Harding Lawson Associates

March 28, 1986

HLA Job No. 6310,030.12

Sparton Technology, Inc.
P.O. Box 1784
9621 Coors Road, N.W.
Albuquerque, New Mexico 87103

Attention: Mr. Richard Mico

Re: RCRA Post-Closure Permit Application
Draft Final for Sparton Coors Road Facility
Albuquerque, New Mexico

Dear Sirs:

Enclosed please find the final of the referenced post-closure permit application (PCPA). All suggested changes from your review have been incorporated into the final permit application.

The PCPA meets the applicable requirements as set forth by both New Mexico Hazardous Waste Management Regulations (NMHWMR Parts 206 and 302) and the Code of Federal Regulations (CFR) Parts 270 and 264. These regulations direct all facilities which close with hazardous waste or residues remaining in place, and/or subsurface contamination to prepare a post-closure plan and apply for a post-closure permit application.

The basic approach was to collate all available information, summarize major points using the regulations as a guide, and prepare, where information was available, a complete permit application that addressed all regulatory requirements. Where data were unavailable, we provided a discussion of how Sparton would achieve completion, along with an indication of the time frame. However, Sparton must realize that within the short period alloted for application preparation (a due date of March 28, 1986), and the absence of certain critical information (ACLs, etc.), HLA could not prepare a permit application that would fully meet all technical requirements.

As with all such permit applications, HLA expects the New Mexico Environmental Improvement Division (NMEID) to conduct a completeness/technical review of the document. They will prepare a

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Hawaii
Nevada

Texas

notice of deficiency (NOD) for Sparton to resolve within a specified time frame. Such deficiencies may most likely focus on the ground-water system, as the monitoring program and ACL demonstration are still in the formative stage, and data are, as yet, unavailable. At such time, HLA and Sparton can review the NOD and decide on a further course of action.

For submission of the post-closure permit application, we have included all of the attachments. The final application for submittal to EID must contain all attachments. Three copies in binders should be forwarded to the appropriate NMEID representative. In addition, please be sure to sign the certification statement on page 35.

It has been a pleasure serving you on this project, and we are eager to continue to assist you on subsequent efforts.

Very truly yours,

HARDING LAWSON ASSOCIATES

Thomas S. Burger

Thomas S. Burger
Associate Environmental Scientist

J. Michael Huls

J. Michael Huls
Program Manager
RCRA Programs

TSB:JMH:das

cc: Jon DeWitt
Blair Thompson

Enclosures

A Project Prepared For

Sparton Technology
4901 Rockway Boulevard S.W.
Rio Rancho, New Mexico 87124

RCRA POST-CLOSURE PERMIT APPLICATION
SPARTON TECHNOLOGY, INC.
COORS ROAD PLANT
ALBUQUERQUE, NEW MEXICO

HLA Job No. 6310,030.12

RECEIVED
APR 17 1987
GROUND WATER/HAZARDOUS WASTE
BUREAU

Prepared by

Joseph A. Hofbauer
Hydrogeologist

Robert J. Bressett
Senior Environmental Scientist

Harding Lawson Associates
6220 Westpark, Suite 100
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March 28, 1986

Harding Lawson Associates

Engineers, Geologists
& Geophysicists

RCRA POST-CLOSURE PERMIT APPLICATION
SPARTON TECHNOLOGY, INCORPORATED
COORS ROAD PLANT
ALBUQUERQUE, NEW MEXICO
MARCH 1986

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ATTACHMENTS

1. Floodplain Standard
2. Land Use Information
3. Pond and Drum Storage Areas Closure Plan
4. Hydrogeologic Characterization and Remedial Investigation
5. Ground-Water Monitoring Program
6. Investigation of Soil and Ground-Water Contamination
7. Pond Waste Analysis and Ground-Water Monitoring Results
8. Hazardous Waste Facility Post-Closure Care Plan
9. Post-Closure Care Plan Comments as Provided by NMEID And Sparton's Response
10. Financial Responsibility Requirement Responses
11. Windrose for Albuquerque, New Mexico
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POST-CLOSURE PERMIT APPLICATION

[Reference: 40 CFR 270.14, 264.118(a); NMHWMR 206.C.2.h(1), 302.A.4.b]

In accordance with the above-referenced regulatory citations, Sparton Technology, Inc. (Sparton) provides this post-closure permit application for two inactive surface impoundments located at the Coors Road facility in the city limits of Albuquerque, New Mexico.

The application contains a copy of the pending post-closure care plan that Sparton will follow over the required 30-year care period. The plan is accompanied by all applicable sections ordinarily submitted with a permit application.

In the permit application, Sparton has submitted the following specific information:

- Part A;
- Part B, including facility description, waste characteristics, process information, ground-water monitoring, post-closure permit requirements, other federal laws, and permit application certification.

Note that descriptions of contingency planning, the waste analysis plan, preparedness and prevention planning, and personnel training programs are not included because the surface impoundments have been inactive for over 2 years, and Sparton has no intention of reactivating them. By regulatory definition, the surface impoundments represent disposal units (i.e., certain potentially contaminated materials remain in place).

SECTION A

PART A

Please print or type in the unshaded areas only
(fill-in areas are spaced for elite type, i.e., 12 characters/inch).

Form Approved OMB No. 158-R0175

FORM 1 GENERAL

EPA

U.S. ENVIRONMENTAL PROTECTION AGENCY

GENERAL INFORMATION

Consolidated Permits Program

(Read the "General Instructions" before starting.)

I. EPA I.D. NUMBER: F N M D 0 8 3 2 1 2 3 3 2

LABEL ITEMS

I. EPA I.D. NUMBER

III. FACILITY NAME

V. FACILITY MAILING ADDRESS

VI. FACILITY LOCATION

PLEASE PLACE LABEL IN THIS SPACE

GENERAL INSTRUCTIONS

If a preprinted label has been provided, a it in the designated space. Review the info ation carefully; if any of it is incorrect, c through it and enter the correct data in appropriate fill-in area below. Also, if an the preprinted data is absent *(the area to left of the label space lists the informa that should appear)*, please provide it in proper fill-in area*(s)* below. If the labe complete and correct, you need not comp Items I, III, V, and VI *(except VI-B w must be completed regardless)*. Complete items if no label has been provided. Refe the instructions for detailed item des tions and for the legal authorizations u which this data is collected.

II. POLLUTANT CHARACTERISTICS

INSTRUCTIONS: Complete A through J to determine whether you need to submit any permit application forms to the EPA. If you answer "yes" to an questions, you must submit this form and the supplemental form listed in the parenthesis following the question. Mark "X" in the box in the third colum if the supplemental form is attached. If you answer "no" to each question, you need not submit any of these forms. You may answer "no" if your activit is excluded from permit requirements; see Section C of the instructions. See also, Section D of the instructions for definitions of bold-faced terms.

SPECIFIC QUESTIONS	MARK 'X' YES	NO	FORM ATTACHED	SPECIFIC QUESTIONS	MARK 'X' YES	NO	FO ATTA
A. Is this facility a **publicly owned treatment works** which results in a discharge to waters of the U.S.? (FORM 2A)		X		B. Does or will this facility *(either existing or proposed)* include a **concentrated animal feeding operation** or **aquatic animal production facility** which results in a discharge to waters of the U.S.? (FORM 2B)		X	
C. Is this a facility which currently results in discharges to waters of the U.S. other than those described in A or B above? (FORM 2C)		X		D. Is this a proposed facility *(other than those described in A or B above)* which will result in a discharge to waters of the U.S.? (FORM 2D)		X	
E. Does or will this facility treat, store, or dispose of **hazardous wastes**? (FORM 3)	X			F. Do you or will you inject at this facility industrial or municipal effluent below the lowermost stratum containing, within one quarter mile of the well bore, underground sources of drinking water? (FORM 4)		X	
G. Do you or will you inject at this facility any produced water or other fluids which are brought to the surface in connection with conventional oil or natural gas production, inject fluids used for enhanced recovery of oil or natural gas, or inject fluids for storage of liquid hydrocarbons? (FORM 4)		X		H. Do you or will you inject at this facility fluids for special processes such as mining of sulfur by the Frasch process, solution mining of minerals, in situ combustion of fossil fuel, or recovery of geothermal energy? (FORM 4)		X	
I. Is this facility a proposed **stationary source** which is one of the 28 industrial categories listed in the instructions and which will potentially emit 100 tons per year of any air pollutant regulated under the Clean Air Act and may affect or be located in an attainment area? (FORM 5)		X		J. Is this facility a proposed **stationary source** which is NOT one of the 28 industrial categories listed in the instructions and which will potentially emit 250 tons per year of any air pollutant regulated under the Clean Air Act and may affect or be located in an attainment area? (FORM 5)		X	

III. NAME OF FACILITY

1 SKIP S P A R T O N T E C H O L O G Y I N C

IV. FACILITY CONTACT

A. NAME & TITLE *(last, first, & title)*	B. PHONE *(area code & no.)*		
2 B O O N E T E R R Y E N V R E N G R	5 0 5	8 9 2	5 3 0 0

V. FACILITY MAILING ADDRESS

A. STREET OR P.O. BOX

3 P O B O X 1 7 8 4

B. CITY OR TOWN	C. STATE	D. ZIP CODE
4 A L B U Q U E R Q U E	N M	8 7 1 0 3

VI. FACILITY LOCATION

A. STREET, ROUTE NO. OR OTHER SPECIFIC IDENTIFIER

5 9 6 2 1 C O O R S R O A D N M

B. COUNTY NAME

B E R N A L I L L O

C. CITY OR TOWN	D. STATE	E. ZIP CODE	F. COUNTY CODE *(if known)*
6 A L B U Q U E R Q U E	N M	8 7 1 1 4	

CONTINUE ON REVE

CONTINUED FROM THE FRONT

VII. SIC CODES *(4-digit, in order of priority)*

A. FIRST		B. SECOND	
3661	(specify) Telecommunications Mfg., Ass'y	3679	(specify) Printed Circuit Boards
C. THIRD		**D. FOURTH**	
3674	(specify) Electronics Assembly	3825	(specify) Transducer Assembly

VIII. OPERATOR INFORMATION

A. NAME: SPARTON TECHNOLOGY INC

B. Is the name listed in Item VIII-A also the owner? [X] YES [ ] NO

C. STATUS OF OPERATOR *(Enter the appropriate letter into the answer box; if "Other", specify.)*
F = FEDERAL
S = STATE
P = PRIVATE
M = PUBLIC *(other than federal or state)*
O = OTHER *(specify)*

Answer: P *(specify)*

D. PHONE *(area code & no.)*: A 505 892 5300

E. STREET OR P.O. BOX: PO BOX 1784

F. CITY OR TOWN: ALBUQUERQUE

G. STATE: NM

H. ZIP CODE: 87103

IX. INDIAN LAND

Is the facility located on Indian lands? [ ] YES [X] NO

X. EXISTING ENVIRONMENTAL PERMITS

A. NPDES *(Discharges to Surface Water)*	N	D. PSD *(Air Emissions from Proposed Sources)*	P
B. UIC *(Underground Injection of Fluids)*	U	E. OTHER *(specify)*	9 *(specify)*
C. RCRA *(Hazardous Wastes)*	R	E. OTHER *(specify)*	9 *(specify)*

XI. MAP

Attach to this application a topographic map of the area extending to at least one mile beyond property bounderies. The map must show the outline of the facility, the location of each of its existing and proposed intake and discharge structures, each of its hazardous waste treatment, storage, or disposal facilities, and each well where it injects fluids underground. Include all springs, rivers and other surface water bodies in the map area. See instructions for precise requirements.

XII. NATURE OF BUSINESS *(provide a brief description)*

1. Manufacture and assembly of Telecommunications monitoring and alarm systems and associated components.
2. Manufacture of printed circuit boards.
3. Assembly of solid state modules. Assembly of high reliability switches.
4. Assembly, calibration of pressure transducers.

XIII. CERTIFICATION *(see instructions)*

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this application and all attachments and that, based on my inquiry of those persons immediately responsible for obtaining the information contained in the application, I believe that the information is true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

A. NAME & OFFICIAL TITLE *(type or print)*	B. SIGNATURE	C. DATE SIGNED
Blair Thompson Secretary/Treasurer	[signature]	8/1/84

COMMENTS FOR OFFICIAL USE ONLY

C

Please print or type with ELITE type *(12 characters/inch)* in the unshaded areas only.

Form Approved OMB No. 158-S79016
GSA No. 0246 EPA-OT

EPA — U.S. ENVIRONMENTAL PROTECTION AGENCY
NOTIFICATION OF HAZARDOUS WASTE ACTIVITY

INSTALLATION'S EPA I.D. NO.	NMD083212332
I. NAME OF INSTALLATION	
II. INSTALLATION MAILING ADDRESS	SPARTON TECHNOLOGY, INC. P.O. Box 1784 Albuquerque, New Mexico 87103
III. LOCATION OF INSTALLATION	9621 Coors Road N.W. Albuquerque, New Mexico 87114

INSTRUCTIONS: If you received a preprinted label, affix it in the space at left. If any of the information on the label is incorrect, draw a line through it and supply the correct information in the appropriate section below. If the label is complete and correct, leave Items I, II, and III below blank. If you did not receive a preprinted label, complete all items. "Installation" means a single site where hazardous waste is generated, treated, stored and/or disposed of, or a transporter's principal place of business. Please refer to the INSTRUCTIONS FOR FILING NOTIFICATION before completing this form. The information requested herein is required by law *(Section 3010 of the Resource Conservation and Recovery Act).*

DETACH

FOR OFFICIAL USE ONLY

COMMENTS: C

INSTALLATION'S EPA I.D. NUMBER	APPROVED	DATE RECEIVED (yr., mo., & day)
S F T/A C 1		

I. NAME OF INSTALLATION

SPARTON TECHNOLOGY INC

II. INSTALLATION MAILING ADDRESS

STREET OR P.O. BOX	CITY OR TOWN	ST.	ZIP CODE
3 PO BOX 1784	4 ALBUQUERQUE	NM	87103

III. LOCATION OF INSTALLATION

STREET OR ROUTE NUMBER	CITY OR TOWN	ST.	ZIP CODE
5 9621 COORS ROAD NW	6 ALBUQUERQUE	NM	87114

IV. INSTALLATION CONTACT

NAME AND TITLE *(last, first, & job title)*	PHONE NO. *(area code & no.)*
2 BOONE TERRY ENVR ENGR	505-892-5300

V. OWNERSHIP

A. NAME OF INSTALLATION'S LEGAL OWNER: 8 SPARTON TECHNOLOGY, INC.

B. TYPE OF OWNERSHIP *(enter the appropriate letter into box)*

F = FEDERAL
M = NON-FEDERAL

M

VI. TYPE OF HAZARDOUS WASTE ACTIVITY *(enter "X" in the appropriate box(es))*

- [X] A. GENERATION
- [ ] B. TRANSPORTATION *(complete item VII)*
- [X] C. TREAT/STORE/DISPOSE
- [ ] D. UNDERGROUND INJECTION

VII. MODE OF TRANSPORTATION *(transporters only – enter "X" in the appropriate box(es))*

- [ ] A. AIR
- [ ] B. RAIL
- [ ] C. HIGHWAY
- [ ] D. WATER
- [ ] E. OTHER *(specify)*:

VIII. FIRST OR SUBSEQUENT NOTIFICATION

Mark "X" in the appropriate box to indicate whether this is your installation's first notification of hazardous waste activity or a subsequent notification. If this is not your first notification, enter your Installation's EPA I.D. Number in the space provided below.

- [ ] A. FIRST NOTIFICATION
- [X] B. SUBSEQUENT NOTIFICATION *(complete item C)*

C. INSTALLATION'S EPA I.D. NO.: NMD083212332

IX. DESCRIPTION OF HAZARDOUS WASTES

Please go to the reverse of this form and provide the requested information.

I.D. – FOR OFFICIAL USE ONLY		
W	T/A	C
		1

IX. DESCRIPTION OF HAZARDOUS WASTES *(continued from front)*

A. HAZARDOUS WASTES FROM NON–SPECIFIC SOURCES. Enter the four–digit number from 40 CFR Part 261.31 for each listed hazardous waste from non–specific sources your installation handles. Use additional sheets if necessary.

1	2	3	4	5	6
F001	F002	F003	F005	F006	
7	**8**	**9**	**10**	**11**	**12**

B. HAZARDOUS WASTES FROM SPECIFIC SOURCES. Enter the four–digit number from 40 CFR Part 261.32 for each listed hazardous waste from specific industrial sources your installation handles. Use additional sheets if necessary.

13	14	15	16	17	18
19	**20**	**21**	**22**	**23**	**24**
25	**26**	**27**	**28**	**29**	**30**

C. COMMERCIAL CHEMICAL PRODUCT HAZARDOUS WASTES. Enter the four–digit number from 40 CFR Part 261.33 for each chemical substance your installation handles which may be a hazardous waste. Use additional sheets if necessary.

31	32	33	34	35	36
37	**38**	**39**	**40**	**41**	**42**
43	**44**	**45**	**46**	**47**	**48**

D. LISTED INFECTIOUS WASTES. Enter the four–digit number from 40 CFR Part 261.34 for each listed hazardous waste from hospitals, veterinary hospitals, medical and research laboratories your installation handles. Use additional sheets if necessary.

49	50	51	52	53	54

E. CHARACTERISTICS OF NON–LISTED HAZARDOUS WASTES. Mark "X" in the boxes corresponding to the characteristics of non–listed hazardous wastes your installation handles. *(See 40 CFR Parts 261.21 – 261.24.)*

- [X] 1. IGNITABLE (D001)
- [X] 2. CORROSIVE (D002)
- [ ] 3. REACTIVE (D003)
- [X] 4. TOXIC (D000)

X. CERTIFICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

SIGNATURE	NAME & OFFICIAL TITLE *(type or print)*	DATE SIGNED
Blair Thompson	Blair Thompson Secretary/Treasurer	5/4/84

Please print or type in the unshaded areas only
(Fill-in areas are spaced for elite type, i.e., 12 characters/inch).

Form Approved OMB No. 158-S80004

FORM 3 RCRA

EPA

U.S. ENVIRONMENTAL PROTECTION AGENCY

HAZARDOUS WASTE PERMIT APPLICATION

Consolidated Permits Program

(This information is required under Section 3005 of RCRA.)

I. EPA I.D. NUMBER

F	N	M	D	0	8	3	2	1	2	3	3	2

FOR OFFICIAL USE ONLY

APPLICATION APPROVED	DATE RECEIVED (yr., mo., & day)	COMMENTS

II. FIRST OR REVISED APPLICATION

Place an "X" in the appropriate box in A or B below *(mark one box only)* to indicate whether this is the first application you are submitting for your facilit revised application. If this is your first application and you already know your facility's EPA I.D. Number, or if this is a revised application, enter your facil EPA I.D. Number in Item I above.

A. FIRST APPLICATION *(place an "X" below and provide the appropriate date)*

☐ 1. EXISTING FACILITY *(See instructions for definition of "existing" facility. Complete item below.)*

C 8 — YR. — MO. — DAY — FOR EXISTING FACILITIES, PROVIDE THE DATE (yr., mo., & day) OPERATION BEGAN OR THE DATE CONSTRUCTION COMMENCED *(use the boxes to the left)*

☐ 2. NEW FACILITY *(Complete item belou*

YR. — MO. — DAY — FOR NEW FACIL PROVIDE THE D. (yr., mo., & day) O TION BEGAN OR EXPECTED TO BI

B. REVISED APPLICATION *(place an "X" below and complete Item I above)*

☒ 1. FACILITY HAS INTERIM STATUS

☐ 2. FACILITY HAS A RCRA PERMIT

III. PROCESSES — CODES AND DESIGN CAPACITIES

A. PROCESS CODE — Enter the code from the list of process codes below that best describes each process to be used at the facility. Ten lines are provided entering codes. If more lines are needed, enter the code(s) in the space provided. If a process will be used that is not included in the list of codes below, describe the process *(including its design capacity)* in the space provided on the form *(Item III-C)*.

B. PROCESS DESIGN CAPACITY — For each code entered in column A enter the capacity of the process.

1. AMOUNT — Enter the amount.
2. UNIT OF MEASURE — For each amount entered in column B(1), enter the code from the list of unit measure codes below that describes the unit of measure used. Only the units of measure that are listed below should be used.

PROCESS	PROCESS CODE	APPROPRIATE UNITS OF MEASURE FOR PROCESS DESIGN CAPACITY
Storage:		
CONTAINER *(barrel, drum, etc.)*	S01	GALLONS OR LITERS
TANK	S02	GALLONS OR LITERS
WASTE PILE	S03	CUBIC YARDS OR CUBIC METERS
SURFACE IMPOUNDMENT	S04	GALLONS OR LITERS
Disposal:		
INJECTION WELL	D79	GALLONS OR LITERS
LANDFILL	D80	ACRE-FEET *(the volume that would cover one acre to a depth of one foot)* OR HECTARE-METER
LAND APPLICATION	D81	ACRES OR HECTARES
OCEAN DISPOSAL	D82	GALLONS PER DAY OR LITERS PER DAY
SURFACE IMPOUNDMENT	D83	GALLONS OR LITERS

PROCESS	PROCESS CODE	APPROPRIATE UNITS OF MEASURE FOR PROCESS DESIGN CAPACITY
Treatment:		
TANK	T01	GALLONS PER DAY OR LITERS PER DAY
SURFACE IMPOUNDMENT	T02	GALLONS PER DAY OR LITERS PER DAY
INCINERATOR	T03	TONS PER HOUR OR METRIC TONS PER HOUR GALLONS PER HOUR OR LITERS PER HOUR
OTHER *(Use for physical, chemical, thermal or biological treatment processes not occurring in tanks, surface impoundments or incinerators. Describe the processes in the space provided; Item III-C.)*	T04	GALLONS PER DAY OR LITERS PER DAY

UNIT OF MEASURE	UNIT OF MEASURE CODE	UNIT OF MEASURE	UNIT OF MEASURE CODE	UNIT OF MEASURE	UNIT MEAS CO
GALLONS	G	LITERS PER DAY	V	ACRE-FEET	
LITERS	L	TONS PER HOUR	D	HECTARE-METER	
CUBIC YARDS	Y	METRIC TONS PER HOUR	W	ACRES	
CUBIC METERS	C	GALLONS PER HOUR	E	HECTARES	
GALLONS PER DAY	U	LITERS PER HOUR	H		

EXAMPLE FOR COMPLETING ITEM III *(shown in line numbers X-1 and X-2 below)*: A facility has two storage tanks, one tank can hold 200 gallons and other can hold 400 gallons. The facility also has an incinerator that can burn up to 20 gallons per hour.

		T/A	C
C	DUP		1

LINE NUMBER	A. PROCESS CODE (from list above)	B. PROCESS DESIGN CAPACITY 1. AMOUNT (specify)	B. 2. UNIT OF MEASURE (enter code)	FOR OFFICIAL USE ONLY	LINE NUMBER	A. PROCESS CODE (from list above)	B. PROCESS DESIGN CAPACITY 1. AMOUNT	B. 2. UNIT OF MEASURE (enter code)	F OFF U ON
X-1	S 0 2	600	G		5				
X-2	T 0 3	20	E		6				
1	S 0 1	24000	G		7				
2	T 0 1	100	U		8				
3					9				
4					10				

III. PROCESSES *(continued)*

C. SPACE FOR ADDITIONAL PROCESS CODES OR FOR DESCRIBING OTHER PROCESSES *(code "T04")*. FOR EACH PROCESS ENTERED HERE INCLUDE DESIGN CAPACITY.

IV. DESCRIPTION OF HAZARDOUS WASTES

A. EPA HAZARDOUS WASTE NUMBER — Enter the four—digit number from 40 CFR, Subpart D for each listed hazardous waste you will handle. If y handle hazardous wastes which are not listed in 40 CFR, Subpart D, enter the four—digit number*(s)* from 40 CFR, Subpart C that describes the character tics and/or the toxic contaminants of those hazardous wastes.

B. ESTIMATED ANNUAL QUANTITY — For each listed waste entered in column A estimate the quantity of that waste that will be handled on an annu basis. For each characteristic or toxic contaminant entered in column A estimate the total annual quantity of all the non—listed waste*(s)* that will be handl which possess that characteristic or contaminant.

C. UNIT OF MEASURE — For each quantity entered in column B enter the unit of measure code. Units of measure which must be used and the appropria codes are:

ENGLISH UNIT OF MEASURE	CODE	METRIC UNIT OF MEASURE	CODE
POUNDS	P	KILOGRAMS	K
TONS	T	METRIC TONS	M

If facility records use any other unit of measure for quantity, the units of measure must be converted into one of the required units of measure taking in account the appropriate density or specific gravity of the waste.

D. PROCESSES

1. PROCESS CODES:
   For listed hazardous waste: For each listed hazardous waste entered in column A select the code*(s)* from the list of process codes contained in Item I to indicate how the waste will be stored, treated, and/or disposed of at the facility.
   For non—listed hazardous wastes: For each characteristic or toxic contaminant entered in column A, select the code*(s)* from the list of process cod contained in Item III to indicate all the processes that will be used to store, treat, and/or dispose of all the non—listed hazardous wastes that posse that characteristic or toxic contaminant.
   Note: Four spaces are provided for entering process codes. If more are needed: (1) Enter the first three as described above; (2) Enter "000" in t extreme right box of Item IV-D(1); and (3) Enter in the space provided on page 4, the line number and the additional code*(s)*.

2. PROCESS DESCRIPTION: If a code is not listed for a process that will be used, describe the process in the space provided on the form.

NOTE: HAZARDOUS WASTES DESCRIBED BY MORE THAN ONE EPA HAZARDOUS WASTE NUMBER — Hazardous wastes that can be described more than one EPA Hazardous Waste Number shall be described on the form as follows:

1. Select one of the EPA Hazardous Waste Numbers and enter it in column A. On the same line complete columns B,C, and D by estimating the total annu quantity of the waste and describing all the processes to be used to treat, store, and/or dispose of the waste.
2. In column A of the next line enter the other EPA Hazardous Waste Number that can be used to describe the waste. In column D(2) on that line ent "included with above" and make no other entries on that line.
3. Repeat step 2 for each other EPA Hazardous Waste Number that can be used to describe the hazardous waste.

EXAMPLE FOR COMPLETING ITEM IV *(shown in line numbers X-1, X-2, X-3, and X-4 below)* — A facility will treat and dispose of an estimated 900 poun per year of chrome shavings from leather tanning and finishing operation. In addition, the facility will treat and dispose of three non—listed wastes. Two wast are corrosive only and there will be an estimated 200 pounds per year of each waste. The other waste is corrosive and ignitable and there will be an estimat 100 pounds per year of that waste. Treatment will be in an incinerator and disposal will be in a landfill.

LINE NO.	A. EPA HAZARD. WASTE NO. (enter code)	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (enter code)	D. PROCESSES 1. PROCESS CODES (enter)	D. PROCESSES 2. PROCESS DESCRIPTION (if a code is not entered in D(1))
X-1	K 0 5 4	900	P	T 0 3 D 8 0	
X-2	D 0 0 2	400	P	T 0 3 D 8 0	
X-3	D 0 0 1	100	P	T 0 3 D 8 0	
X-4	D 0 0 2				*included with above*

 CONTINUE ON PA

Continued from page 2.

NOTE: Photocopy this page before completing if you have more than 26 wastes to list.

Form Approved OMB No. 158-S80004

EPA I.D. NUMBER (enter from page 1)															FOR OFFICIAL USE ONLY				
S	N	M	D	0	8	3	2	1	2	3	3	2	T/A	C	S	DUP	T/A	C	DUP
W														1	W			2	

IV. DESCRIPTION OF HAZARDOUS WASTES *(continued)*

LINE NO.	A. EPA HAZARD. WASTE NO. (enter code)	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (enter code)	D. PROCESSES 1. PROCESS CODES (enter)	D. PROCESSES 2. PROCESS DESCRIPTION (If a code is not entered in D(1))
1	F001	50000	P	S01	
2	F002				(Included with above)
3	F003	1500	P	S01	
4	F005	7000	P	S01	
5	F006	15,000	P	S01	
6	F006	250,000	P	T01	
7	D001	20,000	P	S01	
8	D002	1000	P	S01	
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					

Continued from the front.

IV. DESCRIPTION OF HAZARDOUS WASTES *(continued)*

E. USE THIS SPACE TO LIST ADDITIONAL PROCESS CODES FROM ITEM D(1) ON PAGE 3.

EPA I.D. NO. *(enter from page 1)*														
S	N	M	D	0	8	3	2	1	2	3	3	2	T/A	C 6

V. FACILITY DRAWING

All existing facilities must include in the space provided on page 5 a scale drawing of the facility *(see instructions for more detail)*.

VI. PHOTOGRAPHS

All existing facilities must include photographs *(aerial or ground—level)* that clearly delineate all existing structures; existing storage, treatment and disposal areas; and sites of future storage, treatment or disposal areas *(see instructions for more detail)*.

VII. FACILITY GEOGRAPHIC LOCATION

LATITUDE *(degrees, minutes, & seconds)*	LONGITUDE *(degrees, minutes, & seconds)*
35 11 05"	106 39 38"

VIII. FACILITY OWNER

☐ A. If the facility owner is also the facility operator as listed in Section VIII on Form 1, "General Information", place an "X" in the box to the left and skip to Section IX below.

B. If the facility owner is not the facility operator as listed in Section VIII on Form 1, complete the following items:

1. NAME OF FACILITY'S LEGAL OWNER	2. PHONE NO. *(area code & no*)
E Sparton Technology, Inc.	505-892-5300

3. STREET OR P.O. BOX	4. CITY OR TOWN	5. ST.	6. ZIP CODE
F P.O. Box 1784	G Albuquerque	NM	87103

IX. OWNER CERTIFICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

A. NAME *(print or type)*	B. SIGNATURE	C. DATE SIGNED
Blair Thompson, Secretary/Treasurer	[signature]	5/4/84

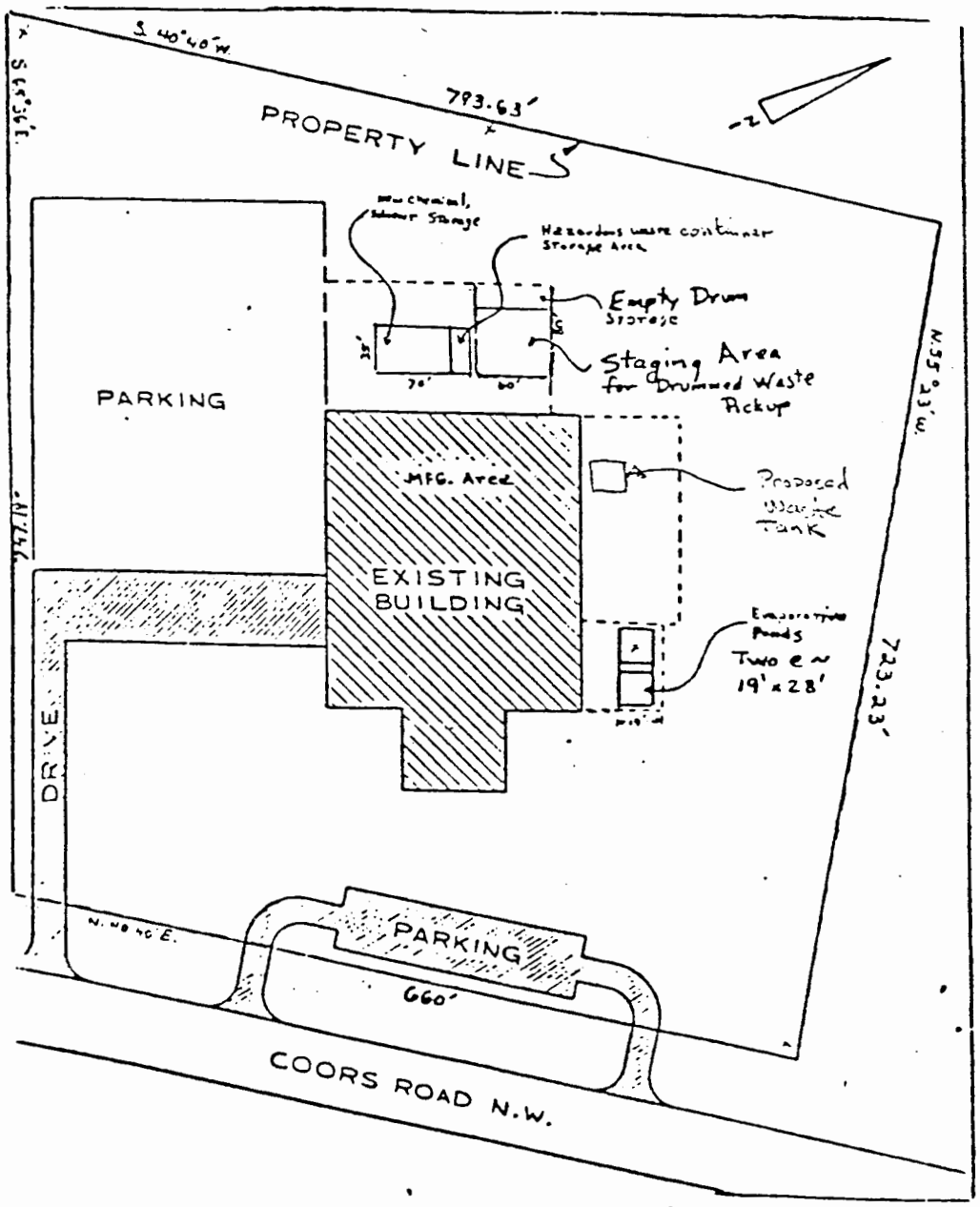
X. OPERATOR CERTIFICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

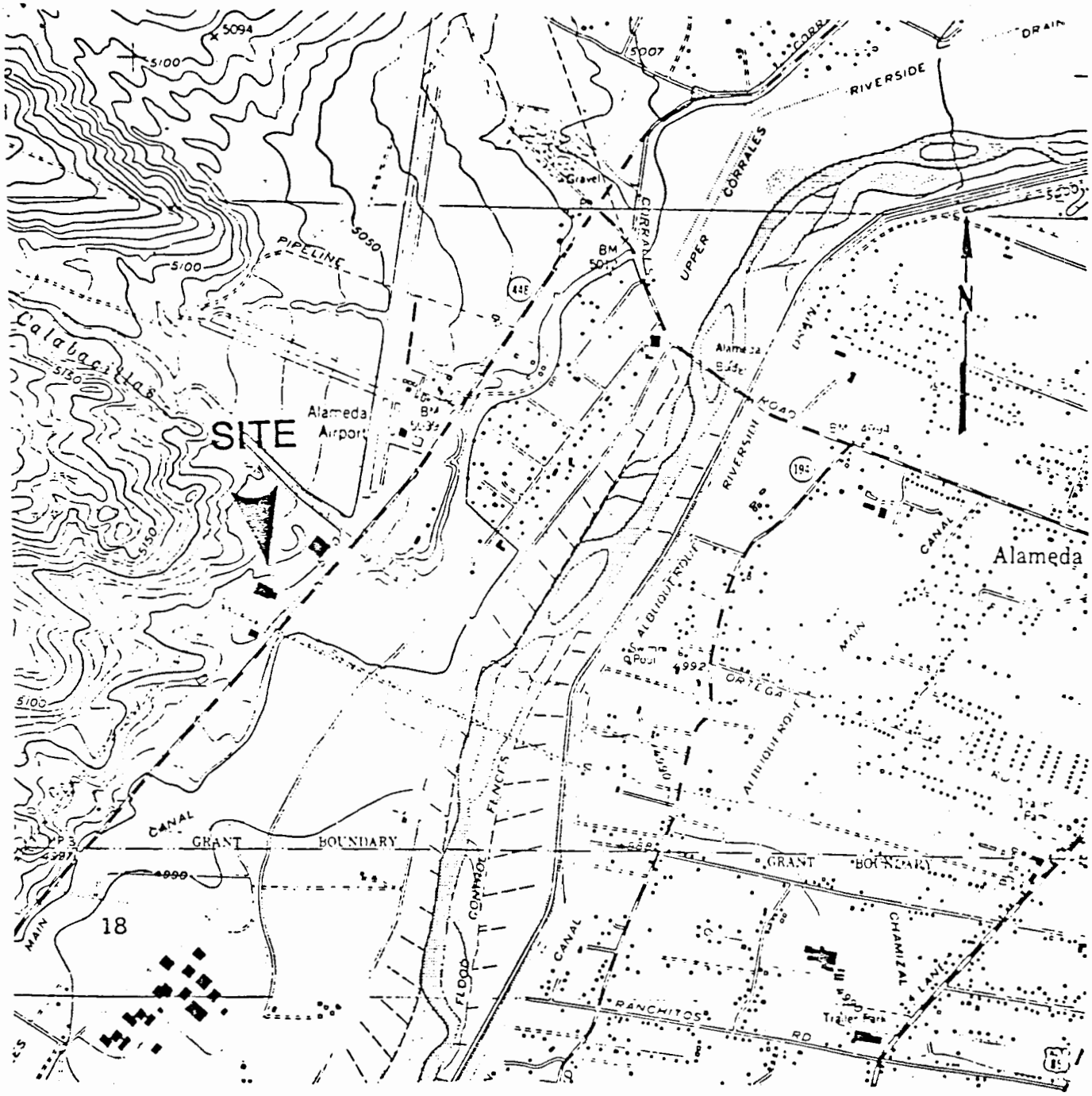
A. NAME *(print or type)*	B. SIGNATURE	C. DATE SIGNED

Continued from page 4.

V. FACILITY DRAWING *(see page 4)*



Scale : 1" = 153'



CONTOUR INTERVAL 10 FEET

Ref: U.S.G.S. Topographic Map, Los Griegos, N. Mex., 7.5 Quadrangle.

Harding Lawson Associates
Engineers Geologists & Geophysicists

SITE LOCATION
SPARTON SOUTHWEST, INC.
ALBUQUERQUE, NEW MEXICO

PLATE 1

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
HM	6310,010.12		9/83		

SECTION B
FACILITY DESCRIPTION

B-1 General Description

[Reference: 40 CFR 270.14(b)(1); NMHWMR 302.A.4.b(1)(a)]

General Facility Information:

- Owner/Operator: Sparton Technology, Inc.
- EPA I.D. Number: NMD083212332
- Mailing Address: Post Office Box 1784
  Albuquerque, New Mexico 87103
- Site Telephone Number: (505) 892-5300

Sparton operates an electronics manufacturing plant at its Coors Road facility. Manufactured products are commercial, industrial, and military electronics, which include circuit board assemblies, transducers, sensors, and pressure systems. The printed circuit manufacturing process employs the use of metal plating which generates an aqueous plating waste characterized as hazardous due to its heavy metals content and corrosivity. Electronics assembly employs the use of solvent cleaning which generates spent halogenated and non-halogenated solvents.

The site is located about 2,500 feet northwest of the Rio Grande River on the west side of Coors Road, NW. Locally, the area is hilly and slopes in several wide terraces toward the river. The site is approximately 60 feet above the Rio Grande River, and 40 to 60 feet lower than the Paradise Park residential area, which is located approximately 4,000 feet west of the site. Approximately 200 feet southeast of the site, and across Coors Road, is the Corrales Canal. The

Calabacilla Arroyo is located about 1,000 feet north of the site. The facility location is shown in Attachment 3, Plate 1.

The Coors Road facility has operated four hazardous waste storage units since 1980 and submitted a Part A application for a hazardous waste permit to operate these units. The units include two lined surface impoundments (ponds), two drum storage areas (as shown in Attachment 3, Plate 2), and a now-closed shallow concrete sump once used to store some spent solvents. On site storage of the aqueous plating waste in the two ponds was conducted until August 1983, when Sparton ceased discharging to either pond and removed the remaining plating waste. Also, Sparton has ceased storage of containerized hazardous waste for periods of longer than 90 days and has therefore withdrawn its Part A permit application. The sumps contained spent solvents until closure in October 1980, prior to the effective date of RCRA. Information provided in this application addresses only post-closure requirements for the two surface impoundments.

B-2 Chemical and Physical Analyses

[Reference: 40 CFR 270.14(b)(2); NMHWMR 302.A.4.b(1)(b)]

Historical Waste Analysis

When active, the two surface impoundments were used exclusively for the storage of wastewater from electroplating operations. The waste is a liquid at 70°F with a density of 8.8 pounds per gallon and a solids content of 9 percent. Waste material profile and analytical reports are provided in Attachment 7. Remaining wastes were removed from the impoundments in August 1983 and disposed off site. (Note:

Similar wastes are currently stored in 55-gallon containers and remain on site for less than 90 days.) The original pond liners and potentially contaminated materials were left in place.

The ponds were subsequently partially filled with cuttings from soil borings. Among other uses, these borings were performed to detect any subsurface contamination in soils surrounding the ponds. Cuttings from Boring MW-16 (which subsequently became a monitoring well) were analyzed and are considered representative of the physical and chemical characteristics of the subsurface soils (see Attachment 4, Plate 1 for the location of Boring MW-16). The logs of Boring MW-16 and other borings surrounding the site indicate that the subsurface consists of soils ranging from clays to fine gravel. The results of the laboratory analysis of material from Boring MW-16 and a description of the test methods used are provided in Attachment 3. Fourteen samples, representing characteristics of the underlying soils from the surface to a depth of 73 feet, were analyzed for trace metals and organic constituents. Results of these analyses are presented in Attachment 4, pages 34, 36, and 37, Tables 4 through 6.

Although concentrations of chromium are elevated in several samples, they were found to exceed EP toxicity standards in only one sample (see Attachment 4, page 37). In this EP extract, total chromium was measured as 8.6 parts per million (ppm), and hexavalent chromium was measured as 8.0 ppm. All other metals were found to be below EP toxicity standards in soil extracts from Boring MW-16.

As described in the closure plan, the ponds will be filled with material removed to prepare the cap subgrade, clean soils and demolition wastes, including broken concrete, concrete blocks, and excess liner from the upper portion of the ponds. The demolition materials are to be placed on the bedding of drill cuttings. As the demolition material is a non-hazardous waste, the only potentially hazardous constituents remaining in the ponds will be contained in the soil cuttings, any remaining bottom liners, and contaminated subsoils.

B-3 Waste Analysis Plan

[Reference: 40 CFR 270.14(b)(3); NMHWMR 302.A.4.b(1)(e)]

Not applicable.

B-4 Description of Security Procedures

[Reference: 40 CFR 270.14(b)(4); NMHWMR 302.A.4.b(1)(d)]

See item E-2, post-closure permit requirements, page 30.

B-5 Copy of General Inspection Schedule

[Reference: 40 CFR 270.14(b)(5); NMHWMR 302.A.4.b(1)(c)]

See item E-3, post-closure permit requirements, page 30.

B-6 Preparedness and Prevention

[Reference: 40 CFR 270.14(b)(6); NMHWMR 302.A.4.b(1)(f)]

Not applicable.

B-7 Copy of Contingency Plan

[Reference: 40 CFR 270.14(b)(7); NMHWMR 302.A.4.b(1)(g)]

Not applicable.

B-8 Prevention of Run-off and Contamination of Water Supplies

[Reference: 40 CFR 270.14(b)(8)(ii) and (iii); NMHWMR 302.A.4.b(1)(h)(ii) and (iii)]

See item E-3, post-closure permit requirements, page 30.

B-9 Ignitable, Reactive, and Incompatible Waste Precautions

[Reference: 40 CFR 270.14(b)(9); NMHWMR 302.A.4.b(1)(i)]

Not applicable.

B-10 Traffic Pattern

[Reference: 40 CFR 270.14(b)(10); NMHWMR 302.A.4.b(1)(i)]

Not applicable.

B-11 Facility Location Information

[Reference: 40 CFR 270.14(b)(11)(iii); NMHWMR 302.A.4.b(1)(k)(iii)]

Seismic Standard

Not applicable.

Floodplain

The Sparton facility is located outside the 100-year floodplain as indicated by information provided by the Federal Emergency Management Agency (see Attachment 1, information adapted from the National Flood Insurance Program Floodway Map).

B-12 Personnel Training

[Reference: 40 CFR 270.14(b)(12); NMHWMR 302.A.4.b(1)(l)]

Not applicable.

B-13 Copy of Closure and Post-Closure Plans

[Reference: 40 CFR 270.14(b)(13); NMHWMR 302.A.4.b(1)(m)]

See item E-4, post-closure permit requirements, page 31.

B-14 Notice In Deed

[Reference: 40 CFR 270.14(b)(14); NMHWMR 302.A.4.b(1)(n)]

See item E-9, post-closure permit requirements, page 33.

B-15 Closure Cost Estimate

[Reference: 40 CFR 270.14(b)(14); NMHWMR 302.A.4.b(1)(0)]

Not applicable.

B-16 Post-Closure Cost Estimate

[Reference: 40 CFR 270.14(b)(16); NMHWMR 302.A.4.b(1)(p)]

See item E-10, post-closure permit requirements, page 34.

B-17 Documentation of Insurance

[Reference: 40 CFR 270.14(b)(17); NMHWMR 302.A.4.b(1)(q)]

See item E-12, post-closure permit requirements, page 34.

B-18 Topographic Map

B-18a General Requirements

[Reference: 40 CFR 270.14(b)(19); NMHWMR 302.A.4.b]

The topographic map requirements have been addressed in previous studies of the Coors Road facility. These studies, with associated maps, are included as Attachments 1 through 7 which follow the text of this permit application. A general description of the maps and their location in this submittal are presented in Table 1.

TABLE 1

Topographic Map Requirements for Sparton

Requirement		Attachment Number	Plate Number
(i)	Map scale and date	All attachments	All plates
(ii)	100-year floodplain	1	--
(iii)	Surface waters	3	2
(iv)	Surrounding land uses	2	--
(v)	Wind rose	11	--
(vi)	Orientation of map	All attachments	All plates
(vii)	Legal boundaries	2	--
(viii)	Access control	3	Appendix A, A-3 and A-4
(ix)	Wells	2	--
(x)	Buildings, TSD operations, other structures	3	Appendix A, A-1 and A-3

TABLE 1

Topographic Map Requirements for Sparton

(Continued)

Requirement		Attachment Number	Plate Number
(xi)	Barriers for drainage or flood control	3	Plate 3
(xii)	Location of operational units	3	Appendix A, A-1 and A-3

SECTION C
SPECIFIC INFORMATION REQUIREMENTS

C-1 List of Wastes

[Reference: 40 CFR 270.17(a); NMHWMR 302.A.4.b(2)(c)(i)]

As discussed in B-2, page 3, the original wastes placed in the surface impoundments (as identified in the Part A permit application) have been removed and disposed off site in an approved manner. Potentially contaminated materials, including subsurface soils and drill cuttings, represent the current waste inventories. These "wastes" will be left in place. Note: Spent solvents were never placed in the surface impoundments.

C-2 Surface Impoundments

[Reference: 40 CFR 270.17(a); NMHWMR 302.A.4.b(2)(c)(ii)]

The plating wastewater was discharged from the facility to the storage ponds located about 35 feet north of the building via an underground, small-diameter PVC pipe. The impoundments are approximately 19 by 28 feet in plan dimension and 5 to 6 feet deep. Each has a concrete wall, and a sloped sand bottom which supports a synthetic liner. Plan and cross section views of the ponds are provided in Attachment 3, Plates A-1 and A-2, respectively.

C-3 Liner System Description

[Reference: 40 CFR 270.17(b)(1); NMHWMR 302.A.4.b(2)(c)(ii)A]

Both surface impoundments and the area between the impoundments are lined with a 30-mil, 2-ply hypalon, 1-ply polyester scrim liner. The liner completely covers the bottom and walls of the two adjacent ponds and is supported at the walls by concrete and a sloped sand backfill (see Attachment 3, Plates A-1 and Plate A-2).

SECTION D
GROUND-WATER MONITORING

D-1 Interim Status Monitoring Data

[Reference: 40 CFR 270.14(c)(1), 265.90 through 95; NMHWMR 302.A.4.2(3)(a)]

Since June 1983, Sparton has performed interim status ground-water monitoring at the Coors Road facility. On July 10, 1985, Sparton requested that interim status for the surface impoundments be terminated, since the site was no longer used to store hazardous wastes for longer than a 90-day period. While waiting for a response to this request, Sparton has continued monitoring the ground water.

Initially, this ground-water monitoring system consisted of four monitoring wells (MW-1, MW-2, MW-3, and MW-4) and a piezometer (P-1). P-1 was used to locate wells properly. Well MW-2 is located hydraulically upgradient, and Wells MW-1, MW-3, and MW-4 are located hydraulically downgradient of the impoundments. A complete description of the interim status ground-water monitoring program is provided in Attachment 5.

After the first quarterly ground-water sampling period, contamination was suspected to exist within the uppermost aquifer. As a result, additional investigations were performed and additional monitoring wells were installed (refer to Attachments 4 and 6). Both inorganic and organic contaminants were identified within the ground water of the

uppermost aquifer. The hazardous constituents identified are described in Attachments 4 and 6, Plates B-11 through B-13. Interim status ground-water monitoring results are provided in Attachment 7.

It was assumed, based on the results of the first five quarters of sampling, that ground-water contamination existed. Based upon this assumption, an alternate ground-water monitoring program (AGMP) was proposed and initiated upon approval of New Mexico Environment Improvement Division (NMEID). Documentation of AGMP approval is enclosed as Attachment 12 in accordance with 40 CFR 265.90(d) and NMHWMR 206.C.1a(4).

The AGMP (as described in Attachment 8, Appendix C), besides specifying quarterly sampling for TOC, pH, specific conductance, etc., includes specific metallic hazardous waste constituents and a Volatile Organic Chemical (VOC) scan of each monitoring well. This procedure allows for an annual determination of the extent and mobility of hazardous waste contaminants and organic constituents in the subsurface water.

A summary of both the initial ground-water monitoring program and AGMP results to date is available in Attachments 4, 6, and 7.

D-1a <u>Description of Wells</u>

[Reference: 40 CFR 265.91; NMHWMR 206.C.1.b(1)(a) and (b)]

The interim status ground-water monitoring system was installed in three phases. A description of each phase including drilling methods, well construction details, and development techniques is included in Attachments 4, 5, and 6.

Table 2 presents the location of the description of each monitoring well within the application.

TABLE 2
Location of Monitoring Well Information
Sparton, Albuquerque, New Mexico

Phase Number	Report Date	Attachment Number	Location in Attachment	Remarks
1	6/29/83	5	pp. 1-7; Plates 5-9	MW-1, MW-2, MW-3, MW-4, P-1
2	3/19/84	6	pp. 3-8; Plates A-2 through A-8	MW-5, MW-6, MW-7, MW-8, MW-9, MW-10, MW-11
3	3/13/85	4	pp. 3-15; Appendix F, Figures 2-9	MW-12, MW-13, MW-14, MW-15, MW-16, MW-17, PW-1

D-1b Description of Sampling/Analysis Procedures

[Reference: 40 CFR 265.92(a); NMWHWMR 206.C.1.c(1)]

A description of the interim status ground-water sampling and analysis plan is included in Attachment 5, pages 2 through 5. This plan includes procedures for:

- Sample collection;
- Sample preservation and shipment;
- Analytical procedures; and
- Chain-of-custody control.

D-1c Monitoring Data

[Reference: 40 CFR 265.92; NMHWMR 206.C.1.c(2), (3), (4), (5), and (6)]

Attachment 5, pages 5 through 7, presents a list of the constituents and parameters to be measured during interim status.

The interim status ground-water monitoring results obtained from June 1983 to October 1985 are provided in Attachment 7, Appendix B.

Ground-water hydrographs identifying the water surface elevations during these sampling periods are included in Attachment 6, Plates 4 through 6.

D-1d Statistical Procedures

[Reference: 40 CFR 265.93(b); NMHWMR 206.C.1.d(2)]

The Cochran's approximation to the Behrens Fisher Student t-test was to be used to determine significant increases (or decreases, in the case of pH) of the indicator parameters in the downgradient wells. This statistical analysis was not performed since it was assumed, based on results obtained during the first five quarterly sampling periods, that the ground water was contaminated. Based on this assumption, a agreement was made with the NMEID to begin an AGMP in accordance with NMHWMR 206.C.1.a(4) (see Attachment 12). Since the AGMP and additional studies were underway prior to the sixth quarter, and these plans encompassed all the items contained in the ground-water quality assessment plan (GWQAP) outline, a GWQAP was not used.

D-1e Ground-Water Assessment Plan

[Reference: 40 CFR 265.93(d)(2); NMHWMR 206.C.1.d(1)]

As specified within the interim status ground-water monitoring program, a GWQAP would have been prepared if the indicator monitoring program had concluded that hazardous waste constituents were entering the ground water. An outline of the proposed but unused assessment plan is contained in Attachment 5, pages 11 through 20.

D-2 General Hydrogeologic Information

[Reference: 40 CFR 270.14(c)(2); NMHWMR 302.A.4.b(3)(b)]

Investigations completed thus far have indicated that there are two aquifers within the upper 140 feet below the surface. The uppermost aquifer is the water bearing zone at an approximate depth of 70 feet below grade. This unconfined aquifer is relatively thin with hydraulic head of no greater than 10 feet. This aquifer consists of sand- to gravel-size material; however, it is mainly categorized as a medium sand unit. The lower aquifer extends from a depth of approximately 80 to 140 feet below grade and consists of sands and gravels.

At a depth of approximately 70 to 80 feet below grade, a relatively thin (approximately 5 to 10 feet), less permeable stratum is located between the two aquifers. Geologic cross sections identifying the aquifers and the less permeable stratum are contained in Attachment 4, Figures 10 through 13.

The potentiometric surface from wells screened in the lower confined aquifer is approximately 2 to 5 feet above the less permeable stratum.

Step-drawdown and constant rate aquifer tests are described in Attachment 4, pages 38 to 48. Based upon these aquifer tests, the hydraulic conductivity of the uppermost aquifer is 0.05 cm/sec (refer to Attachment 4, Table 7), with an estimated porosity of 0.4.

The direction of ground-water flow is toward the southwest, with an approximate hydraulic gradient of 0.01 ft/ft (see Attachment 4, Figure 14). As shown on the water table hydrographs in Attachment 6, Plates 4 through 6, the ground-water flow direction does not fluctuate seasonally.

Using Darcy's law and the parameters mentioned above, the ground-water velocity in the uppermost aquifer is calculated to be approximately 0.001 cm/sec (2.85 ft/day).

D-3 Topographic Map Requirements

[Reference: 40 CFR 270.14(c)(3); NMHWMR 302.A.4.b(3)(c)]

The topographic map requirements for the site are met in Attachments 4 and 6. Table 3 presents the locations of the items required on the maps within the attachments.

D-4 Contaminant Plume Description

[Reference: 40 CFR 270.14(c)(4); NMHWMR 302.A.4.b(3)(d)]

Appendix C of Attachment 7 contains a summary of the maximum concentration (as of May 7, 1985) of each contaminant identified in the ground-water on site. Attachment 4, Figures 16 and 17, and Attachment 6, Plates 8, 9, and 10, provide a plan view of the extent of the contaminant plume. Since June 1984, Sparton has included in its ground-water monitoring program (as approved by NMEID), specific metallic hazardous waste contaminants, and a VOC scan to assist in describing the contaminated plume.

TABLE 3

Topographic Map Requirements For
Land Disposal Facilities
Sparton, Albuquerque, New Mexico

Requirement	Attachment Number	Figure or Plate Number
Monitoring well locations	4	Figure 1
Waste management area	3	Plate A-1
Direction of ground-water flow in the uppermost aquifer	4	Figure 14
Point of compliance	4	Figure 1
Contaminant plume	4, 6	Plates 8, 9, 10, 16, 17

Monitoring results obtained from monitoring well MW-9, located hydraulically downgradient of the waste management area, have shown a constant improvement in ground-water quality since the fifth sampling quarter. These results are shown in Attachment 7, Appendix B.

D-5 General Monitoring Program Requirements

[Reference: 40 CFR 264.97; NMHWMR 206.D.1.h]

Since Sparton had reason to believe ground-water contamination exists at its Coors Road facility, an AGMP has been implemented as specified by 40 CFR Section 265.90(d) (refer to Section D-1d of this application). A copy of the AGMP is provided in Attachment 8, Post-Closure Care Plan, Appendix C. The present monitoring program monitors for pH, certain metals, specific conductance, and TOC. Volatile organics are monitored voluntarily to aid in description of any plume of contamination. This is because of the interfering effects of contamination from a solid waste management unit (sump).

D-5a Description of Wells

[Reference: 40 CFR 264.97(a)(b) and (c); NMHWMR 206.D.1.h(1) and (3)]

Section D-1a of this plan presents a description of wells. Monitoring wells MW-1, MW-2, MW-3, and MW-4 and piezometer P-1 are scheduled for removal in early 1986. Well plugging and abandonment procedures are outlined in Attachment 3, Appendix E.

D-5b Description of Sampling/Analysis Procedures

[Reference: 40 CFR 264.97(d); NMHWMR 206.D.1.h(4)]

Attachment 4, Appendix C, presents ground-water sampling and analytical procedures. These procedures include:

- Sample collection;
- Sample preservation and shipment;
- Analytical procedures; and
- Chain-of-custody controls.

D-5c Procedures for Establishing Background

[Reference: 40 CFR 264.97(g)(2); NMHWMR 206.D.1.h(7)]

Since December 1983, both monitoring wells MW-5 and MW-6 have provided a record of the ground-water quality hydraulically upgradient of the waste management area. Recently, MW-5 has been substituted as the primary upgradient well, since MW-6 has not provided sufficient quantities of water for analytical testing and ground-water elevations. Analytical results obtained from both of these monitoring wells are provided in Attachment 7, Appendix B.

D-6 Detection Monitoring Program

[Reference: 40 CFR 270.14(c)(b), 264.98; NMHWMR 206.D.1.c]

Since hazardous constituents have been identified within the ground water at Sparton's Coors Road facility, a detection monitoring program is not applicable.

D-7 Compliance Monitoring Program

[Reference: 40 CFR 270.14(c)(7), 264.99; NMHWMR 206.D.1.j]

Since hazardous constituents have been detected within the ground water at Sparton's Coors Road facility, a compliance monitoring program is not applicable.

D-8 Corrective Action Program

[Reference: 40 CFR 270.14(c)(8), 264.100; NMHWMR 206.D.1.k]

Because hazardous constituents have been detected within the facility ground water, Sparton proposes a corrective action program (CAP) as specified by 40 CFR 264.100. The CAP is detailed below.

D-8a Characterization of Contamination

[Reference: 40 CFR 270.14(c)(8)(i); NMHWMR 302.A.4.b(3)(i)]

A description of the contaminant plume has been obtained from earlier hydrogeologic studies of the Coors Road facility (refer to Section D-4). Maximum concentrations of hazardous constituents are provided in Attachment 7, Appendix C. An Appendix VIII scan of the facility ground water was not completed. NMEID agreed the scan was unnecessary, since earlier investigations had identified the contaminants of concern. Further hydrogeologic and remedial action studies are currently underway to characterize the extent and distribution of contaminants within the facility ground water. These demonstrations include:

- Numerous ground-water models, soil-gas tests, and evaluations of historical on-site data to provide the rate and extent of migration of hazardous waste constituents in the ground water (see Attachment 6, pages 21 through 23); and

- Site investigations, including additional borings, to assess the vertical and lateral distribution of contaminants in the ground water and vadose zone (see Attachment 6, pages 51 through 53).

The results of these investigations will be submitted to NMEID mid-1986.

D-8b Concentration Limits

[Reference: 40 CFR 270.14(c)(8)(ii), 264.94(b); NMHWMR 302.A.4.b(3)(ii)]

At the completion of the aforementioned studies, Sparton will specify a proposed concentration limit for each hazardous constituent. If deemed feasible, these limits will not exceed Table 1 of Section 264.94; however, it is expected that alternate concentration limits (ACLs) will be proposed.

D-8b(2) Alternate Concentration Limits

[Reference: 40 CFR 264.94(b); NMHWMR 206.D.1.e(1)(c)]

Since correcting contaminated ground water to background constituent levels seems neither environmentally beneficial nor economically feasible in this situation, Sparton will most likely propose to demonstrate an ACL for all hazardous constituents present within the facility ground water. All

ACLs will be submitted for NMEID approval upon the completion of the current remedial action studies (refer to Section D-8a) and will reflect the following factors:

1. Potential adverse effects on ground-water quality considering:
   - the physical and chemical characteristics of the waste in the regulated unit, including its migration potential;
   - The hydrogeologic characteristics of the facility and surrounding land;
   - The quantity of ground water and direction of flow;
   - The proximity and withdrawal rates of ground-water users;
   - The current and future uses of ground water in the area;
   - The existing quality of ground water, including other sources of contamination and their cumulative impact on ground-water quality;
   - The potential for health risks caused by human exposure to waste constituents;
   - The potential damage to wildlife, crops, vegetation, and physical structures caused by exposure to waste constituents; and

- The persistence and permanence of the potential adverse effects;

2. Potential adverse effects on hydraulically connected surface water quality, considering:
   - The volume and physical and chemical characteristics of the waste in the regulated unit;
   - The hydrogeological characteristics of the facility and surrounding land;
   - The quantity and quality of ground water, and the direction of ground-water flow;
   - The patterns of rainfall in the region;
   - The proximity of the regulated unit to surface waters;
   - The existing quality of surface water, including other sources of contamination and the cumulative impact on surface water quality;
   - The potential for health risks caused by human exposure to waste constituents;
   - The potential damage to wildlife, crops, vegetation, and physical structures caused by exposure to waste constituents; and
   - The persistence and permanence of the potential adverse effects.

D-8c Corrective Action Plan

[Reference: 270.14(c)(8)(iii), 264.100(b); NMHWMR 206.D.1.k(2)]

Based upon the results obtained from studies currently underway, a detailed plan will be submitted which outlines the corrective measures proposed for the facility. This corrective action plan will include:

- Maps showing the location of engineered barriers, caps, drains, wells, etc., to be used;

- Descriptions and engineering drawings of construction details and specifications of engineered structures, caps, drains, etc.;

- A description of treatment technologies to be used for contaminated ground water that is removed from the zone of contamination;

- A prediction of the effectiveness of corrective actions;

- If treated ground water is reinjected at the site, the concentration levels of all hazardous constituents to be reinjected;

- A description and summary of any additional hydrogeologic data collected for use in designing the corrective action;

- Operation and maintenance plans for the corrective action measures; and

- Decontamination procedures for corrective action materials and equipment.

D-8d Ground-Water Monitoring Program

[Reference: 40 CFR 270.14(c)(8)(iv); 264.100(d); NMHWMR 206.D.1.k(3)]

Currently, a post-closure ground-water monitoring program has been submitted to NMEID for approval. A description of this program is included in Attachment 8, Appendix C, and includes:

- A description of the monitoring system;
- A description of sampling and analysis procedures; and
- Reporting requirements.

Based on results of the hydrogeologic and remedial action studies currently underway, minor modifications to this program may be necessary. All program modifications will be submitted to NMEID for approval prior to implementation.

SECTION E
POST-CLOSURE PERMIT REQUIREMENTS

E-1 Post-Closure Plan

[Reference: 40 CFR 270.17(f), 264.117, 264.118, 264.228(b), 264.228(c)(1)(ii); NMHWMR 206.C.2.h, 206.C.6.f, and 206.D.2.h]

A copy of the post-closure care plan for the Coors Road facility is included in this application as Attachment 8. All references noted below will apply to this attachment. The post-closure care plan was reviewed by the NMEID. NMEID comments applicable to the enclosed post-closure plan were received by Sparton (see NMEID letter to Sparton dated February 17, 1986, in Attachment 9). In addition, a copy of the closure plan is included as Attachment 3.

E-2 Description of Post-Closure Security Procedures and Equipment

[Reference: 40 CFR 264.117(b)(1) and (2); NMHWMR 206.C.2.g(2)]

Adequate security at the closed site during the post-closure period is demonstrated in the post-closure plan, Section D, page 10.

E-3 Description of Inspection Program and Maintenance Activities and Frequencies

[Reference: 40 CFR 264.228(b), 264.228(c)(1)(ii); NMHWMR 302.A.4.b(1)(c)]

The inspections to be conducted during the post-closure care period are described in the post-closure plan, Sections D through F, pages 10 through 13. The description includes the

frequency, procedures, and logs to be used and maintained at the facility. The specific items considered include:

- Security devices;
- Erosion damage;
- Cover settlement, subsidence, and displacement;
- Run-on/run-off control systems; and
- Ground-water monitoring system.

The applicable inspection log for these items is found in Appendix A of the post-closure plan.

E-4 Locations and Number of Copies of Post-Closure Plan

[Reference: 40 CFR 264.118(a)(3); NMHWMR 206.D.2.h(1)]

1 copy to: Mr. Blair Thompson
Sparton Corporation
2400 East Ganson Street
Jackson, Michigan 49202

2 copies to: Mr. Richard Mico
Sparton Technology, Inc.
4901 Rockaway Boulevard, S.E.
Rio Rancho, New Mexico 87124

2 copies to: Mr. Jon F. DeWitt
Varnum, Riddering, Schmidt & Howlett
171 Monroe Avenue, N.W.
Grand Rapids, Michigan 49503

5 copies to: Mr. Peter H. Pache
Environmental Improvement Division
Ground Water and Hazardous Waste Bureau
Harold Reynolds Building
1190 St. Francis Drive
Santa Fe, New Mexico 87504-0968

E-5 Plan Contact During Post-Closure Period

[Reference: 40 CFR 264.118(a)(3); NMHWMR 206.D.2.h(1)(c)]

The address and telephone number of the office to contact about the facility during the post-closure period is:

Office of the Vice President and General Manager
Sparton Technology, Inc.
Post Office Box 1784
Albuquerque, New Mexico 87103
(505) 892-5300

E-6 Procedure for Updating All Copies

[Reference: 40 CFR 264.118(b); NMHWMR 206.D.2.h(2)]

The post-closure plan will be amended, as necessary, to reflect changes in the operating plans or facility designs, or in the closure or post-closure operations following NMEID approval.

E-7 Specific Post-Closure Plan Requirements for Surface Impoundments

[Reference: 40 CFR 264.228(b); NMHWMR 206.D.2.h(1)(a) and (b)]

Procedures for maintaining and monitoring the integrity and effectiveness of the final cover, the ground-water monitoring system, and other applicable requirements are referenced in the following sections of the post-closure plan:

- Maintenance and repair of final cover - Section G, pages 13 and 14;
- Maintenance and monitoring of the ground-water system - Sections F and G, pages 12 through 14;
- Compliance with NMHWMR 206.C.1 - Appendix C of the post-closure plan, pages C-1 through C-4.

E-8 Notice to the Local Land Authority

[Reference: 40 CFR 264.119; NMHWMR 206.C.2(i)]

Provisions for a copy of a survey plat, prepared and certified by a professional land surveyor and indicating the dimensions and location of the closure area, are included in Section J of the post-closure plan, page 15.

E-9 Notice in Deed

[Reference: 40 CFR 270.14(b)(14), 264.120, 264.117(c), 264.119; NMHWMR 206.C.2(j)]

Provisions to record on the deed to the facility property a notation to inform any potential purchaser of the restricted use of the land is referenced in Section K of the post-closure plan, page 16.

E-10 Post-Closure Cost Estimate

[Reference: 40 CFR 270.14(b)(16), 264.144; NMHWMR 206.C.3.e]

The post-closure cost estimate as calculated, covers the cost of post-closure care monitoring and maintenance over a 30-year period. The current cost estimate for facility post-closure care is $526,968. The cost estimate and calculations may be found in the post-closure plan, Appendix B.

E-11 Financial Assurance Mechanism for Post-Closure Care

[Reference: 40 CFR 270.14(b)(16), 264.145; NMHWMR 206.C.3.f]

A financial assurance mechanism for post-closure care of the Sparton facility has not yet been established.

E-12 Liability Requirements

[Reference: 40 CFR 270.14(b)(17), 265.147; NMHWMR 206.C.3.h]

Liability coverages for sudden and non-sudden accidental occurrences have not yet been obtained. Attachment 10 presents the various responses to contacts Sparton has made in an attempt to comply with this requirement.

SECTION F
COMPLIANCE WITH OTHER REGULATIONS

F-1 Other Federal Laws

[Reference: 40 CFR 270.14(b)(20), 270.3; NMHWMR 501]

No other federal laws are applicable.

SECTION G
CERTIFICATION

G-1 Certification

[Reference: 40 CFR 270.11(d); NMHWMR 302.B.4]

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

_____ _____

Signature Date

DISTRIBUTION

1 copy to: Sparton Corporation
2400 East Ganson Street
Jackson, Michigan 49202

Attention: Mr. Blair Thompson

1 copy to: Varnum, Riddering, Schmidt & Howlett
171 Monrie Avenue, N.W.
Grand Rapids, Michigan 49503

Attention: Mr. Jon DeWitt

2 copies t: Sparton Technology, Inc.
P.O. Box 1784
9621 Coors Road, N.W.
Albuquerque, New Mexico 87103

Attention: Mr. Richard Mico

JMH:JAH:GRH:das

QUALITY CONTROL REVIEW

Quality Control Reviewer

J. Michael Huls
Senior Environmental Scientist

LIST OF ATTACHMENTS

ATTACHMENT 1	- FLOODPLAIN STANDARD
ATTACHMENT 2	- SURROUNDING LAND USES
ATTACHMENT 3	- POND AND DRUM STORAGE AREAS CLOSURE PLAN, SPARTON TECHNOLOGY, INC., COORS ROAD FACILITY, ALBUQUERQUE, NEW MEXICO, December 19, 1986
Appendix A	- Pond and Sump Area Closure
Appendix B	- Material and Construction Specifications
Appendix C	- Chain-of-Custody Procedures
Appendix D	- Analytical Methods
Appendix E	- Monitoring Well Plugging and Abandonment Procedures
Appendix F	- Model Safety Plan Outline
Appendix G	- Old Drum Area Soils Investigation
Appendix H	- Final Closure Schedule
Appendix I	- Closure Cost Estimates
ATTACHMENT 4	- HYDROGEOLOGIC CHARACTERIZATION AND REMEDIAL INVESTIGATION, SPARTON TECHNOLOGY, INC., ALBUQUERQUE, NEW MEXICO, March 13, 1985
Appendix A	- Rotary Drilling and Well Construction Procedures
Appendix B	- Hollow Stem Auger Drilling and Well Construction Procedures
Appendix C	- Ground-Water Sampling and Analytical Protocol
Appendix D	- Aquifer Test Procedures
Appendix E	- Aquifer Test Data
Appendix F	- Figures 1 through 21
ATTACHMENT 5	- GROUNDWATER MONITORING PROGRAM, SPARTON SOUTHWEST, INC., ALBUQUERQUE, NEW MEXICO, June 29, 1983
Attachment A	- Chain-of-Custody Procedures
Attachment B	- Cochran's Approximation to the Behrens-Fisher Students' t-test, 47 CFR 32367 (July 26, 1982)
Attachment C	- Monitoring Well Installation Report, Sparton Southwest, Inc., Coors Road Facility
ATTACHMENT 6	- INVESTIGATION OF SOIL AND GROUNDWATER CONTAMINATION SPARTON TECHNOLOGY, COORS ROAD FACILITY, ALBUQUERQUE, NEW MEXICO, March 19, 1984
Appendix A	- Logs of Borings
Appendix B	- Laboratory Test Results

LIST OF ATTACHMENTS (Continued)

ATTACHMENT 7	- POND WASTE ANALYSIS AND GROUNDWATER MONITORING RESULTS (This attachment is made up of various data which are divided into three appendices)
Appendix A	- Pond Waste Analysis
Appendix B	- Interim Status Monitoring Results
Appendix C	- Maximum Concentrations of Hazardous Constituents
ATTACHMENT 8	- HAZARDOUS WASTE FACILITY POST-CLOSURE CARE PLAN, COORS ROAD PLANT, ALBUQUERQUE, NEW MEXICO, December 17, 1985
Appendix A	- Post-Closure Quarterly Inspection Checklist
Appendix B	- Post-Closure Care Costs
Appendix C	- Alternative Ground-Water Monitoring Program
ATTACHMENT 9	- POST-CLOSURE CARE PLAN COMMENTS AS PROVIDED BY NMEID February 17, 1986; SPARTON'S RESPONSE, March 21, 1986
ATTACHMENT 10	- FINANCIAL RESPONSIBILITY REQUIREMENT RESPONSES
ATTACHMENT 11	- WIND ROSE FOR ALBUQUERQUE, NEW MEXICO
ATTACHMENT 12	- ALTERNATIVE GROUNDWATER MONITORING PROGRAM DOCUMENTATION, March 29, 1985

ATTACHMENT 1

FLOODPLAIN STANDARD

TO VIEW THE MAP AND/OR MAPS WITH THIS DOCUMENT, PLEASE CALL THE HAZARDOUS WASTE BUREAU AT 505-476-6000 TO MAKE AN APPOINTMENT

ATTACHMENT 3

POND AND DRUM STORAGE AREAS
CLOSURE PLAN
SPARTON TECHNOLOGY, INC.
COORS ROAD FACILITY
ALBUQUERQUE, NEW MEXICO

December 19, 1985

A Report Prepared For

Sparton Corporation
2400 East Ganson Street
Jackson, Michigan 49402

POND AND DRUM STORAGE AREAS
CLOSURE PLAN
SPARTON TECHNOLOGY, INC.
COORS ROAD PLANT
ALBUQUERQUE, NEW MEXICO

HLA Job. No. 6310,012.12

Prepared by

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Harding Lawson Associates
6220 Westpark, Suite #100
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Telephone: (713) 789-8050

December 19, 1985

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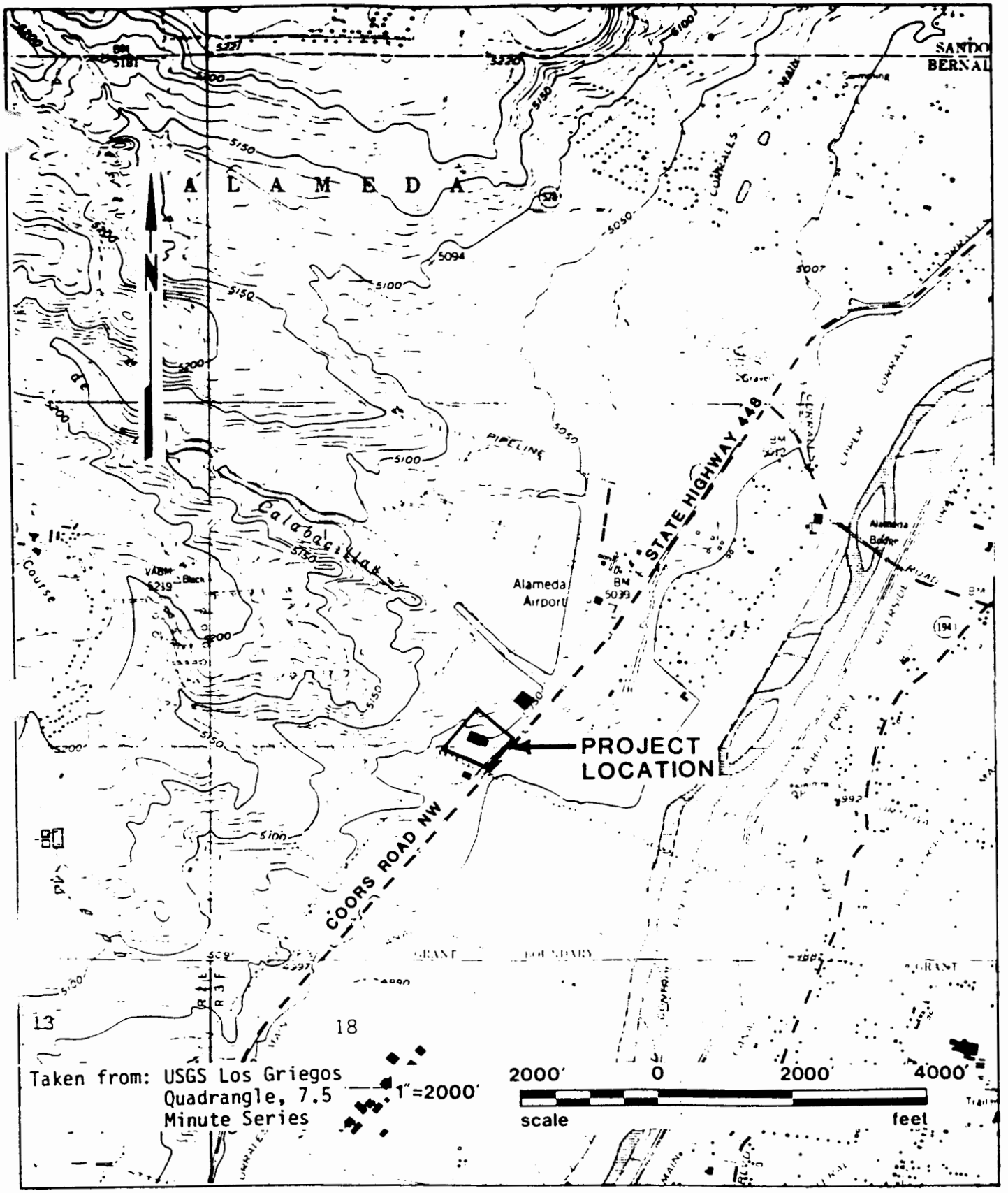
I GENERAL FACILITY INFORMATION

A. Owner and Operator:	Sparton Technology, Inc.
B. EPA ID No.:	NMD083212332
C. Mailing Address:	Post Office Box 1784 Albuquerque, New Mexico 87103
D. Facility Location:	9621 Coors Road, N.W. Albuquerque, New Mexico 87114
E. Telephone:	(505) 892-5300
F. Type of Facility:	Hazardous Waste Storage

II INTRODUCTION

Sparton Technology, Inc. (Sparton) has operated four hazardous waste storage units, at its Coors Road facility, which have received wastes since November 19, 1980. The facility location is shown in Plate 1. These units include two lined surface impoundments (ponds) and two drum storage areas, as shown in Plate 2. Sparton has submitted a Part A Application for a Hazardous Waste Permit to operate these units. The operation and subsequent closure of the ponds and the drum storage areas is subject to the New Mexico Hazardous Waste Management (HWM) Regulations.

Sparton also operated a waste solvent storage sump, which was closed in October 1980. Since this date is prior to the effective date of 40 CFR 265, Subtitle C, this sump is not regulated under New Mexico's HWM regulations.



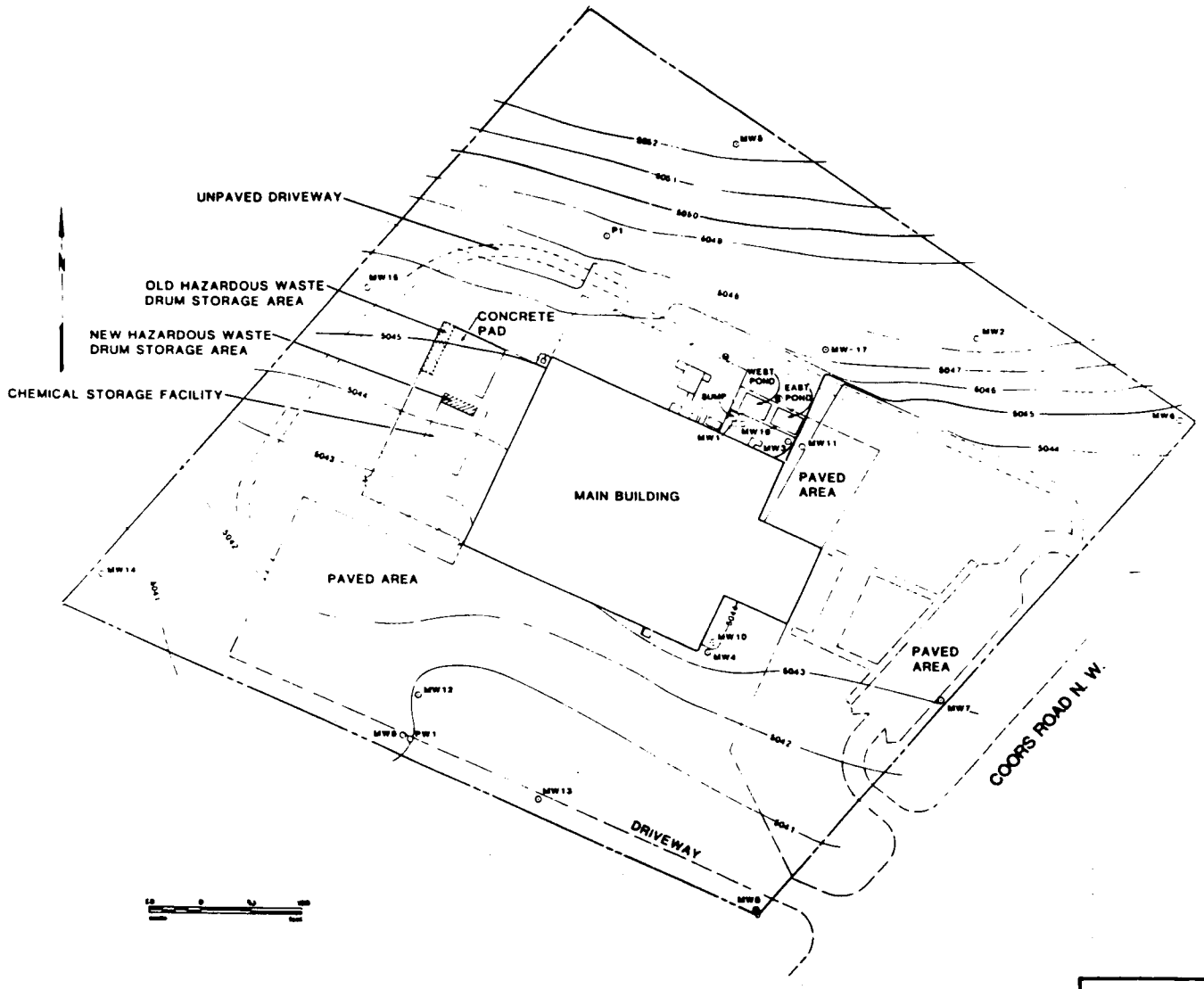
Harding Lawson Associates
Engineers Geologists & Geophysicists

LOCATION MAP

Sparton Technology, Inc.
Albuquerque, New Mexico

1

DRAWN	PROJECT NUMBER				
SP	6310,012.12			12-17-83	



LEGEND

- MONITOR WELL LOCATION
- WATER METER
- GAS METER
- CHAIN LINK FENCE
- LIMITS OF PAVEMENT
- UNPAVED DRIVEWAY
- 5045 ELEVATION CONTOURS (MSL)
- PROPERTY LINE

HLA

PLOT PLAN

SPARTON TECHNOLOGY, INC
ALBUQUERQUE, NEW MEXICO

2

MK 12-17-86

The planned closure of the ponds, the drum storage areas, and the sump are subject to the New Mexico Water Quality Control Commission Regulations.

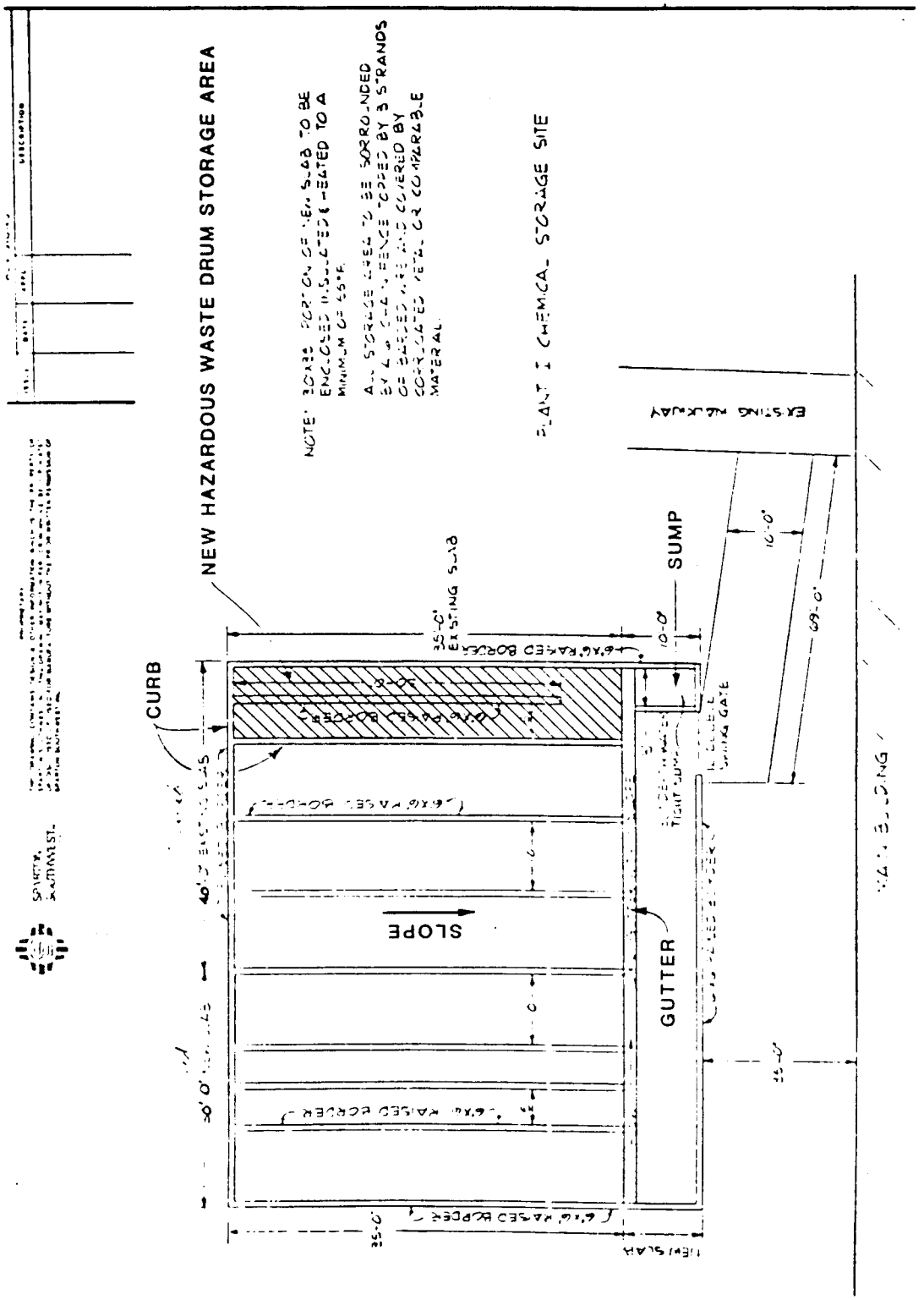
This closure plan will describe how Sparton plans to close each unit at this facility in a manner which is environmentally sound and which meets the legal requirements of both sets of regulations.

III BACKGROUND

A. Drum Storage Area

The old hazardous waste drum storage area (old drum area) was used to store hazardous wastes prior to May 1981, when the present hazardous waste drum storage area (new drum area) became operational. The old drum area was located adjacent to the west edge of a concrete pad north of the new drum area.

The new drum area occupies the northern portion of a covered chemical storage facility which is fenced and completely underlain by a curbed concrete pad (see Plate 3). The concrete pad is sloped to drain any spills toward a concrete gutter which, in turn, leads to an open-top concrete sump. Segregation of incompatible materials is maintained by a series of spill containment curbs which control any drainage toward the gutter.



Harding Lawson Associates
Engineers, Geologists & Geophysicists

CHEMICAL STORAGE FACILITY

Sparton Technology, Inc.
Albuquerque, New Mexico

3

JD 6310,012.12 H.G. 12-17-85

Sparton has notified the New Mexico Environmental Improvement Division (EID) of its intention to cease storage of containerized hazardous waste for periods of longer than 90 days and to withdraw its Part A Application. To convert to short term storage, the drum storage areas must be closed in accordance with the HWM regulations. Therefore, this closure plan presents the steps necessary to close the old and new drum areas in a manner which provides for their subsequent reuse.

B. Pond and Sump Area

The two ponds (East Pond and West Pond) and the closed sump are located on the north side of the manufacturing plant. The ponds were used exclusively for storage of aqueous plating wastes, on a regular basis, until August 1983, when Sparton ceased discharging to either pond and removed the remaining plating wastes. At that time, the liners were visually inspected and appeared to be intact.

The sump was used exclusively for the storage of waste solvents until its closure in October 1980. Sump closure consisted of removing residual wastes from the sump and filling the sump with sand. The removed wastes were containerized and disposed as a hazardous waste at an appropriate off-site disposal facility.

C. Additional Background Information

The site is located about 2,500 feet northwest of the Rio Grande River on the west side of Coors Road, NW. Locally, the area is hilly and slopes in several wide terraces toward the river. The site is approximately 60 feet above the Rio Grande River, and 40 to 60 feet lower than the Paradise Park residential area, which is located approximately 4,000 feet west of the site. Approximately 200 feet southeast of the site, and across Coors Road, is the Coralles Canal. The Calabacilla Arroyo is located about 1,000 feet north of the site.

The site is underlain by the massive sand and gravel aquifer of the Rio Grande River Valley Basin. Surface elevations are approximately 65 feet above the water table. This is a discharge region for the river, and regional ground-water flows in a southward direction consistent with the flow of the river and slightly divergent from the river. Soils in the area are generally sand and gravel with lenses of finer grained materials ranging from silty sands to clay. A locally extensive finer grained unit underneath the subject site separates a thin upper aquifer (0- to 10-feet thick) from a lower aquifer estimated to be 50- to 60-feet-thick. The finer-grained unit consists of silty sands to clay, is 5- to 10-feet thick, and has been characterized as a semi-confining unit.

Ground-water monitoring has detected metallic hazardous waste constituents and a number of volatile organic constituents in ground water of the upper and lower aquifers. Although contamination is believed to be much higher in the upper aquifer, an investigation is underway to determine the vertical and lateral extent of the contamination. A vadose zone investigation is presently underway to evaluate the extent of contamination in the soils of the unsaturated zone. Previous studies and preliminary results from the present investigations indicate that extensive spreading of contaminants has occurred in the vadose zone. Soil moisture values are generally low and are believed to represent evaporation from the water table.

The Albuquerque climate is semi-arid, with annual rainfall measuring approximately 10 inches per year and annual evapotranspiration in excess of 60 inches per year. Record rainfalls are on the order of 1 inch in 24 hours. Rain at the facility generally enters the top layer of soil and is held by capillary action until removed by a wicking action caused by evaporation at the surface. This phenomenon results in practically no local recharge of the aquifer. Preliminary results from the vadose zone investigation indicate that, although metallic and organic constituents are detectable in soils at most depths, no concentrated reservoirs of contamination appear to exist above the water table. Some metals in soil samples are detected in the low parts per million range, and halogenated organic chemicals

have been either not detected or have been in the low parts per billion.

In contrast to the above, HNU meter readings of soil samples at the time of collection indicated organic contaminants in the vapor phase, possibly resulting from vaporization of contaminants in the upper aquifer. This suggests that a useful remedial technology may involve air venting within the vadose zone to drive off volatile constituents. This alternative has not been fully evaluated as yet; however, we feel that any cap design must be compatible with this type of technology. Air venting would only be feasible if the cap were designed to a minimal size, leaving surrounding soils exposed to the atmosphere to provide for the escape of organic vapors.

Sparton has undertaken an extensive site investigation to characterize the site's geology and hydrogeology and to determine the extent of contamination and the dynamics of contaminant migration. Reports of the first three phases of investigation include the following:

- MONITORING WELL INSTALLATION REPORT, SPARTON SOUTHWEST, INC., COORS ROAD FACILITY, Harding Lawson Associates, June 29, 1983
- INVESTIGATION OF SOIL AND GROUND-WATER CONTAMINATION, SPARTON TECHNOLOGY, COORS ROAD FACILITY, ALBUQUERQUE, NEW MEXICO, Harding Lawson Associates, March 19, 1984

- HYDROGEOLOGIC CHARACTERIZATION AND REMEDIAL INVESTIGATION, SPARTON TECHNOLOGY, INC., 9261 COORS ROAD, NORTHWEST, ALBUQUERQUE, NEW MEXICO, Harding Lawson Associates, March 13, 1985

A final phase of investigation is underway which includes studies of vadose zone contamination, ground-water mass transport modeling, and soil gas studies. These studies will be discussed in future reports.

D. Proposed Asphaltic Concrete Cap

As shown in this closure plan, the pond and sump area will be closed and subsequently covered with an asphaltic concrete cap to prevent surface water infiltration and subsequent leaching of contaminants from the vadose zone into the ground water. Asphaltic concrete has, according to EPA-600/Z-76-255, proven to be relatively impervious with coefficients of permeability of 1×10^{-8} cm/sec or less.

IV GENERAL INFORMATION

A. Facility Size and Type

The Coors Road facility is located on an approximately 12-acre parcel and consists of an approximately 64,000-square-foot building constructed in 1961. The company manufactures commercial, industrial, and military electronics which include circuit board

assemblies, transducers, sensors, and pressure systems. Facility operations include machine and model shops, printed circuit board manufacturing facilities, assembly areas, testing laboratory, engineering, and drafting.

B. Hazardous Wastes

The printed circuit manufacturing process at the Coors Road plant employs the use of metal plating which generates an aqueous plating waste which is classified as hazardous due to heavy metals and low pH. Waste solvents (chlorinated and nonchlorinated) are generated primarily from cold solvent cleaning of electronic components. The waste solvents, which are listed hazardous wastes, have always been managed separately from the plating wastes.

C. Hazardous Waste Management Units

1. Surface Impoundments

The two ponds are located in a fenced area on the north side of the main building. They are each approximately 20 by 30 feet in plan dimension by 5 feet deep. The ponds and the area between the ponds are lined with a 30-mil, two-ply hypalon liner with a polyester scrim. The East pond has concrete block walls, and the West Pond has cast concrete walls. In each, the walls contain a sloped sand backfill to support the liner. The pond area is enclosed by a security fence.

The surface impoundments were used for temporary storage of aqueous plating wastes. The ponds were alternately filled and emptied, providing regular opportunities to visually inspect for evidence of liner failure.

Any hazardous wastes or hazardous waste constituents which may have emanated from the ponds would have originated from aqueous plating wastes only. Waste solvents have never been stored in the ponds.

2. Old Solvent Sump

The sump is located in the same general area as the surface impoundments, constructed of concrete blocks, and measures approximately 5 feet by 5 feet in plan dimension by 2 feet deep. At one time, the sump was used for the storage of waste chlorinated and non-chlorinated solvents, which were emptied into the sump manually. Sparton closed the sump in October 1980 by removing the remaining waste and then filling the sump with sand. Since that time, no wastes have been managed in the sump. The sump is believed to be the source of organic contamination in the soils and ground water under the site.

a. Old Drum Area

The old drum area is an area where drums of hazardous waste were stored upon the ground surface prior to May 1981,

when containerized hazardous waste storage was transferred to the new chemical storage facility. The old drum area is immediately west of a concrete pad. The old drum area was not lined or paved with an impervious surface and did not have spill containment structures.

b. New Drum Area

The present hazardous waste drum storage area is the northern portion of a chemical storage facility which was specifically designed for this purpose (see Plate 3). The chemical storage facility is constructed over a curbed concrete pad which slopes to a concrete gutter which, in turn, drains to a concrete spill collection sump. Storage areas are segregated by 6-inch high curbs which serve to direct any spills towards the gutter. The entire facility is covered and enclosed by a fence which is equipped with a windbreak. The chemical storage facility fully meets regulatory requirements and contemporary standards for a hazardous waste and hazardous chemical drum storage area.

V POND AND SUMP CLOSURE

Pond and sump closure will consist of some excavation of potentially contaminated surface soils prior to placement of a relatively impervious asphaltic concrete cap. The soils thus removed will be disposed as fill in the ponds. The cap will divert surface

water and rainfall from the pond and sump area, thus minimizing infiltration of surface water into the ground.

A. Basis of Cap Design

An asphaltic concrete cap is proposed in lieu of the standard 2-1-2 cap described in EPA's Draft RCRA Guidance Document, LANDFILL DESIGN LINER SYSTEMS AND FINAL COVER, July 1982. The basis of this choice is related to site-specific characteristics.

Additional borings may become necessary in the future to further evaluate contamination or to install additional monitoring wells. The cap design should provide for easy repair in the event of additional borings or excavations. It is also possible that the final site remedial design would call for an extension of the capped area. Therefore, any cap installed over the pond and sump area should be designed to provide for a technically feasible enlargement. An asphaltic concrete cap can be easily repaired or extended as needed. A 2-1-2 cap (which includes a membrane component) will be difficult or impossible to repair, should additional borings be required. In addition, a clay/membrane cap is not amenable to areal enlargement.

A 2-1-2 cap (which includes a recompacted clay layer) will be subject to dehydration damage (shrinkage) in the semi-arid climate of Albuquerque, New Mexico.

We believe the most notable functions of a cap in this area will be to prevent surface water infiltration and to efficiently shed rainfall away from the closure area. HLA feels a properly engineered and constructed pavement-quality asphalt concrete cap will meet this requirement and, at the same time, avoid the disadvantages of a compacted clay membrane cap. Asphaltic concrete has, according to EPA-600/Z-76-255, proven to be relatively impervious with coefficients of permeability of 1×10^{-8} cm/sec or less.

The asphaltic concrete cap proposed in this plan has been designed using the AASHTO design method with a California Bearing Ratio of 10 for sandy soil, and a load bearing capacity of 100,000 pounds. The cap will consist of a six inch asphaltic base course overlain by a tack coat and a three inch asphaltic concrete surface course.

B. Closure Process

1. Site Preparation

Monitoring Wells MW1, MW3, and MW11, located in the vicinity of construction activity, will be abandoned and plugged prior to closure of the pond and sump area. The methods for plugging monitoring wells are included in Appendix E of this plan. The underground piping from the plant to the ponds has already been disconnected and plugged at the building. The abandoned piping will

be left in place except where encountered during excavation. Piping which is excavated will be placed in the ponds.

Existing fencing and gates, as shown on Plate A-1 (see Appendix A), will be removed from the construction area, and temporary construction barricades will be set up around the perimeter.

2. Pond Alteration

The walls of the ponds presently extend above the proposed elevation of the asphaltic concrete cap. Therefore, removal of the upper portions of the walls will be required before installation of the asphaltic concrete cap.

A 30-mil-thick hypalon liner that extends over the walls of the ponds is anchored near the ground surface on all sides of the ponds (see Plate A-2). The soils around the upper portion of the walls will be excavated so that the liner may be temporarily folded inward, thus exposing the pond walls. Soils excavated during this process will be placed inside the ponds. (The West Pond is presently about 10 to 25 percent filled with drill cuttings from area borings.)

The upper portions of the pond walls will be removed to an elevation of approximately 5043.5 feet MSL or about one to one and one half feet below existing ground surface. The top edge of the

walls will be capped with a sand mortar to provide a smooth surface, and the liner will be replaced over the walls and reanchored by burying the edges approximately one and one half feet below grade. Details on Plate A-2 in Appendix A illustrate this procedure.

Demolition wastes, including broken concrete, concrete blocks, and excess liner will be placed inside the lined ponds. Care will be taken to prevent demolition wastes from damaging the liner. Demolition materials will be placed on a bedding of drill cuttings or excavated soil.

3. Sump Removal

The old solvent sump, including concrete block walls and bottom slab and sand backfill, will be excavated and placed in the ponds. Again, care will be taken to prevent possible damage to the liner.

4. Subgrade Preparation

The surface soils in the cap area will be excavated to the bottom elevation of the asphaltic base course. These soils, consisting of sand and gravel, will be used for backfill in the ponds and sump. Backfill above the pond walls will consist of cement stabilized sand for a distance of approximately four feet on either

side of the wall to minimize differential settling which could possibly damage the liner that is draped over the pond walls.

As the ponds are backfilled, material will generally be hand tamped or vibrated to provide the required degree of compaction and to eliminate large void spaces without damaging the liner.

5. Paved Cap

When the areas within the two ponds and sump have been brought to the proposed grade, a 6-inch-thick asphaltic base course will be placed over the area as shown on Plate A-3 in Appendix A. The area to be paved will extend from the plant to approximately 10 feet beyond the north wall of the ponds, and from the existing paved parking lot to approximately 10 feet beyond the former sump location.

After the asphalt base has been placed, an asphaltic tack coat will then be applied. A 3-inch-thick asphaltic concrete surface course will be placed above the asphaltic base course. The final paved surface will sloped at 1- to 1-1/2 percent to promote drainage into the swale located on the north side of the cap and onto the existing paved area east of the cap.

6. Construction Specifications

Specifications for construction materials and procedures involved in the closure of the pond and sump area are included in Appendix C of this report.

7. Safety Plan

The proposed construction activities present some potential safety and health risks for construction workers and plant employees. Any construction activity creates potential safety hazards due to the movement and operation of machinery and from unnatural or unstable conditions due to excavation and other work. In addition, this construction site involves exposure of some potentially contaminated materials. Therefore, the construction area must be clearly posted and barricaded to prevent entry by unauthorized personnel.

The contractor will be responsible for the safety and health of his personnel. He will be required to develop and follow a written safety plan setting forth procedures and safeguards for all construction activities. A model safety plan is provided in Appendix F.

B. Closure Standard

The method of closure will minimize the need for future maintenance. The asphalt surface should require very little repair since only light weight vehicles will be allowed to use it. Effects of freezing and thawing should be minimal since the sub-grade consists of a well-graded, granular soil.

The asphaltic concrete surface will prevent infiltration of surface water or rainfall so that leaching of any contaminated material existing in the vadose zone should be minimized, thus keeping it out of the upper ground water.

C. Closure Certification

Following the above procedures, Sparton will obtain certification of closure from a registered professional engineer and submit this to EID.

VI CLOSURE OF DRUM STORAGE AREAS

A. Old Drum Area

The old drum area is an earthen plot located to the west of a concrete pad at the west end of the building. This area is shown in Plate 2. Since the old drum area contained no barriers to prevent migration of any spilled hazardous waste, an assessment will be made to determine if any hazardous wastes or hazardous waste constituents

have entered the soil. Sample collection methods for the assessment are discussed in Appendix G. Chain-of-custody procedures and analytical methods are described in Appendices C and D, respectively. If results of the assessment indicate that the soils are uncontaminated, no further closure activity will be required.

If it is determined that hazardous wastes or hazardous waste constituents have entered the soil, a more extensive investigation will be undertaken to determine the areal and vertical extent of vadose zone contamination. In this case, an amendment to this closure plan will be submitted to the EID.

A certificate of closure, indicating the results of the soil investigation, will be obtained from a registered professional engineer and submitted to the EID.

B. New Drum Area

Prior to closure of the New Drum Area, all hazardous waste currently in storage will be removed and disposed at an appropriate disposal facility. The concrete pad, curbs, drainage gutter, and collection sump will be visually inspected to determine that they are still intact, and that there is no evidence of past spills or leaks which may have escaped the storage facility. If any contamination is discovered within the storage facility, the facility will be

thorougnly cleaned with a portable steam cleaner. Contaminated wash water will drain to the integral sump and then be removed for disposal as a hazardous waste.

Following the above procedures, Sparton will obtain certification of closure from a registered professional engineer and submit this to EID. Following closure of the drum storage facility, Sparton will utilize the area for temporary storage of hazardous waste for periods not to exceed 90 days.

VII GROUND-WATER MONITORING

A. Alternative Ground-Water Monitoring Program

Long-term site ground-water monitoring is provided in Sparton's Alternative Ground-Water Monitoring Program (AGMP). The AGMP also provides an assessment of the extent of contamination and rate and direction of contaminant migration. The AGMP is discussed more fully in Appendix C of the Post-Closure Care Plan.

VIII SECURITY REQUIREMENTS

The drum storage area and the pond and sump area are currently surrounded by barriers comprised of the plant building and chain-link fences. Warning signs have been posted at both HWM units. These measures will provide adequate security for all remedial site activities which do not require removal of any fence.

During the planned pond and sump area closure, sections of the chain-link fence will be removed to provide access to work crews and equipment. If surface removal is required in the drum storage area, some of the adjacent fence may likewise have to be removed. During periods when the subject areas are not completely surrounded by the fence or building barriers, barricades will be erected which will clearly establish the work area. Warning signs will be posted indicating that the work site poses a danger due to the presence of hazardous substances, and that unauthorized entry is not allowed.

During periods when the work crews are not actively engaged in closure of the site, normal building security inspections will be modified to include the barricaded areas.

IX CLOSURE CERTIFICATION

Following each major element of the closure activities described herein, a statement will be provided by both Sparton and an independent registered professional engineer verifying that the closure activity has conformed to the closure plan. These individual closure elements include the following:

A. Closure of the old hazardous waste drum storage area;
B. Closure of the new hazardous waste drum storage area; and
C. Construction of impervious cap over the ponds and sump area.

X NOTICE OF CLOSURE

Following the completion of closure of the drum storage area and the pond and sump area, Sparton will submit to the local land authority and to the EID Director a survey plat indicating the location of the closed hazardous waste management units.

Sparton will also record a notation on the deed to the Coors Road facility property that portions of the property have been used to manage hazardous waste.

XI FINAL CLOSURE SCHEDULE

A schedule of major closure activities is presented in Appendix H. This schedule may have to be amended periodically based upon new information. EID will be promptly notified upon any amendment to the schedule.

XII CLOSURE COST ESTIMATES

The closure cost estimates are presented in Appendix I. These cost estimates may have to be revised periodically. EID will be promptly notified of any revisions to the cost estimates.

DISTRIBUTION

1 copy to:	Sparton Corporation 2400 East Ganson Street Jackson, Michigan 49202
Attention:	Mr. Blair Thompson
2 copies to:	Sparton Technology, Inc. 4901 Rockaway Boulevard, S.E. Rio Rancho, New Mexico 87124
Attention:	Mr. Richard Mico
2 copies to:	Varnum, Riddering, Schmidt & Howlett 171 Monroe Avenue, N.W. Grand Rapids, Michigan 49503
Attention:	Mr. Jon F. DeWitt
5 copies to:	Environmental Improvement Division Ground Water and Hazardous Waste Bureau Harold Reynolds Building 1190 St. Francis Drive Santa Fe, New Mexico 87504-0968
Attention:	Mr. Peter H. Pache

QUALITY CONTROL REVIEW:

Gary R. Horwitch, P.E.
Associate Engineer

APPENDIX A
to
ATTACHMENT 3

Pond and Sump Area Closure

APPENDIX B
to
ATTACHMENT 3

Material and Construction Specifications

Technical Specifications

For

Pond and Sump Closure

Sparton Technology, Inc.

Albuquerque, New Mexico

SECTION 00010

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SECTION 01010

SUMMARY OF WORK

PART I - GENERAL

1.01 Scope

This specification provides general direction and technical requirements for closure of the two ponds and one sump at the Sparton Technology, Inc., Albuquerque, New Mexico facility.

The Contractor shall provide all labor, materials, products, accessories, tools, equipment, transportation, supervision, and other items which are necessary for completion of the work.

The work covered under this specification includes:

- Removal and replacement of fences.
- Demolition of portion of reinforced concrete walls in West pond.
- Demolition of portion of concrete block walls in East pond.
- Removal of sump.
- Construction of asphaltic concrete pavement system (cap).

1.02 Additional Contractor Responsibilities

Contractor's additional responsibilities are, in general, those which are contained in these Contract Documents including, but not limited to, the following:

- Provide a Health and Safety Plan covering all aspects of health and safety for personnel as approved by the Owner.

- Furnish all required insurance for projects.

- Receive, unload, convey, store, and protect all materials, tools, and equipment at the job site.

- Clean and remove all surplus material and debris generated from the work.

- Furnish potable water, ice, and coolers necessary during the project.

- Furnish Owner-approved hard hats, safety glasses, safety shoes, and any other safety equipment. Comply with Owner's safety rules.

- Provide the Owner at least 24 hour prior notice for construction inspection, field testing, engineering, or surveying, as required under this contract.

- Set up temporary barricades with warning signs restricting access to the site.

- Comply with all applicable OSHA regulations.

- Furnish sanitary facilities.

PART II - PRODUCTS

Not Applicable.

PART III - EXECUTION

Not Applicable.

END OF SECTION

SECTION 01400

STANDARDS

PART I - GENERAL

The following standards are applicable to construction of the pond and sump area closure for Sparton Technology, Inc., Albuquerque, New Mexico. In cases where a referenced standard specification has been revised or replaced, the new version shall apply.

ASTM A-48	Grey Iron Castings
ASTM A-120	Pipe, Steel, Black and Hot-Dipped Zinc Coated, Welded and Seamless, for Ordinary Uses
ASTM A-123	Zinc Coatings or Products Fabricated from Rolled, Pressed, and Forged Steel Shapes, Plates, Bars, and Strip
ASTM A-153	Zinc Coating on Iron and Steel Hardware
ASTM A-392	Zinc Coated Steel Chain-Link Fence Fabric
ASTM A-491	Aluminum Coated Steel Chain-Link Fence Fabric
ASTM C-270	Mortar for Unit Masonry
ASTM D-422	Particle Size Analysis of Soils
ASTM D-698	Moisture-Density Relations of Soils and Soil Aggregate Mixtures, Using 5.5 lb. (2.5 kg) Rammer and 12-Inch (304.8 mm) Drop
ASTM D-1556	Density of Soil in Place by the Sand-Cone Method
ASTM D-1560	Resistance to Deformation and Cohesion of Bituminous Mixtures by Means of Hveem Apparatus

ASTM D-977	Emulsified Asphalt
ASTM D-995	Requirements for Mixing Plants for Hot-Mixed, Hot-Laid Bituminous Paving Mixtures
ASTM D-3381	Viscosity-Graded Asphalt Cement for Use in Pavement Construction
ASTM D-3515	Hot-Mixed, Hot-Laid Bituminous Paving Mixtures
ASTM D-2922	Density of Soil and Soil Aggregate in Place by Nuclear Methods

AMERICAN ASSOCIATION OF STATE HIGHWAY TESTING OFFICIALS

AASHTO M-240	Type IS Portland Blast Furnace Cement

PART II - PRODUCTS

Not Applicable

PART III - EXECUTION

Specific items of the plans and specifications not referenced to applicable specifications shall be governed by applicable ASTM specifications.

END OF SECTION

SECTION 01450

DEFINITIONS

PART I - GENERAL

The following definitions are applicable to the construction specifications:

Work:	Performance of tasks necessary to complete each item described by the drawings in accordance with requirements of the specifications.
Engineer:	The Registered Professional Engineer (Engineer), or designated firm employed by Owner, to undertake testing and inspection of the work.
Contractor:	The person, partnership, or corporation which has entered into agreement with the Owner to perform all work included in these specifications.
Owner:	Sparton Technology, Inc.

Fill Material:	Soils, aggregates, or other fill materials as approved by the Engineer for use as fill.
Approved or Permitted:	Approved or Permitted by the Owner or Engineer.
Required:	Required by Contract Documents.
Submitted:	Submitted to the Owner or Engineer for review.

PART II - PRODUCTS

Not Applicable.

PART III - EXECUTION

Non Applicable.

END OF SECTION

SECTION 01460

DRAWINGS

PART I - GENERAL

1.01 Description of Drawings

The following drawings are applicable to the closure of the pond and sump area for Sparton Technology, Inc., Albuquerque, New Mexico:

Plate Number	Title
A-1	Pond and Sump Area Existing Facilities - Base Map
A-2	Pond and Sump Area Existing Cross-Sections and Details
A-3	Pond and Sump Area Final Plan and Cross-Sections
A-4	Fencing Details

PART II - PRODUCTS

Not Applicable.

PART III - EXECUTION

Not Applicable.

END OF SECTION

SECTION 02200

EXCAVATION OF SOILS

PART I - GENERAL

1.01 Description of Work

The Contractor shall furnish all labor, materials, tools, and equipment to perform all work for excavating soil and extraneous material as shown on the drawings and as specified.

All work shall be observed by the Owner or Engineer for conformance with the plans and specifications.

PART II - PRODUCTS

2.01 Potentially Contaminated Soils

Soils excavated during removal of the upper section of pond walls and soils excavated from the old solvent sump (including contents of the sump and soil adjacent to the sump as defined on the plans) shall be considered potentially contaminated. All other excavated soil shall be considered uncontaminated.

2.02 Uncontaminated Soils

Uncontaminated soils are soils within the area to be capped which are not potentially contaminated as defined above.

PART III - EXECUTION

3.01 Protection of Utilities

The Contractor shall identify and locate utility lines prior to construction work. Underground utilities shall be protected from damage during excavation. Any damage to known utility lines as a result of the work performed by the Contractor shall be repaired by the Contractor at no additional cost.

3.02 Protection of Liner

The Contractor shall exercise caution to prevent damage to the existing 30-mil Hypalon liners in the ponds. Any damage to the liner, as a result of the construction activities, will be repaired at the Contractor's expense.

3.03 Excavation of Potentially Contaminated Soil

Soils defined as potentially contaminated shall be excavated to the lines and grades shown on the plans. Excavated material shall be placed in the ponds in accordance with provisions of Section 02400 of this specification.

The contractor shall provide protective clothing and equipment as specified in the Health and Safety Plan required by Section 01010 of this specification.

Equipment used for this excavation shall be decontaminated by the Contractor, in accordance with provisions of Section 03000 of this specification, before it is used for excavation of uncontaminated soil.

3.04 Other Excavation

The Contractor shall excavate all materials to the lines, grades, and elevations shown on the drawings or as specified. Excavated soils shall be used to backfill the sump excavation and the excavated area around and above the ponds. Backfill shall be in accordance with Section 02400 of this specification.

3.05 Drainage During Construction

All rainfall runoff, shallow ground water, water from rinsing or decontamination procedures, or any other water which is potentially contaminated on the site shall be retained and disposed of in accordance with Section 03010, "Disposal of Potentially Contaminated Waste."

3.06 Environmental Compliance

The Contractor is responsible for compliance with all environmental laws and regulations.

END OF SECTION

SECTION 02300

DEMOLITION

PART I - GENERAL

1.01 Description of Work

The Contractor shall furnish all labor, materials, tools, and equipment necessary to perform all work and services for demolition of the upper portion of pond walls and the sump, as shown on the drawings and as specified.

PART II - PRODUCTS

2.01 Mortar

Sand mortar shall be in accordance with ASTM C-270.

PART III - EXECUTION

3.01 Procedure

The Contractor shall excavate soil around the outside of the walls as necessary to uncover the edges of the 30-mil Hypalon liner and to access the outside of the walls for demolition. Excavation shall be in accordance with Section 02200 of this specification.

The exposed edge of the liner shall be laid back over the interior of the pond to expose the pond wall as shown in the drawings. The upper portion of the walls shall be removed to

the elevation shown on the plans. Use of a pneumatic hammer will be permitted. Use of explosives is NOT permitted.

The top of the remaining walls shall be capped using a sand mortar with smooth finish. The liner will then be returned to its original position and buried as shown. Excess liner may be trimmed to make it more manageable.

3.02 Disposal of Debris

Debris from the demolition of the walls, including concrete pieces, concrete block, and excess liner shall be placed into the ponds in accordance with Section 02400 of this specification. Pieces of concrete shall be reduced to a maximum of 3 feet in any dimension and shall not be placed within 3 feet of the asphaltic base course.

END OF SECTION

SECTION 02400

BACKFILL AND COMPACTION

PART I - GENERAL

1.01 Description of Work

The Contractor shall furnish all labor, materials, tools, and equipment to perform all work and services for backfilling and compacting as shown on the drawings and as specified. All work shall be observed by the Engineer for conformance with the plans and specifications.

PART II - PRODUCTS

2.01 Soils

Soils used for backfilling shall be those excavated from the site.

2.02 Cement Stabilized Sand

a. Cement

Cement for stabilization of soil above pond walls shall meet the requirements of AASHTO Designation M-240, "Type IS Portland Blast Furnace Cement."

b. Sand

Sand shall be sandy soil from the site area.

PART III - EXECUTION

3.01 Job Conditions

Earthwork shall not be performed during unfavorable weather conditions. When work is interrupted by rain, fill operations shall not be resumed until the field density tests performed by the Engineer indicate that the moisture-content and density of the fill are as specified. Proper drainage shall be maintained at all times.

3.02 Backfilling and Compacting in Ponds

Existing material in the ponds shall be compacted in place using manually operated tamping and compacting equipment. Potentially contaminated soil, as defined in Section 02200, shall be placed in 8-inch-loose lifts and compacted with hand operated equipment.

Demolition material shall be placed in the ponds with a minimum of 12 inches of soil material separating it from the pond liner, and at least 3 feet below the asphaltic base.

All materials shall be placed in the ponds and compacted in a manner which will not damage the pond liner. Material shall be allowed to free fall no more than 24 inches during placement.

