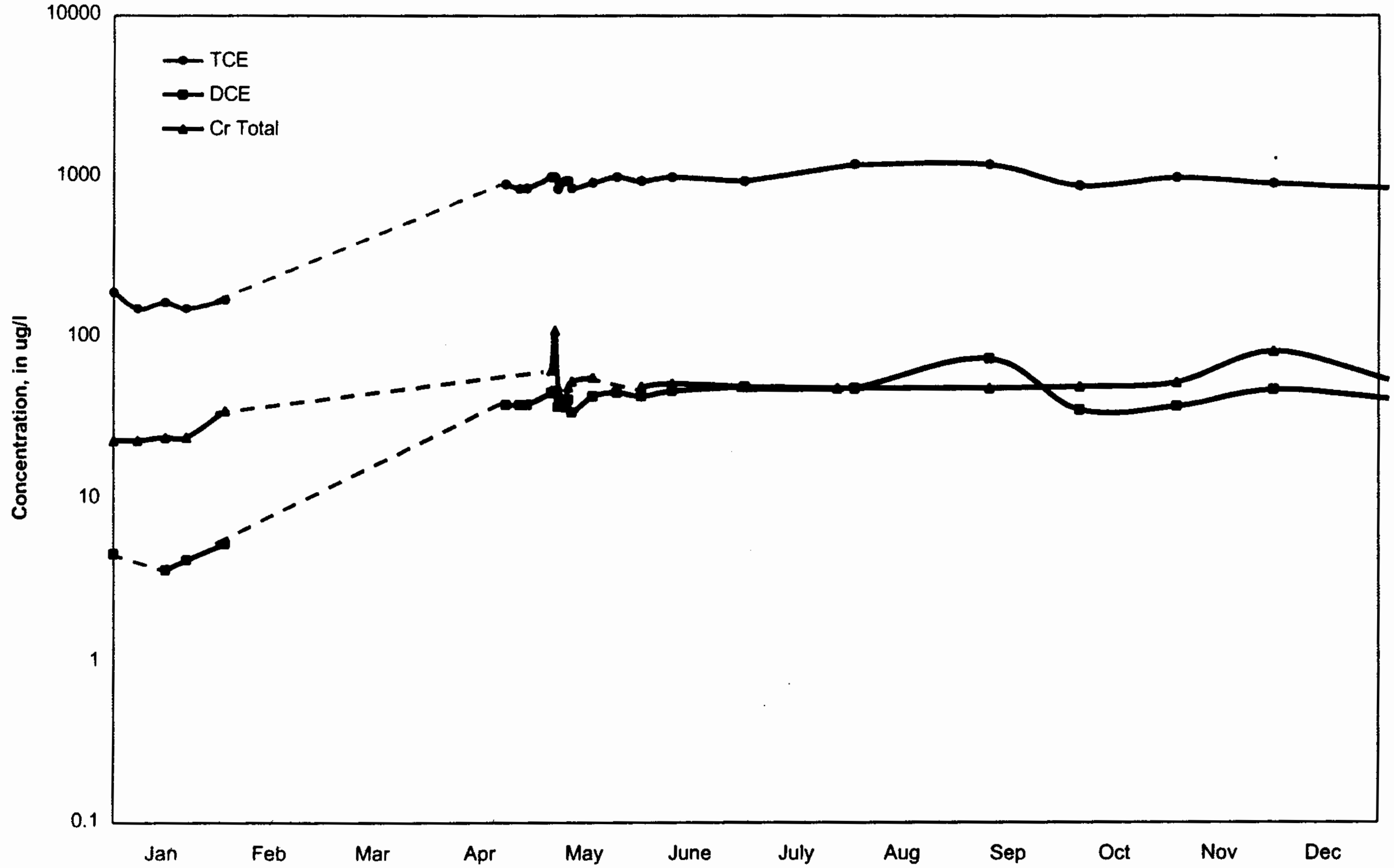


Figure 5.21 Off-Site Containment System - TCE, DCE and Total Chromium Concentrations in the Influent - 1999

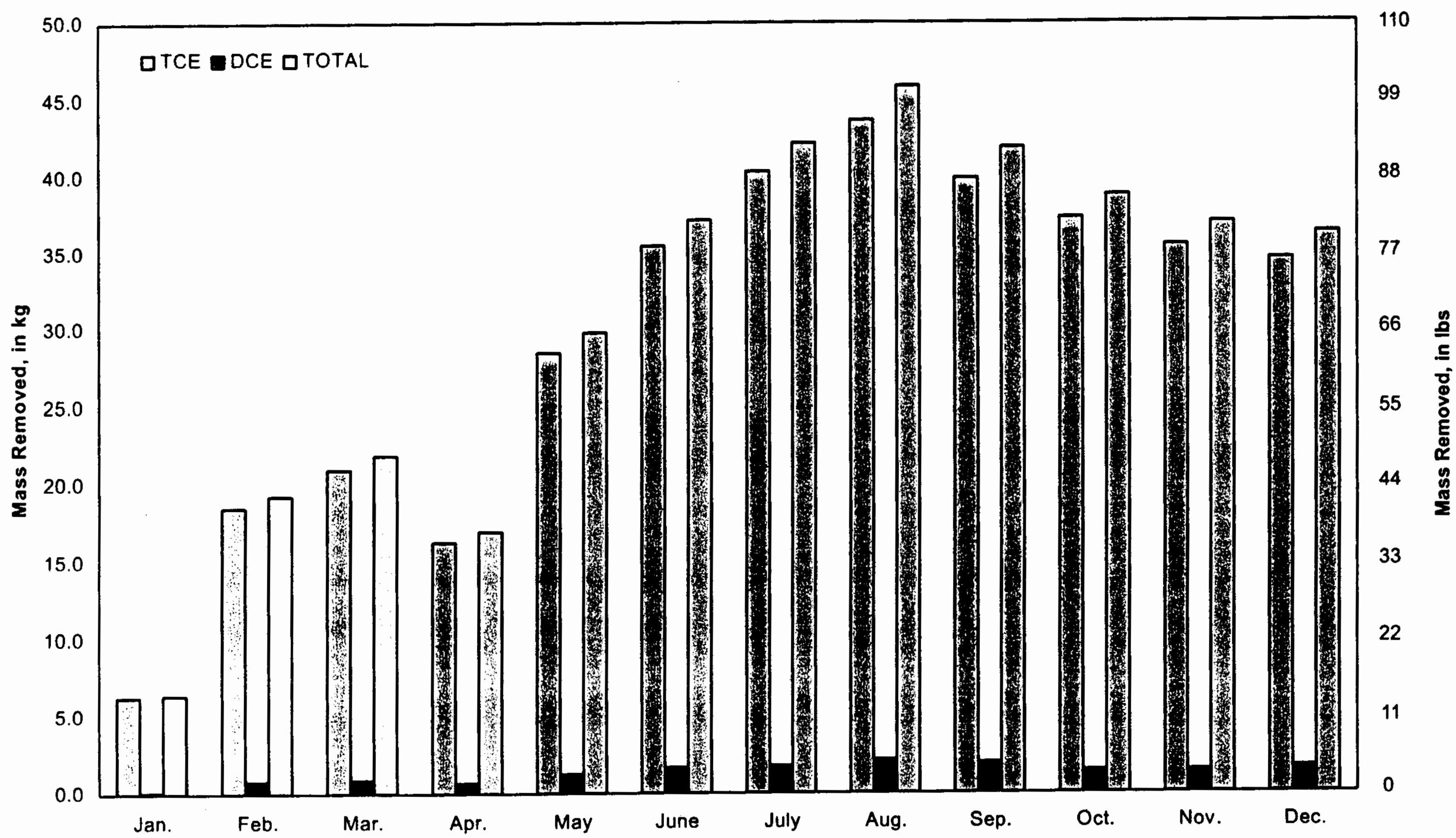


Figure 5.22 Monthly Contaminant Mass Removal by the Off-Site Containment Well - 1999

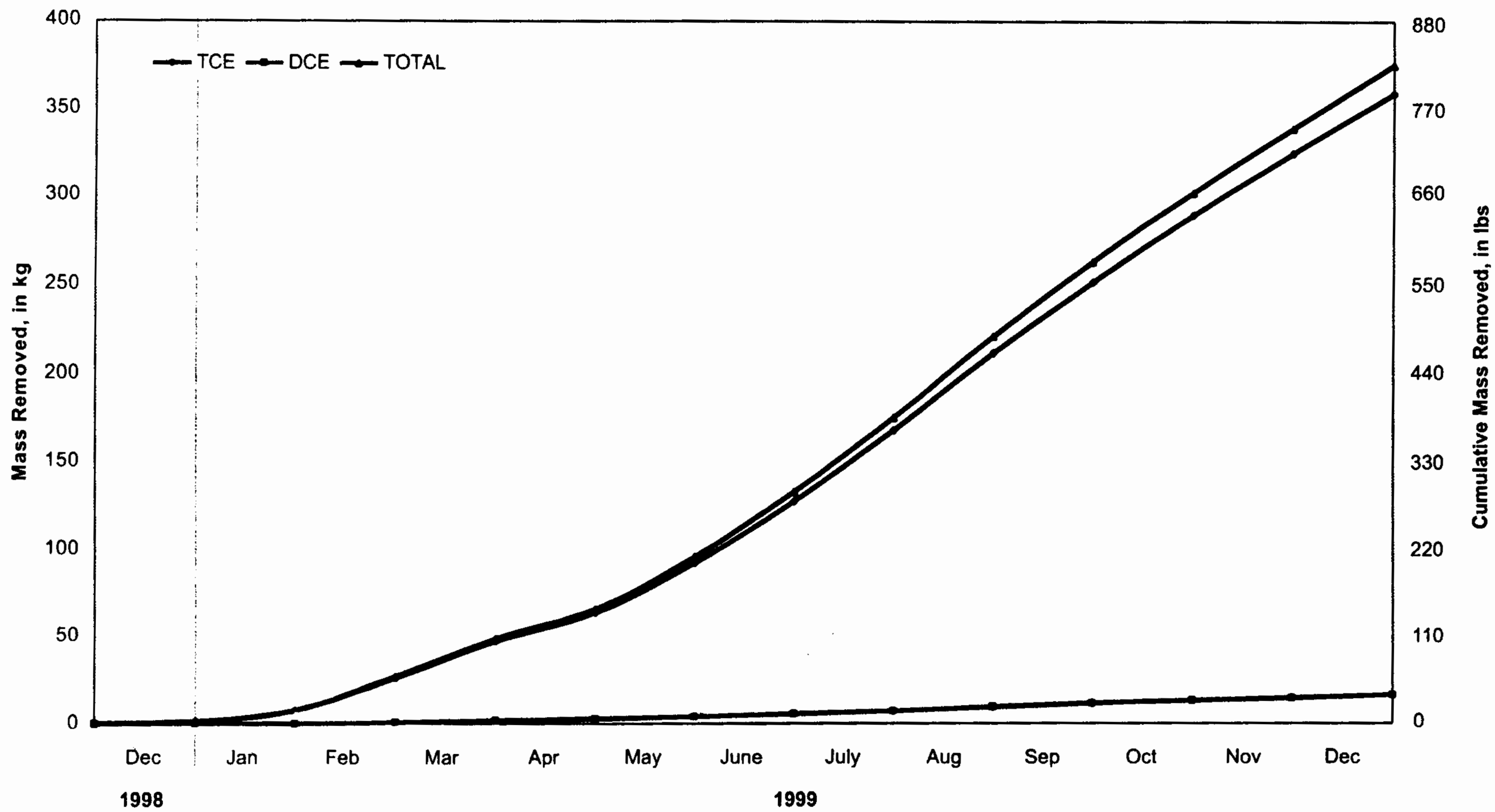


Figure 5.23 Cumulative Contaminant Mass Removal by the Off-Site Containment Well

ATTACHMENT 4

4.2 SVE Monitoring Results

Flow rate, operating pressure, and influent concentration data for the 1999 SVE operations are presented in the following sections.

4.2.1 Flow Rates

The AcuVac system was operated from May 12 to June 23, 1999 (42 days) at an average rate of about 50 cfm. The operating logs for the system are presented in Appendix F. The flow rate of the system was determined by measuring the differential pressure (reported as "Extraction Well Flow" on the operating logs) across a pitot tube located on the 2-inch line leading from the extraction well to the system. Figure F-1 in Appendix F was then used to convert this differential pressure to a flow rate. The differential pressure during the operation of the system ranged from 0.75 to 0.82 inches of water (see Appendix F) and averaged about 0.80 inches of water; for a 2-inch line this corresponds to an average flow rate of about 50 cfm (see Figure F-1).