If damage of the liner occurs, the Contractor shall repair the liner in a manner satisfactory to the Owner and Engineer at the Contractor's sole expense.

Soils within the ponds shall be compacted using hand operated equipment. Soils 3 feet below the asphaltic base shall be compacted to at least 90 percent of the standard Proctor test method (ASTM D-698). Soils within 3 feet of the asphaltic base shall be compacted to at least 95 percent of ASTM D-698.

The Contractor shall provide protective equipment and clothing as specified in the Health and Safety Plan required by Section 01010 of this specification.

Equipment used for backfill and compaction in ponds shall be decontaminated by the Contractor in accordance with provisions of Section 03000 after pond backfilling is complete.

3.03 Backfilling and Compacting

The soils used for backfill within the upper 3 feet of the asphaltic base course shall be moisture-conditioned to within 3 percent of optimum moisture content (OMC) of the fill soils to facilitate compaction. If the moisture-content of the fill soil is

less than 3 percent below OMC, water shall be added until the moisture content is raised as required. If the moisture content of the fill soils is greater than 3 percent above OMC, the fill soil shall be aerated by blading, discing or other satisfactory methods until the moisture content is lowered as required. The wet soils may be mixed with approved drier materials to achieve an acceptable moisture content.

All fill soils within the upper 3 feet at the ponds shall be spread and leveled in layers not to exceed 8 inches in thickness before compaction. Compaction shall be accomplished with appropriate equipment to at least 95 percent of the standard Proctor test method (ASTM D-698). All fill soils shall be compacted at a moisture content within 3 percent of the optimum moisture content as determined by ASTM D-698.

Soil required for fill or embankment in excess of that obtained by excavation within the grading limits shall be excavated from borrow areas as directed by the Engineer.

3.03 Cement Stabilization

Sandy soils shall be cement stabilized where shown on the plans. A mixture of 5 percent cement by dry weight of the soil shall

be mixed in such a manner that all materials are thoroughly blended to a uniform gradation and color. Mixing water shall be added in a manner that will provide uniform blending with the materials being mixed. Cement stabilized sands shall be compacted to at least 95 percent of the standard Proctor test method (ASTM D-698).

END OF SECTION

SECTION 02450

PROOFROLLING

PART I - GENERAL

1.01 Description of Work

Contractor shall furnish all labor, material, and equipment to perform all work and services in conjunction with proofrolling of areas outside the pond walls at the site. All work under this section shall be observed by the Engineer for conformance with the plans and specifications.

PART II - PRODUCTS

2.01 Proofrolling Equipment

Proofrolling shall be performed utilizing a 10-ton rubber-tired compactor, or similar construction vehicle, approved by the Owner or Engineer.

2.02 Soft, Organic, or Excessively Wet Soil (Unsuitable Material)

Soft, organic, or excessively wet soil (unsuitable material) encountered during the proofrolling operation shall be excavated and replaced with select fill, as specified in Sections 02200 and 02400 of this specification.

PART III - EXECUTION

3.01 Proofrolling

a. The proofrolling equipment shall make at least four passes over each area, with the last two passes perpendicular to the first two passes.

b. Soft or unstable soils that fail to compact shall be cement stabilized or placed inside the ponds.

c. Proofrolling shall be performed just prior to placement of asphaltic base course.

3.02 Stabilization

Soft or unstable areas that fail to proofroll may be stabilized, as specified in Section 02400, to facilitate compaction. Use of cement stabilization to facilitate compaction must be approved by the Engineer prior to accomplishing the work. Stabilization to facilitate compaction shall be performed at the sole expense of the Contractor.

END OF SECTION

SECTION 02500

ASPHALTIC PAVEMENT SYSTEM

PART I - GENERAL

1.01 Description of Work

The Contractor shall furnish all labor, materials, tools, and equipment necessary to install the asphaltic pavement system over the pond and sump area as shown on the drawings and as specified.

All work shall be observed by the Owner or Engineer for conformance to plans and specifications.

1.02 Primary Objectives

The primary objective of the asphalt pavement is to minimize passage of water to the subgrade. The Contractor shall construct the pavement in a manner that will provide a tightly sealed surface with no open joints or cracks.

PART II - PRODUCTS

2.01 Asphalt Base Course

The asphaltic base course shall be Composition 1A or 2A as specified in ASTM D-3515 using at least 3-1/2 percent asphaltic cement Grade AC-10 as specified in ASTM D-3381.

2.02 Tack Coat

The tack coat shall be Emulsified Asphalt Grade SS-1 or SS-1h as specified in ASTM D-977.

2.03 Wearing Surface

The asphaltic concrete wearing surface shall be Composition 6A as specified in ASTM D-3515 using 8 percent asphaltic cement Grade AC-10 as specified in ASTM D-3381.

PART III - EXECUTION

3.01 Sub-Grade Preparation

Sub-grade shall be graded to proper lines and grades and compacted in accordance with Section 02400. Subgrade shall be proofrolled in accordance with Section 02450.

3.02 Asphalt Base Course Construction

Asphalt base course shall be placed and compacted to the lines and grades shown on the plans. The Contractor shall provide suitable equipment of sufficient size to allow continuous, uninterrupted movement of the spreader.

The mixing plant shall conform to ASTM Specification D-995.

As soon as the mixture has been spread and has set sufficiently to prevent cracking, compaction shall begin. A delay in the initial rolling will not be allowed. Asphaltic base course shall be compacted to 95 percent Hveem stability as specified in ASTM D-1560.

3.03 Tack Coat Application

Tack coat material shall be applied as directed by the Engineer up to a maximum of 0.1 gallon per square yard. It shall be spread in advance to permit construction to progress continuously after the curing period. As soon as the tack cast has become "tacky" or sticky, covering may proceed. If the tack coat has lost its viscous quality, it shall be reapplied before the surface course is placed.

3.04 Asphaltic Surface Course Application

The asphaltic concrete wearing surface shall be installed in accordance with Paragraph 3.02 of this section.

Placing of paving layers shall be continuous. All joints shall be made in a manner which will provide a smooth, well bonded and sealed joint. All joints between alternatively paved areas shall be feathered at a slope of 6 horizontal to 1 vertical. The intersection of alternatively paved areas shall be covered with a tack coat, as

specified in Section 3.03 of this section, before additional asphaltic surface course is applied. Asphaltic concrete surface course shall be compacted to 95 percent Hveem stability as specified in ASTM D-1560.

3.05 Testing

Asphaltic concrete mixtures shall be sampled and tested in accordance with ASTM D-3515. The Contractor shall furnish certified test results to the Owner for each mixture used.

END OF SECTION

SECTION 02600

CHAIN-LINK FENCE AND GATES

PART I - GENERAL

1.01 Description of Work

The Contractor shall furnish all labor, materials, tools, and equipment to remove the existing fence and to install and complete all chain-link fences and gates as shown on drawings and as specified. The Contractor shall furnish and install all fenceposts, supplementary or miscellaneous items, appurtenances and devices incidental to, or necessary for, a sound, secure, and complete installation. The Contractor shall salvage and re-install fence fabric and gates as shown on the drawings. New posts and materials shall be compatible with the existing fence.

All work shall be observed by the Engineer for conformance to plans and specifications.

1.02 Product, Storage, and Handling

Store fence fabric, posts, and other items off ground and protected from damage.

PART II - PRODUCTS

2.01 Fencing Materials

a. General

Use only new materials. Pipe sizes indicated are commercial pipe sizes. Tube sizes are nominal flange dimensions. Rolled form section sizes are nominal outside dimensions.

Iron or steel components shall be hot-dip galvanized after fabrication. Use galvanized and aluminized finish complying with the following minimum requirements:

Pipe:	2.0 oz. zinc/square foot (s.f.)
Square Tubing:	ASTM A-123, 2.0 oz. zinc/s.f.
Roll Form:	ASTM A-120
Hardware and Accessories:	ASTM A-153
Fabric:	ASTM A-392, Class II, 1.4 oz. zinc/s.f. or ASTM A-491, Class II, .4 oz. aluminum/s.f.
Miscellaneous items:	ASTM-A-120, 1.0 oz. zinc/s.f.

b. Chain-Link Fabric

Chain-link fabric shall be woven 2-inch mesh of No. 9 galvanized copper-bearing steel wire, galvanized after fabrication in accordance with ASTM A-392 for zinc coating.

c. Steel Line Posts

Line posts shall be 2-1/2 inch O.D. steel pipe weighing at least 3.65 pounds per lineal foot.

d. Steel Top and Bottom Rails

Rails shall be 1-5/8 inch O.D. steel pipe weighing at least 2.27 pounds per lineal foot or 1-5/8 inch rolled form section. Fit rails with expansion couplings of outside sleeve type. Rails shall be continuous for outside sleeve type for full length of fence.

e. Steel Terminal, End, Corner, and Pull Posts (Terminal Posts)

Terminal posts shall be 3-inch O.D. steel pipe weighing at least 5.79 pounds per lineal foot. Provide posts of sufficient length to permit 36 inches to be set in concrete footing.

f. Bracing for Use Between Terminal, End, Corner, Gate, Pull Posts, and First Adjacent Line Posts

Bracing shall be 1-5/8 inch O.D. steel pipe weighing at least 2.27 pounds per lineal foot. Space no lower than 1/2 of fabric width from top of posts and trussed

back to base of terminal, end, corner, or pull post with 3/8-inch truss rod with turn-buckles.

g. Gate Posts

Gate posts shall be round steel pipe not less than size and weight given below:

- Double gate, total width 24 feet; 4-inch O.D. weighing not less than 9.11 pounds per lineal foot.
- Provide posts of sufficient length to permit bottom 26 inches to be set in concrete.

h. Tension Bars

Tension bars shall be 3/16 inch x 3/4 inch minimum steel, one piece for full height of fabric.

i. Stretcher Bars and Bands

Stretcher bars shall be 1/8 inch x 1 inch, threaded through fabric and secured to posts with metal bands spaced not greater than 14 inches O.D.

j. Wire Ties

Ties shall be No. 6 gauge steel wire for securing fabric to posts and rails. Space bands not greater than 14 inches O.C.

k. Gate Frames

Gate frames shall be not less than 2 inch O.D. steel pipe weighing at least 2.72 pounds per lineal foot.

l. Gate Hardware

1. Hinges: Pressed or forged steel or malleable iron to suit gate size, of non-lift-off heavy duty type, offset to permit 180 degree gate opening. Provide 1-1/2 pair for each leaf over 6 feet nominal height.

2. Latches for Single and Double Gates: Heavy duty, automatically engaging, lockable latch. Furnish drop rod complete with suitable casting set in concrete to hold gate leaf in place when drop rod is engaged.

3. Keepers: Provide keepers for all gates to automatically engage gate leaf and hold it in open position until manually released.

m. Post Tops

Post tops shall be steel, wrought iron or malleable iron, designed as a weather-tight closure cap, one cap per post.

n. Barbed Wire

Barbed wire shall consist of two strands of No. 9 steel wire twisted with four point barbs of No. 9 wire at 15 inch O.C. maximum. Wire shall be galvanized after fabrication in accordance with ASTM A-392 for zinc coating.

o. Miscellaneous Items and Materials

Provide as required to complete fence installation. Items and materials shall be consistent in quality with materials listed above.

2.02 Concrete

Concrete for embedment of terminal posts shall obtain a compressive strength of 2500 psi.

PART III - EXECUTION

3.01 General

The Contractor shall remove existing fence and gates, store materials to be reused, and dispose of other material off site.

The Contractor shall furnish and erect fence and gates, along the lines and grades and at locations specified on plans or established by the Engineer. Provide a rigid, taut fence. Install fence in true and correct alignment with vertical posts.

3.02 Installation

Drill holes in firm, undisturbed or compacted soil extending not less than six inches below bottom of posts (36 inches deep).

Set all posts in concrete footings as shown on the drawings. Fence post footings shall have the following minimum dimensions, be

crowned one inch minimum and steel troweled, except as otherwise detailed:

Line Posts = 10 inch diameter and 3 feet deep.

Other Posts = 16 inch diameter and 3 feet deep.

Wait at least seven days after posts are set in concrete before placing fabric in tension. Install fence tight, free of sags and bulges. Construct fence such that bottom edge of fabric is about one inch above grade. Correct minor irregularities in ground surface so that maximum clearance beneath fabric does not exceed 2 inches.

Space line posts at equal intervals not exceeding 10 feet. Install terminal posts at gates, corners, and any other points of strain. Fit terminal posts with bracing assembled between terminal posts and brace posts (first line post adjacent to terminal posts).

Provide top rails with expansion couplings at not more than 20 foot intervals. Use couplings which provide rigid connection and allow for expansion and contraction. Anchor top rails to line posts with appropriate wrought or malleable fittings.

Install bracing assemblies at all line posts and at both sides of corner and pull posts. Locate compression members at mid-height of

fabric. Extend diagonal tension members from compression members to bases of line posts. Use tension members not less than 3/8 inch diameter and fitted with tension take-up device. Install braces so that posts are plumb when diagonal rod is under correct tension.

Pull fabric taut and secure to posts and rails. Install fabric on security side of fence and secure to framework so that fabric remains in tension after pulling force is released. Secure fabric to line posts at not over 12 inches O.C. Use U-shaped wire conforming to diameter of pipe to which attached, clasping pipe and fabric firmly with ends twisted at least two full turns. Bend ends of wire to minimize hazards to persons or clothing.

Thread stretcher bars through fabric and secure to terminal posts with metal bands spaced not greater than 14 inches O.D. Pull each strand of barbed wire taut individually and secure to posts with wire ties. Space strands of barbed wire 4 inches apart with the bottom strand 4 inches above top rail.

Construct gate frames with malleable fittings at joints. Bracing and details of construction provide a rigid, non-sagging, non-twisting gate. Use fabric same as fence fabric and similarly attached. Do not weld fabric to frame. Furnish gate frames with three rows of barbed wire at top.

3.03 Acceptance

Remove and replace all damaged or improperly installed fencing components to satisfaction of Engineer at no additional expense to Owner.

END OF SECTION

SECTION 03000

DECONTAMINATION

PART I - GENERAL

1.01 Description of Work

The Contractor shall provide all labor, materials, tools, and equipment necessary for decontamination of equipment and personnel which have been directly involved in relocation and handling of potentially contaminated material.

PART II - PRODUCTS

2.01 Decontamination Facilities

Equipment capable of supplying high pressure spray of water and steam shall be provided by the Contractor for cleaning of excavation equipment. The Contractor shall provide all sheeting (polyethelene), tubs, buckets, brushes, hoses, and cleaning compounds necessary for decontamination of personnel and equipment. Throw-away garbage containers shall be provided for disposable protective clothing.

PART III - EXECUTION

3.01 Procedure

The decontamination area shall be adjacent to the area to be capped. Polyethylene or equivalent sheeting and sandbags or formwork

shall be used to form a sump to contain any materials generated from the decontamination process.

All equipment used for relocation of potentially contaminated materials shall be thoroughly cleaned with the high pressure steam cleaner. Decontamination shall be accomplished after the contaminated material has been placed in the ponds and compacted, but before backfilling with uncontaminated soil.

Personnel who have worked within the potentially contaminated area shall decontaminate before leaving the site. Specific procedures are as follows:

Personnel

At the end of each work period (before eating, drinking, smoking, or leaving the site), each person will pass through the designated decontamination area. Each of the following stations will be used as appropriate:

- Equipment/tool drop station.
- Boot Wash - Soiled boots will be washed in a tub containing a low-sudsing detergent solution.
- Boot Rinse - Personnel will step into a tub containing rinse water after washing boots.

- Glove Wash - Intact gloves will be wiped clean over a glove wash bucket containing low-sudsing detergent and water.
- Glove Rinse - Washed gloves will be rinsed with water or wiped with a water wetted towel.
- Contaminated Clothing - Used tyvek suits will be dropped into a bag lined garbage can for approved disposal.
- Showers - Personnel will shower as soon as possible at the end of the work day.

Equipment

1. Prior to equipment demobilization, loose mud will be removed using brushes and scrapers, as necessary, and equipment will be steam cleaned over polyethylene sheets. The perimeter of the sheeting will be bermed to prevent movement of liquids or solids away from the decontamination area.

END OF SECTION

SECTION 03010

DISPOSAL OF POTENTIALLY CONTAMINATED WASTE

PART I - GENERAL

1.01 Description of Work

The Contractor shall furnish all labor, materials, tools, and equipment necessary to dispose of contaminated and potentially contaminated solid and liquid waste generated during the work.

PART II - PRODUCTS

2.01 Potentially Contaminated Waste

Potentially contaminated waste includes all disposable items which have been used within the area to be capped and those used in the decontamination process.

2.02 Potentially Contaminated Water

Potentially contaminated water is any rainfall runoff, washwater, or other water which may have had direct contact with potentially contaminated soil as defined in Section 02400 of this specification. This generally includes all rainfall runoff from the area to be capped and all water used for decontamination.

PART III - EXECUTION

3.01 Disposal Method

Potentially contaminated waste shall be placed in polyethelene bags which shall be placed in approved lined steel drums for removal to an approved hazardous waste disposal site.

Potentially contaminated water shall be placed in approved lined steel drums (or polyethylene drums) for removal to an approved hazardous waste disposal site.

Drums shall be properly marked and labelled for hazardous waste disposal and shall conform to DOT 17-H for open top steel drums, or to DOT 34 for polyethylene drums (Exemption DOT-E6637).

Removal of drums for disposal shall be under the direction of the Owner or Engineer.

END OF SECTION

SECTION 04000

INSPECTION AND TESTING

PART I - GENERAL

1.01 Description of Work

Furnish all labor, materials, tools, and equipment to perform all work and services in conjunction with the earthwork construction operations specified in other sections. Replace or rework items which are not approved by the Engineer based upon testing described in this section, at the sole expense of the Contractor. The sampling and testing described in this section will be performed by the Engineer in checking the Contractor's work, at no cost to the Contractor.

PART II - PRODUCTS

Not Applicable.

PART III - EXECUTION

3.01 General Backfilling and Compaction

All compacted fill must be tested and approved by the Engineer.

The Contractor shall notify the Engineer at least 48 hours before requiring testing services and shall cooperate with the Engineer to facilitate all sampling and testing.

3.02 Replacement of Unapproved Work

Any earthwork which does not conform to the requirements of this section, as determined by the Engineer, shall be removed and replaced, or re-worked until approved by the Engineer. The Contractor shall replace or re-work unacceptable sections at no cost to the Owner.

3.03 Soil Compaction Testing

All fill shall be compacted according to the moisture and density requirements described in Section 02400.

In-place density tests shall be in accordance with ASTM D-1556 or ASTM D-2922, at the discretion of the Engineer.

At least one in-place field density test shall be performed for each lift placed.

There shall be a minimum of one in-place density test on any day of compaction activity. Additional in-place field density tests may be performed at the discretion of the Engineer.

Initially, one standard Proctor test shall be performed for each new fill material and for each 10 in-place field density tests performed. The frequency of standard Proctor tests may be increased or decreased at the discretion of the Engineer as the job progresses.

END OF SECTION

APPENDIX C
to
ATTACHMENT 3

Chain-of-Custody Procedures

APPENDIX C

CHAIN-OF-CUSTODY PROCEDURES

I Custodianship

A custodian will maintain custody and control of each sample under his care until it is relinquished, analyzed, or disposed. Normal security measures such as locked containers; evidence tape; or personal, physical possession will be utilized by the custodian.

The person actually collecting the sample becomes the first custodian. His duties include sealing the sample container with evidence tape, or locking the sample containers, if he does not maintain continuous personal, physical possession.

If the sample is to be split into subsamples, or if anyone else will have possession of the samples prior to laboratory delivery, the first custodian will also initiate Chain-of-Custody documentation. If the sample collector personally delivers the samples to the laboratory, he may obtain an itemized and dated receipt from an authorized laboratory representative in lieu of the Chain-of-Custody documents.

As the sample moves from the initial custodian through the Chain-of-Custody, subsequent custodians will sign when receiving the sample, and upon relinquishing same. (NOTE: Custodians will handle each sample in their possession in such a manner so as to be able to testify that it was continuously under their control and not subject to any tampering.)

II Documentation

A. Chain of Custody Document Contents

1. Facility name and location:

   Sparton Technology, Inc.
   9621 Coors Road, NW
   Albuquerque, New Mexico 87103

2. For each sample:

   a. Sample location and depth;
   b. Date and time of collection; and
   c. Number of sample containers.

3. Name of sample collector

4. Special security features used, such as locked containers or evidence tape.

B. Multiple Samples

A single Chain-of-Custody document may be used for more than one sample, provided that all requirements specified in Item B.1 are met. If multiple samples are identified in one document, they nor-

mally will be packaged together and the package sealed with evidence tape.

C. Acceptance/Release Format

Each transfer of possession of a sample will be recorded on the document with the following items:

1. Signature of person relinquishing sample control;
2. Signature of person receiving sample control;
3. Date and time of transfer; and
4. Stipulation that the sample has/has not been visibly tampered with.

Remarks should include any exceptions or deviations from normal routine involved with the sample.

If the samples are to be mailed, the Chain-of-Custody document is to be enclosed within the shipping container. In this case, the date and time will be recorded separately to indicate when the package was sealed and when it was opened at the receiving end.

APPENDIX D
to
ATTACHMENT 3

Analytical Methods

LABORATORY SUPPORT FOR ALTERNATIVE GROUND WATER MONITORING PROGRAM AT SPARTON TECHNOLOGY, INC.

Prepared For:

Harding Lawson Associates

Prepared By:

Rocky Mountain Analytical Laboratory
5530 Marshall Street
Arvada, Colorado 80002

May 6, 1985

INTRODUCTION

Rocky Mountain Analytical Laboratory will continue to provide support for the Alternative Ground Water Monitoring Program at Sparton Technology, Inc. The analytical methodologies, sample containers, and preservation techniques used for this program are attached. They represent the current guidelines contained in Federal Register, 40 CFR Part 136, October 26, 1984.

ROCKY MOUNTAIN ANALYTICAL LABORATORY

Inorganic Analytical Methodology

Parameter	Units	Nominal Detection Limit[a]	Methodology	Reference	Preservation Bottle No.	Maximum Holding Time[b]
MAJOR IONS						
Sodium	mg/l	0.5	ICP Emission Spectroscopy	3	4	6 months
Potassium	mg/l	0.3	ICP Emission Spectroscopy	3	4	6 months
Calcium	mg/l	0.1	ICP Emission Spectroscopy	3	4	6 months
Magnesium	mg/l	0.1	ICP Emission Spectroscopy	3	4	6 months
Chloride	mg/l	3	Manual Titrimetric, $Hg(NO_3)_2$	1-325.3/2-407B	1	28 days
			Automated Colorimetric Ferricyanide	1-325.2	1	28 days
Fluoride	mg/l	0.1	Electrode	1-340.2/2-413B	1	28 days
Sulfate	mg/l	5	Manual Turbidimetric	1-375.4/2-426C	1	28 days
			Automated Colorimetric MTB	1-375.2	1	28 days
Total Alkalinity as $CaCO_3$ at pH 4.5	mg/l	5	Titrimetric	1-310.1/2-403	1	14 days
Carbonate Alkalinity as $CaCO_3$ at pH 8.3	mg/l	5	Titrimetric	1-310.1/2-403	1	14 days
Bicarbonate Alkalinity as $CaCO_3$ at pH 4.5	mg/l	5	Titrimetric	1-310.1/2-403	1	14 days
Hydroxide Alkalinity as $CaCO_3$	mg/l	5	Calculation	2-403	-	-
Nitrate+Nitrite as N	mg/l	0.1	Manual Cd Reduction - Colorimetric	1-353.3/2-418C	2	28 days
		0.1	Automated Cd Reduction - Colorimetric	1-353.2	2	28 days
Total Cations	meq/l	0.1	Calculation	2-104C	-	-
Total Anions	meq/l	0.1	Calculation	2-104C	-	-
Difference	%	0.1	Calculation	2-104C	-	-
RADIOCHEMISTRY						
Gross Alpha	pCi/l	0.1	Proportional Counter	2-703	5	6 months
Gross Beta	pCi/l	0.1	Proportional Counter	2-703	5	6 months
Radium 226	pCi/l	0.1	Separation - Counter	2-705	5	6 months
Radium 228	pCi/l	0.1	Separation - Counter	2-707	5	6 months
Uranium	mg/l	0.005	Fluorimetric	4-D2907-75	5	6 months

ROCKY MOUNTAIN ANALYTICAL LABORATORY

Inorganic Analytical Methodology (Continued)

Parameter	Units	Nominal Detection Limit[a]	Methodology	Reference	Preservation Bottle No.	Maximum HoldingTime[b]
TRACE METALS[c]						
Aluminum	mg/l	0.05	ICP Emission Spectroscopy	3	4	6 months
Antimony	mg/l	0.002	Furnace Atomic Absorption	1-204.2	4	6 months
Arsenic	mg/l	0.002	Furnace Atomic Absorption	1-206.2	4	6 months
Barium	mg/l	0.005	ICP Emission Spectroscopy	3	4	6 months
Beryllium	mg/l	0.001	ICP Emission Spectroscopy	3	4	6 months
Boron	mg/l	0.004	ICP Emission Spectroscopy	3	4	6 months
Cadmium	mg/l	0.002	ICP Emission Spectroscopy	3	4	6 months
Chromium	mg/l	0.005	ICP Emission Spectroscopy	3	4	6 months
Cobalt	mg/l	0.003	ICP Emission Spectroscopy	3	4	6 months
Copper	mg/l	0.002	ICP Emission Spectroscopy	3	4	6 months
Iron	mg/l	0.05	ICP Emission Spectroscopy	3	4	6 months
Lead	mg/l	0.025	ICP Emission Spectroscopy	3	4	6 months
		0.001	Furnace Atomic Absorption	1-239.2	4	6 months
Manganese	mg/l	0.005	ICP Emission Spectroscopy	3	4	6 months
Mercury	mg/l	0.0002	Cold Vapor Atomic Absorption	1-245.1	4	6 months
Molybdenum	mg/l	0.005	ICP Emission Spectroscopy	3	4	6 months
Nickel	mg/l	0.01	ICP Emission Spectroscopy	3	4	6 months
Selenium	mg/l	0.002	Furnace Atomic Absorption	1-270.2	4	6 months
Silver	mg/l	0.003	ICP Emission Spectroscopy	3	4	6 months
Strontium	mg/l	0.005	ICP Emission Spectroscopy	3	4	6 months
Thallium	mg/l	0.002	Furnace Atomic Absorption	1-279.2	4	6 months
Tin	mg/l	0.03	ICP Emission Spectroscopy	3	4	6 months
Titanium	mg/l	0.002	ICP Emission Spectroscopy	3	4	6 months
Vanadium	mg/l	0.002	ICP Emission Spectroscopy	3	4	6 months
Zinc	mg/l	0.004	ICP Emission Spectroscopy	3	4	6 months
INORGANIC PARAMETERS						
pH	units	0.01	Meter	1-150.1; 2-423	1	ASAP
Specific Conductance at 25°C	umhos/cm	1	Bridge	1-120.1; 2-205	1	28 days
Total Dissolved Solids	mg/l	10	Gravimetric, 180°C	1-160.1; 2-209B	1	7 days
Total Suspended Solids	mg/l	2	Gravimetric, 105°C	1-160.2	1	7 days
Total Solids	mg/l	10	Gravimetric, 105°C	1-160.3	1	7 days
Total Volatile Solids	mg/l	10	Gravimetric, 550°C	1-160.4	1	7 days
Ortho-Phosphate as P	mg/l	0.01	Single Reagent Colorimetric	1-365.2; 2-424F	1	48 hours

ROCKY MOUNTAIN ANALYTICAL LABORATORY

Inorganic Analytical Methodology (Continued)

Parameter	Units	Nominal Detection Limit[a]	Methodology	Reference	Preservation Bottle No.	Maximum Holding Time[b]
INORGANIC PARAMETERS (Continued)						
Total Phosphorus as P	mg/l	0.06	Digestion; ICP Emission Spectroscopy	1-4.1.4; 3	4	28 days
		0.01	Digestion - Colorimetric	1-365.2; 1-424C,F	2	28 days
Silica as SiO_2	mg/l	0.1	ICP Emission Spectroscopy	3	4	28 days
	mg/l	1	Colorimetric	1-370.1; 2-425C	1	28 days
Biological Oxygen Demand	mg/l	2	Dilution Bottle - D.O. Probe	1-405.1; 2-507	1	48 hours
Chemical Oxygen Demand	mg/l	5	Micro Colorimetric	1-410.4; 2-508A	2	28 days
Total Organic Carbon	mg/l	0.1	Oxidation-Infrared Absorption	1-415.1; 2-505	2	28 days
Ammonia as N	mg/l	0.1	Electrode	1-350.3; 2-417E	2	28 days
		0.1	Automated Colorimetric	1-350.1	2	28 days
Total Kjeldahl Nitrogen as N	mg/l	0.1	Digestion - Electrode	1-351.4; 2-420B	2	28 days
		0.1	Digestion - Colorimetric	1-351.2	2	28 days
Total Organic Nitrogen as N	mg/l	0.1	Calculation (TKN - NH_3)	-	-	-
Oil and Grease	mg/l	1	Freon Extraction-Gravimetric	1-413.1; 2-503A	3	28 days
Free Cyanide	mg/l	0.01	Chlorination-Distillation-Colorimetric	1-335.1; 2-412F,D	6	14 days
Total Cyanide	mg/l	0.01	Distillation - Colorimetric	1-335.2; 2-412B,D	6	14 days
Phenolics	mg/l	0.01	Distillation - Colorimetric	1-420.1; 2-510A,B	2	28 days
Fecal Coliform	Colonies/100 ml	1	Membrane Filter	2-909C	8	ASAP
Total Coliform	Colonies/100 ml	1	Membrane Filter	2-909A	8	ASAP
Bromide	mg/l	0.1	Colorimetric	2-405	1	28 days
Residual Chlorine	mg/l	0.05	Amperometric	1-330.2; 2-408C	1	ASAP
Hexavalent Chromium	mg/l	0.01	Colorimetric	1-218.4; 2-312B	1	24 hours
Color	units	5	Pt-Co Colorimetric	1-110.2; 2-204A	1	48 hours
Hardness as $CaCO_3$	mg/l	5	Calculation	2-314A	4	6 months
Nitrite as N	mg/l	0.01	Colorimetric	1-354.1; 2-419	1	48 hours
Sulfide	mg/l	0.05	Titrimetric - Electrode	1-376.1; 2-427B,D	7	7 days
Sulfite	mg/l	2	Titrimetric	1-377.1; 2-428	1	ASAP
MBAS (Surfactants)	mg/l	0.1	Colorimetric	1-425.1; 2-512A	1	48 hours
Turbidity	NTU	0.1	Turbidimeter	1-180.1; 2-214A	1	48 hours

ROCKY MOUNTAIN ANALYTICAL LABORATORY

Inorganic Analytical Methodology (Continued)

References

(1) "Methods for Chemical Analysis of Water and Wastes", EPA-600/4-79-020, EMSL, Cincinnati, 1979.

(2) "Standard Methods for the Examination of Water and Wastewater", 15th Edition, APHA, 1980.

(3) Federal Register, 40 CFR 136, December 3, 1979; USEPA EMSL-Cincinnati, OH 45268.

(4) "Annual Book of ASTM Standards", Part 31, Water, 1980.

Notes

[a] Nominal values are the best achievable with the listed analytical method. Interferences in specific samples may result in a higher detection limit.

[b] Applicable to NPDES wastes as updated by Robert C. Booth, Director, EMSL-Cincinnati, September 22, 1981.

[c] Digestion procedure 1-4.1.4 used for elements determined by ICP Emission Spectroscopy when determining total metals. Digestion procedures for graphite furnace elements included with reference listed.

11/10/82

GUIDELINES FOR SAMPLE BOTTLES AND PRESERVATIVES[a]

Bottle No.	Parameters	Container	Preservative	Notes
1	Cl^-, F^-, $SO_4^=$, Tot. Alk., $CO_3^=$ Alk., HCO_3^- Alk., OH^- Alk., pH, spec. cond., TDS, TSS, TS, TVS, o-PO_4 SiO_2, BOD, Br^-, res. Cl_2, Cr^{+6}, color, NO_2^-, $SO_3^=$, MBAS, Turbidity.	1 liter poly	4° C	Provide unfiltered sample for solids and turbidity.
2	Tot. P, COD, TOC, NH_3, TKN, TON, Phenolics NO_3 + NO_2.	500 ml poly	2 ml 50% H_2SO_4, 4°C	
3	O & G	1 liter glass	4 ml 50% H_2SO_4, 4°C	Do not filter, collect directly in bottle.
4	Na, K, Ca, Mg, Al, Sb, As, Ba, Be, B, Cd, Cr, Co, Cu, Fe, Pb, Mn, Hg, Mo, Ni, Se, Ag, Sr, Tl, Sn, Ti, V, Zn, ICP, Hardness.	500 ml poly	5 ml 50% HNO_3	Provide separate samples for total and dissolved sample (filter before adding to bottle.)
5	Alpha, Beta, Ra^{226}, Ra^{228}, U	1 liter poly (no Ra^{228}) ½ gallon poly (with Ra^{228})	10 ml 50% HNO_3 20 ml 50% HNO_3	
6	Free CN, Tot. CN	500 ml poly	2 ml 50% NaOH, 4°C	
7	Sulfide	250 ml poly	1 ml 1 N Zn acetate, 1 ml 50% NaOH, 4°C	
8	Fecal coli., total coli.	8 oz. sterile	4° C	Collect directly in sterile bottle
11	VOA, purgeable organics, THM	2 - 40 ml glass vial	4° C	Completely fill bottle, leave no air bubbles.
12	B/NA	1 liter glass	4° C	
13	Pest./PCB	1 liter glass	4° C	
14	Herbicides	1 liter glass	4° C	
15	TOX	1 liter glass	4° C	

[a]Federal Register, 40 CFR 136, December 3, 1979, as updated by EPA, EMSL-Cincinnati, September 22, 1981.

11/5/82

ROCKY MOUNTAIN ANALYTICAL LABORATORY

Organic Analytical Methodology

Parameter	Units	Nominal Detection Limit[a]	Methodology	Reference[1]	Preservation Bottle No.	Maximum Holding Time[b]
Purgeables	ug/l	1	Purge & Trap GC/MS	624	11	14 days
Base/Neutrals	ug/l	10	Extraction/GC/MS	625	12	7 days/40 days
Acids	ug/l	10	Extraction/GC/MS	625	12	7 days/40 days
Organochlorine Pesticides/PCB's	ug/l	0.01	Extraction/GC/ECD	608	13	7 days/40 days
		10	Extraction/GC/MS	625	12	7 days/40 days
Phenoxy Herbicides	ug/l	0.01	Extraction/GC/ECD	(2)	14	7 days/40 days
Total Organic Halogen (TOX)	ug/l	5	Adsorbtion/Coulometric	450.1(3)	15	-
Trihalomethanes (THM)	ug/l	1	Extraction/GC/ECD	(4)	11	14 days
		1	Purge & Trap GC/MS	(4)	11	14 days
Dioxin	ug/l	0.005	Extraction/GC/MS/ECD	613	16	7 days/40 days
Purgeable Halocarbons	ug/l	0.01	Purge & Trap/GC/Hall	601	11	14 days
Purgeable Aromatics	ug/l	1	Purge & Trap/GC/PID	602	17	14 days
Acrolein & Acrylonitrile	ug/l	100	Purge & Trap/GC/FID	603	18	14 days
Phenols by GC	ug/l	10	Extraction/GC/FID	604	16	7 days/40 days
Benzidines	ug/l	0.1	Extraction/HPLC	605	19	7 days/40 days
Phthalate Esters	ug/l	10	Extraction/GC/FID	606	12	7 days/40 days
Nitrosamines	ug/l	1	Extraction/GC/NPD	607	20	7 days/40 days
Nitroaromatics/isophorone	ug/l	1	Extraction/GC/FID & GC/ECD	609	12	7 days/40 days
Polynuclear Aromatics	ug/l	0.5	Extraction/HPLC	610	20	7 days/40 days
Haloethers	ug/l	1	Extraction/GC/Hall	611	17	7 days/40 days
Chlorinated Hydrocarbons	ug/l	0.02	Extraction/GC/ECD	612	12	7 days/40 days
Organophosphorus Pesticides	ug/l	0.1	Extraction/GC/NPD	622(5)	12	7 days/40 days
Triazine Pesticides	ug/l	0.1	Extraction/GC/NPD	(6)	12	7 days/40 days

References

(1) Federal Register, Vol. 44, No. 233, Monday, December 3, 1979.
(2) "Method for Chlorinated Phenoxy Acid Herbicides in Industrial Effluents," Federal Register, Vol. 38, No. 75, Part II.
(3) "Total Organic Halide," US EPA-EMSL, Cincinnati, November, 1980.
(4) Federal Register, Vol. 44, No. 231, Thursday, November 29, 1979, Appendix, Part I.
(5) "Method 622- Organophosphorus Pesticides," Proposed EPA Method, 304 (h) Committee.
(6) Federal Register, Vol. 38, No. 75, 1973.

Notes

[a] Nominal values are the best achievable with the listed analytical method for a typical component. Interferrences in specific samples may result in a higher detection limit.

[b] Applicable to NPDES Wastes as updated by Robert C. Booth, Director, EMSL-Cincinnati, September 22, 1981. Where two times are given, the first refers to the time to extraction, the second to the time of instrumental analysis.

ROCKY MOUNTAIN ANALYTICAL LABORATORY

Organic Analytical Methodology (continued)

Preservation Bottle No.	Parameter Group	Bottle	Preservation
11	Purgeables	40 ml glass with teflon lined silicone septum cap	4°C (thiosulfate if Cl_2 present)
17	Purgeables	40 ml glass with teflon lined silicone septum cap	4°C, HCl to pH less than 2 (thiosulfate if Cl_2 present)
18	Purgeables	40 ml glass with teflon lined silicone septum cap	4°C, adjust pH to 4 - 5 (thiosulfate if Cl_2 present)
16	Extractables	1 liter glass with teflon lined cap	4°C (thiosulfate if Cl_2 present)
19	Extractables	1 liter glass with teflon lined cap	4°C, adjust pH to 2 - 7 (thiosulfate if Cl_2 present)
12, 13, 14	Extractables	1 liter glass with teflon lined cap	4°C
20	Extractables	1 liter glass with teflon lined cap	4°C, store in dark (thiosulfate is Cl_2 present)
15	TOX	250 ml glass with teflon lined cap, single 1 liter glass with teflon lined cap, quad.	4°C, store in dark (thiosulfate if Cl_2 present)

LABORATORY SUPPORT FOR VADOSE ZONE STUDIES AT SPARTON TECHNOLOGY, INC.

Prepared For:

Harding Lawson Associates

Prepared By:

Rocky Mountain Analytical Laboratory
5530 Marshall Street
Arvada, Colorado 80002

May 6, 1985

INTRODUCTION

As part of a closure plan at Sparton Technologies' Albuquerque, New Mexico facility, an extensive analytical program will be conducted to accomplish the following:

- Task 1, provide detailed characterization of soil samples obtained from a series of soil borings for selected metal and volatile organic compounds, and

- Task 2, determine the amount of water required to remove the contaminants from the vadose zone by performing a column leaching study.

Characterization of the soil cores in Task 1 will be to analyze the samples for total metals, EP Toxicity metals, volatile organics, and total organic halogen (TOX). The total metals analyses will be for chromium, cadmium, lead, and nickel. The EP toxicity tests will be for metals detected as total metals. Analysis for EP chromium will always include trivalent chromium and hexavalent chromium. Samples with detectable TOX will be analyzed for the following four organic compounds: 1,1-Dichloroethylene, Methylene chloride, 1,1,1-Trichloroethane and Trichloroethylene. One sample per boring will be analyzed for the volatile priority pollutants plus acetone as shown in Table 1. The column leaching studies in Task 2 will be oriented to the same list of parameters in Task 1.

Subsequent sections of this document provide additional information concerning the analytical methods as well as supporting information.

TABLE I - SOIL DETECTION LIMITS FOR VOLATILE ORGANICS GC/MS

Parameter		Units	Detection Limit
1V	Acrolein	ug/kg	100
2V	Acrylonitrile	ug/kg	100
3V	Benzene	ug/kg	5
5V	Bromoform	ug/kg	5
6V	Carbon tetrachloride	ug/kg	5
7V	Chlorobenzene	ug/kg	5
8V	Chlorodibromomethane	ug/kg	5
9V	Chloroethane	ug/kg	10
10V	2-Chloroethylvinyl ether	ug/kg	5
11V	Chloroform	ug/kg	5
12V	Dichlorobromomethane	ug/kg	5
14V	1,1-Dichloroethane	ug/kg	5
15V	1,2-Dichloroethane	ug/kg	5
16V	1,1-Dichloroethylene	ug/kg	5
17V	1,2-Dichloropropane	ug/kg	5
18V	1,3-Dichloropropylene(c&t)	ug/kg	5
19V	Ethylbenzene	ug/kg	5
20V	Methylbromide	ug/kg	10
21V	Methylchloride	ug/kg	10
22V	Methylene chloride	ug/kg	10
23V	1,1,2,2-Tetrachloroethane	ug/kg	5
24V	Tetrachloroethylene	ug/kg	5
25V	Toluene	ug/kg	5
26V	1,2-trans-Dichloroethylene	ug/kg	5
27V	1,1,1-Trichloroethane	ug/kg	5
28V	1,1,2-Trichloroethane	ug/kg	5
29V	Trichloroethylene	ug/kg	5
31V	Vinyl chloride	ug/kg	10
	Acetone	ug/kg	10

BDL = Below detection limit.

TECHNICAL APPROACH

This section describes in detail the specific technical approach which will be utilized, especially for Tasks 2 and 3. Information about the analytical methodology will be presented in a subsequent section.

Task 1 - Soil Core Characterization

This task is to analyze soil cores for specific contaminants. All analyses will be in accordance with standard EPA Methodology referenced in SW-846 as shown below:

Total Metals	- EPA Method 6010
EP Toxicity Metals	- EPA Method 1310
Hexavalent Chromium	- EPA Method 7196
Volatile Organics	- EPA Method 8240
Total Organic Halogen	- EPA Method 9020
Volatile Halocarbons	- EPA Method 8010

Task 2 - Column Leaching Study

For this study, two 12" x 3" columns will be packed with contaminated soil. One column will be for inorganic constituents and one for organic constituents. Local source water will be used to leach the contaminants from the soil. Gravity head pressure will be used to elute each column. If required, the columns will be pressurized to generate a minimum column flow of 20 ml/hour. The column pore volume is estimated to be 500 ml. During the initial phase of the study, samples will be collected every 200-250 ml. Once breakthrough has occurred, the sampling frequency will decrease.

For the inorganic column study, 100 ml samples will be collected and analyzed for chromium, lead and hexavalent chromium.

The collection of column leachates for volatile organics represents a significant analytical challenge. RMAL proposes to collect the samples with in-line charcoal filters. Back up samples would be collected in collapsed Tedlar bags and then transferred to standard VOA glass vials for longer storage. The charcoal samples will be analyzed for TOX and/or specific chlorinated species.

The TOX measurement would be according to standard practice with the charcoal analyzed directly. For the detailed organic speciation, a sample preparation step would be required prior to analysis. Specific organic compounds would be determined on a benzene extract of the charcoal using the GC/HECD conditions in EPA Method 601 as described previously.

Approximately 30-50 ml of sample will be be required for each analysis. Two charcoal tubes would be collected sequentially, one for the TOX analysis and one reserved for organic compound speciation.

The metals and TOX analyses will be performed on a daily basis to establish breakthrough curves. After breakthrough has been established for the organics, but prior to completion of the test, selected samples will be analyzed for specific organics to verify the TOX results.

ANALYTICAL METHODOLOGY

All samples analyses will be in accordance with standard EPA Methodology as published in SW-846. The discussion below highlights the application of these methods.

Total Metals

The samples (soils and batch/column leachates) will be digested using SW-846 Method 3050. The digestate will then be analyzed by inductively coupled argon plasma spectrometry (ICP) using SW-846 Method 6010. A Jarrell-Ash Model 9000 ICP will be used for the determinations.

EP Toxicity Metals

SW-846 Method 1310 will be used to generate a leachate. The leachate will be analyzed for metals by SW-846 Method 6010 as described above and for hexavalent chromium using SW-846 Method 9030.

Total Organic Halogen

Total organic halogen (TOX) determinations of column leachate samples will be analyzed as specified in SW-846 Method 9020. This method does not address the analysis of soil samples for TOX. RMAL has developed a procedure in which an aliquot of the soil sample is extracted with methanol. The methanol extract is then injected into the TOX instrument. The detection limit for this procedure is 50 mgCl^-/kg.

An alternative approach involves extracting a 10 g aliquot of soil with 10 ml hexane. One milliliter of this extract is then combusted in an oxygen atmosphere in a combustion bomb. The combustion products are collected in a weak carbonate/bicarbonate trapping solution. This solution is then analyzed using ion chromatography as outlined in EPA Method 300.0.[1] The detection limit for this procedure after optimization will be 1 mgCl^-/kg.

Note: Since this printing, the methanol extract method has been demonstrated to be most reliable. Detection limit is 2 mgCl^-/kg.

[1]"Methods for Chemical Analysis of Water and Waste", EPA-600/4-79-020, EMSL, Cincinnati, 1979.

Hexavalent Chromium

Hexavalent chromium in leachate samples will be measured by a colorimetric method in SW-846, Method 7196.

Volatile Organics Scan

Soil and selected batch leachate samples will be analyzed for the complete list of volatile priority pollutants and acetone using a purge and trap GC/MS method in SW-846, Method 8240. Aqueous samples can be purged directly as specified in SW-846 Method 5030. Soil samples will require a preliminary extraction with tetraglyme, as specified in Method 8240, prior to analysis.

Volatile Halocarbons

Batch and column leachate samples will be analyzed for selected chlorinated volatile species using SW-846 Method 8010. This method is a purge and trap GC method similar to Method 8240, but uses a chlorine specific detector, the Hall electroconductivity detector (HECD), rather than a mass spectrometer for identification and quantification of the organic species.

SAMPLE COLLECTION AND PRESERVATION

The procedures for the collection, field preparation, containerization, preservation and shipment of samples will be discussed below. The sample collection procedures are as important as the analytical procedures in producing meaningful data.

For soil and sludges with no free water, a 1-quart glass bottle (Teflon-lined cap) is adequate for all organic and inorganic tests except VOA's. One separate VOA vial should be also collected per sample. These samples are best composited in a stainless steel bucket using a stainless trowel for mixing. Compositing should be done expeditiously to minimize loss of volatiles. After compositing samples with no free oil, the bucket is best wiped out between samples with clean paper towels. Samples with free oil may coat the bucket with oil. Hexane followed by methanol can remove oil. The use of solvents should be considered only as a last resort.

Two special samples will be required for the batch and column leaching studies. A one to two gallon sample of contaminated soil will be collected by compositing appropriate core samples in a stainless steel bucket as described previously. This composite will be stored in clean metal cans which will be sealed with a Teflon liner. The containers should be filled completely to minimize headspace and resulting loss of volatiles. In addition to this bulk soil sample, a large quantity (15 to 20 gallons) of uncontaminated groundwater will be needed. This water will be collected in one gallon bottles and stored in RMAL's 4°C storage area.

RMAL will provide all sample bottles packed in coolers with foam wrapping. A packing list and chain-of-custody form will accompany each cooler. The bottles will be shipped out by UPS in advance of the sampling start date. Extra bottles will be sent to cover breakage during shipping or handling in the field.

The coolers will be sealed with nylon filament tape. The coolers should be sealed with tape in the field after sample collection. All samples should be shipped by air express next day delivery to RMAL. The coolers will be opened, the custody verified and the samples logged into the RMAL computer for sample tracking. The RMAL facility is always locked and has a 24 hour-a-day monitored security system. All windows and doors have intrusion detection bugs.

In addition to the sample bottles for the field samples, some column leachate samples will be collected in Tedlar bags. Tedlar is a polyvinylfluoride film with very low permeability for organic species.

APPENDIX E
to
ATTACHMENT 3

Monitoring Well Plugging
and Abandonment Procedures

APPENDIX E

MONITORING WELL PLUGGING AND ABANDONMENT PROCEDURES

I Introduction

Three monitoring wells (MW1, MW3, and MW11) will be plugged and abandoned prior to initiation of closure of the pond and sump area.

II Abandonment Methodology

Two well abandonment methodologies are being considered. The final choice will be based on the equipment and capabilities of the drilling contractor selected.

A. Method A

Prior to excavation of the surface impoundment, the steel protector pipes and concrete collars of the three monitoring wells will be removed and discarded. A drilling rig will be located over the existing monitoring well, and the casing and screen will be filled with a bentonite slurry. A mills knife, or a pneumatic or mechanical device, will be used to cut or fracture the casing so that the bentonite will invade the surrounding formation outside the casing.

The bentonite will be allowed to settle for at least 12 hours, and the remainder of the boring will be filled with a neat grout and bentonite mixture to the land surface.

B. Method B

Method B is similar to Method A except that the casing and well annulus will be drilled out using stringer to guide the drill bit down the well casing.

III Record Filing

A record of each well plugged and abandoned will be filed with the State Engineer.

APPENDIX F
to
ATTACHMENT 3

Model Safety Plan Outline

Harding Lawson Associates

JOB SAFETY PLAN

Part 1 - Site Information

1. Site: Sparton Technology, Inc. 2. Job No.: 6310,023.12
3. Location: 9621 Coors Road N.W., Albuquerque, New Mexico 87103
4. Plan Prepared By: H. A. Wood Date: August 20, 1985
5. Plan Approved By: Thomas S. Burger Date: August 20, 1985
6. Plan Revised: February 18, 1986 7. Approved: February 18, 1986
8. Facility Description: Electronics manufacturing facility with lagoon and drum storage of hazardous wastes.
9. Status (active, inactive, unknown): Active electronics manufacturing
10. Unusual Features (dike integrity, powerlines, etc.): Waste discharge lines, fences, gas lines, outside fences.
11. History (injuries, exposures, complaints): Old drum area used 1981, sump closed 1980, two ponds and two drum storage areas used 1980 to present
12. Surroundings (location with respect to residences, businesses, natural features): Facility is on State Highway 448 about 0.5 mile south of Alameda Airport, 0.5 mile west of Rio Grande River. Commercial/unimproved land use, low density pop.
13. Site Sketch (attach sketch showing salient features) Plates 1, 2, 3, & 4
14. Climate: Strong daytime heating, cool nights, wide daily temperature range. Summers fair, dry, sunny, hot. Winters cold to warm, some snow.

a) average wind speed and direction: Prevailing winds are January N or SE; July mostly SE; Annual average SE and NW.

b)

	July	October	January	April
mean high temperature	90		45	
mean low temperature	60		20	

15. Hazardous Material Type: X Liquid X Solid X Sludge X Gas/Vapor __Other
16. Hazardous Material Characteristics: __Corrosive * Ignitable * Toxic __Volatile __Reactive __Radioactive __Carcinogenic __Other

* If in pure form. Hazardous materials expected to be encountered in the field will be unsaturated and saturated soils with trace (ppm) contamination.

17. Chemical Information Summary

The chemicals listed below might be encountered at the site during field exploration. Appendix A presents detailed summary information for each chemical listed.

m-Xylene
o,p-Xylene
Boron
Chromium
Manganese
Nickel
Sodium
Ethyl Benzene
Methyl Chloride
Methylene Chloride
1,1,2,2-Tetrachloroethane
Tetrachloroethylene
Toluene
1,2-Dichloroethylene
1,1,1-Trichloroethane
1,1,2-Trichloroethane
Trichloroethylene
Acetone
Benzene
Chlorobenzene
Chloroform
1,1-Dichloroethane
Trichlorotriflouroethane
1,1-Dichloroethylene

Task Description: FIELD EXPLORATION (TEST BORINGS)

Task Name:

18. ANALYSIS OF KNOWN OR SUSPECTED UNMITIGATED HAZARDS		19. RISK ANALYSIS		
Hazard Type	How Does Hazard Exist?	Expos	Prob	Conseq
Mechanical	Drill rig and associated equipment	Cont	Unu	Min to Fatal
Electrical	Active Plant Site	Occ	Unu	Chron to Fatal
Chemical	Ingestion Inhalation Skin Contact Eye Contact	Cont	Like	Mod to Fatal
Temperature	If personal protective equipment is worn, special consideration to heat stress	Cont	Like	Min to Fatal
Acoustical	N/A			
Radioactive	N/A			
O2 Deficiency	N/A			
Biohazard	N/A			

Expos: Frequency of exposure to the hazard event
- cont - many times per day
- freq - once or twice per day
- occ - once a week or month
- seld - once a month or year

Prob: Liklihood that an injury will occur upon exposure
- cert - certain
- like - 50/50 chance
- unu - unusual
- imp - improbable

Conseq: Degree of injury if one occurs
- fatal - fatality
- ser - serious, requires hospitalization
- mod - moderate, requires out-patient care
- min - requires on-site first aid
- chron - chronic, no acute affects

20. MITIGATION MEASURES	REQUIRED PERSONAL PROTECTIVE EQUIPMENT	
Define work areas Wear hard hat, steel toe and shank shoes	LEVEL __A __B XX C __D	
Have all lines identified and marked	Head: Hard Hat	Eye/Face: Safety Glasses
PPE in use or available	Hand: Neoprene Gloves	Body: Tyvek Impermeable (2)
Air monitoring during work (See Below)	Lung: (2) 1/2 Face Respirator OV cartridge with dust filter	Ear: Equipment operators use plugs if needed
Hard hat, gloves, eye protection and foot protection to be worn as necessary (i.e., equipment operators use all, soil handlers use gloves and glasses, observers use glasses). Tyvek suits and respirators to be work above action levels presented below.	Foot: Steel toe/Steel shank boots	
	Special Equipment Required:	

Special Procedures Required:

1.) Underground natural gas line to be removed by client prior to any drilling or excavation in pond and sump area.

2.) Workplace to be monitored by HNU Meter Model II 101 with 11.7 or 10.2 ev probe.

- respirator action level = 5 ppm
- tyvek suit action level = 5 ppm
- evacuation action level = 50 ppm

21. Required Personal Protective Equipment

Task: Field Exploration

Level: ___A ___B X C ___D

Head

X Hardhat

Eye/Face

X Safety Glasses ___ Face Shield
___ Goggles

Hand

X Neoprene ___ Nitrile X PVC
___ Viton ___ Underglove ___ Other: _____

Body

___ Full Encapsulating Suit: _____

___ Two Piece Rainsuit, Material = _____

___ One Piece Splash Suite, Material = _____

X Tyvek Suit* ___Tyvek/Saranax Suit ___ Tyvek/Polyethylene Suit

___ Cloth Coveralls X Other: Standard Work Clothes

Lung

___ SCBA (open circuit, pressure demand): _____

___ Full Face Respirator, cartridge = _____

X Half Mask Respirator, *cartridge = Organic Vapor (OV) or OV & Acid Gas; each with dust filter

___ Other: _____

Ear

X Earplug, type = discretionary

___ Earmuff, type = _____

Foot

X Boots, type = Steel toe and Shank

___ Disposable Overboots, type = _____

22. Special Equipment, Facilities, or Procedures:

Refer to Items 20, 23, and 28.

No smoking or eating within work areas.

All personnel working on site will be briefed on the safety procedures established by this plan.

* To be used if deemed appropriate by site safety officer in accordance with Item 20 of the Safety Plan.

23. Decontamination Procedures: Seal all drill holes with a cement/bentonite grout. Decon of personnel and equipment per Attachment 5.

24. Investigation-Derived Material Disposal: Drill cuttings to be stored in drums. Disposal method to be determined based on analysis of soil.

25. Site Resources

Water Supply: Potable water on building wall
Telephone: Carpenters Shop
Radio: Not Required
Other:

26.

Team Member	Responsibility	Date of Safety Training	Date of Physical Exam
Bruce Stearns	Field Engineering Geologist and Safety Officer	May'85	May'85

27. Emergency Telephone Numbers

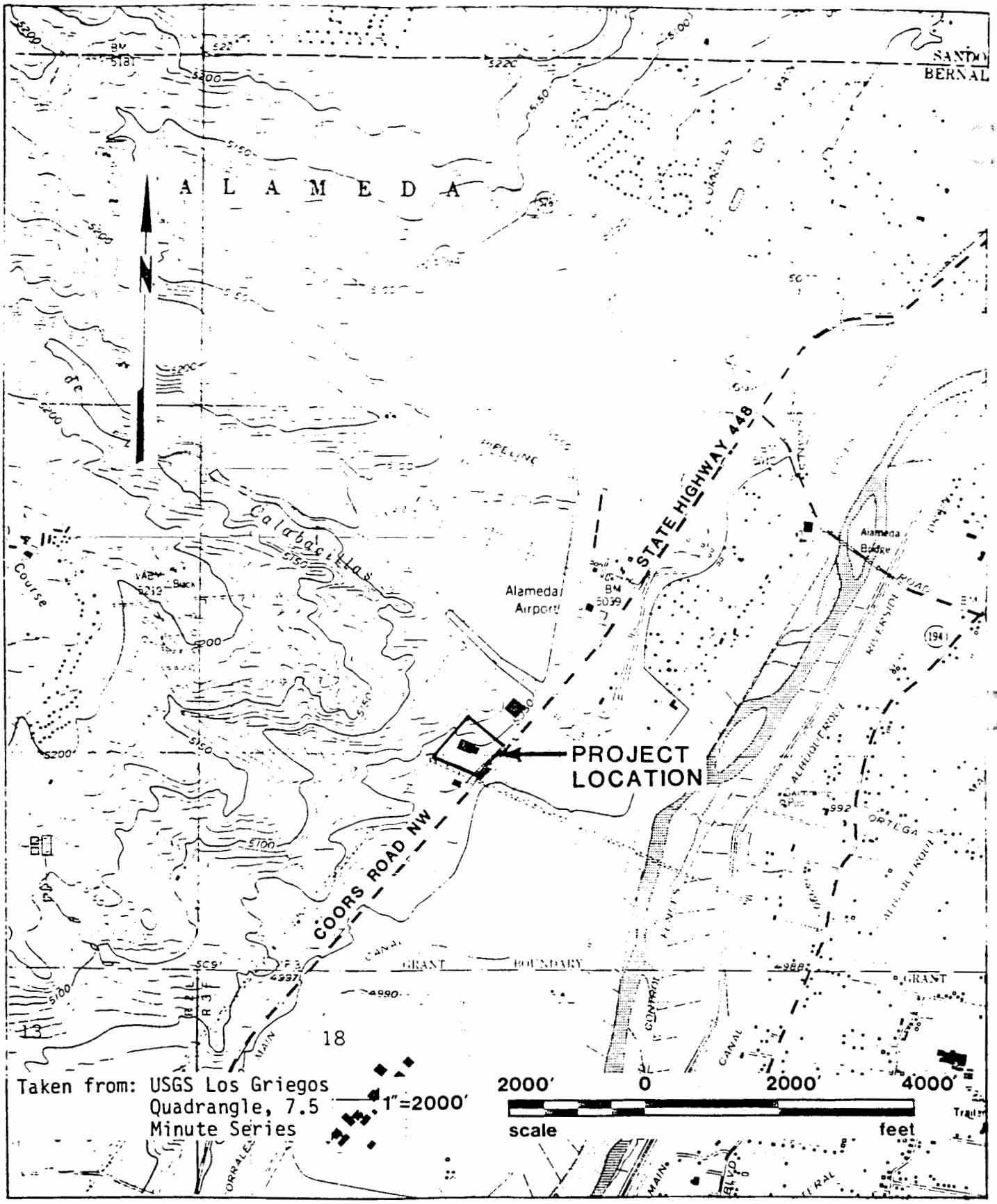
Phone/Radio Location:	Carpenter Shop Ext. # 174 & 172
Ambulance:	765-1100
Hospital Emergency Room:	841-1111
Poison Control Center:	843-2551
Police:	911
Fire Department:	911
Airport:	898-1313 7 Bar Airport 0.5 mile NE
Explosives Unit:	
EPA Contact:	
State Contact:	Ray Krehoff, New Mexico EID (505) 827-2275
Client:	Cleoves Martinez (505) 898-1150

28. Emergency Equipment Location

a. Safety Shower/Eyewash	Portable eyewash at Carpenter Shop, shower/eyewash
b. First Aid Kit	Carpenter Shop in wetroom (Plate
c. Fire Extinguishers	Carpenter Shop and on Drill Rig
d. Other	Fire Hydrant at Coors Road East of Ponds

29. Emergency Routes (give road or other directions; attach map)

Hospital Presbyterian Hospital - Go south on Coors Road, east on Interstate 40 and south on Interstate 25. Exit Grand/Central and turn east on Central Avenue. Immediately look to the south side of Central Avenue to see hospital and emergency ~~Other~~ entrance.



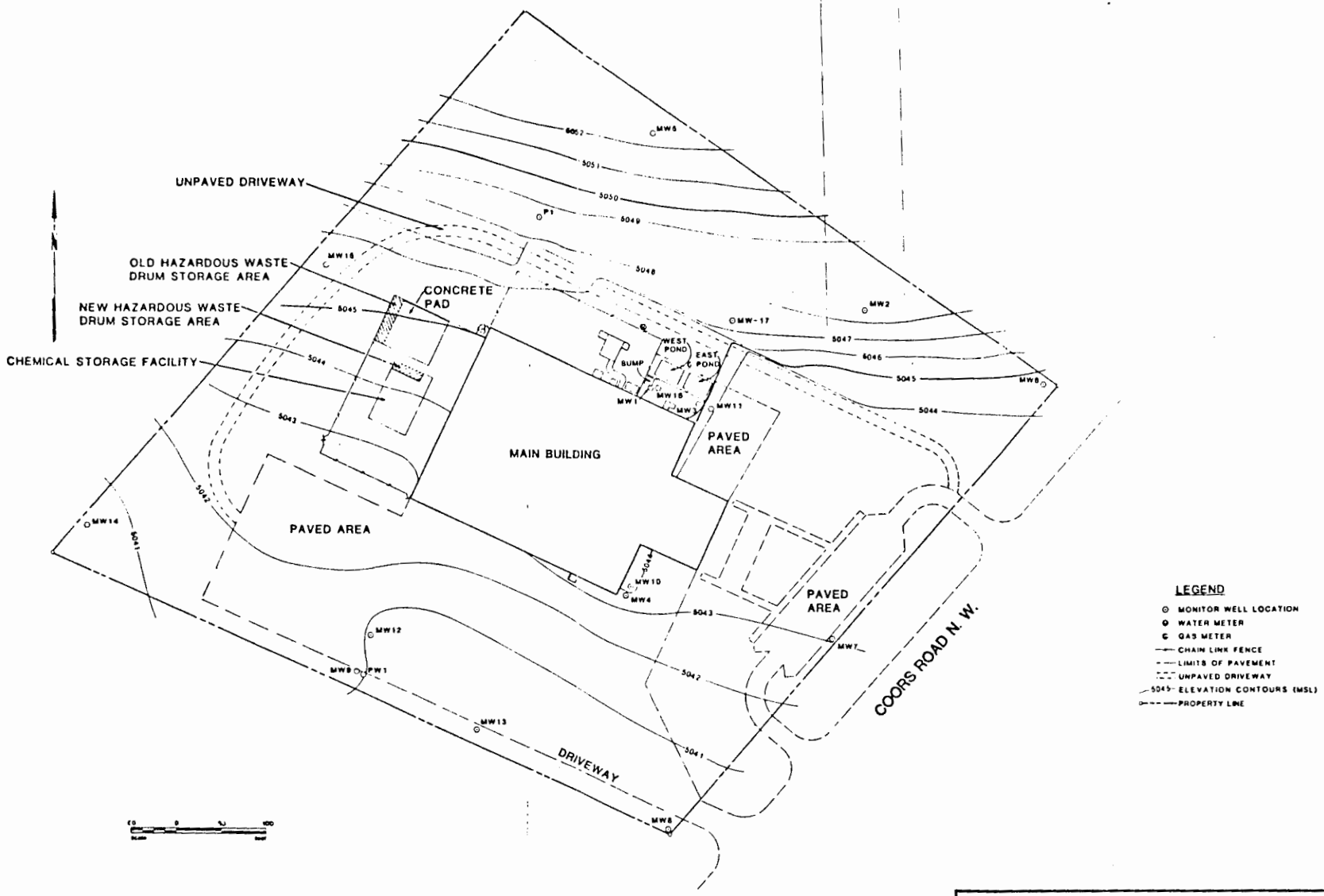
Harding Lawson Associates
Engineers Geologists & Geophysicists

LOCATION MAP

Sparton Technology, Inc.
Albuquerque, New Mexico

1

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
SP	6310,012.12				



LEGEND

- MONITOR WELL LOCATION
- WATER METER
- GAS METER
- CHAIN LINK FENCE
- LIMITS OF PAVEMENT
- UNPAVED DRIVEWAY
- 5045 ELEVATION CONTOURS (MSL)
- PROPERTY LINE

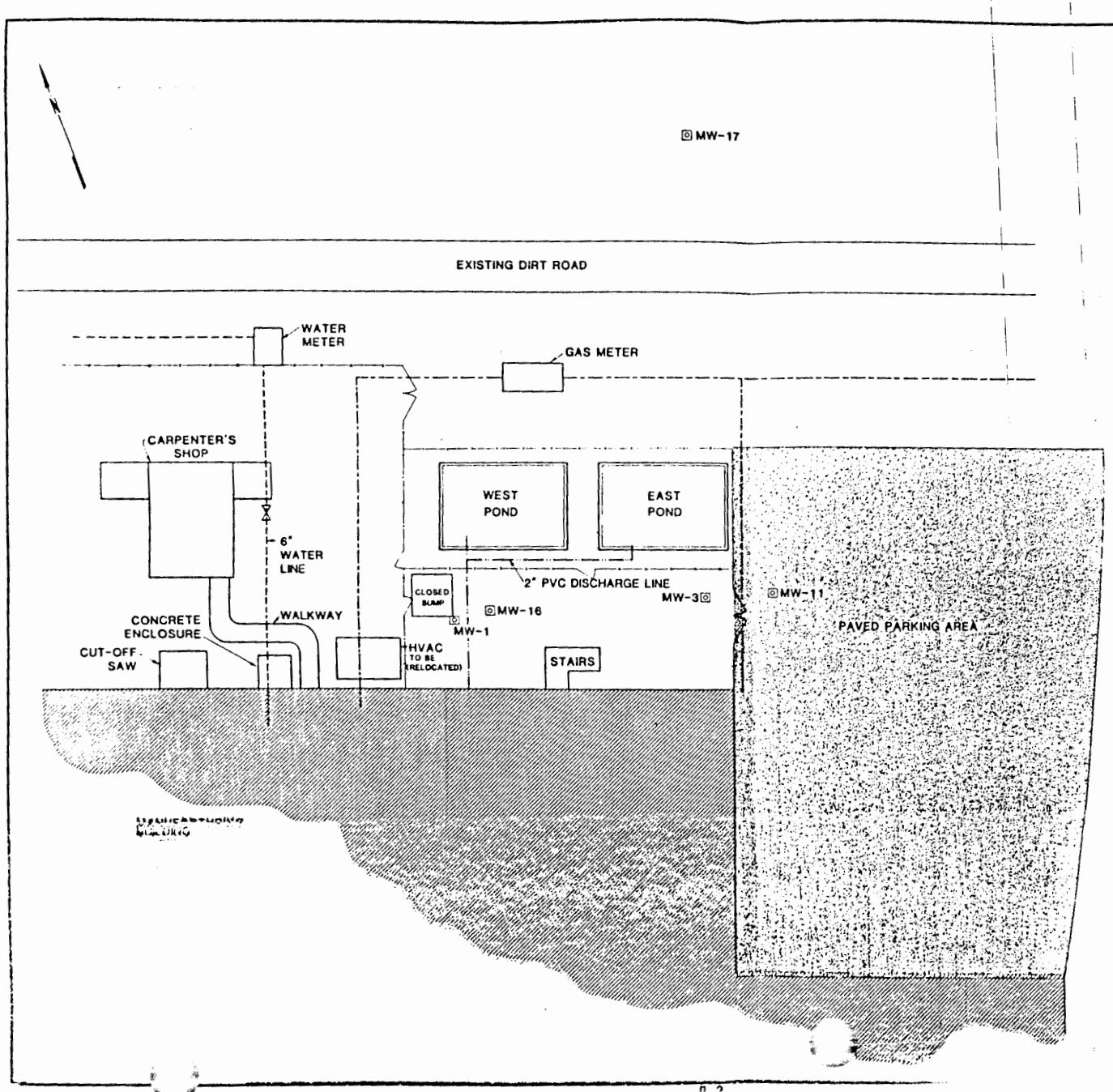
Harding Lawson Associates
Engineers, Geologists & Geophysicists

PLOT PLAN

SPARTON TECHNOLOGY, INC
ALBUQUERQUE, NEW MEXICO

2

MK 8310,012.12



NOTE:

1. All underground line locations are approximate. Field locate prior to excavation.
2. Gas line and meter to be relocated.
3. MW-1, MW-3, MW-11, and MW-16 to be plugged and removed.

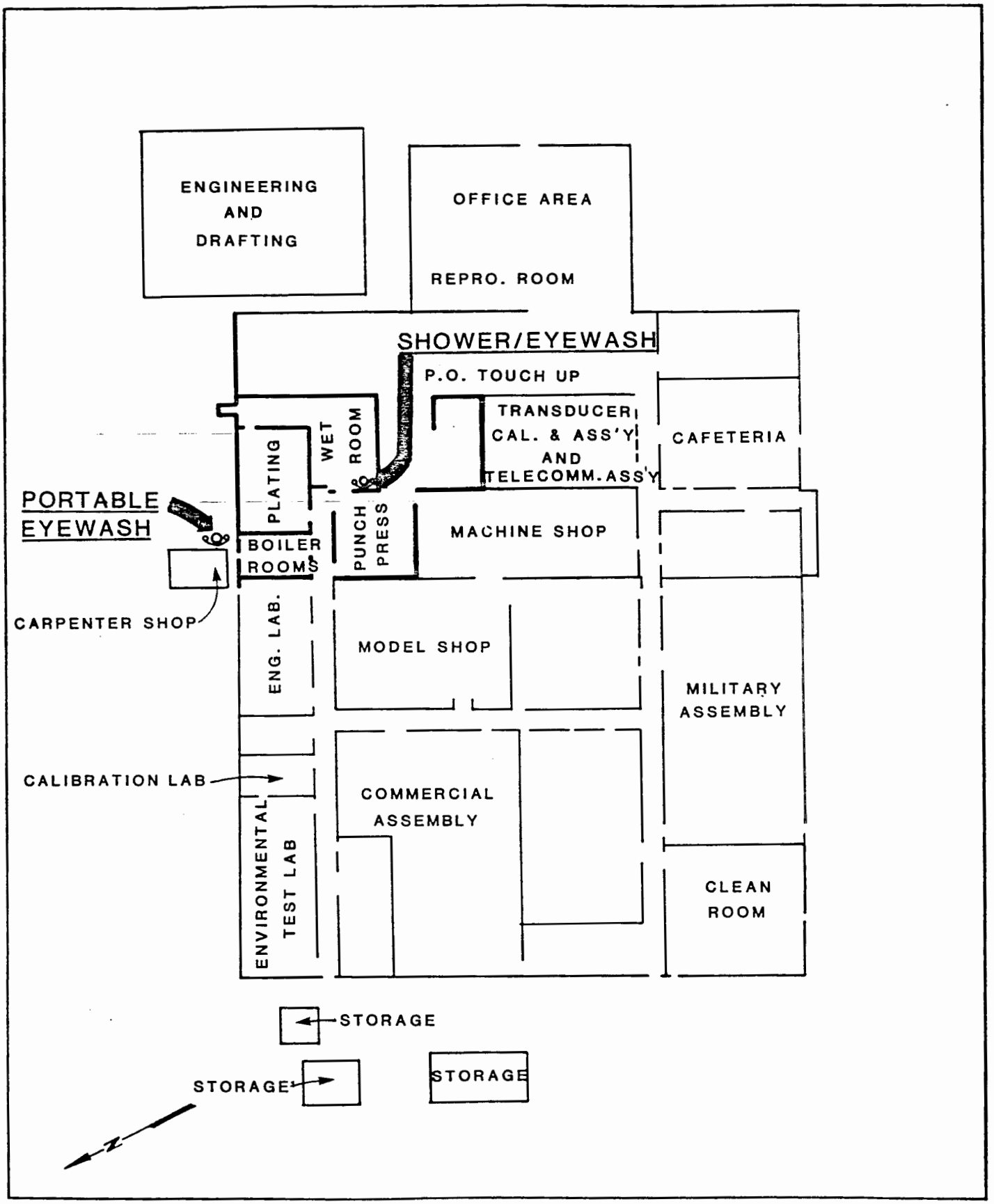
LEGEND:

- PVC Discharge Line
- Gas Line
- Water Line
- Chain Link Fencing (To be relocated in the area of the Ponds and Sump)
- Water Valve
- Monitor Well with 2 foot concrete pad

POND AND SUMP AREA
EXISTING FACILITIES
BASE MAP

3

JD



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Engineers, Geologists & Geophysicists

EMERGENCY SHOWER/EYEWASH

Sparton Technology, Inc.
Albuquerque, New Mexico

PLATE 4

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
Ed.	6310,023.12				

DECONTAMINATION PROCEDURES

Personnel

At the end of each work period (before eating, drinking, smoking, or leaving the site) each person will decontaminate by passing through the designated decontamination area. Each of the following stations will be used as appropriate.

- Equipment/Tool drop station
- Boot Wash - soiled boots will be washed in a tub containing a detergent solution
- Boot Rinse - personnel will step into a tub containing rinse water after washing boots
- Glove Wash - intact gloves will be wiped clean over a glove wash bucket containing detergent and water
- Glove Rinse - washed gloves will be rinsed with water or wiped with a water wet towel
- Used tyvek suits will be dropped into a bag lined garbage can for approved disposal
- Spent respirator cartridges will be dropped into a bag lined garbage can for approved disposal
- Personnel will shower as soon as possible at the end of the work day

Equipment

1. Prior to drilling equipment demobilization, loose mud will be removed using brushes and scrapers, as necessary, and equipment will be steam cleaned over polyethylene sheets. The perimeter of the sheeting will be elevated using formwork.

2. Polyethelene sheeting, mud, and wash water will be placed in drums for subsequent disposal.

APPENDIX G
to
ATTACHMENT 3

Old Drum Area Soils Investigation

APPENDIX G

OLD DRUM AREA SOILS INVESTIGATION

Three soil samples will be collected from the ground surface in the old hazardous waste drum storage area. These samples will be collected from points near the north and south ends of the area, and midway between these areas. Each sample will consist of a composite of four samples collected at points equidistant on the circumference of an imaginary 3-foot-diameter circle. The composite soil samples will be sealed in storage containers provided by the analytical laboratory and submitted for analysis for the following parameters:

pH	chromium
lead	silver
nickel	Total Organic Halides

APPENDIX H
to
ATTACHMENT 3

Final Closure Schedule

APPENDIX H

FINAL CLOSURE SCHEDULE

I Introduction

This section has been prepared to demonstrate the time required for completion of major activities in the closure of the hazardous waste storage units at the Coors Road facility. All times are expressed in days after approval of the closure plan. Activities expected to be completed prior to final closure plan approval will be assigned a time of 0. Closure of both drum storage areas and the ponds is expected to commence in 1986.

II Hazardous Waste Areas

A. Old Drum Area

Activity	Time (days)
1. Collect soil samples	30
2. Submit closure certification	60

B. New Drum Area

Activity	Time (days)
1. Remove existing drums	30
2. Inspect facility	45
3. Decontaminate facility (if necessary)	60
4. Submit closure certification	90

C. Pond and Sump Area

Activity	Time (days)
1. Plug monitoring wells	0
2. Complete modifications to pond walls and remove sump	60
3. Complete final grading and fencing alterations	90
4. Complete asphaltic concrete cap	120
5. Submit certification of closure	180

III Extension of Closure Time

It is not anticipated that any extension of the closure time will be necessary.

APPENDIX I
to
ATTACHMENT 3

Closure Cost Estimates

APPENDIX I

CLOSURE COST ESTIMATES

I Introduction

This section contains cost estimates for closure of the two ponds and the drum storage areas at the Sparton Technology, Inc., Coors Road facility in Albuquerque, New Mexico. As described in the closure plan, closure certification will be provided for four discrete closure elements. Cost estimates for each of these four elements is provided in Tables N-1 through N-3.

II Maximum Waste Inventories

The maximum inventory of hazardous waste drums in the drum storage area is 480 drums. The West pond contains drill cuttings from area borings. The total volume of material in the ponds is estimated to be 30 cubic yards.

III Basis for Estimates

Costs related to engineering have been estimated by Sparton's consultant, Harding Lawson Associates (HLA). Laboratory costs are based on current prices charged by Rocky Mountain Analytical Laboratory. Costs related to earthwork and construction to support the pond and sump area modifications were obtained from Means' Site Work Cost Data, 1986 edition.

IV Cost Estimate Revisions

The date of this cost estimate is December 5, 1985. Annually, the closure cost estimate will be adjusted using an inflation factor derived from the annual Implicit Price Deflator for Gross National Product, as published by the U.S. Department of Commerce Survey of Current Business. The inflation factor is the result of dividing the latest published annual Deflator by the Deflator for the previous year. The adjustment will be made by multiplying the most recent closure cost estimate or adjusted closure cost estimate by the inflation factor.

The closure cost estimate will be revised whenever a change in the closure plan would cause a change in the anticipated cost of closure.

V Closure Costs

The cost to close the drum storage areas and the two ponds is estimated as follows:

• Old Drum Area Closure	$ 1,810.00
• New Drum Area Closure	61,875.00
• Pond and Sump Area Closure	40,750.00
Total Closure Costs	$104,435.00

TABLE I-1

OLD DRUM AREA CLOSURE COST ESTIMATE
(1986 Basis)

ITEM	UNITS	COST($)/UNIT	COST
Sample Collection	3 samples	70.00/ea	$ 210.00
Laboratory Analysis	1 ea	600.00/ea	600.00
Closure Certification	1 ea	1,000.00/ea	1,000.00
		TOTAL	$ 1,810.00

TABLE I-2

NEW DRUM AREA CLOSURE COST ESTIMATE
(1986 Basis)

ITEM	UNITS	COST($)/UNIT	COST
Remove Maximum Inventory for Disposal	480 drums	125.00/ea	$ 60,000.00
Equipment Rental	1 day	175.00/day	175.00
Materials	4 drums	25.00/ea	100.00
Remove Wash Water for Disposal	4 drums	125.00/ea	500.00
Labor	12 hours	50.00/hr	600.00
Closure Certification	1 ea	500.00/ea	500.00
	TOTAL		$ 61,875.00

TABLE I-3

POND AND SUMP AREA SURFACE REMOVAL COST ESTIMATE
(1986 Basis)

ITEM	UNITS	COST($)/UNIT	COST
Excavate soil to grade	150 c.y.	$9.90	$1,480.00
Demolition			
concrete	250 s.f.	20.00	5,000.00
masonry	200 s.f.	10.00	2,000.00
Backfill & compaction	150 c.y.	21.30	3,200.00
Soil stabilization	50 c.y.	20.00	1,000.00
Remove fence & gates	270 L.F.	1.84	500.00
Reinstall fence & gates	200 L.F.	9.00	1,800.00
Install asphalt base	525 s.y.	14.00	7,350.00
Install tack coat	525 s.y.	.38	200.00
Install asphaltic concrete	525 s.y.	6.70	3,520.00
Prepare bid documents	1 ea.	5,000	5,000.00
Closure certification	1 ea.	9,700	9,700.00
	TOTAL		$40,750.00

ATTACHMENT 4

HYDROGEOLOGIC CHARACTERIZATION
AND REMEDIAL INVESTIGATION
SPARTON TECHNOLOGY, INC.
ALBUQUERQUE, NEW MEXICO

March 13, 1985

A Report Prepared for:

Sparton Corporation
2400 East Ganson Street
Jackson, Michigan 49202

HYDROGEOLOGIC CHARACTERIZATION AND REMEDIAL INVESTIGATION SPARTON TECHNOLOGY, INC. 9261 COORS ROAD, NORTHWEST ALBUQUERQUE, NEW MEXICO

HLA Job No. 6310,013.12

by

David L. Bratberg
Hydrogeologist

Frank A. DeLuca
Principal Hydrogeologist

Thomas S. Burger, Manager
Environmental Science Division

Harding Lawson Associates
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Houston, Texas 77057
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March 13, 1985

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I INTRODUCTION

This report presents the work performed by Harding Lawson Associates (HLA) for the SPARTON Technology, Inc. manufacturing facility located at Coors Boulevard, Albuquerque, New Mexico. In this report, we have incorporated data from previous work phases conducted by HLA at the site.

The purpose of this report is to provide SPARTON with additional understanding of the hydrogeologic conditions at the plant site, to categorize the extent and rate of migration of dissolved volatile organics and metals in the ground water, and to determine the concentration of organics and metals in soil near a suspected contamination source.

HLA performed a review of existing data, reports, and files relevant to the above purpose. Field work for this phase of the project included drilling and installation of six monitoring wells and one production well, collecting soil and water samples for organic and metal analyses, water level monitoring, and conducting both a pump test and an infiltration test to evaluate the hydrogeologic framework.

This report includes appendices which describe in detail the operating procedures and methods used during the field work and for data analyses. The main text therefore contains only data and interpretation obtained during this work phase. The reader is referred to these appendices to obtain specific methodology.

II FIELD WORK

A. Drilling, Well Construction and Development

Six monitor wells (MW-12 through MW-17) and one production well (PW-1) were installed during this phase of work. Wells were installed using both rotary wash (mud-rotary) and hollow-stem auger drilling methods. Appendices A and B detail the methodologies used for the drilling program. The locations of all existing and new wells are shown on Figure 1.

B. Well MW-12

Well MW-12 was drilled approximately 50 feet northeast of MW-9. The well site was selected to collect formation samples for the design of the production well, to obtain a water sample representative of the ground water in the vicinity of the planned production well, and to monitor water level response during the pumping test.

A hollow-stem auger drilling rig was used to drill to a depth of 70 feet below grade. Continuous sampling with the 5-foot core barrel was conducted from 50 to 70 feet. Flowing sand conditions and large gravels in the borehole slowed the drilling rate and the remainder of the boring was completed with a mud-rotary drilling rig. Soils were classified from split-spoon samples taken at selected depths in conjunction with a description of the drill cuttings. Figures 2A and 2B are a log of the materials penetrated and the well construction details for MW-12.

The boring encountered fine to medium grain sand from 0 to 39 feet. A dense fine layer was present from 39 to 40 feet which overlaid a 5-foot section of coarse gravel and cobbles. The coarse material appeared to be a terrace-type deposit consisting of sub-rounded, flat granite cobbles 2 inches in diameter.

Drive samples from 50 to 70 feet indicated a well graded sand with small percentages of gravel and silt. The soils increased in moisture content at 60 feet and the auger rig encountered flowing (saturated) sand conditions below 65 feet.

Split-spoon samples obtained by the mud-rotary rig showed that a 4-foot thick layer of dense brown, fine silty sand is present from 74 to 78 feet. A sample obtained from the 75- to 77-foot depth was submitted to HLA's soil laboratory for sieve analysis. Figure 3 is a grain size distribution graph showing the material as a very fine sand with about 25 percent fines.

The materials from 80 to 135 feet are a well-graded sand with little or no fines. Figure 3 also includes the grain size analyses conducted by Rodgers & Company of samples taken from 60 to 70 and from 80 to 135 feet for the design of the well screen. The sand has a median grain size of greater than 0.6 millimeters, which is about

three times larger than the median grain size of the silty sand layer of 74 to 78 feet. The silty sand layer had over 25 percent silt and clay size particles while the sand had no appreciable quantity of fine materials.

A layer of fine-grained material was encountered at a depth of 138 feet. A split-spoon sample collected from 139 to 140 foot interval contained 4 inches of silty clay above a dense brown silt having a small percentage of clay.

A 4-inch-diameter PVC threaded and flush-jointed well was constructed in the borehole with 69 feet of well screen. The screen with a slot size of 0.020 inches was installed at a depth of 64 to 133 feet. Centralizers were placed around the screen to keep the well in the center of the boring. Solid 4-inch-diameter casing extended from the top of the screen to ground surface. Specially-graded sand (Grade No. 10 x 20; see Appendix A) was placed in the annular space to 60 feet. A 2-foot bentonite pellet layer was placed above the sand and the remainder of the annular space was pressure grouted with a neat grout and bentonite mixture. The well was finished below grade with a drive over box and locking cap. The elevation of the top of casing was surveyed into mean sea level datum. The information is listed at the end of this chapter in Section J.

The well was developed for two hours with an air compressor. The flow rate at the end of development was estimated at 30 to 40 gallons per minute (gpm). Following development, a 1/2 horsepower submersible pump was lowered 100 feet below top of casing and the well was pumped for 60 minutes at 5 gpm. The flow rate was then reduced to 1 gpm and samples were obtained for organic and metal analyses using the sampling protocol in Appendix C. All water from development and sampling was discharged to the municipal sanitary sewer. The volatile organic samples were placed in 40 milliliter teflon-sealed vials with no head space and a two liter sample was taken for metal analyses. All samples were immediately iced and delivered to Rocky Mountain Analytical Laboratory (RMA), Arvada, Colorado by overnight delivery. Section III C. discusses the results of the analytical work.

C. Well MW-13

This monitoring well is located next to the south property line, about 200 feet west of MW-8 (Figure 1). The purpose of this boring was to determine the stratigraphy of the subsurface between wells MW-8 and MW-9 and for use as an observation well and a sampling location during later portions of this field work. An 8-inch diameter boring was drilled using mud-rotary techniques. The geologic log and well construction details are shown in Figures 4A and 4B.

The upper 66 feet of the boring consisted of sands and gravels, with two layers of fine-grained material from 30 to 44 feet and from 54 to 56 feet. A dense, silty clay layer with a small quantity of fine sand was noted from 66 to 71. A split-spoon sample was pushed into this material, but no recovery of the soil was obtained. Beneath this layer, a fine sandy silt layer was present from 70 to 80 feet.

Sand was noted from 80 to 86 feet, which changed to silty sand from 86 to 90 feet. A sandy silt was penetrated from 90 to 105 feet and a coarse gravelly sand was present from 105 to 135 feet. This gravelly sand material had similar drilling and textural properties as was noted during the drilling from 80 to 138 feet in MW-12.

A fine-grained layer was present in the bottom of MW-13, and a split-spoon sample of the material was taken at 140 feet. The soil was a fine sandy silt with a trace of clay. The sample was very dense.

A 2-inch diameter threaded and flush-jointed PVC well was constructed in the boring with 79.5 feet of 0.020-inch slot screen placed from 60 to 139.5 feet. The annular space around the well screen was packed with 10 x 20 sand up to 58 feet. Two feet of bentonite pellets were placed above the sand pack and the remainder of the annular space was filled with a neat grout and bentonite slurry. The well construction was completed by cementing a 6-inch diameter steel protector pipe with a locking cap around the PVC well.

The well was developed with air for two hours. The average withdrawal rate of water was 6 gpm. All water was discharged to the municipal sanitary sewer.

D. Well MW-14

This well, located in the southwestern corner of the SPARTON property (Figure 1), was used as an observation point for water level measurements, water sample collection, and to obtain subsurface information from that portion of the site. An 8-inch boring was drilled using rotary wash techniques. Figures 5A and 5B shows the log of subsurface material and well construction.

A coarse sand and gravel layer was present from 40 to 127 feet separated by a 2-foot layer of fine silty sand from 69 to 71 feet. A dense, silty clay layer was encountered at 127 to 130 feet. Split-spoon samples show that the material from both layers was very dense and nonplastic.

A 2-inch-diameter threaded and flush-jointed PVC monitoring well was constructed with 66 feet of 0.020 slot well screen from 61 to 127 feet. Graded 10 x 20 sand was placed in the annular space from 58 to 130 feet. The remainder at the annular space was sealed with a 2-foot layer of bentonite pellets, followed by neat grout with bentonite. The well was finished by cementing a 6-inch diameter steel protector pipe with a locking cap.

The well was developed with air for a period of two hours with a yield of 5 gpm. All water was discharged to the municipal sanitary sewer.

E. MW-15

An 8-inch boring was drilled by rotary wash technique at the western border of the plant property (Figure 1). Data obtained from this boring, along with the information derived from MW-14, were used to develop a better understanding of the hydrogeology on the western site of the property. Figures 6A and 6B are a log of the sub-surface materials and well construction details.

The top 39 feet of the boring consisted of a fine silty sand with a small percentage of clay. Beneath this material was a coarse gravel layer to 70 feet. A fine-grained layer was encountered from 70 to 77 feet. A soil sample from 70 to 71.5 feet showed a fine silty sand with a small percentage of clay. A 3-foot gravel layer was present from 77 to 80 feet. Beneath the gravel layer the formation alternated from coarse sand and gravel to fine-grained soils in approximately 10-foot layers. A dense clay was encountered at 125 feet. Drilling was continued to 130 feet where a split-spoon sample was to have been taken. However, the formation changed to sand and gravel, and the sample was not obtained. Drilling continued to a total depth of 140 feet.

The clay layer breached from 125 to 130 feet may separate a lower aquifer. To assure that ground-water flow would not occur through the boring, the bottom was filled with sand to 130 feet, and a 2-foot layer of bentonite pellets were placed in the boring opposite the clay layer prior to well construction.

MW-15 was constructed using 2-inch-threaded and flush-jointed PVC with 64.5 feet of 0.020-slot well screen from 60 to 124.5 feet. The sand pack extended from 55 to 128 feet and consisted of 10 x 20 sand. The remainder of the annular space was sealed with a 2-foot layer of bentonite followed by a neat grout with bentonite. A 6-inch steel protector pipe with locking cap was cemented into place.

The well was developed with air for two hours. The average yield of the well was 6 gpm. All water from the development was discharged to the municipal sanitary sewer.

F. MW-16

This boring is located in the fenced area adjacent to the two lined lagoons and is about 5 feet east from MW-1 (Figure 1). The boring was drilled using hollow-stem auger methods. Sampling with a 5-foot internal core barrel was used to a total depth of 73 feet.

The purpose of this boring was to obtain a series of soil samples for analytical analyses of total metals. Soil samples were also screened for organic vapor concentration using a photo-ionization detector (PID) meter manufactured by HNU Corporation (Model 101 with 11.7 eV lamp). The PID was calibrated to benzene vapors and was also used to continuously monitor the ambient atmosphere in the work area for health and safety purposes. Figure 7 is a log of the subsurface material encountered and the well construction details.

The boring penetrated brown, well-graded sand to 30 feet, where a 5-foot dense layer of clay was encountered. Beneath the clay layer coarse sand was present to 70 feet with a stiff clay layer located at 53 to 55 feet. Flowing sand conditions were encountered below 70 feet, causing sand to enter the augers after the core barrel was removed. Data regarding organic vapor concentration and metal concentration are included in Section III D.

A monitoring well was installed in the boring using 2-inch-diameter threaded and flush-jointed PVC casing and screen. Five feet of 0.020-inch slot well screen was installed from 68 to 73 feet. The annular space surrounding the well screen was allowed to collapse from 58 to 73 feet. Thick bentonite slurry was placed from 14 to 58 feet, and a neat cement grout was set from 0 to 14 feet. The well was finished with a 6-inch steel protector pipe with a locking cap.

The well was developed by bailing sand and water from the well for approximately two hours. The well yield was less than 0.5 gpm. All water was placed into the lined lagoons.

G. MW-17

Boring MW-17 is located approximately 55 feet north of the eastern lined lagoon (Figure 1). This boring was originally located adjacent to MW-3, but was moved when New Mexico Environmental Improvement Division (NMEID) personnel expressed reservations about conducting an infiltration test adjacent to the lined lagoons. The purpose of this well was to monitor water level fluctuation during the infiltration test. The boring was drilled similarly to MW-16, using a hollow-stem auger with a 5-foot internal core barrel. Figure 8 shows the well construction and subsurface materials encountered during drilling.

The top 40 feet of the boring encountered well-graded sand with a few thin fine-grained layers. Fine-grained clayey sand was noted from 40 to 45 feet, with clayey sandy silt from 45 to 50 feet, and coarse sand was penetrated from 50 to 55 feet. A dense clay layer was present from 55 to 60 feet. Coarse sand and gravelly sand was found to 72 feet where flowing sand conditions were encountered.

A 2-inch-diameter threaded and flush-jointed monitoring well was installed with a 5-foot well screen (0.020-slot) from 67 to 72 feet. The borehole was allowed to collapse from 63 to 72 feet. The annular space was filled with a thick bentonite slurry from 20 to 63 feet, with neat grout from 0 to 20 feet. A steel protector pipe was then cemented over the PVC well casing.

The well was developed by bailing for approximately two hours. The yield during development was less then 0.5 gpm. Water was discharged to the lined ponds.

H. PW-1

A production well was drilled approximately 8 feet east of MW-9 (Figure 1). The immediate purpose of this well was to conduct a pump test to evaluate the hydrogeologic properties of the aquifer beneath the site. The well was drilled with a 16-inch drill bit and with 47 feet of stabilizers, using rotary wash techniques. The well depth and screen design were based upon the samples obtained from MW-12. Figures 9A and 9B shows the materials encountered during drilling and the well construction.

The materials encountered during the drilling were similar in texture and stratigraphy as was noted in MW-12. A fine-grained layer was present in the boring from about 70 to 80 feet which corresponds to the upper silty sand layer present from 74 to 78 feet in MW-12. A

second fine-grained layer was encountered at about 135 feet. The drill cuttings continued to increase in silt and clay content to the bottom of the boring at 145 feet. Original plans were to drill to 140 feet, but the boring was extended an additional 5 feet to allow an ample sump for any cuttings which may not have been removed from the boring. This allowed the driller to use a much thinner drilling fluid which aided in well development.

A 10-inch diameter threaded and flush-jointed PVC well casing and screen was installed in the boring to a total depth of 138 feet. Two intervals are screened: from 60 to 70 feet to collect ground water from above the upper silty sand layer; and from 80 to 138 feet to allow the well to be open opposite the coarse sand and gravel below the upper fine-grained layer. The well screen has slot openings of 0.045 inches, based on the grain size analyses from MW-12.

Three sets of centralizers were used to allow the uniform placement of 66 - 100 pounds bags of 8 x 16 gravel around the well screen from the bottom of the boring to 55 feet. Bentonite pellets were placed from 53 to 55 feet and a neat grout with bentonite was pumped into the annular space from 53 feet to grade. The well was completed by cementing a 14-inch steel protector pipe with locking cap over the PVC well casing.

Well development was conducted with the drill rig's air compressor. The initial withdrawal rate was 60 gpm, but after about 90 minutes, the rate was 100 gpm. Development continued for a total of 4 hours 15 minutes until the well produced water with little to no sediment or turbidity. All water was discharged to the municipal sanitary sewer.

I. Infiltration Gallery

An 8-foot-long by 0.88 foot by 4-foot-deep infiltration gallery was installed with a backhoe 4 feet south of MW-17 (Figure 1). The open area of the bottom of the gallery was 7 feet^2. The gallery consisted of a wooden box with an open bottom filled with 3 feet of 1.5-inch gravel to ensure integrity and stop erosion during the test. As mentioned earlier, the intended location of the gallery was originally adjacent to MW-16, but was relocated because of concerns expressed by NMEID.

The purpose of the gallery was to conduct a pilot scale infiltration test to determine the capability of the subsurface to receive infiltration. A test of this scale (as opposed to a small test with an infiltrometer) was used to give a much more accurate depiction of the infiltration characteristics of the subsurface.

J. Well Data Summary

Table 1 lists the top of casing elevation and screened interval below grade for the seven wells. The elevation data were obtained from Denny-Gross & Associates, Inc., registered surveyors from Alburquerque, New Mexico. The top of casing data listed are actually the elevation of the top of a flat 3/8-inch-thick bar laid across the top of the steel protector pipe. All water level measurements were obtained using the top of the bar as the reference point.

TABLE 1

WELL COMPLETION SUMMARY

SPARTON TECHNOLOGY, INC.

ALBUQUERQUE, NEW MEXICO

Well	Top of Casing Feet MSL	Screened Interval Feet Below Grade
MW-12	5041.81	64-133
MW-13	5043.35	60-139.5
MW-14	5041.94	61-127
MW-15	5047.51	60-124.5
MW-16	5047.53	68-73
MW-17	5049.30	67-72
PW-1	5043.89	60-70; 80-138

III HYDROGEOLOGIC FRAMEWORK

A. Geologic Conditions

Based upon the results of previous field investigation and the data obtained from these borings, a conceptual three-dimensional hydrogeologic framework has been developed for the SPARTON site. In general, the plant is located on unconsolidated sand and gravel deposits with occasional fine-grained layers of silt and clay located at specific depths. The stratigraphy of these deposits is characteristic of valley-fill alluvium and colluvium of the unconsolidated aquifer in the Rio Grande Valley. The flat, subrounded gravels are indicative of a meandering stream, which deposited sand and gravel in the main channel, and fine-grained sediments on a relatively broad flood plain. Some of these fine-grained layers appear to be found almost continuously beneath the site; the impact of these layers are discussed in this section.

The subsurface conditions can be most easily understood by constructing cross-sections using the geologic information gathered during this and the previous phases of site work. These crosssections are necessarily interpretive, and are therefore subject to change based upon future data acquisition and analysis.

Figure 10 is cross-section A-A' (shown in Figure 1) which shows the interpreted geologic conditions beneath the center of the plant site in a northeast-southwest direction. The boring information from MW-1, 2, 3, 4, 9, 10, 11, 12, 16, 17 and PW-1 is projected onto this cross-section.

The unsaturated zone consists mainly of sand, silty sand, and sandy gravel, with an occasional silt and clay lenses. No data are available to suggest that any of these fine-grained layers are continuous in the unsaturated zone.

Two fine-grained layers are suspected to be present almost continuously beneath the site in this cross-section. A layer, alternately described as silty sand or clayey silt, is present between elevation 4965 to 4975 feet in boring MW-9, 10, 11, 12 and PW-1. MW-16 and 17 were not drilled to this depth. MW-2, 3, and 4 were not logged as having encountered this material, however split-spoon samples were not obtained during drilling of these wells.

The second fine-grained layer is present at about elevation 4900 feet and consists of dense fine sands, silts and clays. The thickness and areal extent of this layer is presently unknown, but the log of MW-10 showed a 1-foot thick clay layer at that depth. Wells MW-9, 16,

and 17 are screened above the upper fine-grained layer, while MW-1, 2, 3, 4, 12 and PW-1 are screened above and below that layer. MW-10 and 11 are screened at or below the lower fine-grained layer.

Figure 11 shows the interpretive cross-section B-B' along the southern property boundary of the plant (Figure 1) and contains data projected from MW-8, 9, 12, 13, 14 and PW-1. This view shows that both of the fine-grained units are probably continuous at this location and gives added indications that these units may be continuous beneath the plant site. Wells MW-8 and 9 are screened above the upper fine-grained layer, while the remainder of the wells are screened above and below.

Boring MW-13 encountered additional fine-grained layers both above and below the water table. The 20-foot thickness of this material below the water table could reduce the transmissivity of the aquifer between the two fine-grained layers which appear to be continuous beneath the site.

Figure 12 shows geologic cross-section C-C' which includes data projected from MW-5, 14, 15, and P-1 (Figure 1). The upper fine-grained layer is present in all boring logs except for P-1 from which split-spoon samples were not collected. Boring MW-15 apparently drilled through the lower fine-grained layer from 4915 to 4920 feet.

That layer consisted of a dense clay which abruptly changed to gravelly sand at 4915 feet. The boring was sealed with a bentonite plug in this interval to assure that no possible migration pathway remained into the sediments beneath the lower fine-grain layer.

The log of MW-15 is similar to MW-13 in that the aquifer between the fine-grained layers contains units of clays and silty sands which may reduce the transmissivity in this area.

In summary, the subsurface at the SPARTON site can be divided into a series of sand and gravel units separated by fine-grained layers. The upper unit extends from the land surface to approximately 70 feet below grade where the upper fine-grained layer was found to be present in all of the borings during this phase of drilling and was noticed in most of the logs from previous field investigations which did not have as vigorous a sampling plan. Ground water is present above this upper fine-grained layer, causing a 5- to 10- foot thickness of saturated sands and gravels above that layer.

A second sand and gravel unit is generally found at elevation 4910 to 4970 feet. This layer generally consists of coarse sand and gravel beneath the water table, although MW-13 and 15 intersected a series of silts and clays between the two fine-grained layers. A

second fine-grained layer appears to be present beneath the site at elevation 4910 to 4900 feet, which may act to separate the lower aquifer from deeper sand and gravel units.

B. Ground-Water Conditions

Ground water was encountered in all of the borings at about 60 to 70 feet below grade. Wells were screened at different intervals throughout the phases of field work at this site, so all water level data must be carefully interpreted in order to develop the most representative concept of the ground-water flow regime of the site.

The upper fine-grained layer appears to divide the sediments into two aquifers: a relatively thin unconfined aquifer at about elevation 4970 to 4980 feet; and a lower aquifer that is present from 4910 to 4970 feet. The integrity of the upper fine-grained layer is not totally known, but based upon this last phase of field work, it appears to be sufficiently continous beneath the site to cause a head difference between the aquifers. Also, chemistry data and results of the aquifer test suggest that the upper unit acts as a semi-confining unit, restricting vertical ground-water flow. These last two topics are discussed in more detail in subsequent sections.

Figure 13 is a cross-section of the ground-water conditions at the SPARTON site. The section was taken through A-A' which is shown on Figure 1. The contour map was constructed using the head data in all wells. The mid-point of the screen was used as the reference elevation corresponding to head measurements for the wells in which large thicknesses of the aquifer were monitored. The contours on the crosssection show an apparent downward vertical gradient with up to 4.0 feet of head difference present between adjacent wells MW-16 and MW-11. The downward vertical gradient present on-site complicates the determination of the horizontal flow gradients since the monitoring wells were completed at different elevations and in both aquifers. We interpolated and extrapolated water-level measurements taken for this study, adjusting the levels to what the piezometric elevation is anticipated to be in the upper and lower aquifers, allowing for the vertical gradient.

Figure 14 is a contour map of the water-table elevations of the upper aquifer. The direction of flow is towards the southwest. An anomoly on this map is the apparent low gradient from MW-6 to MW-8. The gradient beneath the plant site of 0.006 is roughly four times as steep as the gradient along the eastern property boundary. The reason for this difference is presently unknown.

Figure 15 shows the piezometric head data for the lower aquifer on the SPARTON site. As mentioned earlier, construction of this map required the interpretation of the water levels taken throughout the plant site. The horizontal gradient in the lower aquifer is about 0.005 toward the west. The gradient of the lower aquifer's piezometric head is less than the gradient of the overlying water table aquifer. The difference in gradients may be due to leakage or changes in the thickness of the upper aquifer.

C. Ground Water Chemistry

This section includes the analyses of water samples taken during this phase of field work. Water samples have been taken from all monitoring wells and PW-1. All analytical work for this phase has been conducted by Rocky Mountain Analytical Laboratory (RMA), Arvada, Colorado. Water samples collected during this phase of work were obtained according to the Ground-Water Sampling and Analytical Protocol attached as Appendix C. All water obtained during well purging was discharged to the sanitary sewer, which was arranged and authorized through SPARTON personnel.

Water samples were taken in MW-12 in order to obtain preliminary chemical data of the anticipated water quality for discharge into the sanitary sewer. PW-1 was sampled four times during the pumping test to determine if any chemical trends could be identified. Water

samples were taken before and after the infiltration test from MW-16 and MW-17 to determine the effects of the vadose zone flushing on ground water chemical constituents. The remainder of the new monitoring wells were sampled to augment and update our information about the areal chemical character of the ground water.

Previous ground-water sampling at the SPARTON site has shown the presence of high concentrations of volatile organic chemicals (VOC) in wells MW-1, 3, and 9 with some VOC constituents found in all of the monitoring well samples. The concentrations of VOCs are greatest from the samples from the wells that are screened above the upper fine-grained layer, as evidenced by the chemical results from MW-9, which is about 500 feet from the suspected contamination source. Wells MW-10 and 11, which are screened at or below the lower fine-grained layer, have shown much lower concentrations. These two wells were not sealed below the water table to prevent downward leakage from the water table to the screened area, so the results from these two wells may not be indicative of ground-water quality at that depth.

Previous sampling of MW-1 through 11 showed high concentrations of boron, chromium, manganese, and nickel. Wells with the highest concentrations were in MW-1, 3, and 9, although manganese was the only one of these metals analyzed in MW-9.

Table 2 lists all of the chemical analyses compiled from the new wells installed during this phase of work. Results of the subs quent sampling in November 1984 are in Appendix C. The concentrations of metals and VOCs were greatest in MW-16, which obtained ground water from above the upper fine-grained layer in the area immediately adjacent to the suspected contamination source. High concentrations of VOCs and metals were also found in MW-14, and 15, on the west side of the plant site. The lowest levels of contaminants were found in the samples from MW-12 and PW-1. Samples for metals analysis were not filtered in the field prior to acidification during this phase of work. Therefore the chemical results represent total metals instead of dissolved metals.

A comparison of the trichloroethylene, Total Organic Carbon, and Specific Conductance results from this work phase and subsequent sampling during November 1984 is shown in Table 3. Trichloroethylene was selected because it is a volatile organic constituent which as been detected in all wells. The highest concentration of trichloroethylene is found in MW-3, with 59,000 ug/l of the organic constituent. The lowest trichloroethylene concentrations are found in MW-5, 6, 8, 10, 12, and PW-1. Trichloroethylene was not detected in MW-11. TOC concentration is highest in MW-3. The highest specific conductance value was found in MW-16, with MW-1, 3, and 9 also exhibiting elevated results. The lowest values were found in MW-2, 5, 7, 8, 10, 11, and 17. A comparison of results in MW-9, 12,

TABLE __

SPARTON TECHNOLOGY, INC.

Analytical Results of Water Samples MW-12 through MW-17 and PW-1

TABLE 3

TRICHLOROETHYLENE, TOC,

AND SPECIFIC CONDUCTANCE VALUES

SPARTON TECHNOLOGY, INC.

ALBUQUERQUE, NEW MEXICO

Well	Sample Date	Sample Method*	Aquifer Sampled**	Trichloroethylene (ug/l)	TOC (mg/l)	Specific Conductance (uho/cm)
MW-1	11/29/84	G	U	23,000	48	3,420
MW-2	11/29/84	G	U	2,100	1.0	713
MW-3	11/29/84	G	U	59,000	86	4,250
MW-4	11/29/84	G	U	7,400	1.8	983
MW-5	11/28/84	G	U	140	3.8	721
MW-6	11/28/84	G	U	310	6.1	866
MW-7	11/27/84	G	U	530	3.6	692
MW-8	11/27/84	G	U	250	5.5	763
MW-9	11/29/84	G	U	9,600	14	2,350
MW-10	11/20/84	G	L	120	3.0	702
MW-11	11/20/84	G	L	ND*	2.2	699
MW-12	08/29/84	P	L	61	1.7	769
MW-13	10/04/84	B	U	6,900	5.2	1,090
MW-14	10/04/84	B	U	12,000	5.9	1,290
MW-15	10/04/84	B	U	4,400	2.7	885
MW-16	10/05/84	B	U	37,000	54	5,300
MW-17	10/05/84	B	U	4,300	5.1	695
PW-1	10/07/84	P	L	200	3.8	801

* G-Gas Squeeze B adder Pump
P-Submersible Centrifugal Pump
B-Teflon Bailer
ND-Not Detected

** U-Upper Aquifer
L-Lower Aquifer

and PW-1, which were obtained by different methods, suggests that the ground water above the upper fine-grained layer is much more contaminated than the ground water beneath the layer. This is explained below.

The samples in MW-13, 14, 15, 16, and 17 were obtained with a Teflon bailer. Sampling methodology for all wells during this phase of work is included in Appendix C. Samples taken with the bailer from MW-13, 14, and 15 should have been representative of conditions in the upper aquifer. Based on this premise, the data indicate that the ground water above the upper fine-grained layer is contaminated at these locations. Samples from MW-12 and PW-1, taken with a submersible pump set near the bottom of the screen, probably were a mixture of water from the two aquifers. However, because of the coarseness of the lower aquifer, most of the water in these samples was from the lower aquifer.

Figure 16 is a contour map of the specific conductance data obtained from all wells except MW-10, 11, 12 and PW-1. The contoured data, which were taken over a period of time listed on Table 3, are more representative of the ground-water chemistry of the upper aquifer. The high conductivity plume extends from the suspected contamination source as measured by MW-1, 3, and 16 towards the southwest. Background conductance values range from about 690 to 760 umhos/cm.

A similar contour pattern is shown in Figure 17, which is a contour map of trichloroethylene data listed in Table 3. Results of MW-10, 11, 12, and PW-1 are not included on this map.

Both contour maps show that the upper aquifer contains relatively high concentrations of the contaminants present at the suspected contamination source. The direction of contaminant migration is towards the southwest. Additional sampling from the upper and lower aquifer in the existing wells MW-12, 13, 14, and 15 would aid in defining the degree of contamination above and below the fine-grained layer.

Four water samples were obtained from the submersible pump line discharge during the pumping test on PW-1 (Table 2). Concentrations of TOX decreased somewhat as pumping continued; the initial TOX concentration was 380 ugCl^-/l and after 12 hours of pumping the concentration was down to 240 ugCl^-/l. The third sample, at the end of the 1500-minute pumping test, had a TOX concentration of 210 ugCl^-/l. A fourth sample taken at the end of the 120-minute pumping test also had a TOX concentration of 210 ugCl^-/l. Based upon the results of these tests, the long-term TOX concentration of pumped water from PW-1 should be about 200 ugCl^-/l; the major organic constituents should be methylene chloride and trichlorethylene.

Samples were taken from MW-16 and 17 before and after the infiltration test. Chemical results show that volatile organic constituents increased in both wells (Table 2), with sharp increases in acetone, 1,1 dichloroethane, methylene chloride, 1,1,1 trichloroethane, and trichloroethylene in MW-16. Metal concentrations increased in MW-16 but decreased in MW-17.

In summary, the ground-water sampling and analytical results show that VOCs and some metals are elevated across the entire plant site in the upper aquifer. The highest concentrations were found in MW-16, which is adjacent to the suspected contamination source. Differences in results between wells screened in the upper and lower aquifer indicate the upper aquifer is more contaminated than the ground water in the lower aquifer. Ground water pumped from MW-12 and PW-1 is more representative of the chemical condition in the lower aquifer, while bailed samples from MW-13, 14, and 15 are more indicative of the chemical condition in the upper aquifer.

Samples taken in MW-16 and 17 before and after the infiltration test suggest that some flushing of organic constituents from the vadose zone were taking place due to the infiltration gallery test. Data are less conclusive about metal flushing; MW-16 showed an increase, while MW-17 metal concentrations decreased in the sample

taken after the test. Increases would be expected to be greatest in the ground water adjacent to the suspected contamination source, as was the case.

D. Unsaturated Zone Studies

Continuous soil samples were obtained in boring MW-16 for metals and organics analyses and to determine the geologic conditions adjacent the suspected contamination source. Samples were obtained with a 5 foot long internal core barrel in the hollow-stem auger as described in Appendix B. Samples from each interval were collected from the barrel, scanned by the PID (see Section II F.) for organic vapor emissions and split into representative samples for laboratory analysis of total metals, extraction procedure (EP) soluble metals and selected TOX analyses. Approximately 20 ml of soil was placed into a 40 ml vial, tightly-capped and placed in the sun for two hours to determine the organic vapor emissions with the PID after the soil was allowed to heat up in a sealed vial.

Table 4 shows the initial and capped PID readings which had been calibrated to benzene vapors. Also shown are RMA lab analyses for TOX on the soil.

The greatest decrease in vapor concentration from the initial sampling was seen at 45 feet which is the top of a 5 foot layer of dense clay. The vapor concentration decreased with depth; at 70 feet the initial vapor levels were less than 10 ppm. The difference in vapor concentration between the initial and capped samples showed the following phenomena: the upper 25 feet of soil had roughly the same concentration with the two methods; from 25 to 45 feet the capped samples had a lower concentration; samples below 45 feet had a higher capped concentration. The mechanism that causes these relationships is unknown.

As mentioned above, soil samples from MW-16 were collected and sent to RMA for analysis. These samples and EP-extracts were analyzed for total concentrations of cadmium, chromium, lead, nickel, and silver. The EP-extracts were also tested for hexavalent chromium. The soil samples were also analyzed for cyanide.

Table 5 lists the total metal and cyanide concentrations for the soil samples. Nickel concentrations are highest in samples from 30 to 45 feet, corresponding to the depth above where organic vapor concentration decreased at 45-50 feet. These metal concentrations are much higher than would be expected in the subsurface away from the suspected contamination source. A subsequent work phase to attempt to determine the "background" metal concentration is discussed in the Recommendation Section of this report.

TABLE 4

MW - 16

ORGANIC VAPOR EMISSIONS

FROM SOIL

Concentration in PPM BENZENE

SPARTON TECHNOLOGY, INC.

ALBUQUERQUE, NEW MEXICO

DEPTH INTERVAL	INITIAL SAMPLE	WARMED & CAPPED SAMPLE	Lab TOX Concentration *
0-5	-	-	
5-10	100	150	
10-15	200	200	
15-20	200	240	ND
20-25	200	150	
25-30	200	80	
30-35	175	50	ND
35-40	175	50	
40-45	150	40	
45-50	40	70	
50-55	30	70	
55-60	20	50	ND
60-65	15	20	
65-70	5	70	
70-73	5	20	

* TOX mg Cl^-/Kg (ppm). Detection limit = 100 ppm

ND = Not Detected

Table 6 lists the metal concentrations found in EP-extracts of the soil samples. The results of these tests follow a similar pattern as the total metal analyses; chromium and nickel concentrations are greatest in the 30 to 45 foot interval. Most of the extracted chromium measured is in the hexavalent form as would be expected.

HLA conducted these tests to show the marked differences between the total and the water-extracted metal concentrations. While the concentrations listed in Tables 5 and 6 are not directly comparable, the data can be used to generally show the expected concentrations of water infiltrating through these soils.

TABLE 5

TOTAL METALS AND CYANIDE CONCENTRATIONS

IN SOIL MW-16

SPARTON TECHNOLOGY, INC.

ALBUQUERQUE, NEW MEXICO

Concentrations in mg/Kg (ppm)

Depth Feet	Cadmium [0.1]*	Chromium [0.3]	Lead [1.3]	Nickel [0.5]	Silver [0.2]	Cyanide [0.25]
5-10	0.8	3.2	3.4	3.3	ND	ND
10-15	0.7	7.7	3.4	4.3	ND	ND
15-20	0.8	6.7	3.6	4.4	ND	ND
20-25	0.9	8.4	3.2	4.0	ND	ND
25-30	0.9	8.6	3.0	4.6	ND	ND
30-35	1.0	350	ND	30	ND	ND
35-40	1.1	500	2.1	41	ND	ND
40-45	2.6	480	2.7	38	ND	ND
45-50	1.1	80	4.2	14	ND	ND
50-55	0.5	130	2.7	13	ND	ND
55-60	0.6	9.8	3.6	5.6	ND	ND
60-65	0.4	24	2.3	4.8	ND	ND
65-70	1.0	52	3.6	9.8	ND	ND
70-73	1.2	69	3.5	7.5	ND	ND

* = Detection Limit

ND = Not Detected

TABLE 6
EP METAL CONCENTRATIONS
IN SOIL EXTRACTS FROM MW-16
SPARTON TECHNOLOGY, INC.
ALBUQUERQUE, NEW MEXICO

All Concentrations in mg/l (ppm) of Extract

Depth Feet	Cadmium [0.002]*	Chromium [0.005]	Hex Chromium [0.01]	Lead [0.025]	Nickel [0.01]	Silver [0.003]
5-10	ND	ND	ND	ND	0.01	ND
10-15	ND	0.027	ND	ND	0.02	ND
15-20	0.003	0.060	0.02	ND	0.027	ND
20-25	ND	0.048	0.02	ND	0.01	ND
25-30	ND	0.083	ND	ND	0.027	ND
30-35	0.003	4.1	3.6	ND	0.13	ND
35-40	0.006	8.6	8.0	ND	0.19	ND
40-45	0.028	2.1	1.6	ND	0.12	ND
45-50	0.013	0.70	0.5	ND	0.11	ND
50-55	0.005	1.1	0.81	ND	0.11	ND
55-60	ND	ND	ND	ND	0.045	ND
60-65	ND	ND	ND	ND	0.026	ND
65-70	ND	0.011	ND	ND	0.050	ND
70-75	ND	0.007	ND	ND	0.045	ND

* = Detection Limit ND = Not Detected

IV AQUIFER TESTS

Tests were conducted on PW-1 and the infiltration gallery in order to determine the hydrogeologic characteristics of the aquifers and the unsaturated zone beneath the plant site. Water samples were collected from the pumping well in order to determine the degree of contamination for design purposes of an on-site treatment facility. The methodologies for these tests are described in Appendix D.