The Roots blower system was operated from June 28 to August 25, 1999 (58 days) at 200 cfm. The operating logs for this system are presented in Appendix G. This blower is a positive displacement blower; for a given size, the flow rate is proportional to the blower speed (rate of rotation). To maintain a flow rate of 200 cfm, a blower speed of 2274 revolutions per minute (rpm) is required. The motor supplied with the blower turns at 1750 rpm; the belt drive between the motor and the blower increases the blower speed to 2274 rpm.

4.2.2 Operating Pressures

The extraction well vacuum during the operation of the AcuVac system ranged between 5.5 and 6.2 inches of water (see Appendix F) and averaged about 6.0 inches of water. The vacuum during the operation of the Roots blower ranged from 1.5 to 2.0 inches of mercury (see Appendix G), corresponding to 20.4 to 27.2 inches of water, and averaged 1.8 inches of mercury, or 24.5 inches of water.

4.2.3 Influent Concentration

During the 42-day operational period of the AcuVac system in 1999, the influent was sampled at the beginning of the operation indicating an initial TCE concentration of 40 mg/m^3. No other samples of influent were collected during the remainder of the system operation.

During the 58-day operating period of the Roots 200 cfm blower in 1999, the influent was sampled twice, once at the beginning and once at the end of the period. The TCE concentration in these samples was 30 mg/m^3 and 6.4 mg/m^3, respectively.

APPENDIX F
ACUVAC OPERATING LOGS
MAY AND JUNE 1999
AND FIGURE F-1

Location: Technician:

	Parameters	5.5.99	Initials	5-5-99	Initials	5-12-99	Initials	5-13-99	Initials	5-14-99 F	Initials	5-14-99	Initials
	Date:	5.5.99		5-5-99		5-12-99		5-13-99		5-14-99 F		5-14-99	
	Time	12:10		13:20		08:15		07:10		0740		1520	
	Hr Meter	4387.0		4388.7		4388.9		4411.9		4436.3		4444.1	
ENGINE / BLOWER	R.P.M.	2100				2050	DG	2100	DG	2000	DG	2050+	DC
	Oil Pressure psi	55				54		54		53		53	
	Water Temp °F	155				149		135		145		155	
	Volts	14.1				14		14		14		14	
	Intake Vac "Hg	11				11		11.5		11		11	
	Gas Flow - Fuel Propane/N.G. cfh	—				—		—		—		—	
	Engine Oil - Enter Amt. Added qts	—				—		—		—		3 QTS	
ATMOSPHERE / VAPORS / AIR	Dilution Air Flow cfm	0.04				0.04		0.03		0.04		0.04	
	Extraction Well Flow cfm	0.81				0.82		0.77		0.80		0.81	
	Extraction Well Vac "H_2O	6.40				6.00		6.10		6.10		5.90	
	Influent Vapor Temp °F	—				—		—		—		—	
	Air Temp °F	61				64		60		65		88	
	Barometric Pressure "Hg	—				NA		NA		NA		—	
MANIFOLD / EFFLUENT	Exhaust Gas Temperature °F	1060				1000		1025		980		950	
	Blower Discharge Temperature °F	—				—		—		—		—	
	Other Weather	Wind				CLEAR		Clear		Clear		CLEAR	
	SVE On/Off	ON				ON		ON		ON		ON	
	Air/Injection On/Off	—				—		—		—		—	
	Air Injection Pressure psi	—				—		—		—		—	
	Air Injection Flow cfm	—				—		—		—		—	
	Samples	Influent Effluent				—		—		—		—	

DATE	OPERATING DATA AND NOTES
5-5-99	12:51 Sampled Effluent
	13:09 Sampled Influent 50 min after drawing from Well VR-1
	13:20 Shutdown - OIL LEAKS By FRONT MAIN SEAL
5-12-99	0830 Light oil LEAK

AirVac Remediation Inc.

OPERATING DATA - UNIT # ________ PAGE # ________ SVE SYSTEM

Location: Technician:

Parameters	Date: 5.16.99	Initials	5.17.99	Initials	5.18.99	Initials	5.19.99	Initials	5.19.99	Initials	5.20.99	Initials
Time	1015		0735		0647		0700		0945		0710	
Hr Meter	4493.0		4508.3		4531.5		4555.8		4555.9		4577.3	
ENGINE / BLOWER												
R.P.M.	2050		2050		2100		2000		2050		2400	
Oil Pressure psi	52		53		53		54		54		54	
Water Temp °F	159		150		145		145		140		150	
Volts	14		14		14		14		14		14	
Intake Vac "Hg	~~6.00~~ 12		12		12		12		12		13	
Gas Flow - Fuel Propane/N.G. cfh	—		—		—		—		—		—	
Engine Oil - Enter Amt. Added qts	3QTS.		~~Q~~		2Q.		0		5gal.		0	
ATMOSPHERE / VAPORS / AIR												
Dilution Air Flow cfm	0.04		0.03		0.03		0.03		0.03		0.02	
Extraction Well Flow cfm	0.81		0.81		0.82		.82		.80		.82	
Extraction Well Vac "H_2O	6.00		6.10		6.20		6.10		5.50		6.00	
Influent Vapor Temp °F	—		—		—		—		—			
Air Temp °F	86		65		66		68		74		66	
Barometric Pressure "Hg	—		NA		NA		NA		—		—	
MANIFOLD / EFFLUENT												
Exhaust Gas Temperature °F	990		1000		1050		1000		1050		1150	
Blower Discharge Temperature °F	—		—		—		—		—		—	
Other Weather	Clear		Clear		Clear		Clear		Clear		Clear	
SVE On/Off	ON		ON		ON		ON		ON		ON	
Air/Injection On/Off	—		—		—		—		—		—	
Air Injection Pressure psi	—		—		—		—		—		—	
Air Injection Flow cfm	—		—		—		—		—		—	
Samples	—		—		—		—		—		—	

DATE	OPERATING DATA AND NOTES
5.16.99	Greased Pump 3 Zerks
5.19.99	Changed Oil + Spark Plugs JDO
5.20.99	10:30 AM SVE RPM Dived Down Below 1000 - DE increased Fuel Flow
	Suspect Fuel Flow Changed in part of City Distribution

Location: Technician:

Parameters	Date: 5-21-99 F	Initials	5-22-99 SA	Initials	5-24-99 M	Initials	5-25-99 T	Initials	6-11-99 F	Initials	6-12-99
Time	0700		0425		0655		0640		1115		10:00
Hr Meter	4601.1		4634.5		4673.1		4696.9		4697.0		4710.0
ENGINE / BLOWER											
R.P.M.	2300↓		2075		1950↑		1925↑		2100	JR	2100
Oil Pressure psi	55		55		55		54		55		55
Water Temp °F	150		155		145		145		150		150
Volts	14		14		14		14		14		14
Intake Vac "Hg	13		11		11		11		12		12
Gas Flow - Fuel Propane/N.G. cfh	—		—		—		—		—		—
Engine Oil - Enter Amt. Added qts	3Q		2½Q		2Q		2Q		—		—
ATMOSPHERE / VAPORS / AIR											
Dilution Air Flow cfm	0.04		0.04		0.03		0.02		0.04		0.04
Extraction Well Flow cfm	0.82		0.80		0.76		0.75		0.80		0.80
Extraction Well Vac "H_2O	6.10		6.0		5.8		5.9		6.0		6.0
Influent Vapor Temp °F	—		—		—		—		—		—
Air Temp °F	70°		81°		63°		60°		82°		80°
Barometric Pressure "Hg	—		—		—		—		—		—
MANIFOLD / EFFLUENT											
Exhaust Gas Temperature °F	1150		1000		1000		1000		1050°		1050
Blower Discharge Temperature °F	—		—		—				—		—
Other WEATHER	Clear		Cloudy		P.C RAIN		P.C		Clear		Clear
SVE On/Off	ON		ON		ON		ON		ON		ON
Air/Injection On/Off	—		—		—		—		—		—
Air Injection Pressure psi	—		—		—		—		—		—
Air Injection Flow cfm	—		—		—		—		—		—
Samples											

DATE	OPERATING DATA AND NOTES ↗ By DG PM
5.24.99	Began Influent Purge @ 15:40 Till 15:44 Sampled 1545
6-11-99	Changed oil + Plugs + Catalytic Converter DG JR
6-14-99	Added 3Q Oil Monday morning

AVI AcuVac Remediation Inc.

OPERATING DATA - UNIT # ________ PAGE # ________ SVE SYSTEM

Location: CRF

Technician:

	Parameters	Date: 6-14-99 Time 0825 Hr Meter 4766.4	Initials	6-15-99 Time 0825 Hr Meter 4790.5	Initials	6-16 99 Time 0820 Hr Meter 4814.5	Initials	6-17-99 Time 0830 Hr Meter	Initials	6-18-99 Time 0735 Hr Meter	Initials	6/21/99 Time 0740 Hr Meter	Initials
ENGINE / BLOWER	R.P.M.	2050	JR	2100	JR	2050	JR	2100		2100	JR	2050	JR
	Oil Pressure psi	55		55		55		53		55		55	
	Water Temp °F	145		145		140		142		140		145	
	Volts	14		14		14		14		14		14	
	Intake Vac "Hg	12		12		12		12		12		12	
	Gas Flow - Fuel Propane/N.G. cfh	—		—		—		—		—		—	
	Engine Oil - Enter Amt. Added qts	3Q		1Q		0		3/4Q		1/2Q		4Q	
ATMOSPHERE / VAPORS / AIR	Dilution Air Flow cfm	0.04		0.03		0.03		0.04		0.04		0.04	
	Extraction Well Flow cfm	0.82		0.80		0.82		0.82		0.80		0.80	
	Extraction Well Vac "H_2O	6.0		6.0		6.0		6.0		6.0		6.0	
	Influent Vapor Temp °F	—		—		—		—		—		—	
	Air Temp °F	70°		72°		74°		72°		68°		74°	
	Barometric Pressure "Hg	—		—		—		—		—		—	
MANIFOLD / EFFLUENT	Exhaust Gas Temperature °F	1050		1050		1000		1050		1000		950	
	Blower Discharge Temperature °F	—		—		—		—		—		—	
	Other	CLEAR		CLEAR		CLEAR		CLEAR		CLEAR		CLEAR	
	SVE On/Off	—		—		—		—		—		—	
	Air/Injection On/Off	—		—		—		—		—		—	
	Air Injection Pressure psi	—		—		—		—		—		—	
	Air Injection Flow cfm												
	Samples												

DATE	OPERATING DATA AND NOTES
6-14-99	Added 3 Q. Oil.
6-15-99	Added 1 Q Oil
6-17-99	Added 3/4 Q Oil
6-18-99	Added 1/2 Q Oil
6-21-99	Added 4Q oil

AccuVac Remediation Inc.

OPERATING ...