A 6-hour step-drawdown test, and 25-hour and 2-hour constant rate pumping test were conducted on PW-1 during the period of October 5 through 8, 1984. An infiltration test was conducted on the infiltration gallery adjacent to MW-17 on October 9 through 10, 1984. The results of the tests are discussed in the next section.

A. Step-Drawdown Test

The step-drawdown test was conducted on PW-1 on October 5, 1984. The pumping schedule was set to nominally withdraw water at 50 gpm increments at 60-minute intervals. The actual rates are as follows:

Elapsed Time Minute	Withdrawal GPM
0 - 60	50
60 - 130	100
130 - 180	150
180 - 360	200

At the 200 gpm step, the hydraulics of the well changed drastically in conjunction with an influx of fine sands and silts into the well. The change is due to the increased development of the formation surrounding the well. The development process increases the available yield of the well by increasing the hydraulic capabilities of the formation adjacent to the well screen. This increase is most easily seen by comparing specific capacities of the well at each pumping rate. Specific capacity is defined as the pumping rate divided by the amount of drawdown; the units used here are gallons per minute per foot of drawdown (gpm/ft):

	Pumping Rate GPM	Drawdown Feet	Specific Capacity GPM/Ft
	50	13.0	3.85
	100	23.8	4.20
	150	36.3	4.13
initial	200	51.8	3.86
ending	200	36.1	5.54

The increase in specific capacity during the 200 gpm rate showed that the well had not been sufficiently developed during construction with the drilling rig's air compressor. While this was anticipated, the degree of fine sand inflow necessitated additional development prior to running the constant-rate test.

The additional development was conducted on October 6, 1984, by pumping and surging the well at rates up to 300 gpm. The development was continued for a total of 5-hours, at the end of which the well was producing relatively clear water with a low sand content. Following the development, the specific capacity of the well was increased to 7.5 gpm/ft at 200 gpm, which is an approximately 100 percent increase over the initial specific capacity at that pumping rate.

Based on the results of the step-drawdown test and the development program, a rate of 200 gpm was chosen for the constant-rate portion of the aquifer test.

B. Constant-Rate Test

A 48-hour constant-rate test of PW-1 at 200 gpm was proposed to start on October 7, 1984. The test was started at 1015 hours and the rate was set to approximately 200 gpm. Unfortunately, sand apparently blocked the flow meter a few minutes into the test and the pumping rate fluctuated for the first 60 minutes. Data from the early portion of the test is important in aquifer analysis, and it was decided to repeat the early portion after this test was ended.

The test was continued at a constant-rate of 180 gpm for a total of 1500 minutes. Water levels were measured with the transducer system in MW-12, 13, 14 and PW-1 as described in Appendices D and E.

Periodic hand-level measurements as discussed in Appendix D were taken in all other wells to determine the extent of pumping influence. Measurable drawdown was observed in all wells equipped with transducers as well as in MW-4, 9, 10, 11, and 15.

Following pump shut-down, water level recovery was monitored in all wells which had shown discernable drawdown. These results are also discussed in the next section.

Following recovery of water levels, a 120-minute constant-rate test was conducted at 189 gpm. Drawdown was measured by transducer in MW-12, 13, 14, and PW-1. This test allowed for much better data to be collected for methods used to analyze early test data.

Water levels were obtained from all monitoring wells at the end of the first constant-rate test. These data were contoured to estimate the ground-water flow directions which were developed due to pumping. Figure 18 is a contour map of cross-section A-A', showing the differences in piezometric head with depth.

Figure 19 is a contour map of the water table in the upper aquifer at the end of the first test. Ground-water flow is still towards the south and the relative thinness of the upper aquifer limits the extent of drawdown away from the well.

Figure 20 shows the piezometric head of the lower aquifer at the end of the test. The ground-water flow direction has been altered, and the direction of flow is towards the south.

C. Aquifer Test Analysis

Appendix E contains the printout and graphical data from the well-tests on PW-1 and the infiltration test. The quantity of data recovered from these tests precludes the individual discussion of drawdown analysis by each method for each portion of the test; rather, this section will summarize the hydrogeologic parameters.

Table 7 lists the mean transmissivity (T), hydraulic conductivity (K), storage coefficient, and leakage coefficients (K'/b') found in the observation wells during the PW-1 tests. The table is divided into groups which are indicative of the upper and lower aquifer.

Well MW-9 was the only point which had measurable drawdown in the upper aquifer; the other wells were screened either in both aquifers or only in the lower aquifer. Transmissivity and Storage Coefficient information on the upper aquifer was obtained during the 50 gpm pumping period of the step drawdown test. The T and K values listed for the upper aquifer take into account the fact that pumping caused withdrawals from both aquifers and the analytical method assumed that all water was removed from a single aquifer. Based on our experience and judgement the actual K of the aquifer should be about 1000 gpd/ft.

TABLE 7

PW-1 Pump Test Summary

SPARTON TECHNOLOGY, INC.

ALBUQUERQUE, NEW MEXICO

Upper Aquifer

Well	T gpd/ft	K gpd/ft^2	S
MW-9	5,000 - 1,000	1,000	0.10

Lower/Both Aquifers

Well	T gpd/ft	K gpd/ft^2	S	K'/b' 1/day
PW-1	25,000	420	-	-
MW-12	13,200	190	0.00047	0.030
MW-13	26,700	360	0.00020	0.018
MW-14	66,200	880	0.00024	0.0018
MW-15	69,000	920	0.00015	-
MW-4	193,400	2,580	0.00028	-
MW-10	63,000	840	0.00024	-
MW-11	67,000	890	0.00026	-

The storage coefficient of 0.10 in MW-9 indicates that the upper aquifer is unconfined. This correlates with the boring log data which does not show any confining layers at the water table elevation.

Examination of the data from wells set in the lower aquifer shows that some of the data are anomolous and probably not representative. For example, the T value from MW-4 appears to be too great, considering the placement of the well screen through what is believed to be the lower-permeable layer which separates the upper and lower aquifer. The screen extends below this layer, and it is possible that a thin sand or gravel layer exists which gives the high transmissivity indication. In fine-grained sediments adjacent to a more transmissive aquifer, pump test data can often produce misleadingly high T values due to the limited drawdown and by delayed leakage from the fine sediments.

MW-12, 13, and PW-1 produced results of a lower T than the other wells which were monitored in the lower aquifer. Boring MW-13 showed silt and clay lenses present in the middle of the lower aquifer, which may reduce transmissivity. However, similar layers were present in boring MW-15 and the transmissivity of the aquifer in that location is similar to the values obtained from MW-10, 11, and 14, which suggests that MW-10 and 11 are in direct hydrologic contact with the lower aquifer. Based upon the results from these tests, the transmissivity of the lower aquifer is between 60,000 to 70,000 gpd/ft. The hydraulic conductivity of the lower aquifer is estimated at 1,000 gpd/ft^2, using an average thickness of the lower aquifer of about 65 feet.

The storage coefficient of the wells in the lower aquifer is approximately 0.0002, which is indicative of a confined or semiconfined aquifer. This information, along with the boring logs from this phase of work, strongly supports the differentiation of the subsurface into the two different aquifers.

Leakage rates of the semi-confining layer were obtained from the time-drawdown graphs of MW-12, 13, and 14. The data, also listed in Table 7, show that the leakage coefficient ranges between 0.002 to 0.03/day. The further the observation point is from the pumping well, the lower the apparent leakage coefficient. Data from the closer wells are more representative since the drawdowns were slightly greater and the leakage across the layer would have been established for a longer time period during the test. Using an average leakage coefficient of 0.02/day and assuming a thickness of 5 feet, the hydraulic conductivity of the semi-confining unit is 0.75 gpd/ft^2 (3.5×10^{-5} cm/sec) which is approximately 3 orders of magnitude less than the hydraulic conductivity of either the upper or lower aquifer. This lower leakage coefficient restricts the flow of ground water between the two aquifers, causing the observed head differences and the chemical concentration patterns present beneath the SPARTON site.

In summary, the results of the pumping test indicate the presence of two aquifers beneath the SPARTON site, separated by a less-permeable layer that appears to be sufficiently continuous to cause the semi-confined aquifer responses of the lower aquifer. The hydraulic conductivity of both aquifers is approximately 1000 gpd/ft^2; the transmissivity of each aquifer is dependent upon the saturated thickness throughout the site. In general, the upper aquifer, being 5- to 10-feet-thick, has a T ranging from 5000 to 10,000 gpd/ft. The lower aquifer, which is about 60- to 70-feet-thick, has a T of 60,000 to 70,000 gpd/ft. MW-10 and 11 exhibited water-level responses during the pumping test which suggests that these two wells are in direct hydrologic contact with the lower aquifer.

The storage coefficient of the upper aquifer is 0.10, indicative of an unconfined aquifer. The S of the lower aquifer is approximately 0.0002, indicative of a semi-confined aquifer.

The semi-confining layer between the two aquifers has an estimated hydraulic conductivity of 0.75 gpd/ft^2, which is about three orders of magnitude less than the K found in both the upper and lower aquifers.

D. Infiltration Test

An infiltration test was conducted on the infiltration gallery from October 8-9, 1984. It was hoped to conduct this test at a sufficient rate to impact the water table, causing a mound beneath the gallery. However, the gallery would accept only 6,100 gallons of water over the 1240 minute test (4.9 gpm) which was insufficient to cause a pronounced mound. Slight water table increases were noticed in MW-16 and 17 but the change could be due to natural fluctuations.

The results of the test show that the gallery could infiltrate water at 4.9 gpm. Using the open area at the bottom of the gallery of 7.0 ft^2, a vertical unsaturated hydraulic conductivity of about 1000 gpd/ft^2 is estimated. This value is the same as the saturated hydraulic conductivity of the two aquifers.

V CONCLUSIONS

Based upon the results of field work and interpretations of pumping, water level, and chemical data, the following conclusions have been made about the SPARTON site:

The SPARTON site is underlain by at least two distinctly different aquifers. The upper aquifer is a relatively thin unconfined system which is present above a fine-grained unit occurring at elevation 4960 to 4970 feet msl. Another aquifer is present beneath this unit which exhibits semi-confined characteristics. The estimated hydrogeologic properties of both aquifers are:

Upper Aquifer	Lower Aquifer
T = 5,000 - 10,000 gpd/ft	60,000 - 70,000 gpd/ft
K = 1,000 gpd/ft	K = 1,000 gpd/ft
S = 0.10	S = 0.0002

An initial estimate of the Leakage Coefficient of the semi-confining layer between the two aquifers is 0.02/day, and the hydraulic conductivity is estimated to be approximately 0.75 gpd/ft^2.

A second fine-grained unit is found at about elevation 4900 feet. The hydrogeologic importance and areal extent of this layer are not fully known at this time.

The ground-water flow direction in the upper aquifer is towards the south-southwest, generally in a direction from MW-16 towards MW-9. The direction of flow in the lower aquifer is apparently towards the west south-west. Extrapolating the piezometric gradient towards the east suggests that the lower aquifer may be in hydrologic contact with the shallow water table upgradient in the area surrounding the Rio Grande.

A significant vertical hydraulic gradient is present beneath the SPARTON site, resulting in the upper aquifer having a hydraulic head more than 4.0 feet above the piezometer level of the lower aquifer in an adjacent monitoring well.

Chemical analyses of ground-water samples show that volatile organic constituents are present in the upper aquifer across the site. Concentrations of metals in ground water also appear to be elevated; however, all samples in this study have been acidified prior to filtering, which takes metals adsorbed onto the sediment into solution. The actual dissolved metal concentration of the ground water has not been determined, but is probably lower.

Infiltration of water through the vadose zone appears to be feasible. Based upon the pilot-scale test, the infiltration rate of the unsaturated zone is 0.70 gpm/ft^2, which is approximately 1,000 gpd/ft^2. Infiltration flushed some of the contaminants from the soil, based upon water samples taken in MW-16 after the test which showed an increase in VOC and metal concentrations.

The unsaturated zone sampled by boring MW-16 showed high concentrations of metals. VOC were not determined from the samples, however, VOCs concentrations were reflected by the PID readings of the vapor emissions. Both metals and VOCs appear to the concentrated in the upper 55 feet near the suspected contamination source.

VI RECOMMENDATIONS

Additional work is required to define the extent of metal and VOC concentrations in the vadose zone and to determine the chemical and hydrostatic head differences in the two aquifers at the southern and western portion of the plant site.

Vadose Zone Contamination

Seven soil borings are recommended to be located around the suspected spill location (concrete sump) as shown in Figure 21. These borings will be drilled using the Hollow Stem Auger and sampling techniques described in Appendix B. The borings will extend to approximately 75 feet below grade.

Soil samples will be taken from each 5-foot soil interval and will be analyzed for total cadmium, chromium, lead, and nickel. VOCs will be determined by solvent extraction followed by purge and trap gas chromatography and mass spectroscopy following U.S. EPA procedure 624. Metal concentrations may be determined from EP-extracts of some of the samples.

An eighth boring will be drilled in order to obtain 'background' metal concentrations of the soil. The location of this boring is shown in Figure 21. Monitoring wells, similar in construction as MW-17, may be installed in some of the borings.

Comparisons of the metallic and organic concentrations between the borings will be used to estimate the extent of vadose zone contamination.

Ground Water Investigation

A series of tests should be conducted on selected wells in order to determine the chemical and hydrostatic profile at the site. These tests will be conducted by inserting inflatable packers in the monitoring well with a pump. A low volume pump, such as a gas squeeze pump, will be used to collect ground-water samples between the two packers. A sufficient quantity of water will be removed prior to sampling to assure that the water samples are representative at each profile. Samples will be analyzed for selected VOC constituents and dissolved metals found during previous sampling. Static water levels will be measured with transducers and a recorder prior to pumping with the packers in place. Vertical communication along the well annulus may affect the water level measurements, but the results should show a vertical profile.

The results of this ground-water investigation will allow us to further evaluate the vertical extent of contamination and the direction of ground-water flow in both aquifers. This information, in conjunction with the results of previous studies, will allow us to design a remedial plan for ground-water contamination abatement. For

example, if the ground-water sampling profile shows no significant contamination in the lower aquifer the remedial design will include only pumpage and treatment of ground-water flow from the water table aquifer. If significant concentrations of contaminants are found in the lower aquifer, a withdrawal system will be designed for both aquifers. Disposal of treated water will probably include infiltration through the vadose zone at the areas found to contain increased concentration of VOCs and metals at the suspected contamination source.

DISTRIBUTION

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QUALITY CONTROL REVIEW:

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D. Aquifer Test Procedures

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APPENDIX A
to
ATTACHMENT 4

Rotary Drilling and
Well Construction Procedures

APPENDIX A

Rotary Drilling and Well Construction Procedures

Borings MW-13, 14, 15, and PW-1 were drilled using rotary wash (mud rotary) techniques. MW-12, drilled from 0 to 70 feet using a hollow-stem auger, was completed using a rotary rig. The following general drilling and construction procedures were used on all rotary drilling wells.

Equipment Set-up

Prior to the set-up of the drilling rig on the prospective well site, all underground utilities were located to help assure that the borings will not encounter any buried power, gas, or telephone lines. Overhead electrical power lines were shrouded with rubber by the electrical utility to protect the workers from electrical hazards. Additionally, all drilling equipment were cleaned with a high pressure steam cleaning machine in order to remove any material which could possibly cause any cross-contamination between boreholes.

Drilling Procedure

The rotary wash well-drilling process involves the use of drilling fluid, normally a bentonite and water mixture, to suspend drill cuttings obtained by the advancement of a tri-cone drill bit into unconsolidated formations. The drilling fluid is pumped down through

the inside of the drill pipe, through the end of the drill bit, and then returns to the surface through the annulus between the drill pipe and the bore hole wall. The fluid cools the drill bit, carries the cuttings to the surface, stops excessive loss of fluid into the formation, and prevents the borehole from collapsing. Upon circulating to the ground surface, the fluid is directed in to mud pits or a portable mud tank in which the cuttings drop out of suspension and are removed.

Soil Sampling

Samples of the formation encountered during drilling were obtained by two different methods: cuttings suspended in the drilling mud and 2-inch split-spoon pushed ahead of the drill bit. Additional data was obtained by noting the rate and ease of drilling penetration.

Formation cuttings were collected at the top of the boring in a strainer. The samples were classified according to the Unified Soil Classification System (USCS) into gravel, sand, silt, and clay mixtures to allow for an understanding of the geologic characteristics of the subsurface. Figure A-1 shows the classification system. This method of sampling has a tendency to miss portions of both the coarse and fine-grain materials, but are satisfactory to delineate the textural changes which occur in the borehole and to determine the depth for split-spoon samples.

MAJOR DIVISIONS				TYPICAL NAMES
COARSE GRAINED SOILS (MORE THAN HALF IS LARGER THAN #200 SIEVE)	GRAVELS (MORE THAN HALF COARSE FRACTION IS LARGER THAN NO. 4 SIEVE SIZE)	CLEAN GRAVELS WITH LITTLE OR NO FINES	GW	WELL GRADED GRAVELS, GRAVEL - SAND MIXTURES
			GP	POORLY GRADED GRAVELS, GRAVEL - SAND MIXTURES
		GRAVELS WITH OVER 12% FINES	GM	SILTY GRAVELS, POORLY GRADED GRAVEL - SAND - SILT MIXTURES
			GC	CLAYEY GRAVELS, POORLY GRADED GRAVEL - SAND - CLAY MIXTURES
	SANDS (MORE THAN HALF COARSE FRACTION IS SMALLER THAN NO. 4 SIEVE SIZE)	CLEAN SANDS WITH LITTLE OR NO FINES	SW	WELL GRADED SANDS, GRAVELLY SANDS
			SP	POORLY GRADED SANDS, GRAVELLY SANDS
		SANDS WITH OVER 12% FINES	SM	SILTY SANDS, POORLY GRADED SAND - SILT MIXTURES
			SC	CLAYEY SANDS, POORLY GRADED SAND - CLAY MIXTURES
FINE GRAINED SOILS (MORE THAN HALF IS SMALLER THAN #200 SIEVE)	SILTS AND CLAYS (LIQUID LIMIT LESS THAN 50)		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS, OR CLAYEY SILTS WITH SLIGHT PLASTICITY
			CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
			OL	ORGANIC CLAYS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS (LIQUID LIMIT GREATER THAN 50)		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACIOUS FINE SANDY OR SILTY SOILS, ELASTIC SILTS
			CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
			OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS			Pt	PEAT AND OTHER HIGHLY ORGANIC SOILS

UNIFIED SOIL CLASSIFICATION SYSTEM

Consol — Consolidation
LL — Liquid Limit (in %)
PL — Plastic Limit (in %)
G_s — Specific Gravity
SA — Sieve Analysis
"Undisturbed" Sample
Bulk Sample

	Shear Strength, psf	Confining Pressure, psf	
*Tx	320	(2600)	Unconsolidated Undrained Triaxial
TxCU	320	(2600)	Consolidated Undrained Triaxial
DS	2750	(2000)	Consolidated Drained Direct Shear
FVS	470		Field Vane Shear
*UC	2000		Unconfined Compression
LVS	700		Laboratory Vane Shear

Notes: (1) All strength tests on 2.8" or 2.4" diameter samples unless otherwise indicated.

(2) * indicates 1.4" diameter sample.

KEY TO TEST DATA

Harding Lawson Associates
Engineers, Geologists & Geophysicists

SOIL CLASSIFICATION CHART AND KEY TO TEST DATA
Sparton Technology, Inc.
Albuquerque, New Mexico

PLATE A1

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

Split-spoon samples were obtained with the following methodology. Upon reaching a desired sampling interval (as noted by the drill cuttings), the drill pipe and bit were raised one foot off the bottom of the borehole and the remaining cuttings in the boring were cleaned by increasing the velocity of the drilling fluid. On occasion, this process would not remove coarse gravel from the borehole and the drilling fluid would have to be thickened in order to help float this coarse material out of the borehole. Upon cleaning out the hole, the drill bit was removed and a 2-foot long, 2-inch outside diameter split-spoon sampler was screwed onto the drill pipe. The sampler was seated into the bottom of the borehole and was pushed into the formation using the hydraulic system of the drill rig. The sampler was pushed a maximum of 24-inches, or until refusal, which was defined as the point where the rig was about to be lifted off its jacks by the pressure on the drill pipe.

The sample was then retrieved and classified according to the USCS standards. Select samples were bagged and kept for future reference. The sampler was then thoroughly cleaned with the high pressure steam cleaning machine.

Well Construction

Upon drilling the boring to its total depth, the hole was cleaned out by a process similar to the one used during the split-spoon sampling process. After the boring is clean, a 1-inch diameter tremie pipe is

lowered to near the bottom of the hole. The well screen and casing are then lowered into the boring. All screen and casing used in this project were threaded and flush-jointed PVC manufactured by Timco, Inc. Couplings between portions of solid casing were made leak-proof by wrapping the threads with Teflon tape. The diameter and lengths of casing and slot size of screen varied in the wells installed; refer to the main text for a discussion of the design of each individual well.

After the well had been placed at its correct position in the boring, lower weight drilling fluid (i.e. less mud content) was added at the bottom of the boring through the tremie pipe. This process helped remove some of the mud which is attached to the side of the boring and reduced the weight of the mud, allowing the pack material to fall through the fluid.

Specially-graded sand was used to pack the annular space from the bottom of the boring to above the top of the well screen. The sand was graded and sold by Fountain Sand and Gravel, Denver, Colorado. Grade numbers listed in the main text refer to the 10 and 99 percentage retained on standard U.S. Sieves. Sand was poured into the annular space around the well, and the tremie pipe was used to sense the level of sand in the well and to assure that this material did not bridge on upper portions of the boring. The level of sand was brought up at least 2-feet above the top of the screen.

Following the placement of the sand pack, the tremie pipe was raised about 4 feet off the top of the sand and sufficient bentonite pellets were placed uniformally into the annular space to give a 2-foot thickness in the boring. The bentonite acts as an excellent seal, retarding vertical flow of ground water in the annular space and acting to stop the grout, which is added next, from invading the sand pack.

A neat grout mixture of approximately one 94 pound sack of cement, 15 pounds of bentonite powder and 7 gallons of water were mixed together and pumped through the tremie pipe down to the top of the bentonite seal. The grout displaced the remaining drilling fluid in the annular space, assuring a competent seal to stop infiltration of any surface water down the bore hole.

Each well was finished by installing either a steel protector pipe or drive-over box depending upon whether the well was finished above or below grade. Each well is secured by a locking cap and the elevation of the top of the protector pipe were surveyed into mean sea level datum by a registered surveyor.

Well Development

Each well was developed shortly after construction by lowering a 1-inch diameter pipe down to near the bottom of the well and forcing

air into the well, which blows water, fine sand, and drilling fluid out of the well. The development process was continued until the water is relatively free of mud and sand. The rate at which water was removed from each wall is listed in the main report. All fluids obtained during development were discharged into the sewer line, under an agreement which was arranged between SPARTON personnel and New Mexico Utilities, Inc.

APPENDIX B
to
ATTACHMENT 4

Hollow Stem Auger Drilling
and Well Construction Procedures

APPENDIX B

Auger Drilling and Well Construction Procedures

Borings MW-16 and 17 were drilled using a hollow-stem auger. MW-12 was drilled from 0 to 70 feet with a hollow stem auger and completed using a rotary rig. The following general drilling and construction procedures were used on all augered wells.

Equipment Set-up

Prior to the set-up of the auger rig on the prospective well site, all underground utilities are located to help assure that the boring will not hit the utilities. All equipment and materials are cleaned with a portable high-pressure steam cleaning machine to remove any material which could possibly cause any cross-contamination between bore holes.

Drilling Procedure

The hollow stem auger drilling procedure involves rotating a hollow auger into the soil. As the auger is rotated into the soil, cuttings are brought to the surface on the continuous flights surrounding the hollow stem. Samples of the formation were obtained by a 5-foot long core barrel in the hollow stem extended out past the bottom of the drill bit. No drilling fluid is used in this method which enables a more representative sample to be obtained.

Each soil sample was removed from the core barrel and classified according to the Unified Soil Classification System (USCS) into gravel, sand, silt, and clay mixtures to allow for an understanding of the three-dimensions geologic characteristic of the subsurface. The sampler was thoroughly cleaned with the steam cleaner between samples.

Well Construction

Upon augering the boring to its total depth, the coring mechanism is removed from the hollow stem augers and a 2-inch-diameter PVC well screen and casing was lowered through the hollow stem. The screen was manufactured by Timco, Inc. and consisted of 10- and 20-foot lengths of threaded and flush-jointed sections; the threads of the joints connecting the solid casing were wrapped with Teflon tape to make them leak-proof. The lengths and depths of casing and screen varied between each well; refer to main text for a discussion of the design of each individual well.

After the well had been placed at its correct position in the hollow stem, the augers were pulled up in the borehole to allow the natural formation to surround the screen. A thick bentonite slurry (approximately 3 pounds of bentonite per gallon of water) was pumped down the annular space to fill up the space above the natural sand pack. The auger was then removed in phases, filling the annulus space with mud as the flights were removed.

A neat grout with about 15 percent bentonite was added the next day to the top of the bentonite after slurry has settled.

Each well was finished by cementing a steel protector pipe with a locking cap over the PVC well. The elevation of both the top of the protector pipe and PVC well were surveyed into mean sea level datum by a registered surveyor.

Well Development

Each well was developed shortly after construction by bailing water, fine sand, and mud from the well. The development process was continued until the water was relatively free of mud and sand. All fluids obtained during bailing were discharged into a lined lagoon.

APPENDIX C
to
ATTACHMENT 4

Ground-Water Sampling
and Analytical Protocol

APPENDIX C

Ground-Water Sampling and Analytical Protocol

Introduction

This sampling and analysis protocol has been compiled for use at locations which require ground-water monitoring and sampling for volatile organic constituents (VOCs). The methods described are equivalent to other HLA sampling plans, such as the document used for sampling MW-1 through 4. This protocol includes procedures and techniques for:

1. Sample collection
2. Sample preservation and shipment
3. Chain of custody control
4. Analytical procedures

Before sample collection can begin, the water sampled from the well casing must be fresh aquifer water. Well purging replaces stagnant well water with representative aquifer water each time a set of samples is taken from the well.

There are no mandated procedures for sample collection, and shipment, only guidelines as contained in two Environmental Protection Agency

(EPA) recommended publications. The sample collection and preservation protocol maintains sample integrity while reducing collection time. It is adaptable to most ground-water monitoring wells and meets both state and federally-recommended guidelines.

Shipping and handling of samples will route the samples to Rocky Mountain Analytical, Arvada, Colorado for the analyses. The chain of custody control program lists all sample handlers, and provides for maximum protection against sample contamination. The recommended procedures for chain of custody control and holding time are followed in this protocol.

Sampling Equipment Water Depth

A battery-operated water-level indicator, such as Model DR-760A as manufactured by Soiltest, Inc., is used to measure water level within the well. This information, along with well construction data, will be used to calculate the volume of water standing in the well casing.

Field Measurements

Portable instruments are used if field measurements are to be obtained. Temperature and conductivity are measured using equipment such as a Yellow Springs Model 33 SCT Meter and an Orion Research Model 399 A/F meter to measure pH.

Well Evacuation

All 2-inch diameter monitoring wells will be purged with a gas squeeze pump or a PVC or Teflon bailer. Wells 4 inches in diameter and larger will be purged by bailing or with an electrical submersible pump. The well will be considered properly purged after four standing water volumes have been removed. In low-yielding wells, the standing water will be removed until the well is essentially dry. The water level in the well will be allowed to recover until a sufficient volume of water is present to obtain the samples.

Sample Collection

All samples for VOCs will be placed in 30 ml septum-seal vials with no headspace. Duplicate VOC samples will be obtained from all wells. Following collection and labeling, all samples will be stored in an ice-filled cooler.

After the well has been properly purged, a water sample will be obtained with a Teflon bailer or a gas squeeze pump.

Equipment Cleaning Procedures

Cleaning and sterilization of the bailer is accomplished by using either a 5 percent household bleach and water or with a dilute methanol solution. Following the cleaning, the bailer is thoroughly

rinsed with deionized water. The submersible pump and tubing, if transferred between wells, are rinsed with deionized water. Dedicated gas-squeeze pumps do not need to be cleaned.

Rocky Mountain Analytical laboratories provided all sample bottles which have been cleaned following EPA-recommended procedures.

Sample Shipment

All samples will be transported to the lab directly from the field. If necessary, insulated cartons and cold packs are available to maintain the temperature ($4^{o}C$) required for the preservation of samples. At the lab, the samples are routed for analysis with priorties based on sample holding times.

Chain of Custody Control

Sample identification numbers and sample name are recorded on a label affixed to each sample. Sample transfer is accomplished in groups with a chain of custody record. When a portion of the samples identified on the record form is to be transferred, the individual samples are noted in the column with the signature of the person relinquishing them. The sample collector is responsible for packaging and dispatching the samples, properly filling out, dating, and signing the chain of custody record form.

VOC Analytical Methodology

The method employed for the analysis of the volatile organic compounds was EPA Method 624 (Federal Register, December 3, 1979, page 69532). The method can be summarized as follows: helium is bubbled through a 5 ml. water sample contained in a specially designed purging chamber at ambient temperature. The purgeable volatile organic compounds are efficiently transferred from an aqueous phase to the vapor phase.

Vapor is swept through a sorbent column where the purgeables are trapped. After purging is completed, the sorbent column is heated and back flushed with helium to desorb the purgeables onto a gas chromtographic column. The gas chromatograph is temperature programmed to separate the purgeables which are then detected with a mass spectrometer.

Other Parameters

Information about analytical methods and sample containers is contained in documents prepared by Rocky Mountain Analytical Laboratory, and incorporated with this Appendix.

Quality Assurance Protocol

The quality assurance protocol followed in all sample analyses is based on the "Handbook for Analytical Control in Water and Wastewater Laboratories," EPA 600/4-79-019, March 1979; National Enforcement Investigation Center Policies and Procedures manual; EPA-330/9/79/001-R, October 1979; and the recommended guidelines to EPA Method 624 and 625.

SAMPLE DESCRIPTION INFORMATION

for

Sparton Technology, Inc.

RMA Sample No.	Sample Description	Sample Type	Date Sampled	Date Received
4333-01	MW-13	Water	10/4/84	10/6/84
4333-02	MW-14	Water	10/4/84	10/6/84
4333-03	MW-15	Water	10/4/84	10/6/84
4333-04	MW-16	Water	10/5/84	10/6/84
4333-05	MW-17	Water	10/5/84	10/6/84
4333-06	PW-1-1	Water	10/7/84	10/11/84
4333-07	PW-1-4	Water	10/8/84	10/11/84
4333-08	MW-16	Water	10/10/84	10/11/84
4333-09	MW-17	Water	10/10/84	10/11/84

October 31, 1984

ANALYTICAL RESULTS

for

Sparton Technology, Inc.

INORGANIC PARAMETERS

Parameter	Units	Detection Limit	4333-01	4333-02	4333-03	4333-04	4333-05	4333-06	4333-07	4333-08	4333-09
pH	units	0.01	7.43	7.61	7.68	7.17	7.90	8.03	7.82	7.30	7.94
Specific Conductance at 25°C	umhos/cm	1	1090	1290	885	5300	695	801	798	5960	748
Fluoride	mg/l	0.1	1.1	0.8	0.8	7.9	1.5	0.8	0.7	6.9	1.4
Nitrate as N	mg/l	0.1	0.6	1.0	4.4	ND	ND	0.7	0.8	ND	0.2
Sulfate	mg/l	5	148	192	146	2180	98	130	130	2320	102
Total Organic Carbon	mg/l	0.1	5.2	5.9	2.7	54	5.1	3.8	6.0	71	4.8
Total Organic Halogen	ugCl^-/l	5	3600	3700	1100	15000	3100	380	210	25000	2500
Total Kjeldahl Nitrogen as N	mg/l	0.1	3.1	1.0	0.5	310	1.5	0.6	0.3	380	1.0
Hexavalent Chromium	mg/l	0.01	ND	0.60	ND	ND	ND	ND	0.01	0.01	ND
Phenolics	mg/l	0.01	0.01	ND	ND	0.04	ND	ND	ND	0.04	ND

TOTAL TRACE METALS

Parameter	Units	Detection Limit	4333-01	4333-02	4333-03	4333-04	4333-05	4333-06	4333-07	4333-08	4333-09
Boron	mg/l	0.004	2.6	2.0	0.16	14	0.19	0.18	0.16	20	0.18
Cadmium	mg/l	0.002	0.003	ND	ND	0.003	0.013	ND	ND	0.012	0.006
Chromium	mg/l	0.005	0.038	0.58	ND	0.75	0.27	ND	ND	2.3	0.092
Manganese	mg/l	0.005	2.0	0.76	0.060	17	4.1	1.1	1.1	25	2.7
Nickel	mg/l	0.01	0.04	0.04	ND	0.40	0.11	ND	ND	0.68	0.05
Sodium	mg/l	0.5	79	77	54	200	69	56	54	266	56

ND = Not detected. NR = Not requested.

ANALYTICAL RESULTS

for

Sparton Technology, Inc.

VOLATILE ORGANICS - PRIORITY POLLUTANTS

Parameter		Units	Detection Limit	4333-01	4333-02	4333-03	4333-04	4333-05	4333-06	4333-07	4333-08	4333-09
1V	Acrolein	ug/l	100	ND	ND	ND	ND	ND	ND	ND	ND	ND
2V	Acrylonitrile	ug/l	100	ND	ND	ND	ND	ND	ND	ND	ND	ND
3V	Benzene	ug/l	5	ND	9	ND	58	ND	ND	ND	56	6
4V	Bis(chloromethyl)ether	ug/l	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
5V	Bromoform	ug/l	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
6V	Carbon tetrachloride	ug/l	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
7V	Chlorobenzene	ug/l	5	ND	ND	ND	16	ND	ND	ND	17	ND
8V	Chlorodibromomethane	ug/l	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
9V	Chloroethane	ug/l	10	ND	ND	ND	45	ND	ND	ND	27	ND
10V	2-Chloroethylvinyl ether	ug/l	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
11V	Chloroform	ug/l	5	15	34	ND	25	ND	ND	ND	33	ND
12V	Dichlorobromomethane	ug/l	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
13V	Dichlorodifluoromethane	ug/l	10	ND	ND	ND	ND	ND	ND	ND	ND	ND
14V	1,1-Dichloroethane	ug/l	5	13	17	ND	3200	1900	ND	ND	2700	2100
15V	1,2-Dichloroethane	ug/l	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
16V	1,1-Dichloroethylene	ug/l	5	820	1000	85	3100	260	13	9	3700	460
17V	1,2-Dichloropropane	ug/l	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
18V	1,3-Dichloropropylene	ug/l	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
19V	Ethylbenzene	ug/l	5	ND	ND	ND	63	ND	ND	ND	53	ND
20V	Methylbromide	ug/l	10	ND	ND	ND	ND	ND	ND	ND	ND	ND
21V	Methylchloride	ug/l	10	ND	ND	ND	70	ND	ND	ND	23	ND
22V	Methylene chloride	ug/l	10	1700	3600	11	49000	17	330	170	51000	66
23V	1,1,2,2-Tetrachloroethane	ug/l	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
24V	Tetrachloroethylene	ug/l	5	17	25	34	140	53	ND	ND	140	77
25V	Toluene	ug/l	5	45	6	ND	1600	50	ND	ND	1400	32
26V	1,2-trans-Dichloroethylene	ug/l	5	ND	ND	ND	200	19	ND	ND	140	21
27V	1,1,1-Trichloroethane	ug/l	5	4600	4100	2200	5500	2300	31	21	6700	2900
28V	1,1,2-Trichloroethane	ug/l	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
29V	Trichloroethylene	ug/l	5	6900	12000	4400	37000	4300	200	130	38000	6200
30V	Trichlorofluoromethane	ug/l	10	ND	ND	ND	ND	ND	ND	ND	ND	ND
31V	Vinyl chloride	ug/l	10	ND	ND	ND	ND	ND	ND	ND	ND	ND

ND = Not detected. NR = Not requested.

ANALYTICAL RESULTS

for

Sparton Technology, Inc.

VOLATILE ORGANICS - ADDITIONAL COMPONENTS

Parameter	Units	Detection Limit	4333-01	4333-02	4333-03	4333-04	4333-05	4333-06	4333-07	4333-08	4333-09
Acetone	ug/l	10	ND	ND	ND	17000	28	ND	ND	22000	53
Ethanol	ug/l	400	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-Hexanone	ug/l	10	ND	ND	ND	ND	ND	ND	ND	ND	ND
Meta-xylene*	ug/l	5	ND	ND	ND	42	ND	ND	ND	32	ND
Ortho, Para-xylene*	ug/l	5	ND	ND	ND	84	ND	ND	ND	67	ND
Trichlorotrifluoroethane	ug/l	5	24	9	48	73	35	ND	ND	90	67

ND = Not detected. NR = Not requested.

*Please note that xylene = dimethylbenzene. The ortho and para isomers are not resolved chromatographically and are therefore reported together. Adding the ortho,para and meta results together gives the total xylene (dimethylbenzene) results.

SAMPLE DESCRIPTION INFORMATION

for

Sparton Technology, Inc., Inc.

RMA Sample No.	Sample Description	Sample Type	Date Sampled	Date Received
4346-01	PW-1-2	Water	10/8/84	10/11/84
4346-02	PW-1-3	Water	10/8/84	10/11/84

October 31, 1984

ANALYTICAL RESULTS

for

Sparton Technology, Inc.

INORGANIC PARAMETERS

Parameter	Units	Detection Limit	4346-01	4346-02
pH	units	0.01	7.86	7.85
Specific Conductance at 25°C	umhos/cm	1	791	789
Total Organic Carbon	mg/l	0.1	5.8	3.5
Total Organic Halogen	ugCl^-/l	5	240	210

VOLATILE ORGANICS

Parameter	Units	Detection Limit	4346-01	4346-02
16V 1,1-Dichloroethylene	ug/l	5	16	12
29V Trichloroethylene	ug/l	5	150	110

ND = Not detected. NR = Not requested.

SAMPLE DESCRIPTION INFORMATION

for

Sparton Technology, Inc.

RMA Sample No.	Sample Description	Sample Type	Date Sampled	Date Received
4216-01	MW-12	Water	8/29/84	8/30/84

September 28, 1984

ANALYTICAL RESULTS

for

Sparton Technology

.NORGANIC PARAMETERS

'arameter	Units	Detection Limit	4216-01
)H	units	0.01	7.65
;pecific Conductance at 25°C	umhos/cm	1	769
·luoride	mg/l	0.1	0.3
:hloride	mg/l	3	23
Nitrite as N	mg/l	0.01	0.02
Nitrate as N	mg/l	0.01	1.3
)rtho-Phosphate as P	mg/l	0.01	ND
;ulfate	mg/l	5	136
'otal Organic Carbon	mg/l	0.1	1.7
'otal Organic Halogen	mg/l	5	74
\mmonia as N	mg/l	0.1	ND
Phenolics	mg/l	0.01	ND
:hromium +3	mg/l	0.005	ND
Hexvalent Chromium	mg/l	0.005	ND

ND = Not detected. NR = Not requested.

ANALYTICAL RESULTS

for

Sparton Technology

TRACE METALS

Parameter	Units	Detection Limit	4216-01
Arsenic	mg/l	0.002	0.006
Barium	mg/l	0.005	0.21
Boron	mg/l	0.004	0.12
Cadmium	mg/l	0.002	0.005
Chromium	mg/l	0.005	ND
Copper	mg/l	0.002	0.005
Iron	mg/l	0.05	0.09
Lead	mg/l	0.025	ND
Manganese	mg/l	0.005	0.98
Mercury	mg/l	0.0002	ND
Molybdenum	mg/l	0.005	0.012
Nickel	mg/l	0.01	ND
Selenium	mg/l	0.002	ND
Silver	mg/l	0.003	ND
Sodium	mg/l	0.5	54
Tin	mg/l	0.03	ND
Zinc	mg/l	0.004	0.055

ND = Not detected. NR = Not requested.

Rocky Mountain Analytical Laboratory

ANALYTICAL RESULTS

for

Sparton Technology

/OLATILE ORGANICS

Parameter		Units	Detection Limit	4216-01
V	Acrolein	ug/l	100	ND
:V	Acrylonitrile	ug/l	100	ND
;V	Benzene	ug/l	5	ND
;V	Bis(chloromethyl)ether	ug/l	5	ND
;V	Bromoform	ug/l	5	ND
;V	Carbon tetrachloride	ug/l	5	ND
'V	Chlorobenzene	ug/l	5	ND
;V	Chlorodibromomethane	ug/l	5	ND
;V	Chloroethane	ug/l	10	ND
0V	2-Chloroethylvinyl ether	ug/l	5	ND
1V	Chloroform	ug/l	5	ND
2V	Dichlorobromomethane	ug/l	5	ND
3V	Dichlorodifluoromethane	ug/l	10	ND
4V	1,1-Dichloroethane	ug/l	5	ND
5V	1,2-Dichloroethane	ug/l	5	ND
6V	1,1-Dichloroethylene	ug/l	5	ND
7V	1,2-Dichloropropane	ug/l	5	ND
8V	1,3-Dichloropropylene	ug/l	5	ND
9V	Ethylbenzene	ug/l	5	ND
0V	Methylbromide	ug/l	10	ND
1V	Methylchloride	ug/l	10	20
2V	Methylene chloride	ug/l	10	ND
3V	1,1,2,2-Tetrachloroethane	ug/l	5	ND
4V	Tetrachloroethylene	ug/l	5	ND
5V	Toluene	ug/l	5	ND
6V	1,2-trans-Dichloroethylene	ug/l	5	ND
7V	1,1,1-Trichloroethane	ug/l	5	ND
8V	1,1,2-Trochloroethane	ug/l	5	ND
9V	Trichloroethylene	ug/l	5	61
0V	Trichlorofluoromethane	ug/l	10	ND
1V	Vinyl chloride	ug/l	10	ND

ND = Not detected. NR = Not requested.

ANALYTICAL RESULTS

for

Sparton Technology

/OLATILE ORGANICS

'arameter	Units	Detection Limit	4216-01
Acetone	ug/l	10	ND
Ethanol	ug/l	10	ND
Freon	ug/l	5	ND
2-Hexanone	ug/l	10	ND
Xylene (Dimethyl benzene)	ug/l	5	ND
O-Xylene (Dimethyl benzene)	ug/l	5	ND

ID = Not detected. NR = Not requested.

SAMPLE DESCRIPTION INFORMATION

for

Sparton Technology

RMA Sample No.	Sample Description	Sample Type	Date Sampled	Date Received
4208-01	Boring MW-16 5-10'	Soil	8/16/84	8/25/84
4208-02	Boring MW-16 10-15'	Soil	8/16/84	8/25/84
4208-03	Boring MW-16 15-20'	Soil	8/16/84	8/25/84
4208-04	Boring MW-16 20-25'	Soil	8/16/84	8/25/84
4208-05	Boring MW-16 25-30'	Soil	8/16/84	8/25/84
4208-06	Boring MW-16 30-35'	Soil	8/16/84	8/25/84
4208-07	Boring MW-16 35-40'	Soil	8/16/84	8/25/84
4208-08	Boring MW-16 40-45'	Soil	8/16/84	8/25/84
4208-09	Boring MW-16 45-50'	Soil	8/16/84	8/25/84
4208-10	Boring MW-16 50-55'	Soil	8/20/84	8/25/84
4208-11	Boring MW-16 55-60'	Soil	8/20/84	8/25/84
4208-12	Boring MW-16 60-65'	Soil	8/20/84	8/25/84
4208-13	Boring MW-16 65-70'	Soil	8/20/84	8/25/84
4208-14	Boring MW-16 70-73'	Soil	8/20/84	8/25/84

October 3, 1984

ANALYTICAL RESULTS

for

Sparton Technology

INORGANIC PARAMETERS

Parameter	Units	Detection Limit	4208-01	4208-02	4208-03	4208-04	4208-05	4208-06	4208-07	4208-08	4208-09	4208-10
pH	units	0.01	7.76	8.25	8.55	8.22	8.27	7.60	8.00	7.52	7.79	7.71
Total Organic Halogen	$mgCl^-/kg$	100	NR	NR	ND	NR	NR	NR	ND	NR	NR	NR
Total Cyanide	mg/kg	0.25	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Hexavalent Chromium, EP TOX	mg/l	0.01	ND	ND	0.02	0.02	ND	3.6	8.9	1.6	0.5	0.81
% Solids	%	0.1	94.0	97.0	97.5	95.6	92.6	95.4	94.2	91.3	94.0	93.5

Parameter	Units	Detection Limit	4208-11	4208-12	4208-13	4208-14
pH	units	0.01	8.27	8.20	8.17	8.08
Total Organic Halogen	$mgCl^-/kg$	100	ND	NR	NR	NR
Total Cyanide	mg/kg	0.25	ND	ND	ND	ND
Hexavalent Chromium, EP TOX	mg/l	0.01	ND	ND	ND	ND
% Solids	%	0.1	87.2	87.2	91.9	86.6

ND = Not detected. NR = Not requested.

Rocky Mountain Analytical Laboratory

ANALYTICAL RESULTS

for

Sparton Technology

:P TOXICITY METALS

'arameter	Units	Detection Limit	4208-01	4208-02	4208-03	4208-04	4208-05	4208-06	4208-07	4208-08	4208-09	4208-10
'admium	mg/l	0.002	ND	ND	0.003	ND	ND	0.003	0.006	0.028	0.013	0.005
'hromium	mg/l	0.005	ND	0.027	0.060	0.048	0.083	4.1	8.6	2.1	0.70	1.1
ead	mg/l	0.025	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
ickel	mg/l	0.01	0.01	0.02	0.027	0.01	0.027	0.13	0.19	0.12	0.11	0.11
ilver	mg/l	0.003	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

'arameter	Units	Detection Limit	4208-11	4208-12	4208-13	4208-14
'admium	mg/l	0.002	ND	ND	ND	ND
'hromium	mg/l	0.005	ND	ND	0.011	0.007
ead	mg/l	0.025	ND	ND	ND	ND
ickel	mg/l	0.01	0.045	0.026	0.050	0.045
ilver	mg/l	0.003	ND	ND	ND	ND

ID = Not detected. NR = Not requested.

Rocky Mountain Analytical Laboratory

ANALYTICAL RESULTS

for

Sparton Technology

OTAL TRACE METALS

'arameter	Units	Detection Limit	4208-01	4208-02	4208-03	4208-04	4208-05	4208-06	4208-07	4208-08	4208-09	4208-10
:adinium	mg/kg	0.1	0.8	0.7	0.8	0.9	0.9	1.0	1.1	2.6	1.1	0.5
'hromium	mg/kg	0.3	3.2	7.7	6.7	8.4	8.6	350	500	480	80	130
.ead	mg/kg	1.3	3.4	3.4	3.6	3.2	3.0	ND	2.1	2.7	4.2	2.7
Iickel	mg/kg	0.5	3.3	4.3	4.4	4.0	4.6	30	41	38	14	13
ilver	mg/kg	0.2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ppm

'arameter	Units	Detection Limit	4208-11	4208-12	4208-13	4208-14
:adinium	mg/kg	0.1	0.6	0.4	1.0	1.2
:hromium	mg/kg	0.3	9.8	24	52	69
.ead	mg/kg	1.3	3.6	2.3	3.6	3.5
Iickel	mg/kg	0.5	5.6	4.8	9.8	7.5
ilver	mg/kg	0.2	ND	ND	ND	ND

ID = Not detected. NR = Not requested.

Results given on a dry weight basis.

SUMMARY OF ANALYTICAL RESULTS AND METHODOLOGY

for

Sparton Technology, Inc. - November 1984 Sampling

As shown on the Sample Description Information sheet, RMAL received eleven samples in late November, 1984.

Results

Analytical results are presented in the enclosed tables. In general, all results are reported in mg/l (ppm). This represents a change over previous reports. This change was made to better permit cross comparison of the GC/MS results to results from other determinations.

These data are consistent with previous reports with one exception, volatile organic compound concentration, for sample MW-11. Previously (RMA #3339), volatile organics were detected in this sample in concentrations varying from .09 to .8 mg/l. The data reported for this sample in this report shows the compounds to be not detected. A review of both reports has not revaled any obvious errors. The current values appear to be correct based on the TOX value of only 0.006 ug/l. In general, the sum of the volatile organics and the TOX values correlate very well for this set of data.

Note that the results for MW-1 are consistent with the previous data in that the 1,1-dichloroethane is substantially less than the 1,1-dichloroethylene. The previous results for MW-16 still cannot be explained.

Analytical Methods

In general, all analyses were in accordance with standard EPA methodology as promulgated in 40 CFR 136. The enclosed table of Inorganic Analytical Methodology summarizes the methods for all parameters except organics.

The volatile organic species were determined by a combination of both GC and GC/MS. All of the priority pollutant organics listed in Table 4 were determined by GC/MS using EPA Method 624. Furthermore, with the exception of ethanol, all of the additional organics listed in Table 5 were also determined by GC/MS. These six organics (including ethanol) were also determined by direct aqueous injection GC/FID using a variation of EPA Method 603. This technique was also used to quantify high concentrations of volatile priority pollutants.

SAMPLE DESCRIPTION INFORMATION

[illegible] ON ANALYTICAL RESULTS AND METHODOLOGY
for

Sparton Technology, Inc.

RMA Sample No.	Sample Description	Sample Type	Date Sampled	Date Received
4466-01	MW-10	Water	11/20/84	11/21/84
4466-02	MW-11	Water	11/20/84	11/21/84
4466-03	MW-5	Water	11/28/84	11/29/84
4466-04	MW-6	Water	11/28/84	11/29/84
4466-05	MW-7	Water	11/27/84	11/29/84
4466-06	MW-8	Water	11/27/84	11/29/84
4466-07	MW-9	Water	11/27/84	11/29/84
4466-08	MW-1	Water	11/29/84	11/30/84
4466-09	MW-2	Water	11/29/84	11/30/84
4466-10	MW-3	Water	11/29/84	11/30/84
4466-11	MW-4	Water	11/29/84	11/30/84

December 31, 1984

TABLE 1. ANALYTICAL RESULTS FOR INORGANIC PARAMETERS, WELLS 5-11

Parameter	Units	Detection Limit	MW-10	MW-11	MW-5	MW-6	MW-7	MW-8	MW-9
Sparton #									
RMA #			4466-01	4466-02	4466-03	4466-04	4466-05	4466-06	4466-07
pH	units	0.01	7.74	7.76	7.64	7.50	7.43	7.50	6.70
Specific Conductance at 25°C	umhos/cm	1	702	699	721	866	692	763	2350
Fluoride	mg/l	0.1	0.2	0.2	0.4	0.3	0.3	0.3	0.3
Nitrate as N	mg/l	0.01	0.2	0.5	1.8	16	3.3	7.4	ND
Sulfate	mg/l	5	119	118	112	120	85	80	372
Total Organic Carbon	mg/l	0.1	3.0	2.2	3.8	6.1	3.6	5.5	14
Total Organic Halogen	$mgCl^-/l$	5	0.040	0.006	0.22	0.45	0.85	0.18	21
Total Kjeldahl Nitrogen as N	mg/l	0.1	0.4	0.6	0.6	0.1	0.2	0.4	1.7
Phenolics	mg/l	0.01	ND	ND	ND	ND	ND	ND	0.02
Hexavalent Chromium	mg/l	0.01	ND	ND	ND	ND	0.02	ND	ND
Trivalent Chromium	mg/l	0.01	ND	ND	ND	ND	ND	ND	ND

ND = Not detected.

TABLE 2. ANALYTICAL RESULTS FOR INORGANIC PARAMETERS, WELLS 1-4

Parameter	Units	Detection Limit	MW-1	MW-2	MW-3	MW-4
Sparton #			MW-1	MW-2	MW-3	MW-4
RMA #			4466-08	4466-09	4466-10	4466-11
pH Value 1	units	0.01	7.73	7.50	7.48	8.17
pH Value 2	units	0.01	7.75	7.60	7.48	8.18
pH Value 3	units	0.01	7.72	7.57	7.47	8.17
pH Value 4	units	0.01	7.71	7.59	4.48	8.17
Specific Conductance at 25°C	umhos/cm	1	3450	714	4250	996
Specific Conductance at 25°C	umhos/cm	1	3420	711	4250	981
Specific Conductance at 25°C	umhos/cm	1	3410	716	4260	979
Specific Conductance at 25°C	umhos/cm	1	3410	710	4250	978
Fluoride	mg/l	0.1	0.4	0.3	0.8	0.4
Nitrate as N	mg/l	0.01	0.9	3.7	1.5	2.3
Sulfate	mg/l	5	285	112	810	150
Total Organic Carbon Value 1	mg/l	0.1	47	1.1	86	1.8
Total Organic Carbon Value 2	mg/l	0.1	49	1.0	86	1.8
Total Organic Carbon Value 3	mg/l	0.1	48	1.0	85	1.8
Total Organic Carbon Value 4	mg/l	0.1	47	1.0	85	1.8
Total Organic Halogen Value 1	mg/Cl^-/l	0.005	45	2.8	86	14
Total Organic Halogen Value 2	mg/Cl^-/l	0.005	45	2.3	68	14
Total Organic Halogen Value 3	mg/Cl^-/l	0.005	42	2.7	74	14
Total Organic Halogen Value 4	mg/Cl^-/l	0.005	39	2.5	80	12
Total Kjeldahl Nitrogen as N	mg/l	0.1	17	0.5	34	0.7
Phenolics	mg/l	0.01	ND	0.01	0.03	ND
Hexavalent Chromium	mg/l	0.01	24	ND	1.0	ND
Trivalent Chromium	mg/l	0.01	ND	ND	ND	ND

ND = Not detected.

TABLE 3. ANALYTICAL RESULTS FOR TRACE METALS

Parameter	Units	Detection Limit	MW-10 4466-01	MW-11 4466-02	MW-5 4466-03	MW-6 4466-04	MW-7 4466-05	MW-8 4466-06	MW-9 4466-07	MW-1 4466-08	MW-2 4466-09	MW-3 4466-10	MW-4 4466-11
Sparton # / RMA #													
Boron	mg/l	0.05	ND	ND	0.12	0.25	0.11	0.37	13	4.4	0.06	32	1.6
Cadmium	mg/l	0.009	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chromium	mg/l	0.01	0.01	0.01	ND	ND	0.021	ND	ND	22	0.022	0.64	ND
Manganese	mg/l	0.006	0.93	0.78	0.68	0.34	0.03	ND	1.9	1.4	0.009	4.2	0.14
Nickel	mg/l	0.006	0.02	0.006	ND	0.005	ND	ND	0.19	0.042	ND	0.73	0.034
Sodium	mg/l	0.5	39	38	71	71	45	75	149	120	49	210	55

ND = Not detected.

TABLE 4. ANALYTICAL RESULTS FOR VOLATILE PRIORITY POLLUTANT ORGANICS

			Concentration, mg/l										
	Sparton #		MW-10	MW-11	MW-5	MW-6	MW-7	MW-8	MW-9	MW-1	MW-2[2]	MW-3[2]	MW-4[3]
	RMA #		4466-01	4466-02	4466-03	4466-04	4466-05	4466-06	4466-07	4466-08	4466-09	4466-10	4466-11
	Parameter	Detection Limit											
1V	Acrolein	0.10	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2V	Acrylonitrile	0.10	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
3V	Benzene	0.005	ND	ND	ND	ND	ND	ND	0.016	0.050	ND	0.083	ND
4V	Bis(chloromethyl)ether	0.005	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
5V	Bromoform	0.005	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
6V	Carbon tetrachloride	0.005	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
7V	Chlorobenzene	0.005	ND	ND	ND	ND	ND	ND	ND	0.006	ND	0.060	ND
8V	Chlorodibromomethane	0.005	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
9V	Chloroethane	0.010	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
10V	2-Chloroethylvinyl ether	0.005	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
11V	Chloroform	0.005	ND	ND	ND	ND	ND	ND	0.057	0.16	ND	0.15	ND
12V	Dichlorobromomethane	0.005	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
13V	Dichlorodifluoromethane	0.010	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
14V	1,1-Dichloroethane	0.005	ND	ND	ND	ND	ND	ND	0.12	0.015	ND	0.061	ND
15V	1,2-Dichloroethane	0.005	ND	ND	ND	ND	ND	ND	ND	0.020	ND	0.050	ND
16V	1,1-Dichloroethylene	0.005	ND	ND	0.007	0.028	0.11	22	1.2	1.4	0.16	4.8	1.0
17V	1,2-Dichloropropane	0.005	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
18V	1,3-Dichloropropylene	0.005	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
19V	Ethylbenzene	0.005	ND	ND	ND	ND	ND	ND	0.013	0.086	ND	ND	ND
20V	Methylbromide	0.010	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
21V	Methylchloride	0.010	16	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
22V	Methylene chloride	0.010	ND	ND	ND	ND	ND	ND	5.2	17	0.035	57	2.3
23V	1,1,2,2-Tetrachloroethane	0.005	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.086	ND
24V	Tetrachloroethylene	0.005	ND	ND	ND	ND	ND	ND	0.060	0.12	ND	0.50	ND
25V	Toluene	0.005	ND	ND	ND	ND	ND	ND	0.29	1.4	0.042	3.2	ND
26V	1,2-trans-Dichloroethylene	0.005	ND	ND	ND	ND	ND	ND	0.011	ND	ND	ND	ND
27V	1,1,1-Trichloroethane	0.005	0.005	ND	0.070	0.081	0.18	0.082	6.9	2.8	0.86	27	4.4
28V	1,1,2-Trichloroethane	0.005	ND	ND	ND	ND	ND	ND	0.11	0.16	ND	0.42	ND
29V	Trichloroethylene	0.005	0.012	ND	0.14	0.31	0.53	0.25	9.6	23	2.1	59	7.4
30V	Trichlorofluoromethane	0.010	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
31V	Vinyl chloride	0.010	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Notes

1. ND = Not detected.
2. Detection limit 10x those listed.
3. Detection limit 100x those listed.

TABLE 5. ANALYTICAL RESULTS FOR NON-PRIORITY POLLUTANT VOLATILE ORGANICS

		Concentration, mg/l										
Sparton #		MW-10	MW-11	MW-5	MW-6	MW-7	MW-8	MW-9	MW-1	MW-2[2]	MW-3[1]	MW-4[2]
RMA #		4466-01	4466-02	4466-03	4466-04	4466-05	4466-06	4466-07	4466-08	4466-09	4466-10	4466-11
Parameter	Detection Limit											
Acetone	0.010	ND[3]	ND	ND	ND	ND	ND	0.033	6.0	0.069	56	ND
Ethanol	0.50	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-Hexanone	0.010	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichorotrifluoroethane	0.005	ND	ND	ND	0.061	0.073	ND	0.20	0.16	0.11	0.47	0.17
m-Xylene	0.005	ND	ND	ND	ND	ND	ND	0.007	0.033	ND	0.020	ND
o,p-Xylene[4]	0.005	ND	ND	ND	ND	ND	ND	0.015	0.036	ND	0.042	ND

Notes

1. Detection limit 10 x those listed.
2. Detection limit 100 x those listed.
3. ND = Not detected.
4. o-Xylene & p=Xylene reported together.

ROCKY MOUNTAIN ANALYTICAL LABORATORY

Organic Analytical Methodology

Parameter	Units	Nominal Detection Limit[a]	Methodology	Reference[1]	Preservation Bottle No.	Maximum Holding Time[b]
Purgeables	ug/l	1	Purge & Trap GC/MS	624	11	14 days
Base/Neutrals	ug/l	10	Extraction/GC/MS	625	12	7 days/40 days
Acids	ug/l	10	Extraction/GC/MS	625	12	7 days/40 days
Organochlorine Pesticides/PCB's	ug/l	0.01	Extraction/GC/ECD	608	13	7 days/40 days
		10	Extraction/GC/MS	625	12	7 days/40 days
Phenoxy Herbicides	ug/l	0.01	Extraction/GC/ECD	(2)	14	7 days/40 days
Total Organic Halogen (TOX)	ug/l	5	Adsorbtion/Coulometric	450.1(3)	15	-
Trihalomethanes (THM)	ug/l	1	Extraction/GC/ECD	(4)	11	14 days
		1	Purge & Trap GC/MS	(4)	11	14 days
Dioxin	ug/l	0.005	Extraction/GC/MS/ECD	613	16	7 days/40 days
Purgeable Halocarbons	ug/l	0.01	Purge & Trap/GC/Hall	601	11	14 days
Purgeable Aromatics	ug/l	1	Purge & Trap/GC/FID	602	17	14 days
Acrolein & Acrylonitrile	ug/l	100	Purge & Trap/GC/FID	603	18	14 days
Phenols by GC	ug/l	10	Extraction/GC/FID	604	16	7 days/40 days
Benzidines	ug/l	0.1	Extraction/HPLC	605	19	7 days/40 days
Phthalate Esters	ug/l	10	Extraction/GC/FID	606	12	7 days/40 days
Nitrosamines	ug/l	1	Extraction/GC/NPD	607	20	7 days/40 days
Nitroaromatics/isophorone	ug/l	1	Extraction/GC/FID & GC/ECD	609	12	7 days/40 days
Polynuclear Aromatics	ug/l	0.5	Extraction/HPLC	610	20	7 days/40 days
Haloethers	ug/l	1	Extraction/GC/Hall	611	17	7 days/40 days
Chlorinated Hydrocarbons	ug/l	0.02	Extraction/GC/ECD	612	12	7 days/40 days
Organophosphorus Pesticides	ug/l	0.1	Extraction/GC/NPD	622(5)	12	7 days/40 days
Triazine Pesticides	ug/l	0.1	Extraction/GC/NPD	(6)	12	7 days/40 days

References

(1) Federal Register, Vol. 44, No. 233, Monday, December 3, 1979.
(2) "Method for Chlorinated Phenoxy Acid Herbicides in Industrial Effluents," Federal Register, Vol. 38, No. 75, Part II.
(3) "Total Organic Halide," US EPA-EMSL, Cincinnati, November, 1980.
(4) Federal Register, Vol. 44, No. 231, Thursday, November 29, 1979, Appendix, Part I.
(5) "Method 622- Organophosphorus Pesticides," Proposed EPA Method, 304 (h) Committee.
(6) Federal Register, Vol. 38, No. 75, 1973.

Notes

[a] Nominal values are the best achievable with the listed analytical method for a typical component. Interferrences in specific samples may result in a higher detection limit.

[b] Applicable to NPDES Wastes as updated by Robert C. Booth, Director, EMSL-Cincinnati, September 22, 1981. Where two times are given, the first refers to the time to extraction, the second to the time of instrumental analysis.

ROCKY MOUNTAIN ANALYTICAL LABORATORY

Organic Analytical Methodology (continued)

Preservation Bottle No.	Parameter Group	Bottle	Preservation
11	Purgeables	40 ml glass with teflon lined silicone septum cap	4°C (thiosulfate if Cl_2 present)
17	Purgeables	40 ml glass with teflon lined silicone septum cap	4°C, HCl to pH less than 2 (thiosulfate if Cl_2 present)
18	Purgeables	40 ml glass with teflon lined silicone septum cap	4°C, adjust pH to 4 - 5 (thiosulfate if Cl_2 present)
16	Extractables	1 liter glass with teflon lined cap	4°C (thiosulfate if Cl_2 present)
19	Extractables	1 liter glass with teflon lined cap	4°C, adjust pH to 2 - 7 (thiosulfate if Cl_2 present)
12, 13, 14	Extractables	1 liter glass with teflon lined cap	4°C
20	Extractables	1 liter glass with teflon lined cap	4°C, store in dark (thiosulfate is Cl_2 present)
15	TOX	250 ml glass with teflon lined cap, single 1 liter glass with teflon lined cap, quad.	4°C, store in dark (thiosulfate if Cl_2 present)

ROCKY MOUNTAIN ANALYTICAL LABORATORY

Inorganic Analytical Methodology

Parameter	Units	Nominal Detection Limit[a]	Methodology	Reference	Preservation Bottle No.	Maximum HoldingTime[b]
MAJOR IONS						
Sodium	mg/l	0.5	ICP Emission Spectroscopy	3	4	6 months
Potassium	mg/l	0.3	ICP Emission Spectroscopy	3	4	6 months
Calcium	mg/l	0.1	ICP Emission Spectroscopy	3	4	6 months
Magnesium	mg/l	0.1	ICP Emission Spectroscopy	3	4	6 months
Chloride	mg/l	3	Manual Titrimetric, $Hg(NO_3)_2$	1-325.3/2-407B	1	28 days
			Automated Colorimetric Ferricyanide	1-325.2	1	28 days
Fluoride	mg/l	0.1	Electrode	1-340.2/2-413B	1	28 days
Sulfate	mg/l	5	Manual Turbidimetric	1-375.4/2-426C	1	28 days
			Automated Colorimetric MTB	1-375.2	1	28 days
Total Alkalinity as $CaCO_3$ at pH 4.5	mg/l	5	Titrimetric	1-310.1/2-403	1	14 days
Carbonate Alkalinity as $CaCO_3$ at pH 8.3	mg/l	5	Titrimetric	1-310.1/2-403	1	14 days
Bicarbonate Alkalinity as $CaCO_3$ at pH 4.5	mg/l	5	Titrimetric	1-310.1/2-403	1	14 days
Hydroxide Alkalinity as $CaCO_3$	mg/l	5	Calculation	2-403	-	-
Nitrate+Nitrite as N	mg/l	0.1	Manual Cd Reduction - Colorimetric	1-353.3/2-418C	2	28 days
		0.1	Automated Cd Reduction - Colorimetric	1-353.2	2	28 days
Total Cations	meq/l	0.1	Calculation	2-104C	-	-
Total Anions	meq/l	0.1	Calculation	2-104C	-	-
Difference	%	0.1	Calculation	2-104C	-	-
RADIOCHEMISTRY						
Gross Alpha	pCi/l	0.1	Proportional Counter	2-703	5	6 months
Gross Beta	pCi/l	0.1	Proportional Counter	2-703	5	6 months
Radium 226	pCi/l	0.1	Separation - Counter	2-705	5	6 months
Radium 228	pCi/l	0.1	Separation - Counter	2-707	5	6 months
Uranium	mg/l	0.005	Fluorimetric	4-D2907-75	5	6 months

ROCKY MOUNTAIN ANALYTICAL LABORATORY

Inorganic Analytical Methodology (Continued)

Parameter	Units	Nominal Detection Limit[a]	Methodology	Reference	Preservation Bottle No.	Maximum HoldingTime[b]
TRACE METALS[c]						
Aluminum	mg/l	0.05	ICP Emission Spectroscopy	3	4	6 months
Antimony	mg/l	0.002	Furnace Atomic Absorption	1-204.2	4	6 months
Arsenic	mg/l	0.002	Furnace Atomic Absorption	1-206.2	4	6 months
Barium	mg/l	0.005	ICP Emission Spectroscopy	3	4	6 months
Beryllium	mg/l	0.001	ICP Emission Spectroscopy	3	4	6 months
Boron	mg/l	0.004	ICP Emission Spectroscopy	3	4	6 months
Cadmium	mg/l	0.002	ICP Emission Spectroscopy	3	4	6 months
Chromium	mg/l	0.005	ICP Emission Spectroscopy	3	4	6 months
Cobalt	mg/l	0.003	ICP Emission Spectroscopy	3	4	6 months
Copper	mg/l	0.002	ICP Emission Spectroscopy	3	4	6 months
Iron	mg/l	0.05	ICP Emission Spectroscopy	3	4	6 months
Lead	mg/l	0.025	ICP Emission Spectroscopy	3	4	6 months
		0.001	Furnace Atomic Absorption	1-239.2	4	6 months
Manganese	mg/l	0.005	ICP Emission Spectroscopy	3	4	6 months
Mercury	mg/l	0.0002	Cold Vapor Atomic Absorption	1-245.1	4	6 months
Molybdenum	mg/l	0.005	ICP Emission Spectroscopy	3	4	6 months
Nickel	mg/l	0.01	ICP Emission Spectroscopy	3	4	6 months
Selenium	mg/l	0.002	Furnace Atomic Absorption	1-270.2	4	6 months
Silver	mg/l	0.003	ICP Emission Spectroscopy	3	4	6 months
Strontium	mg/l	0.005	ICP Emission Spectroscopy	3	4	6 months
Thallium	mg/l	0.002	Furnace Atomic Absorption	1-279.2	4	6 months
Tin	mg/l	0.03	ICP Emission Spectroscopy	3	4	6 months
Titanium	mg/l	0.002	ICP Emission Spectroscopy	3	4	6 months
Vanadium	mg/l	0.002	ICP Emission Spectroscopy	3	4	6 months
Zinc	mg/l	0.004	ICP Emission Spectroscopy	3	4	6 months
INORGANIC PARAMETERS						
pH	units	0.01	Meter	1-150.1; 2-423	1	ASAP
Specific Conductance at 25°C	umhos/cm	1	Bridge	1-120.1; 2-205	1	28 days
Total Dissolved Solids	mg/l	10	Gravimetric, 180°C	1-160.1; 2-209B	1	7 days
Total Suspended Solids	mg/l	2	Gravimetric, 105°C	1-160.2	1	7 days
Total Solids	mg/l	10	Gravimetric, 105°C	1-160.3	1	7 days
Total Volatile Solids	mg/l	10	Gravimetric, 550°C	1-160.4	1	7 days
Ortho Phosphate as P	mg/l	0.01	Single Reagent Colorimetric	1-365.2; 2-424F	1	48 hours

ROCKY MOUNTAIN ANALYTICAL LABORATORY

Inorganic Analytical Methodology (Continued)

Parameter	Units	Nominal Detection Limit[a]	Methodology	Reference	Preservation Bottle No.	Maximum Holding Time[b]
INORGANIC PARAMETERS (Continued)						
Total Phosphorus as P	mg/l	0.06	Digestion; ICP Emission Spectroscopy	1-4.1.4; 3	4	28 days
		0.01	Digestion - Colorimetric	1-365.2; 1-424C,F	2	28 days
Silica as SiO_2	mg/l	0.1	ICP Emission Spectroscopy	3	4	28 days
	mg/l	1	Colorimetric	1-370.1; 2-425C	1	28 days
Biological Oxygen Demand	mg/l	2	Dilution Bottle - D.O. Probe	1-405.1; 2-507	1	48 hours
Chemical Oxygen Demand	mg/l	5	Micro Colorimetric	1-410.4; 2-508A	2	28 days
Total Organic Carbon	mg/l	0.1	Oxidation-Infrared Absorption	1-415.1; 2-505	2	28 days
Ammonia as N	mg/l	0.1	Electrode	1-350.3; 2-417E	2	28 days
		0.1	Automated Colorimetric	1-350.1	2	28 days
Total Kjeldahl Nitrogen as N	mg/l	0.1	Digestion - Electrode	1-351.4; 2-420B	2	28 days
		0.1	Digestion - Colorimetric	1-351.2	2	28 days
Total Organic Nitrogen as N	mg/l	0.1	Calculation (TKN - NH_3)	-	-	-
Oil and Grease	mg/l	1	Freon Extraction-Gravimetric	1-413.1; 2-503A	3	28 days
Free Cyanide	mg/l	0.01	Chlorination-Distillation-Colorimetric	1-335.1; 2-412F,D	6	14 days
Total Cyanide	mg/l	0.01	Distillation - Colorimetric	1-335.2; 2-412B,D	6	14 days
Phenolics	mg/l	0.01	Distillation - Colorimetric	1-420.1; 2-510A,B	2	28 days
Fecal Coliform	Colonies/100 ml	1	Membrane Filter	2-909C	8	ASAP
Total Coliform	Colonies/100 ml	1	Membrane Filter	2-909A	8	ASAP
Bromide	mg/l	0.1	Colorimetric	2-405	1	28 days
Residual Chlorine	mg/l	0.05	Amperometric	1-330.2; 2-408C	1	ASAP
Hexavalent Chromium	mg/l	0.01	Colorimetric	1-218.4; 2-312B	1	24 hours
Color	units	5	Pt-Co Colorimetric	1-110.2; 2-204A	1	48 hours
Hardness as $CaCO_3$	mg/l	5	Calculation	2-314A	4	6 months
Nitrite as N	mg/l	0.01	Colorimetric	1-354.1; 2-419	1	48 hours
Sulfide	mg/l	0.05	Titrimetric - Electrode	1-376.1; 2-427B,D	7	7 days
Sulfite	mg/l	2	Titrimetric	1-377.1; 2-428	1	ASAP
MBAS (Surfactants)	mg/l	0.1	Colorimetric	1-425.1; 2-512A	1	48 hours
Turbidity	NTU	0.1	Turbidimeter	1-180.1; 2-214A	1	48 hours

ROCKY MOUNTAIN ANALYTICAL LABORATORY

Inorganic Analytical Methodology (Continued)

References

(1) "Methods for Chemical Analysis of Water and Wastes", EPA-600/4-79-020, EMSL, Cincinnati, 1979.

(2) "Standard Methods for the Examination of Water and Wastewater", 15th Edition, APHA, 1980.

(3) Federal Register, 40 CFR 136, December 3, 1979; USEPA EMSL-Cincinnati, OH 45268.

(4) "Annual Book of ASTM Standards", Part 31, Water, 1980.

Notes

[a] Nominal values are the best achievable with the listed analytical method. Interferences in specific samples may result in a higher detection limit.

[b] Applicable to NPDES wastes as updated by Robert C. Booth, Director, EMSL-Cincinnati, September 22, 1981.

[c] Digestion procedure 1-4.1.4 used for elements determined by ICP Emission Spectroscopy when determining total metals. Digestion procedures for graphite furnace elements included with reference listed.

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GUIDELINES FOR SAMPLE BOTTLES AND PRESERVATIVES[a]

Bottle No.	Parameters	Container	Preservative	Notes
1	Cl^-, F^-, $SO_4^=$, Tot. Alk., $CO_3^=$ Alk., HCO_3^- Alk., OH^- Alk., pH, spec. cond., TDS, TSS, TS, TVS, o-PO_4 SiO_2, BOD, Br^-, res. Cl_2, Cr^{+6}, color, NO_2^-, $SO_3^=$, MBAS, Turbidity.	1 liter poly	4° C	Provide unfiltered sample for solids and turbidity.
2	Tot. P, COD, TOC, NH_3, TKN, TON, Phenolics $NO_3 + NO_2$.	500 ml poly	2 ml 50% H_2SO_4, 4°C	
3	O & G	1 liter glass	4 ml 50% H_2SO_4, 4°C	Do not filter, collect directly in bottle.
4	Na, K, Ca, Mg, Al, Sb, As, Ba, Be, B, Cd, Cr, Co, Cu, Fe, Pb, Mn, Hg, Mo, Ni, Se, Ag, Sr, Tl, Sn, Ti, V, Zn, ICP, Hardness.	500 ml poly	5 ml 50% HNO_3	Provide separate samples for total and dissolved sample (filter before adding to bottle.)
5	Alpha, Beta, Ra^{226}, Ra^{228}, U	1 liter poly (no Ra^{228}) ½ gallon poly (with Ra^{228})	10 ml 50% HNO_3 20 ml 50% HNO_3	
6	Free CN, Tot. CN	500 ml poly	2 ml 50% NaOH, 4°C	
7	Sulfide	250 ml poly	1 ml 1 N Zn acetate, 1 ml 50% NaOH, 4°C	
8	Fecal coli., total coli.	8 oz. sterile	4° C	Collect directly in sterile bottle
11	VOA, purgeable organics, THM	2 - 40 ml glass vial	4° C	Completely fill bottle, leave no air bubbles.
12	B/NA	1 liter glass	4° C	
13	Pest./PCB	1 liter glass	4° C	
14	Herbicides	1 liter glass	4° C	
15	TOX	1 liter glass	4° C	

[a]Federal Register, 40 CFR 136, December 3, 1979, as updated by EPA, EMSL-Cincinnati, September 22, 1981.

11/5/82

APPENDIX D
to
ATTACHMENT 4

Aquifer Test Procedures

APPENDIX D

Aquifer Test Procedures

The purpose of an aquifer test is to estimate the hydrogeologic properties of the subsurface. These properties are determined by stressing the aquifer by either the addition or removal of water and monitoring the hydrostatic and chemical changes which occur at monitoring points throughout the system. Prediction of aquifer response can be made under different conditions, if the hydrogeologic framework is correctly understood. These test are also used to determine the hydraulics of wells in order to design pumping systems.

The tests conducted at the SPARTON site included a series of pumping tests on PW-1 and an infiltration test of the infiltration gallery adjacent to MW-17. The methodology employed in each test is discussed in the next section.

PW-1 Aquifer Test

A 25-horsepower submersible pump was installed 126 feet below TOC in PW-1 by Rodgers & Company on October 4, 1984. Discharge from the pump was directed through 4-inch irrigation pipe to the municipal sewer located just off the southeast corner of SPARTON property. SPARTON personnel obtained permission from the Albuquerque Sewer Authority for the discharge.

The pump was powered with a diesel electric generator and flow was controlled with a valve and direct-reading totalizing flow meter.

Water level measurements were taken in all wells with an accurately calibrated water level indicator such as a chalked steel tape or electric conductivity probe. All levels were referenced into the TOC elevation, which was determined by a registered surveyor.

Constant water level measurements were automatically recorded with the use of a computer-operated pressure transducer system manufactured by INSITU-Inc., Laramie, Wyoming. The SE-2000 system collected data from four transducers throughout the tests, reduced and tabulated the data, and printed graphs of water level changes in MW-12, 13, 14, and PW-1. These data were complemented by periodic hand water level measurements in the surrounding wells using a chalked steel tape or a battery-operated water level indicator.

All data from the tests were reduced into a format of elapsed time and drawdown and analyzed by standard hydrogeologic methods such as those discussed in Lohman, 1979. The Theis, Jacob, and Hantush methods of analyses were used to develop aquifer parameters.

The results of these analyses were then used to estimate the flow and storage properties of the subsurface, and to determine the hydraulic characteristics of the upper finer-grain layer.

Infiltration Test

A pilot-scale infiltration test was conducted using the infiltration gallery constructed 5 feet south of MW-17. The gallery consisted of a nominal 8-foot long, 1-foot wide, wooden box 4-feet deep filled with coarse gravel. The actual open area of the bottom of the gallery was 7 feet^2.

Water was added to the gallery from the fire hydrant at the northwest corner of the SPARTON property, keeping the gallery filled to a prescribed elevation. The infiltration rate was monitored with an in-line flow meter and controlled with a valve.

The pressure transducer system was used to monitor water-level changes in MW-11, 16, and 17. The fourth transducer was placed in the gallery.

This pilot-scale test was conducted in order to develop actual infiltration rates rather than a small double-ring infiltrometer which would yield data on the vertical hydraulic conductivity coefficient. The pilot-scale study removed much of the calculation and extrapolation which would be necessary to design a full-scale infiltration gallery.

Aquifer Parameters

The parameters of greatest interest are the aquifer's Transmissivity, Hydraulic Conductivity, Storage and Leakage coefficients. The following is a brief discussion of each parameter.

Transmissivity (T) describes the ability of water to flow through the aquifer. Specifically defined, it is the quantity of ground water which will travel through a vertical unit width of aquifer under a hydraulic gradient of one. It is dependent upon both the aquifer material and thickness. Typical units are gallons per day per foot (gpd/ft) or feet ^{2}/day (ft^2/day).

Hydraulic conductivity (K) of an aquifer is defined as the quantity of ground water that will flow through a unit area of aquifer under a unit gradient. The horizontal K of an aquifer is equal to the Transmissivity divided by the aquifer thickness (b): $K = T/b$. Typical units are gallons per day per square foot (gpd/ft^2) or feet/day (ft/day). Soil hydraulic conductivity is often listed in cm/sec, but these units are generally not applicable to ground water situations.

Storage coefficient (S) describes the quantity of ground water removed from the aquifer per unit decline of either the water table or the potentiometric surface. For water table aquifers, S typically ranges

from 0.01 to 0.20 and in confined or semi-confined aquifers, S can range from 0.000001 to 0.001. The parameter is unitless, being the ratio of water yielded to volume of aquifer.

Leakage coefficient (K'/b') is the ratio of the hydraulic conductivity of the semi-confining layer to its thickness. Typical units are in 1/day or gallons per day per cubic feet (gpd/ft^3). The leakier the confining layer, the greater the K'/b'.

REFERENCES

1. Lohman, S.W. 1979. Ground-Water Hydraulics: United States Geological Survey Professional Paper 708.

APPENDIX E
to
ATTACHMENT 4

Aquifer Test Data

SPARTON CONSTANT-RATE TEST PW-1
Run 3
10/07/84

SE200B DATA
constant rate test

SPARTON TECHNOLOGY INC
ALBUQUERQUE NEW MEXICO
Constant rate test of PW-1
HARDING LAWSON ASSOCIATES INC
HOUSTON TEXAS
JOB # 6310 013.12
OPERATORS: DAVID BRATBERG &
FRANK DELUCA
Anticipated Q= 150 gpm
Total test time: 48 hrs

TRANSDUCER TABLE

Input 1: PW-1
Transducer s/n: 135
Scale factor: 49.95
Initial level: 67.47 feet

Input 2: MW-12
Transducer s/n: 871/846
Scale factor: 10.02
Initial level: 64.52 feet

Input 3: MW-13
Transducer s/n: 477/830
Scale factor: 10.12
Initial level: 65.18 feet

Input 4: MW-14
Transducer s/n: 034
Scale factor: 10.1
Initial level: 65.47 feet

PUMP SCHEDULE

Drawdown for 2880 min
Pump at 200 GPM
Pump set at 131 feet

Recovery for 1440 min

SAMPLING SCHEDULE

0-1	min	@	5	sec
1-10	min	@	20	sec
10-100	min	@	2	min
100-1000	min	@	20	min
1000-10000	min	@	60	min
10000-9999[illegible]	[illegible]	@	200	min

DRAWDOWN REPORT

Started at 1015
Lasted 1499.9 min

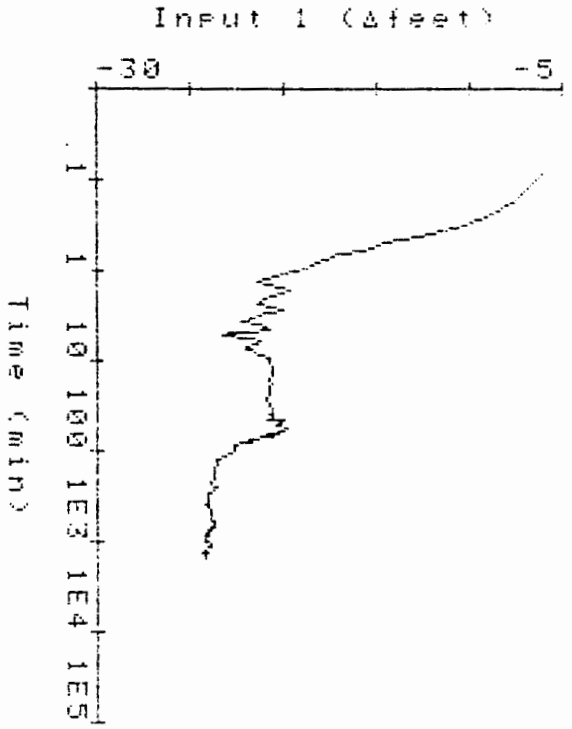
Input 1 (feet):

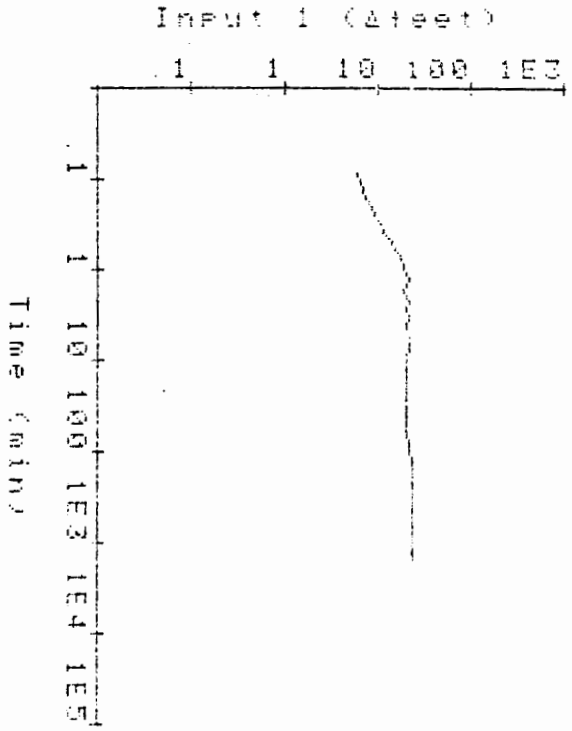
Time	ET (min)	level	Δlevel
1015	0.000	67.47	0.00
1015	0.084	73.58	-6.11
1015	0.167	74.95	-7.47
1015	0.251	76.47	-9.00
1015	0.334	78.32	-10.85
1015	0.417	80.28	-12.80
1015	0.501	81.95	-14.48
1015	0.584	83.33	-15.86
1015	0.667	84.51	-17.04
1015	0.751	85.24	-17.77
1015	0.834	85.79	-18.32
1015	0.917	86.41	-18.94
1016	1.001	86.97	-19.50
1016	1.277	88.84	-21.37
1016	1.710	87.20	-19.73
1017	2.043	88.57	-21.10
1017	2.377	88.86	-21.39
1017	2.710	87.48	-20.01
1018	3.043	88.44	-20.97
1018	3.377	89.22	-21.75
1018	3.710	89.84	-22.37
1019	4.043	88.64	-21.17
1019	4.377	88.25	-20.78
1019	4.710	89.41	-21.94
1020	5.043	90.21	-22.74
1020	5.377	90.69	-23.22
1020	5.710	89.16	-21.69
1021	6.043	88.74	-21.27
1021	6.377	88.87	-21.40
1021	6.710	89.19	-21.72
1022	7.043	89.52	-22.05
1022	7.377	89.51	-22.04
1022	7.710	89.26	-21.79
1023	8.043	88.9[illegible]	-21.50
1023	8.377	88.7[illegible]	-21.23
1023	8.710	88.5[illegible]	-21.04
1024	9.043	88.33	-20.86
1024	9.377	88.21	-20.74
1024	9.710	88.28	-20.81
1025	10.043	88.24	-20.77
1027	12.312	88.02	-20.55
1029	14.078	88.07	-20.60
1031	16.142	88.20	-20.73
1033	18.142	88.17	-20.70
1035	20	[illegible]	-20.74
1037	22	3	-20.75
1039	24	8	-20.81

1041	26 [illegible]	[illegible]	-20.91
1043	28 [illegible]	[illegible]	-20.94
1045	30 [illegible]	[illegible]	-20.83
1047	32.068	88.18	-20.71
1049	34.068	88.14	-20.67
1051	36.068	88.10	-20.62
1053	38.068	88.12	-20.65
1055	40.068	88.18	-20.71
1057	42.068	88.17	-20.70
1059	44.068	88.38	-20.91
1101	46.068	87.52	-20.05
1103	48.193	87.79	-20.32
1105	50.193	87.76	-20.29
1107	52.193	87.94	-20.47
1109	54.193	87.61	-20.14
1111	56.193	87.29	-19.82
1113	58.193	87.32	-19.85
1115	60.193	87.51	-20.03
1117	62.193	87.76	-20.29
1119	64.193	87.74	-20.26
1121	66.193	88.34	-20.87
1123	68.193	88.17	-20.70
1125	70.193	88.67	-21.20
1127	72.193	88.64	-21.17
1129	74.193	89.05	-21.58
1131	76.193	89.29	-21.82
1133	78.193	89.15	-21.68
1135	80.193	89.85	-22.38
1137	82.193	89.77	-22.30
1139	84.193	90.08	-22.61
1141	86.193	89.95	-22.48
1143	88.193	90.11	-22.64
1145	90.193	90.17	-22.70
1147	92.193	90.16	-22.68
1149	94.193	90.10	-22.63
1151	96.193	90.08	-22.61
1153	98.193	90.05	-22.58
1215	120.150	91.02	-23.55
1235	140.160	91.08	-23.61
1255	160.160	91.21	-23.74
1315	180.170	91.22	-23.75
1335	200.150	91.15	-23.68
1355	220.150	91.32	-23.85
1415	240.150	91.34	-23.87
1435	260.070	91.11	-23.63
1455	280.070	91.22	-23.75
1515	300.070	91.51	-24.04
1535	320.070	91.54	-24.07
1555	340.070	91.55	-24.08
1615	360.070	91.52	-24.05
1635	380.070	91.64	-24.17
1655	400.070	91.58	-24.11
1715	420.070	91.47	-23.99
1735	440.070	91.44	-23.97
1755	460.030	91.38	-23.91
1815	480.030	91.42	-23.95
1835	500.030	91.42	-23.95
1855	520.030	91.41	-23.94
1915	540.030	91.41	-23.94
1935	560.030	91.39	-23.92
1955	580.030	91.34	-23.87
2015	600.030	91.29	-23.82
2035	620.030	91.31	-23.84
2055	640.		-23.72
2115	660.		-23.79
2135	680.		-23.75

2155	70[illegible]	[illegible]71	-23.84
2215	72[illegible]	[illegible]38	-23.91
2235	740.100	91.39	-23.92
2255	760.100	91.48	-24.[illegible]
2315	780.100	91.47	-23.[illegible]
2335	800.100	91.62	-24.15
2355	820.130	91.48	-24.01
0015	840.130	91.51	-24.04
0035	860.130	91.62	-24.15
0055	880.130	91.65	-24.18
0115	900.130	91.68	-24.21
0135	920.130	91.68	-24.21
0155	940.130	91.64	-24.17
0215	960.130	91.70	-24.23
0235	980.130	91.68	-24.21
0255	1000.100	91.58	-24.11
0355	1060.300	91.45	-23.98
0455	1120.300	91.45	-23.98
0555	1180.300	91.51	-24.04
0655	1240.300	91.62	-24.15
0755	1300.300	91.54	-24.07
0855	1360.300	91.81	-24.34
0955	1420.200	91.70	-24.23
1055	1480.200	91.68	-24.21
1114	1499.900	91.68	-24.21

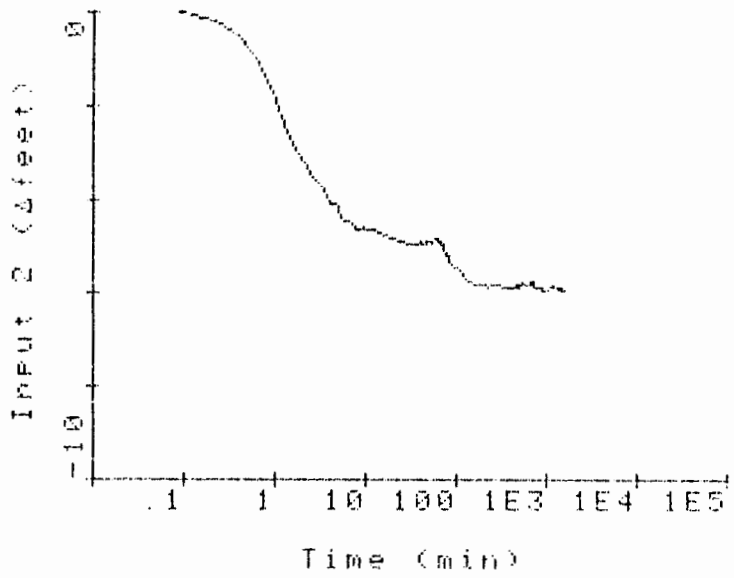
Average [illegible].29

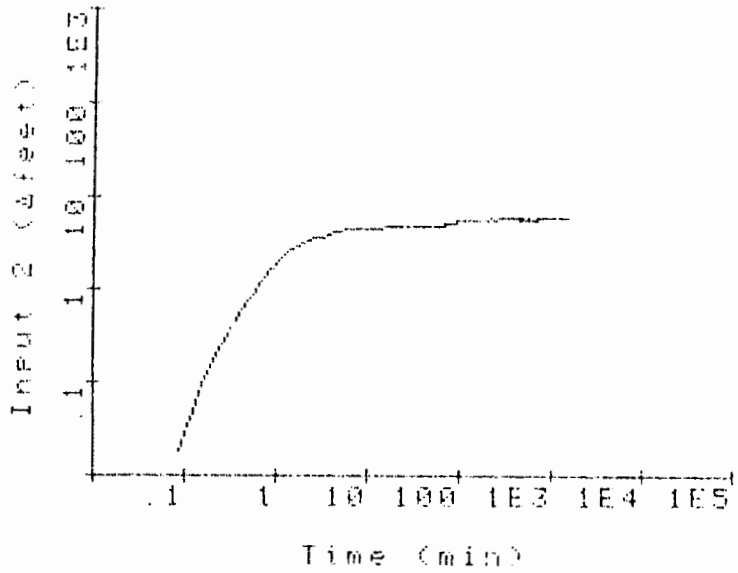


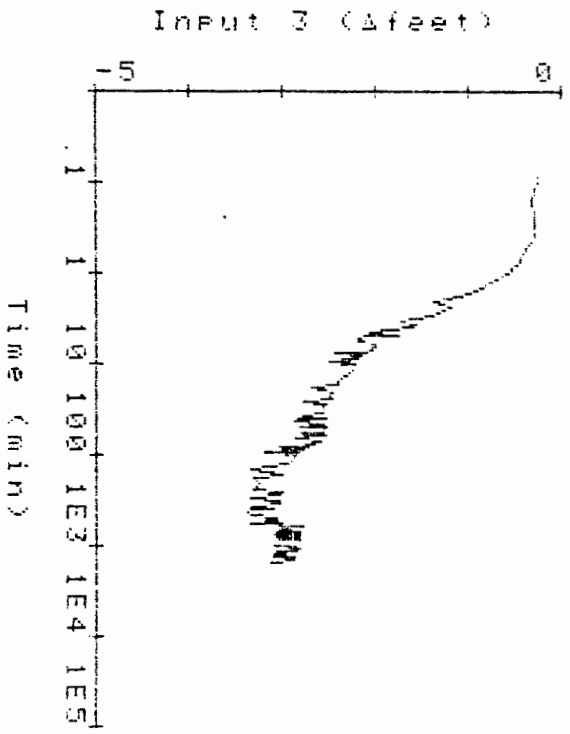


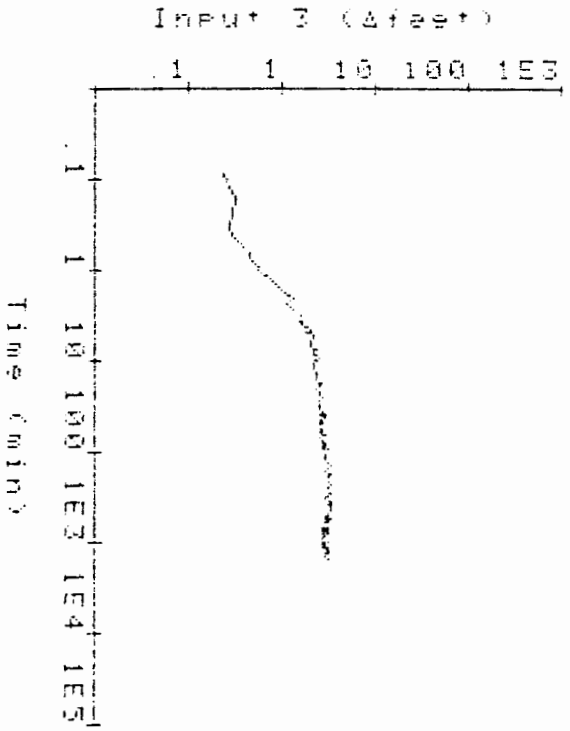
Input 2 (

Time	ET (		Δlevel
1015	0.000	64.52	0.00
1015	0.084	64.54	-0.02
1015	0.167	64.64	-0.12
1015	0.251	64.78	-0.26
1015	0.334	64.94	-0.42
1015	0.417	65.11	-0.59
1015	0.501	65.28	-0.76
1015	0.584	65.47	-0.95
1015	0.667	65.64	-1.12
1015	0.751	65.85	-1.33
1015	0.834	66.04	-1.51
1015	[illegible].917	66.23	-1.70
1016	[illegible].001	66.41	-1.89
1016	1.377	67.05	-2.53
1016	1.710	67.47	-2.95
1017	2.043	67.69	-3.17
1017	2.377	67.93	-3.41
1017	2.710	68.06	-3.54
1018	3.043	68.15	-3.63
1018	3.377	68.28	-3.76
1018	3.710	68.45	-3.93
1019	4.043	68.57	-4.05
1019	4.377	68.60	-4.08
1019	4.710	68.64	-4.11
1020	5.043	68.76	-4.24
1020	5.377	68.88	-4.36
1020	5.710	68.97	-4.45
1021	6.043	68.96	-4.44
1021	6.377	68.94	-4.42
1021	6.710	68.98	-4.46
1022	7.043	69.03	-4.51
1022	7.377	69.07	-4.55
1022	7.710	69.13	-4.61
1023	8.043	69.15	-4.63
1023	8.377	69.16	-4.64
1023	8.710	69.14	-4.62
1024	9.043	69.11	-4.59
1024	9.377	69.13	-4.61
1024	9.710	69.12	-4.60
1025	10.043	69.13	-4.61
1027	12.312	69.17	-4.65
1029	14.078	69.20	-4.67
1031	16.142	69.25	-4.73
1033	18.142	69.31	-4.79
1035	20.472	69.33	-4.81
1037	22.068	69.37	-4.85
1039	24.068	69.38	-4.86
1041	26.068	69.42	-4.89
1043	28.068	69.44	-4.92
1045	30.068	69.45	-4.93
1047	32.068	69.44	-4.92
1049	34.068	69.43	-4.91
1051	36.068	69.44	-4.92
1053	38.068	69.43	-4.91
1055	40.068	69.46	-4.93
1057	42.068	69.45	-4.93
1059	44.068	69.47	-4.95
1101	46.068	69.40	-4.88
1103	48.193	69.37	-4.85
1105	50.193	69.40	-4.88
1107	52.193	69.43	-4.91
1109	54.193	69.38	-4.86
1111	56.193	69.34	-4.82
1113	58	33	-4.81
1115	60	31	-4.79
1117	62.1	29	-4.87


Input 2 (afeet)
0
-10
.1
1
10
100
1E3
1E4
1E5
Time (min)


Input 2 (afeet)
.1
1
10
100
1E3
.1
1
10
100
1E3
1E4
1E5
Time (min)



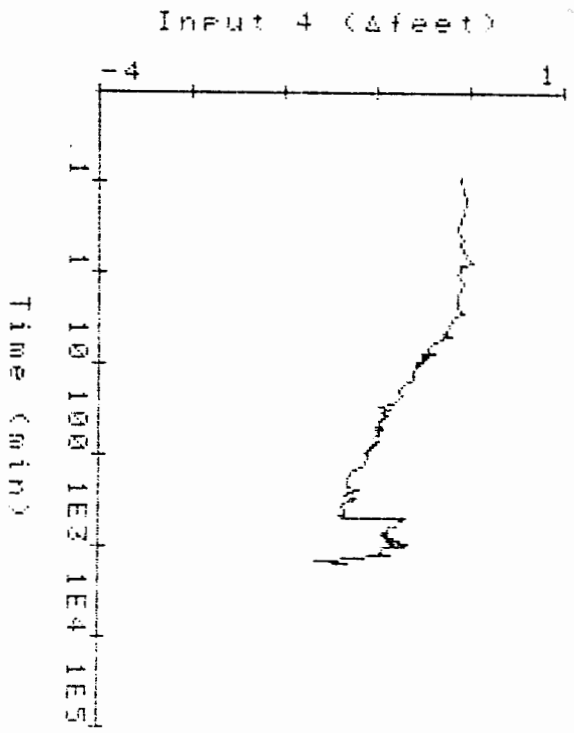


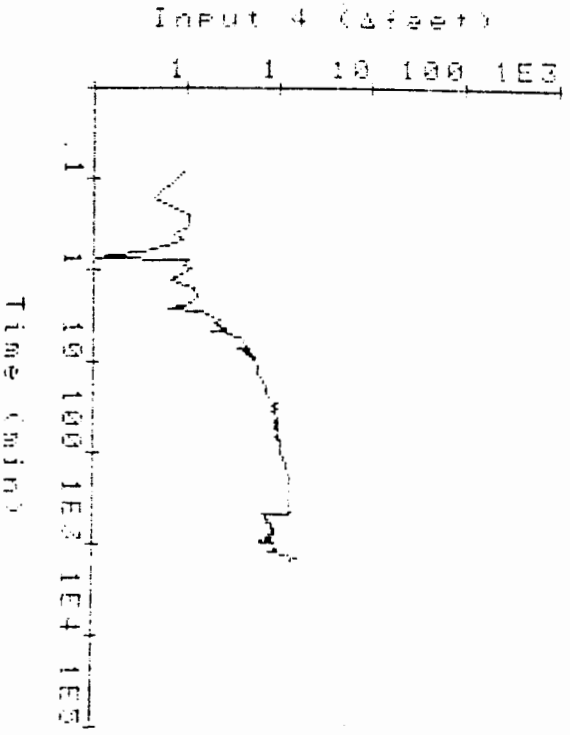
Input 4 (

Time	ET		Δlevel
1015	0.000	65.47	0.00
1015	0.084	65.57	-0.10
1015	0.167	65.52	-0.05
1015	0.251	65.58	-0.11
1015	0.334	65.58	-0.11
1015	0.417	65.55	-0.08
1015	0.501	65.56	-0.09
1015	0.584	65.52	-0.05
1015	0.667	65.50	-0.03
1015	0.751	65.45	0.02
1015	0.834	65.58	-0.10
1015	0.917	65.56	-0.09
1016	1.001	65.59	-0.12
1016	1.377	65.54	-0.07
1016	1.710	65.60	-0.13
1017	2.043	65.61	-0.14
1017	2.377	65.59	-0.12
1017	2.710	65.54	-0.07
1018	3.043	65.63	-0.15
1018	3.377	65.66	-0.19
1018	3.710	65.70	-0.23
1019	4.043	65.68	-0.21
1019	4.377	65.75	-0.28
1019	4.710	65.67	-0.20
1020	5.043	65.75	-0.28
1020	5.377	65.74	-0.27
1020	5.710	65.86	-0.39
1021	6.043	65.89	-0.41
1021	6.377	65.89	-0.42
1021	6.710	65.90	-0.43
1022	7.043	65.92	-0.45
1022	7.377	65.96	-0.49
1022	7.710	65.84	-0.36
1023	8.043	65.97	-0.50
1023	8.377	65.98	-0.51
1023	8.710	65.93	-0.45
1024	9.043	65.99	-0.52
1024	9.377	66.02	-0.55
1024	9.710	65.99	-0.52
1025	10.043	66.03	-0.56
1027	12.312	66.07	-0.59
1029	14.078	66.08	-0.61
1031	16.142	66.15	-0.68
1033	18.142	66.19	-0.71
1035	20.472	66.22	-0.75
1037	22.068	66.21	-0.73
1039	24.068	66.23	-0.76
1041	26.068	66.27	-0.80
1043	28.068	66.33	-0.86
1045	30.068	66.44	-0.97
1047	32.068	66.32	-0.85
1049	34.068	66.45	-0.98
1051	36.068	66.35	-0.88
1053	38.068	66.40	-0.93
1055	40.068	66.39	-0.92
1057	42.068	66.45	-0.98
1059	44.068	66.44	-0.97
1101	46.068	66.43	-0.96
1103	48.193	66.46	-0.99
1105	50.193	66.42	-0.95
1107	52.193	66.42	-0.94
1109	54.193	66.46	-0.99
1111	56.193	66.43	-0.96
1113	58.193	66.46	-0.99
1115	60.193	66.44	-0.97
1117	62.193	66.46	-0.99
1119	64.1[illegible]	[illegible].49	-1.02
1121	66.1[illegible]	[illegible].49	-1.03

1123			-1.01
1125			-0.99
1127	72.193	66.49	-0.96
1129	74.193	66.51	-1.04
1131	76.193	66.49	-1.02
1133	78.193	66.53	-1.06
1135	80.193	66.53	-1.06
1137	82.193	66.51	-1.04
1139	84.193	66.57	-1.10
1141	86.193	66.57	-1.10
1143	88.193	66.57	-1.10
1145	90.193	66.58	-1.10
1147	92.193	66.57	-1.10
1149	94.193	66.58	-1.11
1151	96.193	66.56	-1.09
1153	98.193	66.58	-1.10
1215	120.150	66.60	-1.13
1235	140.160	66.74	-1.26
1255	160.160	66.76	-1.28
1315	180.170	66.78	-1.31
1335	200.150	66.77	-1.30
1355	220.150	66.79	-1.32
1415	240.150	66.67	-1.20
1435	260.070	66.78	-1.30
1455	280.070	66.81	-1.33
1515	300.070	66.68	-1.21
1535	320.070	66.77	-1.30
1555	340.070	66.84	-1.37
1615	360.070	66.85	-1.38
1635	380.070	66.82	-1.35
1655	400.070	66.83	-1.35
1715	420.070	66.83	-1.36
1735	440.070	66.82	-1.35
1755	460.030	66.88	-1.41
1815	480.030	66.83	-1.36
1835	500.030	66.16	-0.68
1855	520.030	66.23	-0.76
1915	540.030	66.21	-0.74
1935	560.030	66.25	-0.77
1955	580.030	66.26	-0.79
2015	600.030	66.24	-0.77
2035	620.030	66.33	-0.86
2055	640.170	66.36	-0.89
2115	660.050	66.35	-0.88
2135	680.050	66.38	-0.91
2155	700.050	66.40	-0.93
2215	720.050	66.36	-0.89
2235	740.100	66.40	-0.93
2255	760.100	66.33	-0.86
2315	780.100	66.32	-0.85
2335	800.100	66.28	-0.81
2355	820.130	66.37	-0.90
0015	840.130	66.36	-0.89
0035	860.130	66.31	-0.84
0055	880.130	66.28	-0.81
0115	900.130	66.13	-0.66
0135	920.130	66.25	-0.78
0155	940.130	66.35	-0.88
0215	960.130	66.26	-0.79
0235	980.130	66.14	-0.67
0255	1000.100	66.41	-0.94
0355	1060.300	66.42	-0.94
0455	1120.300	66.45	-0.98
0555	1180.300	66.44	-0.97
0655	1240.300	66.30	-0.83
0755	1300.300	66.85	-1.37
0855	1360.300	66.82	-1.36
0955	1420.200	56.92	-1.45
1055	1480.200	67.14	-1.67
1114	1499.900	66.78	-1.31

Average leve 55



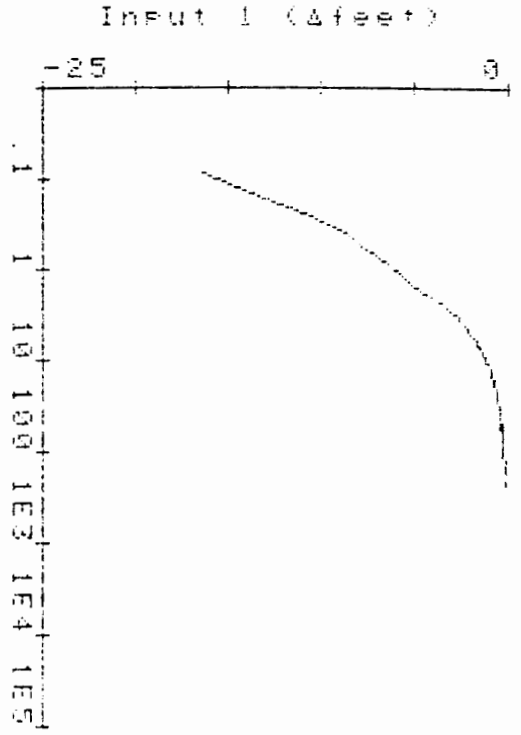


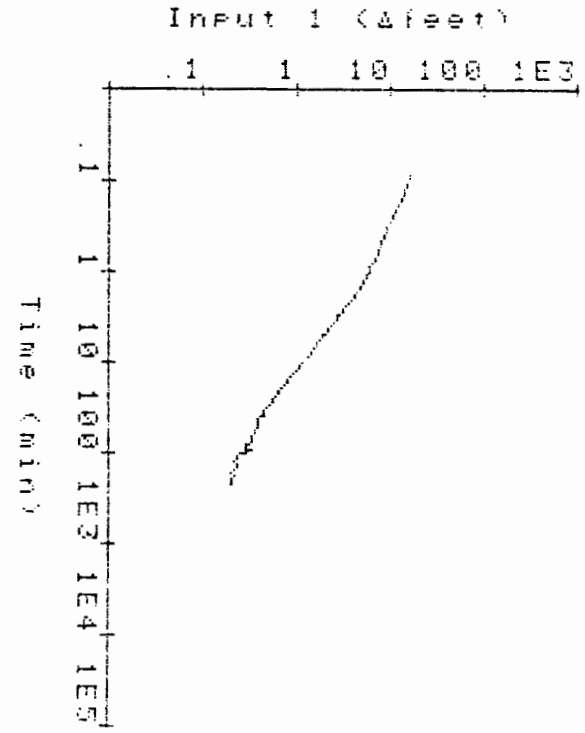
--------RECOVERY REPORT---------

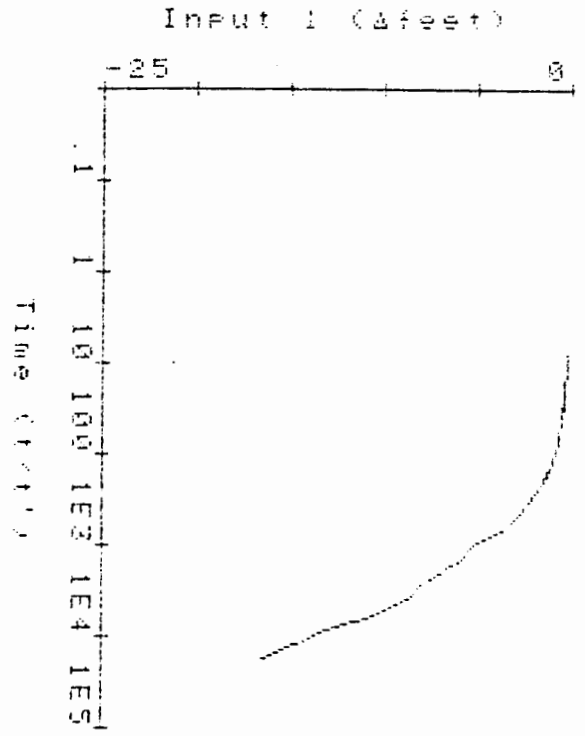
Started at 1114
Lasted 216.07 min

Input 1 (feet):

Time	ET (min)	level	Δlevel
1115	0.084	83.93	-16.46
1115	0.167	80.40	-13.93
1115	0.251	77.94	-10.47
1115	0.334	76.62	-9.15
1115	0.417	75.98	-8.51
1115	0.501	75.55	-8.08
1115	0.584	75.12	-7.65
1115	0.667	74.73	-7.26
1115	0.751	74.37	-6.90
1115	0.834	74.02	-6.55
1115	0.917	73.71	-6.24
1115	1.001	73.42	-5.95
1116	1.376	72.73	-5.26
1116	1.710	72.08	-4.61
1116	2.043	71.42	-3.95
1117	2.376	70.94	-3.47
1117	2.710	70.57	-3.10
1117	3.043	70.29	-2.82
1118	3.376	70.18	-2.71
1118	3.710	69.98	-2.51
1118	4.043	69.79	-2.32
1119	4.376	69.65	-2.17
1119	4.710	69.53	-2.06
1119	5.043	69.43	-1.96
1120	5.377	69.33	-1.86
1120	5.710	69.26	-1.79
1120	6.043	69.19	-1.71
1121	6.377	69.11	-1.64
1121	6.710	69.07	-1.60
1121	7.043	69.00	-1.53
1122	7.377	68.95	-1.48
1122	7.710	68.91	-1.44
1122	8.043	68.85	-1.38
1123	8.377	68.81	-1.34
1123	8.710	68.77	-1.30
1123	9.043	68.74	-1.27
1124	9.376	68.70	-1.22
1124	9.710	68.67	-1.20
1124	10.043	68.64	-1.17
1127	12.141	68.48	-1.01
1129	14.141	68.36	-0.89
1131	16.141	68.29	-0.82
1133	18.142	68.22	-0.75
1135	20.142	68.13	-0.66
1137	22.142	68.12	-0.65
1139	24.142	68.09	-0.62
1141	26.142	68.05	-0.58
1143	28.142	68.03	-0.56
1145	30.142	68.00	-0.53
1147	32.142	67.98	-0.50
1149	34.142	67.93	-0.46
1151	36		-0.46
1153	38		-0.45
1155	40		-0.42
1157	42		-0.40
1159	44	87	-0.40
1201	46	86	-0.39
1203	48	86	-0.39
1205	50.142	67.87	-0.40
1207	52.142	67.87	-0.40
1209	54.142	67.86	-0.39
1211	56.142	67.85	-0.37
1213	58.142	67.85	-0.37
1215	60.142	67.85	-0.37
1217	62.142	67.83	-0.36
1219	64.142	67.82	-0.35
1221	66.142	67.82	-0.35
1223	68.142	67.80	-0.33
1225	70.142	67.80	-0.33
1227	72.142	67.82	-0.35
1229	74.142	67.80	-0.33
1231	76.097	67.80	-0.33
1233	78.142	67.79	-0.32
1235	80.142	67.79	-0.32
1237	82.142	67.77	-0.30
1239	84.142	67.76	-0.29
1241	86.142	67.76	-0.29
1243	88.142	67.77	-0.30
1245	90.142	67.80	-0.33
1247	92.142	67.80	-0.33
1249	94.142	67.80	-0.33
1251	96.142	67.77	-0.30
1253	98.142	67.76	-0.29
1255	100.140	67.73	-0.26
1315	120.310	67.69	-0.22
1335	140.310	67.70	-0.23
1355	160.310	67.67	-0.20
1415	180.320	67.69	-0.22
1435	200.320	67.67	-0.20
1451	216.070	67.67	-0.20



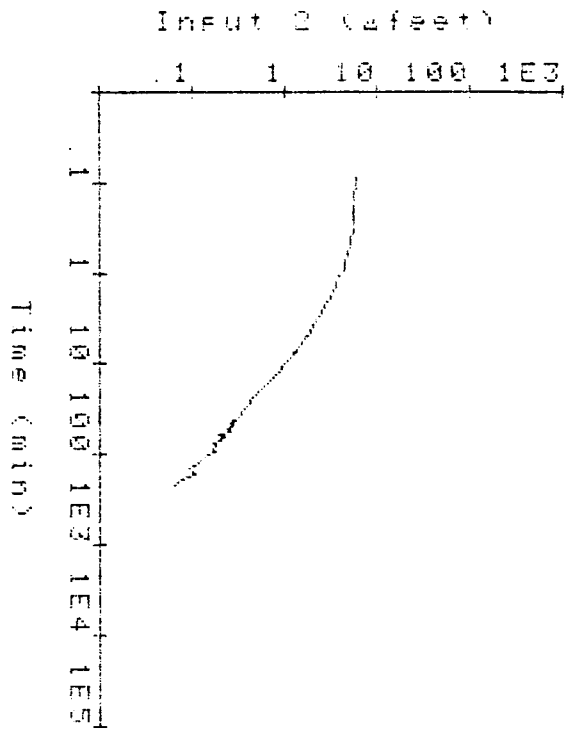


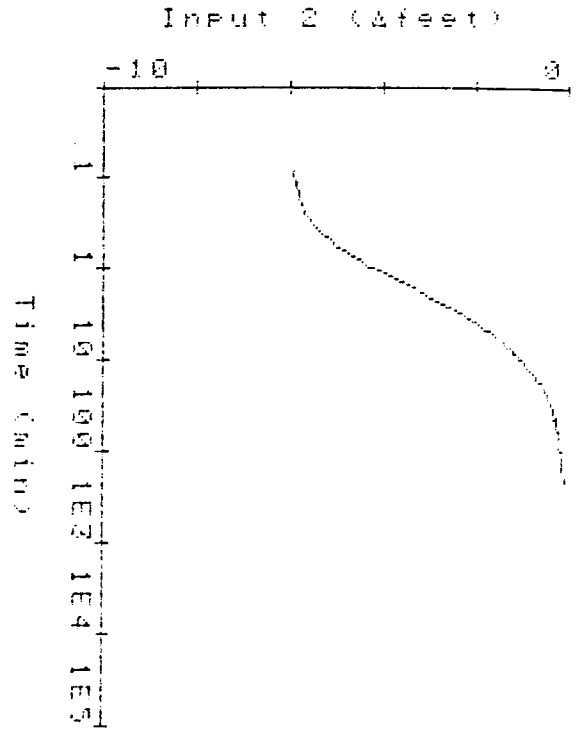


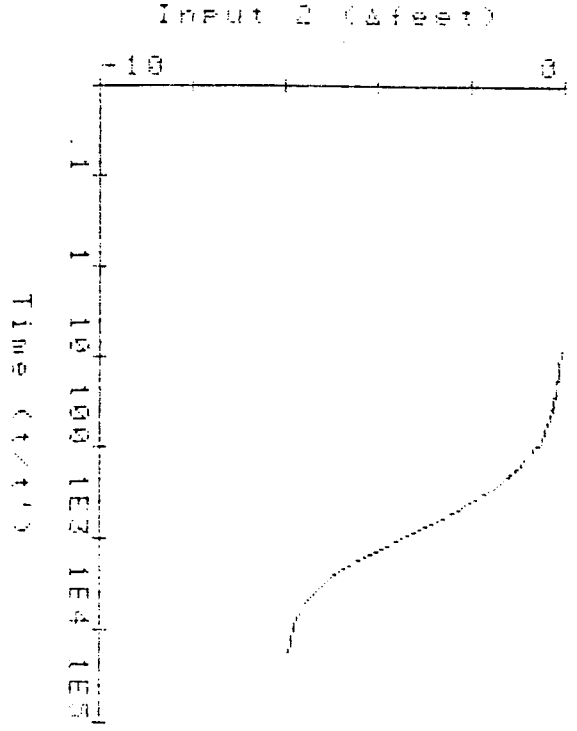
Input 2 (feet):

Time	ET (min)	level	Δlevel
1115	0.084	70.48	-5.96
1115	0.167	70.35	-5.82
1115	0.251	70.20	-5.68
1115	0.334	70.02	-5.50
1115	0.417	69.82	-5.30
1115	0.501	69.63	-5.11
1115	0.584	69.49	-4.97
1115	0.667	69.35	-4.83
1115	0.751	69.19	-4.67
1115	0.834	69.04	-4.52
1115	0.917	68.90	-4.38
1115	1.001	68.75	-4.22
1116	1.376	68.23	-3.70
1116	1.710	67.85	-3.33
1116	2.043	67.57	-3.05
1117	2.376	67.31	-2.79
1117	2.710	67.11	-2.59
1117	3.043	66.93	-2.41
1118	3.376	66.77	-2.25
1118	3.710	66.64	-2.11
1118	4.043	66.53	-2.01
1119	4.376	66.41	-1.89
1119	4.710	66.34	-1.81
1119	5.043	66.23	-1.71
1120	5.377	66.18	-1.66
1120	5.710	66.08	-1.56
1120	6.043	66.04	-1.
1121	6.377	65.96	-1.
1121	6.710	65.91	-1.38
1121	7.043	65.87	-1.35
1122	7.377	65.83	-1.31
1122	7.710	65.75	-1.23
1122	8.043	65.72	-1.20
1123	8.377	65.69	-1.17
1123	8.710	65.65	-1.13
1123	9.043	65.60	-1.07
1124	9.376	65.59	-1.07
1124	9.710	65.56	-1.03
1124	10.043	65.54	-1.01
1127	12.141	65.38	-0.86
1129	14.141	65.28	-0.76
1131	16.141	65.18	-0.66
1133	18.142	65.11	-0.59
1135	20.142	65.04	-0.51
1137	22.142	65.02	-0.50
1139	24.142	64.99	-0.47
1141	26.142	64.95	-0.43
1143	28.142	64.93	-0.41
1145	30.142	64.91	-0.39
1147	32.142	64.89	-0.37
1149	34.142	64.86	-0.34
1151	36.142	64.85	-0.33
1153	38.142	64.83	-0.31
1155	40.142	64.83	-0.31
1157	42.142	64.80	-0.
1159	44.142	64.80	-0.
1201	46.142	64.78	-0.26
1203	48.142	64.78	-0.26
1205	50.142	64.79	-0.27
1207	5	78	-0.26
1209	5	76	-0.24
1211	5	77	-0.25
1213	5	76	-0.23

1215	[illegible]	[illegible]75	-0.23
1217	[illegible]	[illegible]71	-0.19
1219	64.142	[illegible]74	-0.22
1221	66.142	64.74	-0.21
1223	68.142	64.72	-0.20
1225	70.142	64.73	-0.21
1227	72.142	64.71	-0.18
1229	74.142	64.70	-0.18
1231	76.097	64.69	-0.17
1233	78.142	64.70	-0.18
1235	80.142	64.69	-0.17
1237	82.142	64.69	-0.17
1239	84.142	64.69	-0.16
1241	86.142	64.69	-0.17
1243	88.142	64.69	-0.16
1245	90.142	64.69	-0.17
1247	92.142	64.68	-0.16
1249	94.142	64.69	-0.17
1251	96.142	64.68	-0.16
1253	98.142	64.68	-0.16
1255	100.140	64.66	-0.14
1315	120.310	64.64	-0.12
1335	140.310	64.62	-0.10
1355	160.310	64.63	-0.10
1415	180.320	64.60	-0.08
1435	200.320	64.59	-0.07
1451	216.070	64.59	-0.07

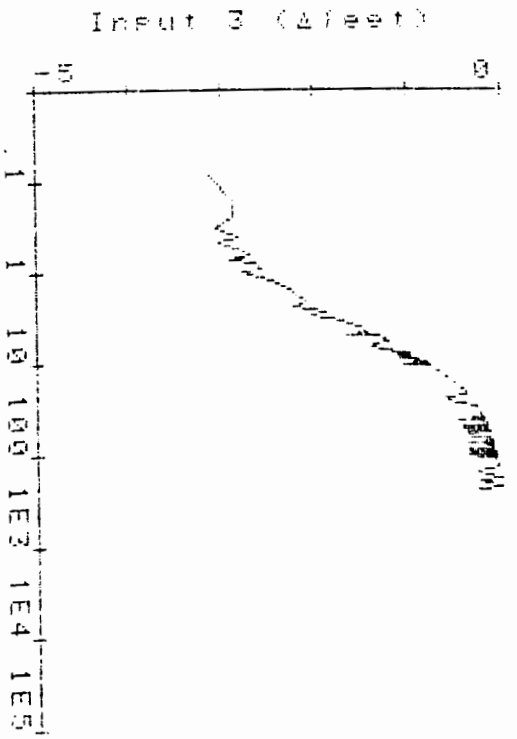


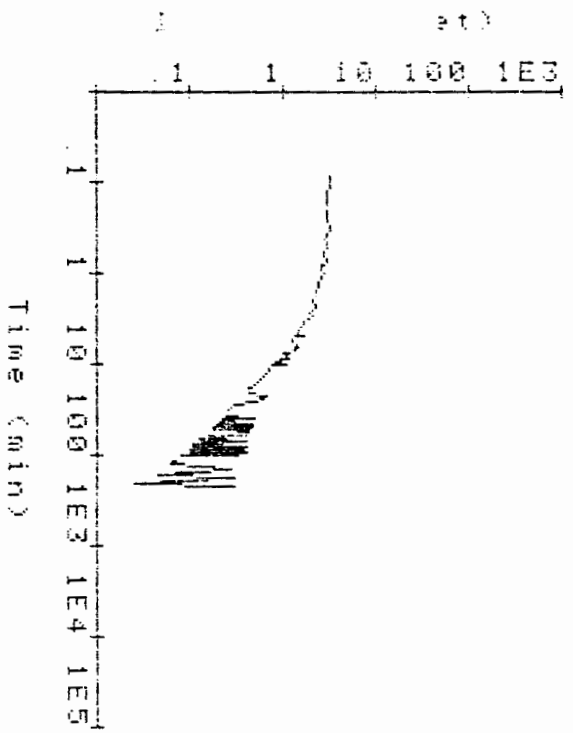


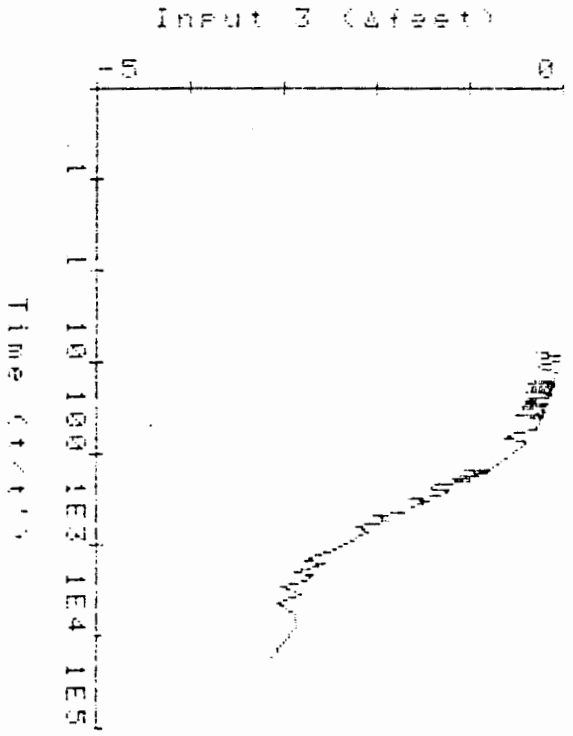


Input 3 (feet):

Time	ET (min)	level	Δlevel
1115	0.084	68.31	-3.13
1115	0.167	68.06	-2.88
1115	0.251	68.06	-2.88
1115	0.334	68.25	-3.07
1115	0.417	68.00	-2.82
1115	0.501	68.21	-3.03
1115	0.584	67.94	-2.76
1115	0.667	67.88	-2.70
1115	0.751	68.08	-2.90
1115	0.834	67.80	-2.61
1115	0.917	67.75	-2.57
1115	1.001	67.96	-2.78
1116	1.376	67.54	-2.36
1116	1.710	67.40	-2.21
1116	2.043	67.28	-2.10
1117	2.376	67.41	-2.23
1117	2.710	67.05	-1.86
1117	3.043	67.20	-2.02
1118	3.376	66.85	-1.67
1118	3.710	66.81	-1.63
1118	4.043	66.69	-1.51
1119	4.376	66.62	-1.44
1119	4.710	66.82	-1.64
1119	5.043	66.50	-1.32
1120	5.377	66.44	-1.26
1120	5.710	66.39	-1.21
1120	6.043	66.60	-1.42
1121	6.377	66.58	-1.40
1121	6.710	66.52	-1.34
1121	7.043	66.48	-1.30
1122	7.377	66.18	-1.00
1122	7.710	66.37	-1.19
1122	8.043	66.25	-1.07
1123	8.377	66.08	-0.90
1123	8.710	66.30	-1.12
1123	9.043	66.02	-0.83
1124	9.376	65.99	-0.81
1124	9.710	66.23	-1.05
1124	10.043	65.95	-0.77
1127	12.141	65.84	-0.66
1129	14.141	65.74	-0.56
1131	16.141	65.67	-0.49
1133	18.142	65.62	-0.43
1135	20.142	65.60	-0.42
1137	22.142	65.82	-0.64
1139	24.142	65.77	-0.59
1141	26.142	65.67	-0.49
1143	28.142	65.47	-0.29
1145	30.142	65.45	-0.27
1147	32.142	65.44	-0.26
1149	34.142	65.42	-0.24
1151	36.142	65.41	-0.23
1153	38.142	65.67	-0.49
1155	40.142	65.39	-0.21
1157	42.142	65.38	-0.20
1159	44.142	65.62	-0.44
1201	46.142	65.37	-0.19
1203	48.142	65.36	-0.18
1205	50.[illegible]	[illegible].62	-0.44
1207	52.[illegible]	[illegible].59	-0.41
1209	54.[illegible]	[illegible].34	-0.16
1211	56.[illegible]	[illegible].79	-0.41
1213	58.[illegible]	[illegible].76	-0.[illegible]
1215	60.142	[illegible].73	-0.[illegible]
1217	62.142	65.56	-0.[illegible]
1219	64.142	65.32	-0.14
1221	66.142	65.31	-0.13
1223	68.142	65.30	-0.12
1225	70.142	65.31	-0.13
1227	72.142	65.57	-0.39
1229	74.142	65.30	-0.12
1231	76.097	65.29	-0.11
1233	78.142	65.53	-0.34
1235	80.142	65.29	-0.11
1237	82.142	65.57	-0.39
1239	84.142	65.28	-0.10
1241	86.142	65.28	-0.10
1243	88.142	65.55	-0.37
1245	90.142	65.56	-0.38
1247	92.142	65.56	-0.38
1249	94.142	65.28	-0.10
1251	96.142	65.29	-0.11
1253	98.142	65.50	-0.32
1255	100.140	65.26	-0.08
1315	120.310	65.24	-0.06
1335	140.310	65.46	-0.28
1355	160.310	65.22	-0.04
1415	180.320	65.47	-0.29
1435	200.320	65.21	-0.03
1451	216.070	65.47	-0.29



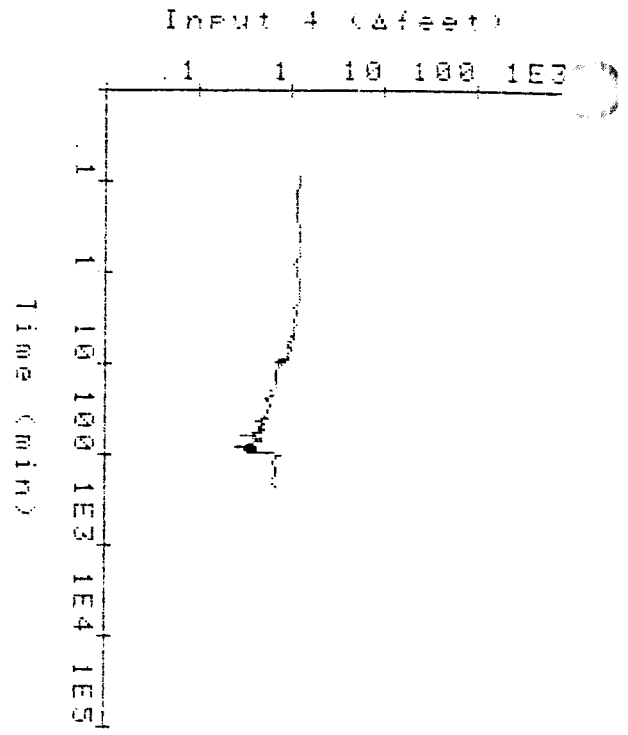


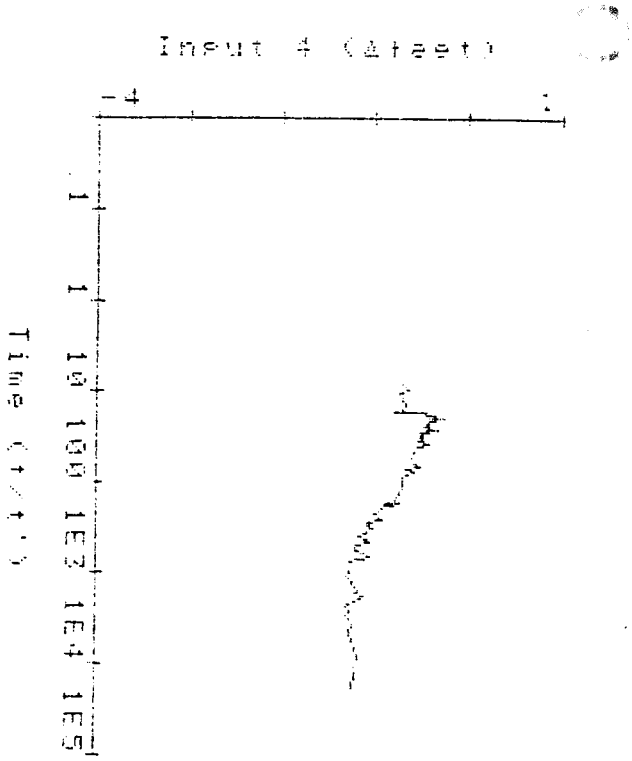


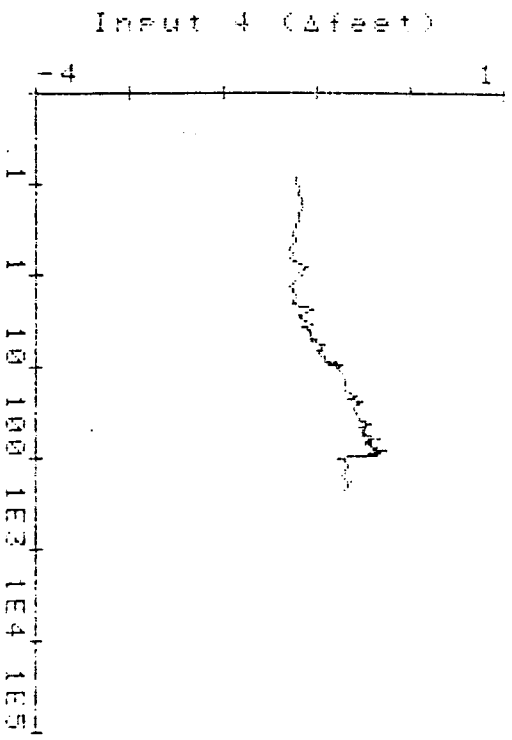
Input 4 (feet):

Time	ET (min)	level	Δlevel
1115	0.084	66.69	-1.22
1115	0.167	66.51	-1.14
1115	0.251	66.65	-1.18
1115	0.334	66.73	-1.26
1115	0.417	66.69	-1.22
1115	0.501	66.74	-1.27
1115	0.584	66.71	-1.23
1115	0.667	66.76	-1.28
1115	0.751	66.66	-1.19
1115	0.834	66.57	-1.10
1115	0.917	66.65	-1.18
1115	1.001	66.62	-1.15
1116	1.376	66.75	-1.28
1116	1.710	66.68	-1.21
1116	2.043	66.72	-1.25
1117	2.376	66.51	-1.04
1117	2.710	66.65	-1.18
1117	3.043	66.67	-1.20
1118	3.376	66.52	-1.05
1118	3.710	66.63	-1.16
1118	4.043	66.52	-1.05
1119	4.376	66.53	-1.06
1119	4.710	66.48	-1.01
1119	5.043	66.54	-1.07
1120	5.377	66.53	-1.06
1120	5.710	66.38	-0.91
1120	6.043	66.40	-0.93
1121	6.377	66.40	-0.93
1121	6.710	66.46	-0.98
1121	7.043	66.44	-0.97
1122	7.377	66.41	-0.94
1122	7.710	66.38	-0.91
1122	8.043	66.39	-0.91
1123	8.377	66.38	-0.91
1123	8.710	66.24	-0.77
1123	9.043	66.36	-0.89
1124	9.376	66.18	-0.71
1124	9.710	66.25	-0.78
1124	10.043	66.22	-0.75
1127	12.141	66.18	-0.71
1129	14.141	66.15	-0.68
1131	16.141	66.17	-0.70
1133	18.142	66.16	-0.68
1135	20.142	66.02	-0.55
1137	22.142	66.12	-0.65
1139	24.142	65.99	-0.52
1141	26.142	66.04	-0.56
1143	28.142	66.07	-0.60
1145	30.142	66.06	-0.59
1147	32.142	66.03	-0.56
1149	34.142	66.03	-0.56
1151	36.142	66.00	-0.53
1153	38.142	65.96	-0.48
1155	40.142	66.02	-0.54
1157	42.142	65.89	-0.41
1159	44.142	65.99	-0.52
1201	46.142	66.00	-0.52
1203	48.142	65.94	-0.47
1205	50.142	65.99	-0.50
1207	52.142	65.98	-0.51
1209	54.142	65.95	-0.48
1211	56.1[illegible]	5.86	-0.39
1213	58.1[illegible]	5.96	-0.49
1215	60.1[illegible]	5.87	-0.40

1217	62.1[illegible]	[illegible]7	-0.30
1219	64.[illegible]7	[illegible]45	-0.48
1221	66.142	[illegible]92	-0.45
1223	68.142	65.95	-0.48
1225	70.142	65.91	-0.44
1227	72.142	65.88	-0.40
1229	74.142	65.86	-0.39
1231	76.097	65.80	-0.33
1233	78.142	65.86	-0.39
1235	80.142	65.88	-0.41
1237	82.142	65.72	-0.25
1239	84.142	65.83	-0.36
1241	86.142	65.81	-0.34
1243	88.142	65.89	-0.42
1245	90.142	65.86	-0.39
1247	92.142	65.80	-0.33
1249	94.142	65.96	-0.49
1251	96.142	66.04	-0.57
1253	98.142	66.26	-0.79
1255	100.140	66.16	-0.69
1315	120.310	66.12	-0.65
1335	140.310	66.17	-0.70
1355	160.310	66.19	-0.72
1415	180.320	66.11	-0.63
1435	200.320	66.13	-0.66
1451	216.070	66.17	-0.70







SE200B manufactured by
In-Situ, Inc.
Laram[illegible]ing

SPARTON SOUTHWEST PUMPTEST
Run 4
10/08/84

SE200B DATA
constant rate test

---LAWSON ASSOCIATES
SPARTON TEXAS
JOB # 6310 013.12
CONSTANT-RATE PUMPING TEST OF
PW-1 AT SPARTON TECHNOLOGY
ALBUQUERQUE NEW MEXICO
TEST WILL RUN 120 MINUTES IN
ORDER TO ACQUIRE EARLY TIME-
DRAWDOWN DATA IN THE SURROUNDING
WELLS.

TRANSDUCER TABLE

Input 1: PW-1
Transducer s/n: 135
Scale factor: 49.95
Initial level: 65.57 feet

Input 2: MW-12
Transducer s/n: 871/846
Scale factor: 10.02
Initial level: 64.68 feet

Input 3: MW-13
Transducer s/n: 477/830
Scale factor: 10.12
Initial level: 64.69 feet

Input 4: MW-14
Transducer s/n: 034
Scale factor: 10.1
Initial level: 65.65 feet

PUMP SCHEDULE

Drawdown for 180 min
Pump at 180 GPM
Pump set at 126 feet

Recovery for 180 min

SAMPLING SCHEDULE

0-1	min	@	5	sec
1-10	min	@	20	sec
10-100	min	@	2	min
100-1000	min	@	20	min
1000-10000	min	@	60	min
10000-99999	min	@	200	min

---------DRAWDOWN REPORT---------

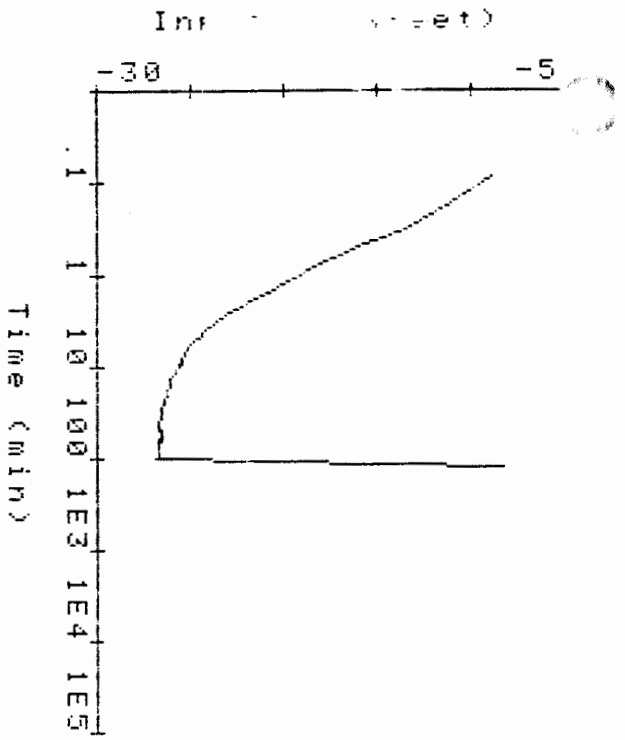
Started at 1515
Lasted 120.02 min

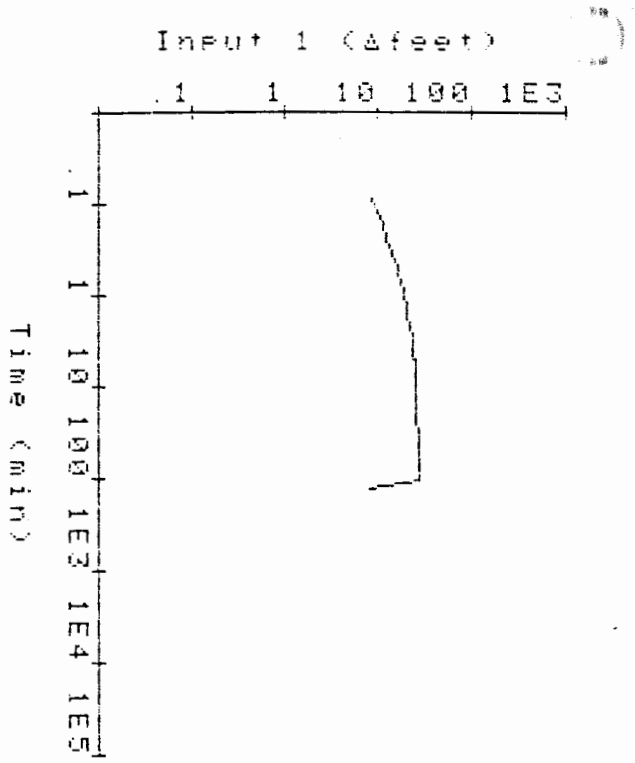
Input 1 (feet):

Time	ET (min)	level	Δlevel
1515	0.000	65.57	0.00
1515	0.084	74.50	-8.93
1515	0.167	76.73	-11.16
1515	0.251	78.29	-12.72
1515	0.334	79.53	-13.96
1515	0.417	80.68	-15.11
1515	0.501	81.64	-16.07
1515	0.584	82.42	-16.85
1515	0.667	83.11	-17.54
1515	0.751	83.65	-18.08
1515	0.834	84.05	-18.48
1515	0.917	84.45	-18.88
1516	1.001	84.75	-19.18
1516	1.377	85.86	-20.29
1516	1.710	86.83	-21.26
1517	2.043	87.59	-22.02
1517	2.377	88.24	-22.67
1517	2.710	88.67	-23.10
1518	3.043	89.00	-23.43
1518	3.377	89.33	-23.76
1518	3.710	89.59	-24.02
1519	4.043	89.74	-24.17
1519	4.377	89.97	-24.40
1519	4.710	90.16	-24.59
1520	5.043	90.33	-24.76
1520	5.377	90.44	-24.87
1520	5.710	90.57	-25.00
1521	6.043	90.66	-25.09
1521	6.377	90.69	-25.12
1521	6.710	90.78	-25.21
1522	7.043	90.82	-25.25
1522	7.377	90.90	-25.33
1522	7.710	90.89	-25.32
1523	8.043	90.98	-25.41
1523	8.377	91.00	-25.43
1523	8.710	91.05	-25.48
1524	9.043	91.11	-25.54
1524	9.377	91.15	-25.58
1524	9.710	91.18	-25.61
1525	10.043	91.22	-25.65
1527	12.127	91.44	-25.87
1529	14.127	91.62	-26.05
1531	16.075	91.74	-26.17
1533	18.075	91.81	-26.24
1535	[illegible]	91.87	-26.30
1537		96	-26.39
1539		91	-26.34

1541	2[illegible]	[illegible]98	-26.41
1543	2[illegible]	[illegible]09	-26.52
1545	30.133	92.11	-26.54
1547	32.133	92.14	-26.57
1549	34.133	92.17	-26.60
1551	36.133	92.19	-26.62
1553	38.133	92.29	-26.72
1555	40.133	92.27	-26.70
1557	42.133	92.29	-26.72
1559	44.270	92.22	-26.65
1601	46.213	92.22	-26.65
1603	48.213	92.19	-26.62
1605	50.213	92.22	-26.65
1607	52.213	92.11	-26.54
1609	54.213	92.10	-26.53
1611	56.213	92.19	-26.62
1613	58.213	92.13	-26.56
1615	60.213	92.14	-26.57
1617	62.213	92.26	-26.69
1619	64.213	92.27	-26.70
1621	66.213	92.20	-26.63
1623	68.213	92.23	-26.66
1625	70.213	92.24	-26.67
1627	72.213	92.27	-26.70
1629	74.213	92.24	-26.67
1631	76.213	92.26	-26.69
1635	80.138	92.30	-26.73
1637	82.138	92.32	-26.75
1639	84.138	92.33	-26.76
1641	86.138	92.27	-26.70
1643	88.053	92.32	-26.75
1645	90.072	92.29	-26.72
1647	92.072	92.32	-26.75
1649	94.072	92.32	-26.75
1651	96.073	92.32	-26.75
1653	98.072	92.42	-26.85
1655	100.070	92.37	-26.80
1715	120.020	73.81	-8.24

Average level: 88.85

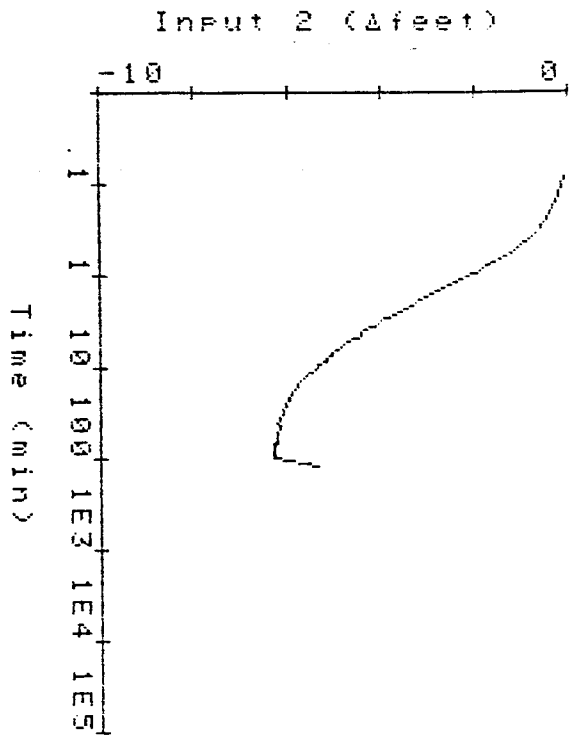


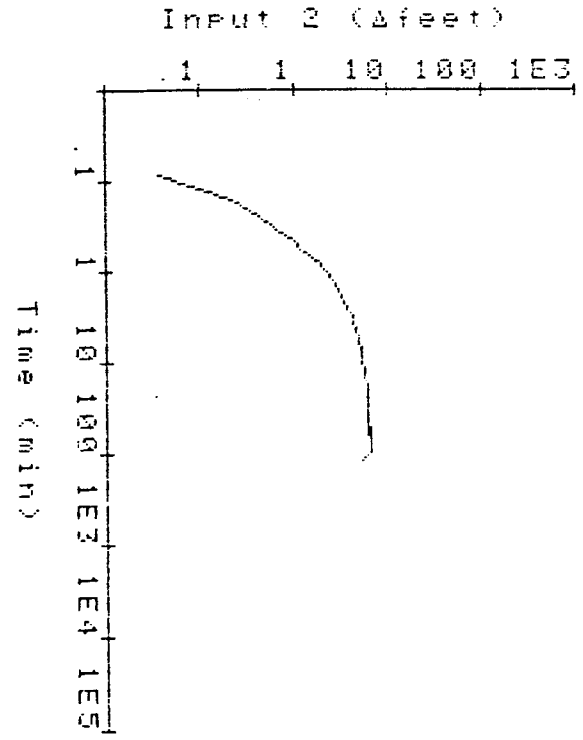


Input 2 (feet):

Time	ET (min)	level	Δlevel
1515	0.000	64.68	0.00
1515	0.084	64.72	-0.04
1515	0.167	64.91	-0.23
1515	0.251	65.09	-0.41
1515	0.334	65.29	-0.61
1515	0.417	65.48	-0.80
1515	0.501	65.67	-0.99
1515	0.584	65.87	-1.19
1515	0.667	66.05	-1.37
1515	0.751	66.24	-1.56
1515	0.834	66.42	-1.74
1515	0.917	66.57	-1.89
1516	1.001	66.70	-2.02
1516	1.377	67.23	-2.55
1516	1.710	67.59	-2.91
1517	2.043	67.91	-3.23
1517	2.377	68.17	-3.49
1517	2.710	68.39	-3.71
1518	3.043	68.59	-3.91
1518	3.377	68.76	-4.08
1518	3.710	68.88	-4.20
1519	4.043	69.03	-4.35
1519	4.377	69.14	-4.46
1519	4.710	69.23	-4.55
1520	5.043	69.31	-4.63
1520	5.377	69.42	-4.74
1520	5.710	69.46	-4.78
1521	6.043	69.54	-4.86
1521	6.377	69.60	-4.92
1521	6.710	69.66	-4.98
1522	7.043	69.73	-5.05
1522	7.377	69.75	-5.07
1522	7.710	69.82	-5.14
1523	8.043	69.85	-5.17
1523	8.377	69.88	-5.20
1523	8.710	69.93	-5.25
1524	9.043	70.01	-5.32
1524	9.377	70.04	-5.36
1524	9.710	70.06	-5.38
1525	10.043	70.07	-5.39
1527	12.127	70.28	-5.60
1529	14.127	70.42	-5.74
1531	16.075	70.50	-5.82
1533	18.075	70.58	-5.90
1535	20.075	70.61	-5.93
1537	22.075	70.65	-5.97
1539	24.[illegible]	70.70	-6.02
1541	26.[illegible]	[illegible]74	-6.06
1543	28.[illegible]	75	-6.07
1545	[illegible]	[illegible]79	-6.11
1547	[illegible]	[illegible]80	-6.12
1549	34.133	[illegible]3	-6.15
1551	36.133	70.85	-6.17
1553	38.133	70.85	-6.17
1555	40.133	70.89	-6.21
1557	42.133	70.91	-6.23
1559	44.270	70.87	-6.19
1601	46.213	70.89	-6.21
1603	48.213	70.89	-6.21
1605	50.213	70.90	-6.22
1607	52.213	70.93	-6.25
1609	54.213	70.95	-6.27
1611	56.213	70.93	-6.25
1613	58.213	70.96	-6.28
1615	60.213	70.92	-6.23
1617	62.213	70.95	-6.27
1619	64.213	70.95	-6.27
1621	66.213	70.94	-6.26
1623	68.213	70.95	-6.27
1625	70.213	70.98	-6.30
1627	72.213	70.96	-6.28
1629	74.213	70.97	-6.29
1631	76.213	70.98	-6.30
1635	80.138	70.99	-6.31
1637	82.138	71.02	-6.34
1639	84.138	70.98	-6.30
1641	86.138	71.00	-6.32
1643	88.053	71.01	-6.33
1645	90.072	71.01	-6.33
1647	92.072	71.02	-6.34
1649	94.072	71.00	-6.32
1651	96.073	71.01	-6.33
1653	98.072	71.02	-6.34
1655	100.070	71.00	-6.32
1715	120.020	70.03	-5.35

Average level: 70.56



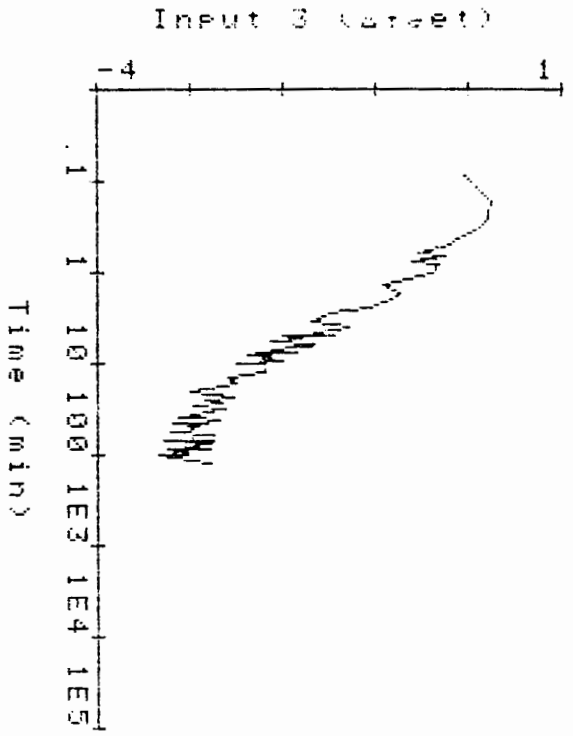


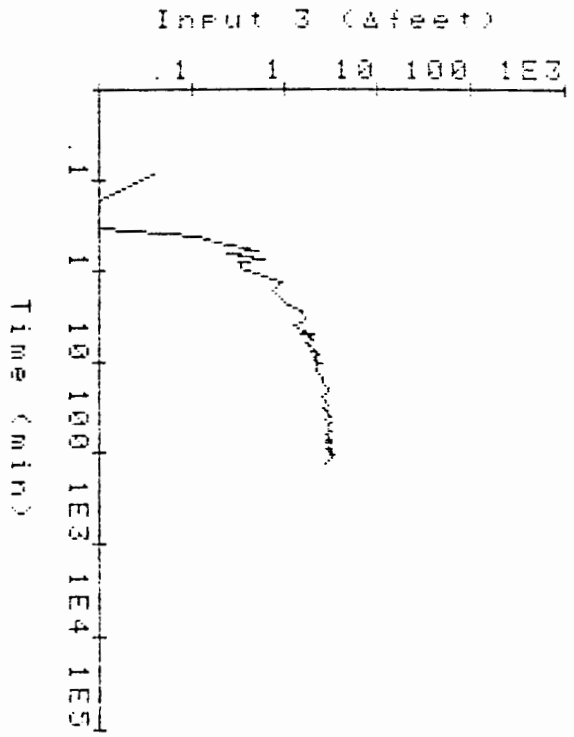
Input 3 (feet):

Time	ET (min)	level	Δlev
1515	0.000	64.69	0.00
1515	0.084	64.73	-0.04
1515	0.167	64.45	0.24
1515	0.251	64.47	0.22
1515	0.334	64.60	0.09
1515	0.417	64.81	-0.12
1515	0.501	64.86	-0.18
1515	0.584	65.22	-0.53
1515	0.667	64.93	-0.25
1515	0.751	65.29	-0.60
1515	0.834	65.01	-0.32
1515	0.917	65.04	-0.35
1516	1.001	65.10	-0.41
1516	1.377	65.61	-0.92
1516	1.710	65.42	-0.73
1517	2.043	65.59	-0.90
1517	2.377	65.75	-1.06
1517	2.710	66.20	-1.51
1518	3.043	66.24	-1.56
1518	3.377	66.37	-1.68
1518	3.710	66.12	-1.43
1519	4.043	65.97	-1.29
1519	4.377	66.34	-1.65
1519	4.710	66.13	-1.44
1520	5.043	66.69	-2.00
1520	5.377	66.46	-1.77
1520	5.710	66.80	-2.
1521	6.043	66.36	-1.
1521	6.377	66.42	-1.73
1521	6.710	66.67	-1.98
1522	7.043	66.73	-2.04
1522	7.377	66.97	-2.28
1522	7.710	66.53	-1.84
1523	8.043	67.07	-2.38
1523	8.377	66.81	-2.12
1523	8.710	66.89	-2.20
1524	9.043	66.94	-2.25
1524	9.377	66.70	-2.01
1524	9.710	67.20	-2.52
1525	10.043	66.87	-2.18
1527	12.127	66.88	-2.19
1529	14.127	67.28	-2.59
1531	16.075	67.19	-2.50
1533	18.075	67.36	-2.67
1535	20.075	67.68	-2.99
1537	22.075	67.45	-2.76
1539	24.447	67.21	-2.52
1541	26.133	67.52	-2.83
1543	28.133	67.33	-2.64
1545	30.133	67.65	-2.96
1547	32.133	67.32	-2.63
1549	34.133	67.56	-2.87
1551	36.133	67.60	-2.91
1553	38.133	67.81	-3.12
1555	40.133	67.63	-2.94
1557	42.133	67.39	-2.
1559	44.270	67.61	-2.92
1601	46.213	67.88	-3.19
1603	48.213	67.60	-2.91
1605	5	65	-2.96
1607	5.		-2.97
1609	5.		-2.99

1611	56.[illegible]	[illegible].70	-3.01
1613	58.[illegible]	[illegible].[illegible]1	-3.22
1615	60.213	67.[illegible]3	-2.74
1617	62.213	67.70	-3.01
1619	64.213	67.66	-2.97
1621	66.213	67.70	-3.01
1623	68.213	67.68	-2.99
1625	70.213	67.43	-2.74
1627	72.213	67.96	-3.27
1629	74.213	[illegible].47	-2.78
1631	76.[illegible]	[illegible].74	-3.07
1635	80.[illegible]	[illegible]	-2.99
1637	82.13[illegible]	[illegible]	-2.91
1639	84.13[illegible]	[illegible]	-3.26
1641	86.138	67.48	-2.79
1643	88.053	67.71	-3.02
1645	90.072	67.74	-3.06
1647	92.072	67.72	-3.03
1649	94.072	67.88	-3.20
1651	96.073	67.72	-3.03
1653	98.072	67.72	-3.03
1655	100.070	68.02	-3.33
1715	120.020	67.46	-2.77

Average level: 67.47

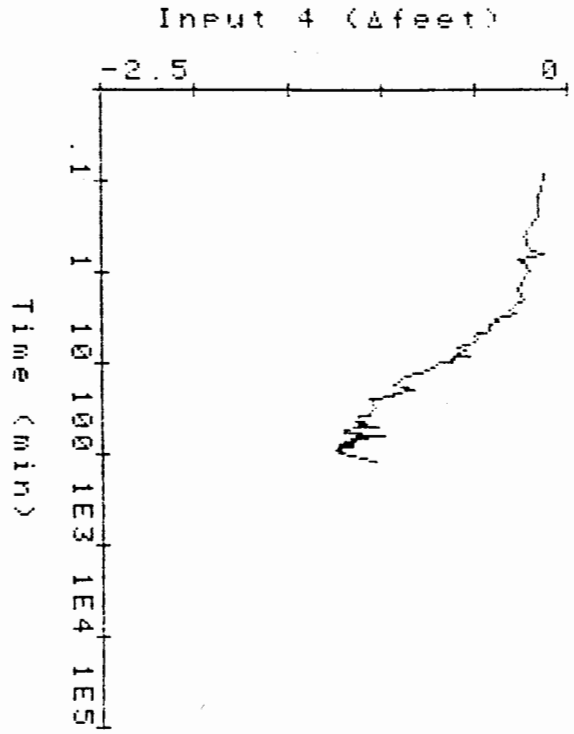


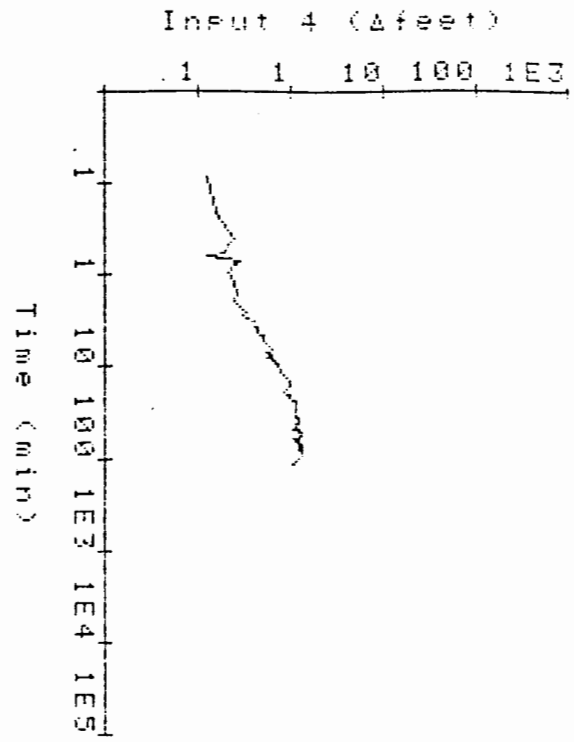


Input 4 (feet):

Time	ET (min)	level	Δlevel
1515	0.000	65.65	0.00
1515	0.084	65.77	-0.12
1515	0.167	65.80	-0.15
1515	0.251	65.81	-0.16
1515	0.334	65.86	-0.21
1515	0.417	65.89	-0.24
1515	0.501	65.86	-0.21
1515	0.584	65.85	-0.20
1515	0.667	65.78	-0.13
1515	0.751	65.92	-0.27
1515	0.834	65.88	-0.23
1515	0.917	65.87	-0.22
1516	1.001	65.86	-0.21
1516	1.377	65.90	-0.24
1516	1.710	65.91	-0.26
1517	2.043	65.88	-0.23
1517	2.377	65.93	-0.27
1517	2.710	65.97	-0.32
1518	3.043	65.94	-0.29
1518	3.377	66.04	-0.39
1518	3.710	66.02	-0.37
1519	4.043	66.07	-0.42
1519	4.377	66.08	-0.43
1519	4.710	66.10	-0.45
1520	5.043	66.13	-0.48
1520	5.377	66.15	-0.50
1520	5.710	66.13	-0.48
1521	6.043	66.17	-0.52
1521	6.377	66.20	-0.55
1521	6.710	66.20	-0.55
1522	7.043	66.24	-0.59
1522	7.377	66.20	-0.55
1522	7.710	66.19	-0.54
1523	8.043	66.24	-0.59
1523	8.377	66.18	-0.53
1523	8.710	66.26	-0.61
1524	9.043	66.28	-0.63
1524	9.377	66.25	-0.60
1524	9.710	66.30	-0.65
1525	10.043	66.34	-0.68
1527	12.127	66.40	-0.75
1529	14.127	66.53	-0.88
1531	16.075	66.56	-0.91
1533	18.[illegible]	66.60	-0.94
1535	20.[illegible]	[illegible] 48	-0.83
1537	22.[illegible]	[illegible]	-0.93
1539	24.[illegible]	[illegible]	-0.94
1541	26.[illegible]	[illegible]	-1.06
1543	28.133	[illegible]	-1.05
1545	30.133	66.70	-1.05
1547	32.133	66.69	-1.04
1549	34.133	66.69	-1.04
1551	36.133	66.72	-1.07
1553	38.133	66.71	-1.06
1555	40.133	66.77	-1.12
1557	42.133	66.78	-1.12
1559	44.270	66.75	-1.10
1601	46.213	66.79	-1.14
1603	48.213	66.76	-1.11
1605	50.213	66.76	-1.11
1607	52.213	66.66	-1.01
1609	54.213	66.79	-1.14
1611	56.213	66.85	-1.20
1613	58.213	66.85	-1.20
1615	60.213	66.80	-1.15
1617	62.213	66.85	-1.20
1619	64.213	66.63	-0.98
1621	66.213	66.80	-1.14
1623	68.213	66.82	-1.[illegible]
1625	70.213	66.79	-1.[illegible]
1627	72.213	66.73	-1.08
1629	74.213	66.85	-1.20
1631	76.213	66.84	-1.19
1635	80.138	66.81	-1.16
1637	82.138	66.89	-1.24
1639	84.138	66.81	-1.16
1641	86.138	66.89	-1.23
1643	88.053	66.87	-1.22
1645	90.072	66.90	-1.25
1647	92.072	66.87	-1.22
1649	94.072	66.89	-1.24
1651	96.073	66.88	-1.23
1653	98.072	66.89	-1.24
1655	100.070	66.89	-1.24
1715	120.020	66.69	-1.03

Average level: 66.69



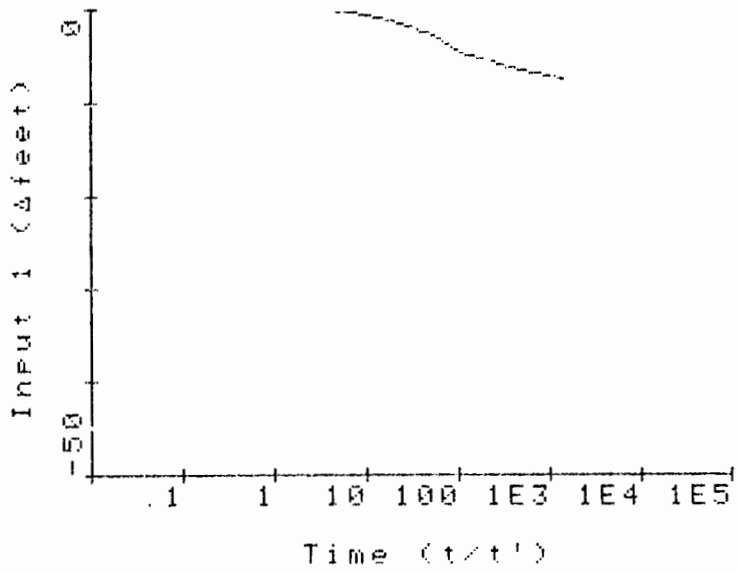


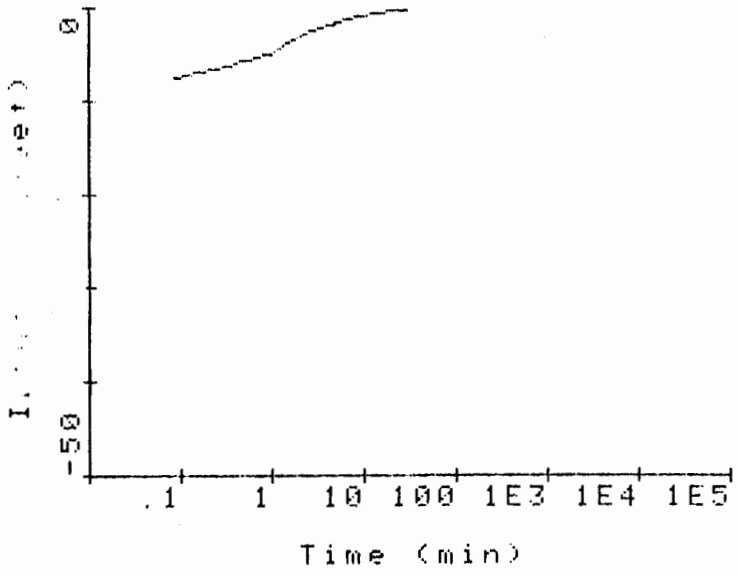
-------- (RT---------

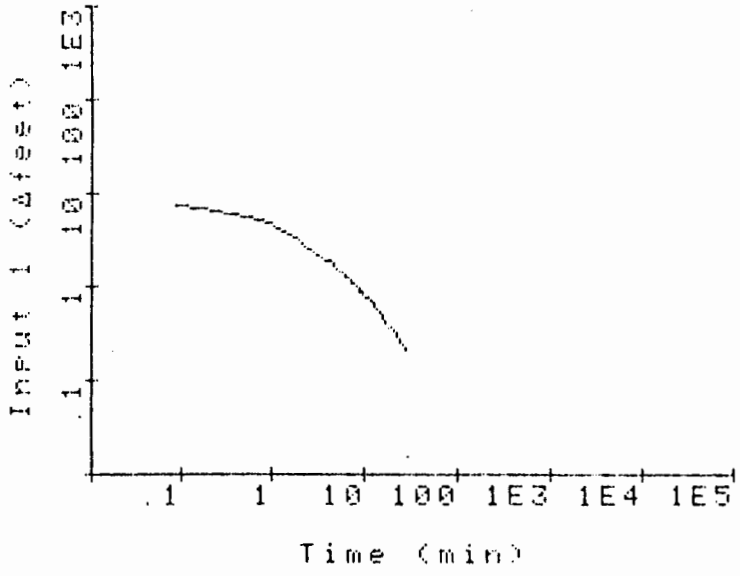
Started at 1715
Lasted 30.123 min

Input 1 (feet):

Time	ET (min)	level	Δlevel
1715	0.084	72.92	-7.35
1715	0.167	72.53	-6.96
1715	0.251	72.15	-6.58
1715	0.334	71.84	-6.27
1715	0.417	71.56	-5.99
1715	0.501	71.29	-5.72
1715	0.584	71.04	-5.47
1715	0.667	70.83	-5.26
1715	0.751	70.74	-5.17
1715	0.834	70.70	-5.13
1716	0.917	70.60	-5.03
1716	1.001	70.47	-4.90
1716	1.376	69.63	-4.06
1716	1.710	69.10	-3.53
1717	2.043	68.70	-3.13
1717	2.376	68.41	-2.84
1717	2.710	68.18	-2.61
1718	3.043	67.98	-2.41
1718	3.376	67.82	-2.25
1718	3.710	67.67	-2.10
1719	4.043	67.54	-1.97
1719	4.376	67.43	-1.86
1719	4.710	67.33	-1.76
1720	5.043	67.21	-1.64
1720	5.377	67.13	-1.56
1720	5.710	67.04	-1.47
1721	6.043	66.97	-1.40
1721	6.377	66.90	-1.33
1721	6.710	66.84	-1.27
1722	7.043	66.78	-1.21
1722	7.377	66.71	-1.14
1722	7.710	66.67	-1.09
1723	8.043	66.62	-1.05
1723	8.377	66.58	-1.01
1723	8.710	66.54	-0.96
1724	9.043	66.49	-0.92
1724	9.376	66.46	-0.89
1724	9.710	66.43	-0.86
1725	10.043	66.41	-0.84
1727	12.134	66.25	-0.68
1729	14.134	66.12	-0.55
1731	16.155	66.05	-0.48
1733	18.137	65.97	-0.40
1735	20.198	65.93	-0.36
1737	22.187	65.90	-0.33
1739	24.187	65.86	-0.29
1741	26.187	65.83	-0.26
1743	28.187	65.80	-0.23
1745	30.123	65.77	-0.20

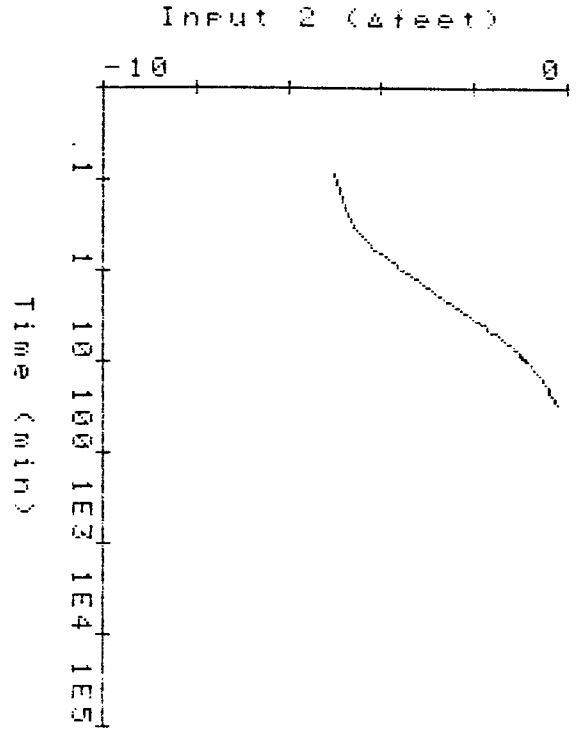

Input 1 (Δfeet)
0
-50
.1
1
10
100
1E3
1E4
1E5
Time (t/t')

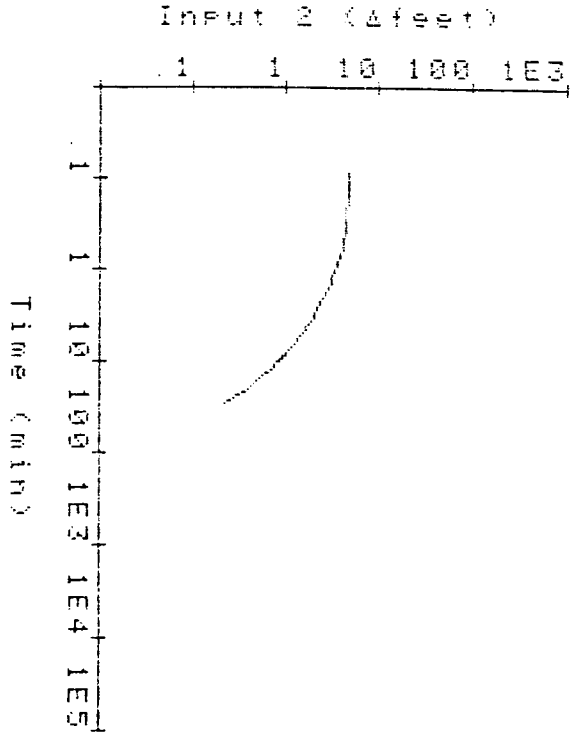

0
-50
.1
1
10
100
1E3
1E4
1E5
Time (min)

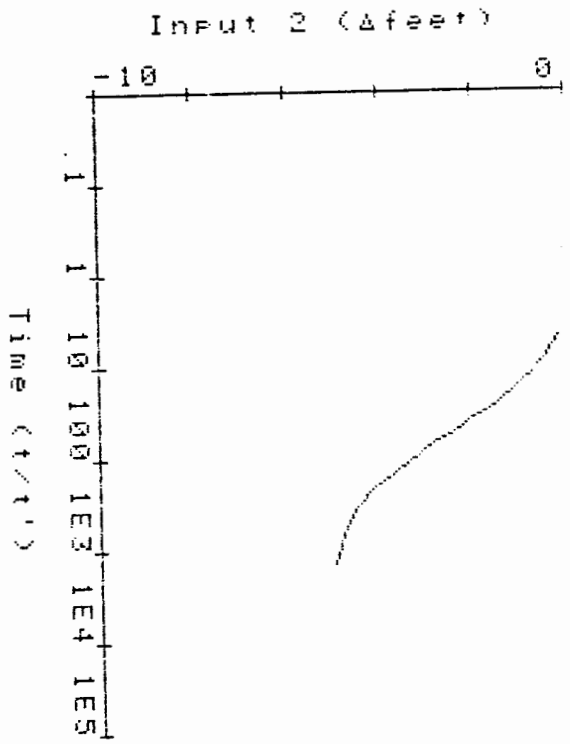

Input 1 (Δfeet)
.1
1
10
100
1E3
.1
1
10
1E4
1E5
Time (min)

Input 2 (feet):

Time	ET (min)	level	Δlevel
1715	0.084	69.69	-5.01
1715	0.167	69.52	-4.84
1715	0.251	69.37	-4.69
1715	0.334	69.22	-4.54
1715	0.417	69.07	-4.39
1715	0.501	68.92	-4.24
1715	0.584	68.77	-4.09
1715	0.667	68.65	-3.97
1715	0.751	68.50	-3.82
1715	0.834	68.40	-3.72
1716	0.917	68.28	-3.60
1716	1.001	68.20	-3.52
1716	1.376	67.82	-3.13
1716	1.710	67.54	-2.86
1717	2.043	67.31	-2.63
1717	2.376	67.10	-2.42
1717	2.710	66.95	-2.27
1718	3.043	66.79	-2.11
1718	3.376	66.67	-1.99
1718	3.710	66.55	-1.87
1719	4.043	66.45	-1.77
1719	4.376	66.36	-1.68
1719	4.710	66.27	-1.59
1720	5.043	66.21	-1.53
1720	5.377	66.12	-1.44
1720	5.710	66.06	-1.38
1721	6.043	65.99	-1.31
1721	6.377	65.93	-1.25
1721	6.710	65.89	-1.20
1722	7.043	65.84	-1.16
1722	7.377	65.79	-1.11
1722	7.710	65.76	-1.08
1723	8.043	65.71	-1.03
1723	8.377	65.66	-0.98
1723	8.710	65.64	-0.96
1724	9.043	65.61	-0.93
1724	9.376	65.56	-0.88
1724	9.710	65.54	-0.86
1725	10.043	65.51	-0.83
1727	12.134	65.36	-0.68
1729	14.134	65.24	-0.56
1731	16.155	65.17	-0.49
1733	18.137	65.12	-0.44
1735	20.198	65.06	-0.38
1737	22.187	65.03	-0.35
1739	24.187	64.98	-0.30
1741	26.187	64.95	-0.27
1743	28.187	64.91	-0.23
1745	30.123	64.90	-0.22

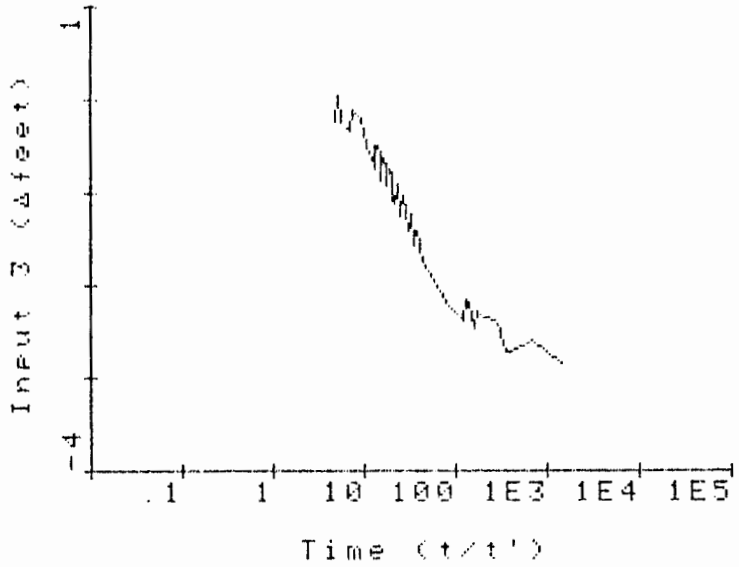






Input 3 (feet):

Time	ET (min)	level	Δlevel
1715	0.084	67.54	-2.85
1715	0.167	67.27	-2.58
1715	0.251	67.37	-2.68
1715	0.334	67.41	-2.72
1715	0.417	67.10	-2.41
1715	0.501	67.05	-2.36
1715	0.584	67.02	-2.33
1715	0.667	66.96	-2.27
1715	0.751	67.17	-2.48
1715	0.834	66.87	-2.18
1716	0.917	66.83	-2.14
1716	1.001	67.07	-2.38
1716	1.376	66.90	-2.21
1716	1.710	66.74	-2.05
1717	2.043	66.62	-1.93
1717	2.376	66.53	-1.84
1717	2.710	66.43	-1.74
1718	3.043	66.10	-1.41
1718	3.376	66.24	-1.55
1718	3.710	65.92	-1.23
1719	4.043	66.10	-1.4[illegible]
1719	4.376	65.85	-1.1[illegible]
1719	4.710	65.72	-1.03
1720	5.043	65.94	-1.25
1720	5.377	65.61	-0.92
1720	5.710	65.80	-1.11
1721	6.043	65.77	-1.08
1721	6.377	65.47	-0.78
1721	6.710	65.42	-0.74
1722	7.043	65.64	-0.95
1722	7.377	65.41	-0.72
1722	7.710	65.32	-0.63
1723	8.043	65.58	-0.89
1723	8.377	65.27	-0.58
1723	8.710	65.23	-0.54
1724	9.043	65.20	-0.51
1724	9.376	65.17	-0.48
1724	9.710	65.44	-0.75
1725	10.043	65.40	-0.71
1727	12.134	65.19	-0.50
1729	14.134	64.91	-0.22
1731	16.155	64.87	-0.18
1733	18.137	64.80	-0.11
1735	20.198	65.04	-0.35
1737	22.187	65.00	-0.32
1739	24.187	64.97	-0.28
1741	26.187	64.94	-0.25
1743	28.187	64.66	0.03
1745	30.123	64.94	-0.25


Input 3 (Δfeet)
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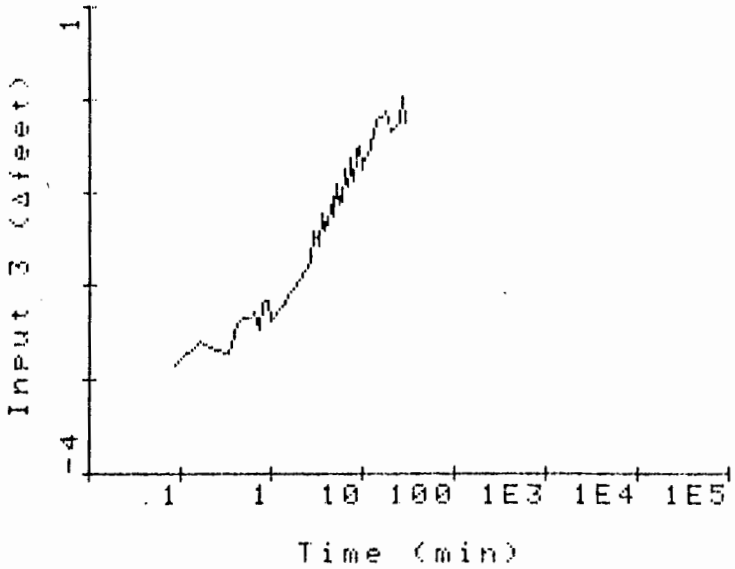
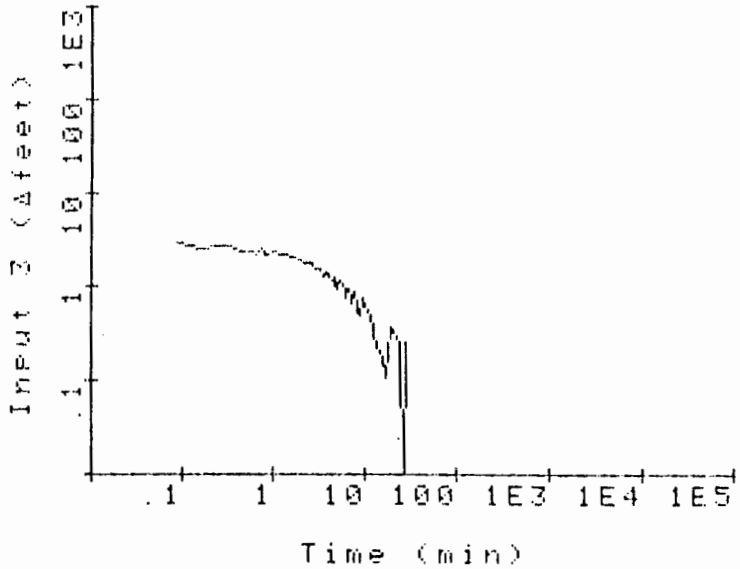
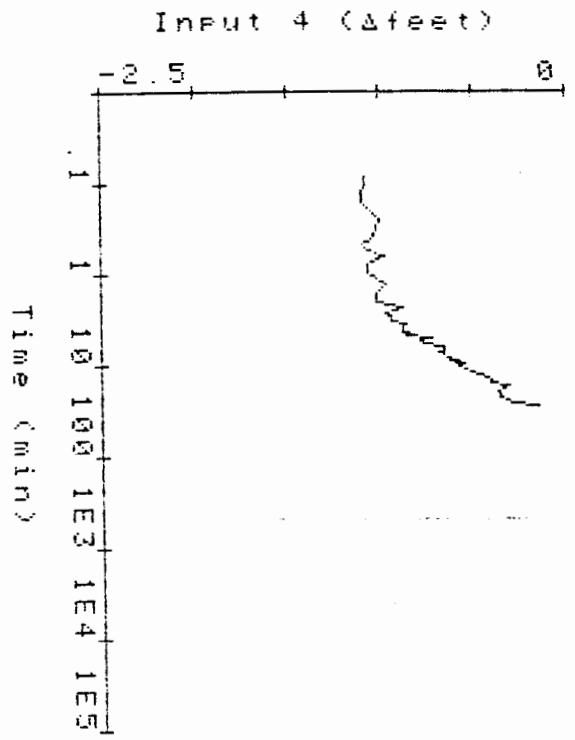
1
10
100
1E3
1E4
1E5
Time (t/t')

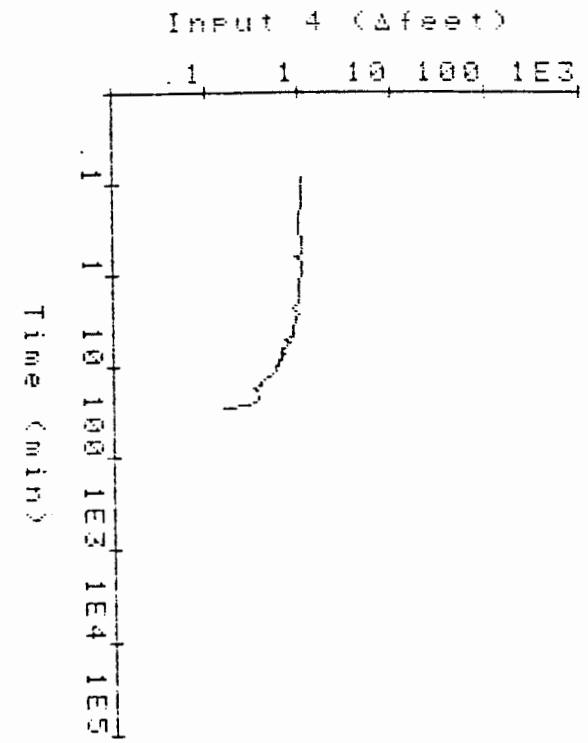

Input 3 (Δfeet)
1
-4
.1
1
10
100
1E3
1E4
1E5
Time (min)

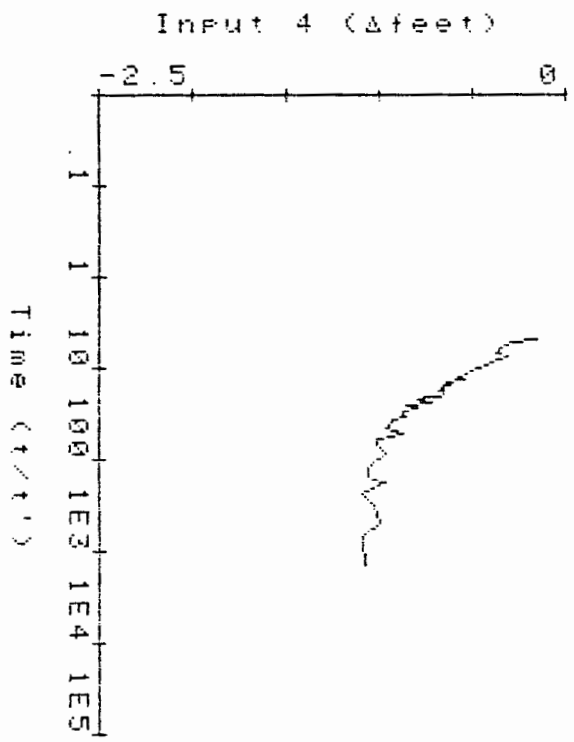

Input 3 (Δfeet)
.1
1
10
100
1E3
.1
1
10
100
1E3
1E4
1E5
Time (min)

Input 4 (feet):

Time	ET (min)	level	Δlevel
1715	0.084	66.73	-1.08
1715	0.167	66.75	-1.10
1715	0.251	66.66	-1.00
1715	0.334	66.66	-1.01
1715	0.417	66.70	-1.05
1715	0.501	66.74	-1.09
1715	0.584	66.69	-1.04
1715	0.667	66.62	-0.96
1715	0.751	66.69	-1.04
1715	0.834	66.71	-1.06
1716	0.917	66.72	-1.07
1716	1.001	66.72	-1.07
1716	1.376	66.62	-0.97
1716	1.710	66.67	-1.02
1717	2.043	66.66	-1.01
1717	2.376	66.52	-0.87
1717	2.710	66.62	-0.97
1718	3.043	66.59	-0.94
1718	3.376	66.59	-0.94
1718	3.710	66.50	-0.85
1719	4.043	66.52	-0.87
1719	4.376	66.52	-0.87
1719	4.710	66.46	-0.80
1720	5.043	66.50	-0.85
1720	5.377	66.37	-0.72
1720	5.710	66.45	-0.80
1721	6.043	66.41	-0.76
1721	6.377	66.32	-0.67
1721	6.710	66.31	-0.66
1722	7.043	66.31	-0.66
1722	7.377	66.34	-0.69
1722	7.710	66.32	-0.66
1723	8.043	66.30	-0.65
1723	8.377	66.27	-0.62
1723	8.710	66.29	-0.64
1724	9.043	66.27	-0.61
1724	9.376	66.25	-0.60
1724	9.710	66.20	-0.54
1725	10.043	66.25	-0.59
1727	12.134	66.17	-0.52
1729	14.134	66.07	-0.42
1731	16.155	66.05	-0.40
1733	18.137	65.97	-0.31
1735	20.198	66.03	-0.38
1737	22.187	66.01	-0.36
1739	24.187	66.00	-0.35
1741	26.187	65.97	-0.32
1743	28.187	65.95	-0.30
1745	30.123	65.81	-0.15







SE200B manufactured by
In-situ, inc.
Lar[illegible]

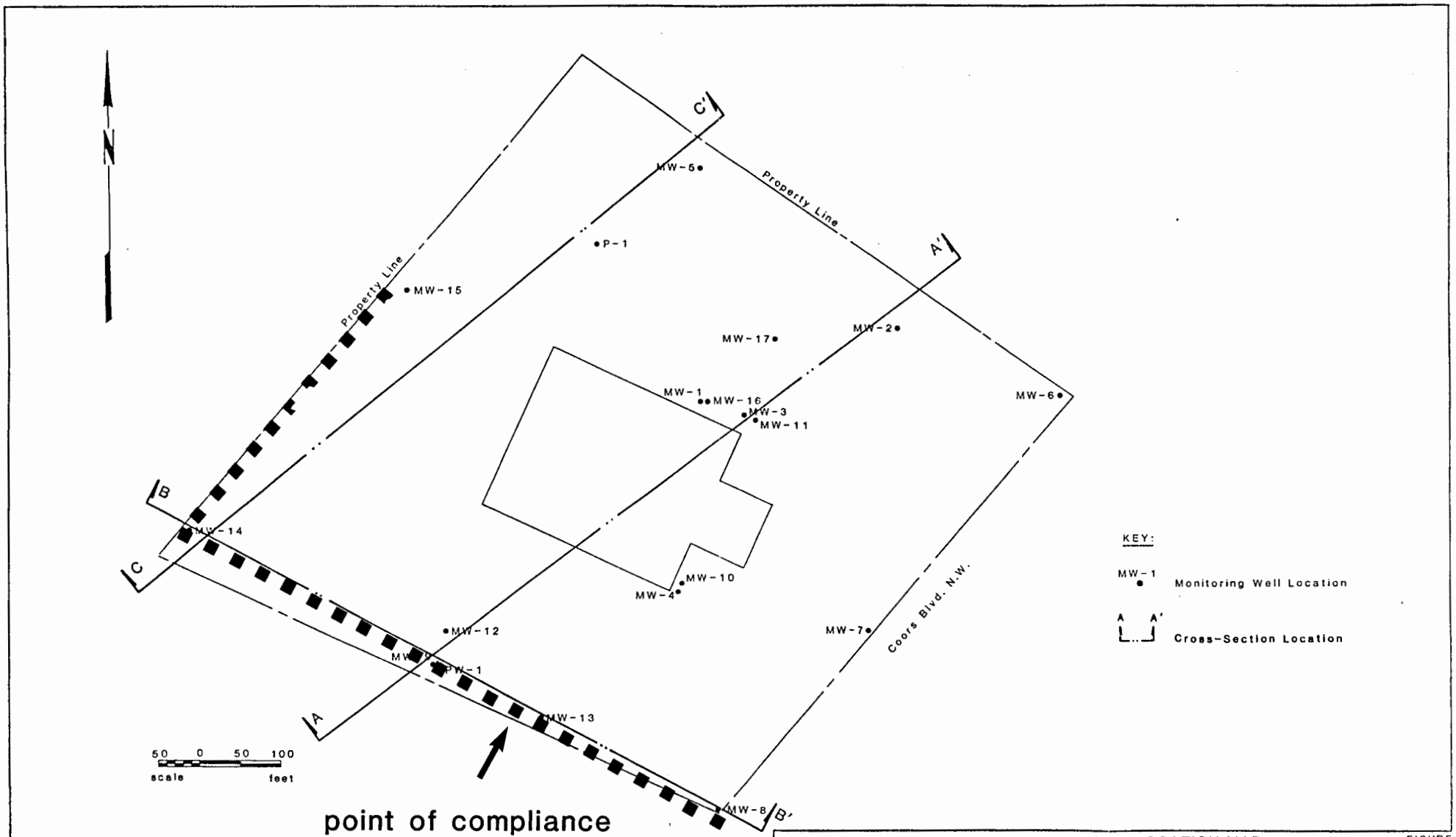
APPENDIX F
to
ATTACHMENT 4

Figures 1 through 21

Appendix F

Figures 1 through 21

Figure 1	Site Location Map
Figure 2A	Log of Well MW-12
Figure 2B	Log of Well MW-12 (cont'd)
Figure 3	Particle Size Analysis
Figure 4A	Log of Well MW-13
Figure 4B	Log of Well MW-13 (cont'd)
Figure 5A	Log of Well MW-14
Figure 5B	Log of Well MW-14 (cont'd)
Figure 6A	Log of Well MW-15
Figure 6B	Log of Well MW-15 (cont'd)
Figure 7	Log of Well MW-16
Figure 8	Log of Well MW-17
Figure 9A	Log of Well PW-1
Figure 9B	Log of Well PW-1 (cont'd)
Figure 10	Geologic Cross-Section A-A'
Figure 11	Geologic Cross-Section B-B'
Figure 12	Geologic Cross-Section C-C'
Figure 13	Static Piezometric Head
Figure 14	Static Water Table in Upper Aquifer
Figure 15	Static Piezometric Head in Lower Aquifer
Figure 16	Specific Conductance Values in Upper Aquifer
Figure 17	Trichloroethylene Concentrations in Upper Aquifer
Figure 18	Piezometric Head at End of Pumping Test
Figure 19	Water Table in Upper Aquifer End of Test
Figure 20	Piezometric Head in Lower Aquifer at End of Test
Figure 21	Proposed Soil Boring Locations



Reference: Sparton Tech. Inc. Survey by Denney-Gross & Assoc., Inc., Dated 10/5/84.

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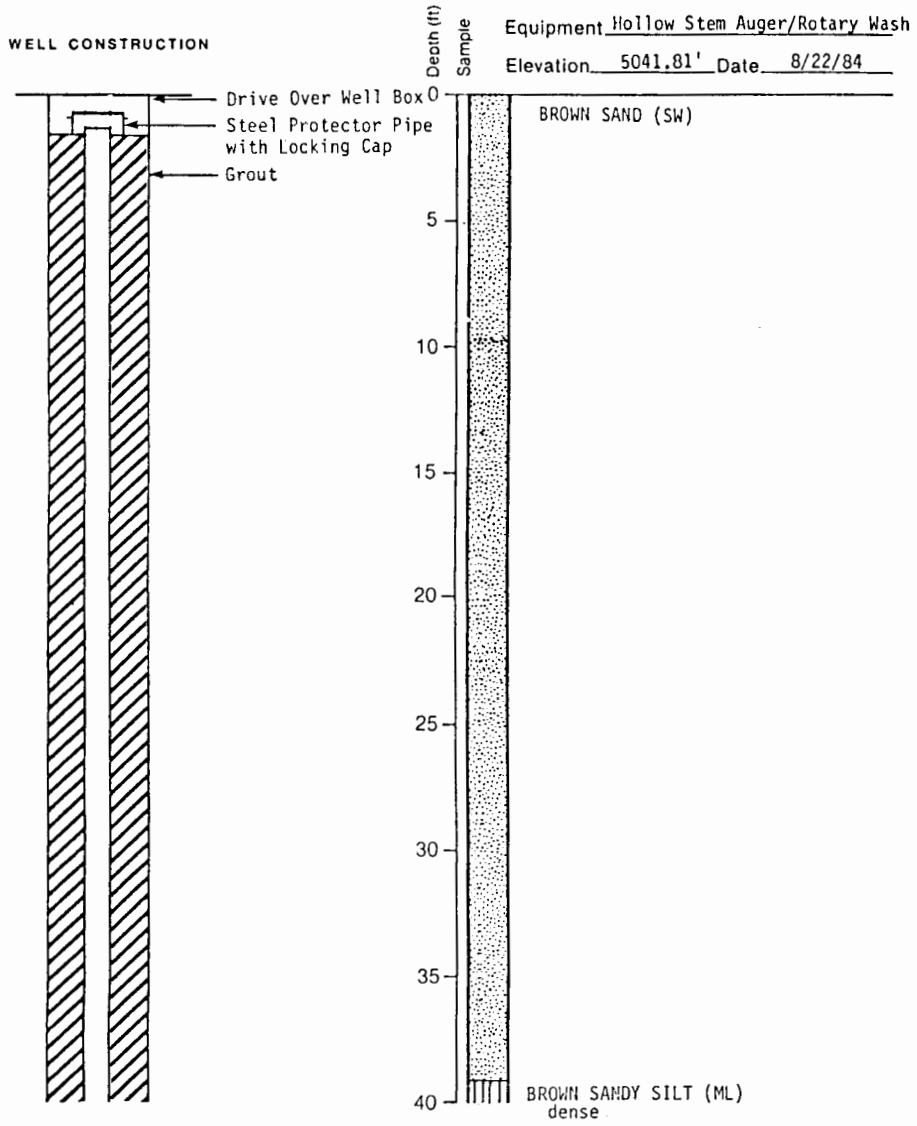
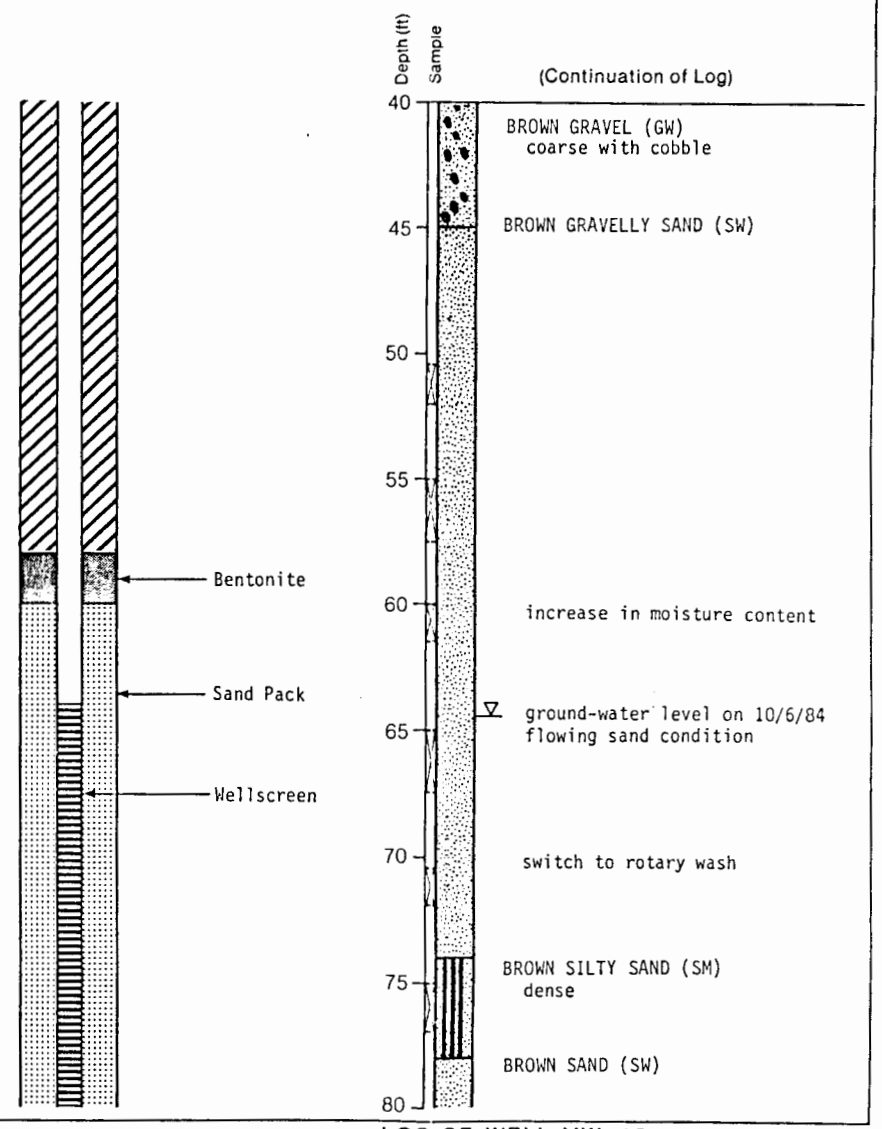
SITE LOCATION MAP
Sparton Technology, Inc.
Albuquerque, New Mexico

FIGURE 1

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
HM	6310,013.12	[illegible]	[illegible]		





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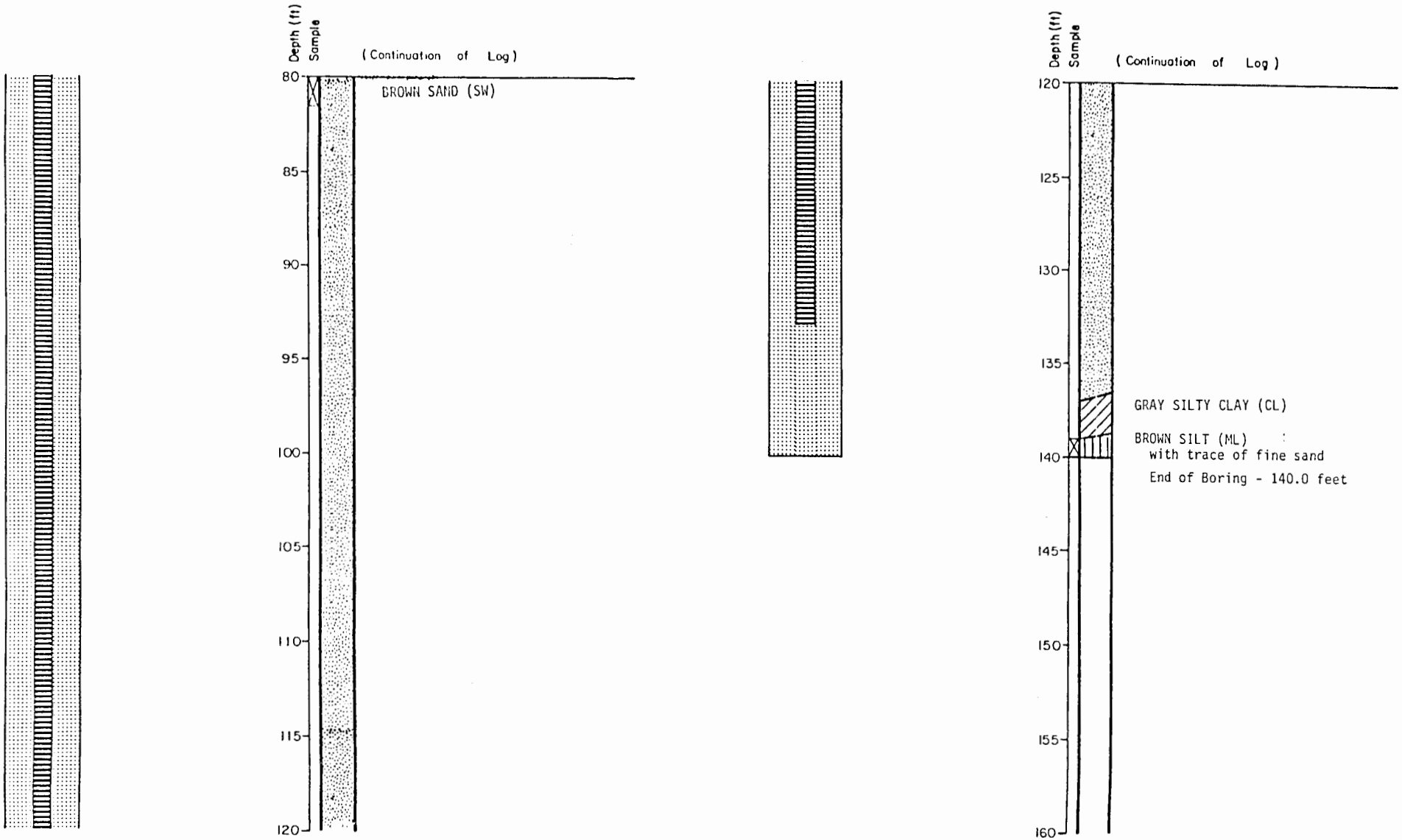
LOG OF WELL MW-12
Sparton Technology, Inc.
Albuquerque, New Mexico

FIGURE 2A

DRAWN GJ | JOB NUMBER 6310,013.12 | APPROVED | DATE | REVISED | DATE



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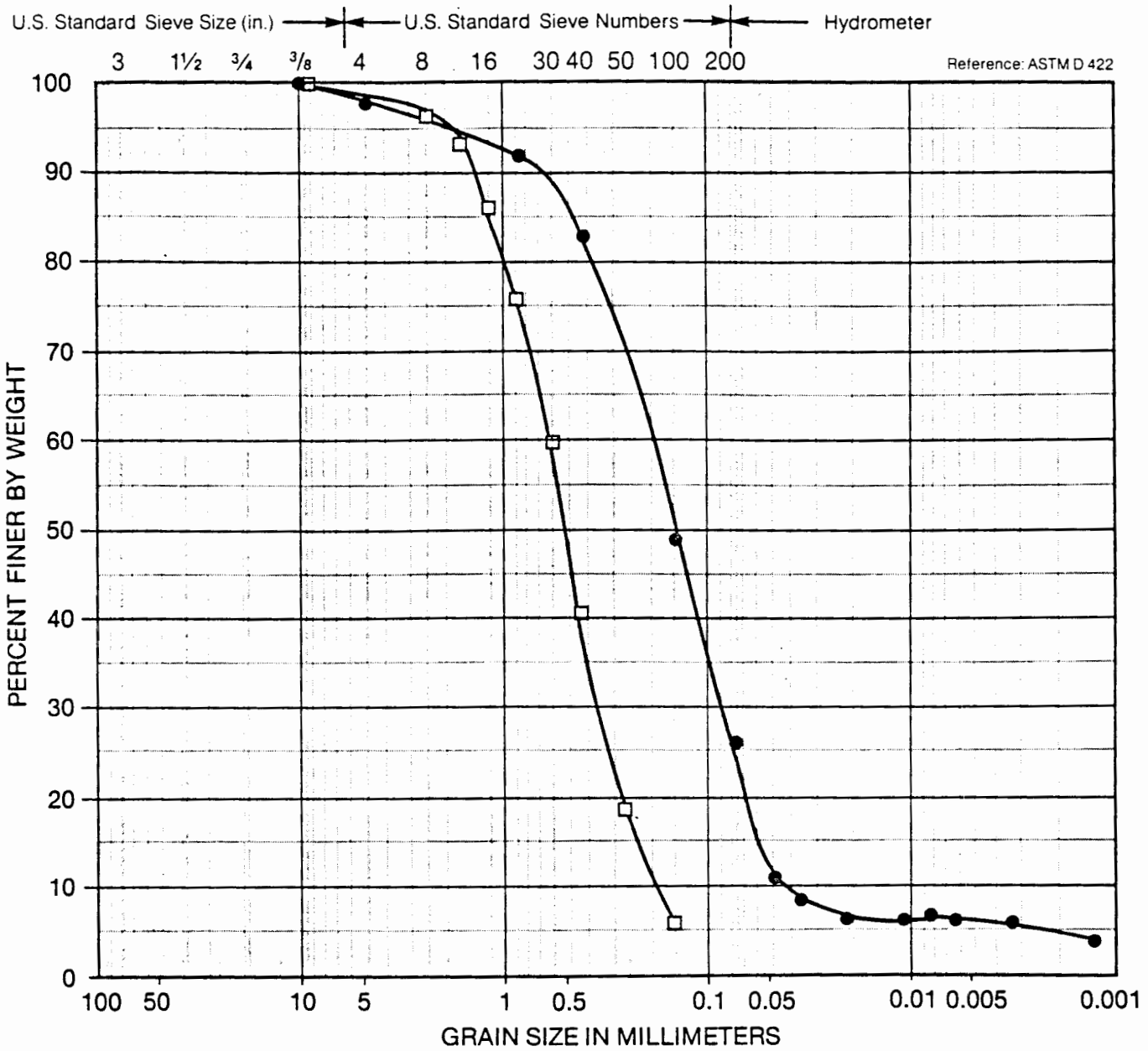
LOG OF WELL MW-12 (Cont'd)
Sparton Technology, Inc.
Albuquerque, New Mexico

FIGURE 2B

6310,013.12



COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT OR CLAY
	GRAVEL		SAND			

Symbol	Sample Source	Classification
●	MW-12 at 75-77'	Silty Sand (SM) (spooned sample) Analyzed by HLA
□	MW-12 at 60-70' ; 80-135'	Sand (SW) (washed sample) Analyzed by Rodgers and Co.

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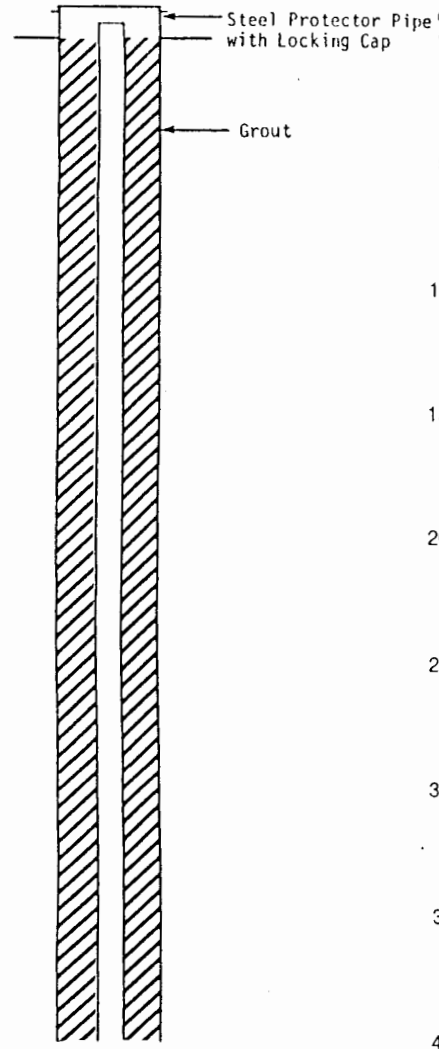
Particle Size Analysis
Sparton Technology, Inc.
Albuquerque, New Mexico

FIGURE
3

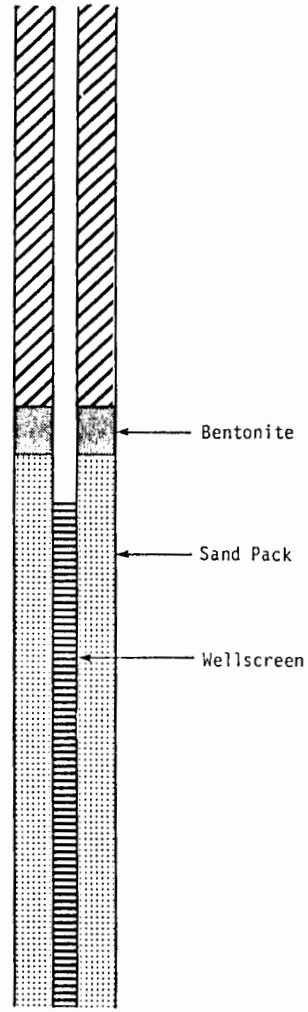
DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
HM	6310,013.12	DCB	1/[illegible]		



Equipment Rotary Wash

Elevation 5043.35' Date 8/28/84

Depth (ft)	Sample	
0		BROWN SAND (SW) medium to fine-grained
5		
10		
15		COARSE BROWN SANDY GRAVEL (GW)
20		BROWN SAND (SW)
25		
30		GRAY BROWN CLAYEY SILT (ML)
35		
40		



(Continuation of Log)

Depth (ft)	Sample	
40		
45		BROWN SANDY GRAVEL (GW)
50		
55		DENSE GRAY CLAY (CL)
		COARSE BROWN GRAVEL (GW)
60		▽ ground-water level on 10/6/84
65		GRAY SILTY CLAY (CL) dense
70		BROWN SILTY SAND (SM)
75		
80		BROWN SAND (SW)

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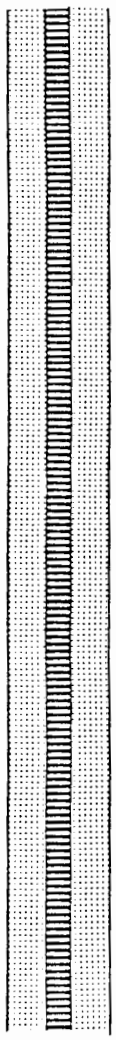
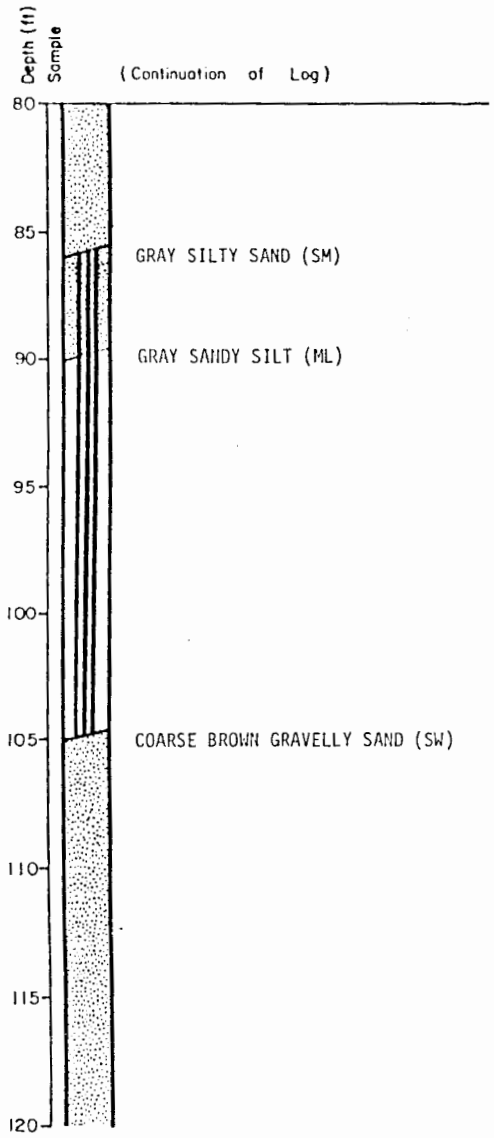
LOG OF WELL MW-13
Sparton Technology, Inc.
Albuquerque, New Mexico

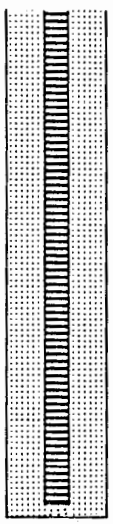
FIGURE 4A

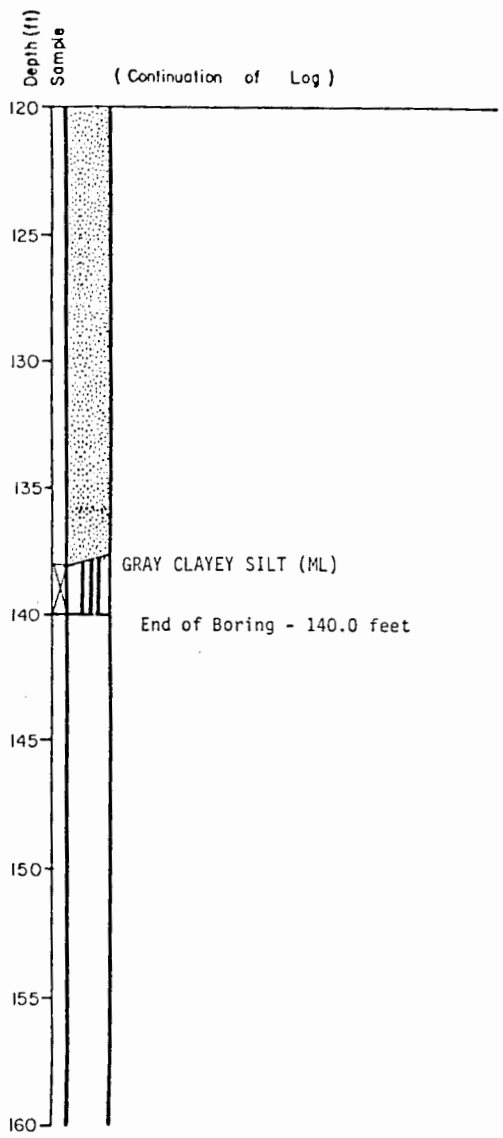
DRAWN HM | JOB NUMBER 6310,013.12 | APPROVED DCL | DATE 9/19/85 | REVISED | DATE

WELL CONSTRUCTION









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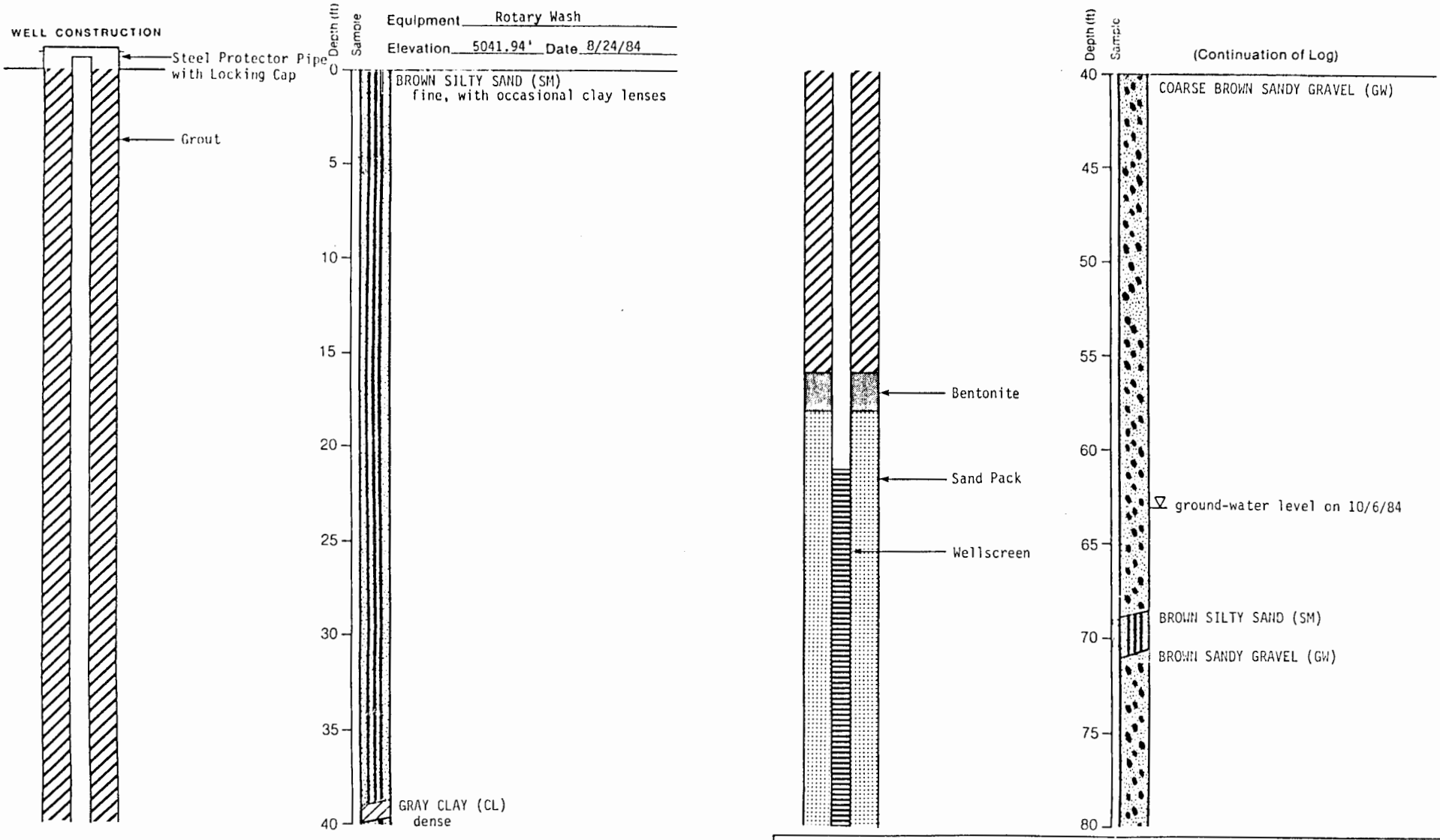
LOG OF WELL MW-13 (Cont'd)

Sparton Technology, Inc.
Albuquerque, New Mexico

FIGURE 4B

LM 6310.013.12



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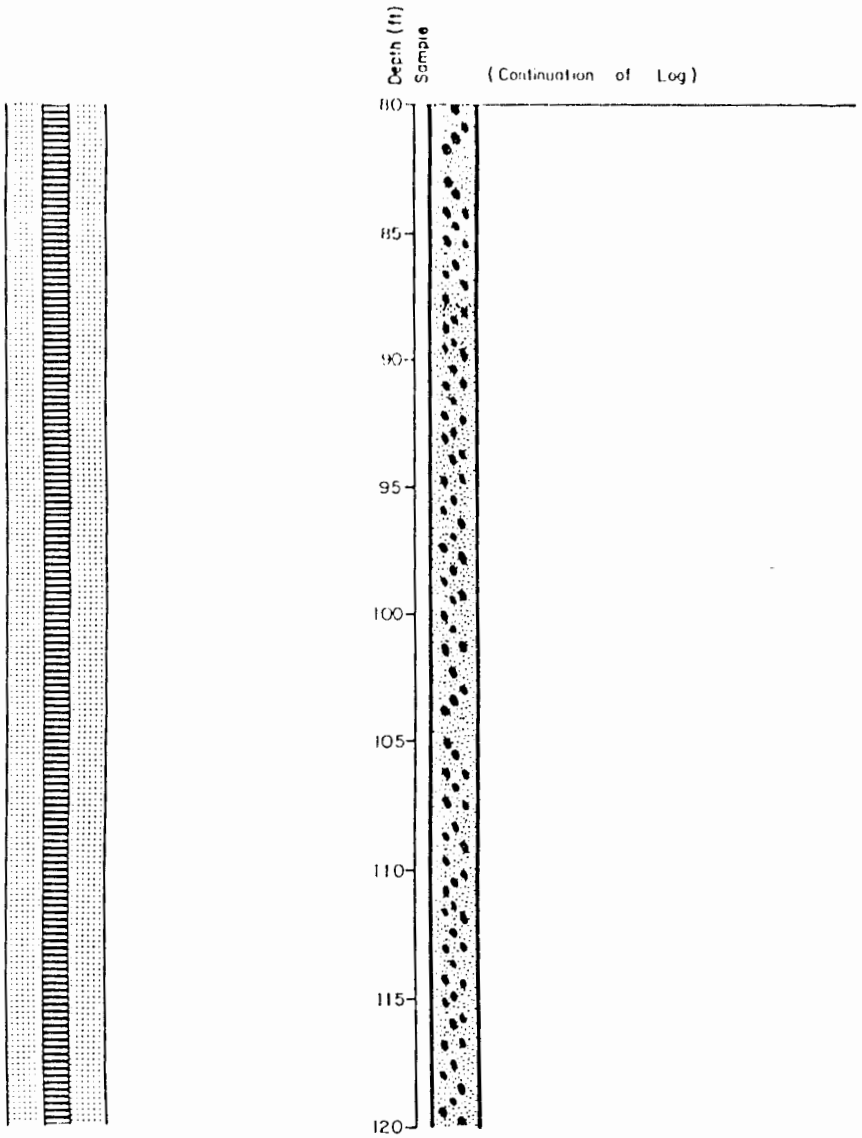
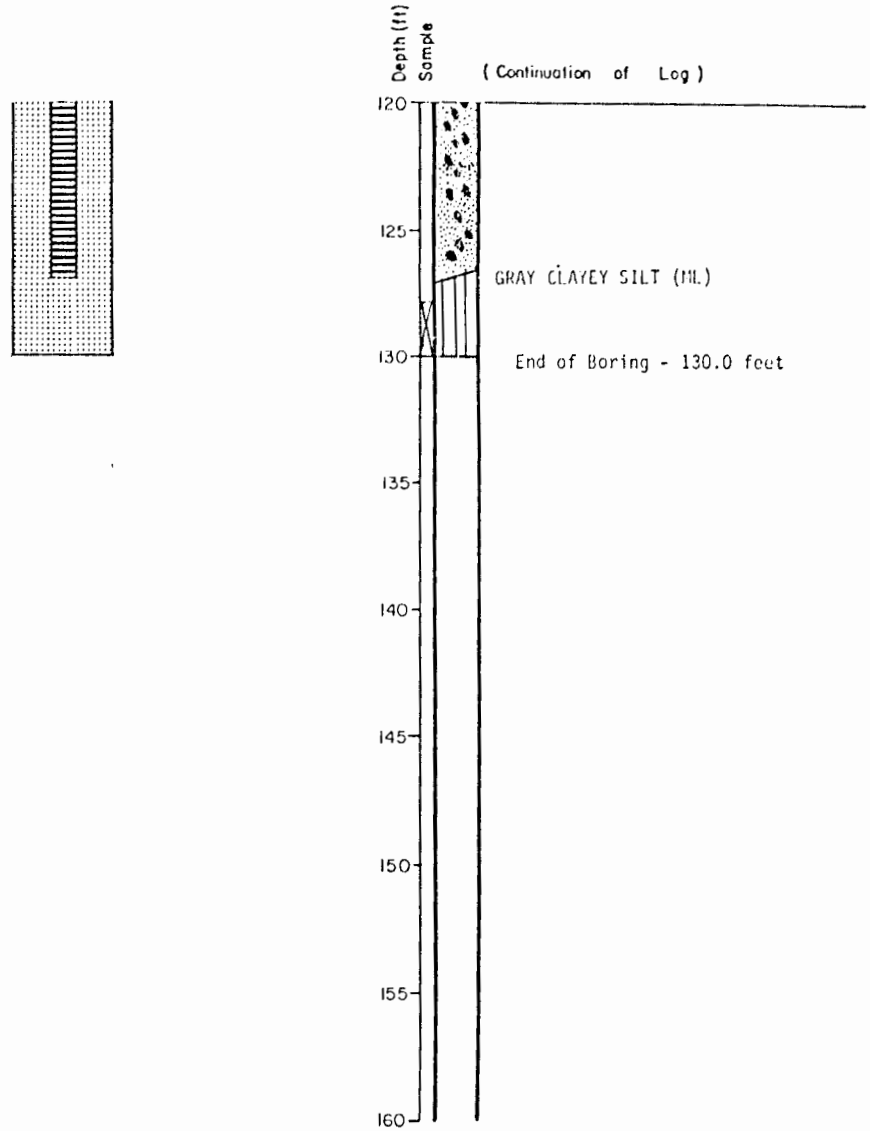
LOG OF WELL MW-14
Sparton Technology, Inc.
Albuquerque, New Mexico

FIGURE 5A

DRAWN HM | JOB NUMBER 6310,013.12 | APPROVED | DATE





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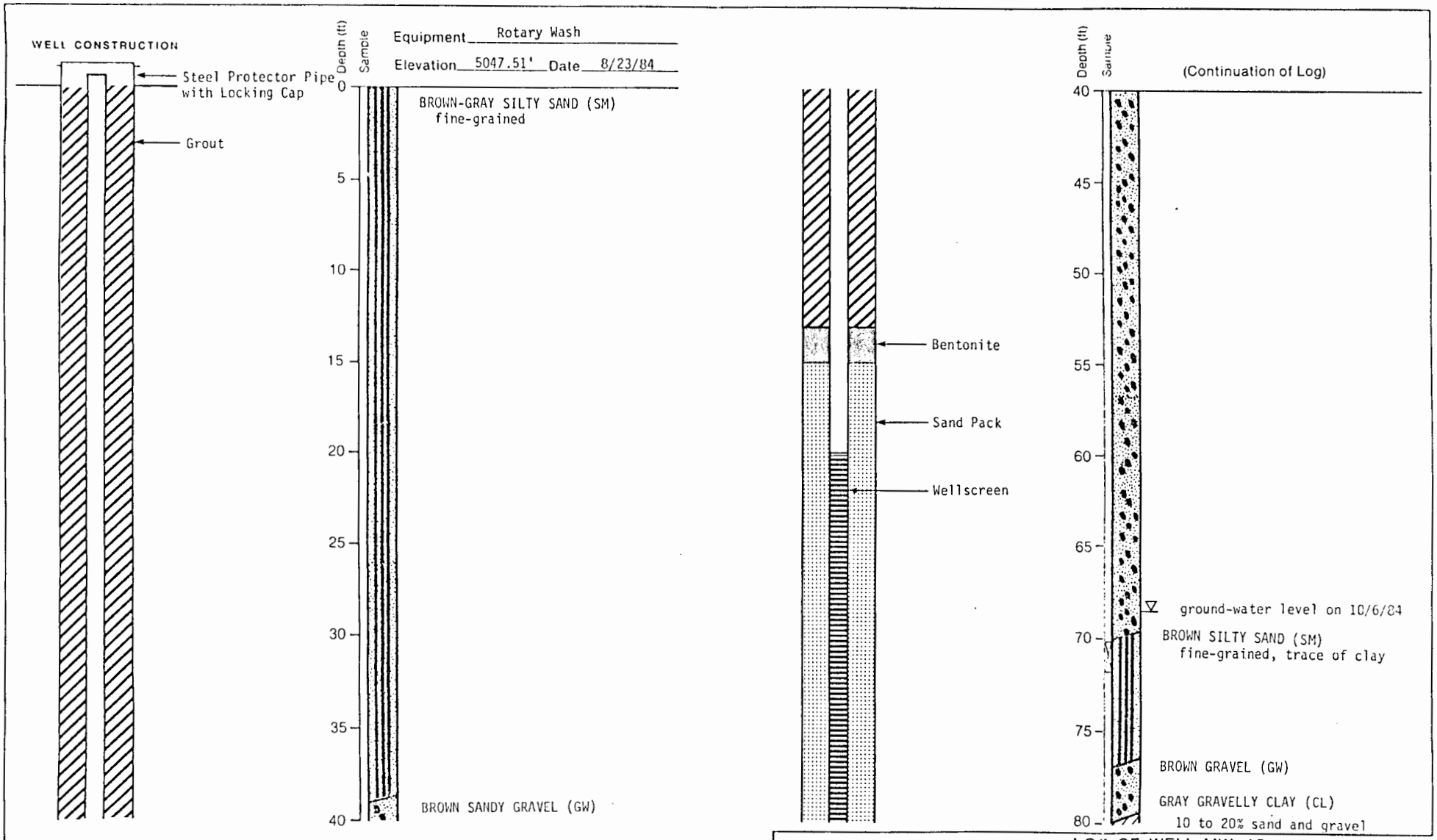
LOG OF WELL MW-14 (Cont'd)
Sparton Technology, Inc.
Albuquerque, New Mexico