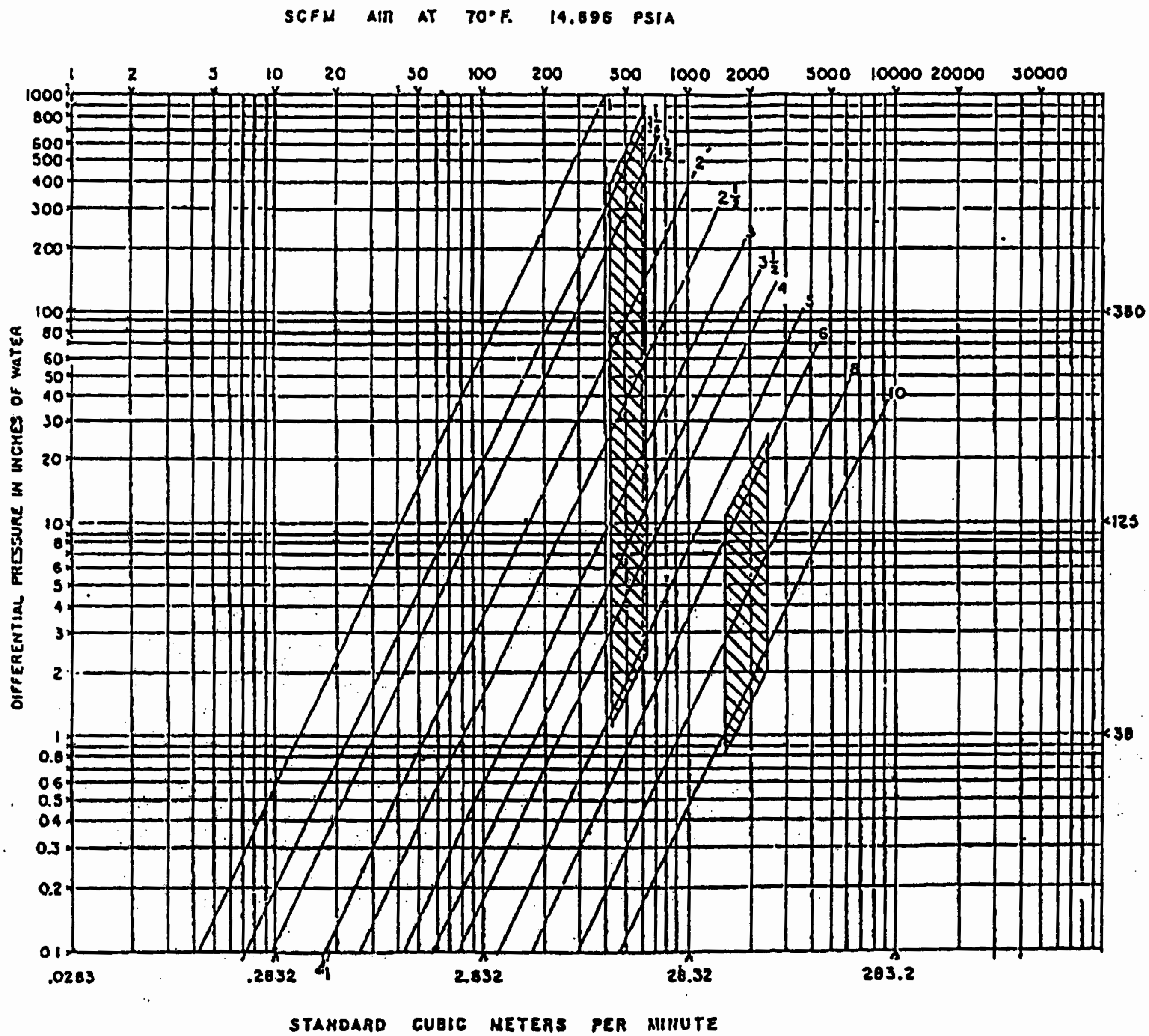
Location:

Technician:

Section	Parameters	Date: 6-22-99		6-23-99 W		6-23-99 W							
		Time 0640	Initials	Time 0900	Initials	Time 1130	Initials	Time	Initials	Time	Initials	Time	Initials
		Hr Meter 4956.7		Hr Meter 4957.1		Hr Meter 4959.7		Hr Meter		Hr Meter		Hr Meter	
ENGINE / BLOWER	R.P.M.	2050	DG	2100	DG								
	Oil Pressure psi	55		56									
	Water Temp °F	150		152									
	Volts	14		14									
	Intake Vac "Hg	12		12									
	Gas Flow - Fuel Propane/N.G. cfh	—		—									
	Engine Oil - Enter Amt. Added qts	—		5 QT.									
ATMOSPHERE / VAPORS / AIR	Dilution Air Flow cfm	0.03		0.04									
	Extraction Well Flow cfm	0.79		0.80									
	Extraction Well Vac "H_2O	6.0		5.9									
	Influent Vapor Temp °F	—		—									
	Air Temp °F	70		76									
	Barometric Pressure "Hg	NA		—									
MANIFOLD / EFFLUENT	Exhaust Gas Temperature °F	950		1000									
	Blower Discharge Temperature °F	—		—									
	Other WEATHER	CLEAR		CLEAR									
	SVE On/Off	ON		ON									
	Air/Injection On/Off	—		—									
	Air Injection Pressure psi	—		—									
	Air Injection Flow cfm	—		—									
	Samples												

DATE	OPERATING DATA AND NOTES
6.22.99	ENGINE MISFIRE - SHUT MOTOR DOWN
	REPLACED OIL + SPARK PLUGS + EXCESSIVE DEPOSITS ON PLUGS
	NEEDED TO BE CHANGED LAST WEEK ON 6.17.99
6.23.99	→ ENGINE IS RUNNING GOOD
6.23.99	SHUT DOWN SVE TOOK HOOK UP ROOTS BLOWER

FIGURE F-1



SHADED AREA INDICATES FLOW REGION WHERE CONTINUOUS OPERATION MAY CAUSE VIBRATIONAL DAMAGE TO FLOW METER

1. ENTER CHART WITH FLOW RATE
2. GO VERTICALLY DOWN TO NOMINAL PIPE SIZE
3. READ DIFFERENTIAL PRESSURE AT LEFT

APPENDIX G
200 CFM ROOTS BLOWER OPERATING LOGS
JUNE THROUGH AUGUST 1999

SPARTON TECHNOLOGY, INC.
subsidiary of SPARTON CORPORATION
An ISO 9001 registered company

200 SCFM Roots Blower Log

JUNE 1999

Well ID VR-1

Date	Time	Status On/Off	Samples Yes/No	Oil Yes/No	Greased Yes/No	VAC (in-Hg)	Weather	Initials
01								
02								
03								
04								
05								
06								
07								
08								
09								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								
25	11:25	ON	NO	O.K	—		Sunny	ER
26								
27								
28	1102	ON	YES	—	—		Sunny	DG
29	0800	ON	N	O.K	YES		Sunny	DG
30								
31								

SPARTON TECHNOLOGY, INC.
subsidiary of SPARTON CORPORATION
An ISO 9001 registered company

Date	Maintenance Activities Performed	Ini.
6·25	12:10 Well Head VAC 13.5" H_2O	GR
	12:17 Below Filter on Roots 20.0" H_2O	GR
28	Sampled Influent w/ NMED + Metric	DG

SPARTON TECHNOLOGY, INC.
subsidiary of SPARTON CORPORATION
An ISO 9001 registered company

200 SCFM Roots Blower Log

July 1999

Well ID VR-1

Date	Time	Status On/Off	Samples Yes/No	Oil Yes/No	Greased Yes/No	VAC (in-Hg)	Weather	Initials
01	—							
02	0900	ON	N	O.K	N	2	OVERCAST	DG
03	—							
04	—							
05 M	Holiday							
06 T	0705	ON	N	O.K	N	2	OVERCAST	DG
07 W								
08 T							RAIN	
09 F	0640	ON	N	O.K	YES	1.75	OVERCAST	DG
10								
11								
12 M	0720	ON	N	O.K	N	2.0	CLEAR	DG
13 T								
14 W								
15 T	1400	ON	N	O.K	Y	1.5	Lt. RAIN	DG
16 F								
17								
18								
19 M								
20 T	0800	ON	N	O.K	N	1.50	Clear	DG
21 W								
22 T								
23 F	1350	ON	N	O.K	Y	1.75	CLEAR	DG
24								
25								
26 M	0830	ON	N	CHANGE	N	1.50	CLEAR	DG
27 T								
28 W								
29 T							RAIN	
30 F	1130	ON	N	N=O.K	Y	1.75	Clear	DG
31								

SPARTON TECHNOLOGY, INC.
subsidiary of SPARTON CORPORATION
An ISO 9001 registered company

200 SCFM Roots Blower Log

Aug 1999

Well ID VR-1

Date	Time	Status On/Off	Samples Yes/No	Oil Yes/No	Greased Yes/No	VAC (in-Hg)	Weather	Initials
01	—							
M 02	0750	ON	N	O.K	N	1.8	P.C	DG
T 03								
W 04								
T 05								
F 06	0945	ON	N	O.K	Y	1.75	RAIN	DG
07								
08								
M 09								
T 10								
W 11								
T 12	1600	ON	N	ADDED	Y	1.75	CLEAR	DG
F 13								
14								
15								
M 16								
T 17								
W 18								
T 19								
F 20	1330	ON	N	O.K	YES	1.90	CLEAR	DG
21								
22								
M 23								
T 24								
W 25	1500	ON	YES	N	N	1.75	CLEAR	DG
T 26								
F 27								
28								
29								
M 30								
T 31								

SPARTON TECHNOLOGY, INC.

subsidiary of SPARTON CORPORATION

An ISO 9001 registered company

	Date	Maintenance Activities Performed	Ini.
	8/11	MANOMETER READINGS w/ METRIC	[illegible]
500	8/25	SAMPLED INFLUENT TO T/BLOWER w/ METRIC G.R.	[illegible]
515	"	SHUT DOWN ROOTS BLOWER UNTIL FURTHER NOTICE	[illegible]
	*	AFTER SIGNATURE OF CONSENT DECREE SPARTON HAS 90	JR
		DAYS TO INSTALL AN ADDITIONAL ROOTS BLOWER ON THE	
		SITE.	

ATTACHMENT 5

5.2 Evaluation of SVE Operation

The AcuVac system was operated for 42 days in the spring of 1999 at a flow rate of 50 cfm. The initial concentration of TCE in the influent was 40 mg/m^3. No other determinations of contaminant concentrations in the influent were made. Therefore, mass removal during the operation of the system cannot be estimated. Since the constituent concentrations at the beginning of this operation of the system were already sufficiently low and met the air discharge permit requirements, the AcuVac system was suspended in favor of the direct-discharge, higher capacity Roots blower system.

The 200 cfm Roots blower system was operated for 58 days in the summer of 1999 between June 28 and August 25. The initial TCE concentration in the influent was 30 mg/m^3, and the final TCE concentration was 6.4 mg/m^3. The analysis of data from the operation of the AcuVac system during April - October 1998 (see Figure 2.8) indicates that the logarithm of influent concentrations varies linearly with the logarithm of time. Influent TCE concentrations between the initial and final measurements made during the Roots blower operation were, therefore, also assumed to vary in a similar manner; a logarithmic plot of these two data points was prepared, and a line was drawn through them as shown in Figure 5.24. The equation of the line fitted to the logarithmic plot of the data (see Figure 5.24) was used to calculate the average influent concentration during the system operation. Using this average concentration and the soil gas volume removed during the operation of the system, the mass of TCE removed was estimated to be about 4 kg.

The TCE mass removed by the 1998 operation of the AcuVac system was estimated to be about 145 kg (see Section 2.4). Thus, the total TCE mass removal by SVE system operations in 1998 and 1999 was about 150 kg of TCE.

On August 31, 1999, subsequent to the AcuVac system and the 200-cfm Roots blower operation, a final characterization of the vadose zone plume was conducted. This included soil-gas sampling at VR-1, VR-2, VP-4, VP-9, VP-10 and MW-18, the locations that had exhibited soil-gas concentrations greater than 10 ppmv prior to the 1999 SVE operations. The results of this characterization are shown in Figure 5.25.

As shown on Figure 5.25, the only location where soil gas concentrations were above the remediation goal of 10 ppmv was monitoring well MW-18. The sample from this well was obtained from just above the water table and had a maximum constituent concentration of 27 ppmv of TCE;this soil-gas concentration is about 40 percent of the phase-equilibrium concentration based on the groundwater concentration of 980 µg/L at that same well. This suggests that the source of TCE detected in the soil gas at this location is volatilization from groundwater. (Under the terms of the Consent Order; however, another 200 cfm Roots blower was installed on the site in the spring of 2000 and a robust system began operating on April 10, 2000 at a flow rate of 400 cfm.).