FIGURE
5B



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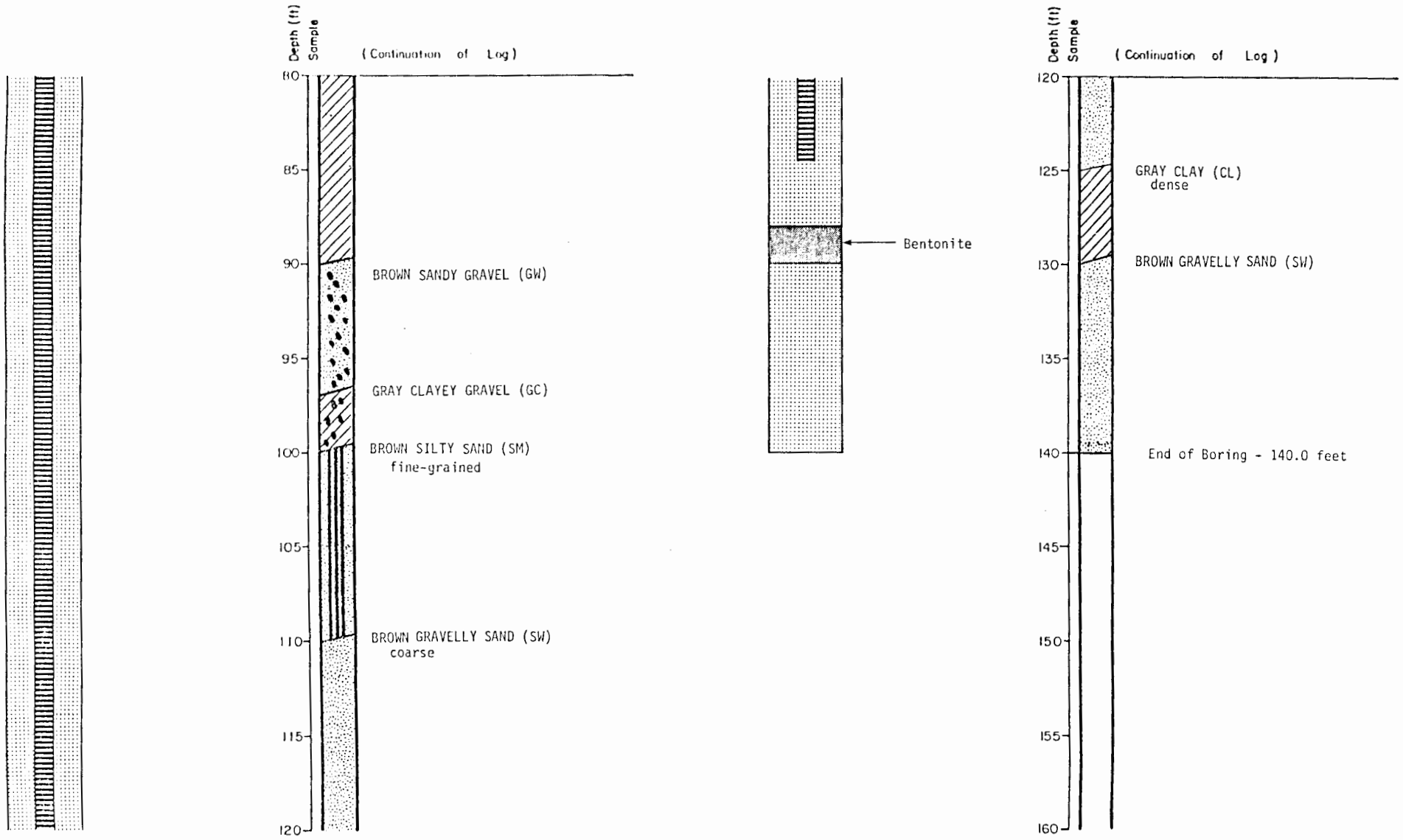
LOG OF WELL MW-15
Sparton Technology, Inc.
Albuquerque, New Mexico

FIGURE 6A

JOB NUMBER 6310,013.12



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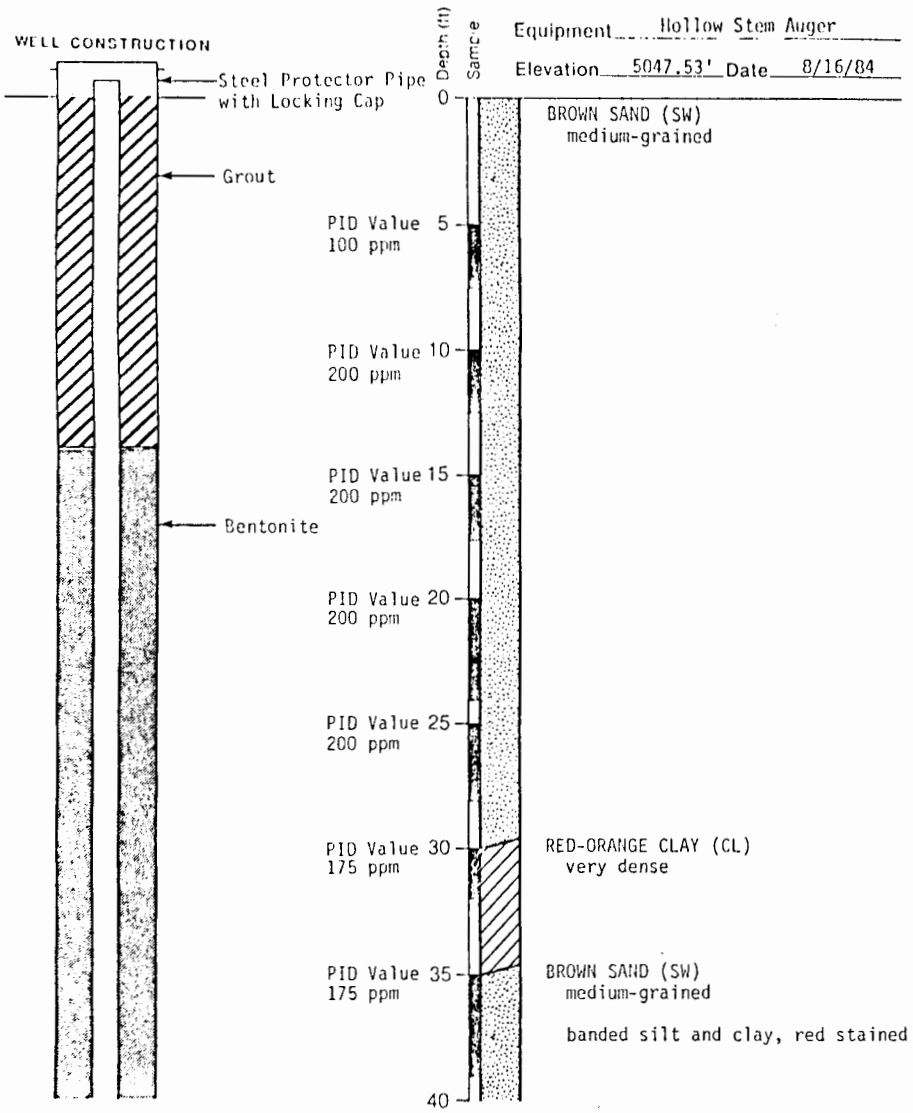
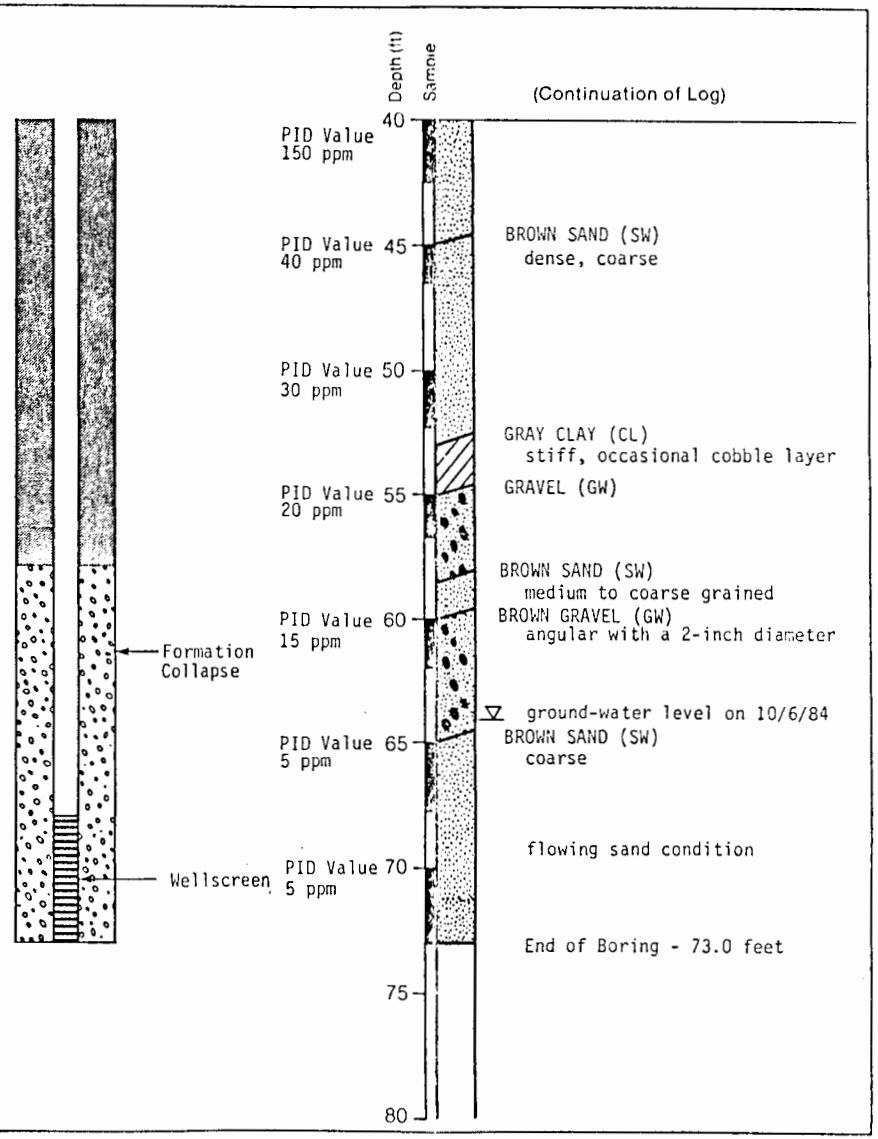
LOG OF WELL MW-15 (Cont'd)
Sparton Technology, Inc.
Albuquerque, New Mexico

FIGURE 6B





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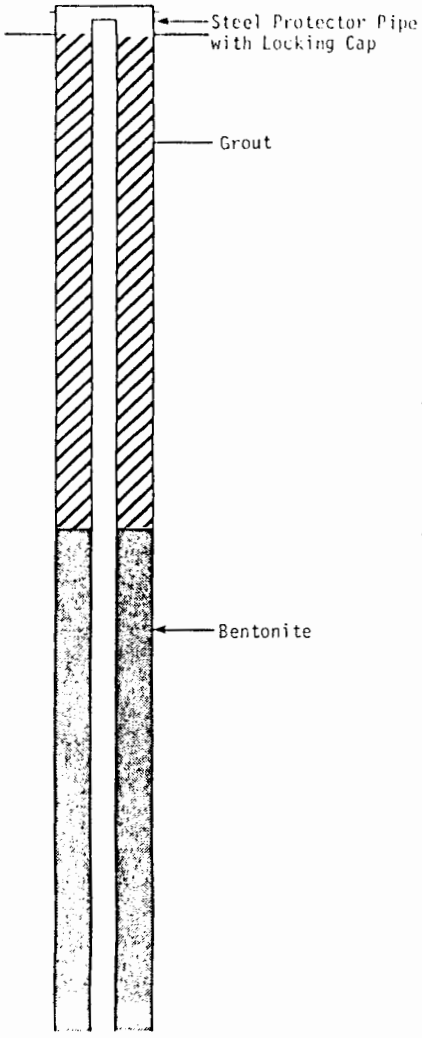
LOG OF WELL MW-16
Sparton Technology, Inc.
Albuquerque, New Mexico

FIGURE 7

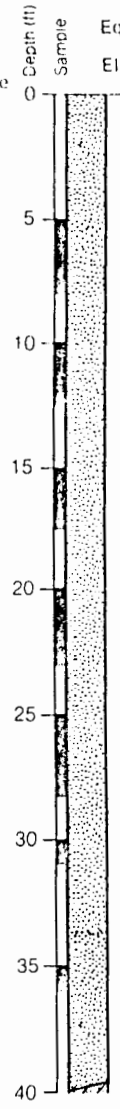
DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
HM	6310,013.12	DCC	1/10/85		

WELL CONSTRUCTION



Equipment Hollow Stem Auger

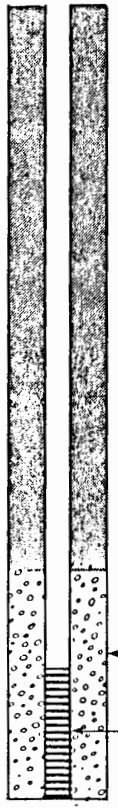
Elevation 5049.30' Date 8/24/84



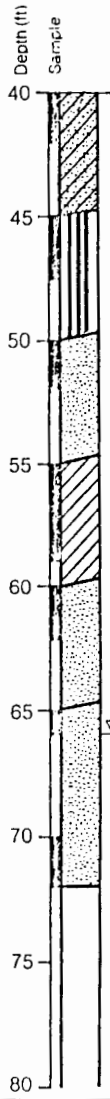
BROWN SAND (SW)
dry, medium grained

increases in density with depth

BROWN CLAYEY SAND (SC)
moist, fine-grained



(Continuation of Log)



GRAY CLAYEY SANDY SILT (ML)

BROWN SAND (SW)
coarse

GRAY CLAY (CL)
dry, dense

BROWN SAND (SW)
wet, coarse to medium grained,
thin clay lenses, gravel layers

GRAY GRAVELLY SAND (SW)
saturated, coarse
ground-water level on 10/6/84

flowing sand condition

End of Boring - 72.0 feet

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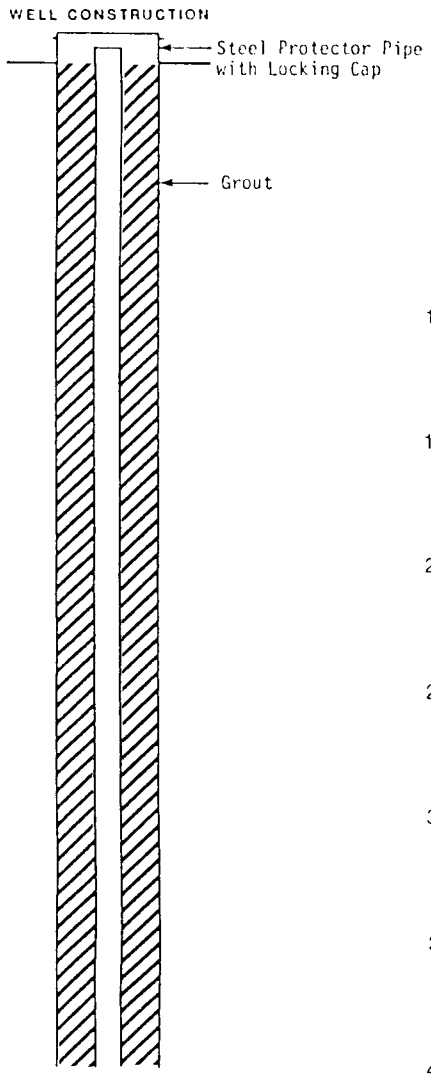
LOG OF WELL MW-17

Sparton Technology, Inc.
Albuquerque, New Mexico

FIGURE 8

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



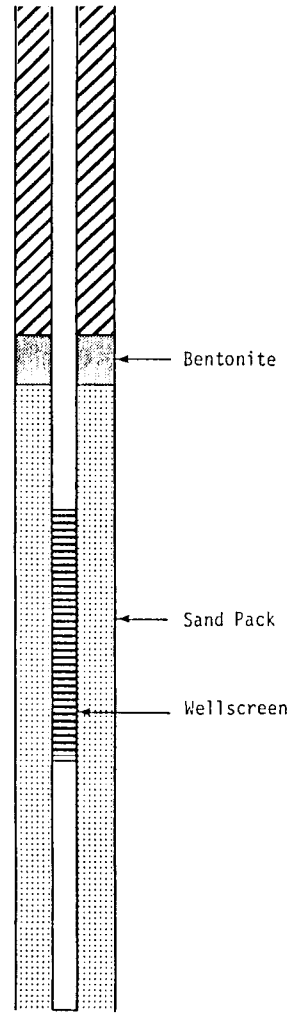
Equipment Rotary Wash

Elevation 5043.89' Date 9/5/84

Depth (ft) | Sample

0 — BROWN SAND (SW)
fine to medium grained sand,
thin silty sand layers

5, 10, 15, 20, 25, 30, 35, 40



Depth (ft) | Sample

(Continuation of Log)

40, 45, 50, 55, 60, 65, 70, 75, 80

50 — BROWN GRAVEL (GW)
very coarse with coarse sand

65 — ▽ ground-water level on 10/6/84

70 — BROWN SILTY SAND (SM)
fine-grained, with clay lenses

80 — BROWN SAND (SW)
medium to coarse sand

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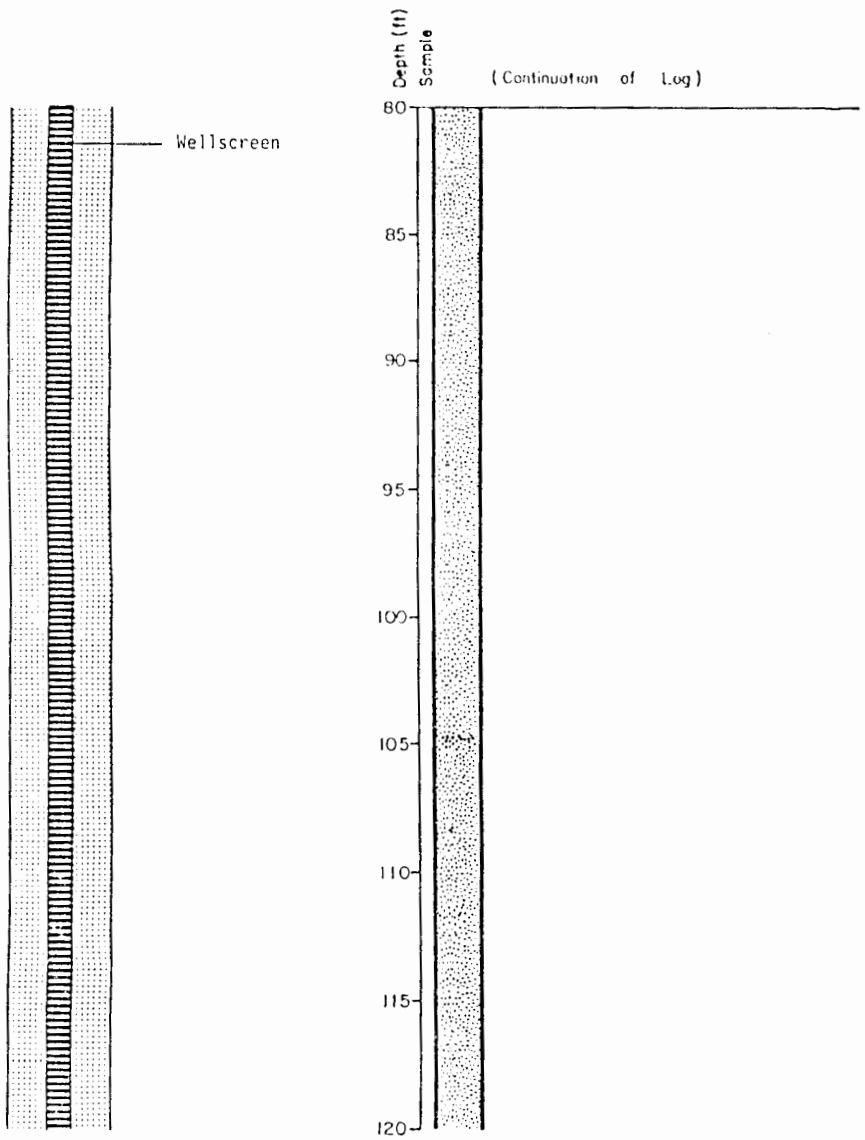
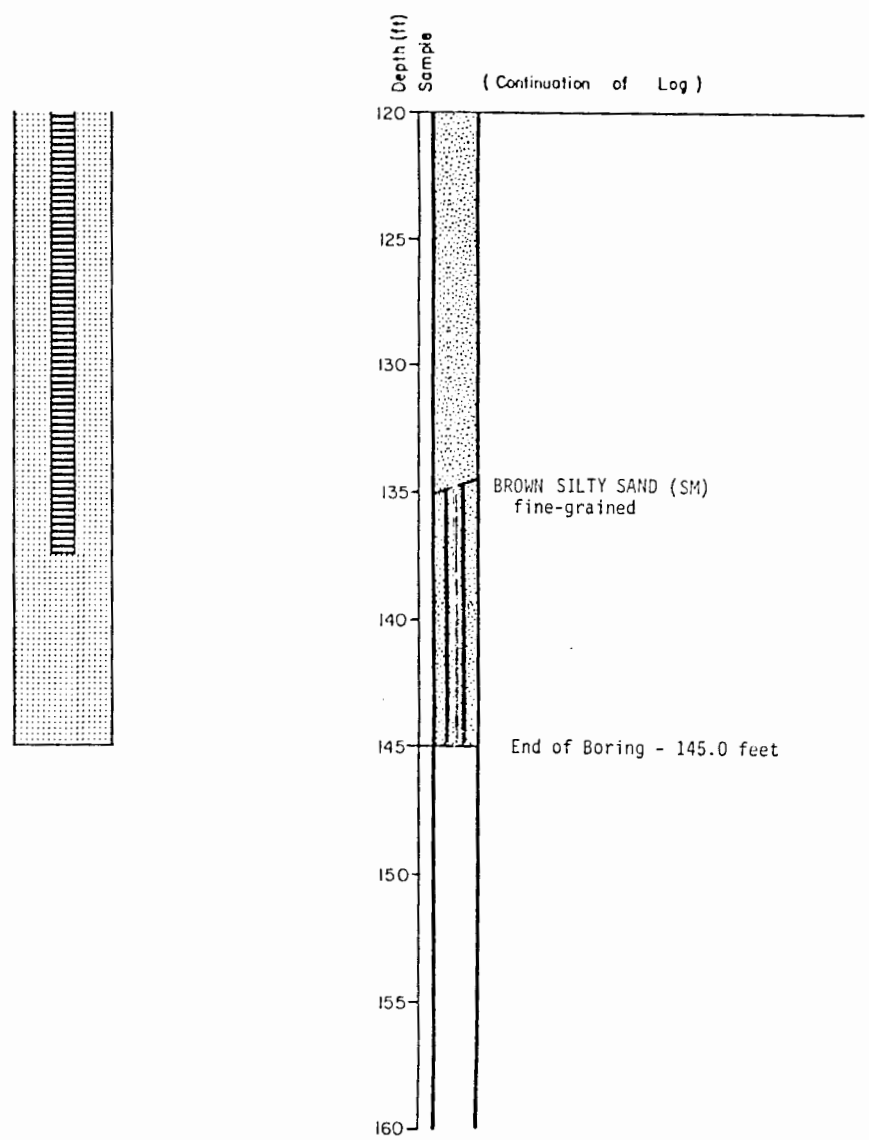
LOG OF WELL PW-1
Sparton Technology, Inc.
Albuquerque, New Mexico

FIGURE 9A

DRAWN HM | JOB NUMBER 6310,013.12 | APPROVED | DATE | REVISED | DATE





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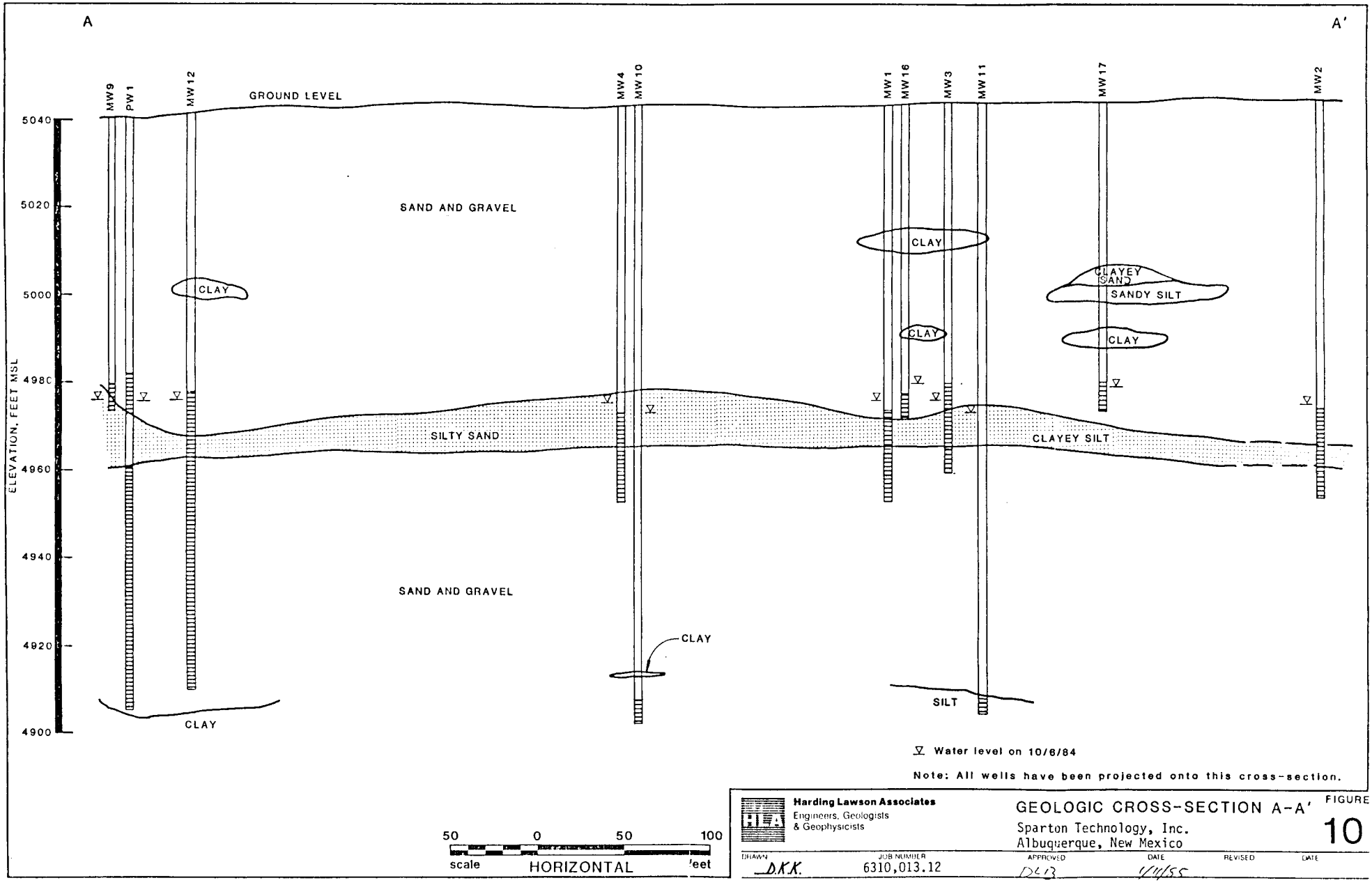
LOG OF WELL PW-1 (Cont'd)
Sparton Technology, Inc.
Albuquerque, New Mexico

FIGURE 9B

LM 6310.013.12



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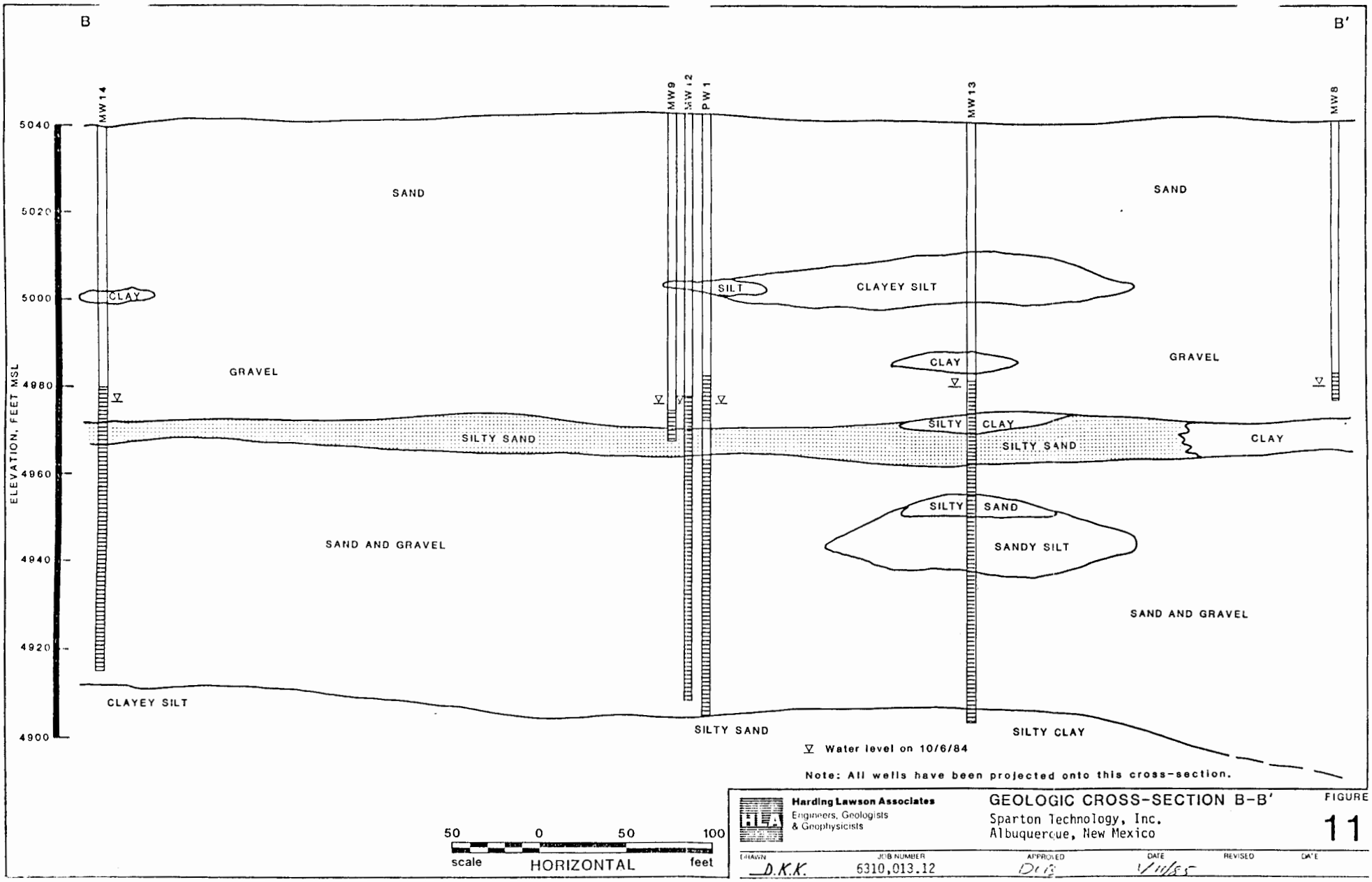
GEOLOGIC CROSS-SECTION A-A'
Sparton Technology, Inc.
Albuquerque, New Mexico

FIGURE 10

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
D.K.K.	6310,013.12	DLB	1/11/85		



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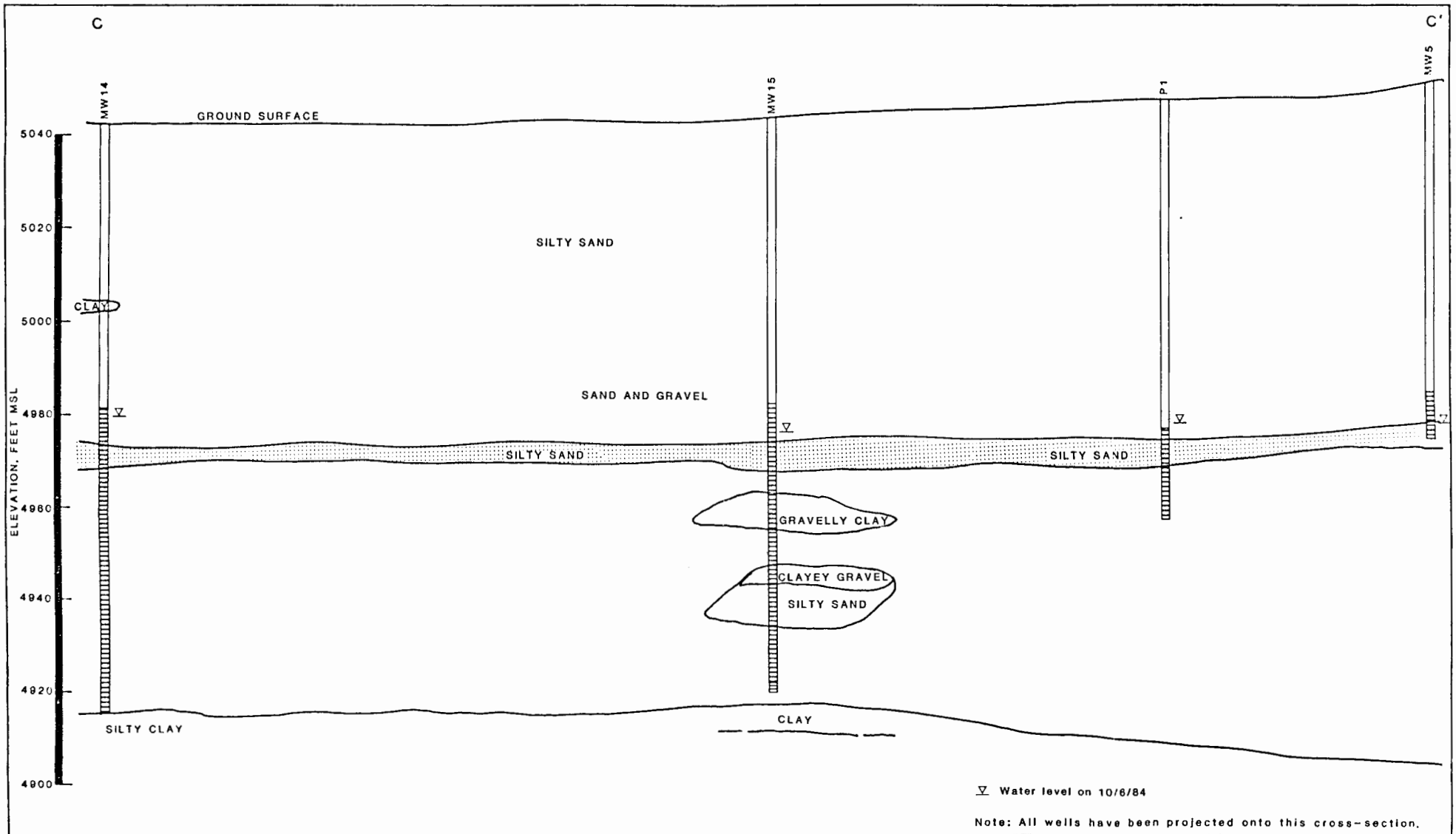
GEOLOGIC CROSS-SECTION B-B'

Sparton Technology, Inc.
Albuquerque, New Mexico

FIGURE 11

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
D.K.K.	6310,013.12	DCB	1/11/85		



50 0 50 100
scale HORIZONTAL feet

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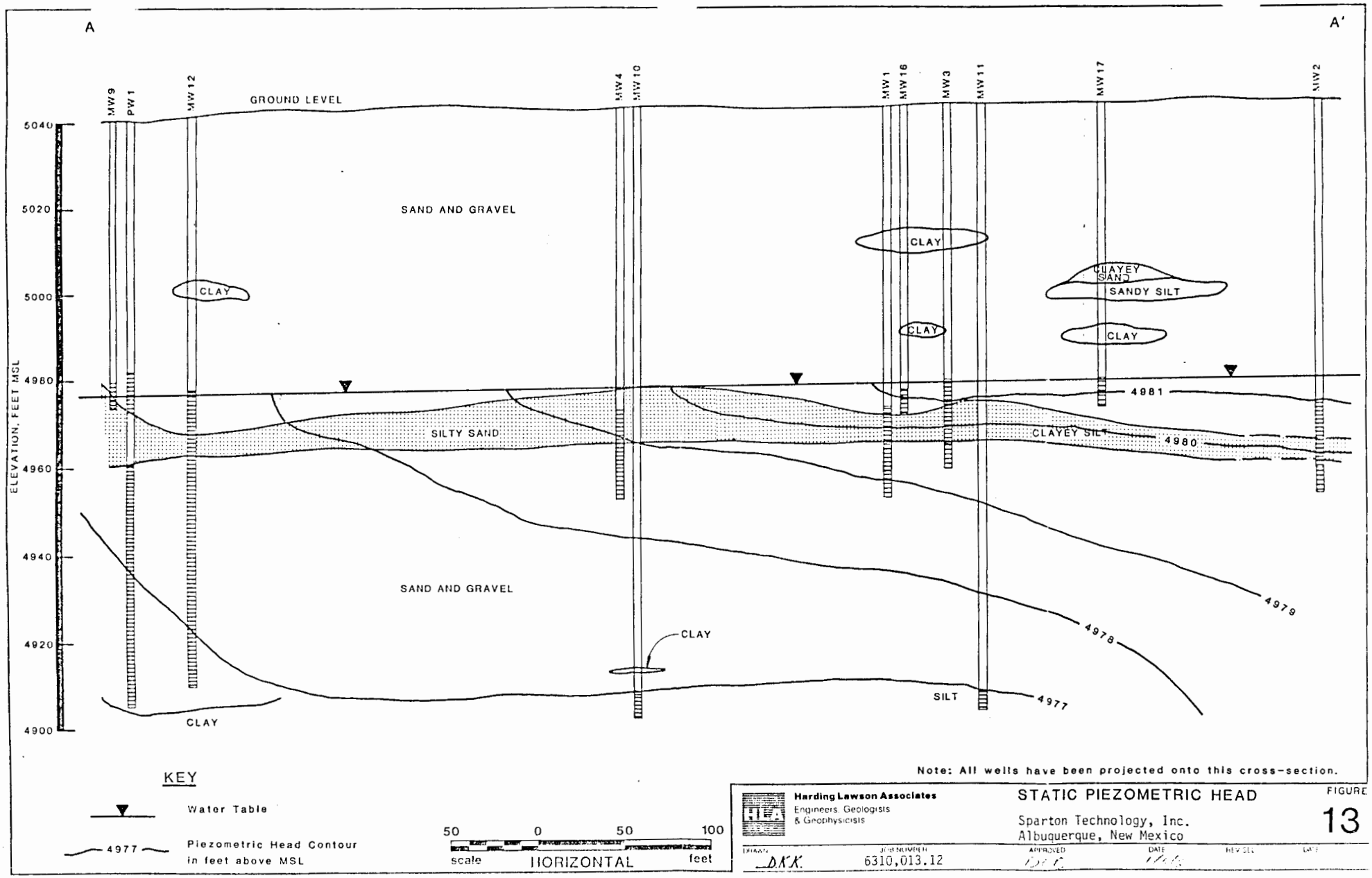
GEOLOGIC CROSS-SECTION C-C'
Sparton Technology, Inc.
Albuquerque, New Mexico

FIGURE 12

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
D.K.K.	6310,013.12	DCJ	1/11/85		



Note: All wells have been projected onto this cross-section.

KEY

Water Table

4977 Piezometric Head Contour in feet above MSL

50 0 50 100
scale HORIZONTAL feet

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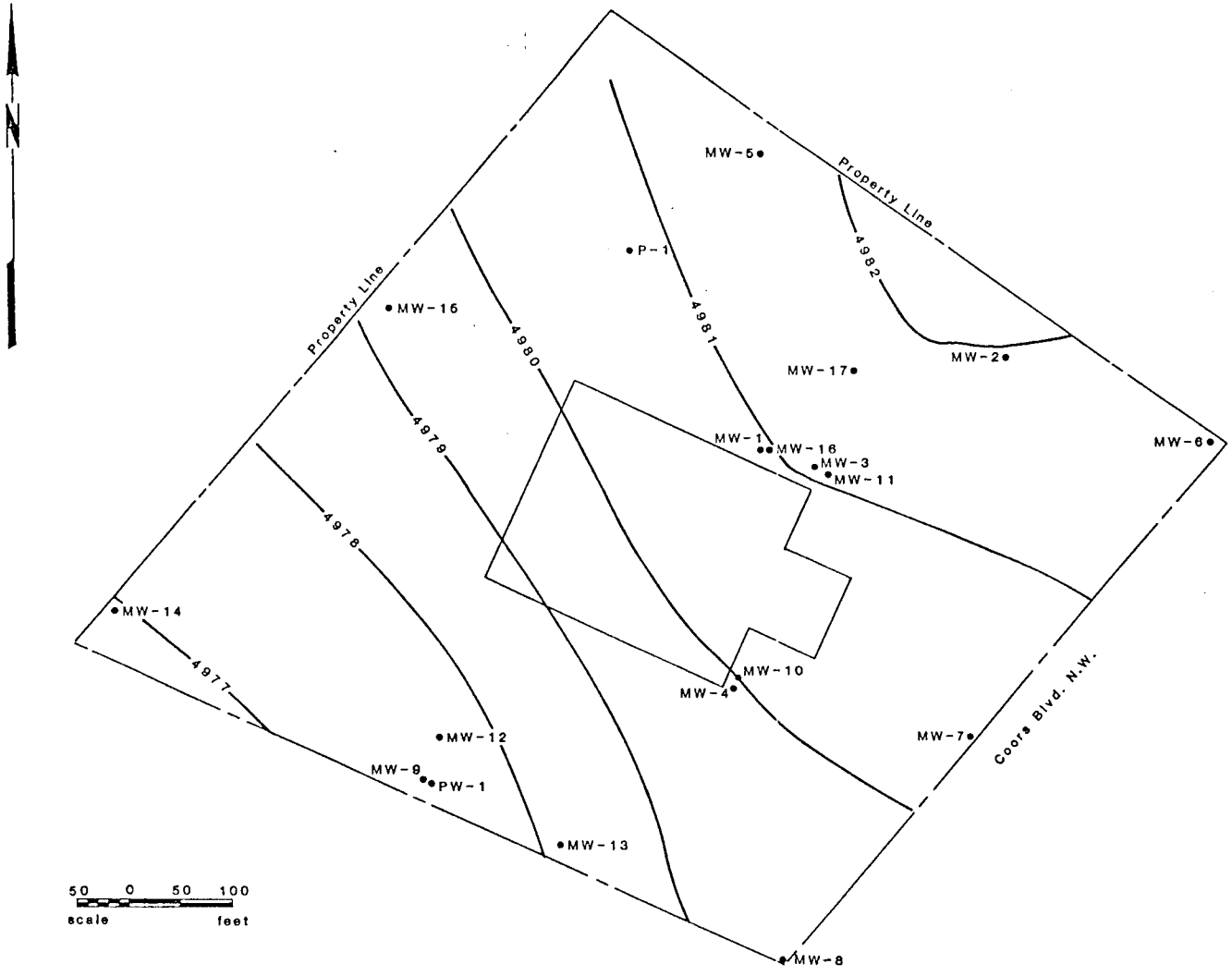
STATIC PIEZOMETRIC HEAD

Sparton Technology, Inc.
Albuquerque, New Mexico

FIGURE 13

DRAWN DKK JOB NUMBER 6310,013.12 APPROVED DATE REVISED DATE



KEY:

MW-1 ● Monitoring Well Location

--4980— Water Table Elevation, feet above MSL (10/6/84)

Contour Interval 1 Foot

Reference: Sparton Tech. Inc. Survey by Denney-Gross & Assoc., Inc., Dated 10/5/84.

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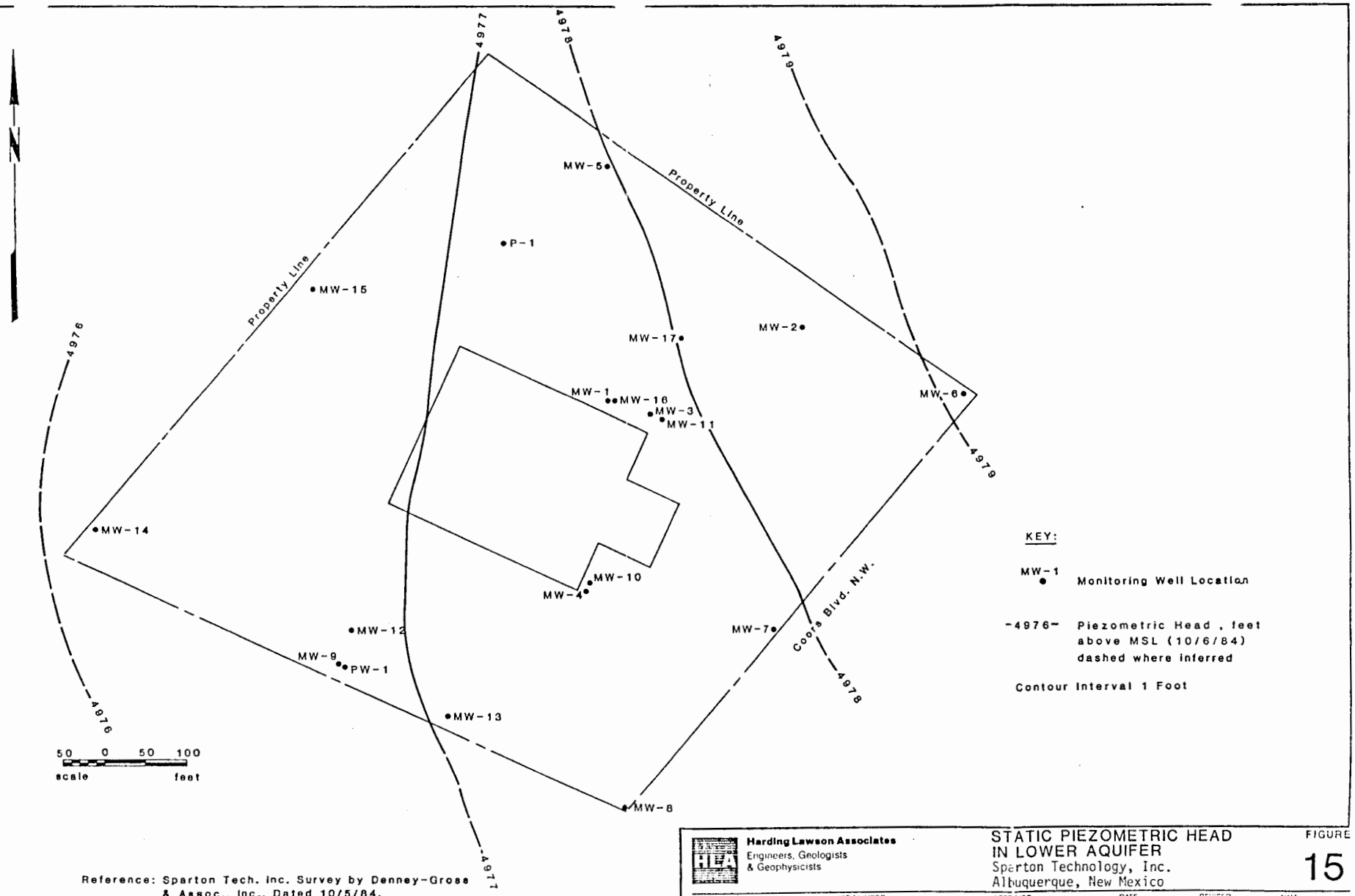
STATIC WATER TABLE IN UPPER AQUIFER
Sparton Technology, Inc.
Albuquerque, New Mexico

FIGURE 14

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	6310,013.12				



Reference: Sparton Tech. Inc. Survey by Denney-Gross & Assoc., Inc., Dated 10/5/84.

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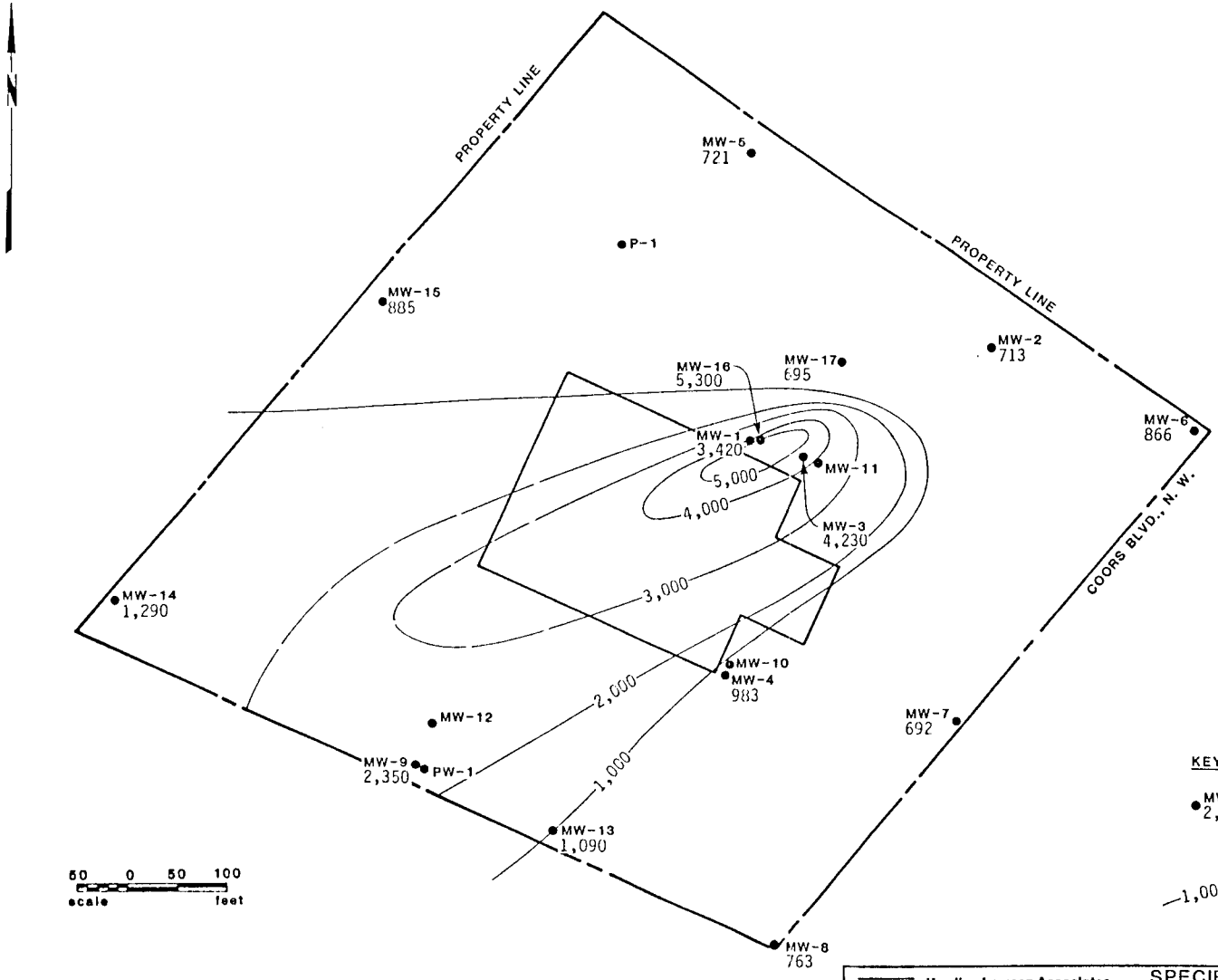
STATIC PIEZOMETRIC HEAD IN LOWER AQUIFER
Sparton Technology, Inc.
Albuquerque, New Mexico

FIGURE 15

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	6310,013.12				



KEY:

MW-1 2,350 — Monitoring Well Location/Specific Conductance in umho/cm

Sampling dates 10/4/84 through 11/29/84

1,000 — Specific Conductance Contour in umho/cm dashed where inferred

Contour interval as shown

Reference: Sparton Technology, Inc. Survey by Denney-Gross & Assoc., Inc., Dated 10/5/84.

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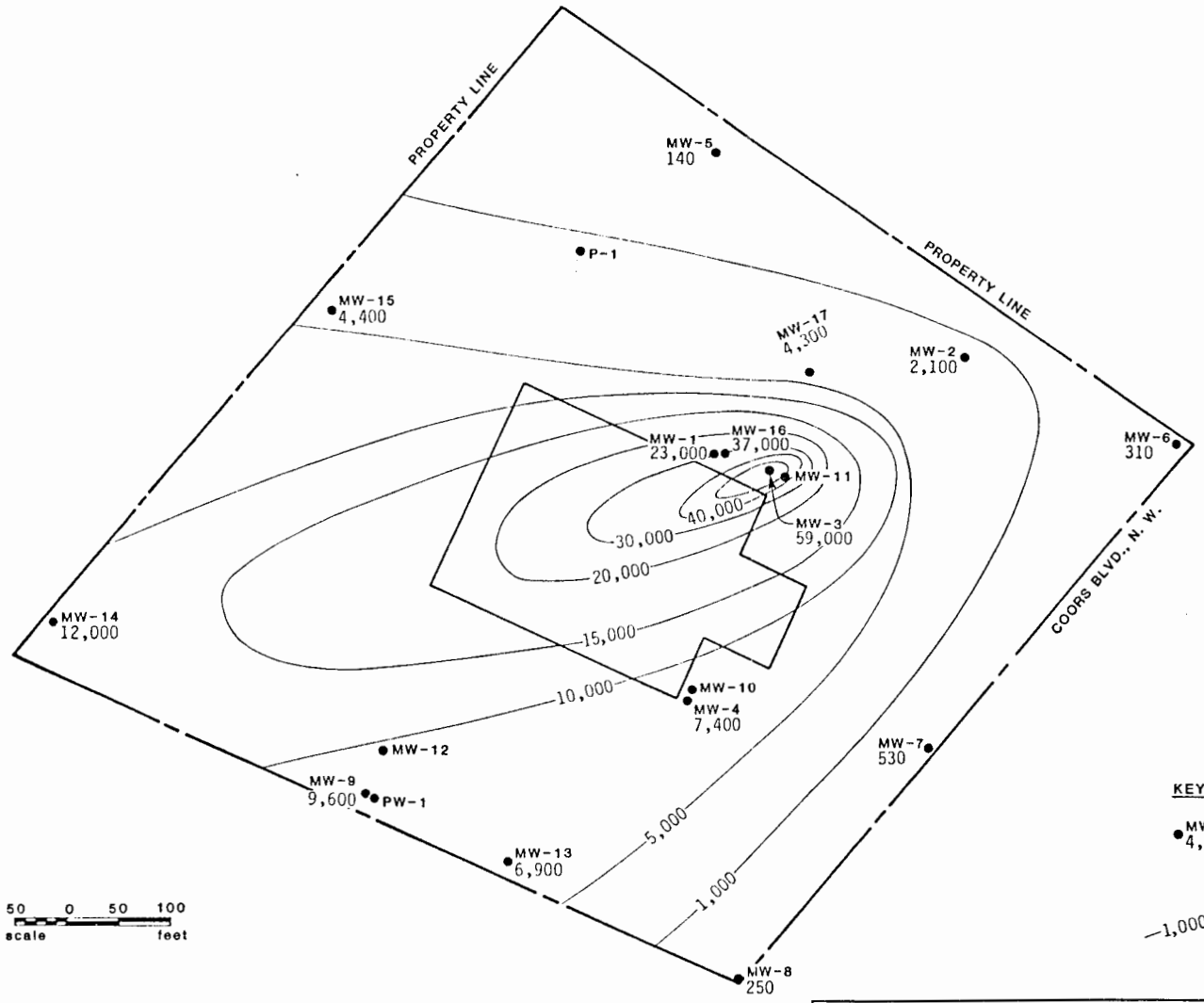
SPECIFIC CONDUCTANCE VALUES IN UPPER AQUIFER
Sparton Technology, Inc.
Albuquerque, New Mexico

PLATE 16

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
JD	6310,013.12	[illegible]	3/85		



KEY:

MW-1 4,400 — Monitoring Well Location/Trichloroethylene Concentration in ug/l(ppb)

Sampling dates 10/4/84 through 11/29/84

1,000 — Trichloroethylene Contour in ug/l dashed where inferred

Contour interval as shown

Reference: Sparton Technology, Inc. Survey by Denney-Gross & Assoc., Inc., Dated 10/5/84.

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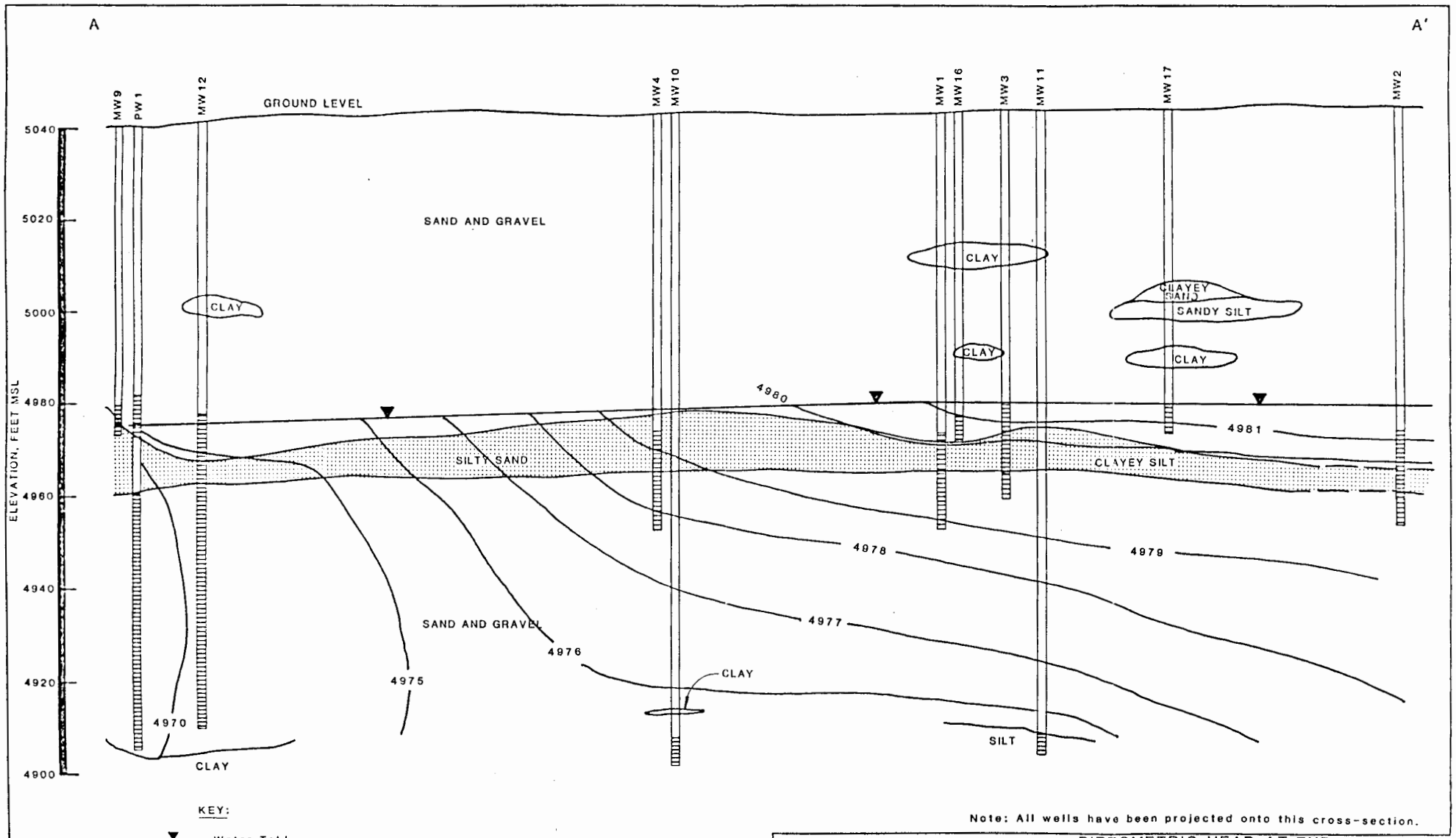
TRICHLOROETHYLENE CONCENTRATIONS IN UPPER AQUIFER
Sparton Technology, Inc.
Albuquerque, New Mexico

FIGURE 17

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
JD	6310,013.12	[illegible]	3/85		



KEY:

Water Table

4976 Piezometric Head Contour in feet above MSL

Contour Interval as Shown

50 0 50 100
scale HORIZONTAL feet

Note: All wells have been projected onto this cross-section.

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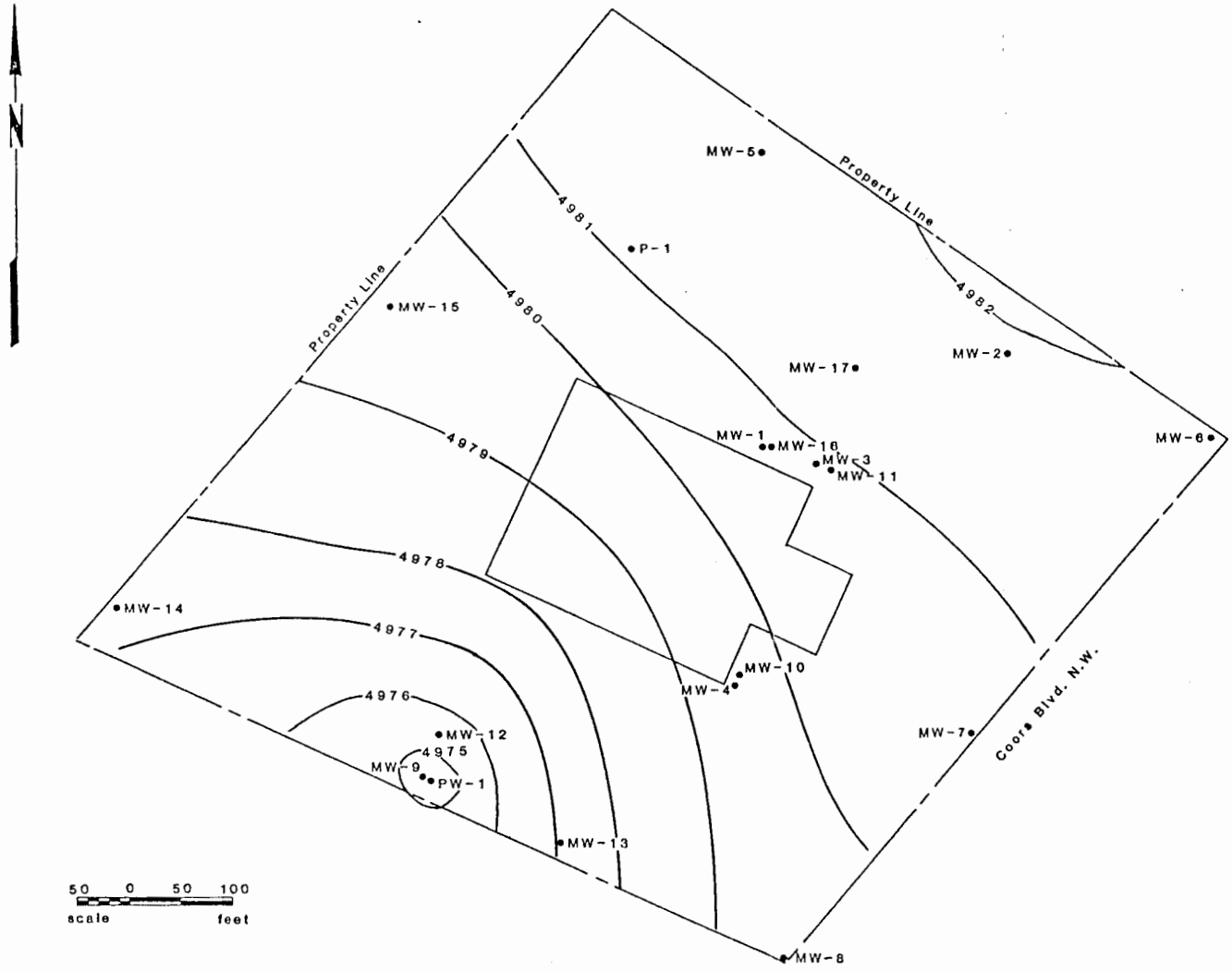
PIEZOMETRIC HEAD AT END OF PUMPING TEST
Sparton Technology, Inc.
Albuquerque, New Mexico

FIGURE 18

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
D.K.K.	6310,013.12	DLB	1/11/85		



KEY:

MW-1 ● Monitoring Well Location

—4981— Water Table Elevation, feet above MSL (10/8/84)

Contour Interval 1 Foot

Reference: Sparton Tech. Inc. Survey by Denney-Gross & Assoc., Inc., Dated 10/5/84.

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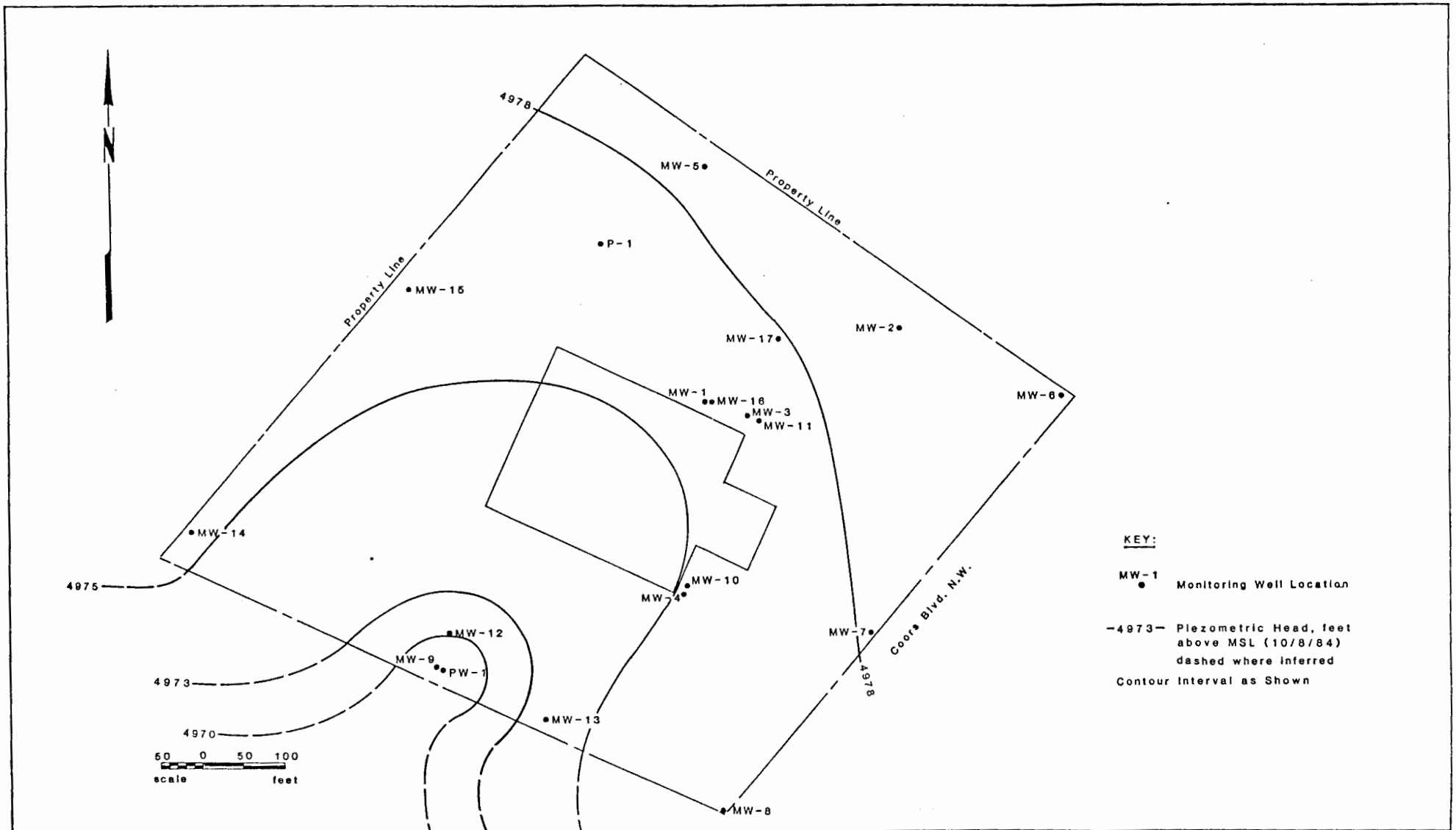
WATER TABLE IN UPPER AQUIFER AT END OF TEST
Sparton Technology, Inc.
Albuquerque, New Mexico

FIGURE 19

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	6310,013.12				



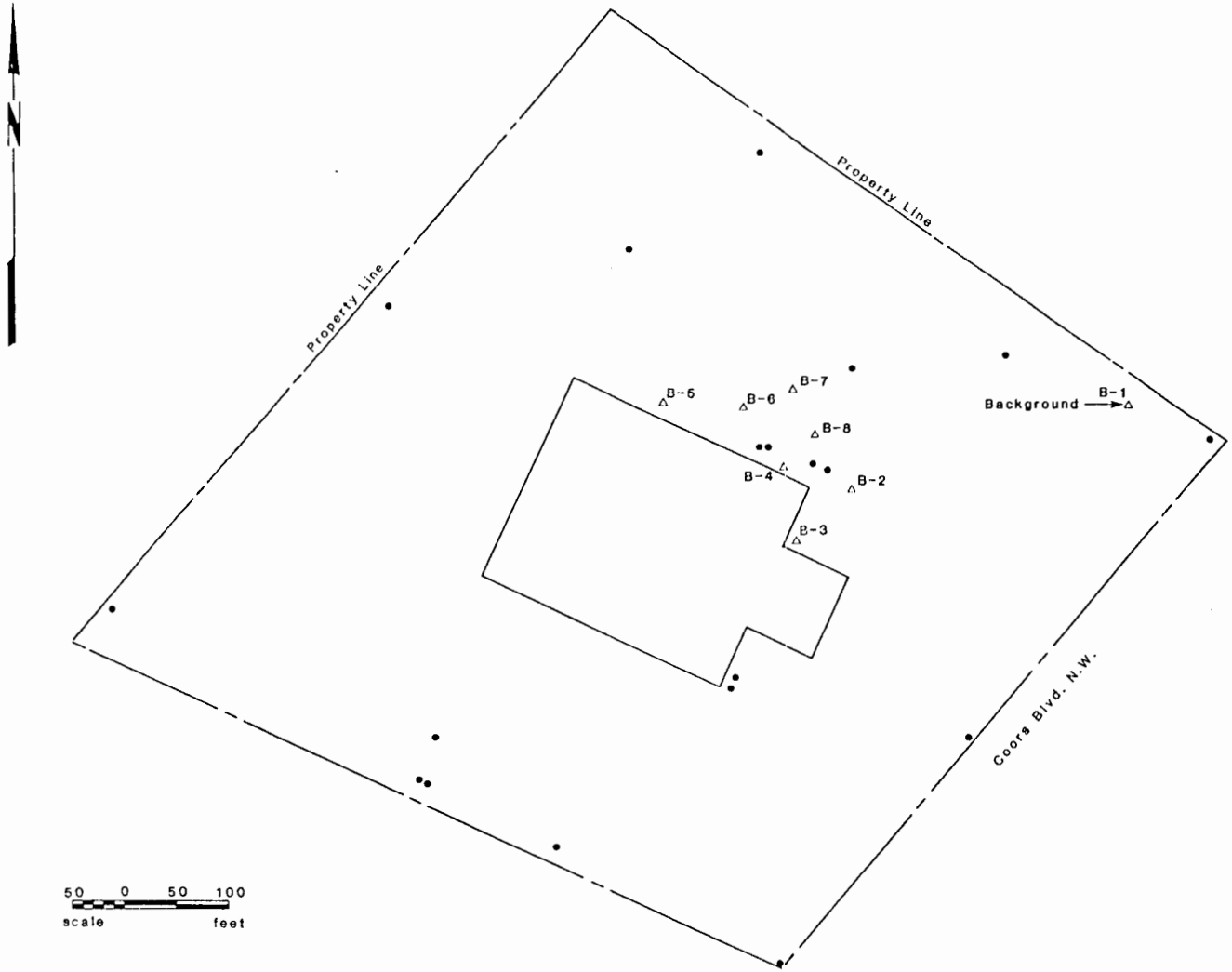
Reference: Sparton Tech. Inc. Survey by Denney-Gross & Assoc., Inc., Dated 10/5/84.

Harding Lawson Associates
Engineers, Geologists & Geophysicists

PIEZOMETRIC HEAD IN LOWER AQUIFER AT END OF TEST
Sparton Technology, Inc.
Albuquerque, New Mexico

FIGURE 20

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
477	6310.013.12				



KEY:

● Well Location

B-2 △ Proposed Soil Boring Location

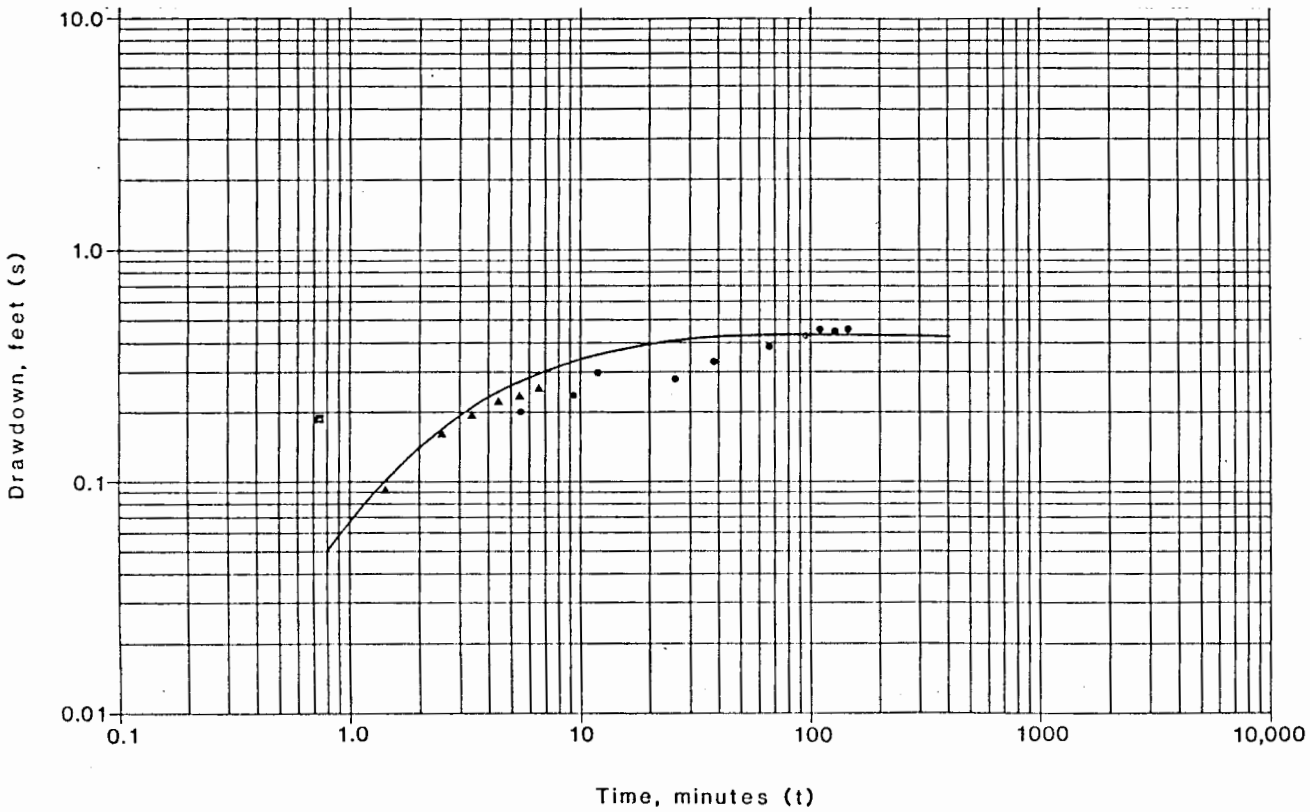
Reference: Sparton Tech. Inc. Survey by Denney-Gross & Assoc., Inc., Dated 10/5/84.

Harding Lawson Associates
Engineers, Geologists & Geophysicists

PROPOSED SOIL BORING LOCATIONS
Sparton Technology, Inc.
Albuquerque, New Mexico

FIGURE 21

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
AM	6310,013.12	DXB	1/14/85		



LEGEND:

- ● Drawdown Data
- ▲ Recovery Data
- ■ Match Point

CALCULATIONS:

$v = 0.2$

$L(u,v) = 1$

$1/u = 1$

$s = 0.18$ feet

$t = 7.2$ minutes

$Q = 180$ gpm

$r = 306$ feet

$T = \frac{114.6\ Q}{s} * L(u,v)$ gpd/ft

$T = 114{,}600$ gpd/ft

$S = \frac{T\ t\ u}{2963\ r^2}$

$S = 0.0033$

$K'/b' = \frac{T\ v^2}{1.87\ r^2}$ 1/day

$K'/b' = 0.026$/day

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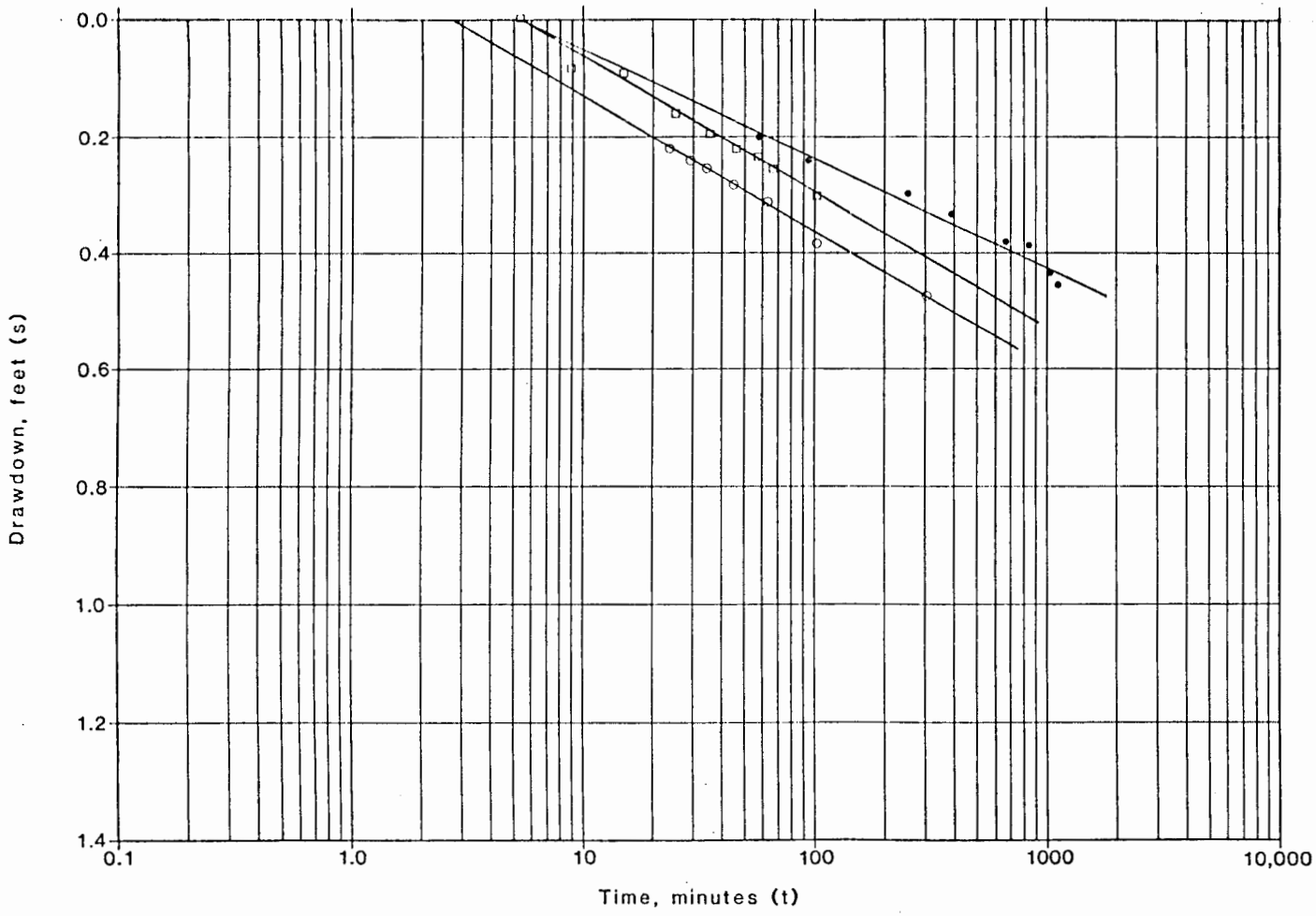
Engineers, Geologists & Geophysicists

MW-4 PUMPING TEST DATA
Sparton Technology, Inc.
Albuquerque, New Mexico

FIGURE E1

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	6310,013.12				



LEGEND:

- • Drawdown Data
- ○ Residual Drawdown Data
- □ Recovery Data

CALCULATIONS:

Q = 180 gpm

r = 306 feet

$T = \frac{264\ Q}{\Delta s}$ gpd/ft

$S = \frac{T\ to}{4790\ r^2}$

	Δs	to	T	S
•	0.205	5.2	232,000	0.0027
○	0.220	-	216,000	-
□	0.225	5.1	211,000	0.0024

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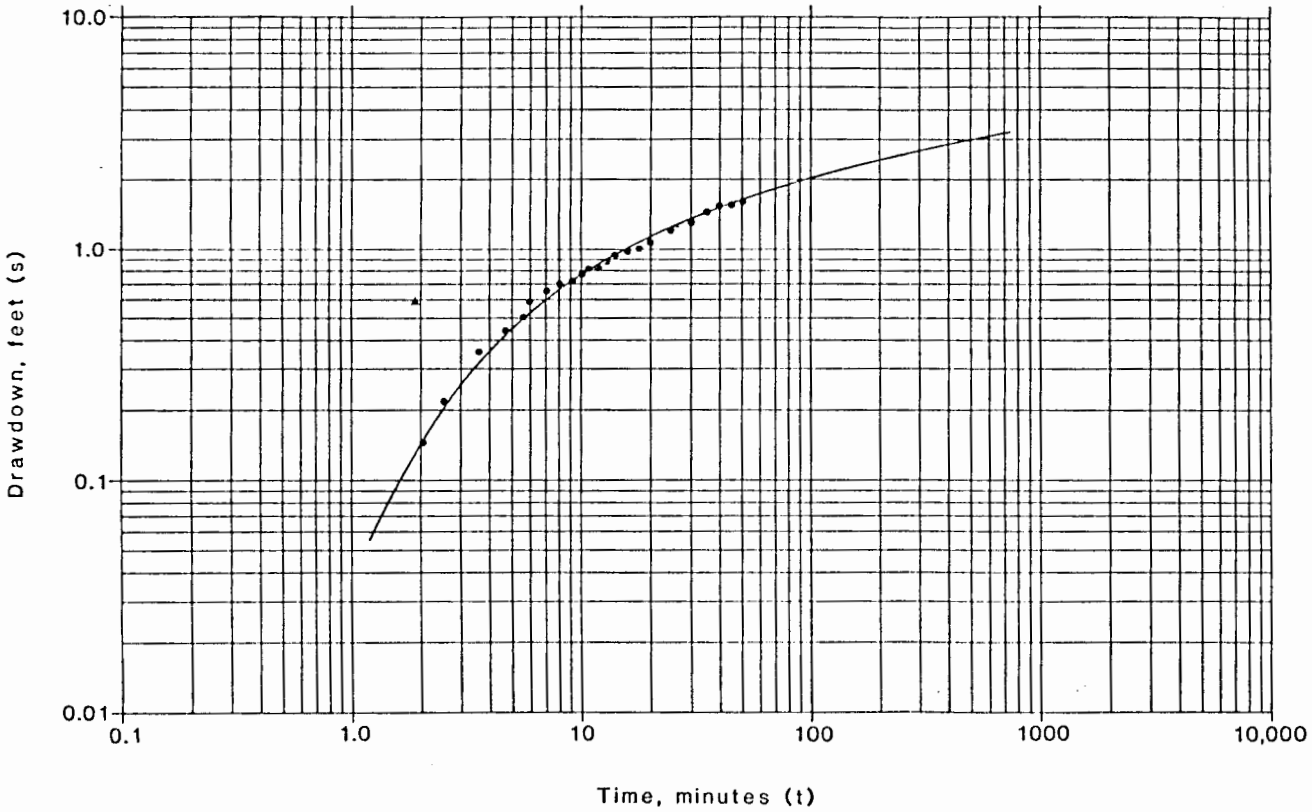
Engineers, Geologists & Geophysicists

MW-4 PUMPING TEST DATA
Sparton Technology, Inc.
Albuquerque, New Mexico

FIGURE E2

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
HM	6310,013.12	DLB	1/11/8		



LEGEND:

- ● Drawdown Data
- ▲ Match Point

CALCULATIONS:

$v = 0$

$L(u,v) = 1$

$1/u = 1$

$s = 0.70$ feet

$t = 2.1$ minutes

$Q = 50$ gpm

$r = 8$ feet

$T = \frac{114.6\ Q}{s} * L(u,v)$ gpd/ft

$T = 9700$ gpd/ft

$S = \frac{T\ t\ u}{2963\ r^2}$

$S = 0.09$

$K'/b' = \frac{T\ v^2}{1.87\ r^2}$ 1/day

$K'/b' = 0$/day

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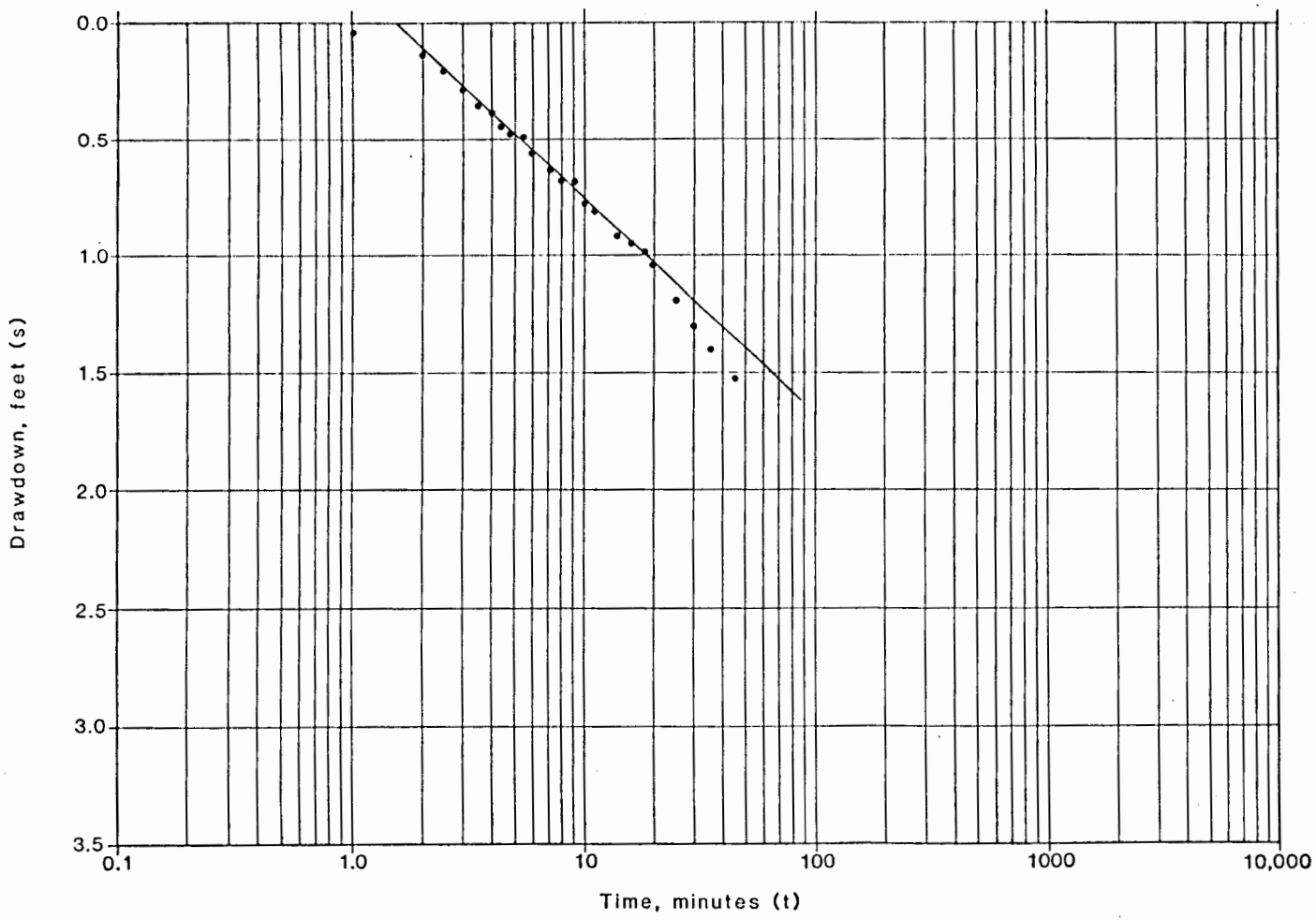
Engineers, Geologists & Geophysicists

MW-9 PUMPING TEST DATA
Sparton Technology, Inc.
Albuquerque, New Mexico

FIGURE E3

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
KM	6310,013.12				



LEGEND:

- Drawdown Data

CALCULATIONS:

Q = 50 gpm

r = 8 feet

$T = \frac{264\ Q}{\Delta s}$ gpd/ft

$S = \frac{T\ to}{4790\ r^2}$

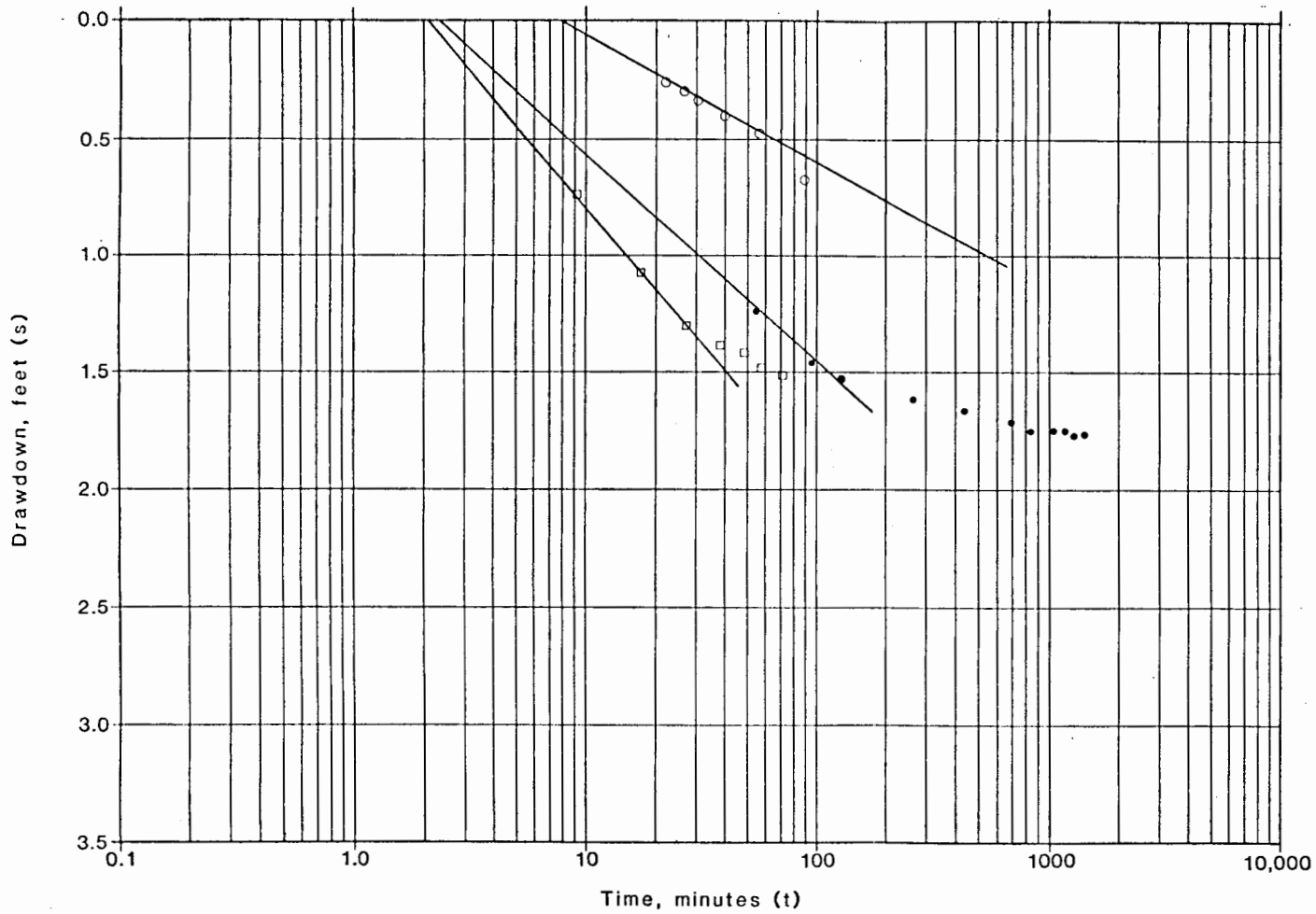
	Δs	to	T	S
•	0.92	1.5	14,300	0.07

Harding Lawson Associates
Engineers, Geologists & Geophysicists

MW-9 PUMPING TEST DATA
Sparton Technology, Inc.
Albuquerque, New Mexico

FIGURE E4

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
LM	6310,013.12	DLE	11/15/		



LEGEND:

- • Drawdown Data
- ○ Residual Drawdown Data
- □ Recovery Data

CALCULATIONS:

Q = 180 gpm

r = 314 feet

$T = \frac{264\ Q}{\Delta s}$ gpd/ft

$S = \frac{T\ to}{4790\ r^2}$

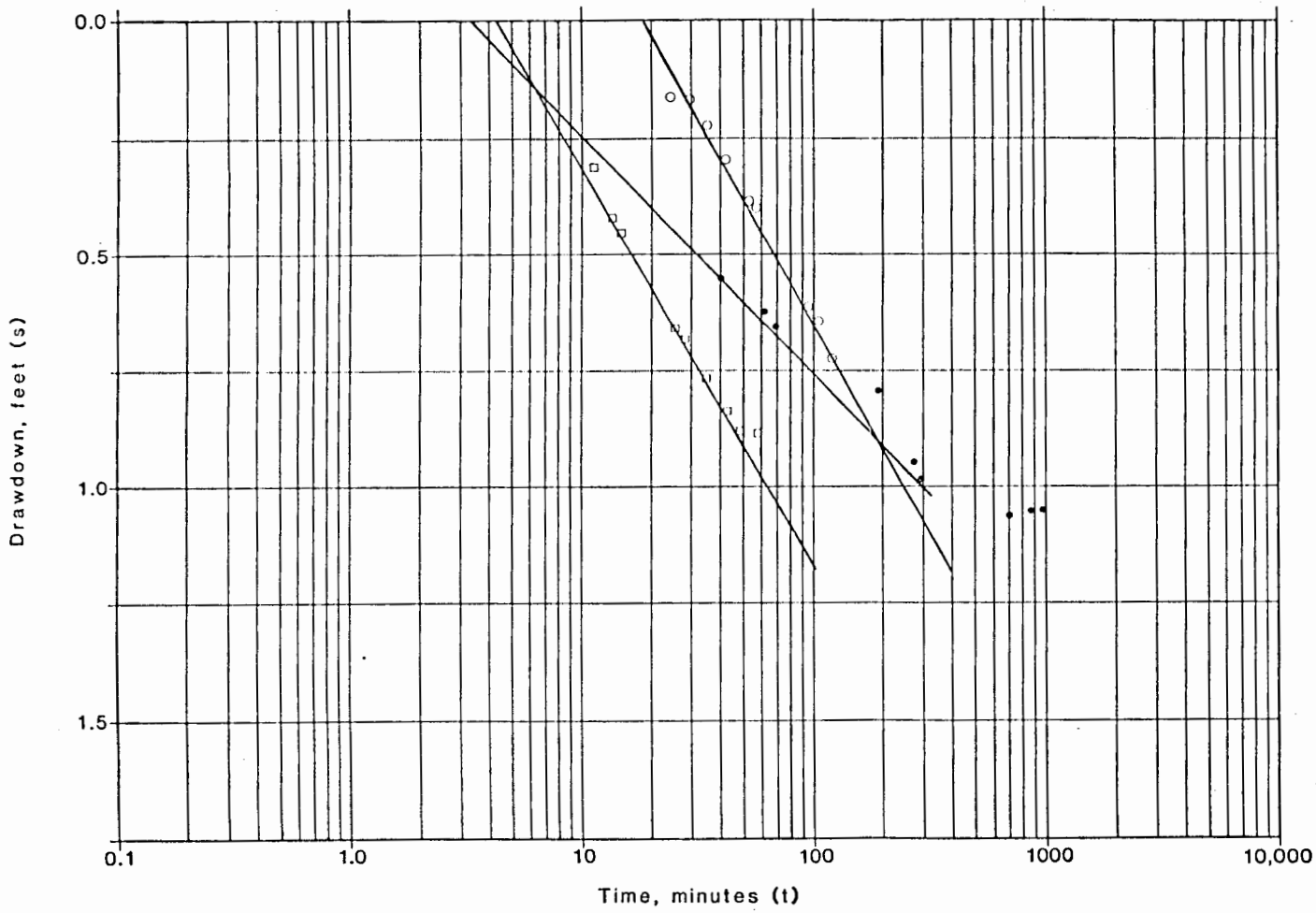
	Δs	to	T	S
•	0.78	2.3	61,000	0.00030
○	0.55	-	86,000	-
□	1.16	2.1	41,000	0.00018

Harding Lawson Associates
Engineers, Geologists & Geophysicists

MW-10 PUMPING TEST DATA
Sparton Technology, Inc.
Albuquerque, New Mexico

FIGURE E5

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
HM	6310,013.12	DVB	1/11/85		



LEGEND:

- • Drawdown Data
- ○ Residual Drawdown Data
- □ Recovery Data

CALCULATIONS:

Q = 180 gpm

r = 488 feet

$T = \frac{264\ Q}{\Delta s}$ gpd/ft

$S = \frac{T\ to}{4790\ r^2}$

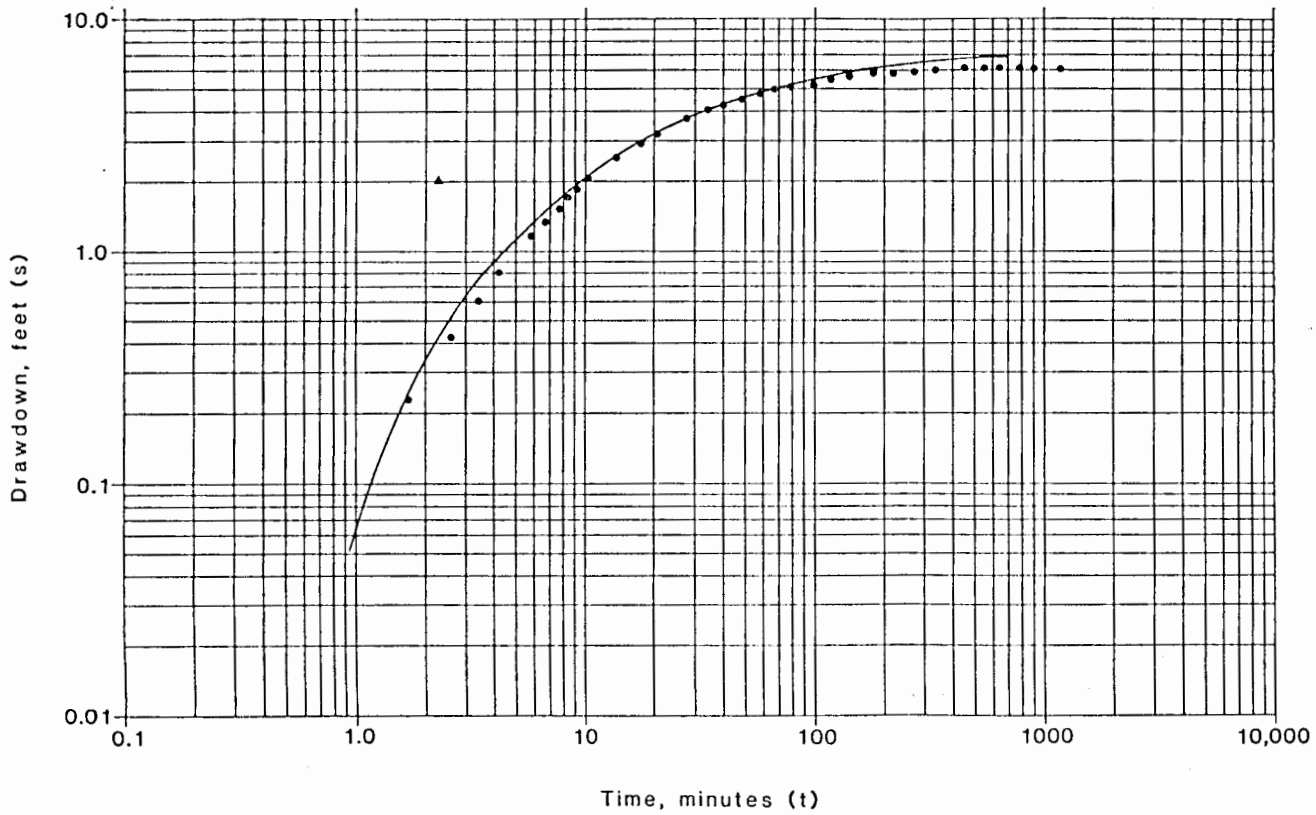
	Δs	to	T	S
•	0.52	3.6	91,000	0.00029
○	0.89	-	53,000	-
□	0.83	4.7	57,000	0.00023

Harding Lawson Associates
Engineers, Geologists & Geophysicists

MW-11 PUMPING TEST DATA
Sparton Technology, Inc.
Albuquerque, New Mexico

FIGURE E6

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
LM	6310,013.12	DLB	1/14/86		



LEGEND:

- • Drawdown Data
- ▲ Match Point

CALCULATIONS:

$v = 0.1$

$L(u,v) = 1$

$1/u = 1$

$s = 2.01$ feet

$t = 0.22$ minutes

$Q = 189$ gpm

$r = 44$ feet

$T = \frac{114.6\ Q}{s} * L(u,v)$ gpd/ft

$T = 10{,}800$ gpd/ft

$S = \frac{T\ t\ u}{2963\ r^2}$

$S = 0.00046$

$K'/b' = \frac{T\ v^2}{1.87\ r^2}$ 1/day

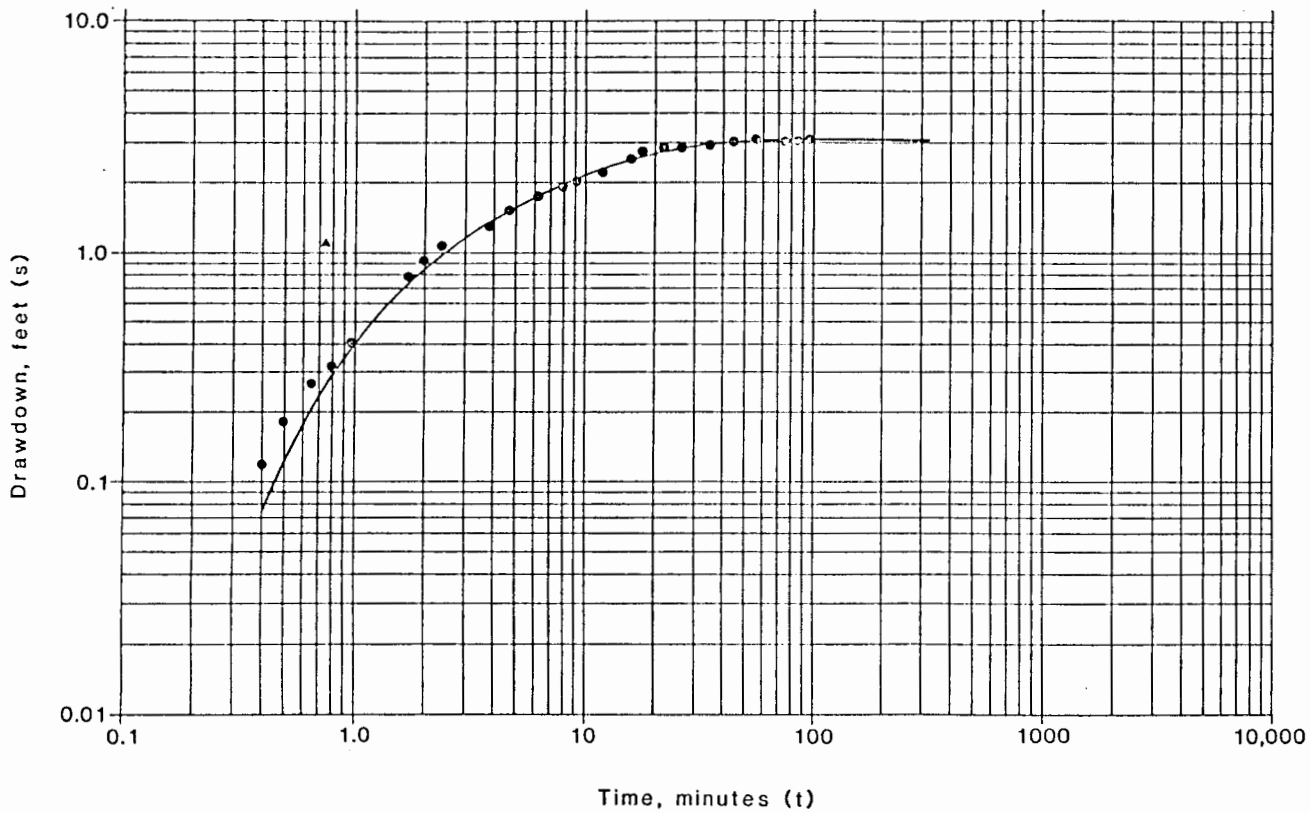
$K'/b' = 0.03$/day

Harding Lawson Associates
Engineers, Geologists & Geophysicists

MW-12 PUMPING TEST DATA
Sparton Technology, Inc.
Albuquerque, New Mexico

FIGURE E7

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
LM	6310,013.12	LMB			



LEGEND:

- ● Drawdown Data
- ▲ Match Point

CALCULATIONS:

$v = 0.15$

$L(u,v) = 1$

$1/u = 1$

$s = 0.77$ feet

$t = 1.07$ minutes

$Q = 189$ gpm

$r = 138$ feet

$T = \frac{114.6\ Q}{s} * L(u,v)$ gpd/ft

$T = 20{,}200$ gpd/ft

$S = \frac{T\ t\ u}{2963\ r^2}$

$S = 0.00028$

$K'/b' = \frac{T\ v^2}{1.87\ r^2}$ 1/day

$K'/b' = 0.013$/day

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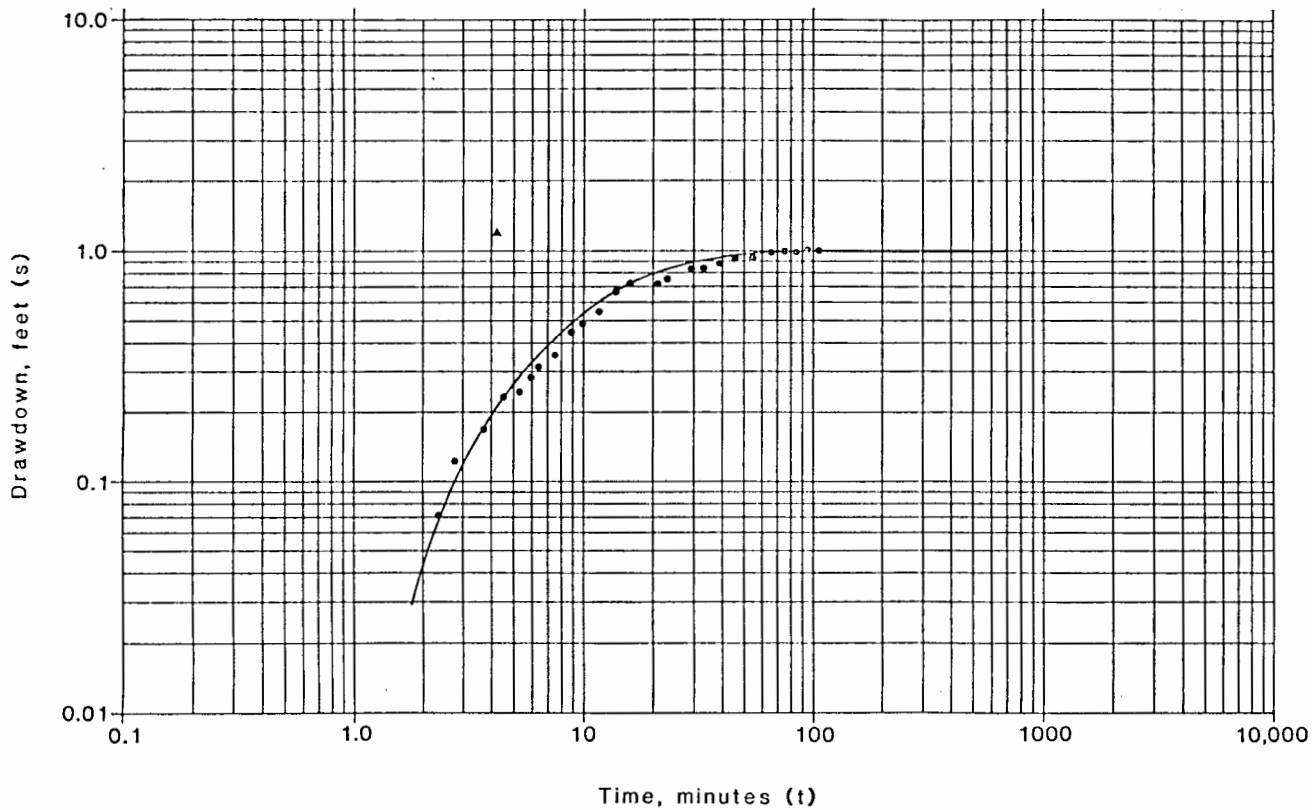
MW-13 PUMPING TEST DATA
Sparton Technology, Inc.
Albuquerque, New Mexico

FIGURE E8

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
LM	6310,013.12				



LEGEND:

- ● Drawdown Data
- ▲ Match Point

CALCULATIONS:

$v = 0.5$

$L(u,v) = 1$

$1/u = 1$

$s = 0.51$ feet

$t = 2.9$ minutes

$Q = 189$ gpm

$r = 345$ feet

$T = \frac{114.6\ Q}{s} * L(u,v)$ gpd/ft

$T = 18{,}000$ gpd/ft

$S = \frac{T\ t\ u}{2963\ r^2}$

$S = 0.00023$

$K'/b' = \frac{T\ v^2}{1.87\ r^2}$ 1/day

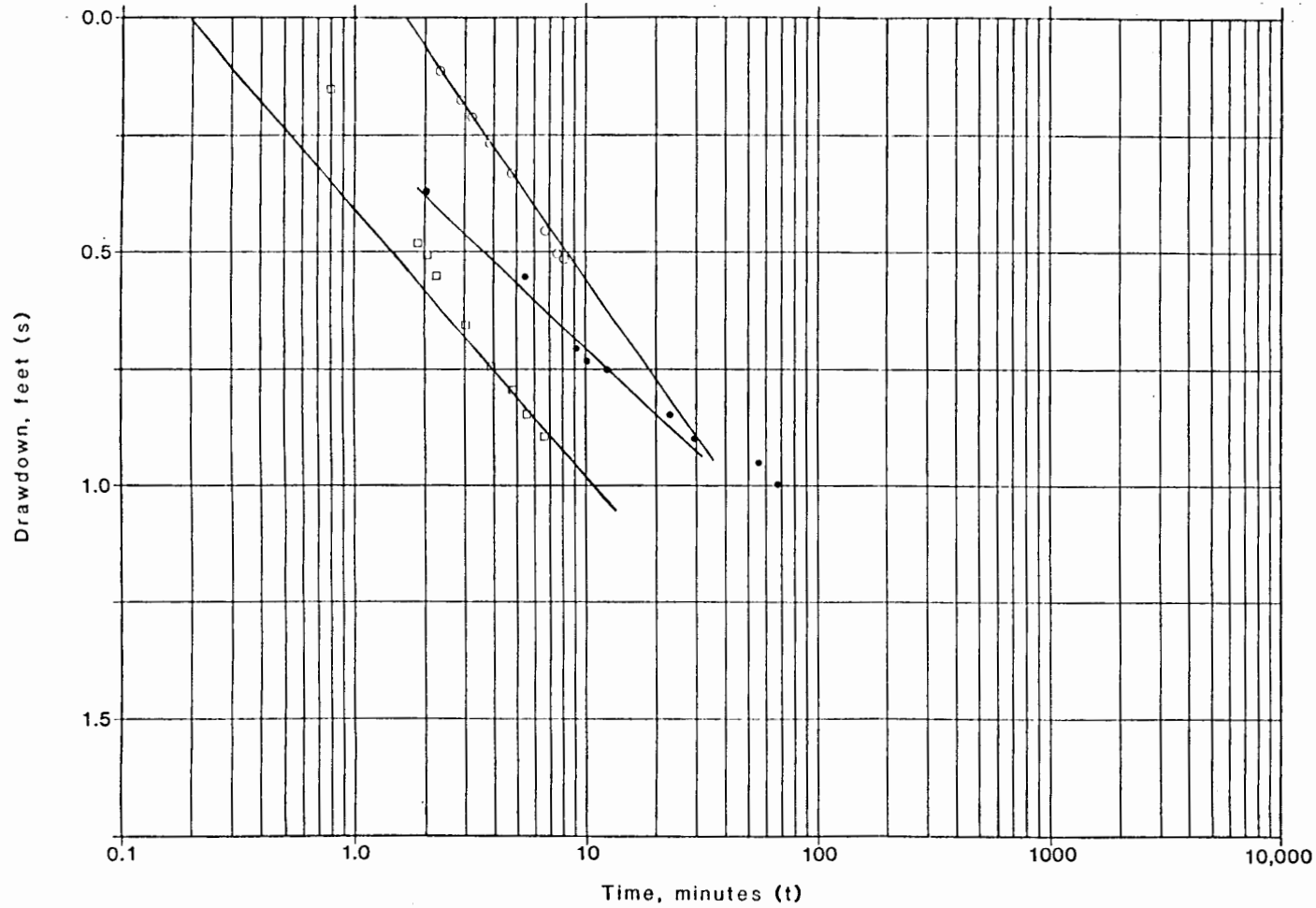
$K'/b' = 0.0018$/day

Harding Lawson Associates
Engineers, Geologists & Geophysicists

MW-14 PUMPING TEST DATA
Sparton Technology, Inc.
Albuquerque, New Mexico

FIGURE E9

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
HM	6310,013.12	JVB	[illegible]		



LEGEND:

- • Drawdown Data
- ○ Residual Drawdown Data
- □ Recovery Data

CALCULATIONS:

Q = 180 gpm

r = 456 feet

$T = \frac{264\ Q}{\Delta s}$ gpd/ft

$S = \frac{T\ to}{4790\ r^2}$

	Δs	to	T	S
•	0.46	3.4	103,300	0.00035
○	0.70	-	68,000	-
□	0.68	2.1	70,000	0.00015

Harding Lawson Associates
Engineers, Geologists & Geophysicists

MW-15 PUMPING TEST DATA
Sparton Technology, Inc.
Albuquerque, New Mexico

FIGURE E10

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
LM	6310,013.12	[illegible]	1/11/85		

ATTACHMENT 5

GROUNDWATER MONITORING PROGRAM
SPARTON SOUTHWEST, INC.
ALBUQUERQUE, NEW MEXICO

June 29, 1983

A Report Prepared For:

Sparton Corporation
2400 East Ganson Street
Jackson, Michigan 49202

GROUNDWATER MONITORING PROGRAM
SPARTON SOUTHWEST, INC.
9261 COORS ROAD, NORTHWEST
ALBUQUERQUE, NEW MEXICO 87114

HLA Job No. 6310,004.12

Prepared By:

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Senior Environmental Specialist

James B. McCutchan
Senior Engineer

Harding Lawson Associates
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June 29, 1983

SPARTON SOUTHWEST, INC.

GROUNDWATER MONITORING PROGRAM

Introduction

Sparton Southwest, Inc. (Sparton) has developed this groundwater monitoring program to provide early detection of seepage from the Coors Road Facility surface impoundments in Albuquerque, New Mexico. The program has been designed to conform with the requirements of the New Mexico Hazardous Waste Management Regulations[13], and of the Code of Federal Regulations[6].

Groundwater monitoring wells will be periodically sampled for analysis of selected indicator parameters. Initial background levels will be compared to subsequent measurements to determine if there has been a significant change in value for any parameter(s). Such changes would be evaluated to determine if they were actually different, or were caused by variations inherent to the sampling and analytical methods. This evaluation would employ the use of statistical methods.

If a determination is ever made that the facility may be contaminating groundwater, a groundwater monitoring program review will be performed which meets the requirements of 40 CFR 265.93(c)(2). If this review continues to suggest the presence of contamination, a more comprehensive groundwater quality assessment program will be implemented which meets the requirements of 40 CFR 265.93(d).

Location and Installation of Groundwater Monitoring Wells

Four monitoring wells have been installed at the Coors Road Facility surface impoundments. These wells collect groundwater from the Rio Grande River alluvium, which is under water table conditions. Attachment C presents well installation details and depicts the well locations.

Facility expansion, well performance or other considerations may occasionally require one or more monitoring wells to be decommissioned and replaced. Approval for such changes will be sought from the U.S. EPA Administrator, Region VI (EPA), and from the New Mexico Environmental Improvement Division, Hazardous Waste Section (EID) on a case-by-case basis. Monitoring wells to be decommissioned will be properly plugged and sealed. Any new monitoring wells will be screened into the same monitoring zone (or other zones, if deemed appropriate by Sparton, EPA, and EID).

Sample Collection

Samples will be collected by site environmental personnel. Prior to sampling, the static water level will be measured. Then the well will be purged of three to five casing volumes of water. After recharge, normally two to four hours with these wells, groundwater

samples will be collected by means of a downwell bladder pump (QED Well Wizard, Model No. 1100). Each well will be provided a dedicated pump in order to eliminate cross-contamination of the wells. Sampling records will be entered in a log and will include the well number, static water level, date, time, and the name of the person sampling. Records will also indicate the suite of parameters tested, preservatives used and analytical laboratory(ies) used.

Groundwater to be tested for metals will be passed through a 0.45 micron membrane filter prior to being combined with the acid preservative. Other samples will be filtered by the analytical laboratory as needed.

Sample Preservation and Containers

Sample containers will be prepared by the analytical laboratory designated to receive the samples. Containers will be washed according to methods presented in the EPA Handbook for Analytical Quality Control in Water and Wastewater Laboratories, Section 4.6[11]. Bottles for bacteriological studies will be presterilized.

Chemical preservatives will be added to containers by the analytical laboratory according to the guidelines of 40 CFR 136[1]. The sample containers should be completely filled so as to minimize

unnecessary exposure to entrapped air. Immediately after labeling, the samples will be cooled by packing with ice in insulated coolers. They will be delivered to the analytical laboratory within twenty-four hours of collection.

Labeling and Chain of Custody

At the time of collection, each sample shall be labeled with the well number, the date and the sampler's initials. The samples will be handled by as few people as possible. Generally, the sampler will maintain personal, physical possession of the samples until delivery to the analytical laboratory. In this case, a laboratory receipt will serve as evidence of adequate control. If any transfers of custody must be made prior to delivery, a Chain of Custody document will be used. The Chain of Custody procedures to be used and a representative document are presented in Attachment 1.

Laboratory Procedures and Methods

Upon receipt, the sample for coliforms is to be submitted promptly for bacteriological analysis. All analytical methods will conform to the procedures approved by the U.S. Environmental Protection Agency (EPA)[3,5,7,8,9], or as otherwise referenced in

40 CFR 136[1]. Summaries of analytical methods initially selected for this program, together with detection limits and reference citations are given in Methodology, Parameters to be Monitored, Tables I, II, and III.

Indicator Monitoring Program

A. Parameters to be Measured

The following groups of parameters will be measured according to the schedules indicated:

1. Parameters characterizing the suitability of the groundwater as a drinking water supply [6] will be measured quarterly during the first year of this program. The values measured will be compared to the National Primary Drinking Water Standards[4].

2. Parameters used as indicators of groundwater contamination[6] will be measured quarterly during the first year of this program and then semi-annually through the active life of the facility and continuing through the postclosure period. Four replicate measurements of each parameter will be made for each sample.

   Indicator parameters will be measured quarterly for the first year of service of any new monitoring wells.

3. Parameters established for groundwater quality[6] will be measured quarterly during the first year of this program, and annually thereafter through the active life of the facility and continuing through the post-closure period. These data may be used to establish the initial background levels for use in the event that a Groundwater Quality Assessment Program must be implemented.

4. On an annual basis, Sparton will review the groundwater monitoring program with respect to any new wastes being managed, to determine if additional parameters should be included in the program.

B. Evaluation of Data

1. Statistical Evaluations

Cochran's Approximation to the Behrens Fisher Student's t-test (Attachment 2)[10] will be used to determine the statistical significance of changes in the values of parameters used as indicators of groundwater contamination as compared to the initial background levels established during the first year. All measurements made during the first year will be used to calculate the initial background arithmetic mean and the initial background variance for each well, for each parameter. For subsequent samples (i.e., after the first year), the arithmetic mean and the variance will be calculated from the four replicate measurements made of each parameter for each well.

The above modification of the Student's t-test involves the calculation of a t-statistic for each parameter for each well. This t-statistic is then compared to calculated values of t_c which are weighted for sample sizes and variances (See Attachment 2). If the calculated value of t exceeds the single-tailed calculated value of t_c (or the double-tailed calculated value of t_c in the case of pH) at the 0.01 level of significance, then there is a statistically significant difference betwen the two arithmetic means.

If no significant differences are found in the four parameters used as indicators, and in the absence of other evidence to the contrary, the groundwater will be evaluated as not contaminated. The occurrence of a statistically significant increase in a parametric value (or pH decrease) will indicate a possible problem which will be evaluated in a review of the groundwater monitoring program.

2. Groundwater Elevations

The static water level measurements recorded on each sampling occasion will be evaluated annually to detect any possible changes in the direction of the hydraulic gradient. If there are any such changes, the locations of existing monitoring wells will be studied to determine if any additional wells would be needed to comply with the requirements[6] for one well to be hydraulically upgradient from the site and at least three wells downgradient.

The static water levels will be derived from measurements of the depth to water from the top of each well. Depth to water will be subtracted from the surveyed elevation of the well top. The surveyed elevations of the monitoring wells are as follows:

Well Number	Elevation at Top of Casing (ft.)
MW-1	5,047.84
MW-2	5,050.26
MW-3	5,047.22
MW-4	5,047.61
P-1	5,050.45

Monitoring Review

Should the Indicator Monitoring Program indicate a possible groundwater contamination problem, a Monitoring Review shall be conducted as rapidly as possible to ascertain the need for a Groundwater Quality Assessment Program. The Monitoring Review shall consist of two parts:

A. Program and Analytical Review:

In conjunction with additional analytical work described below, the Groundwater Monitoring Program shall be reviewed. In particular, other results for the particular well(s) of interest will be compared with similar results from other wells in the monitoring system in order to detect any trends. The spatial and depth distribution of the wells must be considered in relationship to the indicated groundwater zone(s) of potential contamination, groundwater flow rates and flow directions, and the locations of possible sources of contamination. Historical data may need to be considered. Additional statistical procedures may need to be used to check or further clarify the apparent discrepancy. The methodologies and quality assurance program of the analytical laboratory should be carefully reviewed.

B. Analytical Check

Affected monitoring wells will be resampled to determine if the discrepancy is due to sampling or laboratory errors.

1. Additional Samples

Additional groundwater samples will be obtained from all potentially involved monitoring wells. The samples will be split into two replicate subsamples, which will be analyzed independently by two qualified laboratories utilizing the same analytical procedure. One of the subsamples may be sent to the same analytical laboratory that produced the results which are being evaluated. Four replicate measurements of the parameter(s) in question will be performed on all such subsamples. Chain of Custody documents will accompany both subsamples.

2. Evaluation of Data

The subsample analytical results will be evaluated to determine if the originally detected parametric increase (or pH decrease) actually reflected a change in the groundwater quality, or was simply the result of sampling or laboratory errors. To do this, the arithmetic mean and variance will be calculated for each set of four replicate measurements made of each parameter for each subsample. Cochran's Approximation to the Behrens Fisher Student's t-test[10] will be used to determine if there is a statistically significant difference between values obtained from either laboratory and the initial background concentration(s) for the parameter(s) in question.

If the conclusion of the Monitoring Review is that the Facility is not adversely affecting groundwater quality, Sparton will resume its normal Groundwater Monitoring Program. If the conclusion of the Monitoring Review is that hazardous waste or hazardous waste constituents may be entering groundwater from the facility, then a Groundwater Quality Assessment, as outlined below, will be initiated.

3. The following describes action to be taken for various potential outcomes of the Analytical Check.

a. Parametric Increase Confirmed for Upgradient Well

If the results from both laboratories reflect a statistically significant parametric increase (or pH decrease) in water from the upgradient well, EPA and EID will be notified, and the Groundwater Monitoring Program shall be resumed.

b. Parametric Increase Confirmed for Downgradient Well(s)

If the results from both laboratories reflect a significant increase (or pH decrease) in water from any of the downgradient wells, a Groundwater Quality Assessment shall be promptly initiated.

c. Neither Laboratory Confirms Parametric Increase

If there is no statistically significant increase (or pH decrease) found for any given parameter by either of the laboratories, the groundwater may be considered as not contaminated. The Groundwater Monitoring Program shall be resumed in this case, after notification of EPA and EID.

d. Split Decision

If only one laboratory has generated results significantly different from the initial background level, a Groundwater Quality Assessment Program shall be promptly initiated. In conjunction with this response, additional groundwater samples may be evaluated.

4. Monitoring Review Reporting

The results of a Monitoring Review will be forwarded within seven (7) days of its completion to the following agencies:

a. Director, Air & Waste Management Division
U.S.EPA (6AW-He)
1201 Elm Street
First International Building
Dallas, Texas 75270

b. Hazardous Waste Section
New Mexico Environmental Improvement Division
725 St. Michael's Drive
Crown Building
Santa Fe, New Mexico 87504-0968

Groundwater Quality Assessment

A. Introduction

If the Monitoring Review concludes that hazardous waste constituents may be entering groundwater, Sparton will have a qualified hydrogeologist or geotechnical engineer prepare, as soon as practicable, a Groundwater Quality Assessment Plan which will specify:

1. The number, location and depth of any new wells
2. Frequency of sampling and sampling methods.
3. Parameters chosen and analytical methods to be employed.
4. Evaluation procedures, including any use of previously gathered groundwater quality information.

This plan will be designed to provide, at a minimum:

1. Whether hazardous waste or hazardous waste constituents have, in fact, entered the groundwater.

2. The rate and extent of migration of hazardous waste or hazardous waste constituents in the groundwater.

3. The concentrations of hazardous waste or hazardous waste constituents in the groundwater.

4. An evaluation of the data generated by the assessment.

5. A prediction of the environmental and economic consequences of the groundwater contamination, if such exists.

The Groundwater Quality Assessment will be developed as a phased succession of study tasks, each one of which will depend on data generated by the previous task. The first set of determinations will be made as soon as technically feasible, and the results will be reported to EPA and EID within 15 days of completion. If it is determined that hazardous waste or hazardous waste constituents have entered the groundwater and that this condition represents a significant impediment to the beneficial use of the groundwater, then the Groundwater Quality Assessment Program will continue on a quarterly basis with reports to be submitted on an annual basis, until final closure of the facility.

B. Confirmation of Contamination

Groundwater samples from the monitoring well(s) of interest will be analyzed to determine if, in fact, the groundwater contains specific hazardous wastes or hazardous waste constituents attributable to wastes managed in the surface impoundments. The search for hazardous waste-related contaminants will be directed by the indicator parameters in question.

Interest in pH and conductance will focus the study on specific anions and cations. Elevated total organic carbon levels will lead to a generalized consideration of hydrocarbon based wastes, whereas elevated total organic halogen levels will direct attention to halogenated aliphatic and aromatic compounds.

If no hazardous wastes or hazardous waste constituents are found in the groundwater, Sparton may resume the Indicator Monitoring Program following notification of EPA and EID. Sparton may also initiate a study of geochemical effects on native groundwater to determine if natural causes may be responsible for the Indicator Program discrepancy(ies).

C. Groundwater Hydraulic Characterization

If it is determined that hazardous waste contaminants have entered the groundwater, the rate of movement and extent of contamination will be determined. Additional piezometers will be installed to more accurately determine the water table and the hydraulic gradient, if needed.

D. Plume Definition

An initial attempt will be made to define the waste plume using geophysical and related methods. Methods which will be employed will be determined based on analytical results. Methods most likely to be

considered include borehole tracer dilution, electrical resistivity, electromagnetic conductivity, and borehole logging for specific conductance, temperature and specific ions.

The probable source of the contamination will be located as nearly as possible. Monitoring wells will then be installed hydraulically downgradient from the source, so that the linear extent of contamination can be approximated by hydrogeological interpretation.

If the data gathered seem amenable to groundwater modeling, a model will be selected to predict the rate and extent of contaminant migration. At least two monitoring wells will be installed to confirm the predicted lateral extent of the contaminant plume.

Once the areal extent of the plume has been estimated, a cluster of wells screened at varying depths (or a stacked sampler in a single well) may be installed near the center of the plume. Analytical results from this well (or wells) can be used to estimate the vertical extent of contamination.

Empirical methods or modeling will be used to make predictions of the rate of contaminant migration and of changes in concentrations at specific wells. Samples will be taken at specified frequencies from key wells to test these predictions.

E. Down-plume Detection Monitoring

Based on predictions of the rate of contaminant migration, a monitoring well will be placed downgradient of the plume to detect its arrival.

F. Assessment Program Parameters

Parameters to be monitored during the Groundwater Quality Assessment may be one or more of the waste constituents. Alternatively, an indicator parameter may be selected which migrates at the same rate as the waste constituents, and can be detected at the limits of the plume. The ideal monitoring parameter would have a strong concentration gradient across the plume and would be expected to persist as long as the most persistent of the waste constituents detected. More than one parameter may be required.

G. Laboratory Analytical Methods

U.S. EPA approved laboratory analytical methods will be employed which have the sensitivity and precision to accurately measure the selected parameter(s) at all significant concentrations expected to be encountered in the field. The procedure should be rapid and reasonably economical. Ideally, the procedure will be suitable for field use.

H. Sampling Methods

Sampling methods will be selected which allow collection of representative groundwater and which do not significantly alter the concentration of the parameter(s) chosen for analysis. Samples will be filtered and preserved in the field, as needed.

I. Evaluation of Groundwater Quality Assessment Data

Evaluation of data generated by the Groundwater Quality Assessment will be used to predict when, if ever, contamination would reach any environmentally sensitive target. The next step will be to assess the potential environmental and economic consequences of the groundwater contamination, if such exists. Some questions to be addressed include the following:

1. Is the contaminated groundwater part of a drinking water quality aquifer, and if so, is the aquifer productive enough to allow economically feasible withdrawal?

2. Are there existing or planned water production wells in the path of the contaminant plume?

3. Are there other environmental resources in the path which may be harmed?

4. Are the contaminants susceptible to biodegradation or physical/chemical attenuation by soils. If so, what will be the effects of this on contaminant concentrations with respect to time and distance?

5. To what extent will the concentration of contaminants be reduced by the dilution effects of mechanical dispersion and other subsurface phenomena?

6. What is the probability that contaminants will reach any potential environmental target in sufficient concentration to cause a public health concern, impede the beneficial use of groundwater, or otherwise cause harm?

7. If environmental impairment were to occur, what would be the environmental and economic consequences of it?

Record Keeping and Reporting

A. Quarterly Reports

During the first year, the values of parameters measured to establish the suitability of groundwater for drinking will be reported, within 15 days of the completion of each quarterly analysis, to the following two agencies:

1. Director, Air & Waste Management Division
   U.S. EPA (6AW-He)
   1201 Elm Street
   First International Building
   Dallas, Texas 75270

2. Hazardous Waste Section
   New Mexico Environmental Improvement Division
   725 St. Michael's Drive
   Crown Building
   Santa Fe, New Mexico 87504-0968

This report will separately identify for each monitoring well, any parameters whose values have been found to exceed the limits specified in the National Interim Primary Drinking Water Standards [4] (See Table IV).

B. Annual Reports Under the Indicator Monitoring Program

The values of parameters used as indicators of groundwater contamination, together with the evaluations of these values, will be included in an annual report to the following two agencies:

1. Director, Air & Waste Management Division
   U.S. EPA (6AW-He)
   1201 Elm Street
   First International Building
   Dallas, Texas 75270

2. Hazardous Waste Section
   New Mexico Environmental Improvement Division
   725 St. Michael's Drive
   Crown Building
   Santa Fe, New Mexico 87504-0968

This report will separately identify any significant differences from the background levels established during the first year. It will also include the results of the annual evaluation of groundwater elevations.

C. Annual Reports Under the Groundwater Quality Assessment Program:

The Facility Annual Report will be adjusted to include the results, obtained under a Groundwater Quality Assessment Program. This report will include, but not be limited to, calculations (or measurements) of the extent of any detected groundwater contamination and the rate of transport of hazardous wastes or hazardous waste constituents in the groundwater during the reporting period.

D. Record Keeping:

Records of all analyses, together with evaluations, performed under the Groundwater Monitoring Program will be maintained during the entire active life of the facility and during the post closure period, according to the provisions of 40 CFR 265.118. These records will be available for inspection by authorized representatives of EPA and EID.

TABLE I

METHODOLOGY, PARAMETERS TO BE MONITORED

Parameters Characterizing the Suitability of the Groundwater as a Drinking Water Supply				
PARAMETER	UNITS	DETECTION LIMITS *	METHOD	METHODOLOGY REFERENCE **
Arsenic	mg/l	0.01	Furnace AA	3 - Method 206. 2
Barium	mg/l	0.1	ICP	9 - Method 200.7
Cadmium	mg/l	0.001	Furnace AA	3 - Method 213.2
Chromium	mg/l	0.001	Furnace AA	3 - Method 218.2
Fluoride	mg/l	0.01	Specific Electrode	3 - Method 340.2
Lead	mg/l	0.001	Furnace AA	3 - Method 239.2
Mercury	mg/l	0.0004	Flameless AA	3 - Method 245.1
Nitrate (as N)	mg/l	0.1	Spectrophotometric	3 - Method 352.1
Selenium	mg/l	0.01	Furnace AA	3 - Method 270.2
Silver	mg/l	0.01	Flame AA	3 - Method 272.2
Endrin	mg/l	0.0002	GC	1 - Method 608
Lindane	mg/l	0.004	GC	1 - Method 608
Methoxychlor	mg/l	0.1	GC	1 - Method 608
Toxaphene	mg/l	0.005	GC	1 - Method 608
2,4-D	mg/l	0.1	GC	12 - Method 115
2,4,5-TP(Silvex)	mg/l	0.01	GC	12 - Method 115
Total Radium	pCi/l	1	Counter	9 - Method 900.1
Gross Alpha	pCi/l	2	Counter	5 - Method 703
Gross Beta	pCi/l	3	Counter	5 - Method 703
Coliform Bacteria	No./100ml	1	Membrane Filter	5 - Method 909A

* As reported by CEP Laboratory, Santa Fe, N.M.

** See Reference Section at end of report

TABLE II

METHODOLOGY, PARAMETERS TO BE MONITORED

Parameters Used As Indicators of Groundwater Contamination				
PARAMETER	UNITS	DETECTION LIMITS *	METHOD	METHODOLOGY REFERENCE **
pH	pH units	1	Electrode	3 - Method 150.1
Specific Conductance	umhos/cm	1	Wheatstone Bridge	3 - Method 120.1
TOC	mg/l	1	Chemical Oxidation Infrared Detector	7 - Method 9020
TOX	ug Cl/l	5	Dohrman TOX	8 - Method 450.1

* As reported by CEP Laboratory, Santa Fe, N.M.

** See Reference Section at end of report

TABLE III

METHODOLOGY, PARAMETERS TO BE MONITORED

Required Parameters Establishing Groundwater Quality				
PARAMETER	UNITS	* DETECTION LIMITS	METHOD	**METHODOLOGY REFERENCE
Chloride	mg/l	0.5	Potentiometric	5 - Method 407.C
Iron	mg/l	0.01	ICP	9 - Method 200.7
Manganese	mg/l	0.001	ICP	9 - Method 200.7
Phenolics	mg/l	0.001	Distillation, Colorimetric	3 - Method 420.1
Sodium	mg/l	0.1	Flame AA	3 - Method 273.1
Sulfate	mg/l	5.0	Gravimetric	3 - Method 375.3

* As reported by CEP Laboratory, Santa Fe, N.M.

** See Reference Section at end of report

TABLE IV

EPA INTERIM PRIMARY DRINKING WATER STANDARDS

Parameter	Maximum Level (mg/l)
Arsenic	0.05
Barium	1.0
Cadmium	0.01
Chromium	0.05
Fluoride	2.4
Lead	0.05
Mercury	0.002
Nitrate (as N)	10.0
Selenium	0.01
Silver	0.05
Endrin	0.0002
Lindane	0.004
Methoxychlor	0.1
Toxaphene	0.005
2,4-D	0.1
2,4,5-TP (Silvex)	0.01
Radium	5 pCi/l
Gross Alpha	15 pCi/l
Gross Beta	4 millirem/yr (normally equivalent to 50 pCi/l)
Coliform Bacteria	1/100 ml

REFERENCES

1. Guidelines for Establishing Test Procedures for the Analysis of Pollutants, 40 CFR, Part 136; FR44, p. 69464 et. seq., December 3, 1979; as corrected in 44FR, p.75028, et. seq., December 18, 1979.

2. Procedures Manual for Groundwater Monitoring at Solid Waste Disposal Facilities, EPA-530/SW-611, August, 1977.

3. Methods for Chemical Analysis of Water and Wastes, EPA-600/4-79-020, March, 1979.

4. National Interim Primary Drinking Water Regulations, EPA-570/9-76-003, September, 1976.

5. Standard Methods for the Examination of Water and Wastewater, 15th Edition, American Public Health Association, 1980.

6. Groundwater Monitoring, Sampling and Analysis, 40 CFR, Part 265, Subpart F, revised as of July 1, 1982.

7. Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, U.S. EPA, SW-846, Second Edition A82.

8. "Proposed Test Method for Organic Halides in Water by Carbon Adsorbtion Microcoulometry", ASTM, 1982, Part 31, page 1497.

9. "Inductively Coupled Plasma - Atomic Emission Spectrometric Method for Trace Element Analysis of Water and Wastes", Environmental Monitoring and Support Laboratory; Cincinnati, Ohio.

10. 40 CFR, Part 264, Appendix IV, as amended in FR 47, P. 32367, July 26, 1982.

11. Handbook for Analytical Quality Control in Water and Wastewater Laboratories, March, 1979, EPA-600/4-79-019.

12. Methods for Benzidine Chlorinated Organic Compounds, Pentachlorophenol and Pesticides in Water and Wastewater, U.S.EPA Interim Document, September 1978.

13. New Mexico Hazardous Waste Regulations, Part II, 206,C,1.

ATTACHMENTS

Attachment A - Chain of Custody Procedures

Attachment B - Cochran's Approximation to the Behrens Fisher Student's t-Test, 47 FR 32367, July 26, 1982,

Attachment C - Monitoring Well Installation Report
Sparton Southwest, Inc.
Coors Road Facility

ATTACHMENT A
to
ATTACHMENT 5

Chain-of-Custody Procedures

Chain of Custody Procedures

A. Custodianship

A custodian will maintain custody and control of each sample under his care until it is relinquished, analyzed, or disposed. Normal security measures, such as locked containers, evidence tape, or personal, physical possession will be utilized by the custodian.

The person actually collecting the sample becomes the first custodian. His duties include sealing the sample container with evidence tape, or locking the sample containers, if he will not maintain continuous personal, physical possession.

If the sample is to be split into subsamples, or if anyone else will have possession of the samples prior to laboratory delivery, the first custodian will also initiate Chain of Custody documentation. If the sample collector personally delivers the samples to the laboratory, he will obtain an itemized and dated receipt from an authorized laboratory representative in lieu of the Chain of Custody documents.

As the sample moves from the initial custodian through the Chain of Custody, subsequent custodians will sign when receiving the sample, and upon relinquishing same.

NOTE: Custodians will handle each sample in their possession in such a manner so as to be able to testify that it was continuously under their control, and not subject to any tampering.

B. Documentation

1. Chain of Custody Document Contents

a. Program Name: "INDICATOR MONITORING PROGRAM," "MONITORING REVIEW or "GROUNDWATER QUALITY ASSESSMENT"

b. Facility name and location:

Sparton Southwest, Inc.
9621 Coors Road, NW
Albuquerque, New Mexico 87103

c. For each sample:

(1) Monitoring well number

(2) Date and time of collection

(3) Number of sample containers

d. Name of sample collector

e. Special security features used, such as locked containers or evidence tape.

2. Multiple Samples

A single Chain of Custody document may be used for more than one sample, provided that all requirements specified in Item B.1 are met. If multiple samples are identified in one document, they normally will be packaged together and the package sealed with evidence tape.

3. Acceptance/Release Format

Each transfer of possession of a sample will be recorded on the document with the following items:

a. Signature of person relinquishing sample control

b. Signature of person receiving sample control

c. Date and time of transfer

d. Stipulation that the sample has/has not been visibly tampered with

e. Remarks should include any exception and deviations from normal routine involved with the sample.

SPARTON SOUTHWEST

CHAIN OF CUSTODY RECORD

SHIPPER

Company Name	
Street/P.O. Box	
City, State	Zip Code

SAMPLING LOCATION

Site Name	
Street or Other Description	
City, State	Zip Code
Site I.D. No.	

SAMPLE COLLECTOR

Name	Telephone No.
Company	
Street/P.O. Box	
City, State	Zip Code

LIST OF SAMPLES

COLLECTOR'S SAMPLE NO.	DATE COLLECTED	TIME	SAMPLE SOURCE	NO. OF CONTAINERS	REMARKS

CHAIN OF POSSESSION

SIGN TO ACCEPT CUSTODY	COMPANY	DATE	TIME	SIGN TO RELINQUISH CUSTODY	REMARKS
(1)					
(2)					
(3)					
(4)					
(5)					
(6)					

ATTACHMENT B
to
ATTACHMENT 5

Cochran's Approximation to the Behrens-Fisher
Students' t-test, 47 CFR 32367 (July 26, 1982)

with, be decomposed by, or be ignited by the contained waste. Inside containers must be tightly and securely sealed. The inside containers must be of the size and type specified in the Department of Transportation (DOT) hazardous materials regulations (49 CFR Parts 173, 178, and 179), if those regulations specify a particular inside container for the waste.

(b) The inside containers must be overpacked in an open head DOT-specification metal shipping container (49 CFR Parts 178 and 179) of no more than 416-liter (110 gallon) capacity and surrounded by, at a minimum, a sufficient quantity of absorbent material to completely absorb all of the liquid contents of the inside containers. The metal outer container must be full after packing with inside containers and absorbent material.

(c) The absorbent material used must not be capable of reacting dangerously with, being decomposed by, or being ignited by the contents of the inside containers in accordance with § 264.17(b).

(d) Incompatible wastes, as defined in § 260.10 of this chapter, must not be placed in the same outside container.

(e) Reactive wastes, other than cyanide- or sulfide-bearing waste as defined in § 261.23(a)(5) of this chapter, must be treated or rendered non-reactive prior to packaging in accordance with paragraphs (a) through (d) of this section. Cyanide- and sulfide-bearing reactive waste may be packed in accordance with paragraphs (a) through (d) of this section without first being treated or rendered non-reactive.

§§ 264.317-264.339 [Reserved]

13. 40 CFR Part 264 is amended by adding Appendix IV to read as follows:

Appendix IV

Cochran's Approximation to the Behrens-Fisher Students' t-test

Using all the available background data (n_B readings), calculate the background mean ($\bar{X}_B$) and background variance (s_B^2). For the single monitoring well under investigation (n_m reading), calculate the monitoring mean ($\bar{X}_m$) and monitoring variance (s_m^2).

For any set of data ($X_1, X_2 \ldots X_n$) the mean is calculated by:

$$\bar{X} = \frac{X_1 + X_2 \ldots + X_n}{n}$$

and the variance is calculated by:

$$s^2 = \frac{(X_1 - \bar{X})^2 + (X_2 - \bar{X})^2 \ldots + (X_n - \bar{X})^2}{n-1}$$

where "n" denotes the number of observations in the set of data.

The t-test uses these data summary measures to calculate a t-statistic (t^*) and a comparison t-statistic (t_c). The t^* value is compared to the t_c value and a conclusion reached as to whether there has been a statistically significant change in any indicator parameter.

The t-statistic for all parameters except pH and similar monitoring parameters is:

$$t^* = \frac{X_m - \bar{X}_B}{\sqrt{\frac{s_m^2}{n_m} + \frac{s_B^2}{n_B}}}$$

If the value of this t-statistic is negative then there is no significant difference between the monitoring data and background data. It should be noted that significantly small negative values may be indicative of a failure of the assumption made for test validity or errors have been made in collecting the background data.

The t-statistic (t_c), against which t^* will be compared, necessitates finding t_B and t_m from standard (one-tailed) tables where,

t_B = t-tables with ($n_B - 1$) degrees of freedom, at the 0.05 level of significance.

t_m = t-tables with ($n_m - 1$) degrees of freedom, at the 0.05 level of significance.

Finally, the special weightings W_B and W_m are defined as:

$$W_B = \frac{s_B^2}{n_B} \quad \text{and} \quad W_m = \frac{s_m^2}{n_m}$$

and so the comparison t-statistic is:

$$t_c = \frac{W_B t_B + W_m t_m}{W_B + W_m}$$

The t-statistic (t^*) is now compared with the comparison t-statistic (t_c) using the following decision-rule:

If *t^* is equal to or larger than* t_c, then conclude that there most likely *has been a significant increase* in this specific parameter.

If *t^* is less than* t_c, then conclude that most likely *there has not been a change* in this specific parameter.

The t-statistic for testing pH and similar monitoring parameters is constructed in the same manner as previously described except the negative sign (if any) is discarded and the caveat concerning the negative value is ignored. The standard (two-tailed) tables are used in the construction t_c for pH and similar monitoring parameters.

If t^* is equal to or larger than t_c, then conclude that there most likely *has been a significant increase* (if the initial t^* had been negative, this would imply a significant decrease). If t^* is less than t_c, then conclude that there most likely has been no change.

A further discussion of the test may be found in *Statistical Methods* (6th Edition, Section 4.14) by G. W. Snedecor and W. G. Cochran, or *Principles and Procedures of Statistics* (1st Edition, Section 5.8) by R. G. D. Steel and J. H. Torrie.

STANDARD T-TABLES 0.05 LEVEL OF SIGNIFICANCE

Degrees of freedom	t-values (one-tail)	t-values (two-tail)
1	6.314	12.706
2	2.920	4.303
3	2.353	3.182
4	2.132	2.776
5	2.015	2.571
6	1.943	2.447
7	1.895	2.365
8	1.860	2.306
9	1.833	2.262
10	1.812	2.228
11	1.796	2.201
12	1.782	2.179
13	1.771	2.160
14	1.761	2.145
15	1.753	2.131
16	1.746	2.120
17	1.740	2.110
18	1.734	2.101
19	1.729	2.093
20	1.725	2.086
21	1.721	2.080
22	1.717	2.074
23	1.714	2.069
24	1.711	2.064
25	1.708	2.060
30	1.697	2.042
40	1.684	2.021

Adapted from Table III of "*Statistical Tables for Biological, Agricultural, and Medical Research*" (1947, R. A. Fisher and F. Yates).

PART 265—INTERIM STATUS STANDARDS FOR OWNERS AND OPERATORS OF HAZARDOUS WASTE TREATMENT, STORAGE, AND DISPOSAL FACILITIES

14. The authority citation for Part 265 reads as follows:

Authority: Sections 1006, 2002(a), and 3004 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1976, as amended (42 U.S.C. 6905, 6912(a), and 6924).

15. In 40 CFR 265, Subpart L, § 265.253 is amended by revising paragraph (a) and removing paragraph (c), and § 265.258 is added to read as follows:

§ 265.253 Containment.

If leachate or run-off from a pile is a hazardous waste, then either:

(a)(1) The pile must be placed on an impermeable base that is compatible with the waste under the conditions of treatment or storage;

(2) The owner or operator must design, construct, operate, and maintain a run-on control system capable of preventing flow onto the active portion of the pile during peak discharge from at least a 25-year storm;

ATTACHMENT C
to
ATTACHMENT 5

Monitoring Well Installation Report
Sparton Southwest, Inc.
Coors Road Facility

A Report Prepared For:

Sparton Corporation
2400 East Ganson Street
Jackson, Michigan 49202

MONITORING WELL INSTALLATION REPORT
SPARTON SOUTHWEST, INC.
COORS ROAD FACILITY

HLA Job No. 6310,004.12

Prepared By:

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(713) 789-8050

June 29, 1983

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8	Log of Well MW-4
9	Log of Well P-1
10	Water-Table Contour Map

MONITORING WELL INSTALLATION REPORT

I. INTRODUCTION

Harding Lawson Associates (HLA) was contracted by Sparton Southwest, Inc. to install a groundwater monitoring system at the company's Coors Road Facility. Plate 1 shows the location of the facility. The groundwater monitoring system was designed to monitor two surface impoundments northeast of the main building. Refer to Plate 2 for the location of the wells.

The monitoring system is comprised of four monitoring wells, one well (MW-2) hydraulically upgradient of the ponds and three wells (MW-1, MW-3 and MW-4) down-gradient of the ponds. One piezometer (P-1) was also installed to aid in the placement of the monitoring wells.

II. DRILLING AND INSTALLATION PROCEDURES

The subsurface and hydrogeologic conditions were investigated by drilling and sampling five borings around the facility. These borings were then converted to either two-inch diameter monitoring wells or piezometers. All drilling and well installation was performed by Sergent, Hauskins and Beckwith Geotechnical Engineers, Inc. under the direct supervision of HLA Senior Field Technician, Michael Lallatin.

The drilling rig was a truck-mounted auger rig using 4-inch I.D. continuous flight, hollow-stemmed augers. Soil samples were collected in boring MW-1 by using a split spoon sampler (advanced with a 140 lb. hammer) inside the auger. Some samples were also collected from drill cuttings off the side of the auger.

The soils were logged and classified according to the Unified Soils Classification System. Plate 3 describes the classification system.

Clear water was circulated through the augers to keep them from filling with sand. All of the borings were drilled and sampled to 90 feet with the exception of one, which advanced to only 85 feet. The boring logs are presented on Plates 5, 6, 7, 8, and 9. These logs depict the lithology underlying the site.

Four of the borings were converted to monitoring wells and one of the borings was converted to a piezometer. The casing for the monitoring wells is comprised of 2-inch diameter, flush-threaded, schedule 80 PVC tube. The screened portion is made of the same material and is machine-slotted at 0.007-inch widths. After completion of the boring, the screen and casing were installed through the augers to the desired depth. The screens were all installed approximately 20 feet into the saturated zone. The augers were then

pulled up around the casing and removed from the boring. At that point, naturally-occurring sand and gravel collapsed around the screen to form a sand and gravel pack. In wells MW-2, MW-3, MW-4, and P-1 the sand collapsed 5 to 10 feet above the top of the screen and bentonite pellets were added at that point to form a seal in the annulus. The remaining annulus was then grouted with a cement and bentonite mixture. Prior to adding the bentonite seal in well MW-1, the boring collapsed up to 30 feet, so the bentonite seal was placed from 28 to 30 feet and the annulus was grouted to the surface. For more specific information on the well-construction details, refer to the well-construction diagrams on the boring logs. Plate 4 presents a legend for the well construction diagrams.

Steel protective well covers were installed around the PVC stand pipe of each monitoring well and piezometer. The well covers are 6 inches in diameter and have lockable caps.

Upon completion of the wells, they were developed using an air-lift method, which consists of lowering an air-hose into the well and blowing out the water with compressed air. This purges the well of water containing sands and fines which initially enter through the screen. The result is a coarse sand and gravel pack around the screen. This pack acts to filter out silts and fine sand from groundwater which enters the well.

III. FINDINGS OF THE INVESTIGATION

A. Regional Setting

1. Geology

Rocks of igneous, metamorphic and sedimentary origin are exposed in the Albuquerque area. Precambrian age rocks, predominantly granite and metamorphosed clastic rocks are exposed in the Sandia and Manzano Mountains. The Precambrian rocks are unconformably overlain by a thick sequence of sedimentary rocks. These sedimentary rocks are of marine and continental origin, and range from Early Pennsylvanian to Recent in age. Basaltic-flow rocks of Tertiary age interbed with stream sediments of Quaternary age to the west of the Rio Grande.

Most of the surface geology of the valley is comprised of Tertiary and Quaternary deposits. These younger deposits are comprised of gravel, sand, silt and clay.

2. Groundwater

The valley fill (Sante Fe Group and alluvium) is the principal aquifer in the Albuquerque area and is composed mostly of gravel, sand, silt and clay.

The groundwater is under water-table conditions throughout most of the valley, although in some locations more permeable sands and gravel are confined by beds of silt or clay.

The overall regional flow of groundwater is to the southeast. The regional flow direction will vary locally because of influences from surface waters, nearby pumping wells or varied hydrogeologic conditions.

B. Site Specific Observations

1. Lithology-Geology

The geology and the groundwater hydrology of the site were investigated during the implementation of the above drilling and monitoring well installation program.

The soils underlying the site are alluvium from the Rio Grande River. They are comprised of sand with varying amounts of gravel to sandy-gravel. The sandy gravels are present at depth while loose sands are present near the surface. Occasional clay lenses are interbedded in the sand. The sand ranges in texture from fine to coarse-grained. The gravel ranges from coarse pebble to cobble-sized gravel.

The boring logs presented on Plates 5 through 9 depict the lithology underlying the site.

2. Groundwater

The water table is present at approximately 65 feet below the ground surface. All the monitoring wells penetrate the saturated zone 15 to 20 feet and are screened during the lowermost 20 feet of their length.

Water level measurements were made relative to the top of the steel protective casings. The top of the steel protective casings were surveyed relative to a common bench mark. Water level measurements were made on June 23, 1983 and are presented on Table 1. Plate 10 shows the gradient of the water table. The direction of groundwater flow varies from the southwest to the southeast across the site. The gradient ranges from 0.0036 to 0.0059 across the site to the south-southeast.

The groundwater monitoring system was designed so that MW-2 is upgradient of the facility, and MW-1, MW-3 and MW-4 are down-gradient of the facility.

TABLE 1

WELL INFORMATION

Well No.	Depth (ft.)	Elevation TOC[a] (MSL, ft.)	Water Level[b] TOC (ft.)	Elevation Water Level (MSL, ft.)
MW-1	90	5,047.84	67.85	4,979.99
MW-2	90	5,050.26	69.22	4,981.04
MW-3	85	5,047.22	67.63	4,979.59
MW-4	90	5,047.61	68.04	4,979.57
P-1	90	5,050.45	68.28	4,981.17

a - Elevation surveyed by Denney-Gross & Associates, Inc.
TOC - Top of Protective Steel Casing

b - Water levels measured June 23, 1983 by Cleovis Martinez, Environmental Engineer, Sparton Southwest, Inc.

DISTRIBUTION

1 copy to: Sparton Corporation
2400 East Ganson Street
Jackson, Michigan 49202

Attn: Mr. Blair Thompson

2 copies to: Sparton Southwest, Inc.
P. O. Box 1784
Albuquerque, New Mexico 87103

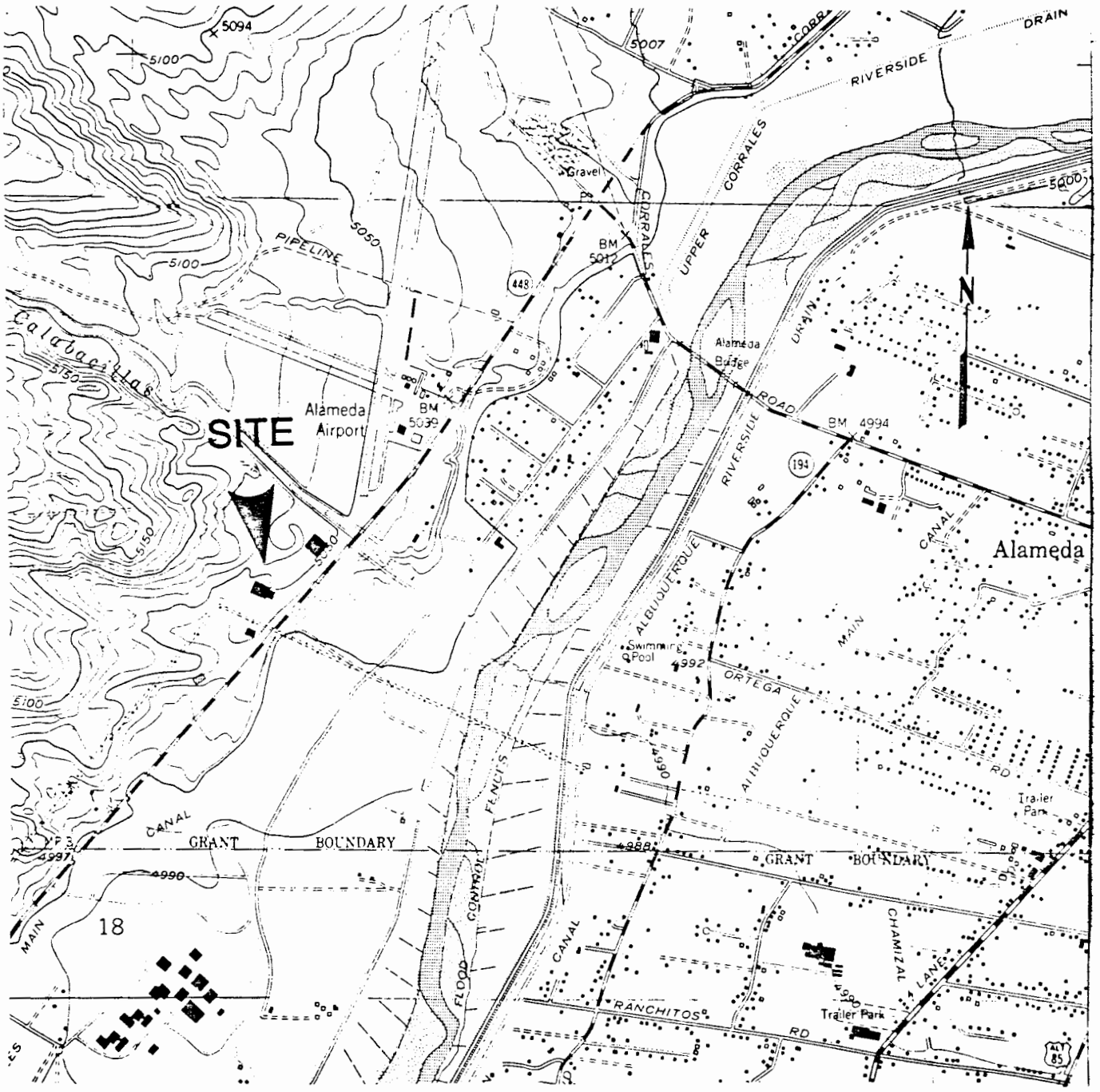
Attn: Mssrs. Martinez and Mico

ARM/JBM:dkh

QUALITY CONTROL REVIEW:

Thomas S. Burger

Thomas S. Burger, R.P.S.



1000 0 1000 2000 FEET

CONTOUR INTERVAL 10 FEET

Ref: U.S.G.S. Topographic Map, Los Griegos, N. Mex., 7.5 Quadrangle.

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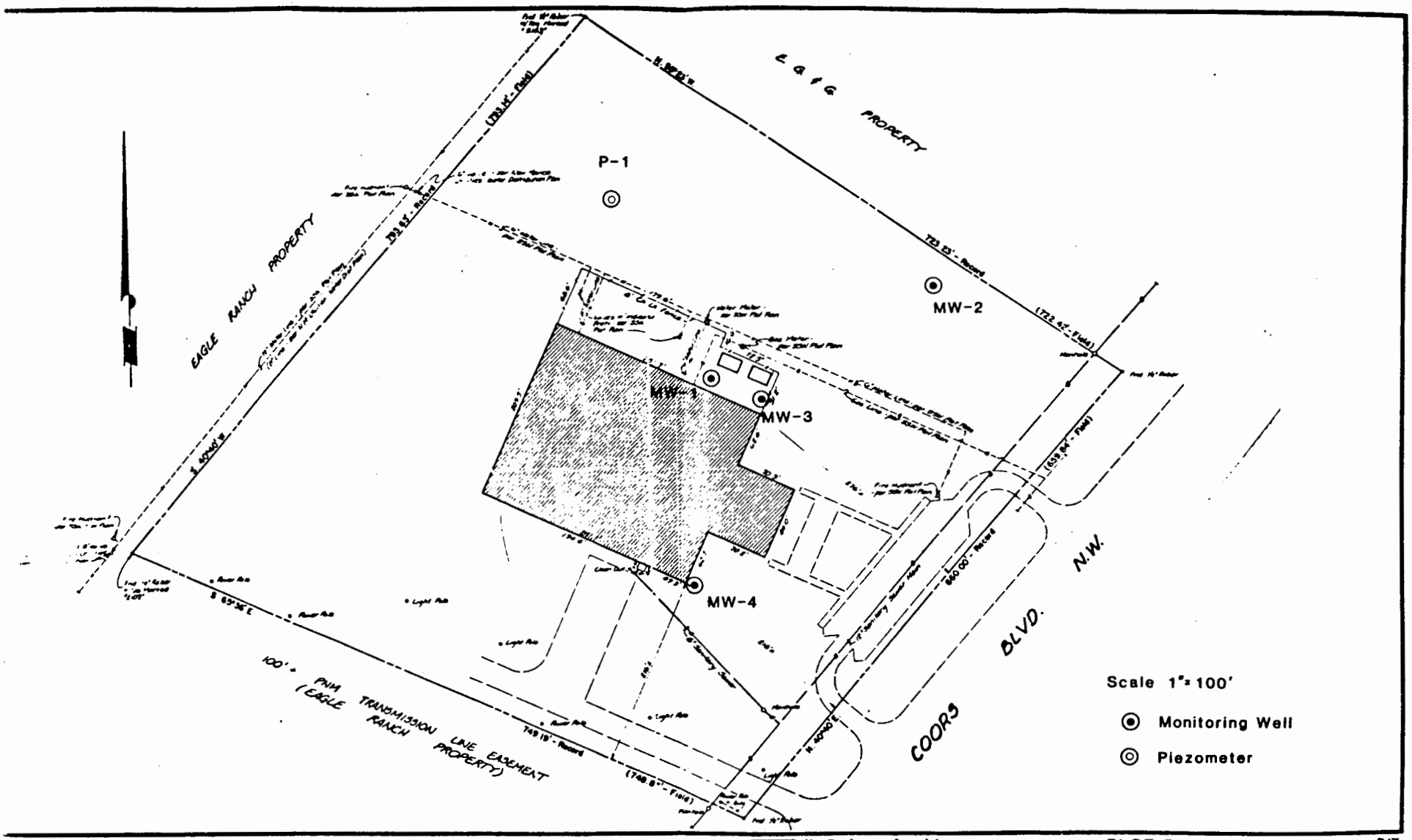
SITE LOCATION

SPARTON SOUTHWEST, INC.
ALBUQUERQUE, NEW MEXICO

PLATE **1**

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



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PLOT PLAN
SPARTON SOUTHWEST, INC.
ALBUQUERQUE, NEW MEXICO

PLATE **2**

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

MAJOR DIVISIONS				TYPICAL NAMES
COARSE GRAINED SOILS (MORE THAN HALF IS LARGER THAN #200 SIEVE)	GRAVELS (MORE THAN HALF COARSE FRACTION IS LARGER THAN NO. 4 SIEVE SIZE)	CLEAN GRAVELS WITH LITTLE OR NO FINES	GW	WELL GRADED GRAVELS, GRAVEL - SAND MIXTURES
			GP	POORLY GRADED GRAVELS, GRAVEL - SAND MIXTURES
		GRAVELS WITH OVER 12% FINES	GM	SILTY GRAVELS, POORLY GRADED GRAVEL - SAND - SILT MIXTURES
			GC	CLAYEY GRAVELS, POORLY GRADED GRAVEL - SAND - CLAY MIXTURES
	SANDS (MORE THAN HALF COARSE FRACTION IS SMALLER THAN NO. 4 SIEVE SIZE)	CLEAN SANDS WITH LITTLE OR NO FINES	SW	WELL GRADED SANDS, GRAVELLY SANDS
			SP	POORLY GRADED SANDS, GRAVELLY SANDS
		SANDS WITH OVER 12% FINES	SM	SILTY SANDS, POORLY GRADED SAND - SILT MIXTURES
			SC	CLAYEY SANDS, POORLY GRADED SAND - CLAY MIXTURES
FINE GRAINED SOILS (MORE THAN HALF IS SMALLER THAN #200 SIEVE)	SILTS AND CLAYS (LIQUID LIMIT LESS THAN 50)		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS, OR CLAYEY SILTS WITH SLIGHT PLASTICITY
			CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
			OL	ORGANIC CLAYS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS (LIQUID LIMIT GREATER THAN 50)		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOILS, ELASTIC SILTS
			CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
			OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS			Pt	PEAT AND OTHER HIGHLY ORGANIC SOILS

UNIFIED SOIL CLASSIFICATION SYSTEM

Consol — Consolidation
LL — Liquid Limit (in %)
PL — Plastic Limit (in %)
G_s — Specific Gravity
SA — Sieve Analysis
"Undisturbed" Sample
Bulk Sample

	Shear Strength, psf	Confining Pressure, psf	
*Tx	320	(2600)	Unconsolidated Undrained Triaxial
TxCU	320	(2600)	Consolidated Undrained Triaxial
DS	2750	(2000)	Consolidated Drained Direct Shear
FVS	470		Field Vane Shear
*UC	2000		Unconfined Compression
LVS	700		Laboratory Vane Shear

Notes: (1) All strength tests on 2.8" or 2.4" diameter samples unless otherwise indicated.

(2) * indicates 1.4" diameter sample.

KEY TO TEST DATA

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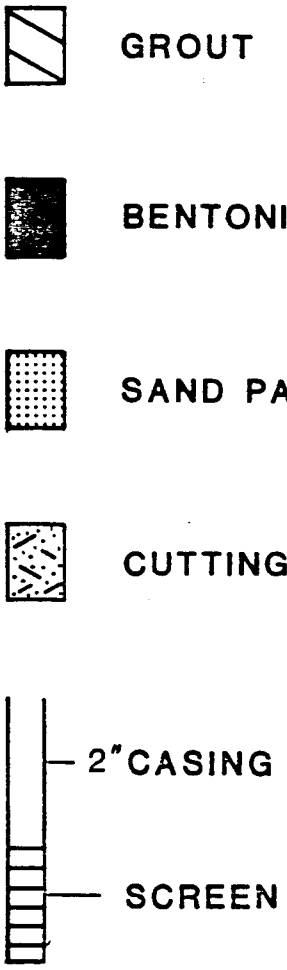
PLATE 3

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	6310,004.12	A. Rom	6/83		

N02470

LEGEND



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WELL CONSTRUCTION LEGEND

SPARTON SOUTHWEST, INC.
ALBUQUERQUE, NEW MEXICO

PLATE 4

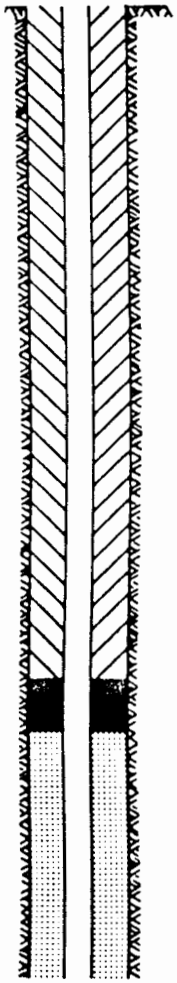
DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
ARM	6310.004.12	a.R.m	6/83		

Equipment Hollow Auger

Elevation _____ Date 5/23/83

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

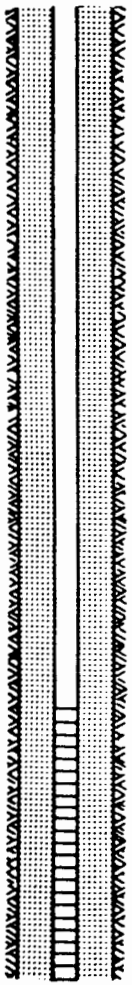
WELL CONSTRUCTION



(Continuation of Log)

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

WELL CONSTRUCTION



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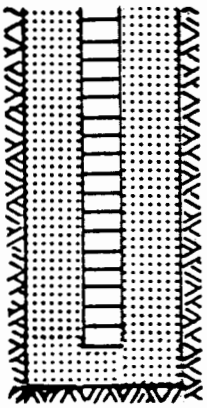
LOG OF WELL MW-1

SPARTON SOUTHWEST, INC.
ALBUQUERQUE, NEW MEXICO

PLATE 5

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
ARM	6310.004.12	R.R.M.	6/83		

WELL CONSTRUCTION	Pocket Penetrometer (ksf)	Vane Shear (ksf)	Blows/Foot	Moisture Content (%)	Dry Density (pcf)	Depth, feet	Sample	
						80		
						85		
						90		End of Boring at 90.0 feet
						95		
						100		
						105		
						110		
						115		
						120		

Equipment Hollow Auger

Elevation Date 5/23/83

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LOG OF WELL MW-1

SPARTON SOUTHWEST, INC.
ALBUQUERQUE, NEW MEXICO

PLATE 5A

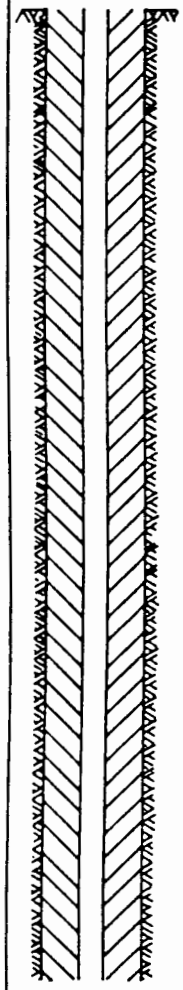
DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
ARM	6310,004.12		6/83		

Equipment Hollow Auger

Elevation _____ Date 5/25/83

Depth (ft)	Blows/foot	Moisture Content (%)	Dry Density (pcf)	Sample	Description
0					LIGHT BROWN SAND (SP) loose, fine-grained, dry becomes medium dense at 2 feet
5					with occasional gravel at 6.5 feet
					sand becomes coarser at 9 feet
10					
15					
20					
25					becomes more gravely from 24.5 to 28.0 feet
30					
35					
40					

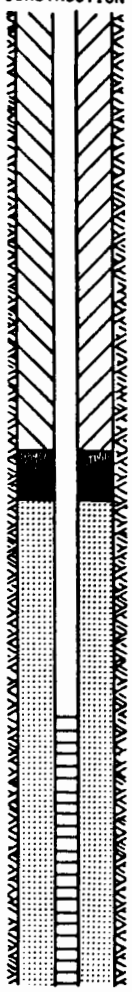
WELL CONSTRUCTION



(Continuation of Log)

Depth (ft)	Blows/foot	Moisture Content (%)	Dry Density (pcf)	Sample	Description
40					
45					
50					BROWN SANDY GRAVEL (GP) very dense, cobble to coarse, moist
					varying amounts of gravel at 52 feet
55					
60					
65					
70					
75					
80					

WELL CONSTRUCTION



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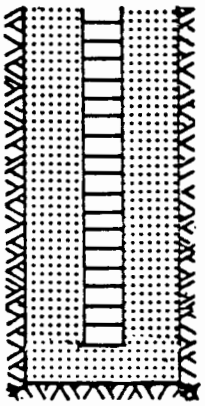
LOG OF WELL MW-2

SPARTON SOUTHWEST, INC.
ALBUQUERQUE, NEW MEXICO

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

WELL CONSTRUCTION	Pocket Penetrometer (ksf)	Vane Shear (ksf)	Blows/Foot	Moisture Content (%)	Dry Density (pcf)	Depth, feet	Sample	
						80		
						85		
						90		End of Boring at 90.0 feet
						95		
						100		
						105		
						110		
						115		
						120		

Equipment Hollow Auger

Elevation Date 5/25/83

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LOG OF WELL MW-2

SPARTON SOUTHWEST, INC.
ALBUQUERQUE, NEW MEXICO

PLATE 67

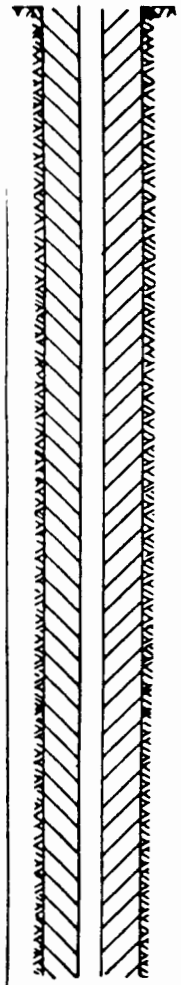
DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
ARM	6310.004.12	J.R.Dr	6/83		

Equipment Hollow Auger

Elevation _____ Date 5/26/83

Depth (ft)	Blows/foot	Moisture Content (%)	Dry Density (pcf)	Sample	Description
0					LIGHT BROWN SAND (SP) medium dense, fine-grained
					occasional gravel at 4 feet
5					
10					
15					
20					
25					
					interbedded with thin clay layers at 29 feet
30					
35					
					becomes more gravelly at 36 feet
					interbedded with thin clay layers at 38 feet
40					

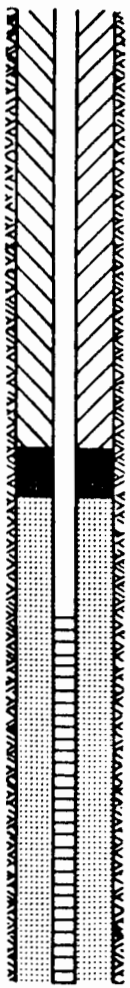
WELL CONSTRUCTION



(Continuation of Log)

Depth (ft)	Blows/foot	Moisture Content (%)	Dry Density (pcf)	Sample	Description
40					
45					
50					BROWN SANDY GRAVEL (GP) very dense, moist, with varying amounts of sand
55					
60					
65					
70					
75					
80					

WELL CONSTRUCTION



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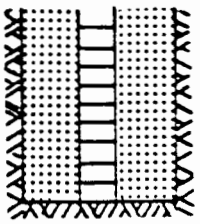
LOG OF WELL MW-3

SPARTON SOUTHWEST, INC.
ALBUQUERQUE, NEW MEXICO

PLATE 7

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
ARM	6310.004.12		6/83		

WELL CONSTRUCTION	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		

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LOG OF WELL MW-3

SPARTON SOUTHWEST, INC.
ALBUQUERQUE, NEW MEXICO

PLATE 7A

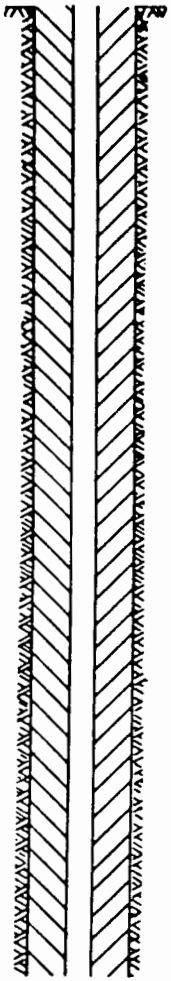
DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
ARM	6310.004.12		6/83		

Equipment: Hollow Auger

Elevation: _____ Date: 5/27/83

Depth (ft)	Blows/foot	Moisture Content (%)	Dry Density (pcf)	Sample	Description
0					LIGHT BROWN SAND (SP) medium dense, fine-grained moist, with intermittent gravelly zones
5					
10					occasional gravel at 9 feet
15					
20					
25					
30					
35					
40					

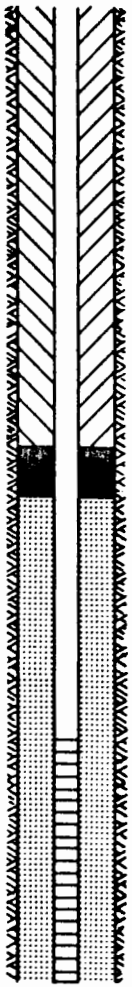
WELL CONSTRUCTION



(Continuation of Log)

Depth (ft)	Blows/foot	Moisture Content (%)	Dry Density (pcf)	Sample	Description
40					
45					BROWN SANDY GRAVEL (GP) very dense, moist
50					
55					
60					
65					
70					
75					
80					

WELL CONSTRUCTION



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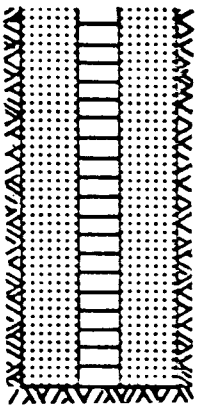
LOG OF WELL MW-4

SPARTON SOUTHWEST, INC.
ALBUQUERQUE, NEW MEXICO

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

WELL CONSTRUCTION	Pocket Penetrometer (ksf)	Vane Shear (ksf)	Blows/Foot	Moisture Content (%)	Dry Density (pcf)	Depth, feet	Sample	
						80		
						85		
						90		End of Boring at 90.0 feet
						95		
						100		
						105		
						110		
						115		
						120		

Equipment Hollow Auger

Elevation Date 5/27/83

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LOG OF WELL MW-4

SPARTON SOUTHWEST, INC.
ALBUQUERQUE, NEW MEXICO

PLATE 8A

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
ARM	6310.004.12		6/83		

Equipment Hollow Auger

Elevation _____ Date 5/24/83

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

(Continuation of Log)

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

WELL CONSTRUCTION

Harding Lawson Associates
Engineers Geologists & Geophysicists

LOG OF WELL P-1

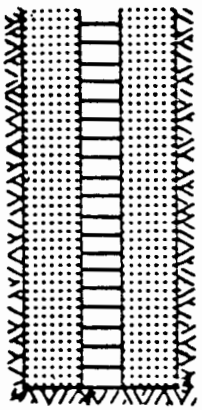
SPARTON SOUTHWEST, INC.
ALBUQUERQUE, NEW MEXICO

PLATE 9

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

Equipment Hollow Auger

Elevation Date 5/24/83

WELL CONSTRUCTION	Pocket Penetrometer (ksf)	Vane Shear (ksf)	Blows/Foot	Moisture Content (%)	Dry Density (pcf)	Depth, feet	Sample	
						80		
						85		
						90		End of Boring at 90.0 feet
						95		
						100		
						105		
						110		
						115		
						120		

Harding Lawson Associates
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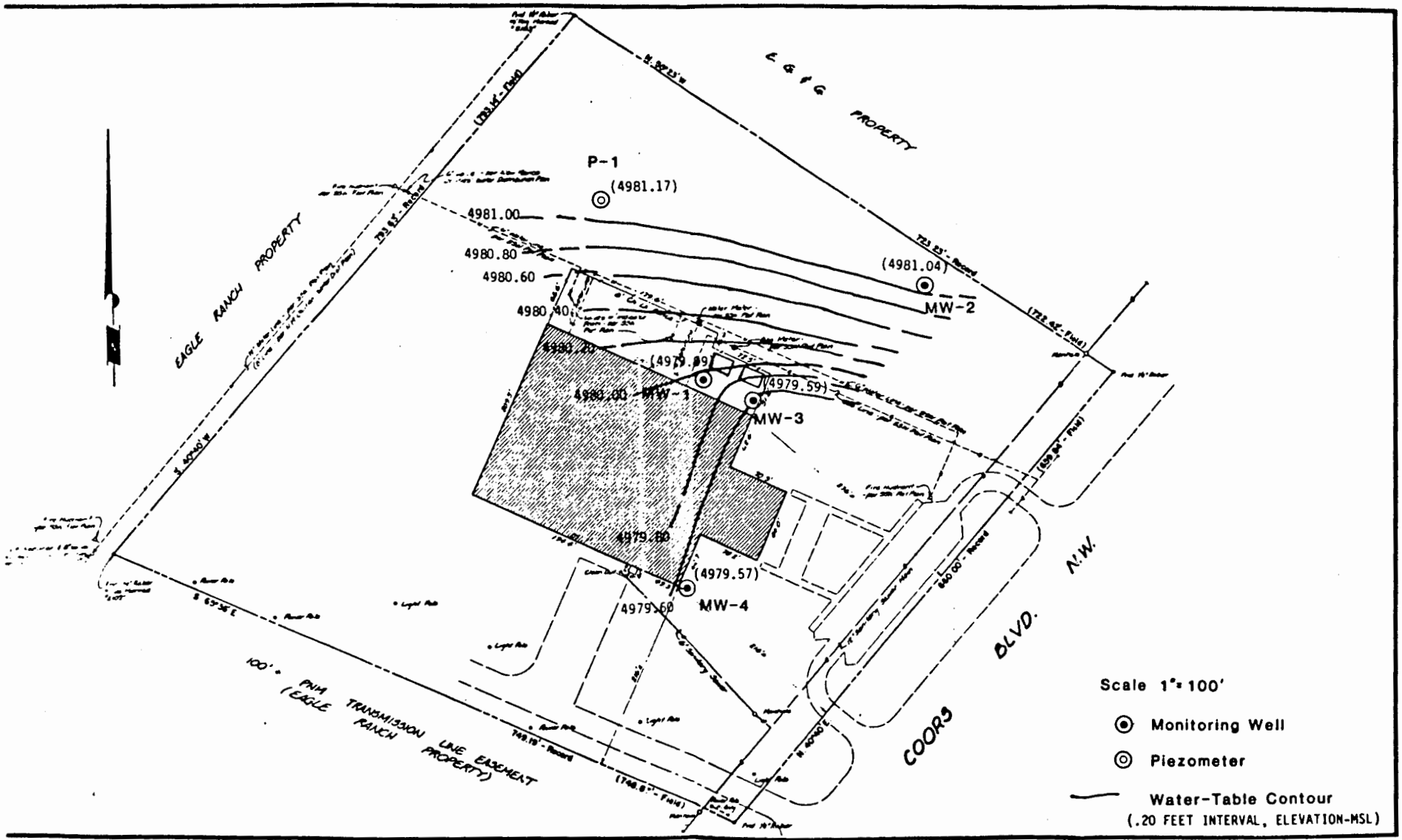
LOG OF WELL P-1

SPARTON SOUTHWEST, INC.
ALBUQUERQUE, NEW MEXICO

PLATE 9A

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



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WATER-TABLE CONTOUR MAP

SPARTON SOUTHWEST, INC.
ALBUQUERQUE, NEW MEXICO

PLATE **10**

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

Monitoring Review

Should the Indicator Monitoring Program indicate a possible groundwater contamination problem, a Monitoring Review shall be conducted as rapidly as possible to ascertain the need for a Groundwater Quality Assessment Program. The Monitoring Review shall consist of two parts:

A. Program and Analytical Review:

In conjunction with additional analytical work described below, the Groundwater Monitoring Program shall be reviewed. In particular, other results for the particular well(s) of interest will be compared with similar results from other wells in the monitoring system in order to detect any trends. The spatial and depth distribution of the wells must be considered in relationship to the indicated groundwater zone(s) of potential contamination, groundwater flow rates and flow directions, and the locations of possible sources of contamination. Historical data may need to be considered. Additional statistical procedures may need to be used to check or further clarify the apparent discrepancy.

B. Analytical Check

Affected monitoring wells will be resampled to determine if the discrepancy is due to sampling or laboratory errors.

1. Additional Samples

Additional groundwater samples will be obtained from all potentially involved monitoring wells. The samples will be split into two replicate subsamples, and one of the subsamples will be sent to the same analytical laboratory that produced the results which are being evaluated. The other subsample will be analyzed by another qualified laboratory, utilizing the same analytical procedure. Four replicate measurements of the parameter(s) in question will be performed on all such subsamples. Chain of Custody documents will accompany both subsamples.

2. Evaluation of Data

The subsample analytical results will be evaluated to determine if the originally detected parametric increase (or pH decrease) actually reflected a change in the groundwater quality, or was simply the result of sampling or laboratory errors. To do this, the arithmetic mean and variance will be calculated for each set of four replicate measurements made of each parameter for each subsample. Cochran's Approximation to the Behrens Fisher Student's t-test[10] will be used to determine if there is a statistically significant difference between values obtained from either laboratory and the initial background concentration(s) for the parameter(s) in question.

Referenced 9/20

If the conclusion of the Monitoring Review is that the Facility is not adversely affecting groundwater quality, Sparton will resume its normal Groundwater Monitoring Program. If the conclusion of the Monitoring Review is that hazardous waste or hazardous waste constituents may be entering groundwater from the facility, then a Groundwater Quality Assessment, as outlined below, will be initiated.

3. The following describes action to be taken for various potential outcomes of the Analytical Check.

a. Parametric Increase Confirmed for Upgradient Well

If the results from both laboratories reflect a statistically significant parametric increase (or pH decrease) in water from the upgradient well, EPA and EID will be notified, and the Groundwater Monitoring Program shall be resumed.

b. Parametric Increase Confirmed for Downgradient Well(s)

If the results from both laboratories reflect a significant increase (or pH decrease) in water from any of the downgradient wells, a Groundwater Quality Assessment shall be promptly initiated.

c. Neither Laboratory Confirms Parametric Increase

If there is no statistically significant increase (or pH decrease) found for any given parameter by either of the laboratories, the groundwater may be considered as not contaminated. The Groundwater Monitoring Program shall be resumed in this case, after notification of EPA and EID.

d. Tiebreaker

If only one laboratory has generated results significantly different from the initial background level, additional samples will be submitted to a third qualified laboratory to determine the need for a Groundwater Quality Assessment.

Replaced 7/2

ATTACHMENT 6

INVESTIGATION OF SOIL AND GROUNDWATER CONTAMINATION
SPARTON TECHNOLOGY, COORS ROAD FACILITY
ALBUQUERQUE, NEW MEXICO

March 19, 1984

A Report Prepared for:

Sparton Corporation
2400 East Ganson Street
Jackson, Michigan 49202

INVESTIGATION OF SOIL AND GROUNDWATER CONTAMINATION SPARTON TECHNOLOGY, COORS ROAD FACILITY ALBUQUERQUE, NEW MEXICO

HLA Job No. 6310,006.12

Prepared by:

Donald G. McEdwards, P.E. for
Project Engineer

Frank A. DeLuca
Associate Hydrogeologist

Harding Lawson Associates
6300 Westpark Drive, Suite 100
Houston, Texas 77057
Telephone: (713) 789-8050

March 19, 1984

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Plate 10	TCE Concentration Contour Map
Plate 11	Proposed Monitoring Well Locations

I. INTRODUCTION

A. Project Background

In May, 1983, Harding Lawson Associates (HLA) installed four groundwater monitoring wells and one piezometer at the Coors Road Plant. The data collected included information on subsurface soil conditions, water level elevation, and chemical analyses of groundwater samples. The results of the study show: the site is underlain by unconsolidated deposits consisting of interbedded sand, gravel, silt and clay; depth to water is on the order of 65 feet below ground surface, with a flow direction generally southeast; and contaminants are present in the groundwater.

As a result of the initial study, Sparton directed HLA to perform the present investigation which is designed to further define the subsurface soils and groundwater conditions. This report presents the results of our geotechnical investigation, our groundwater sampling and chemical analyses program, and recommendations for design of a groundwater removal and treatment system.

B. Scope of Services

The purpose of this study was to identify possible sources of contamination and assess the potential for contaminant migration

off-site. The investigation included the exploration of subsurface soil and water conditions, the collection and analyses of groundwater samples, and the laboratory testing of selected soil samples.

The specific tasks included:

1. Drilling and sampling of seven (7) borings to further define the subsurface soil conditions.
2. Installation of a monitoring well in each of the seven (7) borings.
3. Coordination of the borehole geophysical logging and the development of the monitoring wells.
4. Engineering analysis to better define the extent of contamination.
5. Develop recommendations for site restoration.

II. FIELD EXPLORATION AND LABORATORY TESTING

A. Field Exploration

The subsurface soil and groundwater conditions at the site were explored by drilling seven test borings ranging in depth from 75.5 to 150.5 feet. The borings were drilled during the period from October 31, to November 22, 1983. The locations of the borings are shown on the Boring Location Plan, Plate 1.

The borings were drilled utilizing truck mounted, 6.5-inch diameter hollow-stem auger and rotary wash equipment. The procedure used in the field to advance the borings was to auger to the water table (approximately 65 feet below grade) and to rotary wash the remainder of the boring by inserting the drilling rods through the hollow stem augers.

Samples of the subsurface materials encountered were obtained during the drilling procedure using split-spoon samplers. Samples were collected at five foot intervals above the water table and at ten foot intervals thereafter. The materials encountered during the field exploration program were classified in accordance with the Unified Soil Classification System described in Plate A-1. The logs of the test borings are presented on Plates A-2 through A-8.

Standard Penetration Tests (SPT) were performed and disturbed samples were obtained with a standard split-spoon sampler (1.375-inch I.D. by 2.00-inch O.D.). The sampler was first seated 6-inches to penetrate any loose cuttings and then driven an additional 12-inches using a 140-pound hammer falling 30-inches. The number of blows required to drive the sampler the final 12-inches was recorded and designated as the "Standard Penetration Resistance" (or SPT N-Value). The "SPT N-Value" test was performed in general accordance with ASTM* Specification D-1586.

Our engineer was present full time during the drilling operation to log the borings and collect the samples for examination and laboratory testing. All soil samples were returned to our Houston laboratory, where they were further examined by a senior engineer; subsequently, certain samples were selected for laboratory testing.

Upon completion of each boring, groundwater monitoring wells were installed, developed, and geophysically logged. Details of the monitoring well installation, development and geophysical logs are discussed in a later section of this report.

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*American Society for Testing Materials

Initially, the field work was expected to last approximately two weeks, however, problems with the drilling process (i.e., broken equipment) extended the field work to approximately four weeks.

B. Monitoring Wells

All of the test borings were converted to groundwater monitoring wells to obtain water-level measurements and to collect water samples for chemical analysis. The soil boring and monitoring well depths are presented in Table 1.

TABLE 1

Soil Boring and Monitoring Well Depths

MONITORING WELL NO.	BORING DEPTH (FEET)	SCREEN DEPTH (FEET)
MW-5	135	68-78
MW-6	150	61.5-66.5
MW-7	75.5	63.5-68.5
MW-8	150	58-63
MW-9	80	62.5-67.5
MW-10	150.5	135-140
MW-11	150	134-139

Immediately after drilling was completed, a 2-inch diameter, threaded, flush-joint, schedule 80 PVC casing and screen was installed through the hollow-stem auger to a selected depth in the boring. All wells have 5 feet of screened section (.006-inch slots), except MW-5 which is constructed with a 10-foot long screen. Each well has a 5-foot sump below the screen section to collect any fines that may enter through the screen. The bottom of the sump was equipped with a check valve to flush the drilling fluid from the borehole.

Clear water was pumped into the wells to flush the drilling fluids from the boring and cause the sand and gravel to collapse around the casing in tne lower portions of the borings and in screened zones. Two of the deep borings (MW-6 and MW-8) were backfilled with gravel up to the base of the monitoring wells.

After flushing, the remaining augers were extruded and sand backfill was placed a minimum of 15 feet above the screen. Backfill consisted of collapsed sand and gravel or sand and gravel cuttings. Bentonite pellets were used to form a one to two foot plug in the annulus above the backfill. The remaining portion of the annulus was filled with a cement/bentonite slurry pumped through a tremie pipe.

Vented caps were placed on the casing and 3.5-foot long steel protective casings with locking tops were placed over the portion of the PVC casing extending above ground level. The protective casings were then concreted in place. Details of the well construction are presented on the Logs of Borings, Plates A-2 through A-8.

The wells were developed by Sergent Hauskins & Beckwith on November 28, 1983, without an HLA representative present. The wells were developed by removing approximately 5 to 6 times the volume of water in the casing using a 175-cfm air compressor. A 3/4-inch air hose was lowered to the bottom of the casing to air-lift the water.

Dedicated monitoring well sampling pumps were installed by Sparton on December 1, 1983, with an HLA senior environmental specialist present. The pumps are Well Wizard Model P-1100 manufactured by Q.E.O. Environmental Systems, Inc. The pumps are of all PVC construction and operate according to the Middleberg (gas squeeze) concept.

C. Geopnysical Logging of Borings

The purpose of geophysical logging is to complement the soil boring logs, and to identify possible thin sand, silt, and clay lenses that might be missed during the drilling process. A brief description of each type of logging is presented in the following sections.

1. Gamma

The gamma log measures the natural gamma radiation emitted from the formations encountered. Unstable isotopes of thorium, uranium, and potassium 40 concentrate in clay minerals and emit gamma radiation. The number of radiation events per second that impact the probe is measured and recorded on a strip chart at the surface. The gamma log gives a qualitative interpretation of the percent of clay at a given depth.

2. Neutron

The neutron-neutron probe contains both a neutron source and neutron particle detector. The source emits neutron particles into the formation. These particles are slowed by collisions with hydrogen ions and their paths are diverted. The neutrons returning to the detector are recorded on a strip chart. In formations below the water table, the percent of pore space is directly related to the rate of neutron particles measured.

The geophysical logs are shown on Plates A-9 through A-15.

D. Laboratory Testing

Selected soil samples from the field exploration were tested in our laboratory to determine their geotechnical engineering properties. Laboratory tests included particle size analyses and Atterberg limit tests. The procedures used to perform these tests are described in the following paragraphs.

Particle-size analyses were performed on selected samples to determine the particle or grain size distribution of the representative soils. The grain size distribution of soils coarser than 0.75 millimeter (mm) diameter was determined by passing the samples through

a set of nested sieves. Particles less than 0.75 mm diameter were suspended in water and their grain size distribution measured by the rate of settlement. The tests were performed as described by ASTM Specification D-422 and D-2217.

Atterberg limits tests were performed to determine the soil's plasticity characteristics. The soil's Plasticity Index (PI) is representative of this characteristic and is bracketed by the Liquid Limit (LL) and the Plastic Limit (PL). The Liquid Limit is the moisture content at which a soil will flow as a heavy viscous fluid and is determined in accordance with ASTM Specification D-423. The Plastic Limit is the moisture content at which a soil begins to lose its plasticity and is determined in accordance with ASTM Specification D-424.

The results of the physical tests performed are presented in Appendix B, Plates B-1 through B-10.

Water samples were collected from each monitoring well and forwarded by Sparton to the laboratory for chemical analysis. The analyses were performed by Rocky Mountain Laboratory, and the results are presented in Appendix B, Plates B-11 through B-13. A detailed discussion is presented in Section IV, Site Conditions.

III. REGIONAL SETTING

A. General Geology

Rocks of igneous, metamorphic and sedimentary origin are exposed in the Albuquerque area. Precambrian age rocks, predominantly granite and metamorphosed clastic rocks are exposed in the Sandia and Manzano Mountains. The precambrian rocks are unconformably overlain by a thick sequence of sedimentary rocks. These sedimentary rocks are of marine and continental origin, and range from Early Pennsylvanian to Recent in age. Basaltic-flow rocks of Tertiary age are interbedded with stream sediments of Quartenary age to the west of the Rio Grande.

Most of the surficial material found in the valley is comprised of Tertiary and Quaternary deposits consisting of gravel, sand, silt, and clay. Generally, sands are found at the land surface with occasional interbedded silt and clay lenses. The sand ranges in texture from fine to coarse-grained, and the gravel ranges from pebble to cobble-sizes.

B. Groundwater

The valley fill (Sante Fe Group and alluvium) is the principal aquifer in the Albuquerque area and is composed primarily of sand and gravel. The groundwater is under water table conditions

throughout most of the valley, although in some locations, permeable sands and gravel are found under confined conditions when situated between beds of silt or clay. The regional groundwater flow is to the southeast, but will vary locally because of influences imposed by surface waters, nearby pumping wells or changes in hydrogeologic conditions.

IV. SITE CONDITIONS

A. Ground Surface Elevations

Ground surface elevations at the site vary from Elevation +5054 Mean Sea Level (MSL) on the northern edge of the property to elevation +5042 feet MSL on the southern edge of the property. An overall surface gradient (from the northern most portion of the site to the southern most portion of the site) is approximately 1.0 percent.

B. Geology

A total of 12 borings have been drilled on the site including the five from the initial investigation, ranging in depth from 75.5 feet to 150.5 feet below ground surface. The boring locations are situated in the eastern and central portion of the property (see Plate 1). The unconsolidated sediments penetrated consist primarily of medium dense silty sands and clean sand, very dense gravel and very dense gray sand that are interbedded with clay and silt.

The SPT N-Value for the upper medium dense to dense brown silty sand and clean sand ranged between 14 to 100 blows per foot (BPF). These sands contain between 76 to 86 percent sand, 6 to 23 percent silt, and 6 to 13 percent clay sizes. Interbedded throughout

the sands are clay and silt layers ranging from approximately 2 to 7-feet thick. This stratum tends to dip downwards toward the southeast direction.

The SPT Value for the very dense brown and gray sandy gravel ranged between 55 to greater than 100 BPF. The gravels are poorly graded and contain between 44 to 78 percent gravel, 20 to 43 percent sand, and 2 to 8 percent silt and clay sizes. This stratum tends to dip downward toward the southeast direction.

The SPT Value for the lower dense to very dense gray sands ranged from 45 to greater than 100 BPF. These sands contain between 45 and 91 percent sand, 2 to 47 percent silt, and 2 to 8 percent clay sizes. Interbedded throughout this stratum are clay and silt layers ranging in thickness from 2 to 10-feet.

The location of two northeast-southwest generalized soil profiles have been developed, the cross sections are shown on Plate 1. Cross section A-A', shown on Plate 2, is located on the east property line and includes information from borings MW-6, MW-7, and MW-8. Cross section B-B', shown on Plate 3, is located in the central portion of the property and includes data from borings MW-5, MW-9, MW-10, and MW-11. As can be seen, cross section A-A' shows the

presence of a less permeable clay layer at approximately elevation 4978 feet, ranging in thickness from 2 to 7-feet. Similarly, cross section B-B' shows the presence of a silty sand and clay layer at about the same elevation, in three of the four borings used to construct the profile (the silt, clay layer was not found in the boring MW-10). The existence of this less permeable layer serves to retard the migration of contaminants to the deeper portion of the aquifer. The evidence indicates that this less permeable layer may be fairly extensive, with windows of more permeable material where the silt and clay is absent.

The existence of a deeper clay and silt layer is evidenced from the data obtained from three of the four deep borings. This layer is found between elevation 4900 and 4920 feet as shown in both cross sections. Again, this material has a lower permeability and functions in a similar manner to retard the downward migration of contaminants. Should this deeper silt and clay layer be extensive, it in conjunction with the shallow layer, would restrict the vertical migration of contaminants to the deeper portion of the aquifer.

C. Groundwater Conditions

The screen sections in monitor wells MW-5 through MW-9 are situated above or partially within the upper silt and clay layer. Of the two deep wells, MW-10 is screened entirely below the deeper silt

and clay layer, while MW-11 is screened partially in the lower section of and below this layer. All of the wells installed during this phase of the investigation are equipped with a 5-foot length of screen, except MW-5 which has a 10-foot long screen. The wells and piezometer installed during the initial phase of the study have 20 feet of screen section.

Static water-level measurements have been obtained in all the wells and hydrographs of the elevations are presented in Plates 4 through 6. The water-level elevations obtained from the shallow wells including those installed during the initial study are in excellent agreement. The pattern of groundwater elevations measured in wells screened above and those wells screened immediately below the upper silt clay layer exhibit no significant difference in head. Based on this data, a groundwater elevation contour map has been developed and is presented on Plate 7. As can be seen, the water table gradient of the top of the water table is about 0.75 feet per 100 feet and the horizontal flow direction is to the southwest.

The water-level measurements obtained from the two deep wells MW-10 and MW-11 when compared to those obtained from the nearby shallow wells MW-3 and MW-4 show a difference in elevation of over two feet. The water-level elevation from the deeper section is lower than that found in the shallower section of the aquifer indicating that a

hydraulic potential exists for a contaminant to migrate vertically downward. The actual head difference between the two zones may be larger than measured due to equilibrium effects created by the hydraulic communication via the granular materials in the annular space between the casing and borehole wall.

An estimate of the groundwater velocity has been calculated. Based on a measured hydraulic gradient of 7.5×10^{-3}, and estimated values of 0.10 cm/sec for hydraulic conductivity, and 0.25 for porosity, the velocity is about 3×10^{-3} cm/sec or about 8.5 feet per day toward the southwest.

D. Chemical Analyses of Groundwater Samples

Water samples were collected from each of the monitoring wells after a minimum of four times the casing volume of water was evacuated. Each well is equipped with a gas squeeze pump to improve sample quality and reduce the potential of cross contaimination of the samples. The samples were collected, preserved, and shipped to the laboratory in accordance with EPA guidelines.

The results of the laboratory analyses of the groundwater samples are presented in Plates B-11 through B-13 respectively. The results of the chemical analyses show that the water sample from each

well contained at least one constituent with a concentration in excess of the allowable State limits. This includes samples collected from wells upgradient of the source adjacent to location of MW-3. The highest concentration of chemical constituents were found in the samples collected from wells MW-1, MW-3, MW-4, and MW-9. As would be expected, the sample with the least contamination was from the upgradient well MW-6, located at the northeast corner of the property.

Although contaminants have been found in water samples collected from the upgradient wells, the concentrations of the constituents are significantly less than those found in wells MW-1 and MW-3, the location of the principal contamination source for the site. Possible sources for the contaminants in the water from the upgradient wells include: migration of contaminants from off-site upgradient sources; migration in the vadose zone from principal on-site source; spills, leaks or disposal on-site in areas other than the principal disposal site; and contamination due to the drilling operation. An awareness of the potential of cross contamination due to drilling was made known to all field personnel, and every effort was made to reduce or eliminate the possibility of introducing contaminants in a borehole. Generally, good disposal practices were reportedly conducted at the plant which would reduce the possibility of additional surface entry sources of contaminants. Although contaminants can migrate

significant lateral distances in the vadose zone, a field survey should be conducted to determine if facilities located upgradient may be possible sources of contaminant contribution to the groundwater system.

Limited amounts of contamination were also found in water samples collected from the two deep wells, MW-10 and MW-11, which are screened in the base of the deeper silt, clay layer, and the underlying granular material. The concentrations of the contaminants measured are on the order of 50 to 500 times less than found in the water sampled from the adjacent shallow wells (MW-3 and MW-4). Because of the presence of the deeper silt and clay layer found in both deep boreholes, the possibility of significant contamination reaching the underlying permeable materials is extremely limited. In all likelihood, the contaminants have reached the deeper zone because of the drilling and well construction procedure employed. Because the drilling penetrated a plume of high concentrations of contaminants, a readily available source is present to migrate downward. Additionally, the collapse of the in-situ material into the annular space around the casing and screen would favor the more granular materials filling the void as opposed to the less permeable clay. The difference in head between the deeper unit and the shallower unit as

discussed previously, provides the hydraulic potential for the downward migration. Thus, the combination of pathway in the annular space of the well, plus the driving force created by the difference in head, provides a possible explanation of the contaminants in the deeper wells.

Selected constituents found in the water samples collected from the shallow wells have been used to develop contour maps of the concentrations. The constituents selected included: 1,1-dichloroethylene (DCE); 1,1,1-trichloroethane (TCA); and trichloroethylene (TCE). The concentration contour maps are presented on Plates 8, 9, and 10 respectively. The highest concentrations can be found in a plume emanating in the vicinity of wells MW-1 and MW-3 and migrating in a south-southwesterly direction. The migration pattern exhibited for all three constituents is very similar, and in good accord with the groundwater elevation contour map showing the horizontal component of groundwater flow.

V. CONCLUSIONS AND RECOMMENDATIONS

A. Remedial Activities

To prevent further migration off-site and remove the contaminated groundwater at the facility, the use of extraction wells appears to be the most viable alternative. Extraction wells located at the down gradient section of the groundwater flow (along the southern property line) would be the most beneficial in this situation.

The actual number of extraction wells and pumping rates are not known at this time because the specific hydrologic properties of the aquifer system have not been derived. However, in an attempt to bound the system requirements, a computer program RESSQ was used with assumed upper and lower limits of hydraulic conductivity values for the site. The computer program calculates the zone of capture of a pumping well in a steady flow field of a specified direction and velocity. For the analysis, the two hydraulic conductivity values used were 0.10 and 0.01 cm/sec. Other values used included a hydraulic gradient of 7.5×10^{-3}, and an effective porosity of 0.25. A ground flow direction of S 45°W, and calculated groundwater velocities of 3,000 and 300 feet per year calculated from the values above were used. Extraction wells screened in 50 feet of permeable material with a discharge rate of 125 gpm are assumed.

The analysis using an assumed hydraulic conductivity of 0.10 cm/sec indicates that eight extraction wells would be required to capture off-site flow. With a screened interval of 70 feet to more closely correspond to site conditions, the discharge rate from a single well would be 175 gpm. The total discharge from eight wells would be 1,400 gpm. The analysis for the assumed hydraulic conductivity of 0.01 cm/sec indicates that a single extraction well with a discharge rate of 175 gpm is sufficient to capture the off-site flow.

Clearly, the number of wells and discharge rate required are a result of the assumed hydrologic properties of the aquifer system. To design an efficient system, aquifer testing is required to develop specific values for the site. A recommended program is presented in a later section of this report.

Once the contaminated groundwater has been extracted, it must be treated before disposal. The utilization of an on-site treatment facility expands the potential use of the treated water to flush the sediments above the water table for eventual removal by the extraction wells. The use of infiltration galleries for the treated water would perform such a function and should not require a discharge permit. However, the need for permits should be checked with the State regulatory agencies. Additionally, the effect of the infiltration galleries on the groundwater flow will be refined based on the results of future testing.

B. Recommended Program

The recommended program is designed to provide additional information on the water-levels and concentrations of contaminants, and aquifer properties. These data are needed to provide an efficient groundwater extraction system to prevent off-site contamination migration.

The program includes the installation of a large diameter well (minimum 6-inch diameter), and at least four additional monitoring wells. The locations of the proposed new wells are shown on Plate 11. The borings should be carried to a depth to ascertain the presence of the deeper silt, clay layer, which may be on the order of 175 feet deep at a specific well location. The screen section of the well should be set so that a portion of the granular material above the upper silt, clay section is included, with the bottom of the screen set between 5 to 10-feet above the lower silt and clay section. Should the upper silt, clay layer be two or more feet thick, a blank section should be installed across the layer to prevent or reduce the possibility of the continuous bleeding of fines into the extraction well. Over a period of time, large amounts of fines entrained in the discharge water causes excessive wear on the pumping equipment, and may interfere with water treatment.

A well graded, rounded, silica gravel pack should be installed around all the well screen, and carried to at least five feet above the top of each screen. A layer of fine sand should be placed on top of the gravel pack, and the remainder of the annulus backfilled and grouted in accordance with State requirements. Following the installation of each well, a development program should be initiated to remove the fine grained material around the screen and assure good hydraulic continuity with the aquifer. Great care should be exercised in the development program for the pumping (6-inch diameter) well.

After all the proposed wells are completed, a water-level measuring program should be performed which includes the previously installed wells. Water samples for chemical analyses should then be collected from the new wells.

At the completion of the water sampling program, a controlled pumping test should be conducted. During the test, water-levels should be measured carefully in both the pumping well and monitoring wells. From the data collected, aquifer coefficients can be calculated to refine the system design. During the pumping test and well development, arrangements to dispose of the discharge water will have to be made.

In conjunction with the above activities, a field testing program to estimate the recharge capacity of possible on-site infiltration, galleries should be conducted. Thus, the data obtained would lead to a more balanced system to pump, treat and discharge the water. Following the completion of the tests, analyses will be performed, and a report issued detailing the field investigations and the findings.

To reduce the potential migration of contaminants from the shallow saturated section to the zone below the lower silt and clay unit, consideration should be given to drilling out the deep wells, MW-10 and MW-11, and plugging the borehole with grout and/or bentonite. However, this activity should be conducted after the initial pumping test has been completed. Because of the close proximity of the two shallow wells MW-3, and MW-4, the drilling and plugging operation for the deep wells may interefere with the effectiveness of the shallow wells.

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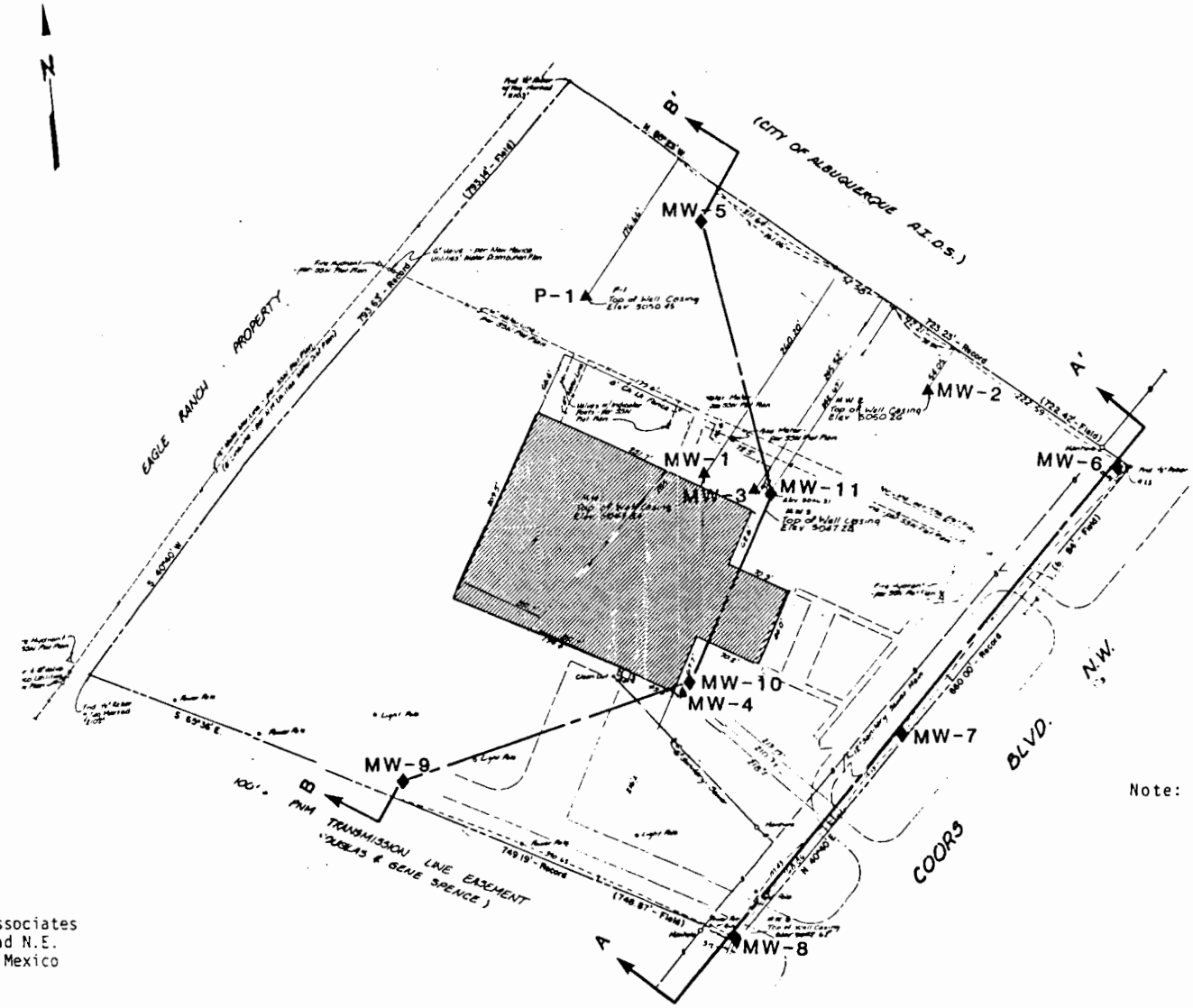
Gary R. Horwitch, P.E.
Senior Engineer



LEGEND

▲ - Previous HLA Borings (June 29, 1983) HLA Job No. 6310,004.12

MW-2 - Monitoring Well Number

◆ - Monitoring well location drilled during this investigation

Note: For Section A-A' see Plate 2.
For Section B-B' see Plate 3.

0 60 120
Scale: Feet

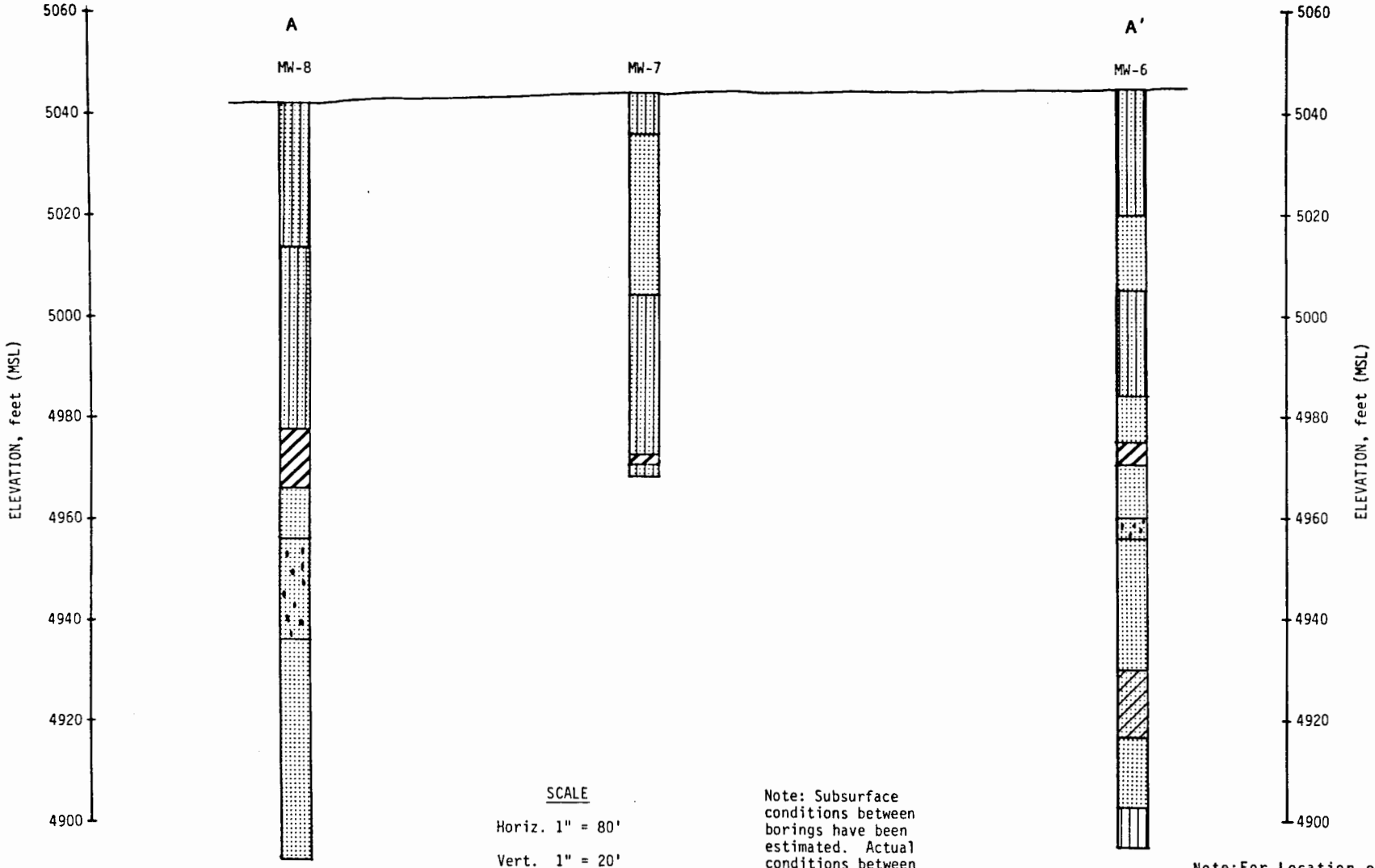
REFERENCE:
Denney-Gross & Associates
2400 Comanche Road N.E.
Albuquerque, New Mexico
12/5/83.

Harding Lawson Associates
Engineers, Geologists & Geophysicists

BORING LOCATION PLAN
Sparton Southwest, Inc.
Albuquerque, New Mexico

PLATE **1**

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	6310,008.12				



SCALE

Horiz. 1" = 80'

Vert. 1" = 20'

Note: Subsurface conditions between borings have been estimated. Actual conditions between borings may differ.

Note: For Location of Cross Section see Plate 1.

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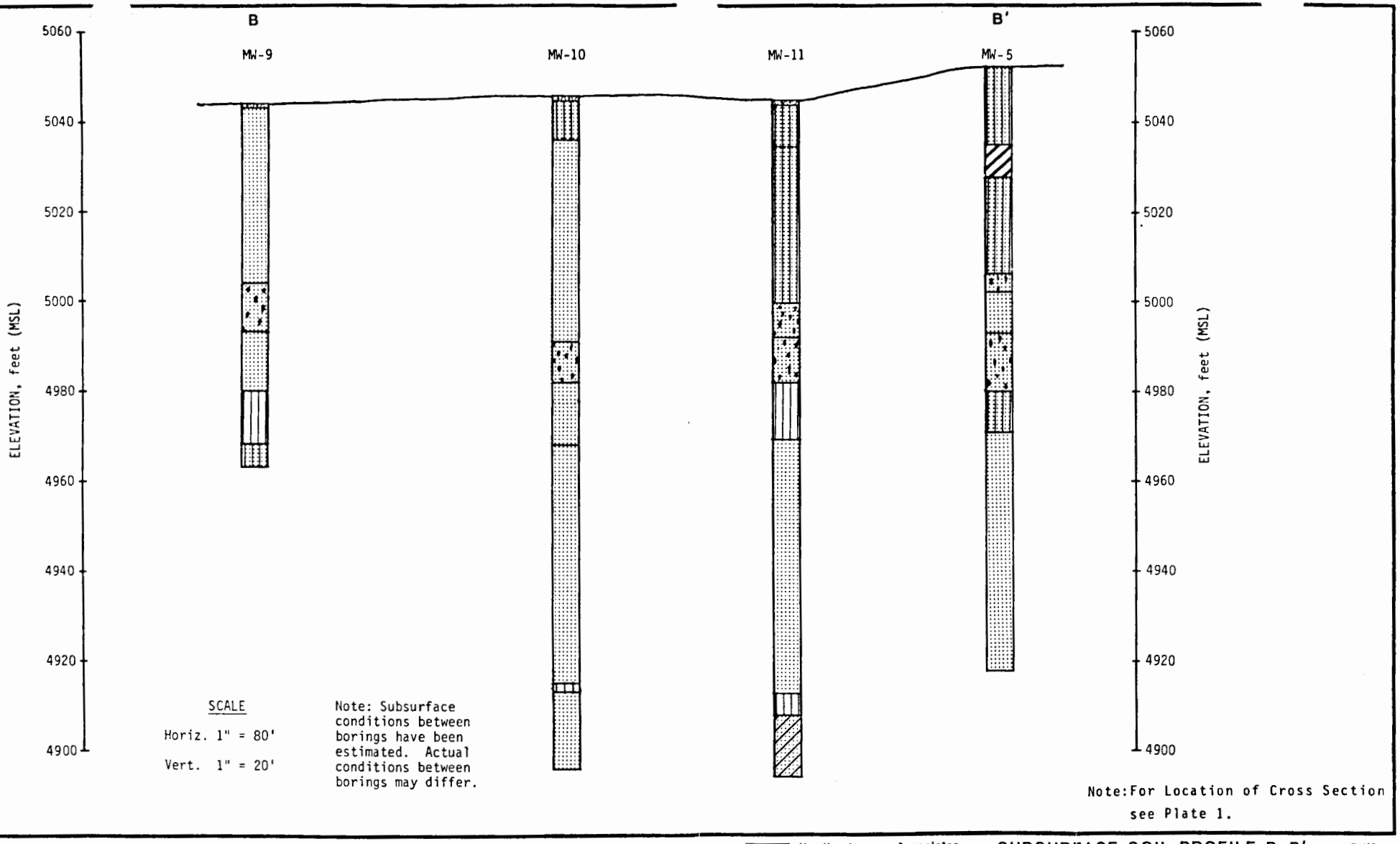
SUBSURFACE SOIL PROFILE A-A'
Sparton Southwest, Inc.
Albuquerque, New Mexico

PLATE **2**

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
KM	6310,008.12				



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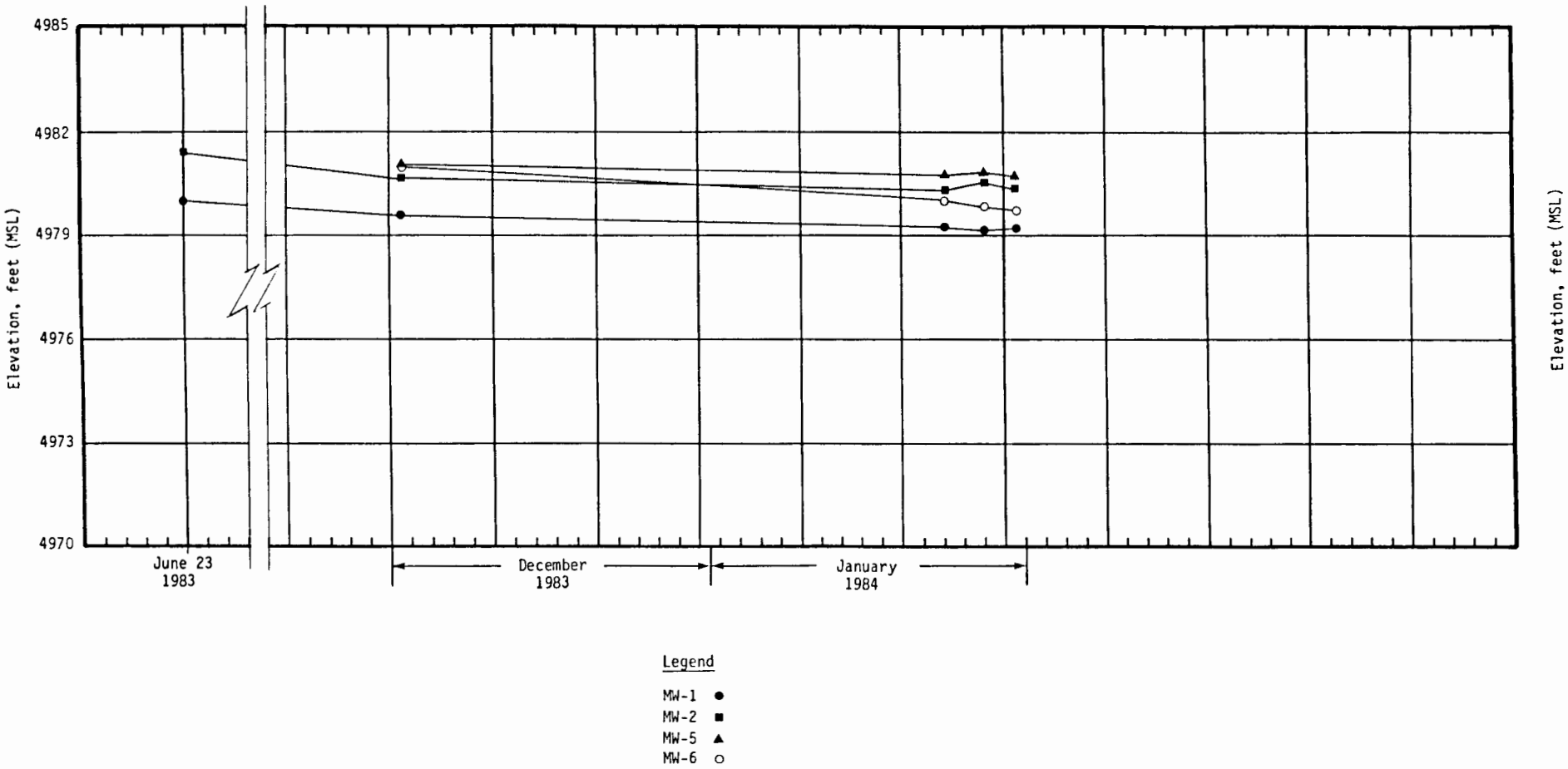
SUBSURFACE SOIL PROFILE B-B'
Sparton Southwest, Inc.
Albuquerque, New Mexico

PLATE **3**

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
HM	6310,008.12	FAD			

Groundwater Elevations vs. Time



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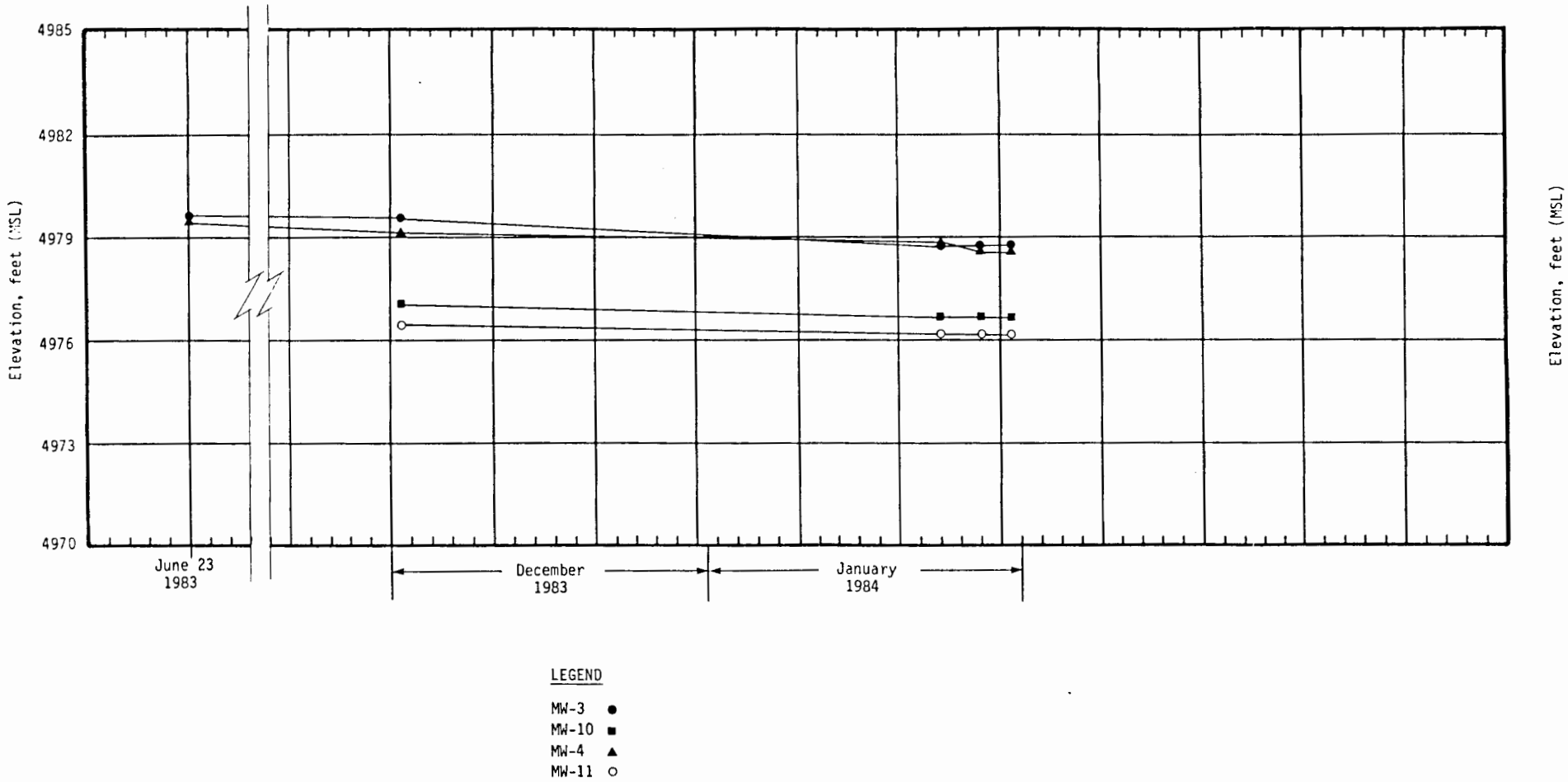
GROUNDWATER HYDROGRAPH
Sparton Southwest, Inc.
Albuquerque, New Mexico

PLATE 4

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
km	6310,008.12				

Groundwater Elevations vs. Time



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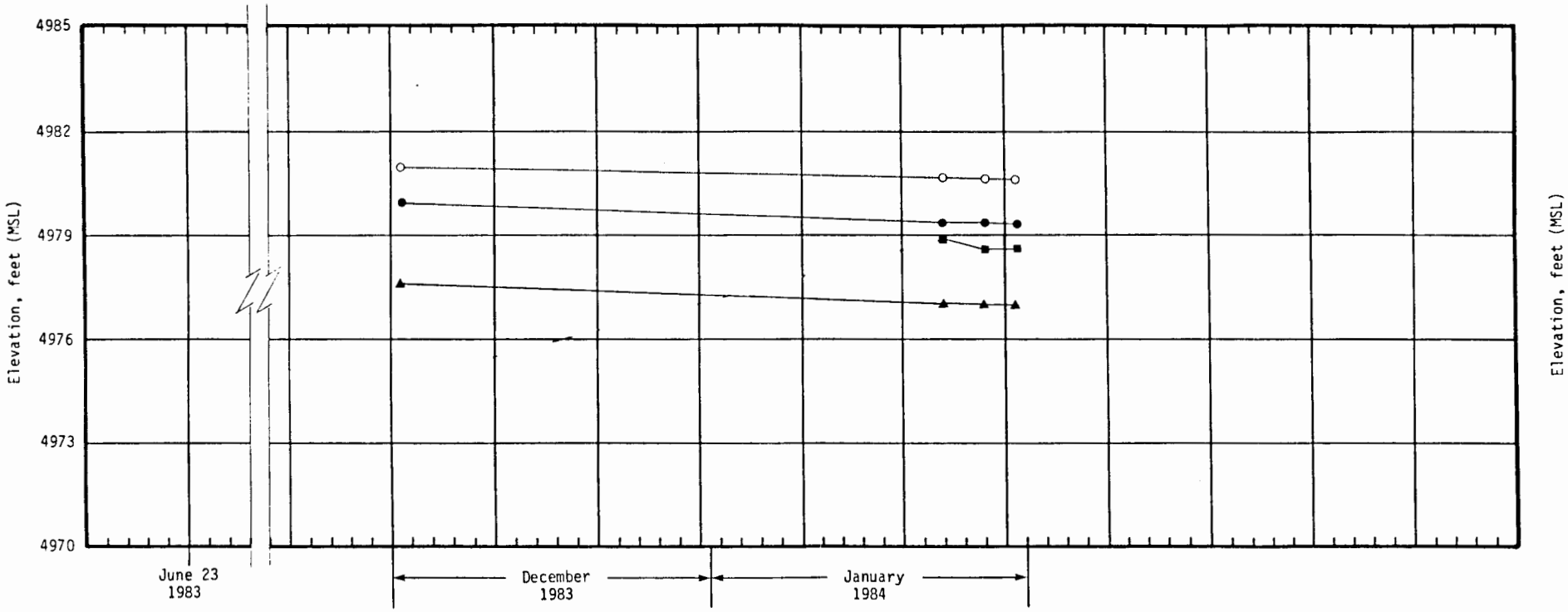
GROUNDWATER HYDROGRAPH
Sparton Southwest, Inc.
Albuquerque, New Mexico

PLATE 5

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
HM	6310,008.12				

Groundwater Elevations vs. Time



LEGEND

MW-7 ●
MW-8 ■
MW-9 ▲
P-1 ○

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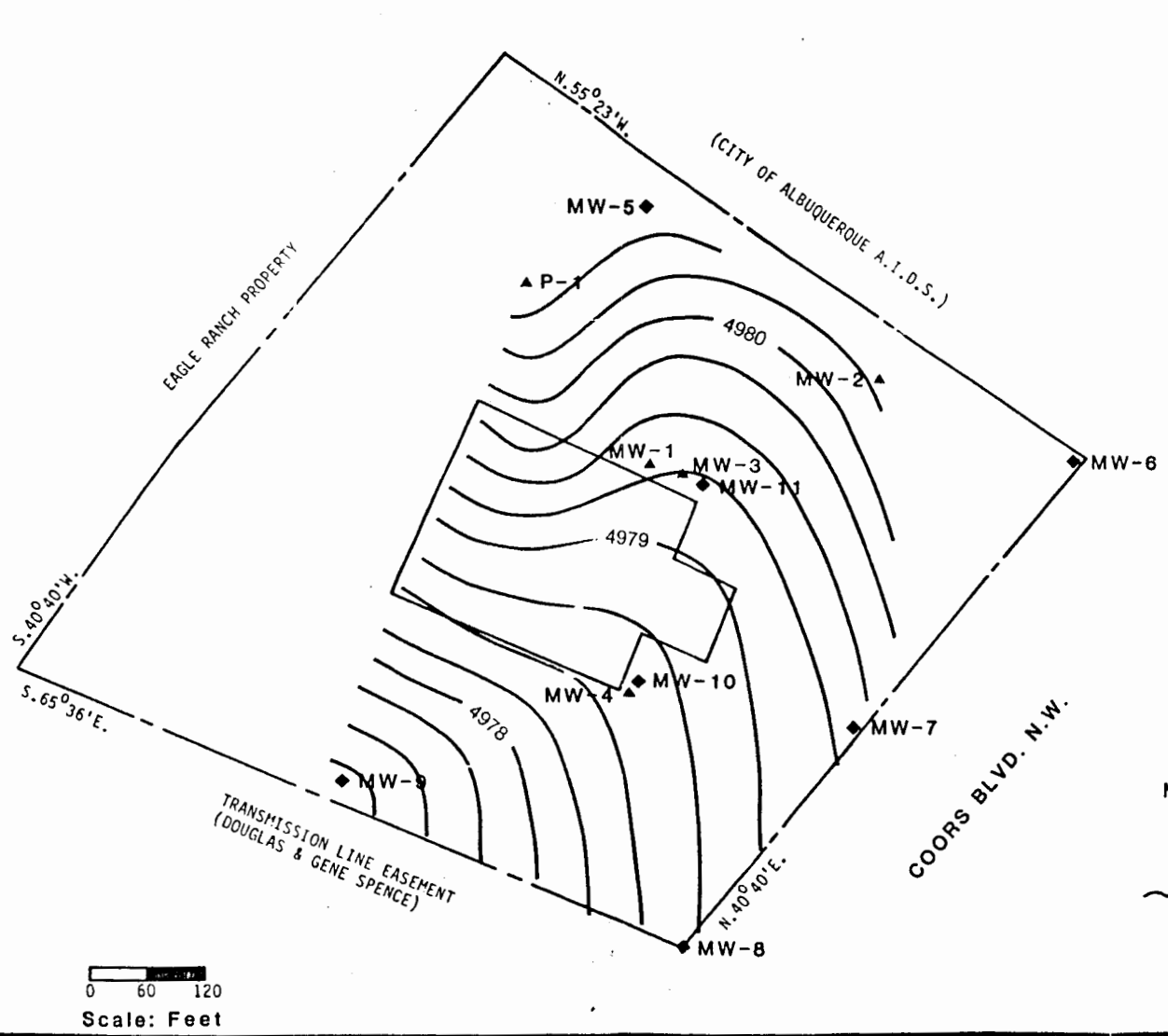
GROUNDWATER HYDROGRAPH
Sparton Southwest, Inc.
Albuquerque, New Mexico

PLATE
6

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	6310,008.12				



REFERENCE:
Denney-Gross & Associates
2400 Comanche Road N.E.
Albuquerque, New Mexico
12/5/83.