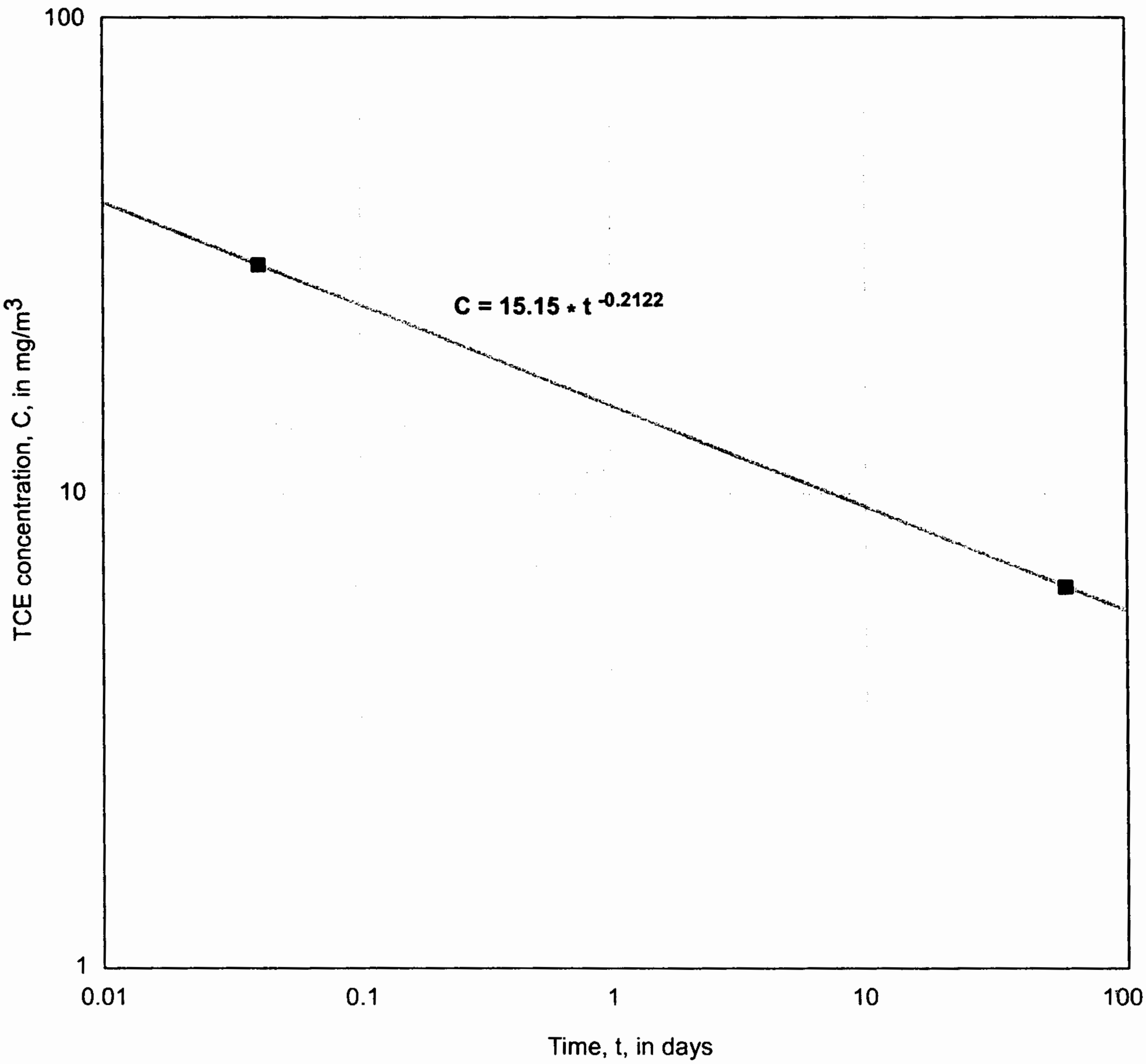
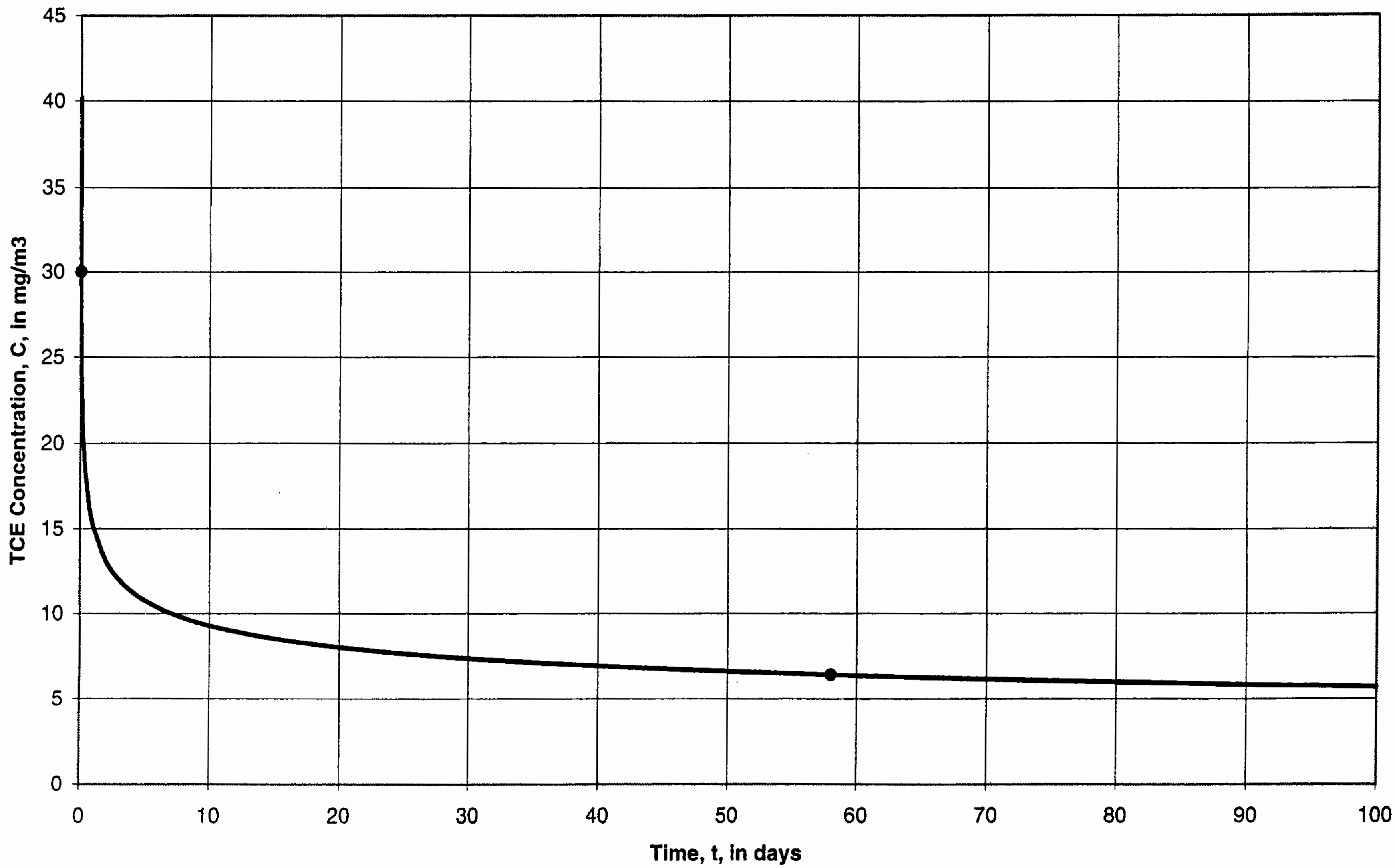


Figure 5.24 Influent Concentrations - SVE Operation - June 28 - August 25, 1999

Linear Plot of the Relationship shown in Figure 5.24



ATTACHMENT 6

5.4 Contacts

During 1999 Baird Swanson (NMED Groundwater Bureau) made several routine visits to the site to obtain split samples from the off-site containment system and from the SVE system.

As part of the implementation of the public involvement plan, in late 1999 Sparton began development of a mailing list of all property owners situated over the November 1998 TCE plume and all property owners situated along the pipeline leading from the off-site containment well to the infiltration gallery.

ATTACHMENT 7

7.2 Future Plans

The off-site containment system will continue to operate at the current rate of approximately 225 gpm. The more intense influent sampling program that was initiated in December 1999 to monitor chromium concentrations will continue. A chromium reduction process will be added to the treatment system in 2000.

Sparton will continue to pursue obtaining of all necessary permits, contracts, and license agreements necessary for the construction and operation of the source containment system. Upon obtaining all necessary documents and approvals, Sparton will implement and begin operating the system.

To eliminate the continuing leakage of contaminated water into the DFZ through monitoring well MW-71, Sparton will seek the approval of the regulatory agencies to overdrill, plug and abandon this well.

Data collection will continue in accordance with the Groundwater Monitoring Program Plan and site permits and as necessary for the evaluation of the performance of the remedial systems. As additional data are being collected, calibration and improvement of the flow and transport model developed to assess aquifer restoration will continue.

The robust 400-cfm SVE system consisting of two 200-cfm Roots blowers, which began operating on April 10, 2000, will continue to be operated for a net operating time of one year as specified in the Consent Decree.

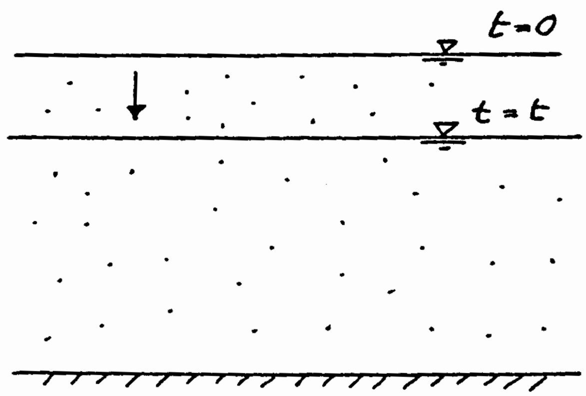
Regulatory agencies will be kept informed of any significant milestones or changes in remedial system operations. The goal of the systems will continue to be the return of the contaminated groundwater to beneficial use.

ATTACHMENT 8

DERIVATION OF
EQUATION USED TO ESTIMATE
VERTICAL HYDRAULIC CONDUCTIVITY

ESTIMATION OF VERTICAL HYDRAULIC CONDUCTIVITY FROM WATER TABLE DECLINES

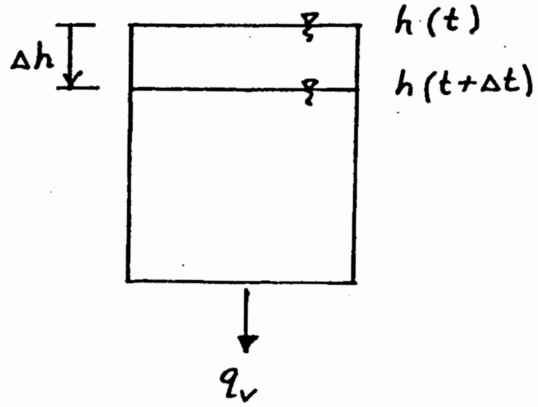
Consider areally extensive decline in a regional water table aquifer.



If we know the vertical hydraulic gradient and the rate of water table decline, can we back-calculate the effective vertical hydraulic conductivity?

ANALYSIS:

Consider a column of base area A:



During a time increment Δt, the volume drained from the column is:

$$\forall_{OUT}^{(1)} = S_Y \cdot \left[h(t) - h(t+\Delta t) \right] A = S_Y \, \Delta h \, A$$

During that time, the volume of water leaving the bottom is:

$$\forall_{OUT}^{(2)} = Q_{OUT} \, \Delta t$$

Now $Q_{OUT} = q_v \, A \, \Delta t$, where q_v = Darcy flux

$= (K_v \, \bar{i}) A \, \Delta t$

Since the volumetric outflow must be equal to the volume drained,

$$\forall_{OUT}^{(1)} = \forall_{OUT}^{(2)}$$

we must have:

$$S_y \, \Delta h \, A = K_v \, \bar{i} \, A \, \Delta t$$

Re-arranging:

$$S_y \frac{\Delta h}{\Delta t} = K_v \, \bar{i}$$

Solving for K_v yields:

$$\boxed{K_v = \frac{S_y \frac{\Delta h}{\Delta t}}{\bar{i}}}$$

ATTACHMENT 9

APPENDIX A
AREAL EXTENT OF
THE 4970-FOOT SILT/CLAY

APPENDIX A

AREAL EXTENT OF THE 4970-FOOT SILT/CLAY

Within the limits of the monitoring wells and borings associated with the Coors Road Plant soil and groundwater investigations, the local areal extent of the 4970-foot silt/clay is defined by the site well and boring logs. Geologic cross-sections along the lines shown in Figure A-1 were prepared to show the southern and western extent of the 4970-foot silt/clay (Figure A-2). The southern or southwestern extent is located between MW-73 and MW-49 (see Cross Section E-E on Figure A-2). The western extent is located between MW-73 and MW-46 (see Cross Section F-F on Figure A-2).