0 60 120
Scale: Feet

LEGEND

▲ Previous HLA Borings (June 29, 1983) HLA Job No. 6310,004.12

MW-2 Monitoring Well Number

◆ Monitoring Well Location Drilled During This Investigation

~4978~ Groundwater Contour and Elevation

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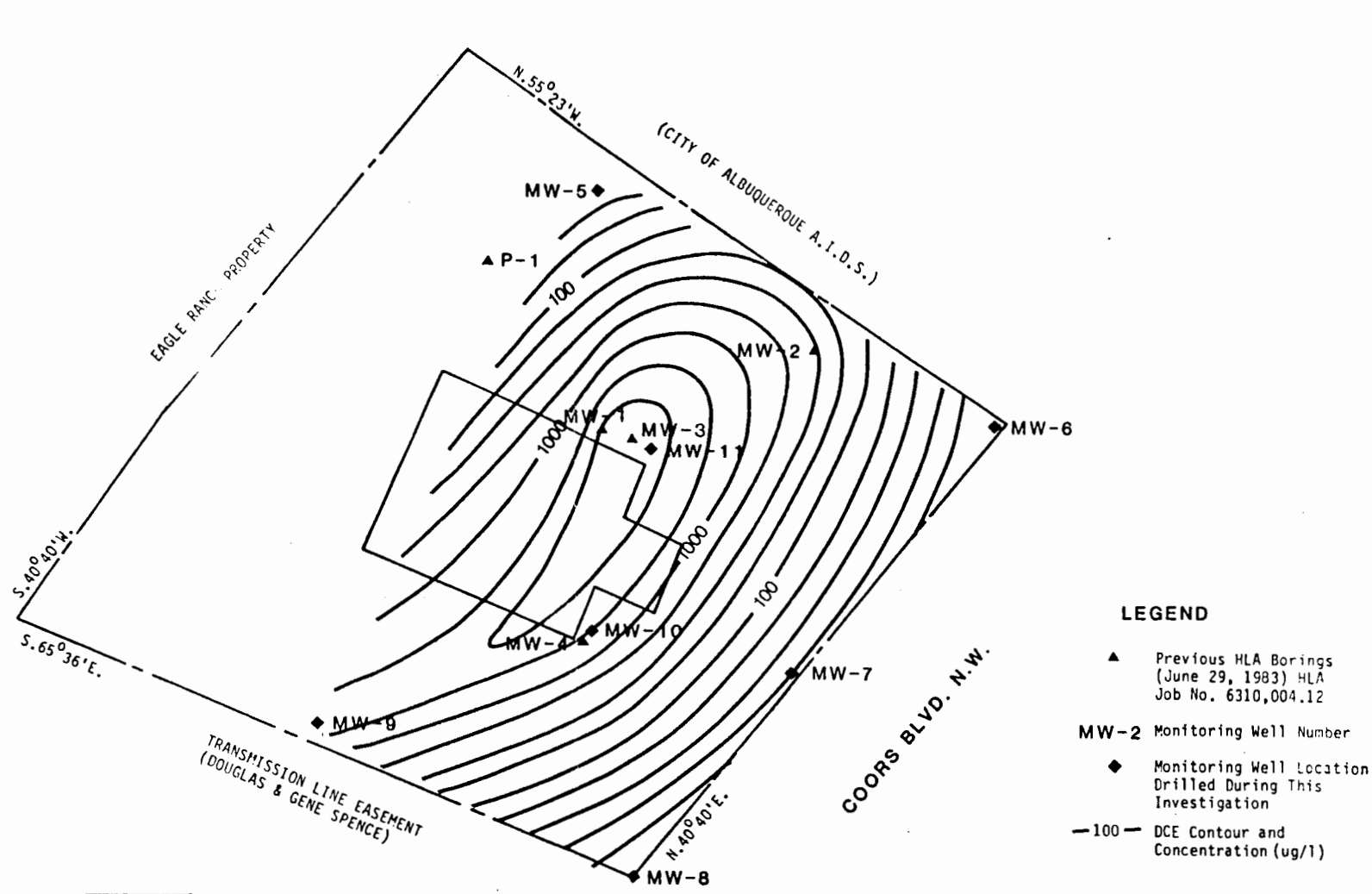
GROUNDWATER ELEVATION CONTOUR MAP
Sparton Southwest, Inc.
Albuquerque, New Mexico

PLATE 7

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
D.K.K.	6310.008.12	FAO			



REFERENCE:
Denney-Gross & Associates
2400 Comanche Road N.E.
Albuquerque, New Mexico
12/5/83.

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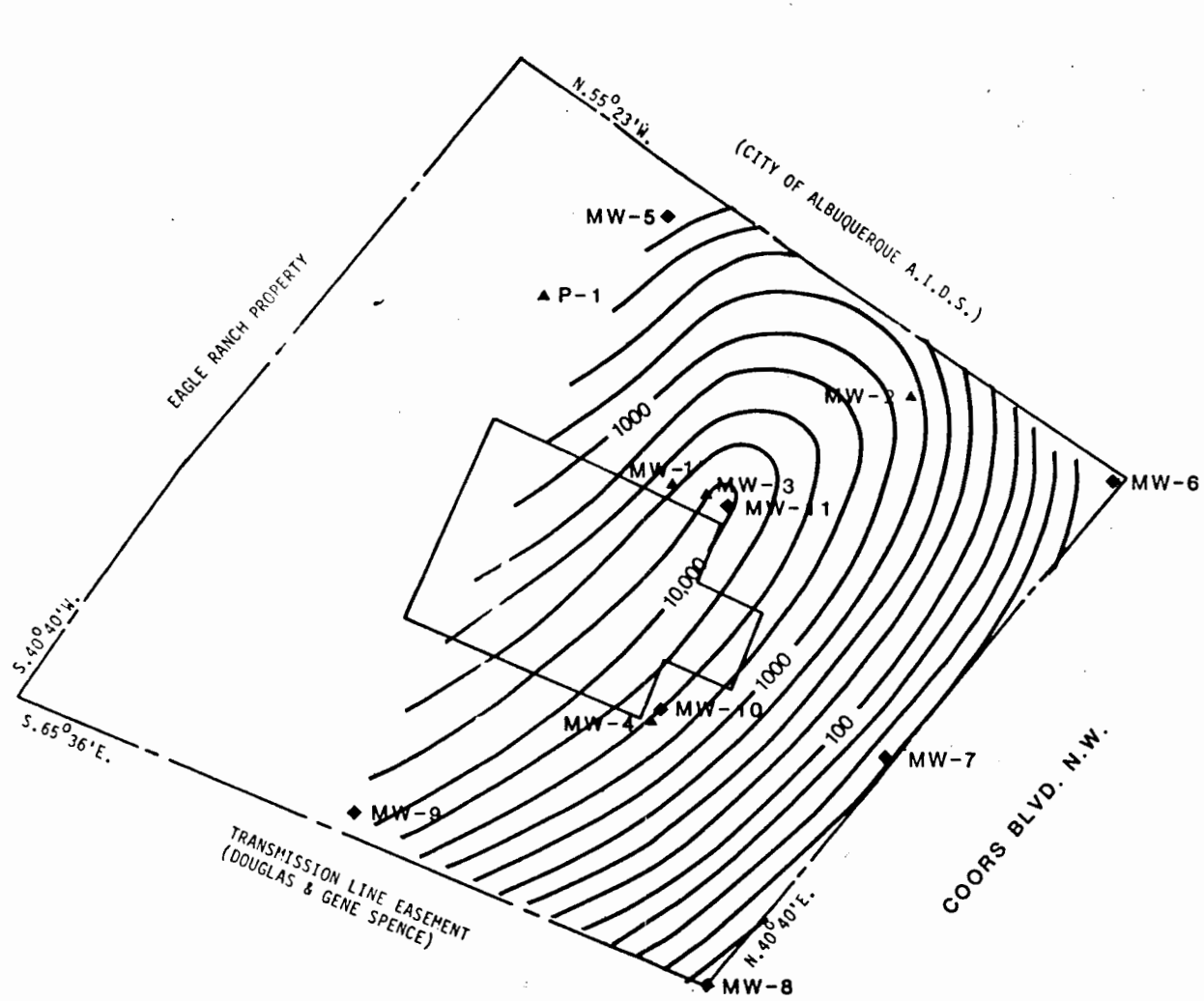
DCE CONCENTRATION CONTOUR MAP
Sparton Southwest, Inc.
Albuquerque, New Mexico

PLATE 8

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
D.K.K	6310,008.12				



REFERENCE:
Denney-Gross & Associates
2400 Comanche Road N.E.
Albuquerque, New Mexico
12/5/83.

0 60 120
Scale: Feet

LEGEND

▲ Previous HLA Borings (June 29, 1983) HLA Job No. 6310,004.12

MW-2 Monitoring Well Number

◆ Monitoring Well Location Drilled During This Investigation

—100— TCA Contour and Concentration (ug/l)

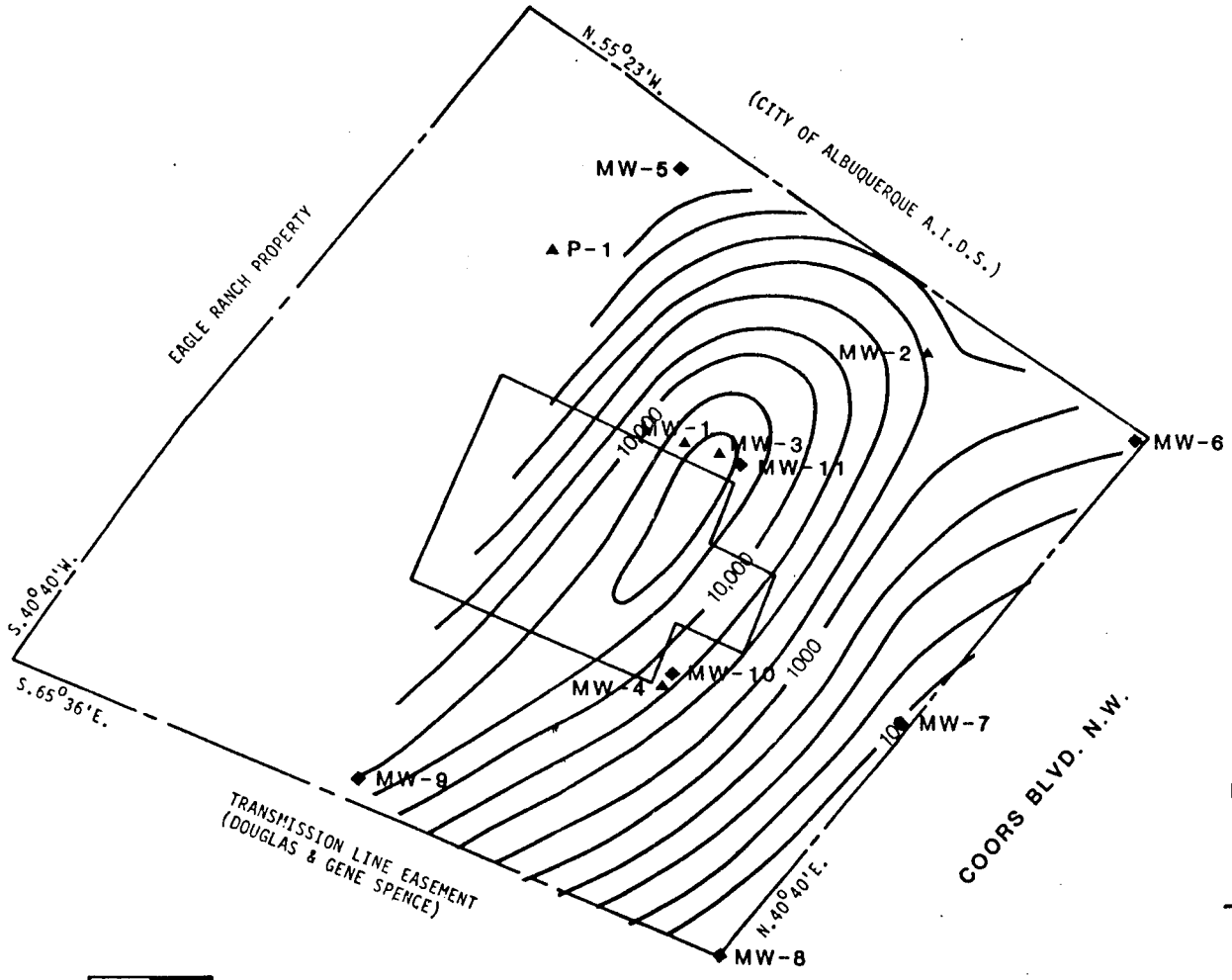
Harding Lawson Associates
Engineers Geologists & Geophysicists

TCA CONCENTRATION CONTOUR MAP

Spartor Southwest, Inc.
Albuquerque, New Mexico

PLATE 9

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
DKK	6310,008.12	FAO			



REFERENCE:
Denney-Gross & Associates
2400 Comanche Road N.E.
Albuquerque, New Mexico
12/5/83.

0 60 120
Scale: Feet

LEGEND

▲ Previous HLA Borings (June 29, 1983) HLA Job No. 6310,004.12

MW-2 Monitoring Well Number

◆ Monitoring Well Location Drilled During This Investigation

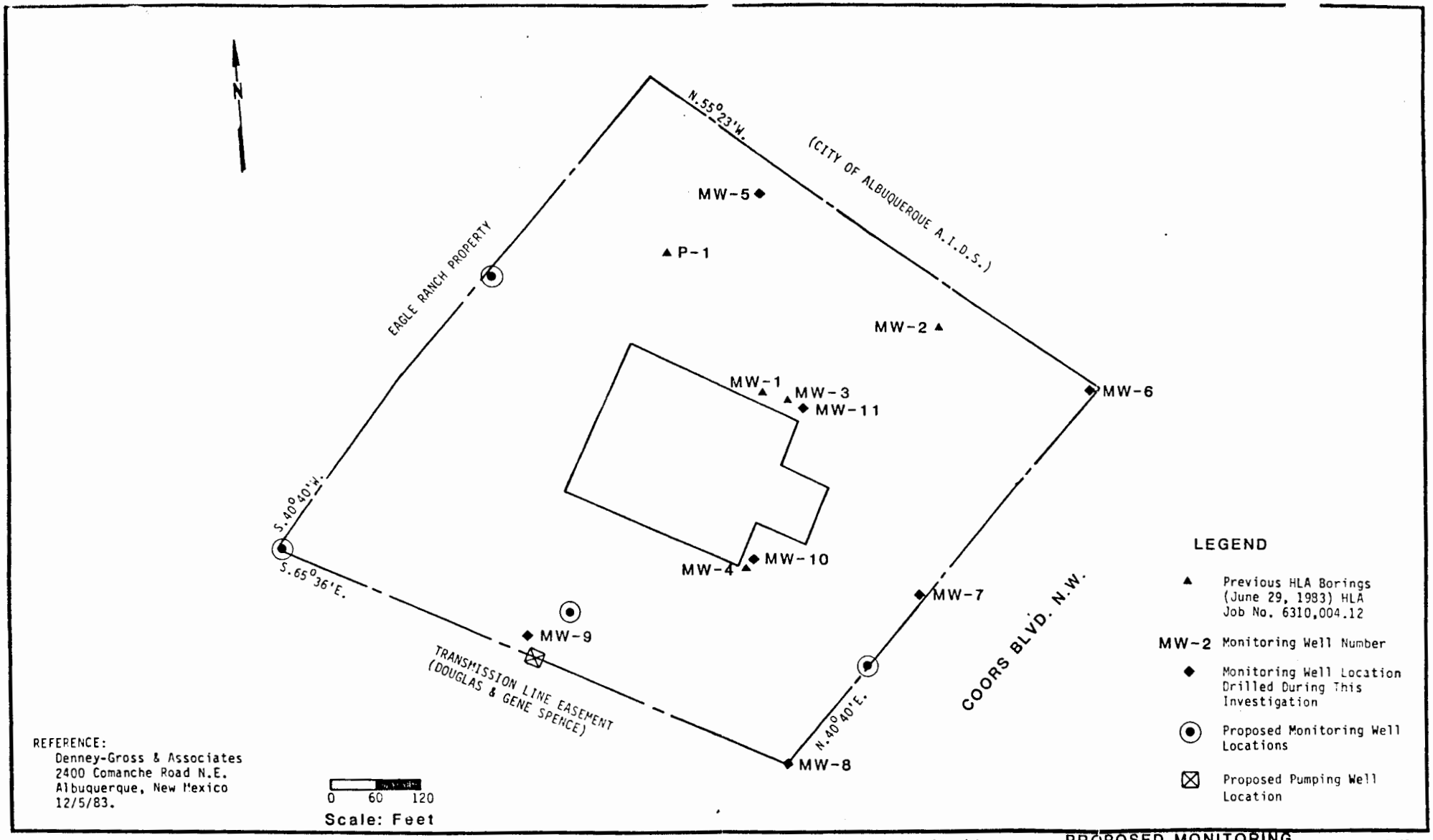
—100— TCE Contour and Concentration (ug/l)

Harding Lawson Associates
Engineers Geologists & Geophysicists

TCE CONCENTRATION CONTOUR MAP
Sparton Southwest, Inc.
Albuquerque, New Mexico

PLATE **10**

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
D.K.K	6310,008.12	FND			



REFERENCE:
Denney-Gross & Associates
2400 Comanche Road N.E.
Albuquerque, New Mexico
12/5/83.

Harding Lawson Associates
Engineers Geologists & Geophysicists

PROPOSED MONITORING WELL LOCATION
Sparton Southwest, Inc.
Albuquerque, New Mexico

PLATE 11

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
D.K.K.	6310,008.12				

APPENDIX A
to
ATTACHMENT 6

Logs of Borings

APPENDIX B
to
ATTACHMENT 6

Laboratory Test Results

UNIFIED SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS			SYMBOL	TYPICAL NAMES
COARSE-GRAINED SOILS (MORE THAN HALF IS LARGER THAN #200 SIEVE)	GRAVELS (MORE THAN HALF COARSE FRACTION IS LARGER THAN NO. 4 SIEVE SIZE)	CLEAN GRAVELS WITH LITTLE OR NO FINES	GW	WELL GRADED GRAVELS, GRAVEL-SAND MIXTURES
			GP	POORLY GRADED GRAVELS, GRAVEL-SAND MIXTURES
		GRAVELS WITH OVER 12% FINES	GM	SILTY GRAVELS, POORLY GRADED GRAVEL-SAND-SILT MIXTURES
			GC	CLAYEY GRAVELS, POORLY GRADED GRAVEL-SAND-CLAY MIXTURES
	SANDS (MORE THAN HALF COARSE FRACTION IS SMALLER THAN NO. 4 SIEVE SIZE)	CLEAN SANDS WITH LITTLE OR NO FINES	SW	WELL GRADED SANDS, GRAVELLY SANDS
			SP	POORLY GRADED SANDS, GRAVELLY SANDS
		SANDS WITH OVER 12% FINES	SM	SILTY SANDS, POORLY GRADED SAND-SILT MIXTURES
			SC	CLAYEY SANDS, POORLY GRADED SAND-CLAY MIXTURES
FINE-GRAINED SOILS (MORE THAN HALF IS SMALLER THAN #200 SIEVE)	SILTS AND CLAYS LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS, OR CLAYEY SILTS WITH SLIGHT PLASTICITY
			CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
			OL	ORGANIC CLAYS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACIOUS FINE SANDY OR SILTY SOILS, ELASTIC SILTS
			CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
			OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS			Pt	PEAT AND OTHER HIGHLY ORGANIC SOILS

KEY TO TEST DATA

			Shear Strength, psf	Confining Pressure, psf	
Consol	— Consolidation	Tx	320	(2600)	Unconsolidated Undrained Triaxial
LL	— Liquid Limit (in %)	TxCU	320	(2600)	Consolidated Undrained Triaxial
PL	— Plastic Limit (in %)	DS	2750	(2000)	Consolidated Drained Direct Shear
PI	— Plasticity Index (in %)	FVS	470		Field Vane Shear
G_s	— Specific Gravity	UC	2000		Unconfined Compression
SA	— Sieve Analysis	LVS	700		Laboratory Vane Shear
■	— "Undisturbed" Sample				
⊠	— Bulk Sample				
□	— Sample attempted with no recovery				
#-200	— % Fines passing #200 sieve				

All strength tests on 2.8" or 2.4" diameter samples unless otherwise indicated.

*indicates 1.4" diameter sample.

NOTES

These Notes Are Applicable To All Boring and/or Test Pit Log Plates in This Report.

Harding Lawson Associates
Engineers, Geologists & Geophysicists

SOIL CLASSIFICATION CHART AND KEY TO TEST DATA

Sparton Southwest, Inc.

PLATE A-1

DRAWN | JOB NUMBER 6310,008.12 | APPROVED | DATE | REVISED | DATE

Equipment: Auger - Rotary Wash

Elevation: 5053 Date: 11/2/83

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

PLATE A-2

DRAWN HM | JOB NUMBER 6310,008.12 | APPROVED FHD | DATE | REVISED | DATE

Equipment Auger - Rotary Wash

Elevation 5045 Date 11/16/83 - 11/17/83

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

(Continuation of Log)

Laboratory Tests	Blows/foot	Moisture Content (%)	Dry Density (pcf)	Depth (ft)	Sample	
	52			80		
						interbedded with course gravel at 85 to 89 feet
7% Gravel 86% Sand 2% Silt 5% Clay	100+			90		
				100		
				110		
	100+					
						BROWN CLAYEY SAND (SC) very dense, wet
				120		
	100+					
						DARK GRAY SAND (SP) very dense, wet
				130		
	100+					
				140		
	100+					
						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

PLATE **A-3**

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
LM	6310,008.12				

Equipment Auger - Rotary Wash

Elevation 5044 Date 11/11/83

Laboratory Tests	Blows/foot	Moisture Content (%)	Dry Density (pcf)	Depth (ft)	Sample	
				0		LIGHT BROWN SILTY SAND (SM) medium dense, dry
	20					
						LIGHT BROWN SAND (SP) medium dense to very dense, dry
	30			10		
	12					
	27			20		
	21					
	100+			30		driller's note: gravel at 28.5 feet
	57					
	32			40		LIGHT BROWN SILTY SAND (SM) medium dense to dense, moist
	18					
	34			50		
	31					
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.	29			60		grades course with depth
	28					water level at 64.5 feet
				70		interbedded with brown and gray clay layers 2-6 inches thick
	6					End of Boring at 75.5 feet
				80		

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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
HM	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	
				0		LIGHT BROWN SILTY SAND (SM) medium dense to dense, dry
	14					
	14			10		
	15					
75% Sand 18% Silt 7% Clay	16			20		
	18					
				30		LIGHT BROWN SAND (SW) with some gravel, dense, moist
	42					
	50			40		
	14					3 inch silt layer at 44.5 feet
	14			50		
	19					occasional silt layers
	26			60		▽ water level at 59 feet occasional silt layers
						BROWN CLAY (CH) stiff, wet
	14			70		driller's note: gravel at 75 feet
	58					BROWN SAND (SW) very dense, wet, coarse grained
				80		

(Continuation of Log)

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

PLATE A-5

DRAWN HM | JOB NUMBER 6310,008.12 | APPROVED | DATE | REVISED | DATE

Equipment Auger - Rotary Wash

Elevation 5043 Date 11/31/83

Laboratory Tests	Blows/foot	Moisture Content (%)	Dry Density (pcf)	Depth (ft)	Sample	
				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
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.	100+			60		water level at 63 feet
	100+			70		LIGHT GRAY SANDY SILT AND SILTY SAND (ML-SM) very dense, wet
Bentonite seal from 55.5 to 57.5 feet. Sand backfill from 40 to 55.5 feet. Grout from 0 to 40 feet.	100+			80		MEDIUM GRAY SILTY SAND (SM) very dense, wet End of Boring at 80 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
HM	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)	Sample	
				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 of Log)

Laboratory Tests	Blows/foot	Moisture Content (%)	Dry Density (pcf)	Depth (ft)	Sample	
	100+			80		
						driller's note: gravel layer at 85 to 87 feet
				90		driller's note: gravel layer at 90 to 91 feet
	100+					driller's note: gravel layer at 94 to 94.5 feet
				100		
	100+					
				110		
44% Gravel 48% Sand 8% Fines	100+					
				120		driller's note: gravel layer at 121 to 122 feet
	100+					
				130		
91% Sand 5% Clay 4% Silt	100+					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

PLATE A-7

DRAWN HR | JOB NUMBER 6310,008.12 | APPROVED | DATE | REVISED | DATE

Equipment Auger - Rotary Wash

Elevation 5045 Date 11/14/83

Laboratory Tests	Pocket Penetrometer (ksf)	Blows/foot	Moisture Content (%)	Dry Density (pcf)	Depth (ft)	Sample	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
		55			50		BROWN AND GRAY SANDY GRAVEL (GP) very dense, moist, with some sand driller's note: clay layer at 52 to 53 feet
		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)
69% Gravel 29% Sand 2% Fines		100+					▽ water level at 65 feet strong organic smell
					70		BROWN AND GRAY CLAYEY SILT (ML) very stiff, wet
		22					driller's note: occasional coarse gravel at 71.5 feet
					80		LIGHT BROWN SAND (SW) very dense, wet

(Continuation of Log)

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

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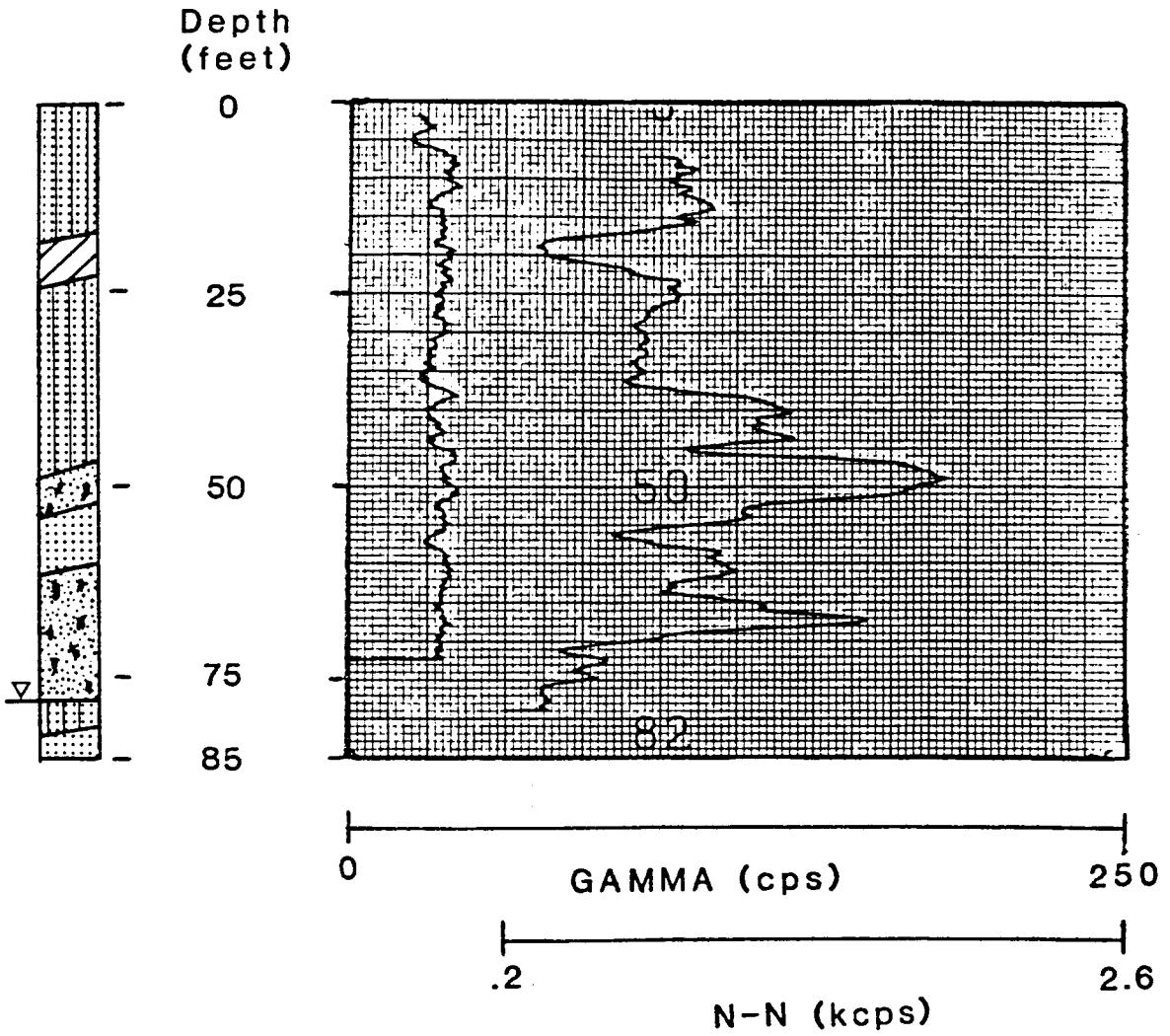
LOG OF WELL MW-11

Sparton Southwest, Inc.
Albuquerque, New Mexico

FIGURE **A-8**

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
LM	6310,008.12				



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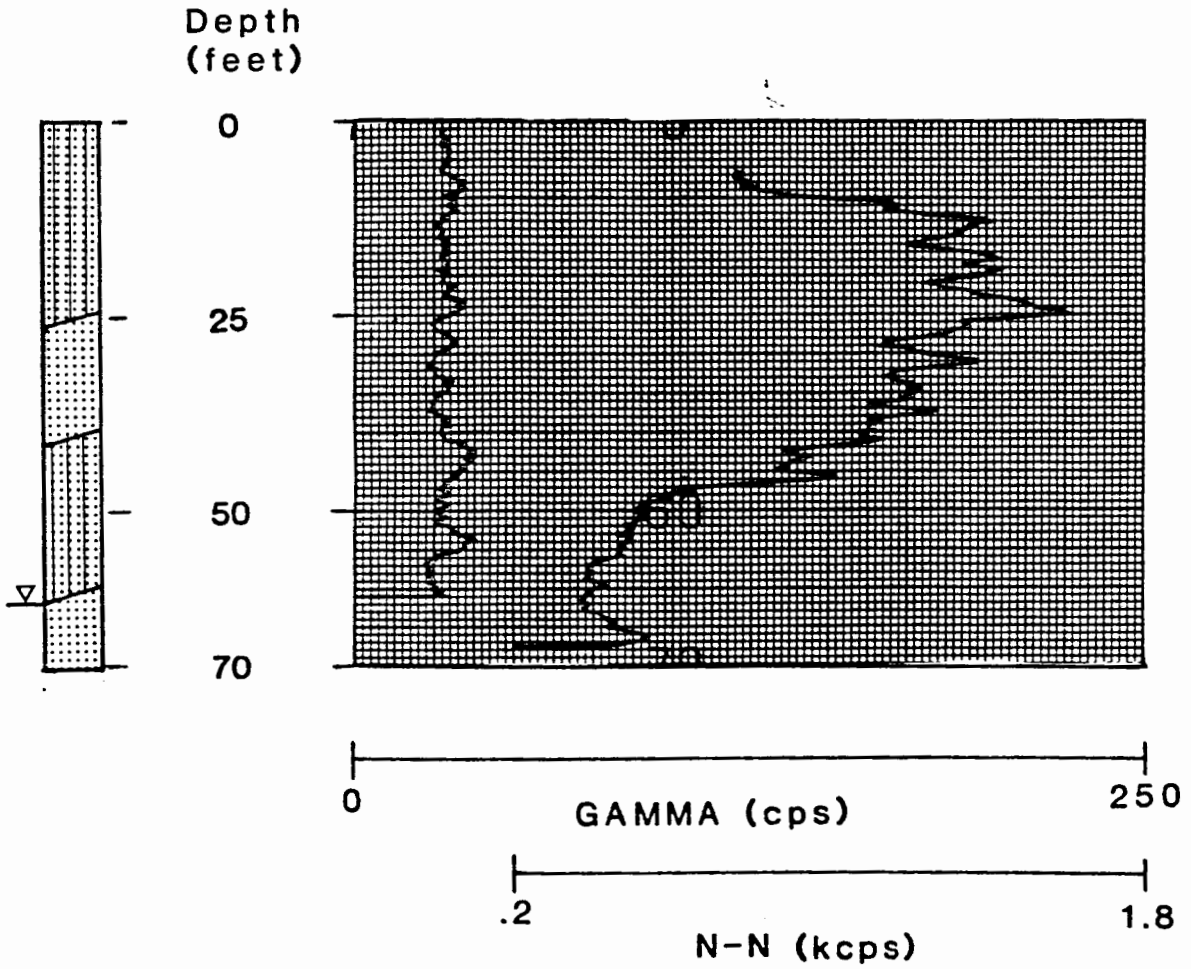
GAMMA & NEUTRON LOG OF MW-5 PLATE
SPARTON SOUTHWEST, INC.
ALBUQUERQUE, NEW MEXICO

A-9

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	6310,008.12				



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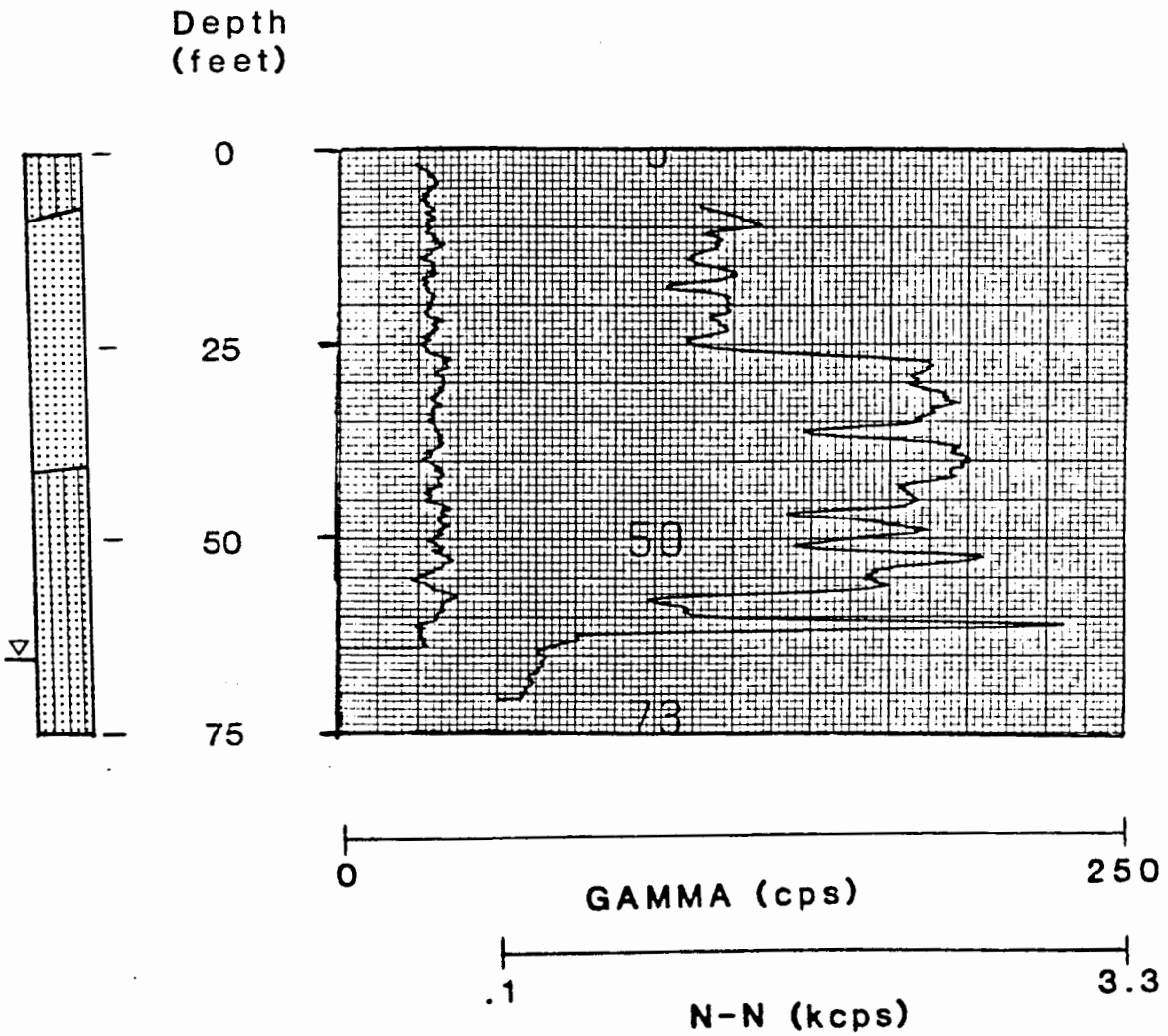
GAMMA & NEUTRON LOG OF MW-6
SPARTON SOUTHWEST, INC.
ALBUQUERQUE, NEW MEXICO

PLATE
A-10

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	6310,008.12				



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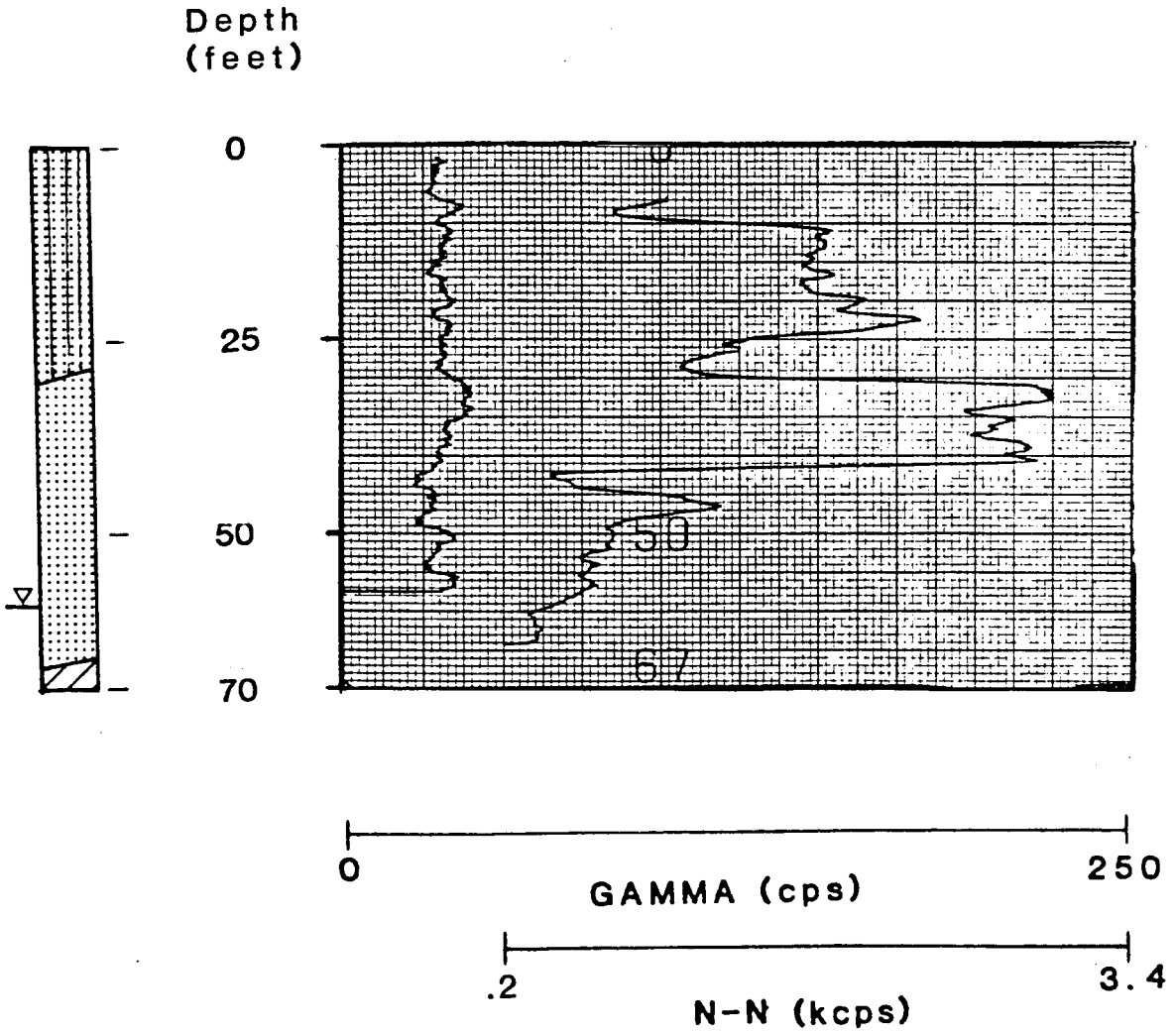
GAMMA & NEUTRON LOG OF MW-7
SPARTON SOUTHWEST, INC.
ALBUQUERQUE, NEW MEXICO

PLATE
A-11

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	6310,008.12				



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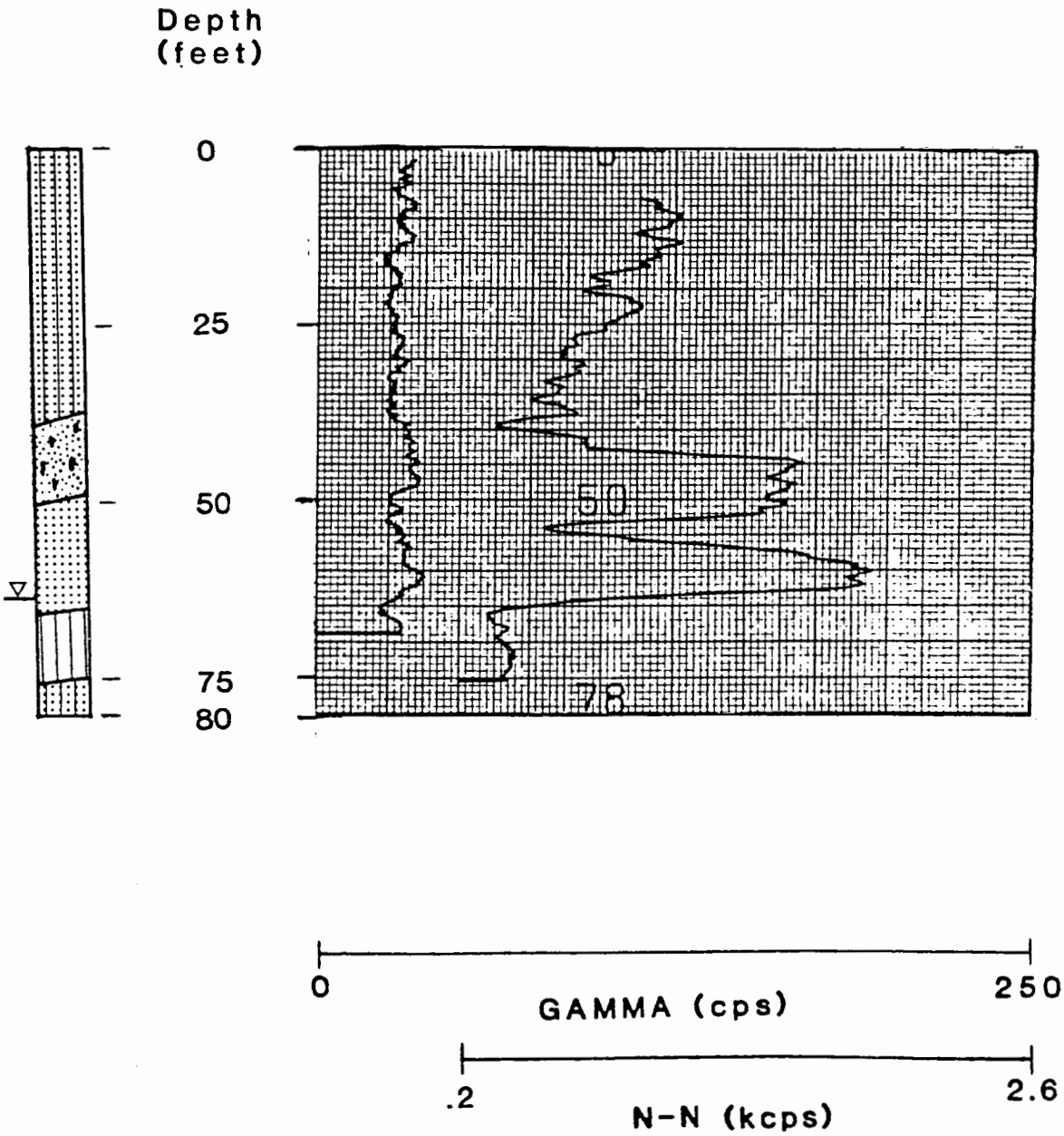
GAMMA & NEUTRON LOG OF MW-8
SPARTON SOUTHWEST, INC.
ALBUQUERQUE, NEW MEXICO

PLATE
A-12

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	6310,008.12				



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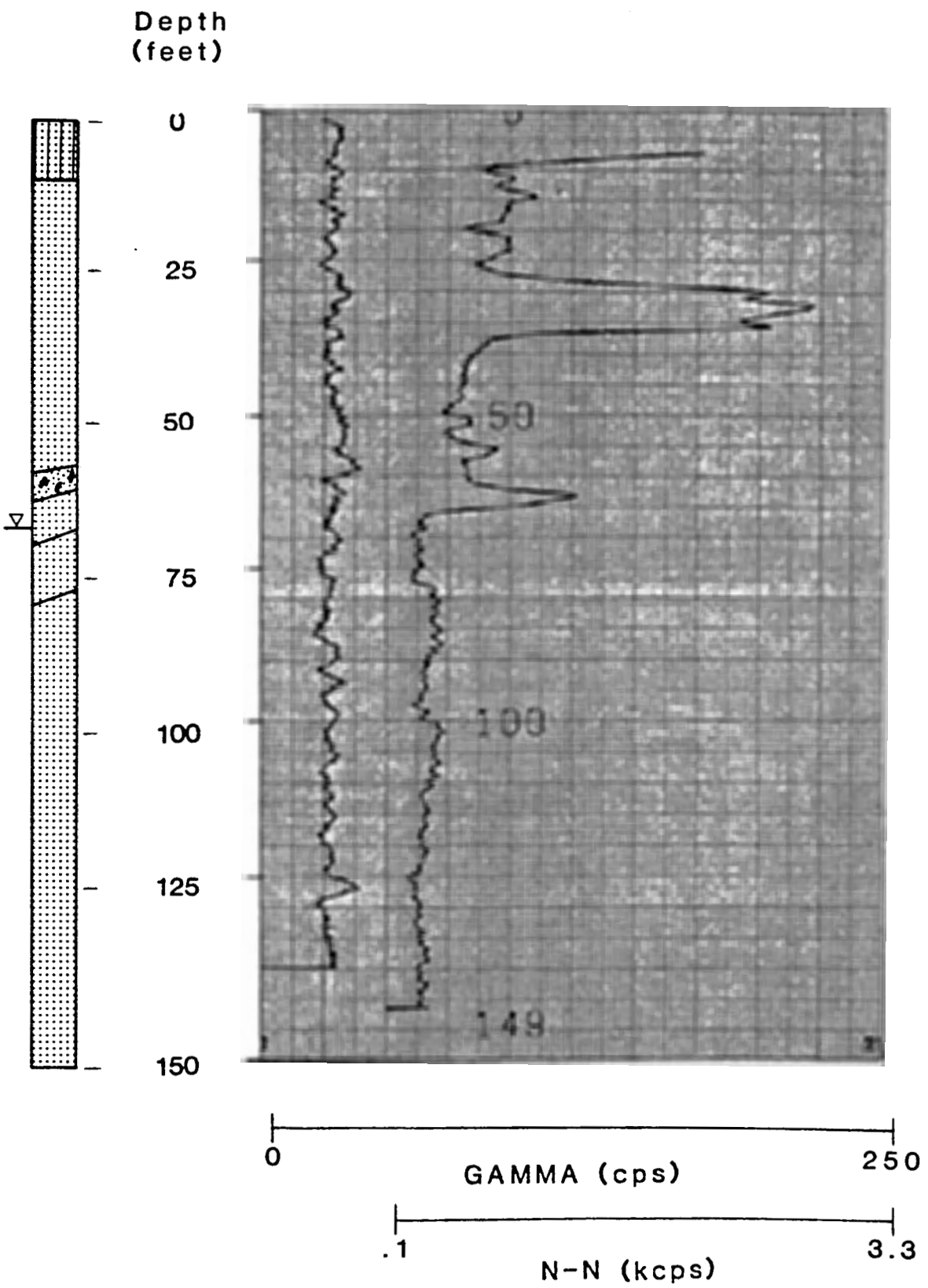
GAMMA & NEUTRON LOG OF MW-9
SPARTON SOUTHWEST, INC.
ALBUQUERQUE, NEW MEXICO

PLATE
A-13

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	6310,008.12				



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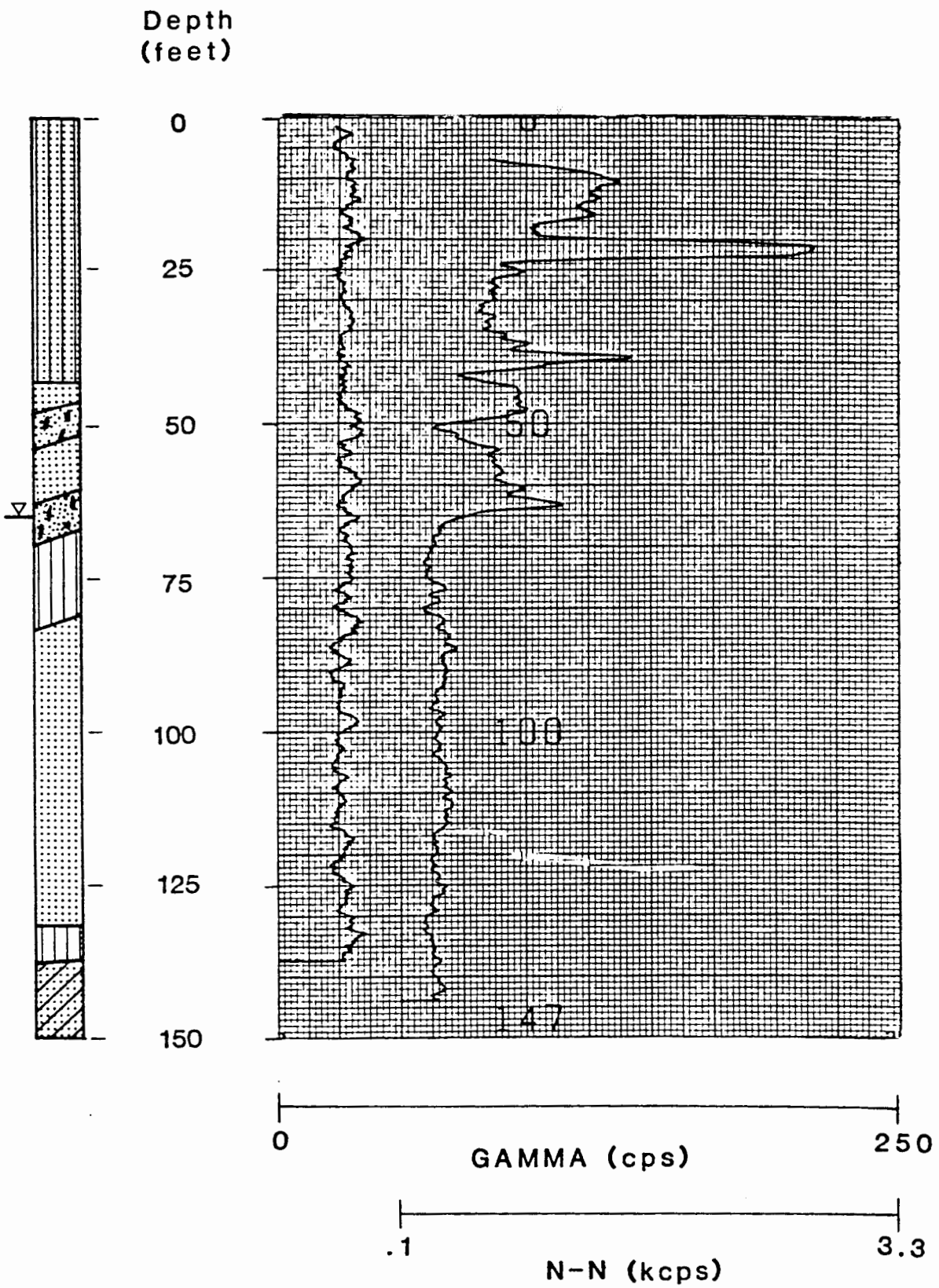
& Geophysicists

GAMMA & NEUTRON LOG OF MW-10

SPARTON SOUTHWEST, INC.
ALBUQUERQUE, NEW MEXICO

PLATE
A-14

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	6310,008.12				

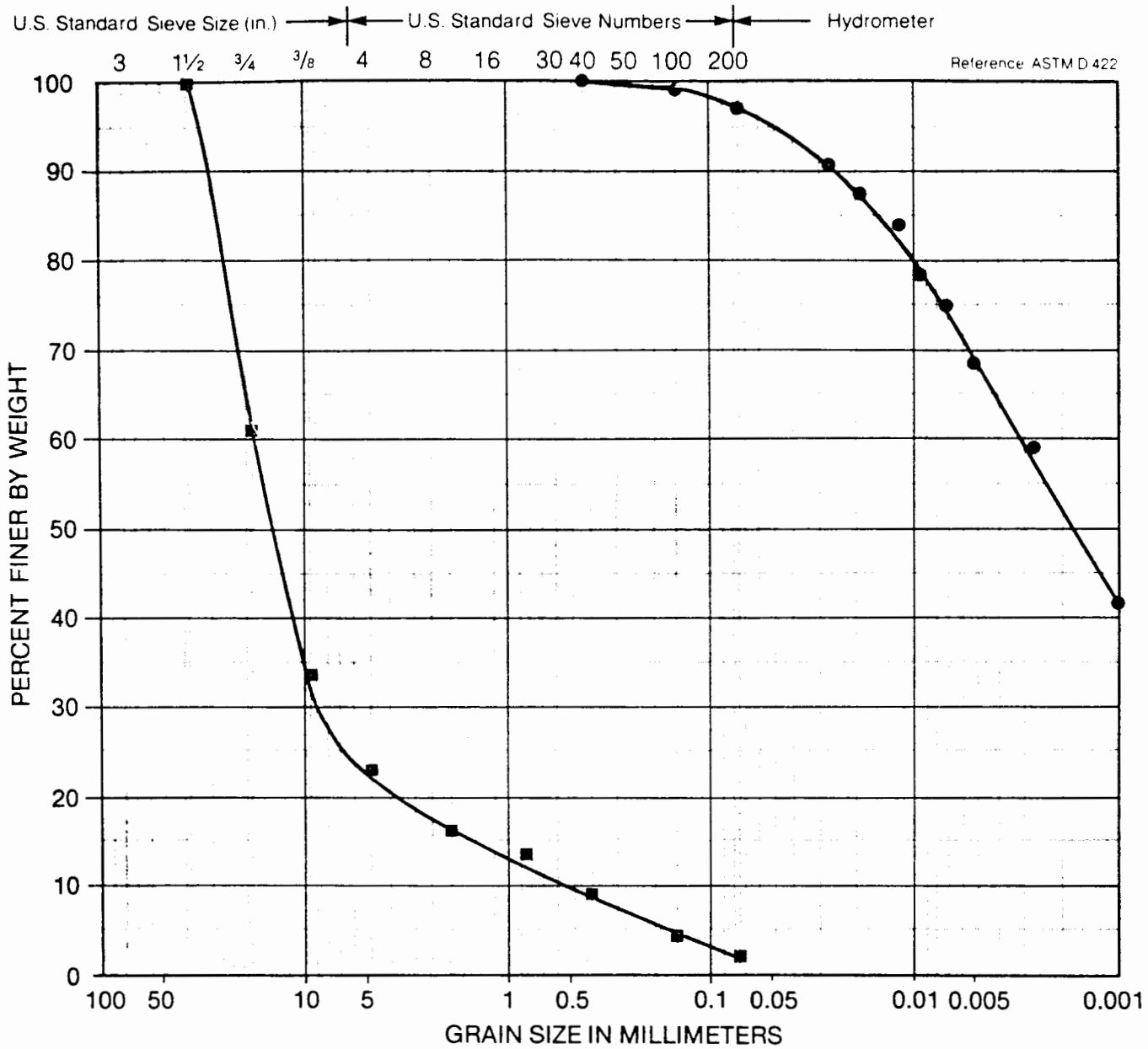


Harding Lawson Associates
Engineers Geologists
& Geophysicists

GAMMA & NEUTRON LOG OF MW-11
SPARTON SOUTHWEST, INC.
ALBUQUERQUE, NEW MEXICO

PLATE A-15

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	6310,008.12				



COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT OR CLAY
	GRAVEL		SAND			

Symbol	Sample Source	Classification
●	MW-5 at 19 FEET	LIGHT BROWN SILTY CLAY (CL)
■	MW-5 at 64 FEET	LIGHT GRAY SANDY GRAVEL (GP) poorly graded

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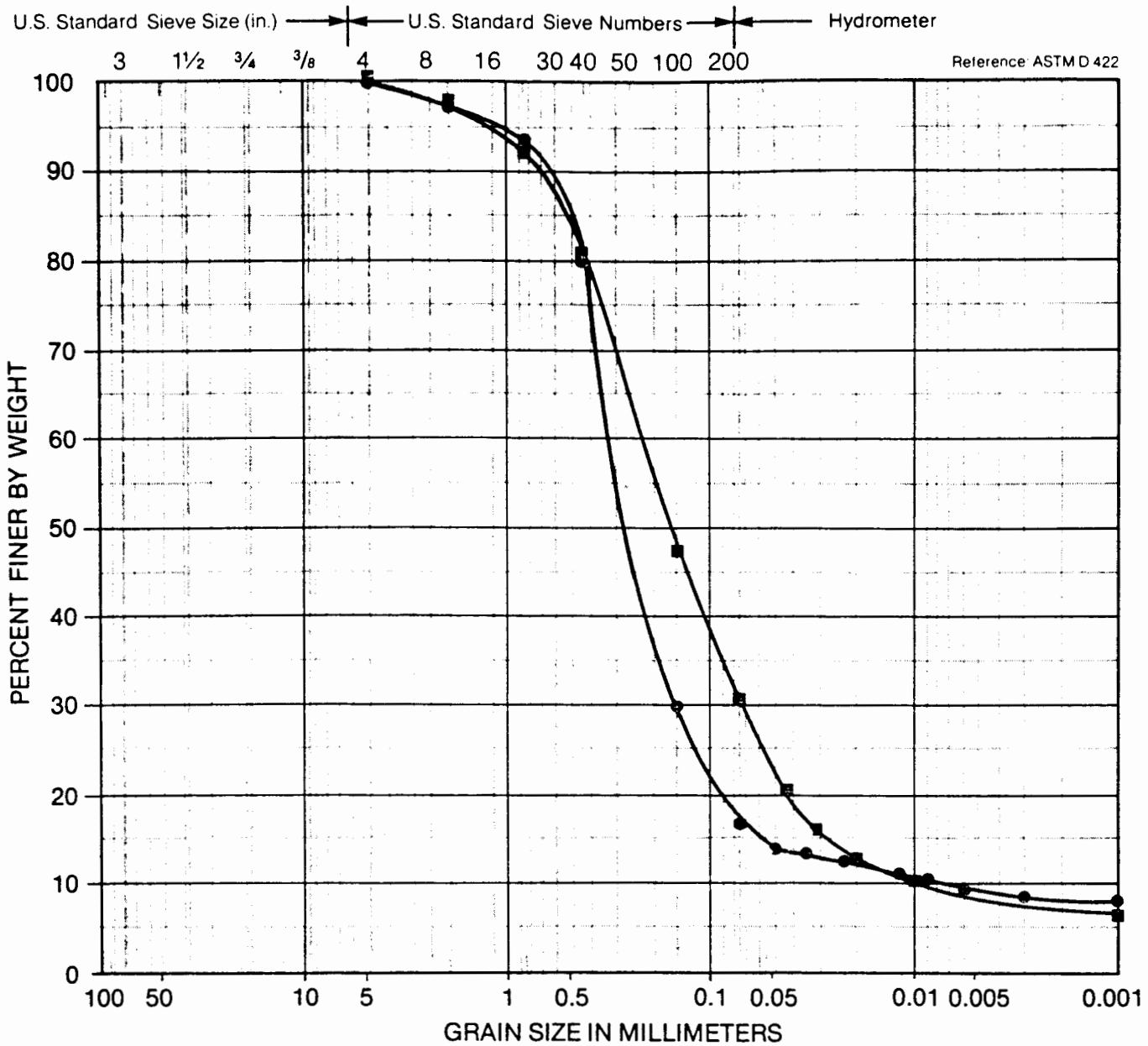
Particle Size Analysis
Sparton Southwest, Inc.
Albuquerque, New Mexico

PLATE
B-1

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
HM	6310,008.12				



COBBLES	GRAVEL: COARSE	GRAVEL: FINE	SAND: COARSE	SAND: MEDIUM	SAND: FINE	SILT OR CLAY

Symbol	Sample Source	Classification
●	MW-5 at 109 FEET	GRAY AND RED SAND (SW) with trace silt and clay, well graded
■	MW-6 at 22 FEET	RED AND GRAY SILTY SAND (SM) with trace clay, well graded

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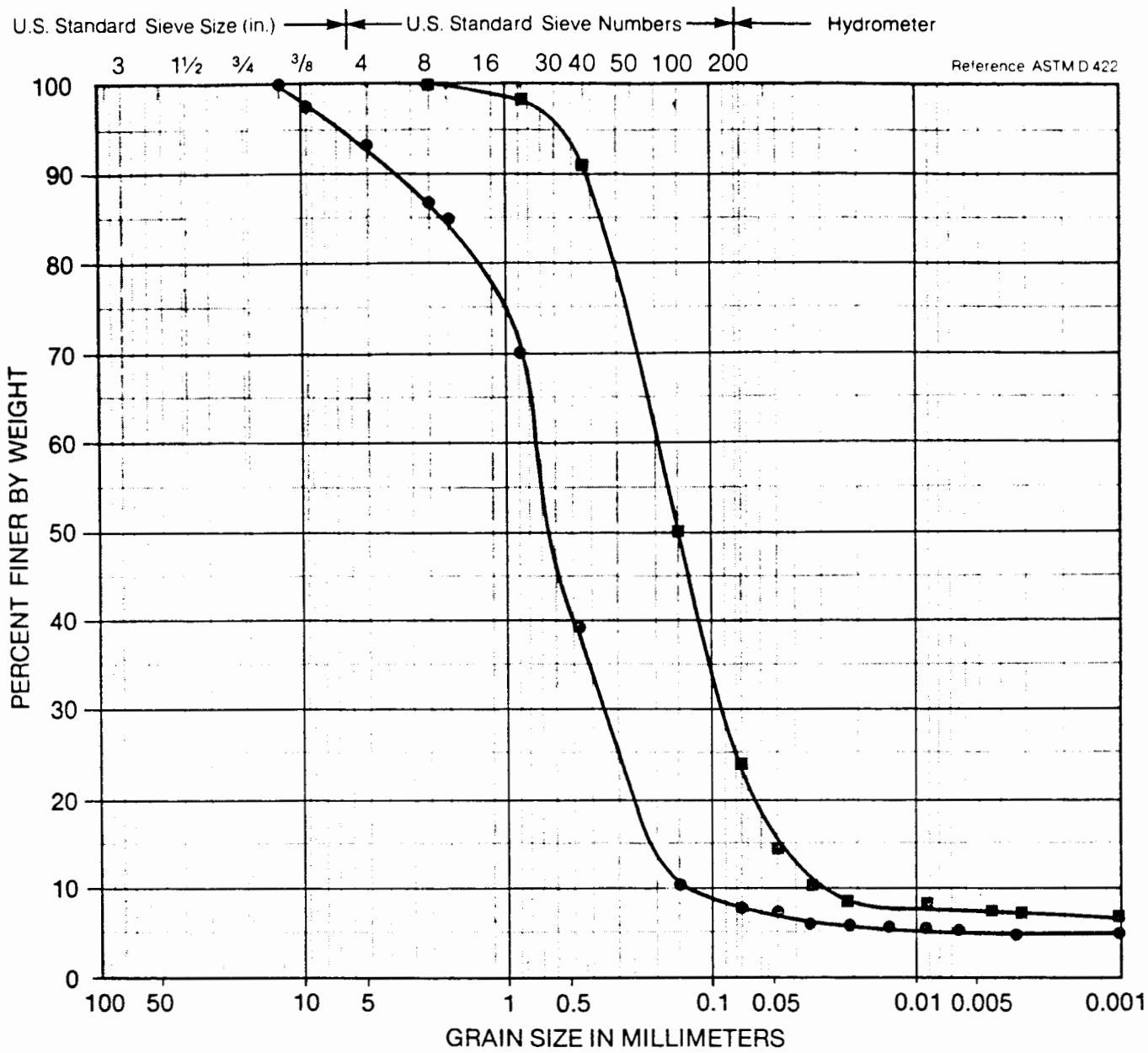
Particle Size Analysis
Sparton Southwest, Inc.
Albuquerque, New Mexico

PLATE **B-2**

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
HM	6310,008.12				



COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT OR CLAY
	GRAVEL		SAND			

Symbol	Sample Source	Classification
●	MW-6 at 92 FEET	GRAY SAND (SP) with trace of silt, clay, and gravel, poorly graded
■	MW-8 at 24 FEET	BROWN SILTY SAND (SM) with trace of clay, well graded

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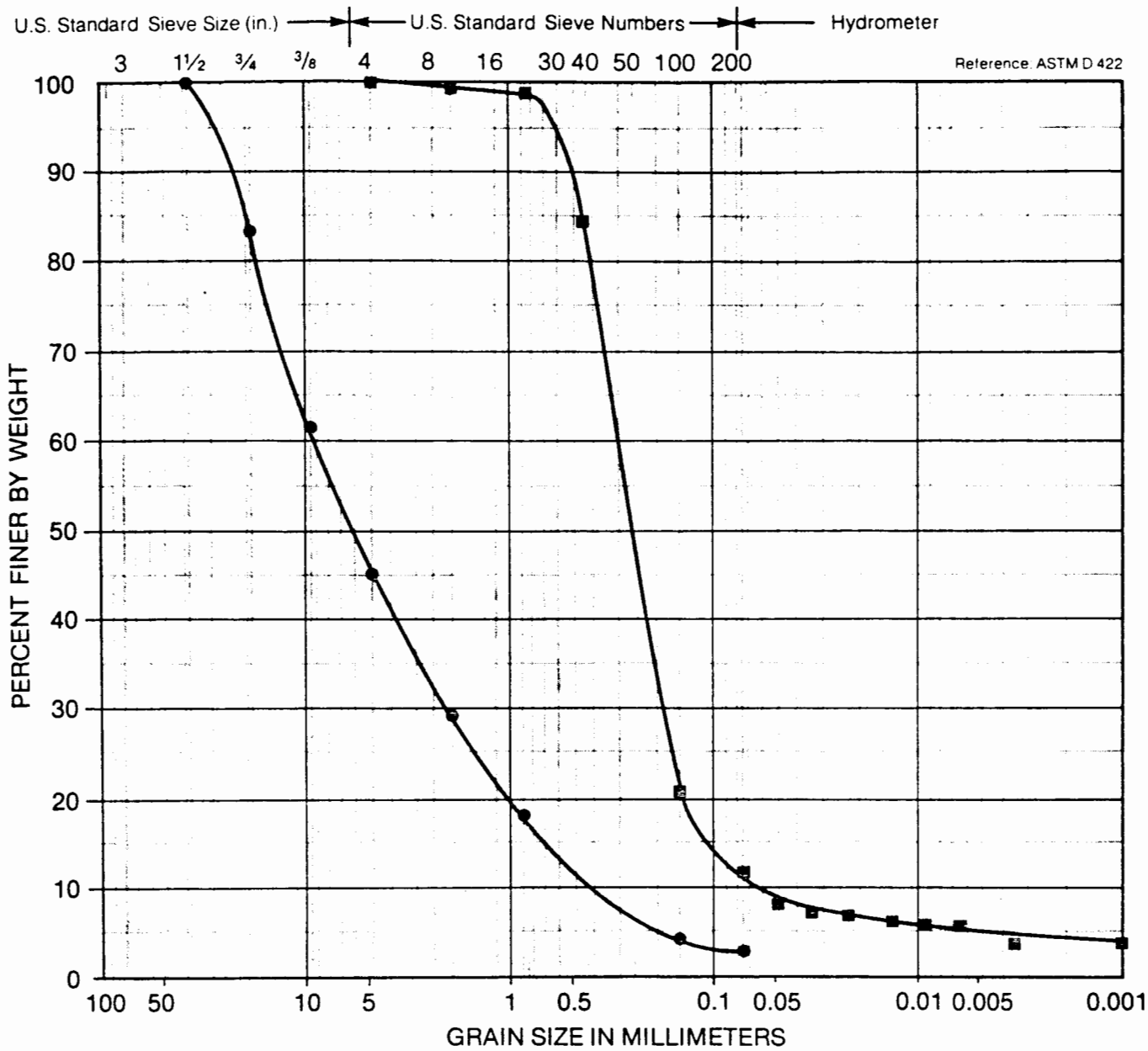
Particle Size Analysis
Sparton Southwest, Inc.
Albuquerque, New Mexico

PLATE
B-3

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
HM	6310,008.12				



COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT OR CLAY
	GRAVEL		SAND			

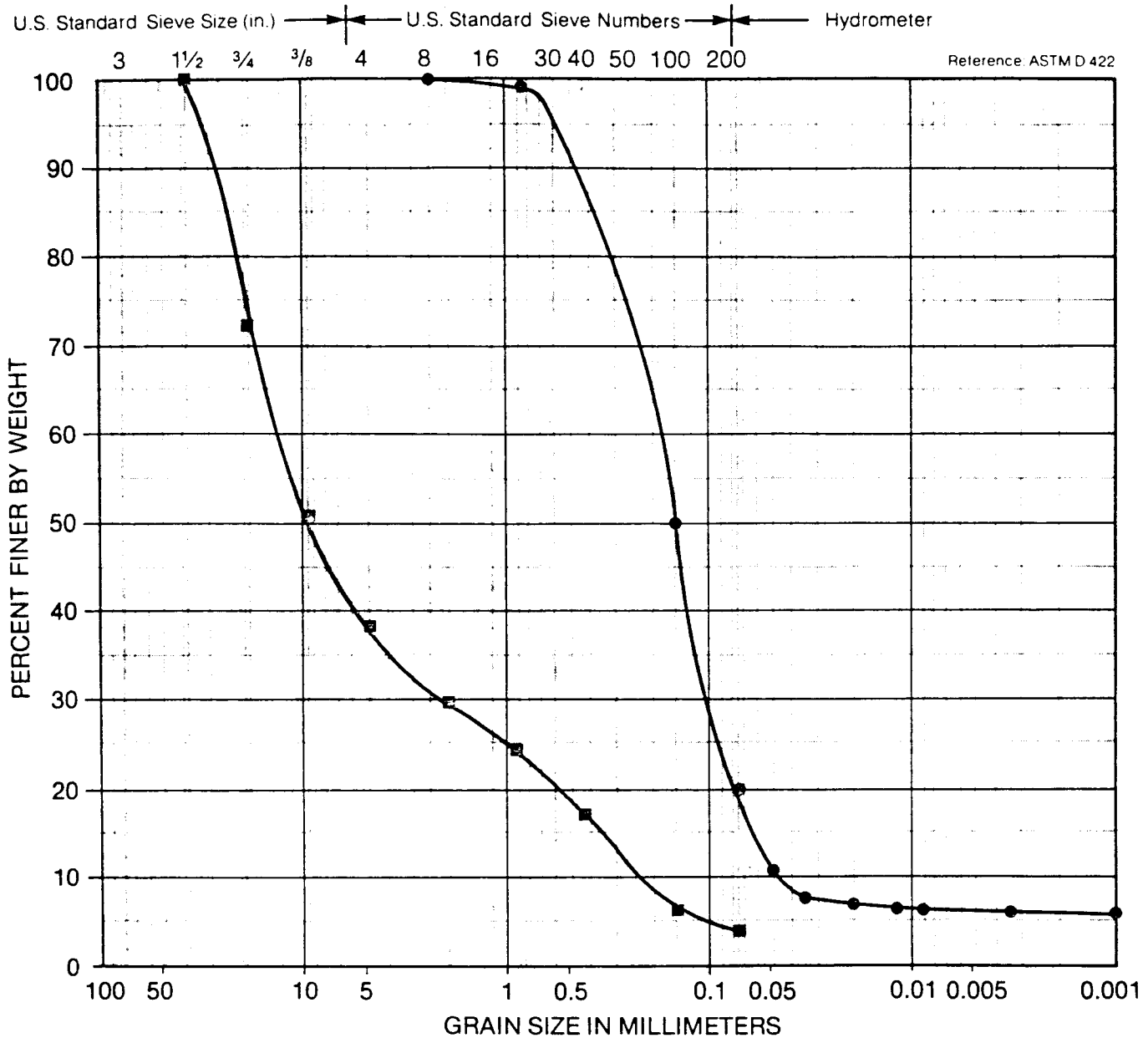
Symbol	Sample Source	Classification
●	MW-8 at 87 FEET	GRAY SANDY GRAVEL (GW) well graded
■	MW-8 at 107 FEET	GRAY SILTY SAND (SM) with trace of clay, well graded

Harding Lawson Associates
Engineers, Geologists & Geophysicists

Particle Size Analysis
Sparton Technology
Albuquerque, New Mexico

PLATE
B-4

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
HM	6310,008.12				



COBBLES	GRAVEL: COARSE	GRAVEL: FINE	SAND: COARSE	SAND: MEDIUM	SAND: FINE	SILT OR CLAY

Symbol	Sample Source	Classification
●	MW-9 at 9 FEET	BROWN SILTY SAND (SM) with trace of clay, poorly graded
■	MW-9 at 39 FEET	GRAY SANDY GRAVEL (GW) with trace of silt and clay, well graded

Harding Lawson Associates
Engineers, Geologists & Geophysicists

Particle Size Analysis
Sparton Technology
Albuquerque, New Mexico

PLATE
B-5

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
HM	6310,008.12				

PARAMETERS	UNITS	DETECTION LIMITS[c]	WELL NO.: MW-1 LAB NO.: 3339-01 DATE[a]: 12/01/83	MW-2 3339-02 12/01/83	MW-3 3339-13 12/14/83	MW-4 3339-03 12/01/83	MW-5 3339-04 12/01/83	MW-6 3339-05 12/01/83	MW-7 3339-06 12/01/83	MW-8 3339-07 12/01/83	MW-9 3339-08 12/01/83	MW-10 3339-09 12/01/83	MW-11 3339-10 12/01/83	Distilled Water 3339-12 12/01/83	QUALITY CONTROL[b] Measured Conc. 3339-11 12/01/83	QUALITY CONTROL[b] Actual Conc.
RADIOCHEMISTRY																
Gross Alpha	pCi/l	0.1	9 ± 5	15 ± 4	0 ± 5	8.3 ± 2.8										
Gross Beta	pCi/l	0.1	15 ± 5	21 ± 3	10 ± 5	12 ± 2										
Radium 226	pCi/l	0.1	1.6 ± 0.5	0.1 ± 0.3	0.2 ± 0.3	2.6 ± 0.6										
ORGANICS																
SDWA																
Lindane	ug/l	0.004	*	*	*	*										
Endrin	ug/l	0.009	*	*	*	*										
Methoxychlor	ug/l	0.25	*	*	*	*										
Toxaphene	ug/l	0.40	*	*	*	*										
SDWA Herbicides																
2, 4-D	ug/l	0.1	*	*	*	*										
Silvex	ug/l	0.05	*	*	*	*										
Total Organic Halogen																
Value 1	ug Cl-/l	25.	21000.	810.	45100.	3470.										
Value 2	ug Cl-/l	25.	21900.	830.	46600.	3310.										
Value 3	ug Cl-/l	25.	20800.	900.	31700.	3360.										
Value 4	ug Cl-/l	25.	20400.	990.	41800.	3130.										
VOLATILE NON-PRIORITY POLLUTANTS																
Acetone	ug/l	100/10	5900.	*	290000.	290.	160.	*	*	*	2300.	*	*	*	*	d
Triclorotrifluoroethane (freon)	ug/l	50/5	170.	190.	310.	280.	*	*	*	*	*	*	*	*	*	d
Ethanol	ug/l	1000/100	*	*	2100.	*	1900.	*	*	*	*	*	*	*	*	d
2-Hexanone	ug/l	100/10	1500.	*	*	*	*	*	*	*	170.	*	*	*	*	d
o-Xylene	ug/l	50/5	150.	*	56.	*	*	*	*	*	31.	*	*	*	*	d
Dimethylbenzene	ug/l	50/5	77.	*	*	*	*	*	*	*	*	*	*	*	*	d
Methyl ethyl ketone	ug/l	100/10	*	*	*	*	*	*	*	*	*	*	*	*	*	d
Isopropyl alcohol	ug/l	100/10	*	*	*	*	*	*	*	*	*	*	*	*	*	d
Glycol ethers	ug/l	1000/100	*	*	*	*	*	*	*	*	*	*	*	*	*	d

[a]Dates indicated are sample collection dates.

[b]Quality control samples were generated in the lab by adding known amounts of chemicals to distilled water. These samples were then analyzed using the same procedures as for well samples.

[c]Where two detection limits are given the first value is for samples 3339-01, -02, -03, -05, -10, and -13. The second value is for 3339-04, -06, -07, -08, -09, -11, and -12.

[d]This parameter was not intentionally added to the quality control sample.

*Not Detectable

Harding Lawson Associates
Engineers, Geologists & Geophysicists

RESULTS FOR LABORATORY ANALYSES FOR WATER SAMPLES FROM MONITORING WELLS MW-1 THROUGH MW-11, CONTINUED

SPARTON TECHNOLOGY, ALBUQUERQUE, NEW MEXICO

PLATE B-12

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
CWP	6310,008.12				

PARAMETERS	UNITS	DETECTION LIMITS[c]	WELL NO.: MW-1 LAB NO.: 3339-01 DATE[a]: 12/01/83	MW-2 3339-02 12/01/83	MW-3 3339-13 12/14/83	MW-4 3339-03 12/01/83	MW-5 3339-04 12/01/83	MW-6 3339-05 12/01/83	MW-7 3339-06 12/01/83	MW-8 3339-07 12/01/83	MW-9 3339-08 12/02/83	MW-10 3339-09 12/01/83	MW-11 3339-10 12/01/83	Distilled Water 3339-12 12/01/83	Measured Conc. 3339-11 12/01/83	QUALITY CONTROL[b] Actual Conc.	QUALITY CONTROL[b] Target Range
VOLATILE ORGANICS																	
Acrolein	ug/l	1000/100	*	*	*	*	*	*	*	*	*	*	*	*	*	d	
Acrylonitrile	ug/l	1000/100	*	*	*	*	*	*	*	*	*	*	*	*	*	d	
Benzene	ug/l	50/5	95.	*	75.	*	*	*	*	*	20.	*	*	*	57.	54.2	27-81
Bis(chloromethyl)ether	ug/l	50/5	*	*	*	*	*	*	*	*	*	*	*	*	*	d	
Bromoform	ug/l	50/5	*	*	*	*	*	*	*	*	*	*	*	*	*	d	
Carbon tetrachloride	ug/l	50/5	*	*	*	*	*	*	*	*	*	*	*	*	*	d	
Chlorobenzene	ug/l	50/5	*	*	*	*	*	*	*	*	*	*	*	*	*	d	
Chlorodibromomethane	ug/l	50/5	*	*	*	*	*	*	*	*	*	*	*	*	*	d	
Chloroethane	ug/l	100/10	*	*	*	*	*	*	*	*	*	*	*	*	*	d	
2-Chloroethyl vinylether	ug/l	50/5	*	*	*	*	*	*	*	*	*	*	*	*	*	d	
Chloroform	ug/l	50/5	270.	*	87.	*	*	*	*	*	*	*	*	*	31.	28.7	17-40
Dichlorobromomethane	ug/l	50/5	*	*	*	*	*	*	*	*	*	*	*	*	*	d	
Dichlorodifluoromethane	ug/l	100/10	*	*	*	*	*	*	*	*	*	*	*	*	*	d	
1,1-Dichloroethane	ug/l	50/5	64.	*	*	*	7.	*	*	*	130.	*	*	*	*	d	
1,2-Dichloroethane	ug/l	50/5	*	*	*	*	*	*	*	*	*	*	*	*	35.	29.1	16-42
1,1-Dichloroethylene	ug/l	50/5	3400.	490.	4900.	2000.	18.	*	17.	*	2500.	*	*	*	*	d	
1,2-Dichloropropane	ug/l	50/5	*	*	*	*	*	*	*	*	*	*	*	*	*	d	
1,3-Dichloropropylene	ug/l	50/5	*	*	*	*	*	*	*	*	*	*	*	*	*	d	
Ethylbenzene	ug/l	50/5	110.	*	91.	*	*	*	*	*	13.	*	*	*	*	d	
Methylbromide	ug/l	100/10	*	*	*	*	*	*	*	*	*	*	*	*	*	d	
Methylchloride	ug/l	100/10	*	*	*	*	*	*	*	*	*	*	*	*	*	d	
Methylene chloride	ug/l	100/10	18000.	*	33000.	1600.	*	*	*	*	9100.	*	420.	*	93.	103.	49-150
1,1,2,2-Tetrachloroethane	ug/l	50/5	*	*	*	*	*	*	*	*	*	*	*	*	*	d	
Tetrachloroethylene	ug/l	50/5	94.	*	240.	*	*	*	*	*	54.	*	*	*	*	d	
Toluene	ug/l	50/5	3200.	*	4600.	74.	45.	*	5.	*	1200.	*	91.	*	83.	94.4	52-140
1,2-trans-Dichloroethylene	ug/l	50/5	*	*	*	*	*	*	*	*	*	*	*	*	*	d	
1,1,1-Trichloroethane	ug/l	50/5	4500.	900.	14000.	3900.	79.	*	14.	7.	15000.	8.	130.	*	23.	29.7	15-45
1,1,2-Trichloroethane	ug/l	50/5	*	*	*	*	*	*	*	*	*	*	*	*	30.	29.5	16-43
Trichloroethylene	ug/l	50/5	33000.	2500.	41000.	7300.	170.	560.	83.	42.	21000.	27.	840.	*	*	d	
Trichlorofluoromethane	ug/l	100/10	*	*	*	*	*	*	*	*	*	*	*	*	*	d	
Vinyl chloride	ug/l	100/10	*	*	*	*	*	*	*	*	*	*	*	*	*	d	

[a]Dates indicated are sample collection dates.

[b]Quality control samples were generated in the lab by adding known amounts of chemicals to distilled water. These samples were then analyzed using the same procedures as for well samples.

[c]Where two detection limits are given the first value is for samples 3339-01, -02, -03, -05, -10, and -13. The second value is for 3339-04, -06, -07, -08, -09, -11, and -12.

[d]This parameter was not intentionally added to the quality control sample.

*Not Detectable

Harding Lawson Associates
Engineers Geologists & Geophysicists

RESULTS FOR LABORATORY ANALYSES FOR WATER SAMPLES FROM MONITORING WELLS MW-1 THROUGH MW-11, CONTINUED

SPARTON TECHNOLOGY, ALBUQUERQUE, NEW MEXICO

PLATE B-13

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
CWP	6310,008.12				

ATTACHMENT 7

POND WASTE ANALYSIS AND
GROUNDWATER MONITORING RESULTS

(This attachment is made up of
various data which are divided into
three appendices)

APPENDIX A
to
ATTACHMENT 7

Pond Waste Analysis

F CHEMICAL WASTE MANAGEMENT, INC. AND OTHER
VASTE MANAGEMENT, INC. COMPANIES.

PHX

WASTE PROFILE SHEET CODE

GENERATOR'S WASTE MATERIAL PROFILE SHEET

ERAL DIRECTIONS: In order for us to determine whether we can lawfully, safely and environmentally transport, store, treat or dispose of your waste stream, we must ask certain information about your waste. All of the information we seek is necessary, for our purposes and yours. Be complete in your answers: if your response is "none," so indicate. Answers must be in ink or typewritten. Information you provide will be maintained in strictest confidence. Please make a copy of this form for your records, returning the original to the location indicated below.

THIS FORM AND ANY SUPPLEMENTAL INFORMATION SHOULD BE RETURNED TO:

1. GENERATOR NAME: Sparton Southwest Inc.
2. GENERATING FACILITY NAME/ADDRESS/USEPA FACILITY I.D. NUMBER (IF ANY): Sparton Southwest Inc.
   9621 Coors Rd. N.W., Albuquerque, New Mexico 87105
   EPA No. NMD083212332
3. COMPANY CONTACTS:

GENERAL		TITLE		PHONE	
		TITLE		PHONE	
TECHNICAL	Cleoves Martinez	TITLE	Envr. Engineer	PHONE	(505)898-1150
		TITLE		PHONE	

4. WASTE NAME:
   PROCESS GENERATING WASTE: Printed circuit board manufacturing
5. WASTE CHARACTERISTICS:
   A. PHASES/LAYERS: BILAYERED ☐ MULTILAYERED ☐ NONE ☒
   B. PHYSICAL STATE AT 70°F: SOLID ☐ SEMI-SOLID ☐ LIQUID ☒ POWDER ☐ OTHER:
   C. SOLIDS: TOTAL (%): 8.88% TOTAL DISSOLVED (ppm or %): 8.54%
   D. SPECIFIC WEIGHT (AS # PER UNIT): 8.829 #/gallon
   E. pH: 8.48 (Show the following as range of %)

AS:	H_2SO_4	n/a %	H_3PO_4	– %
	HCl	– %	NaOH	– %
	HF	– %	NH_4OH	– %
	HNO_3	– %	$Ca(OH)_2$	– %
OTHER:		– %		– %
		– %		– %

   F. FLASH POINT: greater than 212 °F (CLOSED CUP TEST ONLY)
   G. VAPOR PRESSURE (in mm of Hg at 25°C) app. 23.8
   H. BTU PER #: n/a ASH CONTENT 7.27 %
   I. CHARACTERISTIC COLOR blue/gray DISTINCTIVE ODOR none
   J. HALOGENATED? no % SULFONATED? no %
   K. ALPHA RADIATION AS pCi/l N/A

FORM WMI-50-A (Rev 11-5-80)
© 1980 WASTE MANAGEMENT INC

WASTE COMPOSITION:

A. ORGANIC COMPONENTS (WITH RANGES — INDICATE WHETHER % OR ppm)

n/a — — — —

— — — —

1 — — —

— — — —

(ATTACH ADDITIONAL PAGES IF NECESSARY)

DOES THIS WASTE CONTAIN ENDRIN, LINDANE, METHOXYCHLOR, TOXAPHENE, 2,4-D, 2,4,5-TP SILVEX, OR ANY OTHER ORGANIC COMPOUNDS LISTED BY USEPA AT 40 CFR 261.24? No IF SO, PLEASE NOTE ABOVE.

B. HEAVY METALS (WITH ppm RANGES):

	TOTAL	TOTAL LEACHABLE		TOTAL	TOTAL LEACHABLE
Ag	25.1		Hg	less than 0.001	
As	less than 0.01		Ni	10.6	
Ba	less than 1.		Pb	7.04	
Cd	0.18		Se	0.28	
Cr	less than 0.05		Zn	6.21	
Cu	1730.		Other (ATTACH ADDITIONAL PAGES)		

(IF YOU HAVE DETERMINED TOTAL LEACHABLES USING USEPA'S "EP TOXICITY TEST PROCEDURE" — AT 40 CFR, PART 261, APPENDIX II — SO INDICATE BY MARKING "EP" AFTER THE RESULT SHOWN ABOVE.)

C. INORGANIC COMPONENTS (WITH % RANGES): OTHER

TOTAL CYANIDE	less than—0.05	ppm		—	%
FREE CYANIDE	less than—0.05	ppm		—	%
SULFIDE AS:	less than—0.05	ppm		—	%
BISULFITE AS:	less than—1.0	ppm		—	%
SULFITE AS:	less than—1.0	ppm		—	%

(ATTACH ADDITIONAL PAGES IF NECESSARY)

D. DOES THIS WASTE STREAM CONTAIN BIOLOGIC MATERIALS, PATHOGENS, OR ETIOLOGICAL AGENTS? No IF SO, ATTACH ADDITIONAL PAGES DESCRIBING SUCH MATERIALS.

E. IS THE WASTE A PESTICIDE OR PRODUCED BY A PESTICIDE MANUFACTURING PROCESS? No
IF SO, INDICATE WHETHER IT CONTAINS:

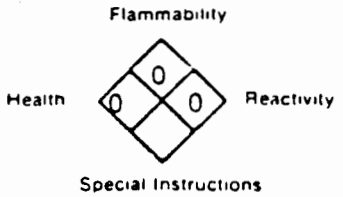
- ☐ ORGANOPHOSPHATES — CONTAINING SULFUR ☐ YES ☐ NO
- ☐ CARBAMATES
- ☐ CHLORINATED HYDROCARBONS

8. HAZARDOUS COMPONENTS AND CHARACTERISTICS

A. HAZARDOUS PROPERTIES (INSERT NUMBER CODES PER INSTRUCTIONS ON LAST PAGE)

(1) TOXICITY RATING: INHALATION 0 DERMAL 1 ORAL 2

(2) HAZARD IDENTIFICATION SYSTEM



B. LIST ANY OTHER ACUTE OR CHRONIC HAZARDS ASSOCIATED WITH OR ALLEGED TO BE ASSOCIATED WITH HUMAN CONTACT WITH OR EXPOSURE TO THE WASTE:

Heavy metal poisoning might be anticipated with ingestion of substantial amounts.

9. REGULATORY CLASSIFICATION OF WASTE

A. IS THIS WASTE A "HAZARDOUS MATERIAL" AS DEFINED BY REGULATIONS OF THE U.S. DEPARTMENT OF TRANSPORTATION PURSUANT TO THE HAZARDOUS MATERIALS TRANSPORTATION ACT? Yes (SEE 49 CFR 172.101 AND 173 FOR "HAZARDOUS MATERIALS" LIST AND CHARACTERISTICS.) IF SO, PLEASE ADVISE OF THE FOLLOWING:

(1) CORRECT SHIPPING DESCRIPTION: Hazardous Waste Liquid N.O.S.

(2) HAZARD CLASS(ES): ORM-E

(3) MATERIAL I.D. NO.(S) NA9189

B. DOES THIS WASTE CONTAIN ANY "HAZARDOUS SUBSTANCE" AS DEFINED BY REGULATIONS OF THE U.S. ENVIRONMENTAL PROTECTION AGENCY PURSUANT TO SECTION 311 OF THE CLEAN WATER ACT? No (SEE 40 CFR 117 FOR "HAZARDOUS SUBSTANCES" AND CATEGORIES.) IF SO, PLEASE ADVISE OF THE FOLLOWING:

(1) THE NAMES OF EACH HAZARDOUS SUBSTANCE PRESENT IN THE WASTE, THE HAZARD CATEGORY (X, A, B, C OR D) AND THE APPROXIMATE CONCENTRATION OF THE SUBSTANCE BY WEIGHT IN THE WASTE:

n/a

(ATTACH ADDITIONAL PAGES IF NECESSARY)

C. IS THIS WASTE A "HAZARDOUS WASTE" AS DEFINED BY REGULATIONS OF THE U.S. ENVIRONMENTAL PROTECTION AGENCY PURSUANT TO SECTION 3001 OF THE RESOURCE CONSERVATION AND RECOVERY ACT? Yes (SEE 40 CFR, PART 261 FOR WHAT IS A "HAZARDOUS WASTE.") IF SO, STATE:

(1) THE USEPA HAZARDOUS WASTE NUMBER(S): F006, F007

(2) DO YOU CLAIM TO BE A SMALL QUANTITY GENERATOR? No (SEE 40 CFR 261.5.)

D. IS THIS WASTE A "HAZARDOUS WASTE" AS DEFINED BY THE ENVIRONMENTAL REGULATORY AGENCY IN YOUR STATE? Yes IF SO, STATE WHY IT IS SO DEFINED AND ANY STATE HAZARDOUS WASTE CODE NUMBERS ASSIGNED: Toxicity

IS THE INFORMATION PROVIDED IN SECTIONS 6-9 BASED UPON LABORATORY ANALYSIS OF THE WASTE MATERIAL? Yes IF SO, PLEASE ADVISE OF THE DATE OF THE MOST RECENT ANALYSIS: _____

11. HAVE YOU OBTAINED TOXICITY STUDIES OF THIS WASTE STREAM? No IF SO, PLEASE ATTACH A COPY OF THE RESULTS.

12. QUANTITY/SHIPPING REQUIREMENTS:

ANTICIPATED VOLUME IS: 5000

GALLONS ☒ TONS ☐ CUBIC YARDS ☐ DRUMS ☐ OTHER ☐ _____

PER: DAY ☐ WEEK ☐ MONTH ☒ YEAR ☐ ONE TIME ☐

TRANSPORTATION EQUIPMENT REQUIRED: Vacuum tanker

SERVICE/SCHEDULING REQUIREMENTS: Contact Cleoves Martinez for scheduling

GENERATOR'S AUTHORIZED SIGNATORY [signature] TITLE Prod Mgr DATE 12/1/81

CONFIDENTIALITY AGREEMENT. _____, as consideration for the Generator's release of the above information, and any other supplemental data provided, agrees to treat such information as confidential property and will not disclose such information to others except as is required by law, and in such circumstances only after first giving notice to the Generator.

By: _____
Name

_____
Title

Albuquerque Analytical, Inc.
4115 SILVER AVE S. E.
ALBUQUERQUE NEW MEXICO 87108
Telephones: (505) 266-9106, (505) 268-5776 — Night 294-6310

manifest # 80-1

ANALYTICAL REPORT

From Sparton Southwest

Address 9621 Coors Rd. N.W. Albuquerque, NM 87103

Work authorized by Reece Lebow Date Received September 4, 1980

Analyzed by J.M. Grover, M.S. Date September 15, 1980 AAI# 12596

SAMPLE ID	Over Flow Pond	Main Pond
Copper (ppm)	9687.5	295.5
Tin (ppm)	58.0	97.5
Palladium (ppm)	< 0.05	< 0.05
Lead (ppm)	13.7	6.52
pH	1.80	1.79

See cover letter

ALBUCHEMIST, INC.
715 San Mateo Boulevard, N.E.
Albuquerque, New Mexico 87108
Phone: 268-7367

DATE: November 20, 1980

LAB. NO. 111480-1

FOR: Rinchem

SAMPLE: Sparton Southwest

DATE DELIVERED: November 14, 1980

RESULTS:

pH - 6.48
Lead - 0.42 parts per million
Copper - 437. ppm
Boron - 194. ppm
Cyanide- less than 0.1 ppm
Specific gravity - 1.033
Tin - less than 1. ppm

BY [signature]
Chemist

ALBUCHEMIST, INC.
Albuquerque, New Mexico [redacted]
Phone: 268-7367

ALBUCHEMIST INC.
501 WYOMING BLVD. S.E.
ALBUQUERQUE, N.M. 87123

DATE: May 27, 1982

LAB. NO. 51982-4

FOR: Sparton Southwest
9621 Coors NW
Albuquerque, New Mexico

SAMPLE: Water, Coors Rd. Manhole
Sparton P.O. #SO-27086-1-BN

DATE DELIVERED: May 19, 1982

RESULTS:

Selenium	-	0.010 parts per million
Boron	-	0.74 ppm
Zinc	-	0.010 ppm
Silver	-	less than 0.02 ppm
Nickel	-	0.45 ppm
Mercury	-	less than 0.0005 ppm
Manganese	-	less than 0.02 ppm
Lead	-	less than 0.05 ppm
Copper	-	0.27 ppm
Chromium	-	less than 0.05 ppm
Cadmium	-	less than 0.01 ppm
Barium	-	less than 1.0 ppm
Arsenic	-	0.030 ppm

BY: Dan Dugan
Chemist

APPENDIX B
to
ATTACHMENT 7

Interim Status Monitoring Results

CUSTOMER 9621 Coors Rd, N.W.
ADDRESS P.O. Box 1784
CITY Albuquerque, NM 87103
ATTENTION Cleoves Martinez cc: Harding Lawson Assoc
INVOICE NO. 306192 Houston, TX 77057

COMPANY CONFIDENTIAL

REPORT OF ANALYSIS

SAMPLES RECEIVED 6/10/83 | CUSTOMER ORDER NUMBER

TYPE OF ANALYSIS Water | Date Collected 6/8/83

Sample Identification	Type of Analysis	pCi/l
MW 1 A-1	Gross Alpha	< 2
	Gross Beta	7 ± 2
	Total Radium	< 1
MW 2 A-2	Gross Alpha	< 2
	Gross Beta	4 ± 2
	Total Radium	1.4 ± 0.7
MW 3 A-3	Gross Alpha	4 ± 3 *
	Gross Beta	11 ± 3
	Total Radium	3 ± 2
MW 4 A-4	Gross Alpha	4 ± 3
	Gross Beta	9 ± 3
	Total Radium	1.3 ± 0.7

*High statistics due to large amount of solids.

This set (8 p) was attached to [illegible] DM's Regional Admin, July 7, 1983.

6/28/83

APPROVED BY Thomas Mendes, Mgr. Tech. Services

PAGE 1 OF 1 PAGE

Controls for Environmental Pollution, Inc.
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Telephone 505/982-9841

CUSTOMER 9621 Coors Rd, N.W.
ADDRESS P.O. Box 1784
CITY Albuquerque, NM 87103
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INVOICE NO. 306192 Houston, TX 77057

COMPANY CONFIDENTIAL

REPORT OF ANALYSIS

SAMPLES RECEIVED 6/15/83 | CUSTOMER ORDER NUMBER

TYPE OF ANALYSIS Water

Sample Identification	Date Collected	Total Coliform
MW 1 MW 1-col-61483	6/14/83 @ 12:00	< 1 Colony/100 mls many other bacteria
MW 2 MW 2 col-61483	6/14/83 @ 1:00 p.m.	< 1 Colony/100 mls many other bacteria
MW 3 MW3-col-61483	6/14/83 @ 2:00 p.m.	< 1 Colony/100 mls many other bacteria
MW 4 MW4-col-61483	6/14/83 @ 3:00 p.m.	< 1 Colony/100 mls many other bacteria

6/28/83

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INVOICE NO. Cleoves Martinez cc: Harding Lawson Assoc
306192 Houston, TX 77057

REPORT OF ANALYSIS

SAMPLES RECEIVED 6/10/83 | CUSTOMER ORDER NUMBER

TYPE OF ANALYSIS Water

VOLATILES:	MW-1 ug/l	MW-2 ug/l	MW-3 ug/l	MW-4 ug/l
Acrolein	ND	ND	ND	ND
Acrylonitrile	ND	ND	ND	ND
Benzene	78	ND	195	ND
Bis (chloromethyl) ether	ND	ND	ND	ND
Bromoform	ND	ND	ND	ND
Carbon tetrachloride	1,150	ND	1,980	660
Chlorobenzene	4.8	ND	53	ND
Chlorodibromethane	ND	ND	ND	ND
Chloroethane	ND	ND	23	ND
2-Chloroethylvinyl ether	ND	ND	ND	ND
Chloroform	260	ND	334	11
Dichlorobromomethane	ND	ND	ND	ND
Dichlorodifluoromethane	ND	33	ND	ND
1,1-Dichloroethane	308	ND	230	20
1,2-Dichloroethane	30	ND	109	ND
1,1-Dichloroethylene	1,010	87	3,900	1,310
1,2-Dichloropropane	ND	ND	20	ND
1,3-Dichloropropene	ND	ND	ND	ND
Ethylbenzene	236	ND	355	ND
Methyl bromide	ND	ND	ND	ND
Methyl chloride	ND	ND	ND	ND
Methylene chloride	1,130	ND	2,430	730
1,1,2,2-Tetrachloroethane	22	ND	268	ND
Tetrachlorethylene	64	ND	487	48
Toluene	2,900	79	2,180	104
1,2-Trans-dichlorothylene	ND	ND	20	ND
1,1,1,-Trichloroethane	3,750	352	ND	2,800
1,1,2-Trichloroethane	21	ND	138	ND
Trichloroethylene	2,580	658	3,500	2,290
Trichlorofluoromethane	ND	ND	ND	ND
Vinyl chloride	ND	ND	ND	ND

ND - Non-detected

APPROVED BY Mendes

6/28/83

Thomas Mendes, Mgr. Tech. Services

Controls for Environmental Pollution, Inc.
P.O. Box 5351 • 1925 Rosina • Santa Fe, New Mexico 87502
Telephone 505/982-9841

mg/l

	TYPE OF ANALYSIS	MW1	MW2	MW3	MW4
A-4	Arsenic	< 0.01	< 0.01	< 0.01	< 0.01
	Barium	< 0.1	< 0.1	< 0.1	< 0.1
	Cadmium	< 0.001	< 0.001	< 0.001	< 0.001
	Chloride	1210	20	1830	41
	Chromium	* 33	0.018	* 9.0	0.009
	Copper	0.046	0.001	0.014	0.002
	Fluoride	0.60	0.30	0.19	0.17
	Iron	< 0.01	< 0.01	< 0.01	< 0.01
	Lead	< 0.001	< 0.001	< 0.001	< 0.001
	Manganese	1.24	0.085	2.00	0.072
	Mercury	< 0.0004	< 0.0004	< 0.0004	< 0.0004
	Nitrogen, Ammonia (as N)	14	< 0.1	100	< 0.1
	Nitrogen, Nitrate (as N)	5.7	1.5	* 38	2.3
	PH X 4	7.31/7.31 7.30/7.30	7.78/7.78 7.78/7.78	7.13/7.13 7.14/7.13	7.56/7.56 7.56/7.56
	Phosphate, Total (as P)	5.2	< 0.1	1.3	< 0.1
	Selenium	< 0.1	< 0.01	< 0.01	< 0.01
	Silver	< 0.1	< 0.01	< 0.01	< 0.01
	Sodium	120	48	400	48
	Specific Conductance Umhos/Cm X 4	3760/3560 3680/3760	730/770 800/730	5860/5860 5860/5710	1000/1 1000/1000
	Sulfate	330	94	1110	96
B-4	Phenols	< 0.001	< 0.001	< 0.001	< 0.001
	Endrin	< 0.0004	< 0.0004	< 0.0004	< 0.0004
	Lindane	< 0.0002	< 0.0002	< 0.0002	< 0.0002
	Methoxychlor	< 0.1	< 0.1	< 0.1	< 0.1
	Toxaphene	< 0.005	< 0.005	< 0.005	< 0.005
	2, 4-D (Acid)	< 0.1	< 0.1	< 0.1	< 0.1
C-4	2, 3, 5-TP Silvex (Acid	< 0.01	< 0.01	< 0.01	< 0.01
	Total Organic Carbon X 4	22/24 23/24	< 1/< 1 1/1	220/220 210/220	1/2 2/2
	Total Organic Halogen X 4	8.8/8.9 8.7/8.9	1.4/1.4 1.5/1.4	2.9/2.8 2.7/2.7	1.3/1.4 1.5/1.2

*EXCEEDS INTERIM PRIMARY DRINKING WATER STANDARDS

ADDRESS P.O. Box 1784
CITY Albuquerque, NM 87103
ATTENTION Cleoves Martinez cc: Harding Lawson Assoc
INVOICE NO. 306192 Houston, TX 77057

REPORT OF ANALYSIS

SAMPLES RECEIVED 6/10/83 | CUSTOMER ORDER NUMBER P.O. 49955-1-MH

TYPE OF ANALYSIS Water | Date Collected 6/8/83

Sample Identification	Type of Analysis	mg/l
MW 1 A-1	Arsenic	< 0.01
	Barium	< 0.1
	Cadmium	< 0.001
	Chloride	1210
	Chromium	* 33
	Copper	0.046
	Fluoride	0.60
	Iron	< 0.01
	Lead	< 0.001
	Manganese	1.24
	Mercury	< 0.0004
	Nitrogen, Ammonia (as N)	14
	Nitrogen, Nitrate (as N)	5.7
	pH X 4	7.31/7.31/7.30/7.30
	Phosphate, Total (as P)	5.2
	Selenium	< 0.1
	Silver	< 0.1
	Sodium	120
	Specific Conductance umhos/cm X 4	3760/3560/3680/3760
	Sulfate	330
MW 1 B-1	Phenols	< 0.001
	Endrin	< 0.0004
	Lindane	< 0.0002
	Methoxychlor	< 0.1
	Toxaphene	< 0.005
	2,4-D (acid)	< 0.1
	2,4,5-TP Silvex (acid)	< 0.01
MW 1 C-1	Total Organic Carbon X 4	22/24/23/24
	Total Organic Halogen X 4	8.8/8.9/8.7/8.9

*EXCEEDS INTERIM PRIMARY DRINKING WATER STANDARDS

6/28/83

APPROVED BY Thomas Mendes, Mgr. Tech. Services

Controls for Environmental Pollution, Inc.
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Telephone 505/982-9841

ADDRESS P.O. Box 1784
CITY Albuquerque, NM 87103
ATTENTION Cleoves Martinez cc: Harding Lawson Assoc.
INVOICE NO. 306192 Houston, TX 77057

COMPANY CONFIDENTIAL

REPORT OF ANALYSIS

SAMPLES RECEIVED 6/10/83 | CUSTOMER ORDER NUMBER P.O. 49955-1-MH

TYPE OF ANALYSIS Water | Date Collected 6/8/83 CORRECTED REPORT

Sample Identification	Type of Analysis	mg/l
MW 2 A-2	Arsenic	< 0.01
	Barium	< 0.1
	Cadmium	< 0.001
	Chloride	20
	Chromium	0.018
	Copper	0.001
	Fluoride	0.30
	Iron	< 0.01
	Lead	< 0.001
	Manganese	0.085
	Mercury	< 0.0004
	Nitrogen, Ammonia (as N)	< 0.1
	Nitrogen, Nitrate (as N)	1.5
	pH X 4	7.78/7.78/7.78/7.78
	Phosphate, Total (as P)	< 0.1
	Selenium	< 0.01
	Silver	< 0.01
	Sodium	48
	Specific Conductance umhos/cm X 4	730/770/800/730
	Sulfate	94
MW 2 B-2	Phenols	< 0.001
	Endrin	< 0.0004
	Lindane	< 0.0002
	Methoxychlor	< 0.1
	Toxaphene	< 0.005
	2,4-D (acid)	< 0.1
	2,4,5-TP Silvex (acid)	< 0.01
MW 2 C-2	Total Organic Carbon X 4	< 1/ < 1/1/1
	Total Organic Halogen X 4	1.4/1.4/1.5/1.4

6/28/83

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ADDRESS 9621 Coors Rd, N.W.
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COMPANY CONFIDENTIAL

REPORT OF ANALYSIS

SAMPLES RECEIVED 6/10/83 | CUSTOMER ORDER NUMBER P.O. 49955-1-MH

TYPE OF ANALYSIS Water | Date Collected 6/8/83

Sample Identification	Type of Analysis	mg/l
MW 3 A-3	Arsenic	< 0.01
	Barium	< 0.1
	Cadmium	< 0.001
	Chloride	1830
	Chromium	* 9.0
	Copper	0.014
	Fluoride	0.19
	Iron	< 0.01
	Lead	< 0.001
	Manganese	2.00
	Mercury	< 0.0004
	Nitrogen, Ammonia (as N)	100
	Nitrogen, Nitrate (as N)	* 38
	pH X 4	7.13/7.13/7.14/7.13
	Phosphate, Total (as P)	1.3
	Selenium	< 0.01
	Silver	< 0.01
	Sodium	400
	Specific Conductance umhos/cm X 4	5860/5860/5860/5710
	Sulfate	1110
MW 3 B-3	Phenols	< 0.001
	Endrin	< 0.0004
	Lindane	< 0.0002
	Methoxychlor	< 0.1
	Toxaphene	< 0.005
	2,4-D (acid)	< 0.1
	2,4,5-TP Silvex (acid)	< 0.01
MW 3 C-3	Total Organic Carbon X 4	220/220/210/220
	Total Organic Halogen X 4	2.9/2.8/2.7/2.7

*EXCEEDS INTERIM PRIMARY DRINKING WATER STANDARDS

6/28/83

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REPORT OF ANALYSIS

SAMPLES RECEIVED 6/10/83 | CUSTOMER ORDER NUMBER P.O. 49955-1-MH

TYPE OF ANALYSIS Water | Date Collected 6/8/83

Sample Identification	Type of Analysis	mg/l
MW 4 A-4	Arsenic	< 0.01
	Barium	< 0.1
	Cadmium	< 0.001
	Chloride	41
	Chromium	0.009
	Copper	0.002
	Fluoride	0.17
	Iron	< 0.01
	Lead	< 0.001
	Manganese	0.072
	Mercury	< 0.0004
	Nitrogen, Ammonia (as N)	< 0.1
	Nitrogen, Nitrate (as N)	2.3
	pH X 4	7.56/7.56/7.56/7.56
	Phosphate, Total (as P)	< 0.1
	Selenium	< 0.01
	Silver	< 0.01
	Sodium	48
	Specific Conductance umhos/cm X 4	1000/1080/1000/1000
	Sulfate	96
MW 4 B-4	Phenols	< 0.001
	Endrin	< 0.0004
	Lindane	< 0.0002
	Methoxychlor	< 0.1
	Toxaphene	< 0.005
	2,4-D (acid)	< 0.1
	2,4,5-TP Silvex (acid)	< 0.01
MW 4 C-4	Total Organic Carbon X 4	1/2/2/2
	Total Organic Halogen X 4	1.3/1.4/1.5/1.2

6/28/83

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Controls for Environmental Pollution, Inc.
P.O. Box 5351 • 1925 Rosina • Santa Fe, New Mexico 87502
Telephone 505/982-9341

CUSTOMER Sparton Southwest, Inc.
ADDRESS 9621 Coors Rd. N.W.
CITY Albuquerque, NM 87114
ATTENTION Cleoves Martinez
INVOICE NO. 308052

REPORT OF ANALYSIS

SAMPLES RECEIVED 7/21/83 | CUSTOMER ORDER NUMBER

TYPE OF ANALYSIS Water (Date Collected: 7/20/83 @ 3:00 pm)

Sample Identification	Type of Analysis	mg/liter
M W I (Sparton Sed)	Bicarbonate (as $CaCO_3$)	290
	Calcium	630
	Carbonate	0
	Chloride	1200
	Chromium (Total)	38
	Chromium 6+	< 0.01
	Fluoride	1.5
	Magnesium	110
	Manganese	2.61
	Nitrogen, Ammonia (as N)	30
	Nitrogen, Nitrate (as N)	5.0
	pH x 4	7.19/7.18/7.19/7.20 units
	Potassium	18
	Sodium	130
	Specific Conductance X 4 umhos/cm	3770,3770,3770,3770
	Sulfate	360

APPROVED BY Thomas Mendes, Manager, Technical Services
8/12/83 PAGE 1 OF 7 PAGE

Controls for Environmental Pollution, Inc.
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CUSTOMER Sparton Southwest, Inc.
ADDRESS 9621 Coors Rd. N.W.
CITY Albuquerque, NM 87114
ATTENTION Cleoves Martinez
INVOICE NO. 308052

REPORT OF ANALYSIS

SAMPLES RECEIVED 7/21/83

CUSTOMER ORDER NUMBER

TYPE OF ANALYSIS Water (Date Collected: 7/21/83)

Sample Identification	Type of Analysis	mg/liter
M W 2-B 2	Bicarbonate (as $CaCO_3$)	200
	Calcium	84
	Carbonate	0
	Chloride	23
	Chromium (Total)	0.001
	Chromium 6+	< 0.01
	Fluoride	0.02
	Mangnesium	12
	Manganese	0.021
	Nitrogen, Ammonia (as N)	0.2
	Nitrogen, Nitrate (as N)	2.0
	pH x 4	7.54/7.54/7.55/7.54 units
	Potassium	5.1
	Sodium	43
	Specific Conductance x 4 umhos/cm	660,670,670,670
	Sulfate	98

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8/12/83

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REPORT OF ANALYSIS

SAMPLES RECEIVED 7/21/83

CUSTOMER ORDER NUMBER

TYPE OF ANALYSIS Water (Date Collected: 7/20/83)

Sample Identification	Type of Analysis	mg/liter
M W 3-B 3	Bicarbonate (as $CaCO_3$)	620
	Calcium	890
	Carbonate	0
	Chloride	1400
	Chromium (Total)	7.9
	Chromium 6+	< 0.01
	Fluoride	0.56
	Magnesium	140
	Manganese	3.16
	Nitrogen, Ammonia (as N)	82
	Nitrogen, Nitrate (as N)	45
	pH x 4	6.75/6.75/6.76/6.76 units
	Potassium	22
	Sodium	350
	Specific Conductance x 4 umhos/cm	5110,5110,5110,5110
	Sulfate	1120

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8/12/83

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INVOICE NO. 308052

REPORT OF ANALYSIS

SAMPLES RECEIVED 7/21/83

CUSTOMER ORDER NUMBER

TYPE OF ANALYSIS Water (Date Collected:7/21/83)

Sample Identification	Type of Analysis	mg/liter
M W 4 -B 4	Bicarbonate (as CaCO)	250
	Calcium	100
	Carbonate	0
	Chloride	40
	Chromium (Total)	0.008
	Chromium 6+	< 0.01
	Fluoride	0.26
	Magnesium	15
	Manganese	< 0.001
	Nitrogen, Ammonia (as N)	< 0.1
	Nitogen, Nitrate (as N)	2.1
	pH x 4	7.50/7.52/7.52/7.51 units
	Potassium	4.6
	Sodium	43
	Specific Conductance x 4	800,790,800,790
	Sulfate	110

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Thomas Mendes, Manager, Technical Services
8/12/83 PAGE 4 OF 7 PAGE

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REPORT OF ANALYSIS

SAMPLES RECEIVED 7/21/83

CUSTOMER ORDER NUMBER

TYPE OF ANALYSIS Water for Total Organic Carbon

Sample Identification	Date Collected	mg/liter
MW1-A1	7/21/83	29
		28
		29
		29
MW2-A2	7/21/83	< 1
		< 1
		< 1
		< 1
MW3-A3	7/20/83	310
		310
		290
		260
MW4-A4	7/21/83	< 1
		< 1
		< 1
		< 1

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Thomas Mendes, Manager, Technical Services
8/12/83

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ATTENTION Cleoves Martinez
INVOICE NO. 308052

REPORT OF ANALYSIS

SAMPLES RECEIVED 7/21/83 | CUSTOMER ORDER NUMBER

TYPE OF ANALYSIS Water for Total Organic Halogens

Sample Identification	Date Collected	mg/liter
MW1-C1	7/20/83	4.4
		4.3
		4.4
		4.6
MW2-C2	7/21/83	3.0
		3.1
		3.2
		3.1
MW3-C3	7/20/83	15.0
		14.0
		14.0
		15.0
MW4-C4	7/21/83	3.3
		3.2
		3.2
		3.3

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CUSTOMER Sparton Southwest, Inc.
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CITY Albuquerque, NM 87103
ATTENTION Cleoves Martinez
INVOICE NO. 308052

REPORT OF ANALYSIS

SAMPLES RECEIVED 7/21/83

CUSTOMER ORDER NUMBER

TYPE OF ANALYSIS Water

Volatiles:	MW1-C1 ug/liter	MW2-C2 ug/liter	MW3-3 ug/liter	MW4-C4 ug/liter
Acrolein	ND	ND	ND	ND
Acrylonitrile	ND	ND	ND	ND
Benzene	ND	ND	24	ND
Bis (chloromethly) ether	ND	ND	ND	ND
Bromoform	ND	ND	ND	ND
Carbon tetrachloride	28	4.6	860	26
Chlorobenzene	ND	ND	7.4	ND
Chlorodibromethane	ND	ND	ND	ND
Chloroethane	ND	ND	ND	ND
2-Chloroethylvinyl ether	ND	ND	ND	ND
Chloroform	26	ND	66	ND
Dichlorobromomethane	ND	ND	ND	ND
Dichlorodifluoromethane	ND	ND	ND	ND
1,1-Dichloroethane	24	ND	41	23
1,2-Dichloroethane	7.8	ND	44	ND
1,1-Dichloroethylene	12.8	ND	660	ND
1,2-Dichloropropane	ND	ND	ND	ND
1,3-Dichloropropane	ND	ND	ND	ND
Ethylbenzene	7.4	ND	41	ND
Methyl bromide	ND	ND	ND	ND
Methyl chloride	ND	ND	ND	ND
Methylene chloride	3200	55	ND	171
1,1,2,2-Tetrachloroethane	9.5	ND	94	ND
Tetrachlorethylene	ND	ND	59	ND
Toluene	390	140	910	150
1,2-Trans-dichlorothylene	ND	ND	ND	ND
1,1,1-Trichloroethane	120	20	2800	120
1,1,2-Trichloroethane	6.3	ND	46	ND
Trichloroethylene	440	47	3300	95
Trichlorofluoromethane	ND	ND	ND	ND
Vinyl chloride	ND	ND	ND	ND

APPROVED BY Thomas Mendes
Thomas Mendes, Manager of Technical Service
8/12/83

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Rocky Mountain Analytical Laboratory

January 3, 1984

Cleovis Martinez
Sparton Technology
9621 Coors Road NW
Albuquerque, NM 87114

Dear Cleovis:

Enclosed are the results for the analysis of the twelve samples received December 3, 1983 and the one sample received December 15, 1983. Not included are the herbicide results for MW-1, MW-2, and MW-3 and the radiochemical results for MW-3. These results will be phoned to you by the close of business January 5. Based on our conversation this week, the gross alpha and beta results for MW-1 appear to be an anomaly. The results will be verified and also phoned to you by January 5.