The regional areal extent of the 4970-foot silt/clay (Figure A-3) was determined by interpreting the local extent of the 4970-foot silt/clay and the regional geology as follows:

The areal extent of "the 4970-foot silt/clay" is controlled primarily by erosional contacts on the east and south and inset depositional contacts on the west. The unit is here interpreted as an early episode of cut and fill during the final (Late Quaternary) stage of cutting of the inner Rio Grande Valley. These overbank deposits (the 4970-foot silt/clay) and underling river-channel sand and gravel (unit TG4) are part of a very low terrace fill that is inset against older terrace fill (Qld) and Upper Santa Fe Group basin fill (USF) to the west. To the east, still younger deposits associated with the present river channel and flood plain system (unit RG) truncate, and are slightly inset below the 4970-foot silt/clay/TG4 fill sequence. Along the western river valley border all these units are partly buried by a series of young arroyo channel and fan deposits (Units VAY, VAY2, VAY1).

The above interpretation was made by Dr. J. W. Hawley, formerly with the New Mexico Bureau of Mines (now retired), who also developed the hydrologic framework (Hawley and Haase, 1992 and Hawley and Lozinsky, 1995) for the Albuquerque Basin and groundwater flow model (Kernodle et al, 1995). Dr. Hawley's interpretation of the areal extent of the 4970-foot silt/clay is consistent with the Albuquerque Basin hydrologic framework.

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Hawley, J. W. and Haase, C. S. 1992. Hydrogeologic framework of the northern Albuquerque Basin: Socorro, New Mexico Bureau of Mines and Mineral Resources Open-File Report 387.

Hawley, J. W., Haase, C. S. and Lozinsky, R. P. 1995. Hydrogeologic framework of the northern Albuquerque Basin, in Ortega-Klett (ed.), The water future of Albuquerque and Middle Rio Grande Basin: New Mexico Water Resources Research Institute, Technical Report No. 290.

Kernodle, J. M., McAda, D. P. and Thorn, C. R. 1995. Simulation of Ground-Water Flow in the Albuquerque Basin, Central New Mexico, 1901-1994, with Projections to 2020. US Geological Survey Water-Resources Investigations Report 94-4251 prepared in cooperation with the City of Albuquerque Public Works Department.

ATTACHMENT 10

FIGURES 6.4a, 6.5a, and 6.6a
FIGURES 6.4b, 6.5b, and 6.6b
AND
FIGURES 6.4c, 6.5c, and 6.6c

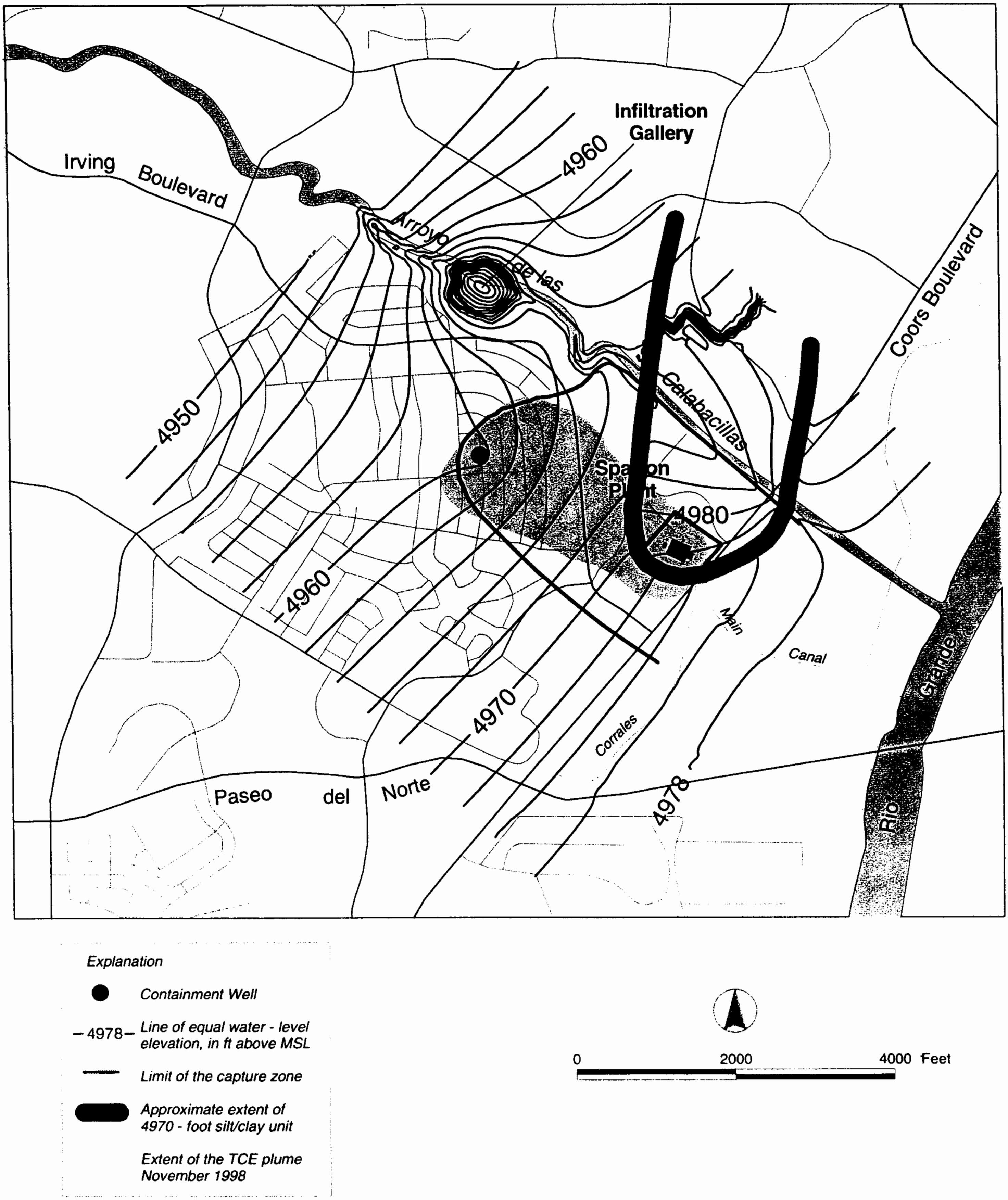


Figure 6.4a Computed Water Levels and Capture Zone in the UFZ - October 1999

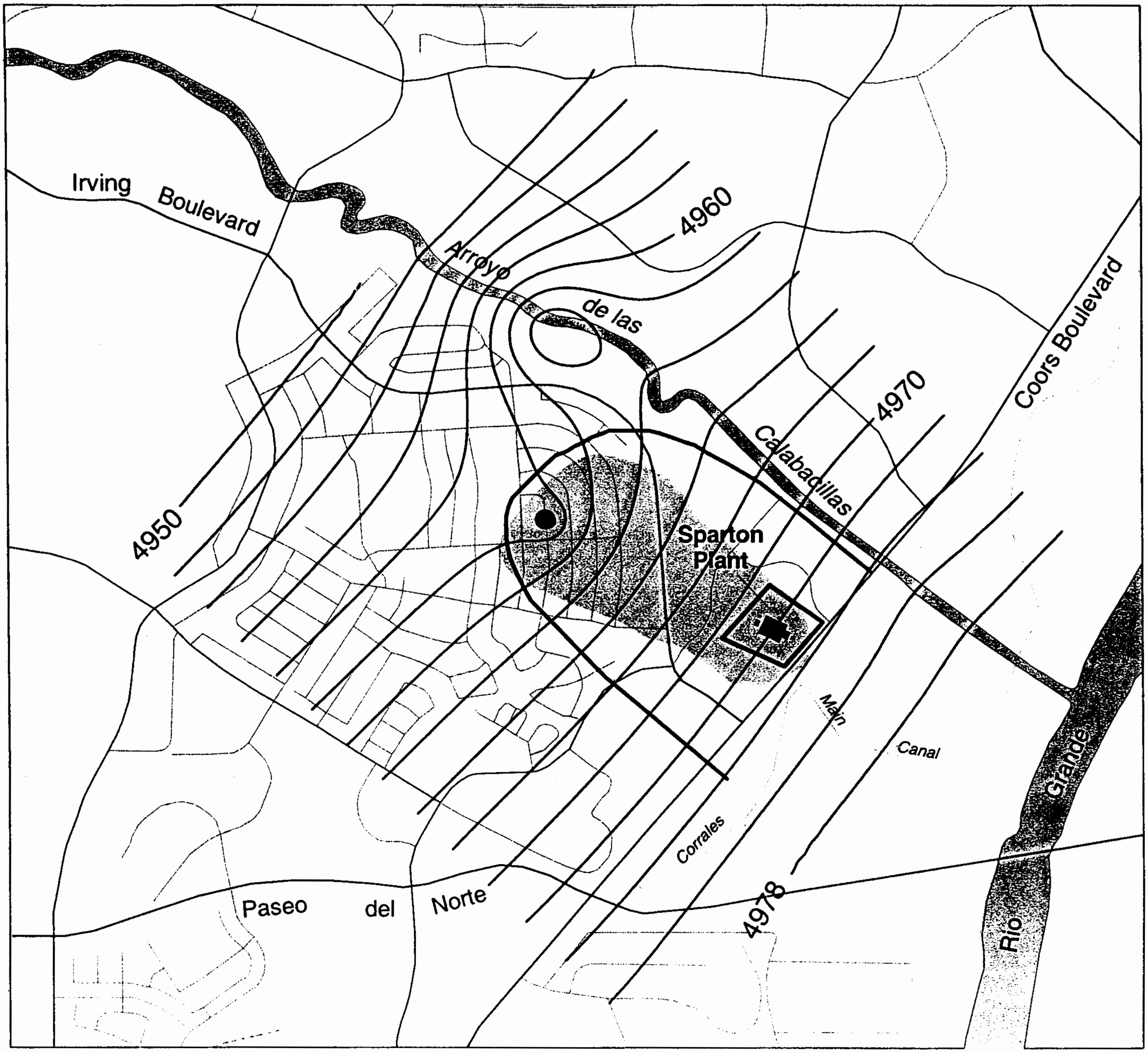


Figure 6.5a Computed Water Levels and Capture Zone in the ULFZ - October 1999

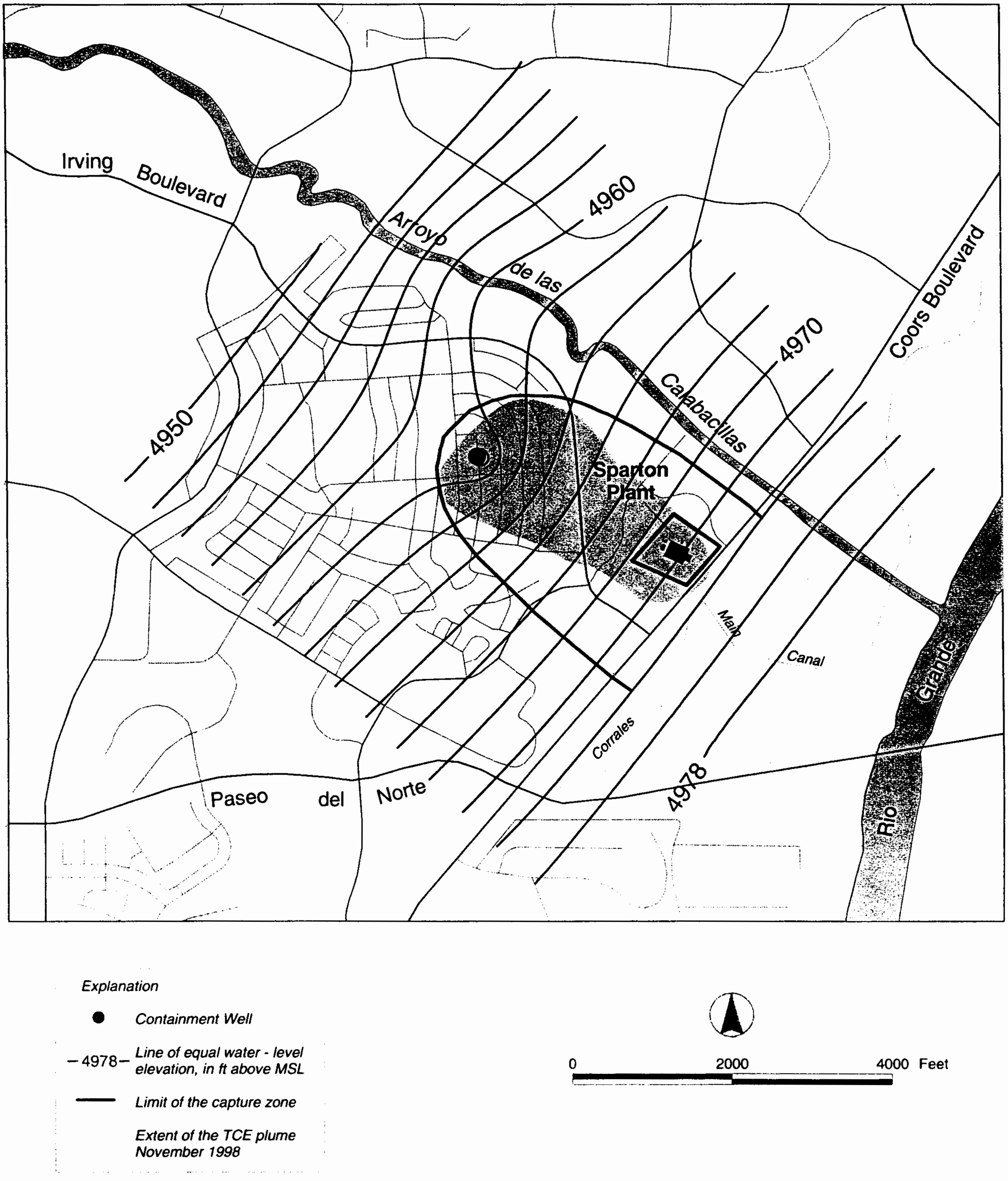
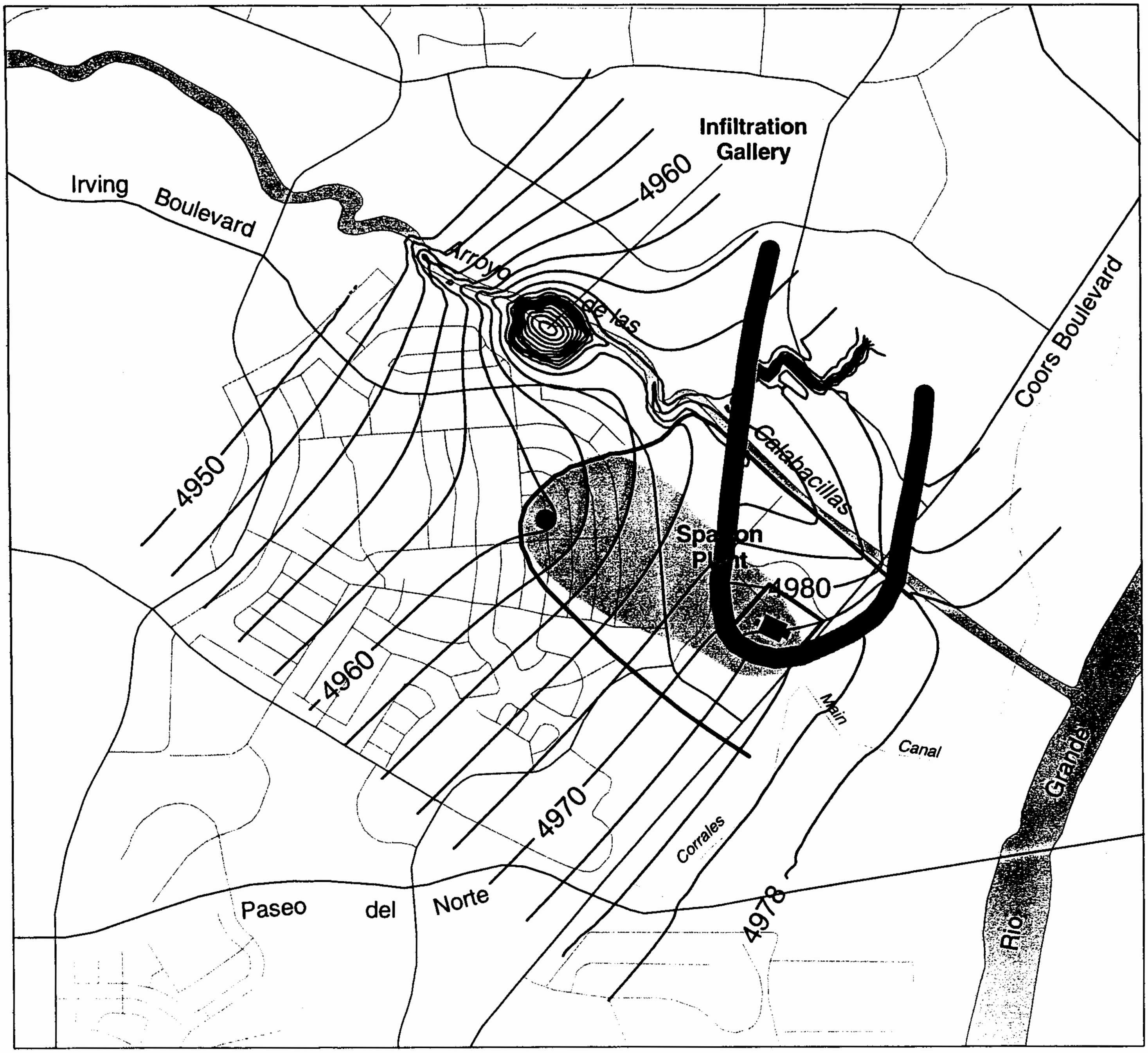


Figure 6.6a Computed Water Levels and Capture Zone in the LLFZ - October 1999



Explanation

Containment Well

–4978– *Line of equal water - level elevation, in ft above MSL*

Limit of the capture zone

Approximate extent of 4970 - foot silt/clay unit

Extent of the TCE plume November 1999

Figure 6.4b Computed Water Levels and Capture Zone in the UFZ - October 1999

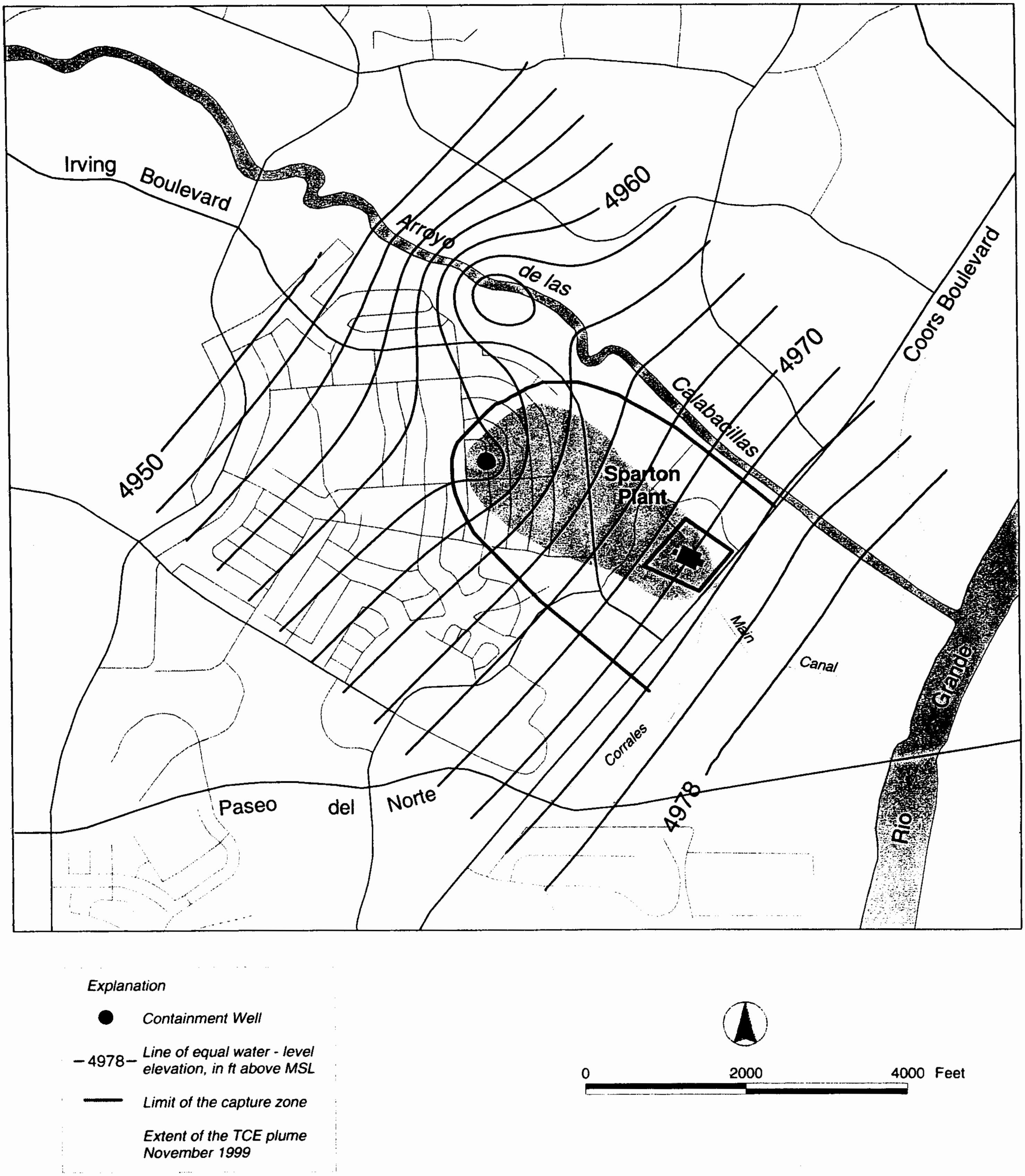


Figure 6.5b Computed Water Levels and Capture Zone in the ULFZ - October 1999

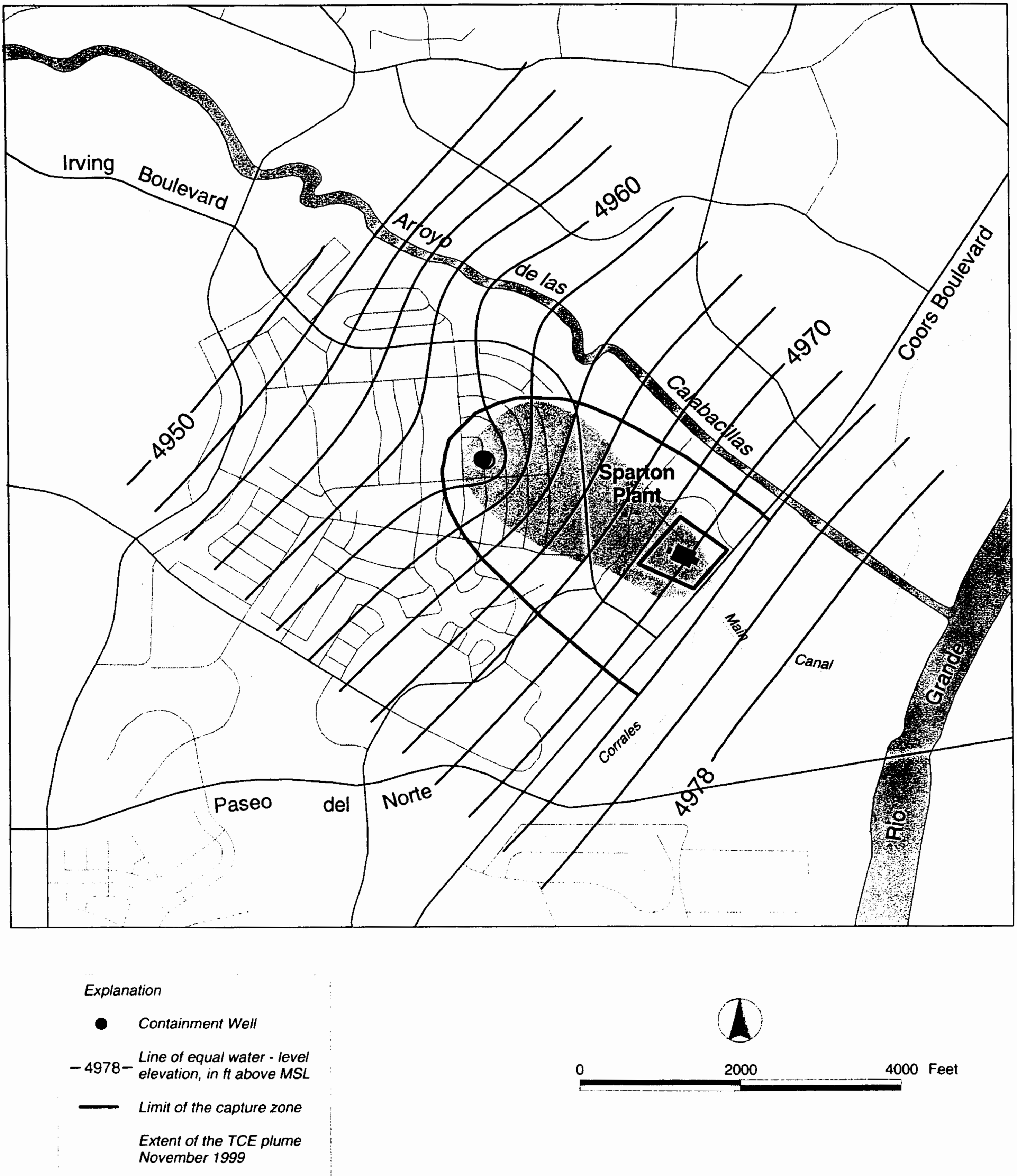


Figure 6.6b Computed Water Levels and Capture Zone in the LLFZ - October 1999

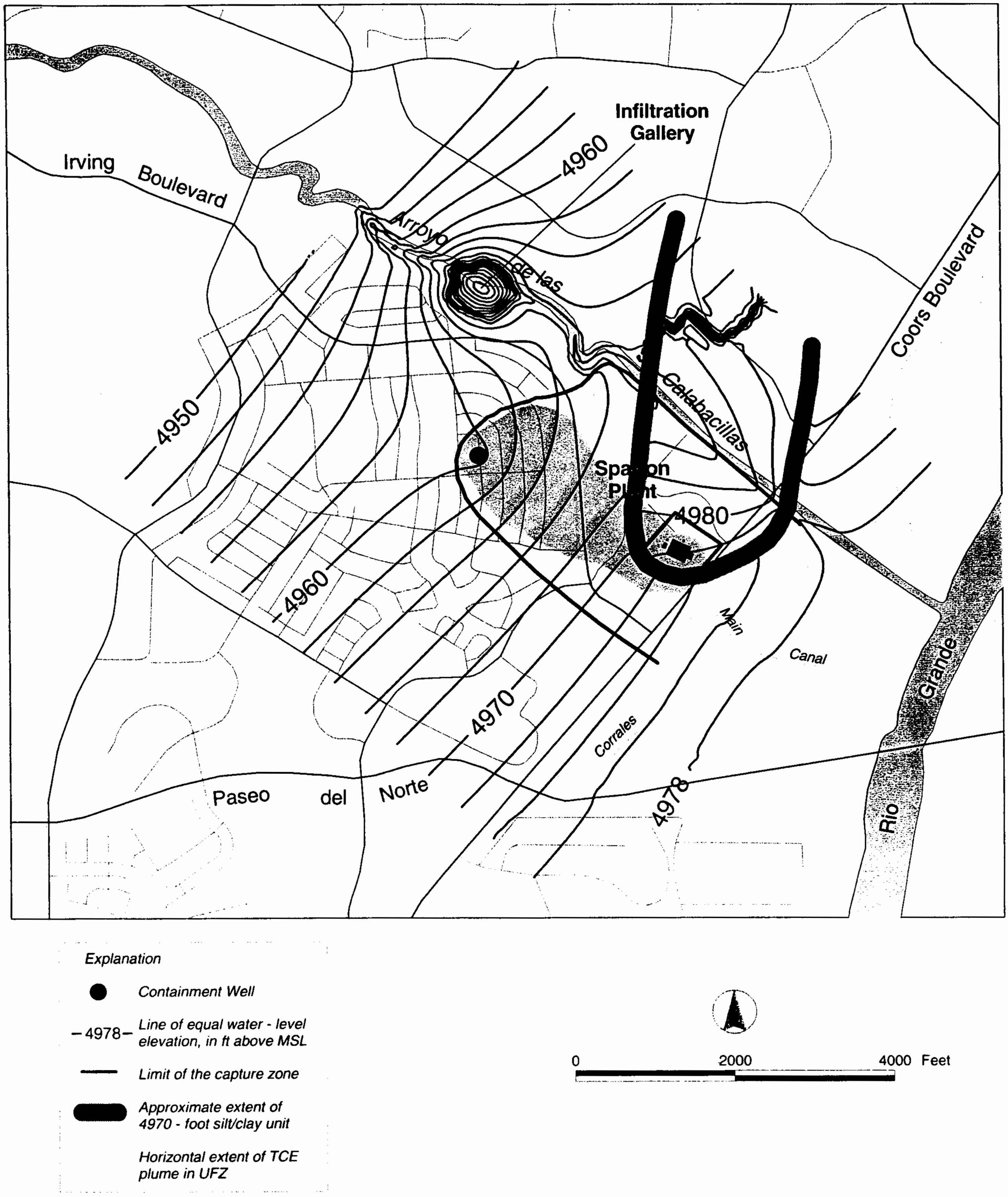


Figure 6.4c Computed Water Levels and Capture Zone in the UFZ - October 1999

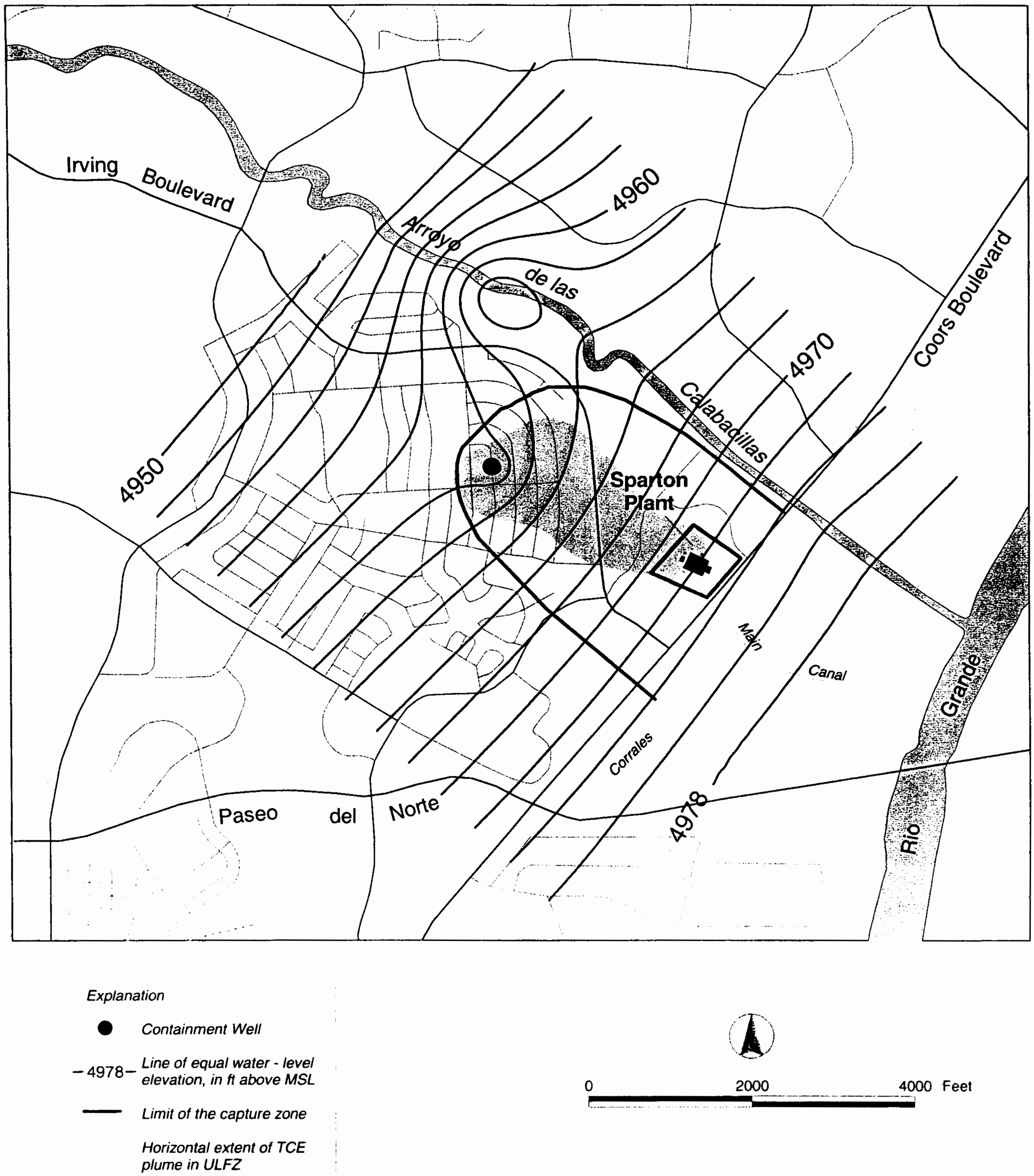


Figure 6.5c Computed Water Levels and Capture Zone in the ULFZ - October 1999

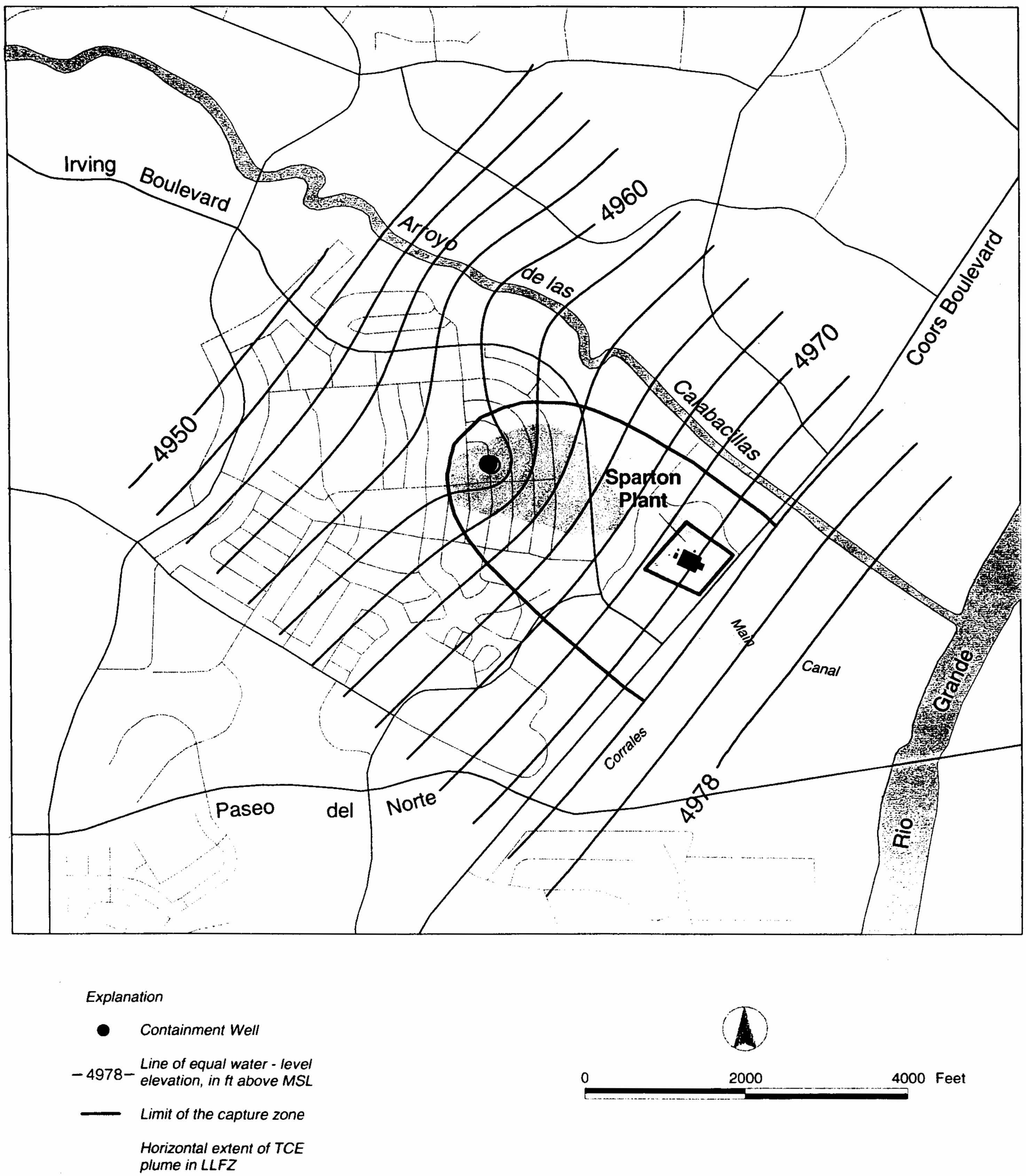


Figure 6.6c Computed Water Levels and Capture Zone in the LLFZ - October 1999

SPECIAL WARRANTY DEED

HUNING LIMITED PARTNERSHIP, a New Mexico limited partnership ("Grantor"), for consideration paid, grants to SPARTON TECHNOLOGY, INC., a New Mexico corporation ("Grantee"), whose address is 2400 E. Ganson Street, Jackson, MI 49202-0000, the following described real estate in Bernalillo County, New Mexico (the "Property"):

> Tract B-2, Adobe Wells Subdivision, as the same is shown and designated on the plat of said subdivision recorded on DEC. 8TH, 1999 in Map Book 99C, Page 329, records of Bernalillo County, New Mexico,

SUBJECT TO taxes for 1999 and subsequent years and all easements, covenants, restrictions, and encumbrances of record;

SUBJECT TO the following covenant, which is solely for the benefit of all present and future owner(s) of land sharing a common boundary with the Property. This covenant may be modified, waived or terminated by written agreement signed by the then current owner(s) of the land sharing a common boundary with the Property: Any activity on the property related to environmental remediation will be limited to the installation and use of groundwater wells and connecting pipelines, all located below ground surface level. This shall be a covenant running with the land enforceable against the Grantee, its successors and assigns.

With special warranty covenants.

WITNESS its hand and seal this 29th day of October, 1999.

HUNING LIMITED PARTNERSHIP,
a New Mexico limited partnership

By John L Huning
John L. Huning, General Partner

By Louis F Huning
Louis F. Huning, as Personal Representative of the Estate of Fred D. Huning, Jr., Deceased, General Partner

STATE OF NEW MEXICO)
) ss.
COUNTY OF BERNALILLO)

This instrument was acknowledged before me on October 29, 1999 by John L. Huning and Louis F. Huning, as Personal Representative of the Estate of Fred D. Huning, Jr., Deceased, as General Partners of Huning Limited Partnership, a New Mexico limited partnership.

[signature]
Notary Public

My commission expires:
9/29/2000

Judy D. Woodward Bern. Co. SPWD R 7.00

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ATTACHMENT H

To the Consent Decree In

Albuquerque v. Sparton Technology, Inc., No. CV 07 0206 (D.N.M.)

Post Closure Care Permit Application Information

ATTACHMENT H

Post Closure Care Permit Application Information

I. Outstanding Items Required to be Submitted

1. An updated original signature of the facility owner or operator for the Part A application and the certification. [NOD Items 1 and 15; Application Page 1 and Attachment 1, Page 7; 40 CFR §270.11].

2. The identification, address, and phone number of the person(s) responsible for storage and updating the facility's copy of the Post-Closure Care Plan during the post-closure care period. [NOD Item 9; 40 CFR §264.144].

3. A copy of the current Post-Closure cost estimate. [NOD Item 10; Application Page 11, Section 2.16.1; 40 CFR §264.145].

4. Supplement and summarize the information on all Solid Waste Management Units (SWMUs) as required by 40 CFR § 270.14(d). One way this can be accomplished is by summarizing and submitting the information contained in previous reports on the Site submitted by Sparton to regulatory authorities.

5. The administrative record appears to be incomplete regarding soil sampling done at the Old Container Storage Area and therefore soil sampling records need to be submitted. (40 CFR §264.101).

6. A description of training, personnel, and record-keeping demonstrating compliance with 40 CFR §264.16. [Application Page 10, Section 2.12; 40 CFR §2.12; 40 CFR §270.14(b) (12)].

7. A statement that, upon completion of post-closure care requirements, a certification of completion of post-closure care will be submitted in accordance with 40 CFR §264.120. [40 CFR §264.120].

8. A statement that Application records will be kept for at least three years. [40 CFR §270.10 (I)].

9. Information in the Part A on activities requiring a Permit, whether the facility is on Indian land, and whether this is a new or existing facility and whether the application is a first or revised application. [40 CFR §§270.13 (a), (f), and (g)].

10. An established financial assurance mechanism for post-closure care as required by 40 CFR Part 264, Subpart H (§§ 264.140-151). As long as and once such a financial mechanism is in place under the Consent Decree, it will satisfy the financial mechanism for the Post-Closure Application. [NOD Items 11 through 13; Application Page 11, Section 2.16.1].

11. A map showing the location of all the monitor wells. This can be included in groundwater monitoring plan.

II. Previous Outstanding Items in the Post-Closure Application Satisfied by Proposed Workplans

1. Detailed plans and an engineering report describing the proposed groundwater monitoring system. This requirement will be satisfied under the Consent Decree. [NOD Item 3; Application Page 19, Section 3.7.5; 40 CFR §270.14(c) (7) (v)].

2. A description of proposed sampling, analysis, and statistical comparison procedures to be utilized in evaluating groundwater monitoring data. This requirement will be satisfied under the Consent Decree. [NOD Item 4; Application Page 19, Section 3.7.6; 40 CFR §270.14 (c) (7) (vi)].

3. Detailed plans and an engineering report describing the corrective action to be taken. This requirement will be satisfied by the Work Plans under the Consent Decree. [NOD Item 6; Application Page 20, Section 3.8.3; 40 CFR §270.14 (c) (8) (iii)].

4. A description of how the groundwater monitoring program will demonstrate the adequacy of the corrective action. This requirement will be satisfied by the Groundwater Monitoring Program Plan, Attachment A to the Consent Decree. [NOD Item 7; Application Page 20, Section 3.8.4; 40 CFR §270.14 (c) (8) (iv)].

5. A statement of the frequency of inspection of the groundwater monitoring wells and verification that inspection records will be retained. This requirement will be satisfied under the Groundwater Monitoring Program Plan, Attachment A to the Consent Decree. [NOD Item 16; Application Page 7, Section 2.5 and Attachment 4; 40 CFR §264.14 (b) (5)].

6. Submittal of semi-annual reports to HRMB. This requirement will be satisfied under the Consent Decree. However, semi-annual ground water information will be submitted, but effectiveness discussions are reserved to the annual reports in the Work Plans. [NOD Item 8; 40 CFR §264.101].

7. Characterization of contaminated groundwater and specification of hazardous constituents under 40 CFR §264.93. This requirement will be satisfied under the Consent Decree. [40 CFR §§270.14 (c) (7) (I) and (ii)].

8. A summary of groundwater monitoring data obtained during the interim status period is satisfied by the Groundwater Monitoring Program Plan, Attachment A to the Consent Decree. [NOD Item 2; Application Page 14, Section 3.1; 40 CFR §270.14 (c) (1)].

REFERENCE LIST OF REGULATORY CITATIONS

Regulatory Citation (s):	Provided: Yes/NA	Section	Page (s)
§270.14 (b)(1)	Yes	1.1,1.2	1, 3
§270.14 (b)(2)	Yes	2.0,2.5	21, 27
§270.14 (b)(3)	Yes	2.0	21
§264.13 (b)	Yes	2.0	21
§264.13 (c)	NA	NA	NA
§270.14 (b)(4)	Yes	1.1.2,1.2.4,3.0	3, 13, 33
§270.14 (b)(5)	Yes	4.0	35
§264.174	Yes	4.0,14.0	35, 73
§264.193 (i)	NA	NA	NA
§264.195	NA	NA	NA
§264.226	NA	NA	NA
§264.254	NA	NA	NA
§264.273	NA	NA	NA
§264.303	NA	NA	NA
§264.602	NA	NA	NA
§264.1033	NA	NA	NA
§264.1052	NA	NA	NA
§264.1053	NA	NA	NA
§264.1058	NA	NA	NA
§270.14 (b)(6)	NA	NA	NA
§270.14 (b)(7)	Yes	5.0,6.0	37, 51
§264.227	NA	NA	NA
§270.14 (b)(8)	Yes	7.0	53
§270.14 (b)(8)(i)	Yes	1.0	1
§270.14 (b)(8)(ii)	Yes	1.2.1,1.2.2	3, 9
§270.14 (b)(8)(iii)	Yes	7.0	53
§270.14 (b)(8)(iv)	Yes	7.0	53
§270.14 (b)(8)(v)	Yes	7.0	53
§270.14 (b)(8)(vi)	Yes	7.0	53
§270.14 (b)(9)	Yes	7.0	53
§264.17 (c)	Yes	7.0	53
§270.14 (b)(10)	Yes	1.1.1,1.2.5,8.0	1, 17, 55
§270.14 (b)(11)	NA	9.0	57
§270.14 (b)(11)(i)	NA	9.0	57
§270.14 (b)(11)(ii)	NA	9.0	57
§270.14 (b)(11)(ii)(A)	NA	9.0	57
§270.14 (b)(11)(ii)(B)	NA	9.0	57
§270.14 (b)(11)(iii)	NA	9.0	57
§270.14 (b)(11)(iv)	NA	9.0	57
§270.14 (b)(11)(iv)(A)	NA	9.0	57

REFERENCE LIST OF REGULATORY CITATIONS (continued)			
Regulatory Citation (s):	**Provided: Yes/NA**	**Section**	**Page (s)**
§270.14 (b)(11)(iv)(B)	NA	9.0	57
§270.14 (b)(11)(iv)(C)	NA	9.0	57
§270.14 (b)(11)(iv)(C)(1)	NA	9.0	57
§270.14 (b)(11))(iv)(C)(2)	NA	9.0	57
§270.14 (b)(11))(iv)(C)(3)	NA	9.0	57
§270.14 (b)(11))(iv)(C)(4)	NA	9.0	57
§270.14 (b)(11)(v)	NA	9.0	57
§270.14 (b)(12)	Yes	11.0	65
§270.14 (b)(13)	Yes	12.0	69
§264.112	Yes	12.0	69
§264.118	~~NA~~ Yes	~~NA~~ 12.0	~~NA~~ 69
§264.178	Yes	12.0	69
§264.197	NA	NA	NA
§264.228	NA	NA	NA
§264.258	NA	NA	NA
§264.280	NA	NA	NA
§264.310	NA	NA	NA
§264.351	NA	NA	NA
§264.601	NA	NA	NA
§264.603	NA	NA	NA
§270.14(b)(14)	NA	NA	NA
§270.14(b)(15)	NA	NA	NA
§270.14(b)(16)	NA	NA	NA
§270.14(b)(17)	NA	NA	NA
§270.14(b)(18)	NA	NA	NA
§270.14(b)(19)	Yes	13.0	71
(i)	Yes	13.0	71
(ii)	NA	13.0	71
(iii)	Yes	13.0	71
(iv)	Yes	13.0	71
(v)	Yes	13.0	71
(vi)	Yes	13.0	71
(vii)	Yes	13.0	71
(viii)	Yes	13.0	71
(ix)	Yes	13.0	71
(x)	Yes	13.0	71
(xi)	Yes	13.0	71
(xii)	Yes	13.0	71
§270.14(b)(20)	Yes	15.0	77

REFERENCE LIST OF REGULATORY CITATIONS *continued*

	Regulatory Citation (s):	Provided: Yes/NA	Section	Page (s)
	(a)	Yes	15.0	77
	(b)	Yes	15.0	77
	(c)	Yes	15.0	77
	(d)	Yes	15.0	77
	(e)	Yes	15.0	77
	(f)	Yes	15.0	77
	§270.14(b)(21)	NA	NA	NA
may need	§270.14(c)	NA	NA	NA
	§270.14(c)(1)	NA	NA	NA
	§270.14(c)(2)	NA	NA	NA
	§270.14(c)	NA	NA	NA
	§270.14(c)(3)	NA	NA	NA
	~~§270.14(c)(3)~~	~~NA~~	~~NA~~	~~NA~~
	§270.14(c)(4)	NA	NA	NA
	(i)	NA	NA	NA
	(ii)	NA	NA	NA
may need	§270.14(c)(5)	NA	NA	NA
may need	§270.14(c)(6)	NA	NA	NA
may need	(i)	NA	NA	NA
	(ii)	NA	NA	NA
	(iii)	NA	NA	NA
	(iv)	NA	NA	NA
	§270.14(c)(7)	NA	NA	NA
	270.15	Yes	1.2.2,19.0	9, 91
	§270.16	NA	NA	NA
	§270.16(a)	NA	NA	NA
	§270.16(b)	NA	NA	NA
	§270.16(c)	NA	NA	NA
	§270.16(d)	NA	NA	NA
	§270.16(e)	NA	NA	NA
	§270.16(f)	NA	NA	NA
	§270.16(g)	NA	NA	NA
	§270.16(h)	NA	NA	NA
	§270.16(i)	NA	NA	NA
	§270.16(j)	NA	NA	NA

no mention of §270.14(d)(1), (2), & (3) for each SWMU.