Included with the results is a list of standard methodologies and nominal detection limits. Please call if you have any questions.

Best regards,

Mark J. Bollinger /cw

Mark J. Bollinger, Ph.D.
Senior Scientist
Inorganic Chemistry

MJB/tma
Enclosure

RMA # 3339

Note to file:
Missing results noted in letter were called in. I entered them by hand on this report. ZSB

SAMPLE DESCRIPTION INFORMATION

for

Sparton Technology

RMA Sample No.	Sample Description	Sample Type	Date Sampled	Date Received
3339-01	MW-1	water	12-01-83	12-03-83
3339-02	MW-2	water	12-01-83	12-03-83
3339-03	MW-4	water	12-01-83	12-03-83
3339-04	MW-5	water	12-01-83	12-03-83
3339-05	MW-6	water	12-01-83	12-03-83
3339-06	MW-7	water	12-01-83	12-03-83
3339-07	MW-8	water	12-01-83	12-03-83
3339-08	MW-9	water	12-01-83	12-03-83
3339-09	MW-10	water	12-01-83	12-03-83
3339-10	MW-11	water	12-01-83	12-03-83
3319-11	QC Standard	water	12-01-83	12-03-83
3339-12	Distilled water blank	water	12-01-83	12-03-83
3339-13	MW-3	water	12-14-83	12-15-83

January 3, 1984

ANALYTICAL RESULTS

for

Sparton Technology

MAJOR IONS

Parameter	Units	Detection Limit	mw1 3339-01	Up mw2 3339-02	mw3 3339-03	mw4 3339-13
Sodium	mg/l	0.5	150	50	86	200
Chloride	mg/l	3	1400	25	52	650
Fluoride	mg/l	0.1	0.90	0.35	0.54	0.94
Sulfate	mg/l	5	220	78	91	694
Nitrate + Nitrite as N	mg/l	0.1	2.8	3.0	1.6	11

RADIOCHEMISTRY

Parameter	Units	Detection Limit	3339-01	3339-02	3339-03	3339-13
Gross Alpha	pCi/l	0.1	9 ± 5	15 ± 4	8.3 ± 2.8	9 ± 5
Gross Beta	pCi/l	0.1	15 ± 5	21 ± 3	12 ± 2	10 ± 5
Radium 226	pCi/l	0.1	1.6 ± 0.5	0.1 ± 0.3	2.6 ± 0.6	1.2 ± 0.[illegible]

ND = Not detected.

ANALYTICAL RESULTS

for

Sparton Technology

INORGANIC PARAMETERS

Parameter	Units	Detection Limit	mw1 3339-01	up mw2 3339-02	mw[illegible] 3339-03	mw3 3339-13
pH						
Value 1	units	0.01	7.27	7.93	7.89	7.31
Value 2	units	0.01	7.29	7.94	7.90	7.30
Value 3	units	0.01	7.31	7.95	7.90	7.31
Value 4	units	0.01	7.35	7.93	7.90	7.32
Specific Conductance at 25°C						
Value 1	umhos/cm	1	4420	702	789	3440
Value 2	umhos/cm	1	4440	695	799	3450
Value 3	umhos/cm	1	4430	689	798	3450
Value 4	umhos/cm	1	4440	694	795	3440
Ortho-Phosphate as P	mg/l	0.01	ND	0.015	ND	0.02
Total Organic Carbon						
Value 1	mg/l	0.1	45	5.3	4.6	210
Value 2	mg/l	0.1	45	5.8	5.0	21
Value 3	mg/l	0.1	45	5.6	4.6	210
Value 4	mg/l	0.1	45	5.1	4.8	210
Ammonia as N	mg/l	0.1	35	ND	ND	18
Phenolics	mg/l	0.01	ND	ND	ND	0.014

ND = Not detected.

ANALYTICAL RESULTS

for

Sparton Technology

TRACE METALS

Parameter	Units	Detection Limit	MW1 3339-01	Up MW2 3339-02	MW3 3339-03	MW4 3339-13
Arsenic	mg/l	0.002	ND	0.004	0.012	0.004
Barium	mg/l	0.005	0.066	0.071	0.063	0.12
Boron	mg/l	0.004	5.7	0.12	1.1	26
Cadmium	mg/l	0.002	0.005	0.004	0.002	ND
Chromium	mg/l	0.005	31	ND	ND	2.0
Copper	mg/l	0.002	0.069	ND	ND	0.004
Iron	mg/l	0.05	ND	ND	ND	ND
Lead	mg/l	0.025	ND	ND	ND	ND
Manganese	mg/l	0.005	2.0	0.013	0.23	0.74
Mercury	mg/l	0.0002	ND	ND	ND	ND
Nickel	mg/l	0.01	0.072	ND	0.011	0.53
Selenium	mg/l	0.002	ND	ND	ND	0.003
Silver	mg/l	0.003	ND	ND	ND	ND
Tin	mg/l	0.03	0.037	ND	ND	ND
Zinc	mg/l	0.004	ND	ND	ND	0.006

ND = Not detected.

ANALYTICAL RESULTS

for

Sparton Technology

ORGANICS

Parameter	Units	Detection Limit	MW1 3339-01	MW2 3339-02	MW4 3339-03	MW 3 3339-13
SWDA Pesticides						
Lindane	ug/l	0.004	ND	ND	ND	ND
Endrin	ug/l	0.009	ND	ND	ND	ND
Methoxychlor	ug/l	0.25	ND	ND	ND	ND
Toxaphene	ug/l	0.40	ND	ND	ND	ND
SDWA Herbicides						
2,4-D	ug/l	0.1	ND	ND	ND	ND
Silvex	ug/l	0.05	ND	ND	ND	ND
Total Organic Halogen						
Value 1	ug Cl^-/l	25	21000	810	3470	45100
Value 2	ug Cl^-/l	25	21900	830	3310	46600
Value 3	ug Cl^-/l	25	20800	900	3360	31700
Value 4	ug Cl^-/l	25	20400	990	3130	41800

ND = Not detected.

ANALYTICAL RESULTS

for

Sparton Technology

VOLATILE ORGANICS

Parameter	Units	Detection Limit	mw 1 3339-01	mw 2 3339-02	mw 4 3339-03	mw 6 3339-05	mw 11 3339-10	mw 3 3339-13
1V ◦ Acrolein	ug/l	1000	ND	ND	ND	ND	ND	ND
2V ◦ Acrylonitrile	ug/l	1000	ND	ND	ND	ND	ND	ND
3V Benzene	ug/l	50	95	ND	ND	ND	ND	75
4V ◦ Bis(chloromethyl)ether	ug/l	50	ND	ND	ND	ND	ND	ND
5V Bromoform	ug/l	50	ND	ND	ND	ND	ND	ND
6V ◦ Carbon tetrachloride	ug/l	50	ND	ND	ND	ND	ND	ND
7V ◦ Chlorobenzene	ug/l	50	ND	ND	ND	ND	ND	ND
8V ◦ Chlorodibromomethane	ug/l	50	ND	ND	ND	ND	ND	ND
9V ◦ Chloroethane	ug/l	100	ND	ND	ND	ND	ND	ND
10V ◦ 2-Chloroethyl vinyl-ether	ug/l	50	ND	ND	ND	ND	ND	ND
11V Chloroform	ug/l	50	270	ND	ND	ND	ND	87
12V ◦ Dichlorobromomethane	ug/l	50	ND	ND	ND	ND	ND	ND
13V ◦ Dichlorodifluoromethane	ug/l	100	ND	ND	ND	ND	ND	ND
14V 1,1-Dichloroethane	ug/l	50	64	ND	ND	ND	ND	ND
15V 1,2-Dichloroethane	ug/l	50	ND	ND	ND	ND	ND	ND
16V 1,1-Dichloroethylene	ug/l	50	3400	490	2000	ND	ND	4900
17V ◦ 1,2-Dichloropropane	ug/l	50	ND	ND	ND	ND	ND	ND
18V ◦ 1,3-Dichloropropylene	ug/l	50	ND	ND	ND	ND	ND	ND
19V Ethylbenzene	ug/l	50	110	ND	ND	ND	ND	91
20V ◦ Methylbromide	ug/l	100	ND	ND	ND	ND	ND	ND
21V ◦ Methylchloride	ug/l	100	ND	ND	ND	ND	ND	ND
22V Methylene Chloride	ug/l	100	18000	ND	1600	ND	420	33000
23V ◦ 1,1,2,2-Tetrachloro-ethane	ug/l	50	ND	ND	ND	ND	ND	ND
24V Tetrachloroethylene	ug/l	50	94	ND	ND	ND	ND	240
25V Toluene	ug/l	50	3200	ND	74	ND	91	4600
26V ◦ 1,2-trans-Dichloro-ethylene	ug/l	50	ND	ND	ND	ND	ND	ND
27V 1,1,1-Trichloroethane	ug/l	50	4500	900	3900	ND	130	14000
28V ◦ 1,1,2-Trichloroethane	ug/l	50	ND	ND	ND	ND	ND	ND
29V Trichloroethylene	ug/l	50	33000	2500	7300	560	840	41000
30V ◦ Trichlorofluoromethane	ug/l	100	ND	ND	ND	ND	ND	ND
31V Vinyl chloride	ug/l	100	ND	ND	ND	ND	ND	ND

ND = Not detected

ANALYTICAL RESULTS

for

Sparton Technology

VOLATILE ORGANICS

Parameter	Units	Detection Limit	mw 5 3339-04	mw 7 3339-06	mw 8 3339-07	mw 9 3339-08	mw 10 3339-09	QC 3339-11	H.O 3339-12
1V Acrolein	ug/l	100	ND	ND	ND	ND	ND	ND	ND
2V Acrylonitrile	ug/l	100	ND	ND	ND	ND	ND	ND	ND
3V Benzene	ug/l	5	ND	ND	ND	20	ND	57	ND
4V Bis(chloromethyl)ether	ug/l	5	ND	ND	ND	ND	ND	ND	ND
5V Bromoform	ug/l	5	ND	ND	ND	ND	ND	ND	ND
6V Carbon tetrachloride	ug/l	5	ND	ND	ND	ND	ND	ND	ND
7V Chlorobenzene	ug/l	5	ND	ND	ND	ND	ND	ND	ND
8V Chlorodibromomethane	ug/l	5	ND	ND	ND	ND	ND	ND	ND
9V Chloroethane	ug/l	10	ND	ND	ND	ND	ND	ND	ND
10V 2-Chloroethyl vinyl-ether	ug/l	5	ND	ND	ND	ND	ND	ND	ND
11V Chloroform	ug/l	5	ND	ND	ND	ND	ND	31	ND
12V Dichlorobromomethane	ug/l	5	ND	ND	ND	ND	ND	ND	ND
13V Dichlorodifluoromethane	ug/l	10	ND	ND	ND	ND	ND	ND	ND
14V 1,1-Dichloroethane	ug/l	5	7	ND	ND	130	ND	ND	ND
15V 1,2-Dichloroethane	ug/l	5	ND	ND	ND	ND	ND	35	ND
16V 1,1-Dichloroethylene	ug/l	5	18	17	ND	2500	ND	ND	ND
17V 1,2-Dichloropropane	ug/l	5	ND	ND	ND	ND	ND	ND	ND
18V 1,3-Dichloropropylene	ug/l	5	ND	ND	ND	ND	ND	ND	ND
19V Ethylbenzene	ug/l	5	ND	ND	ND	13	ND	ND	ND
20V Methylbromide	ug/l	10	ND	ND	ND	ND	ND	ND	ND
21V Methylchloride	ug/l	10	ND	ND	ND	ND	ND	ND	ND
22V Methylene Chloride	ug/l	10	ND	ND	ND	9100	ND	93	ND
23V 1,1,2,2-Tetrachloro-ethane	ug/l	5	ND	ND	ND	ND	ND	ND	ND
24V Tetrachloroethylene	ug/l	5	ND	ND	ND	54	ND	ND	ND
25V Toluene	ug/l	5	45	5	ND	1200	ND	83	ND
26V 1,2-trans-Dichloro-ethylene	ug/l	5	ND	ND	ND	ND	ND	ND	ND
27V 1,1,1-Trichloroethane	ug/l	5	79	14	7	15000	8	23	ND
28V 1,1,2-Trichloroethane	ug/l	5	ND	ND	ND	ND	ND	30	ND
29V Trichloroethylene	ug/l	5	170	83	42	21000	27	ND	ND
30V Trichlorofluoromethane	ug/l	10	ND	ND	ND	ND	ND	ND	ND
Vinyl chloride	ug/l	10		ND	ND	ND	ND	ND	ND

ND = Not detected.

Volatile Non-Priority Pollutants Detected

Parameter	Units	Detection Limit	mw 1 3339-01	mw 2 3339-02	mw 4 3339-03	mw 5 3339-04	mw 6 3339-05	mw 7 3339-06	mw 8 3339-07
Acetone	ug/l	10	5900	ND	290	160	ND	ND	ND
Trichlorotri-fluoroethane (Freon)	ug/l	5	170	190	280	ND	ND	ND	ND
Ethanol	ug/l	100	ND	ND	ND	1900	ND	ND	ND
2-Hexanone	ug/l	10	1500	ND	ND	ND	ND	ND	ND
o-Xylene	ug/l	5	150	ND	ND	ND	ND	ND	ND
Dimethyl-benzene	ug/l	5	77	ND	ND	ND	ND	ND	ND
Methyl ethyl ketone	ug/l	10	ND	ND	ND	ND	ND	ND	ND
Isopropyl alcohol	ug/l	10	ND	ND	ND	ND	ND	ND	ND
Glycol ethers	ug/l	100	ND	ND	ND	ND	ND	ND	ND

Detection limits for samples 3348-01, -02, -03, -05, -10, -13 should be multiplied by a factor of 10 due to the dilutions required.

ND = Not Detected

Volatile Non-Priority Pollutants Detected (Con't)

Parameter	Units	Detection Limit	mw 9 3339-08	mw 10 3339-09	mw 11 3339-10	QC 3339-11	H_2O 3339-12	mw3 3339-13
Acetone	ug/l	10	2300	ND	ND	ND	ND	290,000
Trichlorotri-fluoroethane (Freon)	ug/l	5	ND	ND	ND	ND	ND	310
Ethanol	ug/l	100	ND	ND	ND	ND	ND	2100
2-Hexanone	ug/l	10	170	ND	ND	ND	ND	ND
o-Xylene	ug/l	5	31	ND	ND	ND	ND	56
Dimethyl-benzene	ug/l	5	ND	ND	ND	ND	ND	ND
Methyl ethyl ketone	ug/l	10	ND	ND	ND	ND	ND	ND
Isopropyl alcohol	ug/l	10	ND	ND	ND	ND	ND	ND
Glycol ethers	ug/l	10	ND	ND	ND	ND	ND	ND

Detection limits for samples 3348-01,-02,-03,-05,-10,-13 should be multiplied by a factor of 10 due to the dilutions required.

ND = Not Detected

ANALYTICAL RESULTS

for

Sparton Technology

MAJOR IONS

Parameter	Units	Detection Limit	mw 5 3339-04	mw 6 3339-05	mw 7 3339-06	mw 8 3339-07	mw 9 3339-08	mw 10 3339-09	mw 11 3339-10
Sodium	mg/l	0.5	93	86	56	81	165	45	49
Chloride	mg/l	3	22	38	116	18	400	26	30
Fluoride	mg/l	0.1	1.05	0.56	0.70	0.76	0.38	0.29	0.32
Sulfate	mg/l	5	81	95	39	65	340	95	97
Nitrate + Nitrite as N	mg/l	0.1	0.9	10	0.4	1.7	ND	0.1	ND

TRACE METALS

Parameter	Units	Detection Limit	5 3339-04	6 3339-05	7 3339-06	8 3339-07	9 3339-08	10 3339-09	11 3339-10
Iron	mg/l	0.05	ND	ND	ND	ND	ND	ND	ND
Manganese	mg/l	0.005	0.37	0.032	0.089	0.098	3.4	0.75	0.76

INORGANIC PARAMETERS

Parameter	Units	Detection Limit	5 3339-04	6 3339-05	7 3339-06	8 3339-07	9 3339-08	10 3339-09	11 3339-10
pH	units	0.01	8.00	7.97	7.94	8.05	7.36	8.03	7.89
Specific Conductance at 25°C	umhos/cm	1	688	821	507	579	2320	694	741
Ortho-Phosphate as P	mg/l	0.01	ND	0.016	ND	0.025	ND	0.013	ND
Total Organic Carbon	mg/l	0.1	21	7.8	80	15	29	7.6	18
Ammonia as N	mg/l	0.1	ND	ND	ND	ND	ND	0.1	ND

ND = Not Detected

ROCKY MOUNTAIN ANALYTICAL LABORATORY

Organic Analytical Methodology

Parameter	Units	Nominal Detection Limit[a]	Methodology	Reference[1]	Preservation Bottle No.	Maximum Holding Time[b]
Purgeables	ug/l	1	Purge & Trap GC/MS	624	11	14 days
Base/Neutrals	ug/l	10	Extraction/GC/MS	625	12	7 days/40 days
Acids	ug/l	10	Extraction/GC/MS	625	12	7 days/40 days
Organochlorine Pesticides/PCB's	ug/l	0.01	Extraction/GC/ECD	608	13	7 days/40 days
		10	Extraction/GC/MS	625	12	7 days/40 days
Phenoxy Herbicides	ug/l	0.01	Extraction/GC/ECD	(2)	14	7 days/40 days
Total Organic Halogen (TOX)	ug/l	5	Adsorbtion/Coulometric	450.1(3)	15	-
Trihalomethanes (THM)	ug/l	1	Extraction/GC/ECD	(4)	11	14 days
		1	Purge & Trap GC/MS	(4)	11	14 days
Dioxin	ug/l	0.005	Extraction/GC/MS/ECD	613	16	7 days/40 days
Purgeable Halocarbons	ug/l	0.01	Purge & Trap/GC/Hall	601	11	14 days
Purgeable Aromatics	ug/l	1	Purge & Trap/GC/FID	602	17	14 days
Acrolein & Acrylonitrile	ug/l	100	Purge & Trap/GC/FID	603	18	14 days
Phenols by GC	ug/l	10	Extraction/GC/FID	604	16	7 days/40 days
Benzidines	ug/l	0.1	Extraction/HPLC	605	19	7 days/40 days
Phthalate Esters	ug/l	10	Extraction/GC/FID	606	12	7 days/40 days
Nitrosamines	ug/l	1	Extraction/GC/NPD	607	20	7 days/40 days
Nitroaromatics/isophorone	ug/l	1	Extraction/GC/FID & GC/ECD	609	12	7 days/40 days
Polynuclear Aromatics	ug/l	0.5	Extraction/HPLC	610	20	7 days/40 days
Haloethers	ug/l	1	Extraction/GC/Hall	611	17	7 days/40 days
Chlorinated Hydrocarbons	ug/l	0.02	Extraction/GC/ECD	612	12	7 days/40 days
Organophosphorus Pesticides	ug/l	0.1	Extraction/GC/NPD	622(5)	12	7 days/40 days
Triazine Pesticides	ug/l	0.1	Extraction/GC/NPD	(6)	12	7 days/40 days

References

(1) Federal Register, Vol. 44, No. 233, Monday, December 3, 1979.
(2) "Method for Chlorinated Phenoxy Acid Herbicides in Industrial Effluents," Federal Register, Vol. 38, No. 75, Part II.
(3) "Total Organic Halide," US EPA-EMSL, Cincinnati, November, 1980.
(4) Federal Register, Vol. 44, No. 231, Thursday, November 29, 1979, Appendix, Part I.
(5) "Method 622- Organophosphorus Pesticides," Proposed EPA Method, 304 (h) Committee.
(6) Federal Register, Vol. 38, No. 75, 1973.

Notes

[a] Nominal values are the best achievable with the listed analytical method for a typical component. Interferrences in specific samples may result in a higher detection limit.

[b] Applicable to NPDES Wastes as updated by Robert C. Booth, Director, EMSL-Cincinnati, September 22, 1981. Where two times are given, the first refers to the time to extraction, the second to the time of instrumental analysis.

ROCKY MOUNTAIN ANALYTICAL LABORATORY

Organic Analytical Methodology (continued)

Preservation Bottle No.	Parameter Group	Bottle	Preservation
11	Purgeables	40 ml glass with teflon lined silicone septum cap	4°C (thiosulfate if Cl_2 present)
17	Purgeables	40 ml glass with teflon lined silicone septum cap	4°C, HCl to pH less than 2 (thiosulfate if Cl_2 present)
18	Purgeables	40 ml glass with teflon lined silicone septum cap	4°C, adjust pH to 4 - 5 (thiosulfate if Cl_2 present)
16	Extractables	1 liter glass with teflon lined cap	4°C (thiosulfate if Cl_2 present)
19	Extractables	1 liter glass with teflon lined cap	4°C, adjust pH to 2 - 7 (thiosulfate if Cl_2 present)
12, 13, 14	Extractables	1 liter glass with teflon lined cap	4°C
20	Extractables	1 liter glass with teflon lined cap	4°C, store in dark (thiosulfate is Cl_2 present)
15	TOX	250 ml glass with teflon lined cap, single 1 liter glass with teflon lined cap, quad.	4°C, store in dark (thiosulfate if Cl_2 present)

ROCKY MOUNTAIN ANALYTICAL LABORATORY

Inorganic Analytical Methodology

Parameter	Units	Nominal Detection Limit[a]	Methodology	Reference	Preservation Bottle No.	Maximum Holding Time[b]
MAJOR IONS						
Sodium	mg/l	0.5	ICP Emission Spectroscopy	3	4	6 months
Potassium	mg/l	0.3	ICP Emission Spectroscopy	3	4	6 months
Calcium	mg/l	0.1	ICP Emission Spectroscopy	3	4	6 months
Magnesium	mg/l	0.1	ICP Emission Spectroscopy	3	4	6 months
Chloride	mg/l	3	Manual Titrimetric, $Hg(NO_3)_2$	1-325.3/2-407B	1	28 days
			Automated Colorimetric Ferricyanide	1-325.2	1	28 days
Fluoride	mg/l	0.1	Electrode	1-340.2/2-413B	1	28 days
Sulfate	mg/l	5	Manual Turbidimetric	1-375.4/2-426C	1	28 days
			Automated Colorimetric MTB	1-375.2	1	28 days
Total Alkalinity as $CaCO_3$ at pH 4.5	mg/l	5	Titrimetric	1-310.1/2-403	1	14 days
Carbonate Alkalinity as $CaCO_3$ at pH 8.3	mg/l	5	Titrimetric	1-310.1/2-403	1	14 days
Bicarbonate Alkalinity as $CaCO_3$ at pH 4.5	mg/l	5	Titrimetric	1-310.1/2-403	1	14 days
Hydroxide Alkalinity as $CaCO_3$	mg/l	5	Calculation	2-403	-	-
Nitrate+Nitrite as N	mg/l	0.1	Manual Cd Reduction - Colorimetric	1-353.3/2-418C	2	28 days
		0.1	Automated Cd Reduction - Colorimetric	1-353.2	2	28 days
Total Cations	meq/l	0.1	Calculation	2-104C	-	-
Total Anions	meq/l	0.1	Calculation	2-104C	-	-
Difference	%	0.1	Calculation	2-104C	-	-
RADIOCHEMISTRY						
Gross Alpha	pCi/l	0.1	Proportional Counter	2-703	5	6 months
Gross Beta	pCi/l	0.1	Proportional Counter	2-703	5	6 months
Radium 226	pCi/l	0.1	Separation - Counter	2-705	5	6 months
Radium 228	pCi/l	0.1	Separation - Counter	2-707	5	6 months
Uranium	mg/l	0.005	Fluorimetric	4-D2907-75	5	6 months

ROCKY MOUNTAIN ANALYTICAL LABORATORY

Inorganic Analytical Methodology (Continued)

Parameter	Units	Nominal Detection Limit[a]	Methodology	Reference	Preservation Bottle No.	Maximum Holding Time[b]
TRACE METALS[c]						
Aluminum	mg/l	0.05	ICP Emission Spectroscopy	3	4	6 months
Antimony	mg/l	0.002	Furnace Atomic Absorption	1-204.2	4	6 months
Arsenic	mg/l	0.002	Furnace Atomic Absorption	1-206.2	4	6 months
Barium	mg/l	0.005	ICP Emission Spectroscopy	3	4	6 months
Beryllium	mg/l	0.001	ICP Emission Spectroscopy	3	4	6 months
Boron	mg/l	0.004	ICP Emission Spectroscopy	3	4	6 months
Cadmium	mg/l	0.002	ICP Emission Spectroscopy	3	4	6 months
Chromium	mg/l	0.005	ICP Emission Spectroscopy	3	4	6 months
Cobalt	mg/l	0.003	ICP Emission Spectroscopy	3	4	6 months
Copper	mg/l	0.002	ICP Emission Spectroscopy	3	4	6 months
Iron	mg/l	0.05	ICP Emission Spectroscopy	3	4	6 months
Lead	mg/l	0.025	ICP Emission Spectroscopy	3	4	6 months
		0.001	Furnace Atomic Absorption	1-239.2	4	6 months
Manganese	mg/l	0.005	ICP Emission Spectroscopy	3	4	6 months
Mercury	mg/l	0.0002	Cold Vapor Atomic Absorption	1-245.1	4	6 months
Molybdenum	mg/l	0.005	ICP Emission Spectroscopy	3	4	6 months
Nickel	mg/l	0.01	ICP Emission Spectroscopy	3	4	6 months
Selenium	mg/l	0.002	Furnace Atomic Absorption	1-270.2	4	6 months
Silver	mg/l	0.003	ICP Emission Spectroscopy	3	4	6 months
Strontium	mg/l	0.005	ICP Emission Spectroscopy	3	4	6 months
Thallium	mg/l	0.002	Furnace Atomic Absorption	1-279.2	4	6 months
Tin	mg/l	0.03	ICP Emission Spectroscopy	3	4	6 months
Titanium	mg/l	0.002	ICP Emission Spectroscopy	3	4	6 months
Vanadium	mg/l	0.002	ICP Emission Spectroscopy	3	4	6 months
Zinc	mg/l	0.004	ICP Emission Spectroscopy	3	4	6 months
INORGANIC PARAMETERS						
pH	units	0.01	Meter	1-150.1; 2-423	1	ASAP
Specific Conductance at 25°C	umhos/cm	1	Bridge	1-120.1; 2-205	1	28 days
Total Dissolved Solids	mg/l	10	Gravimetric, 180°C	1-160.1; 2-209B	1	7 days
Total Suspended Solids	mg/l	2	Gravimetric, 105°C	1-160.2	1	7 days
Total Solids	mg/l	10	Gravimetric, 105°C	1-160.3	1	7 days
Total Volatile Solids	mg/l	10	Gravimetric, 550°C	1-160.4	1	7 days
Ortho-Phosphate as P	mg/l	0.01	Single Reagent Colorimetric	1-365.2; 2-424F	1	48 hours

ROCKY MOUNTAIN ANALYTICAL LABORATORY

Inorganic Analytical Methodology (Continued)

Parameter	Units	Nominal Detection Limit[a]	Methodology	Reference	Preservation Bottle No.	Maximum Holding Time[b]
INORGANIC PARAMETERS (Continued)						
Total Phosphorus as P	mg/l	0.06	Digestion; ICP Emission Spectroscopy	1-4.1.4; 3	4	28 days
		0.01	Digestion - Colorimetric	1-365.2; 1-424C,F	2	28 days
Silica as SiO_2	mg/l	0.1	ICP Emission Spectroscopy	3	4	28 days
	mg/l	1	Colorimetric	1-370.1; 2-425C	1	28 days
Biological Oxygen Demand	mg/l	2	Dilution Bottle - D.O. Probe	1-405.1; 2-507	1	48 hours
Chemical Oxygen Demand	mg/l	5	Micro Colorimetric	1-410.4; 2-508A	2	28 days
Total Organic Carbon	mg/l	0.1	Oxidation-Infrared Absorption	1-415.1; 2-505	2	28 days
Ammonia as N	mg/l	0.1	Electrode	1-350.3; 2-417E	2	28 days
		0.1	Automated Colorimetric	1-350.1	2	28 days
Total Kjeldahl Nitrogen as N	mg/l	0.1	Digestion - Electrode	1-351.4; 2-420B	2	28 days
		0.1	Digestion - Colorimetric	1-351.2	2	28 days
Total Organic Nitrogen as N	mg/l	0.1	Calculation (TKN - NH_3)	-	-	-
Oil and Grease	mg/l	1	Freon Extraction-Gravimetric	1-413.1; 2-503A	3	28 days
Free Cyanide	mg/l	0.01	Chlorination-Distillation-Colorimetric	1-335.1; 2-412F,D	6	14 days
Total Cyanide	mg/l	0.01	Distillation - Colorimetric	1-335.2; 2-412B,D	6	14 days
Phenolics	mg/l	0.01	Distillation - Colorimetric	1-420.1; 2-510A,B	2	28 days
Fecal Coliform	Colonies/100 ml	1	Membrane Filter	2-909C	8	ASAP
Total Coliform	Colonies/100 ml	1	Membrane Filter	2-909A	8	ASAP
Bromide	mg/l	0.1	Colorimetric	2-405	1	28 days
Residual Chlorine	mg/l	0.05	Amperometric	1-330.2; 2-408C	1	ASAP
Hexavalent Chromium	mg/l	0.01	Colorimetric	1-218.4; 2-312B	1	24 hours
Color	units	5	Pt-Co Colorimetric	1-110.2; 2-204A	1	48 hours
Hardness as $CaCO_3$	mg/l	5	Calculation	2-314A	4	6 months
Nitrite as N	mg/l	0.01	Colorimetric	1-354.1; 2-419	1	48 hours
Sulfide	mg/l	0.05	Titrimetric - Electrode	1-376.1; 2-427B,D	7	7 days
Sulfite	mg/l	2	Titrimetric	1-377.1; 2-428	1	ASAP
MBAS (Surfactants)	mg/l	0.1	Colorimetric	1-425.1; 2-512A	1	48 hours
Turbidity	NTU	0.1	Turbidimeter	1-180.1; 2-214A	1	48 hours

ROCKY MOUNTAIN ANALYTICAL LABORATORY

Inorganic Analytical Methodology (Continued)

References

(1) "Methods for Chemical Analysis of Water and Wastes", EPA-600/4-79-020, EMSL, Cincinnati, 1979.

(2) "Standard Methods for the Examination of Water and Wastewater", 15th Edition, APHA, 1980.

(3) Federal Register, 40 CFR 136, December 3, 1979; USEPA EMSL-Cincinnati, OH 45268.

(4) "Annual Book of ASTM Standards", Part 31, Water, 1980.

Notes

[a] Nominal values are the best achievable with the listed analytical method. Interferences in specific samples may result in a higher detection limit.

[b] Applicable to NPDES wastes as updated by Robert C. Booth, Director, EMSL-Cincinnati, September 22, 1981.

[c] Digestion procedure 1-4.1.4 used for elements determined by ICP Emission Spectroscopy when determining total metals. Digestion procedures for graphite furnace elements included with reference listed.

11/10/82

GUIDELINES FOR SAMPLE BOTTLES AND PRESERVATIVES[a]

Bottle No.	Parameters	Container	Preservative	Notes
1	Cl^-, F^-, $SO_4^=$, Tot. Alk., $CO_3^=$ Alk., HCO_3^- Alk., OH^- Alk., pH, spec. cond., TDS, TSS, TS, TVS, o-PO_4 SiO_2, BOD, Br^-, res. Cl_2, Cr^{+6}, color, NO_2^-, $SO_3^=$, MBAS, Turbidity.	1 liter poly	4° C	Provide unfiltered sample for solids and turbidity.
2	Tot. P, COD, TOC, NH_3, TKN, TON, Phenolics $NO_3 + NO_2$.	500 ml poly	2 ml 50% H_2SO_4, 4°C	
3	O & G	1 liter glass	4 ml 50% H_2SO_4, 4°C	Do not filter, collect directly in bottle.
4	Na, K, Ca, Mg, Al, Sb, As, Ba, Be, B, Cd, Cr, Co, Cu, Fe, Pb, Mn, Hg, Mo, Ni, Se, Ag, Sr, Tl, Sn, Ti, V, Zn, ICP, Hardness.	500 ml poly	5 ml 50% HNO_3	Provide separate samples for total and dissolved sample (filter before adding to bottle.)
5	Alpha, Beta, Ra^{226}, Ra^{228}, U	1 liter poly (no Ra^{228}) ½ gallon poly (with Ra^{228})	10 ml 50% HNO_3 20 ml 50% HNO_3	
6	Free CN, Tot. CN	500 ml poly	2 ml 50% NaOH, 4°C	
7	Sulfide	250 ml poly	1 ml 1 N Zn acetate, 1 ml 50% NaOH, 4°C	
8	Fecal coli., total coli.	8 oz. sterile	4° C	Collect directly in sterile bottle
11	VOA, purgeable organics, THM	2 - 40 ml glass vial	4° C	Completely fill bottle, leave no air bubbles.
12	B/NA	1 liter glass	4° C	
13	Pest./PCB	1 liter glass	4° C	
14	Herbicides	1 liter glass	4° C	
15	TOX	1 liter glass	4° C	

[a]Federal Register, 40 CFR 136, December 3, 1979, as updated by EPA, EMSL-Cincinnati, September 22, 1981.

11/5/82

Rocky Mountain Analytical Laboratory

April 4, 1984

Terry Boone
Sparton Technology
9621 Coors Road, N.W.
Albuquerque, NM 87114

Dear Terry:

Enclosed are the results for the analysis of the four water samples received March 14-15, 1984. The concentration determined for MW-1 are very consistent with the December sampling. MW-2 appears unchanged except for a marked increase in the TOX concentration. A number of parameters, including specific conductance, total organic carbon, total organic halogen, chloride, sulfate, arsenic and manganese increased significantly in MW-3. In MW-4, increases in specific conductance, TOC and TOX were observed.

Included with the results is a list of standard methodologies and nominal detection limits. Please call if you have any questions.

Best regards,

Mark J. Bollinger, Ph.D.
Manager
Inorganic Chemistry

MJB/tma
Enclosure

RMA # 3580

SAMPLE DESCRIPTION INFORMATION

for

Sparton Technology

RMA Sample No.	Sample Description	Sample Type	Date Sampled	Date Received
3580-01	MW-1	Water	3/13/84	3/14/84
3580-02	MW-3	Water	3/13/84	3/14/84
3580-03	MW-2	Water	3/14/84	3/15/84
3580-04	MW-4	Water	3/14/84	3/15/84

April 4, 1984

List (4 pages) Transmittal letter RDM FRS GED, April 11, 84

ANALYTICAL RESULTS

for

Sparton Technology

INORGANIC PARAMETERS

Parameter	Units	Detection Limit	3580-01	3580-02	3580-03	3580-04
pH						
Value 1	units	0.01	7.26	6.90	7.96	7.56
Value 2	units	0.01	NR	NR	7.98	NR
Value 3	units	0.01	NR	NR	7.97	NR
Value 4	units	0.01	NR	NR	7.98	NR
Specific Conductance at 25°C						
Value 1	umhos/cm	1	4470	5880	701	1190
Value 2	umhos/cm	1	NR	NR	695	NR
Value 3	umhos/cm	1	NR	NR	699	NR
Value 4	umhos/cm	1	NR	NR	691	NR
Sodium	mg/l	0.5	108	185	30	45
Fluoride	mg/l	0.1	ND*	ND*	0.5	0.4
Chloride	mg/l	3	1200	1200	26	60
Nitrate + Nitrite as N	mg/l	0.1	0.8	3.4	0.9	0.3
Sulfate	mg/l	5	270	1300	110	94
Total Organic Carbon						
Value 1	mg/l	0.1	44	330	3.4	13
Value 2	mg/l	0.1	NR	NR	3.8	NR
Value 3	mg/l	0.1	NR	NR	3.4	NR
Value 4	mg/l	0.1	NR	NR	3.4	NR
Total Organic Halogen						
Value 1	ug Cl^-/l	5	20,800	104,000	1880	8520
Value 2	ug Cl^-/l	5	NR	NR	1620	NR
Value 3	ug Cl^-/l	5	NR	NR	1780	NR
Value 4	ug Cl^-/l	5	NR	NR	1870	NR
Phenolics	mg/l	0.01	ND	0.03	ND	ND
Total Coliform	colonies/100 ml		ND	250	ND	ND

ND = Not detected. NR = Not requested. * Detection Limit of 2 mg/l

ANALYTICAL RESULTS

for

Sparton Technology

TRACE METALS

Parameter	Units	Detection Limit	3580-01	3580-02	3580-03	3580-04
Arsenic	mg/l	0.003	ND	0.019	0.006	0.012
Barium	mg/l	0.005	0.085	0.061	0.074	0.084
Cadmium	mg/l	0.002	ND	0.002	0.003	ND
Chromium	mg/l	0.005	34	2.6	ND	ND
Iron	mg/l	0.05	0.52	0.53	0.052	0.12
Lead	mg/l	0.025	ND	ND	ND	ND
Manganese	mg/l	0.005	2.0	3.2	0.030	1.0
Mercury	mg/l	0.0002	ND	ND	ND	ND
Selenium	mg/l	0.004	ND	ND	ND	ND
Silver	mg/l	0.003	0.004	ND	ND	ND

ND = Not detected. NR = Not requested.

ANALYTICAL RESULTS

for

Sparton Technology

ORGANICS

Parameter	Units	Detection Limit	3580-01	3580-02	3580-03	3580-04
SDWA Pesticides						
Lindane	ug/l	0.08	ND	ND	ND	ND
Endrin	ug/l	0.006	ND	ND	ND	ND
Methoxychlor	ug/l	0.25	ND	ND	ND	ND
Toxaphene	ug/l	0.24	ND	ND	ND	ND
SDWA Herbicides						
2,4-D	ug/l	0.1	ND	ND	ND	ND
Silvex	ug/l	0.05	ND	ND	ND	ND

ND = Not detected. NR = Not requested.

RADIOCHEMISTRY

Parameter	Units	Detection Limit	3580-01	3580-02	3580-03	3580-04
Gross Alpha	pCi/l	0.1	0±13	34±22	8±2	0±2
Gross Beta	pCi/l	0.1	32±13	0±15	6±1	4±2
Radium 226	pCi/l	0.1	1.1±0.5	1.1±0.4	0.5±0.4	0.6±0.5

ND = Not detected. NR = Not requested.

Rocky Mountain Analytical Laboratory

RECEIVED
AUG 15 1984
HLA - HOUSTON

August 8, 1984

Terry Boone
Sparton Technology
9621 Coors Rd., N.W.
Albuquerque, NM 87114

Dear Terry:

Enclosed are the results for the analysis of the four samples received June 21, 1984. The results appear consistent with previous samplings, although fluctuations in the total organic halogen levels were observed. There was some loss of volatile halogenated organics in the TOX analysis as can be observed by comparison with the volatile organics analysis. The values obtained in the latter analyses are probably more indicative of the concentrations present in the monitoring wells.

Please call if you have any questions.

Best Regards,

Mark J. Bollinger, Ph.D.
Manager
Inorganic Chemistry

MJB/cc
Enclosures

RMA # 3963

SAMPLE DESCRIPTION INFORMATION

for

Sparton Technology

RMA Sample No.	Sample Description	Sample Type	Date Sampled	Date Received
3963-01	MW-1	Water	6/20/84	6/21/84
3963-02	MW-2	Water	6/20/84	6/21/84
3963-03	MW-3	Water	6/20/84	6/21/84
3963-04	MW-4	Water	6/20/84	6/21/84
3963-05	VOA QC	Water		6/21/84

August 8, 1984

ANALYTICAL RESULTS

for

Sparton Technology

INORGANIC PARAMETERS

Parameter	Units	Detection Limit	3963-01	3963-02	3963-03	3963-04
pH, Val 1	units	0.01	7.07	7.75	6.80	7.23
pH, Val 2	units	0.01	NR	7.75	NR	NR
pH, Val 3	units	0.01	NR	7.76	NR	NR
pH, Val 4	units	0.01	NR	7.76	NR	NR
Specific Conductance at 25°C	umhos/cm	1	4570	704	5150	1470
Specific Conductance at 25°C	umhos/cm	1	NR	703	NR	NR
Specific Conductance at 25°C	umhos/cm	1	NR	690	NR	NR
Specific Conductance at 25°C	umhos/cm	1	NR	690	NR	NR
Fluoride	mg/l	0.1	1.0	ND	0.33	ND
Chloride	mg/l	3	1100	34	940	160
Nitrate + Nitrite as N	mg/l	0.1	2	3.4	3.4	0.9
Sulfate	mg/l	5	2100	108	990	219
Total Organic Carbon, Val 1	mg/l	0.1	26	1.1	140	9.1
Total Organic Carbon, Val 2	mg/l	0.1	NR	1.0	NR	NR
Total Organic Carbon, Val 3	mg/l	0.1	NR	1.0	NR	NR
Total Organic Carbon, Val 4	mg/l	0.1	NR	1.1	NR	NR
Total Organic Halogen, Val 1	ug Cl^-/l	5	32000	240	64000	23000
Total Organic Halogen, Val 2	ug Cl^-/l	5	NR	210	NR	NR
Total Organic Halogen, Val 3	ug Cl^-/l	5	NR	190	NR	NR
Total Organic Halogen, Val 4	ug Cl^-/l	5	NR	180	NR	NR
Phenolics	mg/l	0.01	ND	ND	0.01	ND
Total Coliform	colonies/100 ml		ND	ND	12	ND

ND = Not detected. NR = Not requested.

ANALYTICAL RESULTS

for

Sparton Technology

TRACE METALS

Parameter	Units	Detection Limit	3963-01	3963-02	3963-03	3963-04
Aluminum	mg/l	0.05	ND	ND	ND	ND
Antimony	mg/l					
Arsenic	mg/l					
Barium	mg/l	0.005	0.094	0.069	0.049	0.069
Boron	mg/l	0.004	4.78	0.12	42	5.8
Cadmium	mg/l	0.002	0.040	0.002	ND	ND
Chromium	mg/l	0.005	34	0.004	1.65	0.007
Copper	mg/l	0.002	ND	ND	0.008	ND
Iron	mg/l	0.05	ND	ND	ND	ND
Lead	mg/l	0.025	ND	ND	ND	ND
Manganese	mg/l	0.005	1.74	ND	4.3	2.9
Mercury	mg/l	0.0002	ND	ND	ND	ND
Nickel	mg/l	0.01	ND	ND	ND	ND
Sodium	mg/l	0.5	131	51	246	74
Selenium	mg/l					
Silver	mg/l	0.003	ND	ND	ND	ND
Tin	mg/l	0.03	ND	ND	0.03	ND
Vanadium	mg/l	0.002	0.040	0.006	0.006	0.002
Zinc	mg/l	0.004	ND	ND	0.005	ND

ND = Not detected. NR = Not requested.

*Detection limits 10x greater for Al, Ba, B, Cd, Cr, Cu, Fe, Pb, Mn, Ni, Na, Ag, Sn, V and Zn.

ANALYTICAL RESULTS

for

Sparton Technology

VOLATILE ORGANICS

Parameter		Units	Detection Limit	3963-01*	3963-02	3963-03	3963-04*	3963-05**
1V	Acrolein	ug/l	1000	ND	ND	ND	ND	ND
2V	Acrylonitrile	ug/l	1000	ND	ND	ND	ND	ND
3V	Benzene	ug/l	50	ND	ND	180	ND	ND
4V	Bis(chloromethyl)ether	ug/l	50	ND	ND	ND	ND	ND
5V	Bromoform	ug/l	50	ND	ND	ND	ND	ND
6V	Carbon tetrachloride	ug/l	50	ND	ND	ND	ND	ND
7V	Chlorobenzene	ug/l	50	ND	ND	90	ND	ND
8V	Chlorodibromomethane	ug/l	50	ND	ND	ND	ND	ND
9V	Chloroethane	ug/l	100	ND	ND	ND	ND	ND
10V	2-Chloroethylvinyl ether	ug/l	50	ND	ND	ND	ND	ND
11V	Chloroform	ug/l	50	ND	ND	320	ND	12
12V	Dichlorobromomethane	ug/l	50	ND	ND	ND	ND	ND
13V	Dichlorodifluoromethane	ug/l	100	ND	ND	ND	ND	ND
14V	1,1-Dichloroethane	ug/l	50	ND	ND	170	ND	ND
15V	1,2-Dichloroethane	ug/l	50	ND	ND	ND	ND	25
16V	1,1-Dichloroethylene	ug/l	50	2700	330	12000	2800	ND
17V	1,2-Dichloropropane	ug/l	50	ND	ND	ND	ND	ND
18V	1,3-Dichloropropylene	ug/l	50	ND	ND	ND	ND	ND
19V	Ethylbenzene	ug/l	50	ND	ND	220	ND	39
20V	Methylbromide	ug/l	100	ND	ND	ND	ND	ND
21V	Methylchloride	ug/l	100	ND	ND	ND	ND	ND
22V	Methylene chloride	ug/l	100	31000	ND	83000	12000	42
23V	1,1,2,2-Tetrachloroethane	ug/l	50	ND	ND	130	ND	ND
24V	Tetrachloroethylene	ug/l	50	ND	ND	640	ND	ND
25V	Toluene	ug/l	50	2100	ND	5400	ND	44
26V	1,2-trans-Dichloroethylene	ug/l	50	ND	ND	ND	ND	ND
27V	1,1,1-Trichloroethane	ug/l	50	4200	1000	41000	9100	90
28V	1,1,2-Trichloroethane	ug/l	50	ND	ND	ND	ND	ND
29V	Trichloroethylene	ug/l	50	30000	2000	72000	12000	ND
30V	Trichlorofluoromethane	ug/l	100	ND	ND	ND	ND	ND
31V	Vinyl chloride	ug/l	100	ND	ND	ND	ND	ND

ND = Not detected. NR = Not requested.

*The detection limits for 3963-01 and 3963-04 are twenty times (20x) those listed.

**The detection limits for 3963-05 are one tenth times (1/10x) those listed.

ANALYTICAL RESULTS

for

Sparton Technology

ORGANICS

Parameter	Units	Detection Limit	3963-01	3963-02	3963-03	3963-04
SDWA Pesticides						
Lindane	ug/l	0.04	ND	ND	ND	ND
Endrin	ug/l	0.06	ND	ND	ND	ND
Methoxychlor	ug/l	2.5	ND	ND	ND	ND
Toxaphene	ug/l	2.4	ND	ND	ND	ND
SDWA Herbicides						
2,4-D	ug/l	0.1	ND	ND	ND	ND
Silvex	ug/l	0.05	ND	ND	ND	ND

RADIOCHEMISTRY

Parameter	Units	Detection Limit	3963-01	3963-02	3963-03	3963-04
Gross Alpha	pCi/l	0.1	7.7±69	8.9±8.6	35.2±55	7.7±14
Gross Beta	pCi/l	0.1	34±49	0.0±9.2	0.0±±38	1.1±10
Radium 226	pCi/l	0.1	0.3±0.2	0.1±0.2	0.4±0.2	0.3±0.2

ND = Not detected. NR = Not requested.

Certification

PriorityPollutnT™ Quality Control Samples

ALL SAMPLES IN LOT NO. 201 HAVE THIS ⇒

Parameter	era Certified Value	Target Range
	µg/ℓ	µg/ℓ
VOLATILES		
chloroform	12.1	7.7-16
1,2-dichloroethane	25.4	14-37
toluene	58.0	31-85
ethylbenzene	52.5	24-81
methylene chloride	60.9	32-90
1,1,1-trichloroethane	113	62-160
ACIDS		
phenol	99.8	32-160
2,4,6-trichlorophenol	140	62-220
2-nitrophenol	90.7	29-150
2,4-dimethyl phenol	52.6	22-83
BASE/NEUTRALS		
1,2-dichlorobenzene	22.2	9-32
anthracene	71.0	31-110
acenaphthene	156	75-230
hexachlorobutadiene	66.6	18-110
hexachloroethane	48.8	23-74
di-n-butylphthalate	97.7	27-160
bis (2-ethylhexyl) phthalate	44.4	13-72
isophorone	111	53-160
PESTICIDES		
heptachlor	1.5	0.75-2.2
Endosulfan A	1.7	0.93-2.4
dieldrin	0.50	0.30-0.70
p,p'-DDT	8.5	4.7-12
p,p'-DDD	3.1	1.5-4.5
PCBs		
Aroclor 1260	8.9	5.3-12

Environmental Resource Associates
120 East Sauk Trail
South Chicago Heights, Illinois 60411
312/755-6060

Rocky Mountain Analytical Laboratory

HOUSTON

August 24, 1984

Note to file: This a revised report from RMA. Orig. report dated ~~[illegible]~~ _____. This report subsequently revised 9/28/84 by RMA due to m w-1 SO_4 error.

Terry Boone
Sparton Technology
9621 Coors Rd., N.W.
Albuquerque, NM 87114

Dear Terry:

Enclosed are the complete results for the analysis of the four samples received June 21, 1984. Through a miscommunication amongst staff members, the arsenic, selenium and antimony results were omitted from the original report. I apologize for any inconvenience the delay in sending this data may have caused.

Please call if you have any questions.

Best Regards,

Mark J. Bollinger

Mark J. Bollinger, Ph.D.
Manager
Inorganic Chemistry

MJB/cc
Enclosures

RMA # 3963

[illegible] (5 [illegible]) [illegible] RDW [illegible] FID [illegible]

SAMPLE DESCRIPTION INFORMATION

for

Sparton Technology

RMA Sample No.	Sample Description	Sample Type	Date Sampled	Date Received
3963-01	MW-1	Water	6/20/84	6/21/84
3963-02	MW-2	Water	6/20/84	6/21/84
3963-03	MW-3	Water	6/20/84	6/21/84
3963-04	MW-4	Water	6/20/84	6/21/84
3963-05	VOA QC	Water		6/21/84

August 8, 1984

ANALYTICAL RESULTS

for

Sparton Technology

INORGANIC PARAMETERS

Parameter	Units	Detection Limit	3963-01	3963-02	3963-03	3963-04
pH, Val 1	units	0.01	7.07	7.75	6.80	7.23
pH, Val 2	units	0.01	NR	7.75	NR	NR
pH, Val 3	units	0.01	NR	7.76	NR	NR
pH, Val 4	units	0.01	NR	7.76	NR	NR
Specific Conductance at 25°C	umhos/cm	1	4570	704	5150	1470
Specific Conductance at 25°C	umhos/cm	1	NR	703	NR	NR
Specific Conductance at 25°C	umhos/cm	1	NR	690	NR	NR
Specific Conductance at 25°C	umhos/cm	1	NR	690	NR	NR
Fluoride	mg/l	0.1	1.0	ND	0.33	ND
Chloride	mg/l	3	1100	34	940	160
Nitrate + Nitrite as N	mg/l	0.1	2	3.4	3.4	0.9
Sulfate	mg/l	5	~~2100~~ 350	108	990	219
Total Organic Carbon, Val 1	mg/l	0.1	26	1.1	140	9.1
Total Organic Carbon, Val 2	mg/l	0.1	NR	1.0	NR	NR
Total Organic Carbon, Val 3	mg/l	0.1	NR	1.0	NR	NR
Total Organic Carbon, Val 4	mg/l	0.1	NR	1.1	NR	NR
Total Organic Halogen, Val 1	ug Cl^-/l	5	32000	240	64000	23000
Total Organic Halogen, Val 2	ug Cl^-/l	5	NR	210	NR	NR
Total Organic Halogen, Val 3	ug Cl^-/l	5	NR	190	NR	NR
Total Organic Halogen, Val 4	ug Cl^-/l	5	NR	180	NR	NR
Phenolics	mg/l	0.01	ND	ND	0.01	ND
Total Coliform	colonies/100 ml		ND	ND	12	ND

error reported by RMA on 9/28.

ND = Not detected. NR = Not requested.

ANALYTICAL RESULTS

for

Sparton Technology

TRACE METALS

Parameter	Units	Detection Limit	3963-01	3963-02	3963-03	3963-04
Aluminum	mg/l	0.05	ND	ND	ND	ND
Antimony	mg/l	0.02	ND	ND	ND	ND
Arsenic	mg/l	0.02	ND	ND	ND	ND
Barium	mg/l	0.005	0.094	0.069	0.049	0.069
Boron	mg/l	0.004	4.78	0.12	42	5.8
Cadmium	mg/l	0.002	0.040	0.002	ND	ND
Chromium	mg/l	0.005	34	0.004	1.65	0.007
Copper	mg/l	0.002	ND	ND	0.008	ND
Iron	mg/l	0.05	ND	ND	ND	ND
Lead	mg/l	0.025	ND	ND	ND	ND
Manganese	mg/l	0.005	1.74	ND	4.3	2.9
Mercury	mg/l	0.0002	ND	ND	ND	ND
Nickel	mg/l	0.01	ND	ND	ND	ND
Sodium	mg/l	0.5	131	51	246	74
Selenium	mg/l	0.008	ND	ND	ND	ND
Silver	mg/l	0.003	ND	ND	ND	ND
Tin	mg/l	0.03	ND	ND	0.03	ND
Vanadium	mg/l	0.002	0.040	0.006	0.006	0.002
Zinc	mg/l	0.004	ND	ND	0.005	ND

ND = Not detected. NR = Not requested.

*Detection limits 10x greater for Al, Ba, B, Cd, Cr, Cu, Fe, Pb, Mn, Ni, Na, Ag, Sn, V and Zn.

ANALYTICAL RESULTS

for

Sparton Technology

VOLATILE ORGANICS

Parameter		Units	Detection Limit	3963-01*	3963-02	3963-03	3963-04*	3963-05**
1V	Acrolein	ug/l	1000	ND	ND	ND	ND	ND
2V	Acrylonitrile	ug/l	1000	ND	ND	ND	ND	ND
3V	Benzene	ug/l	50	ND	ND	180	ND	ND
4V	Bis(chloromethyl)ether	ug/l	50	ND	ND	ND	ND	ND
5V	Bromoform	ug/l	50	ND	ND	ND	ND	ND
6V	Carbon tetrachloride	ug/l	50	ND	ND	ND	ND	ND
7V	Chlorobenzene	ug/l	50	ND	ND	90	ND	ND
8V	Chlorodibromomethane	ug/l	50	ND	ND	ND	ND	ND
9V	Chloroethane	ug/l	100	ND	ND	ND	ND	ND
10V	2-Chloroethylvinyl ether	ug/l	50	ND	ND	ND	ND	ND
11V	Chloroform	ug/l	50	ND	ND	320	ND	12
12V	Dichlorobromomethane	ug/l	50	ND	ND	ND	ND	ND
13V	Dichlorodifluoromethane	ug/l	100	ND	ND	ND	ND	ND
14V	1,1-Dichloroethane	ug/l	50	ND	ND	170	ND	ND
15V	1,2-Dichloroethane	ug/l	50	ND	ND	ND	ND	25
16V	1,1-Dichloroethylene	ug/l	50	2700	330	12000	2800	ND
17V	1,2-Dichloropropane	ug/l	50	ND	ND	ND	ND	ND
18V	1,3-Dichloropropylene	ug/l	50	ND	ND	ND	ND	ND
19V	Ethylbenzene	ug/l	50	ND	ND	220	ND	39
20V	Methylbromide	ug/l	100	ND	ND	ND	ND	ND
21V	Methylchloride	ug/l	100	ND	ND	ND	ND	ND
22V	Methylene chloride	ug/l	100	31000	ND	83000	12000	42
23V	1,1,2,2-Tetrachloroethane	ug/l	50	ND	ND	130	ND	ND
24V	Tetrachloroethylene	ug/l	50	ND	ND	640	ND	ND
25V	Toluene	ug/l	50	2100	ND	5400	ND	44
26V	1,2-trans-Dichloroethylene	ug/l	50	ND	ND	ND	ND	ND
27V	1,1,1-Trichloroethane	ug/l	50	4200	1000	41000	9100	90
28V	1,1,2-Trichloroethane	ug/l	50	ND	ND	ND	ND	ND
29V	Trichloroethylene	ug/l	50	30000	2000	72000	12000	ND
30V	Trichlorofluoromethane	ug/l	100	ND	ND	ND	ND	ND
31V	Vinyl chloride	ug/l	100	ND	ND	ND	ND	ND

ND = Not detected. NR = Not requested.

*The detection limits for 3963-01 and 3963-04 are twenty times (20x) those listed.

**The detection limits for 3963-05 are one tenth times (1/10x) those listed.

ANALYTICAL RESULTS

for

Sparton Technology

ORGANICS

Parameter	Units	Detection Limit	3963-01	3963-02	3963-03	3963-04
SDWA Pesticides						
Lindane	ug/l	0.04	ND	ND	ND	ND
Endrin	ug/l	0.06	ND	ND	ND	ND
Methoxychlor	ug/l	2.5	ND	ND	ND	ND
Toxaphene	ug/l	2.4	ND	ND	ND	ND
SDWA Herbicides						
2,4-D	ug/l	0.1	ND	ND	ND	ND
Silvex	ug/l	0.05	ND	ND	ND	ND

RADIOCHEMISTRY

Parameter	Units	Detection Limit	3963-01	3963-02	3963-03	3963-04
Gross Alpha	pCi/l	0.1	7.7±69	8.9±8.6	35.2±55	7.7±14
Gross Beta	pCi/l	0.1	34±49	0.0±9.2	0.0±±38	1.[illegible]±10
Radium 226	pCi/l	0.1	0.3±0.2	0.1±0.2	0.4±0.2	0.3±0.2

ND = Not detected. NR = Not requested.

Rocky Mountain Analytical Laboratory

September 28, 1984

Terry Boone
Sparton Technology
9621 Coors Rd., N.W.
Albuquerque, NM 87114

Dear Terry:

Enclosed are the corrected results for the samples received June 21, 1984. The color of the sample in MW-1 produced an interference in the original sulfate analysis. This was corrected in the reanalysis. I apologize for any inconvenience that this may have caused.

Please call if you have any questions.

Best Regards,

Mark J. Bollinger, Ph.D.
Manager
Inorganic Chemistry

MJB/lk
Enclosures

RMA # 3963

SAMPLE DESCRIPTION INFORMATION

for

Sparton Technology

RMA Sample No.	Sample Description	Sample Type	Date Sampled	Date Received
3963-01	MW-1	Water	6/20/84	6/21/84
3963-02	MW-2	Water	6/20/84	6/21/84
3963-03	MW-3	Water	6/20/84	6/21/84
3963-04	MW-4	Water	6/20/84	6/21/84
3963-05	VOA QC	Water		6/21/84

September 28, 1984

ANALYTICAL RESULTS

for

Sparton Technology

INORGANIC PARAMETERS

Parameter	Units	Detection Limit	3963-01	3963-02	3963-03	3963-04
pH, Val 1	units	0.01	7.07	7.75	6.80	7.23
pH, Val 2	units	0.01	NR	7.75	NR	NR
pH, Val 3	units	0.01	NR	7.76	NR	NR
pH, Val 4	units	0.01	NR	7.76	NR	NR
Specific Conductance at 25°C	umhos/cm	1	4570	704	5150	1470
Specific Conductance at 25°C	umhos/cm	1	NR	703	NR	NR
Specific Conductance at 25°C	umhos/cm	1	NR	690	NR	NR
Specific Conductance at 25°C	umhos/cm	1	NR	690	NR	NR
Fluoride	mg/l	0.1	1.0	ND	0.33	ND
Chloride	mg/l	3	1100	34	940	160
Nitrate + Nitrite as N	mg/l	0.1	2	3.4	3.4	0.9
Sulfate	mg/l	5	350	108	990	219
Total Organic Carbon, Val 1	mg/l	0.1	26	1.1	140	9.1
Total Organic Carbon, Val 2	mg/l	0.1	NR	1.0	NR	NR
Total Organic Carbon, Val 3	mg/l	0.1	NR	1.0	NR	NR
Total Organic Carbon, Val 4	mg/l	0.1	NR	1.1	NR	NR
Total Organic Halogen, Val 1	ug Cl^-/l	5	32000	240	64000	23000
Total Organic Halogen, Val 2	ug Cl^-/l	5	NR	210	NR	NR
Total Organic Halogen, Val 3	ug Cl^-/l	5	NR	190	NR	NR
Total Organic Halogen, Val 4	ug Cl^-/l	5	NR	180	NR	NR
Phenolics	mg/l	0.01	ND	ND	0.01	ND
Total Coliform	colonies/100 ml		ND	ND	12	ND

ND = Not detected. NR = Not requested.

ANALYTICAL RESULTS

for

Sparton Technology

TRACE METALS

Parameter	Units	Detection Limit	3963-01	3963-02	3963-03	3963-04
Aluminum	mg/l	0.05	ND	ND	ND	ND
Antimony	mg/l	0.02	ND	ND	ND	ND
Arsenic	mg/l	0.02	ND	ND	ND	ND
Barium	mg/l	0.005	0.094	0.069	0.049	0.069
Boron	mg/l	0.004	4.78	0.12	42	5.8
Cadmium	mg/l	0.002	0.040	0.002	ND	ND
Chromium	mg/l	0.005	34	0.004	1.65	0.007
Copper	mg/l	0.002	ND	ND	0.008	ND
Iron	mg/l	0.05	ND	ND	ND	ND
Lead	mg/l	0.025	ND	ND	ND	ND
Manganese	mg/l	0.005	1.74	ND	4.3	2.9
Mercury	mg/l	0.0002	ND	ND	ND	ND
Nickel	mg/l	0.01	ND	ND	ND	ND
Sodium	mg/l	0.5	131	51	246	74
Selenium	mg/l	0.008	ND	ND	ND	ND
Silver	mg/l	0.003	ND	ND	ND	ND
Tin	mg/l	0.03	ND	ND	0.03	ND
Vanadium	mg/l	0.002	0.040	0.006	0.006	0.002
Zinc	mg/l	0.004	ND	ND	0.005	ND

ND = Not detected. NR = Not requested.

*Detection limits 10x greater for Al, Ba, B, Cd, Cr, Cu, Fe, Pb, Mn, Ni, Na, Ag, Sn, V and Zn.

ANALYTICAL RESULTS

for

Sparton Technology

VOLATILE ORGANICS

Parameter		Units	Detection Limit	3963-01*	3963-02	3963-03	3963-04*	3963-05**
1V	Acrolein	ug/l	1000	ND	ND	ND	ND	ND
2V	Acrylonitrile	ug/l	1000	ND	ND	ND	ND	ND
3V	Benzene	ug/l	50	ND	ND	180	ND	ND
4V	Bis(chloromethyl)ether	ug/l	50	ND	ND	ND	ND	ND
5V	Bromoform	ug/l	50	ND	ND	ND	ND	ND
6V	Carbon tetrachloride	ug/l	50	ND	ND	ND	ND	ND
7V	Chlorobenzene	ug/l	50	ND	ND	90	ND	ND
8V	Chlorodibromomethane	ug/l	50	ND	ND	ND	ND	ND
9V	Chloroethane	ug/l	100	ND	ND	ND	ND	ND
10V	2-Chloroethylvinyl ether	ug/l	50	ND	ND	ND	ND	ND
11V	Chloroform	ug/l	50	ND	ND	320	ND	12
12V	Dichlorobromomethane	ug/l	50	ND	ND	ND	ND	ND
13V	Dichlorodifluoromethane	ug/l	100	ND	ND	ND	ND	ND
14V	1,1-Dichloroethane	ug/l	50	ND	ND	170	ND	ND
15V	1,2-Dichloroethane	ug/l	50	ND	ND	ND	ND	25
16V	1,1-Dichloroethylene	ug/l	50	2700	330	12000	2800	ND
17V	1,2-Dichloropropane	ug/l	50	ND	ND	ND	ND	ND
18V	1,3-Dichloropropylene	ug/l	50	ND	ND	ND	ND	ND
19V	Ethylbenzene	ug/l	50	ND	ND	220	ND	39
20V	Methylbromide	ug/l	100	ND	ND	ND	ND	ND
21V	Methylchloride	ug/l	100	ND	ND	ND	ND	ND
22V	Methylene chloride	ug/l	100	31000	ND	83000	12000	42
23V	1,1,2,2-Tetrachloroethane	ug/l	50	ND	ND	130	ND	ND
24V	Tetrachloroethylene	ug/l	50	ND	ND	640	ND	ND
25V	Toluene	ug/l	50	2100	ND	5400	ND	44
26V	1,2-trans-Dichloroethylene	ug/l	50	ND	ND	ND	ND	ND
27V	1,1,1-Trichloroethane	ug/l	50	4200	1000	41000	9100	90
28V	1,1,2-Trichloroethane	ug/l	50	ND	ND	ND	ND	ND
29V	Trichloroethylene	ug/l	50	30000	2000	72000	12000	ND
30V	Trichlorofluoromethane	ug/l	100	ND	ND	ND	ND	ND
31V	Vinyl chloride	ug/l	100	ND	ND	ND	ND	ND

ND = Not detected. NR = Not requested.

*The detection limits for 3963-01 and 3963-04 are twenty times (20x) those listed.

**The detection limits for 3963-05 are one tenth times (1/10x) those listed.

ANALYTICAL RESULTS

for

Sparton Technology

ORGANICS

Parameter	Units	Detection Limit	3963-01	3963-02	3963-03	3963-04
SDWA Pesticides						
Lindane	ug/l	0.04	ND	ND	ND	ND
Endrin	ug/l	0.06	ND	ND	ND	ND
Methoxychlor	ug/l	2.5	ND	ND	ND	ND
Toxaphene	ug/l	2.4	ND	ND	ND	ND
SDWA Herbicides						
2,4-D	ug/l	0.1	ND	ND	ND	ND
Silvex	ug/l	0.05	ND	ND	ND	ND

RADIOCHEMISTRY

Parameter	Units	Detection Limit	3963-01	3963-02	3963-03	3963-04
Gross Alpha	pCi/l	0.1	7.7±69	8.9±8.6	35.2±55	7.7±14
Gross Beta	pCi/l	0.1	34±49	0.0±9.2	0.0±±38	1.1±10
Radium 226	pCi/l	0.1	0.3±0.2	0.1±0.2	0.4±0.2	0.3±0.2

ND = Not detected. NR = Not requested.

Rocky Mountain Analytical Laboratory

September 28, 1984

Note: Contains VOC error. See corrected RMA report 10/23/84.

Terry Boone
Sparton Technology
9621 Coors Road, N.W.
Albuquerque, NM 87103

Dear Terry:

Enclosed are the results for the analysis of the monitoring well sample MW-12 received August 30, 1984. Included with the results is a list of standard methodologies and nominal detection limits. The inorganic results are low; however, the organic results show some chlorinated solvents. The results are confirmed by the total organic halogen determination.

Please call if you have any questions.

Best Regards,

Mark J. Bollinger, Ph.D.
Manager
Inorganic Chemistry

MJB/cc
Enclosures

cc: Tom Burger
Harding Lawson Associates

RMA # 4216

SAMPLE DESCRIPTION INFORMATION

for

Sparton Technology, Inc.

RMA Sample No.	Sample Description	Sample Type	Date Sampled	Date Received
4216-01	MW-12	Water	8/29/84	8/30/84

September 28, 1984

Rocky Mountain Analytical Laboratory

ANALYTICAL RESULTS

for

Sparton Technology

INORGANIC PARAMETERS

Parameter	Units	Detection Limit	4216-01	NM STD
pH	units	0.01	7.65	
Specific Conductance at 25°C	umhos/cm	1	769	
Fluoride	mg/l	0.1	0.3	
Chloride	mg/l	3	23	250
Nitrite as N	mg/l	0.01	0.02	
Nitrate as N	mg/l	0.01	1.3	
Ortho-Phosphate as P	mg/l	0.01	ND	
Sulfate	mg/l	5	136	600
Total Organic Carbon	mg/l	0.1	1.7	
Total Organic Halogen	~~mg/l~~	5	74	µg/l.
Ammonia as N	mg/l	0.1	ND	
Phenolics	mg/l	0.01	ND	
Chromium +3	mg/l	0.005	ND	
Hexvalent Chromium	mg/l	0.005	ND	

ND = Not detected. NR = Not requested.

ANALYTICAL RESULTS

for

Sparton Technology

TRACE METALS

Parameter	Units	Detection Limit	4216-01	N.M. STD.
Arsenic	mg/l	0.002	0.006	
Barium	mg/l	0.005	0.21	
Boron	mg/l	0.004	0.12	0.75
Cadmium	mg/l	0.002	0.005	
Chromium	mg/l	0.005	ND	
Copper	mg/l	0.002	0.005	
Iron	mg/l	0.05	0.09	
Lead	mg/l	0.025	ND	
Manganese	mg/l	0.005	0.98	0.2
Mercury	mg/l	0.0002	ND	
Molybdenum	mg/l	0.005	0.012	
Nickel	mg/l	0.01	ND	
Selenium	mg/l	0.002	ND	
Silver	mg/l	0.003	ND	
Sodium	mg/l	0.5	54	
Tin	mg/l	0.03	ND	
Zinc	mg/l	0.004	0.055	

ND = Not detected. NR = Not requested.

ANALYTICAL RESULTS

for

Sparton Technology

/OLATILE ORGANICS

Parameter		Units	Detection Limit	4216-01
V	Acrolein	ug/l	100	ND
V	Acrylonitrile	ug/l	100	ND
V	Benzene	ug/l	5	ND
V	Bis(chloromethyl)ether	ug/l	5	ND
V	Bromoform	ug/l	5	ND
V	Carbon tetrachloride	ug/l	5	ND
V	Chlorobenzene	ug/l	5	ND
V	Chlorodibromomethane	ug/l	5	ND
V	Chloroethane	ug/l	10	ND
0V	2-Chloroethylvinyl ether	ug/l	5	ND
1V	Chloroform	ug/l	5	ND
2V	Dichlorobromomethane	ug/l	5	ND
3V	Dichlorodifluoromethane	ug/l	10	ND
4V	1,1-Dichloroethane	ug/l	5	ND
5V	1,2-Dichloroethane	ug/l	5	ND
6V	1,1-Dichloroethylene	ug/l	5	ND
7V	1,2-Dichloropropane	ug/l	5	ND
8V	1,3-Dichloropropylene	ug/l	5	ND
9V	Ethylbenzene	ug/l	5	ND
0V	Methylbromide	ug/l	10	ND
1V	Methylchloride	ug/l	10	~~20~~
2V	Methylene chloride	ug/l	10	~~ND~~ → 20
3V	1,1,2,2-Tetrachloroethane	ug/l	5	ND
4V	Tetrachloroethylene	ug/l	5	ND
5V	Toluene	ug/l	5	ND
6V	1,2-trans-Dichloroethylene	ug/l	5	ND
7V	1,1,1-Trichloroethane	ug/l	5	ND
8V	1,1,2-Trochloroethane	ug/l	5	ND
9V	Trichloroethylene	ug/l	5	61
0V	Trichlorofluoromethane	ug/l	10	ND
1V	Vinyl chloride	ug/l	10	ND

ND = Not detected. NR = Not requested.

ANALYTICAL RESULTS

for

Sparton Technology

/OLATILE ORGANICS

'arameter	Units	Detection Limit	4216-01
Acetone	ug/l	10	ND
Ethanol	ug/l	10	ND
Freon	ug/l	5	ND
2-Hexanone	ug/l	10	ND
Xylene (Dimethyl benzene)	ug/l	5	ND
O-Xylene (Dimethyl benzene)	ug/l	5	ND

ID = Not detected. NR = Not requested.

ROCKY MOUNTAIN ANALYTICAL LABORATORY

Inorganic Analytical Methodology

Parameter	Units	Nominal Detection Limit[a]	Methodology	Reference	Preservation Bottle No.	Maximum Holding Time[b]
MAJOR IONS						
Sodium	mg/l	0.5	ICP Emission Spectroscopy	3	4	6 months
Potassium	mg/l	0.3	ICP Emission Spectroscopy	3	4	6 months
Calcium	mg/l	0.1	ICP Emission Spectroscopy	3	4	6 months
Magnesium	mg/l	0.1	ICP Emission Spectroscopy	3	4	6 months
Chloride	mg/l	3	Manual Titrimetric, Hg $(NO_3)_2$	1-325.3/2-407B	1	28 days
			Automated Colorimetric Ferricyanide	1-325.2	1	28 days
Fluoride	mg/l	0.1	Electrode	1-340.2/2-413B	1	28 days
Sulfate	mg/l	5	Manual Turbidimetric	1-375.4/2-426C	1	28 days
			Automated Colorimetric MTB	1-375.2	1	28 days
Total Alkalinity as $CaCO_3$ at pH 4.5	mg/l	5	Titrimetric	1-310.1/2-403	1	14 days
Carbonate Alkalinity as $CaCO_3$ at pH 8.3	mg/l	5	Titrimetric	1-310.1/2-403	1	14 days
Bicarbonate Alkalinity as $CaCO_3$ at pH 4.5	mg/l	5	Titrimetric	1-310.1/2-403	1	14 days
Hydroxide Alkalinity as $CaCO_3$	mg/l	5	Calculation	2-403	-	-
Nitrate+Nitrite as N	mg/l	0.1	Manual Cd Reduction - Colorimetric	1-353.3/2-418C	2	28 days
		0.1	Automated Cd Reduction - Colorimetric	1-353.2	2	28 days
Total Cations	meq/l	0.1	Calculation	2-104C	-	-
Total Anions	meq/l	0.1	Calculation	2-104C	-	-
Difference	%	0.1	Calculation	2-104C	-	-
RADIOCHEMISTRY						
Gross Alpha	pCi/l	0.1	Proportional Counter	2-703	5	6 months
Gross Beta	pCi/l	0.1	Proportional Counter	2-703	5	6 months
Radium 226	pCi/l	0.1	Separation - Counter	2-705	5	6 months
Radium 228	pCi/l	0.1	Separation - Counter	2-707	5	6 months
Uranium	mg/l	0.005	Fluorimetric	4-D2907-75	5	6 months

ROCKY MOUNTAIN ANALYTICAL LABORATORY

Inorganic Analytical Methodology (Continued)

Parameter	Units	Nominal Detection Limit[a]	Methodology	Reference	Preservation Bottle No.	Maximum Holding Time[b]
TRACE METALS[c]						
Aluminum	mg/l	0.05	ICP Emission Spectroscopy	3	4	6 months
Antimony	mg/l	0.002	Furnace Atomic Absorption	1-204.2	4	6 months
Arsenic	mg/l	0.002	Furnace Atomic Absorption	1-206.2	4	6 months
Barium	mg/l	0.005	ICP Emission Spectroscopy	3	4	6 months
Beryllium	mg/l	0.001	ICP Emission Spectroscopy	3	4	6 months
Boron	mg/l	0.004	ICP Emission Spectroscopy	3	4	6 months
Cadmium	mg/l	0.002	ICP Emission Spectroscopy	3	4	6 months
Chromium	mg/l	0.005	ICP Emission Spectroscopy	3	4	6 months
Cobalt	mg/l	0.003	ICP Emission Spectroscopy	3	4	6 months
Copper	mg/l	0.002	ICP Emission Spectroscopy	3	4	6 months
Iron	mg/l	0.05	ICP Emission Spectroscopy	3	4	6 months
Lead	mg/l	0.025	ICP Emission Spectroscopy	3	4	6 months
		0.001	Furnace Atomic Absorption	1-239.2	4	6 months
Manganese	mg/l	0.005	ICP Emission Spectroscopy	3	4	6 months
Mercury	mg/l	0.0002	Cold Vapor Atomic Absorption	1-245.1	4	6 months
Molybdenum	mg/l	0.005	ICP Emission Spectroscopy	3	4	6 months
Nickel	mg/l	0.01	ICP Emission Spectroscopy	3	4	6 months
Selenium	mg/l	0.002	Furnace Atomic Absorption	1-270.2	4	6 months
Silver	mg/l	0.003	ICP Emission Spectroscopy	3	4	6 months
Strontium	mg/l	0.005	ICP Emission Spectroscopy	3	4	6 months
Thallium	mg/l	0.002	Furnace Atomic Absorption	1-279.2	4	6 months
Tin	mg/l	0.03	ICP Emission Spectroscopy	3	4	6 months
Titanium	mg/l	0.002	ICP Emission Spectroscopy	3	4	6 months
Vanadium	mg/l	0.002	ICP Emission Spectroscopy	3	4	6 months
Zinc	mg/l	0.004	ICP Emission Spectroscopy	3	4	6 months
INORGANIC PARAMETERS						
pH	units	0.01	Meter	1-150.1; 2-423	1	ASAP
Specific Conductance at 25°C	umhos/cm	1	Bridge	1-120.1; 2-205	1	28 days
Total Dissolved Solids	mg/l	10	Gravimetric, 180°C	1-160.1; 2-209B	1	7 days
Total Suspended Solids	mg/l	2	Gravimetric, 105°C	1-160.2	1	7 days
Total Solids	mg/l	10	Gravimetric, 105°C	1-160.3	1	7 days
Total Volatile Solids	mg/l	10	Gravimetric, 550°C	1-160.4	1	7 days
Ortho-Phosphate as P	mg/l	0.01	Single Reagent Colorimetric	1-365.2; 2-424F	1	48 hours

ROCKY MOUNTAIN ANALYTICAL LABORATORY

Inorganic Analytical Methodology (Continued)

Parameter	Units	Nominal Detection Limit[a]	Methodology	Reference	Preservation Bottle No.	Maximum Holding Time[b]
INORGANIC PARAMETERS (Continued)						
Total Phosphorus as P	mg/l	0.06	Digestion; ICP Emission Spectroscopy	1-4.1.4; 3	4	28 days
		0.01	Digestion - Colorimetric	1-365.2; 1-424C,F	2	28 days
Silica as SiO_2	mg/l	0.1	ICP Emission Spectroscopy	3	4	28 days
	mg/l	1	Colorimetric	1-370.1; 2-425C	1	28 days
Biological Oxygen Demand	mg/l	2	Dilution Bottle - D.O. Probe	1-405.1; 2-507	1	48 hours
Chemical Oxygen Demand	mg/l	5	Micro Colorimetric	1-410.4; 2-508A	2	28 days
Total Organic Carbon	mg/l	0.1	Oxidation-Infrared Absorption	1-415.1; 2-505	2	28 days
Ammonia as N	mg/l	0.1	Electrode	1-350.3; 2-417E	2	28 days
		0.1	Automated Colorimetric	1-350.1	2	28 days
Total Kjeldahl Nitrogen as N	mg/l	0.1	Digestion - Electrode	1-351.4; 2-420B	2	28 days
		0.1	Digestion - Colorimetric	1-351.2	2	28 days
Total Organic Nitrogen as N	mg/l	0.1	Calculation (TKN - NH_3)	-	-	-
Oil and Grease	mg/l	1	Freon Extraction-Gravimetric	1-413.1; 2-503A	3	28 days
Free Cyanide	mg/l	0.01	Chlorination-Distillation-Colorimetric	1-335.1; 2-412F,D	6	14 days
Total Cyanide	mg/l	0.01	Distillation - Colorimetric	1-335.2; 2-412B,D	6	14 days
Phenolics	mg/l	0.01	Distillation - Colorimetric	1-420.1; 2-510A,B	2	28 days
Fecal Coliform	Colonies/100 ml	1	Membrane Filter	2-909C	8	ASAP
Total Coliform	Colonies/100 ml	1	Membrane Filter	2-909A	8	ASAP
Bromide	mg/l	0.1	Colorimetric	2-405	1	28 days
Residual Chlorine	mg/l	0.05	Amperometric	1-330.2; 2-408C	1	ASAP
Hexavalent Chromium	mg/l	0.01	Colorimetric	1-218.4; 2-312B	1	24 hours
Color	units	5	Pt-Co Colorimetric	1-110.2; 2-204A	1	48 hours
Hardness as $CaCO_3$	mg/l	5	Calculation	2-314A	4	6 months
Nitrite as N	mg/l	0.01	Colorimetric	1-354.1; 2-419	1	48 hours
Sulfide	mg/l	0.05	Titrimetric - Electrode	1-376.1; 2-427B,D	7	7 days
Sulfite	mg/l	2	Titrimetric	1-377.1; 2-428	1	ASAP
MBAS (Surfactants)	mg/l	0.1	Colorimetric	1-425.1; 2-512A	1	48 hours
Turbidity	NTU	0.1	Turbidimeter	1-180.1; 2-214A	1	48 hours

ROCKY MOUNTAIN ANALYTICAL LABORATORY

Inorganic Analytical Methodology (Continued)

References

(1) "Methods for Chemical Analysis of Water and Wastes", EPA-600/4-79-020, EMSL, Cincinnati, 1979.

(2) "Standard Methods for the Examination of Water and Wastewater", 15th Edition, APHA, 1980.

(3) Federal Register, 40 CFR 136, December 3, 1979; USEPA EMSL-Cincinnati, OH 45268.

(4) "Annual Book of ASTM Standards", Part 31, Water, 1980.

Notes

[a] Nominal values are the best achievable with the listed analytical method. Interferences in specific samples may result in a higher detection limit.

[b] Applicable to NPDES wastes as updated by Robert C. Booth, Director, EMSL-Cincinnati, September 22, 1981.

[c] Digestion procedure 1-4.1.4 used for elements determined by ICP Emission Spectroscopy when determining total metals. Digestion procedures for graphite furnace elements included with reference listed.

11/10/82

GUIDELINES FOR SAMPLE BOTTLES AND PRESERVATIVES[a]

Bottle No.	Parameters	Container	Preservative	Notes
1	Cl^-, F^-, $SO_4^=$, Tot. Alk., $CO_3^=$ Alk., HCO_3^- Alk., OH^- Alk., pH, spec. cond., TDS, TSS, TS, TVS, o-PO_4 SiO_2, BOD, Br^-, res. Cl_2, Cr^{+6}, color, NO_2^-, $SO_3^=$, MBAS, Turbidity.	1 liter poly	4° C	Provide unfiltered sample for solids and turbidity.
2	Tot. P, COD, TOC, NH_3, TKN, TON, Phenolics $NO_3 + NO_2$.	500 ml poly	2 ml 50% H_2SO_4, 4°C	
3	O & G	1 liter glass	4 ml 50% H_2SO_4, 4°C	Do not filter, collect directly in bottle.
4	Na, K, Ca, Mg, Al, Sb, As, Ba, Be, B, Cd, Cr, Co, Cu, Fe, Pb, Mn, Hg, Mo, Ni, Se, Ag, Sr, Tl, Sn, Ti, V, Zn, ICP, Hardness.	500 ml poly	5 ml 50% HNO_3	Provide separate samples for total and dissolved sample (filter before adding to bottle.)
5	Alpha, Beta, Ra^{226}, Ra^{228}, U	1 liter poly (no Ra^{228}) ½ gallon poly (with Ra^{228})	10 ml 50% HNO_3 20 ml 50% HNO_3	
6	Free CN, Tot. CN	500 ml poly	2 ml 50% NaOH, 4°C	
7	Sulfide	250 ml poly	1 ml 1 N Zn acetate, 1 ml 50% NaOH, 4°C	
8	Fecal coli., total coli.	8 oz. sterile	4° C	Collect directly in sterile bottle
11	VOA, purgeable organics, THM	2 - 40 ml glass vial	4° C	Completely fill bottle, leave no air bubbles.
12	B/NA	1 liter glass	4° C	
13	Pest./PCB	1 liter glass	4° C	
14	Herbicides	1 liter glass	4° C	
15	TOX	1 liter glass	4° C	

[a]Federal Register, 40 CFR 136, December 3, 1979, as updated by EPA, EMSL-Cincinnati, September 22, 1981.

11/5/82

ROCKY MOUNTAIN ANALYTICAL LABORATORY

Organic Analytical Methodology

Parameter	Units	Nominal Detection Limit[a]	Methodology	Reference[1]	Preservation Bottle No.	Maximum Holding Time[b]
Purgeables	ug/l	1	Purge & Trap GC/MS	624	11	14 days
Base/Neutrals	ug/l	10	Extraction/GC/MS	625	12	7 days/40 days
Acids	ug/l	10	Extraction/GC/MS	625	12	7 days/40 days
Organochlorine Pesticides/PCB's	ug/l	0.01	Extraction/GC/ECD	608	13	7 days/40 days
		10	Extraction/GC/MS	625	12	7 days/40 days
Phenoxy Herbicides	ug/l	0.01	Extraction/GC/ECD	(2)	14	7 days/40 days
Total Organic Halogen (TOX)	ug/l	5	Adsorbtion/Coulometric	450.1(3)	15	-
Trihalomethanes (THM)	ug/l	1	Extraction/GC/ECD	(4)	11	14 days
		1	Purge & Trap GC/MS	(4)	11	14 days
Dioxin	ug/l	0.005	Extraction/GC/MS/ECD	613	16	7 days/40 days
Purgeable Halocarbons	ug/l	0.01	Purge & Trap/GC/Hall	601	11	14 days
Purgeable Aromatics	ug/l	1	Purge & Trap/GC/FID	602	17	14 days
Acrolein & Acrylonitrile	ug/l	100	Purge & Trap/GC/FID	603	18	14 days
Phenols by GC	ug/l	10	Extraction/GC/FID	604	16	7 days/40 days
Benzidines	ug/l	0.1	Extraction/HPLC	605	19	7 days/40 days
Phthalate Esters	ug/l	10	Extraction/GC/FID	606	12	7 days/40 days
Nitrosamines	ug/l	1	Extraction/GC/NPD	607	20	7 days/40 days
Nitroaromatics/isophorone	ug/l	1	Extraction/GC/FID & GC/ECD	609	12	7 days/40 days
Polynuclear Aromatics	ug/l	0.5	Extraction/HPLC	610	20	7 days/40 days
Haloethers	ug/l	1	Extraction/GC/Hall	611	17	7 days/40 days
Chlorinated Hydrocarbons	ug/l	0.02	Extraction/GC/ECD	612	12	7 days/40 days
Organophosphorus Pesticides	ug/l	0.1	Extraction/GC/NPD	622(5)	12	7 days/40 days
Triazine Pesticides	ug/l	0.1	Extraction/GC/NPD	(6)	12	7 days/40 days

References

(1) Federal Register, Vol. 44, No. 233, Monday, December 3, 1979.
(2) "Method for Chlorinated Phenoxy Acid Herbicides in Industrial Effluents," Federal Register, Vol. 38, No. 75, Part II.
(3) "Total Organic Halide," US EPA-EMSL, Cincinnati, November, 1980.
(4) Federal Register, Vol. 44, No. 231, Thursday, November 29, 1979, Appendix, Part I.
(5) "Method 622- Organophosphorus Pesticides," Proposed EPA Method, 304 (h) Committee.
(6) Federal Register, Vol. 38, No. 75, 1973.

Notes

[a] Nominal values are the best achievable with the listed analytical method for a typical component. Interferrences in specific samples may result in a higher detection limit.

[b] Applicable to NPDES Wastes as updated by Robert C. Booth, Director, EMSL-Cincinnati, September 22, 1981. Where two times are given, the first refers to the time to extraction, the second to the time of instrumental analysis.

ROCKY MOUNTAIN ANALYTICAL LABORATORY

Organic Analytical Methodology (continued)

Preservation Bottle No.	Parameter Group	Bottle	Preservation
11	Purgeables	40 ml glass with teflon lined silicone septum cap	4°C (thiosulfate if Cl_2 present)
17	Purgeables	40 ml glass with teflon lined silicone septum cap	4°C, HCl to pH less than 2 (thiosulfate if Cl_2 present)
18	Purgeables	40 ml glass with teflon lined silicone septum cap	4°C, adjust pH to 4 - 5 (thiosulfate if Cl_2 present)
16	Extractables	1 liter glass with teflon lined cap	4°C (thiosulfate if Cl_2 present)
19	Extractables	1 liter glass with teflon lined cap	4°C, adjust pH to 2 - 7 (thiosulfate if Cl_2 present)
12, 13, 14	Extractables	1 liter glass with teflon lined cap	4°C
20	Extractables	1 liter glass with teflon lined cap	4°C, store in dark (thiosulfate is Cl_2 present)
15	TOX	250 ml glass with teflon lined cap, single 1 liter glass with teflon lined cap, quad.	4°C, store in dark (thiosulfate if Cl_2 present)

Rocky Mountain Analytical Laboratory

October 23, 1984

Terry Boone
Sparton Technology
9621 Coors Road, N.W.
Albuquerque, NM 87103

Dear Terry:

Enclosed please find the complete report for the analysis of the monitoring well sample MW-12 received August 30, 1984. The Volatile Organics on page 5 of this report have been corrected.

Please call if you have any further questions.

Best Regards,

Mark J. Bollinger, Ph.D.
Manager
Inorganic Chemistry

MJB/cc
Enclosures

cc: Tom Burger
Harding Lawson Associates

RMA # 4216

SAMPLE DESCRIPTION INFORMATION

for

Sparton Technology, Inc.

RMA Sample No.	Sample Description	Sample Type	Date Sampled	Date Received
4216-01	MW-12	Water	8/29/84	8/30/84

September 28, 1984

ANALYTICAL RESULTS

for

Sparton Technology

INORGANIC PARAMETERS

Parameter	Units	Detection Limit	4216-01
pH	units	0.01	7.65
Specific Conductance at 25°C	umhos/cm	1	769
Fluoride	mg/l	0.1	0.3
Chloride	mg/l	3	23
Nitrite as N	mg/l	0.01	0.02
Nitrate as N	mg/l	0.01	1.3
Ortho-Phosphate as P	mg/l	0.01	ND
Sulfate	mg/l	5	136
Total Organic Carbon	mg/l	0.1	1.7
Total Organic Halogen	ugCl^-/l	5	74
Ammonia as N	mg/l	0.1	ND
Phenolics	mg/l	0.01	ND
Chromium +3	mg/l	0.005	ND
Hexvalent Chromium	mg/l	0.005	ND

ND = Not detected. NR = Not requested.

ANALYTICAL RESULTS

for

Sparton Technology

TRACE METALS

Parameter	Units	Detection Limit	4216-01
Arsenic	mg/l	0.002	0.006
Barium	mg/l	0.005	0.21
Boron	mg/l	0.004	0.12
Cadmium	mg/l	0.002	0.005
Chromium	mg/l	0.005	ND
Copper	mg/l	0.002	0.005
Iron	mg/l	0.05	0.09
Lead	mg/l	0.025	ND
Manganese	mg/l	0.005	0.98
Mercury	mg/l	0.0002	ND
Molybdenum	mg/l	0.005	0.012
Nickel	mg/l	0.01	ND
Selenium	mg/l	0.002	ND
Silver	mg/l	0.003	ND
Sodium	mg/l	0.5	54
Tin	mg/l	0.03	ND
Zinc	mg/l	0.004	0.055

ND = Not detected. NR = Not requested.

ANALYTICAL RESULTS

for

Sparton Technology

VOLATILE ORGANICS

Parameter		Units	Detection Limit	4216-01
1V	Acrolein	ug/l	100	ND
2V	Acrylonitrile	ug/l	100	ND
3V	Benzene	ug/l	5	ND
4V	Bis(chloromethyl)ether	ug/l	5	ND
5V	Bromoform	ug/l	5	ND
6V	Carbon tetrachloride	ug/l	5	ND
7V	Chlorobenzene	ug/l	5	ND
8V	Chlorodibromomethane	ug/l	5	ND
9V	Chloroethane	ug/l	10	ND
10V	2-Chloroethylvinyl ether	ug/l	5	ND
11V	Chloroform	ug/l	5	ND
12V	Dichlorobromomethane	ug/l	5	ND
13V	Dichlorodifluoromethane	ug/l	10	ND
14V	1,1-Dichloroethane	ug/l	5	ND
15V	1,2-Dichloroethane	ug/l	5	ND
16V	1,1-Dichloroethylene	ug/l	5	ND
17V	1,2-Dichloropropane	ug/l	5	ND
18V	1,3-Dichloropropylene	ug/l	5	ND
19V	Ethylbenzene	ug/l	5	ND
20V	Methylbromide	ug/l	10	ND
21V	Methylchloride	ug/l	10	ND
22V	Methylene chloride	ug/l	10	20
23V	1,1,2,2-Tetrachloroethane	ug/l	5	ND
24V	Tetrachloroethylene	ug/l	5	ND
25V	Toluene	ug/l	5	ND
26V	1,2-trans-Dichloroethylene	ug/l	5	ND
27V	1,1,1-Trichloroethane	ug/l	5	ND
28V	1,1,2-Trochloroethane	ug/l	5	ND
29V	Trichloroethylene	ug/l	5	61
30V	Trichlorofluoromethane	ug/l	10	ND
31V	Vinyl chloride	ug/l	10	ND

ND = Not detected. NR = Not requested.

ANALYTICAL RESULTS

for

Sparton Technology

VOLATILE ORGANICS

Parameter	Units	Detection Limit	4216-01
Acetone	ug/l	10	ND
Ethanol	ug/l	10	ND
Freon	ug/l	5	ND
2-Hexanone	ug/l	10	ND
Total Xylenes (Dimethyl benzene)	ug/l	5	ND
m-Xylene	ug/l	5	ND
o,p-Xylene	ug/l	5	ND

ND = Not detected. NR = Not requested.

Rocky Mountain Analytical Laboratory

October 31, 1984

Terry Boone
Sparton Technology, Inc.
9621 Coors Road, N.W.
Albuquerque, NM 87103

Dear Mr. Boone:

We have completed the analysis of your well samples covered under P.O. # 52418-1-MH. The analytical report is attached.

As requested, the samples were run for volatile organics with minimal dilution in order to achieve the lowest possible detection limits. This meant that several of the more concentrated components in the samples were at levels outside the linear range of the GC/MS. These concentrated components, however, were quantified using gas chromatography with flame ionization detection (GC/FID). The GC/FID provided both qualitative and quantitative verification of the results for the highly concentrated volatile organics detected.

It should be noted that the TOX concentrations found are lower than the sum of the volatile chlorinated organics detected in the GC/MS runs. This is commonly seen in samples with high concentrations of these volatile solvents since a portion of these solvents are lost in the TOX procedure. The TOX values should be viewed as indicative of the level of chlorinated organic material present, but will not always correlate quantitatively to the sum of the chlorinated compounds in the GC/MS results.

Please call if you have any questions.

Sincerely,

Michael P. Phillips

Michael P. Phillips, Ph.D.
Manager
Industrial Organic Chemistry

MPP/cc
Enclosures

cc: Tom Burger, Harding Lawson Associates

RMA # 4333,4346

SAMPLE DESCRIPTION INFORMATION

for

Sparton Technology, Inc.

RMA Sample No.	Sample Description	Sample Type	Date Sampled	Date Received
4333-01	MW-13	Water	10/4/84	10/6/84
4333-02	MW-14	Water	10/4/84	10/6/84
4333-03	MW-15	Water	10/4/84	10/6/84
4333-04	MW-16	Water	10/5/84	10/6/84
4333-05	MW-17	Water	10/5/84	10/6/84
4333-06	PW-1-1	Water	10/7/84	10/11/84
4333-07	PW-1-4	Water	10/8/84	10/11/84
4333-08	MW-16	Water	10/10/84	10/11/84
4333-09	MW-17	Water	10/10/84	10/11/84

October 31, 1984

ANALYTICAL RESULTS

for

Sparton Technology, Inc.

INORGANIC PARAMETERS

Parameter	Units	Detection Limit	4333-01	4333-02	4333-03	4333-04	4333-05	4333-06	4333-07	4333-08	4333-09
pH	units	0.01	7.43	7.61	7.68	7.17	7.90	8.03	7.82	7.30	7.94
Specific Conductance at 25°C	umhos/cm	1	1090	1290	885	5300	695	801	798	5960	748
Fluoride	mg/l	0.1	1.1	0.8	0.8	7.9	1.5	0.8	0.7	6.9	1.4
Nitrate as N	mg/l	0.1	0.6	1.0	4.4	ND	ND	0.7	0.8	ND	0.2
Sulfate	mg/l	5	148	192	146	2180	98	130	130	2320	102
Total Organic Carbon	mg/l	0.1	5.2	5.9	2.7	54	5.1	3.8	6.0	71	4.8
Total Organic Halogen	ugCl^-/l	5	3600	3700	1100	15000	3100	380	210	25000	2500
Total Kjeldahl Nitrogen as N	mg/l	0.1	3.1	1.0	0.5	310	1.5	0.6	0.3	380	1.0
Hexavalent Chromium	mg/l	0.01	ND	0.60	ND	ND	ND	ND	0.01	0.01	ND
Phenolics	mg/l	0.01	0.01	ND	ND	0.04	ND	ND	ND	0.04	ND

TOTAL TRACE METALS

Parameter	Units	Detection Limit	4333-01	4333-02	4333-03	4333-04	4333-05	4333-06	4333-07	4333-08	4333-09
Boron	mg/l	0.004	2.6	2.0	0.16	14	0.19	0.18	0.16	20	0.18
Cadmium	mg/l	0.002	0.003	ND	ND	0.003	0.013	ND	ND	0.012	0.006
Chromium	mg/l	0.005	0.038	0.58	ND	0.75	0.27	ND	ND	2.3	0.092
Manganese	mg/l	0.005	2.0	0.76	0.060	17	4.1	1.1	1.1	25	2.7
Nickel	mg/l	0.01	0.04	0.04	ND	0.40	0.11	ND	ND	0.68	0.05
Sodium	mg/l	0.5	79	77	54	200	69	56	54	266	56

ND = Not detected. NR = Not requested.

ANALYTICAL RESULTS

for

Sparton Technology, Inc.

VOLATILE ORGANICS - PRIORITY POLLUTANTS

Parameter		Units	Detection Limit	4333-01	4333-02	4333-03	4333-04	4333-05	4333-06	4333-07	4333-08	4333-09
1V	Acrolein	ug/l	100	ND	ND	ND	ND	ND	ND	ND	ND	ND
2V	Acrylonitrile	ug/l	100	ND	ND	ND	ND	ND	ND	ND	ND	ND
3V	Benzene	ug/l	5	ND	9	ND	58	ND	ND	ND	56	6
4V	Bis(chloromethyl)ether	ug/l	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
5V	Bromoform	ug/l	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
6V	Carbon tetrachloride	ug/l	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
7V	Chlorobenzene	ug/l	5	ND	ND	ND	16	ND	ND	ND	17	ND
8V	Chlorodibromomethane	ug/l	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
9V	Chloroethane	ug/l	10	ND	ND	ND	45	ND	ND	ND	27	ND
10V	2-Chloroethylvinyl ether	ug/l	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
11V	Chloroform	ug/l	5	15	34	ND	25	ND	ND	ND	33	ND
12V	Dichlorobromomethane	ug/l	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
13V	Dichlorodifluoromethane	ug/l	10	ND	ND	ND	ND	ND	ND	ND	ND	ND
14V	1,1-Dichloroethane	ug/l	5	13	17	ND	3200	1900	ND	ND	2700	2100
15V	1,2-Dichloroethane	ug/l	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
16V	1,1-Dichloroethylene	ug/l	5	820	1000	85	3100	260	13	9	3700	460
17V	1,2-Dichloropropane	ug/l	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
18V	1,3-Dichloropropylene	ug/l	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
19V	Ethylbenzene	ug/l	5	ND	ND	ND	63	ND	ND	ND	53	ND
20V	Methylbromide	ug/l	10	ND	ND	ND	ND	ND	ND	ND	ND	ND
21V	Methylchloride	ug/l	10	ND	ND	ND	70	ND	ND	ND	23	ND
22V	Methylene chloride	ug/l	10	1700	3600	11	49000	17	330	170	51000	66
23V	1,1,2,2-Tetrachloroethane	ug/l	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
24V	Tetrachloroethylene	ug/l	5	17	25	34	140	53	ND	ND	140	77
25V	Toluene	ug/l	5	45	6	ND	1600	50	ND	ND	1400	32
26V	1,2-trans-Dichloroethylene	ug/l	5	ND	ND	ND	200	19	ND	ND	140	21
27V	1,1,1-Trichloroethane	ug/l	5	4600	4100	2200	5500	2300	31	21	6700	2900
28V	1,1,2-Trichloroethane	ug/l	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
29V	Trichloroethylene	ug/l	5	6900	12000	4400	37000	4300	200	130	38000	6200
30V	Trichlorofluoromethane	ug/l	10	ND	ND	ND	ND	ND	ND	ND	ND	ND
31V	Vinyl chloride	ug/l	10	ND	ND	ND	ND	ND	ND	ND	ND	ND

ND = Not detected. NR = Not requested.

ANALYTICAL RESULTS

for

Sparton Technology, Inc.

VOLATILE ORGANICS - ADDITIONAL COMPONENTS

Parameter	Units	Detection Limit	4333-01	4333-02	4333-03	4333-04	4333-05	4333-06	4333-07	4333-08	4333-09
Acetone	ug/l	10	ND	ND	ND	17000	28	ND	ND	22000	53
Ethanol	ug/l	400	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-Hexanone	ug/l	10	ND	ND	ND	ND	ND	ND	ND	ND	ND
Meta-xylene*	ug/l	5	ND	ND	ND	42	ND	ND	ND	32	ND
Ortho, Para-xylene*	ug/l	5	ND	ND	ND	84	ND	ND	ND	67	ND
Trichlorotrifluoroethane	ug/l	5	24	9	48	73	35	ND	ND	90	67

ND = Not detected. NR = Not requested.

*Please note that xylene = dimethylbenzene. The ortho and para isomers are not resolved chromatographically and are therefore reported together. Adding the ortho,para and meta results together gives the total xylene (dimethylbenzene) results.

SAMPLE DESCRIPTION INFORMATION

for

Sparton Technology, Inc., Inc.

RMA Sample No.	Sample Description	Sample Type	Date Sampled	Date Received
4346-01	PW-1-2	Water	10/8/84	10/11/84
4346-02	PW-1-3	Water	10/8/84	10/11/84

October 31, 1984

ANALYTICAL RESULTS

for

Sparton Technology, Inc.

INORGANIC PARAMETERS

Parameter	Units	Detection Limit	4346-01	4346-02
pH	units	0.01	7.86	7.85
Specific Conductance at 25°C	umhos/cm	1	791	789
Total Organic Carbon	mg/l	0.1	5.8	3.5
Total Organic Halogen	ugCl^-/l	5	240	210

VOLATILE ORGANICS

Parameter	Units	Detection Limit	4346-01	4346-02
16V 1,1-Dichloroethylene	ug/l	5	16	12
29V Trichloroethylene	ug/l	5	150	110

ND = Not detected. NR = Not requested.

ROCKY MOUNTAIN ANALYTICAL LABORATORY

Organic Analytical Methodology

Parameter	Units	Nominal Detection Limit[a]	Methodology	Reference[1]	Preservation Bottle No.	Maximum Holding Time[b]
Purgeables	ug/l	1	Purge & Trap GC/MS	624	11	14 days
Base/Neutrals	ug/l	10	Extraction/GC/MS	625	12	7 days/40 days
Acids	ug/l	10	Extraction/GC/MS	625	12	7 days/40 days
Organochlorine Pesticides/PCB's	ug/l	0.01	Extraction/GC/ECD	608	13	7 days/40 days
		10	Extraction/GC/MS	625	12	7 days/40 days
Phenoxy Herbicides	ug/l	0.01	Extraction/GC/ECD	(2)	14	7 days/40 days
Total Organic Halogen (TOX)	ug/l	5	Adsorbtion/Coulometric	450.1(3)	15	-
Trihalomethanes (THM)	ug/l	1	Extraction/GC/ECD	(4)	11	14 days
		1	Purge & Trap GC/MS	(4)	11	14 days
Dioxin	ug/l	0.005	Extraction/GC/MS/ECD	613	16	7 days/40 days
Purgeable Halocarbons	ug/l	0.01	Purge & Trap/GC/Hall	601	11	14 days
Purgeable Aromatics	ug/l	1	Purge & Trap/GC/FID	602	17	14 days
Acrolein & Acrylonitrile	ug/l	100	Purge & Trap/GC/FID	603	18	14 days
Phenols by GC	ug/l	10	Extraction/GC/FID	604	16	7 days/40 days
Benzidines	ug/l	0.1	Extraction/HPLC	605	19	7 days/40 days
Phthalate Esters	ug/l	10	Extraction/GC/FID	606	12	7 days/40 days
Nitrosamines	ug/l	1	Extraction/GC/NPD	607	20	7 days/40 days
Nitroaromatics/isophorone	ug/l	1	Extraction/GC/FID & GC/ECD	609	12	7 days/40 days
Polynuclear Aromatics	ug/l	0.5	Extraction/HPLC	610	20	7 days/40 days
Haloethers	ug/l	1	Extraction/GC/Hall	611	17	7 days/40 days
Chlorinated Hydrocarbons	ug/l	0.02	Extraction/GC/ECD	612	12	7 days/40 days
Organophosphorus Pesticides	ug/l	0.1	Extraction/GC/NPD	622(5)	12	7 days/40 days
Triazine Pesticides	ug/l	0.1	Extraction/GC/NPD	(6)	12	7 days/40 days

References

(1) Federal Register, Vol. 44, No. 233, Monday, December 3, 1979.
(2) "Method for Chlorinated Phenoxy Acid Herbicides in Industrial Effluents," Federal Register, Vol. 38, No. 75, Part II.
(3) "Total Organic Halide," US EPA-EMSL, Cincinnati, November, 1980.
(4) Federal Register, Vol. 44, No. 231, Thursday, November 29, 1979, Appendix, Part I.
(5) "Method 622- Organophosphorus Pesticides," Proposed EPA Method, 304 (h) Committee.
(6) Federal Register, Vol. 38, No. 75, 1973.

Notes

[a] Nominal values are the best achievable with the listed analytical method for a typical component. Interferrences in specific samples may result in a higher detection limit.

[b] Applicable to NPDES Wastes as updated by Robert C. Booth, Director, EMSL-Cincinnati, September 22, 1981. Where two times are given, the first refers to the time to extraction, the second to the time of instrumental analysis.

ROCKY MOUNTAIN ANALYTICAL LABORATORY

Organic Analytical Methodology (continued)

Preservation Bottle No.	Parameter Group	Bottle	Preservation
11	Purgeables	40 ml glass with teflon lined silicone septum cap	4°C (thiosulfate if Cl_2 present)
17	Purgeables	40 ml glass with teflon lined silicone septum cap	4°C, HCl to pH less than 2 (thiosulfate if Cl_2 present)
18	Purgeables	40 ml glass with teflon lined silicone septum cap	4°C, adjust pH to 4 - 5 (thiosulfate if Cl_2 present)
16	Extractables	1 liter glass with teflon lined cap	4°C (thiosulfate if Cl_2 present)
19	Extractables	1 liter glass with teflon lined cap	4°C, adjust pH to 2 - 7 (thiosulfate if Cl_2 present)
12, 13, 14	Extractables	1 liter glass with teflon lined cap	4°C
20	Extractables	1 liter glass with teflon lined cap	4°C, store in dark (thiosulfate is Cl_2 present)
15	TOX	250 ml glass with teflon lined cap, single 1 liter glass with teflon lined cap, quad.	4°C, store in dark (thiosulfate if Cl_2 present)

ROCKY MOUNTAIN ANALYTICAL LABORATORY

Inorganic Analytical Methodology

Parameter	Units	Nominal Detection Limit[a]	Methodology	Reference	Preservation Bottle No.	Maximum Holding Time[b]
MAJOR IONS						
Sodium	mg/l	0.5	ICP Emission Spectroscopy	3	4	6 months
Potassium	mg/l	0.3	ICP Emission Spectroscopy	3	4	6 months
Calcium	mg/l	0.1	ICP Emission Spectroscopy	3	4	6 months
Magnesium	mg/l	0.1	ICP Emission Spectroscopy	3	4	6 months
Chloride	mg/l	3	Manual Titrimetric, $Hg(NO_3)_2$	1-325.3/2-407B	1	28 days
			Automated Colorimetric Ferricyanide	1-325.2	1	28 days
Fluoride	mg/l	0.1	Electrode	1-340.2/2-413B	1	28 days
Sulfate	mg/l	5	Manual Turbidimetric	1-375.4/2-426C	1	28 days
			Automated Colorimetric MTB	1-375.2	1	28 days
Total Alkalinity as $CaCO_3$ at pH 4.5	mg/l	5	Titrimetric	1-310.1/2-403	1	14 days
Carbonate Alkalinity as $CaCO_3$ at pH 8.3	mg/l	5	Titrimetric	1-310.1/2-403	1	14 days
Bicarbonate Alkalinity as $CaCO_3$ at pH 4.5	mg/l	5	Titrimetric	1-310.1/2-403	1	14 days
Hydroxide Alkalinity as $CaCO_3$	mg/l	5	Calculation	2-403	-	-
Nitrate+Nitrite as N	mg/l	0.1	Manual Cd Reduction - Colorimetric	1-353.3/2-418C	2	28 days
		0.1	Automated Cd Reduction - Colorimetric	1-353.2	2	28 days
Total Cations	meq/l	0.1	Calculation	2-104C	-	-
Total Anions	meq/l	0.1	Calculation	2-104C	-	-
Difference	%	0.1	Calculation	2-104C	-	-
RADIOCHEMISTRY						
Gross Alpha	pCi/l	0.1	Proportional Counter	2-703	5	6 months
Gross Beta	pCi/l	0.1	Proportional Counter	2-703	5	6 months
Radium 226	pCi/l	0.1	Separation - Counter	2-705	5	6 months
Radium 228	pCi/l	0.1	Separation - Counter	2-707	5	6 months
Uranium	mg/l	0.005	Fluorimetric	4-D2907-75	5	6 months

ROCKY MOUNTAIN ANALYTICAL LABORATORY

Inorganic Analytical Methodology (Continued)

Parameter	Units	Nominal Detection Limit[a]	Methodology	Reference	Preservation Bottle No.	Maximum HoldingTime[b]
TRACE METALS[c]						
Aluminum	mg/l	0.05	ICP Emission Spectroscopy	3	4	6 months
Antimony	mg/l	0.002	Furnace Atomic Absorption	1-204.2	4	6 months
Arsenic	mg/l	0.002	Furnace Atomic Absorption	1-206.2	4	6 months
Barium	mg/l	0.005	ICP Emission Spectroscopy	3	4	6 months
Beryllium	mg/l	0.001	ICP Emission Spectroscopy	3	4	6 months
Boron	mg/l	0.004	ICP Emission Spectroscopy	3	4	6 months
Cadmium	mg/l	0.002	ICP Emission Spectroscopy	3	4	6 months
Chromium	mg/l	0.005	ICP Emission Spectroscopy	3	4	6 months
Cobalt	mg/l	0.003	ICP Emission Spectroscopy	3	4	6 months
Copper	mg/l	0.002	ICP Emission Spectroscopy	3	4	6 months
Iron	mg/l	0.05	ICP Emission Spectroscopy	3	4	6 months
Lead	mg/l	0.025	ICP Emission Spectroscopy	3	4	6 months
		0.001	Furnace Atomic Absorption	1-239.2	4	6 months
Manganese	mg/l	0.005	ICP Emission Spectroscopy	3	4	6 months
Mercury	mg/l	0.0002	Cold Vapor Atomic Absorption	1-245.1	4	6 months
Molybdenum	mg/l	0.005	ICP Emission Spectroscopy	3	4	6 months
Nickel	mg/l	0.01	ICP Emission Spectroscopy	3	4	6 months
Selenium	mg/l	0.002	Furnace Atomic Absorption	1-270.2	4	6 months
Silver	mg/l	0.003	ICP Emission Spectroscopy	3	4	6 months
Strontium	mg/l	0.005	ICP Emission Spectroscopy	3	4	6 months
Thallium	mg/l	0.002	Furnace Atomic Absorption	1-279.2	4	6 months
Tin	mg/l	0.03	ICP Emission Spectroscopy	3	4	6 months
Titanium	mg/l	0.002	ICP Emission Spectroscopy	3	4	6 months
Vanadium	mg/l	0.002	ICP Emission Spectroscopy	3	4	6 months
Zinc	mg/l	0.004	ICP Emission Spectroscopy	3	4	6 months
INORGANIC PARAMETERS						
pH	units	0.01	Meter	1-150.1; 2-423	1	ASAP
Specific Conductance at 25°C	umhos/cm	1	Bridge	1-120.1; 2-205	1	28 days
Total Dissolved Solids	mg/l	10	Gravimetric, 180°C	1-160.1; 2-209B	1	7 days
Total Suspended Solids	mg/l	2	Gravimetric, 105°C	1-160.2	1	7 days
Total Solids	mg/l	10	Gravimetric, 105°C	1-160.3	1	7 days
Total Volatile Solids	mg/l	10	Gravimetric, 550°C	1-160.4	1	7 days
Ortho-Phosphate as P	mg/l	0.01	Single Reagent Colorimetric	1-365.2; 2-424F	1	48 hours

ROCKY MOUNTAIN ANALYTICAL LABORATORY

Inorganic Analytical Methodology (Continued)

Parameter	Units	Nominal Detection Limit[a]	Methodology	Reference	Preservation Bottle No.	Maximum HoldingTime[b]
INORGANIC PARAMETERS (Continued)						
Total Phosphorus as P	mg/l	0.06	Digestion; ICP Emission Spectroscopy	1-4.1.4; 3	4	28 days
		0.01	Digestion - Colorimetric	1-365.2; 1-424C,F	2	28 days
Silica as SiO_2	mg/l	0.1	ICP Emission Spectroscopy	3	4	28 days
	mg/l	1	Colorimetric	1-370.1; 2-425C	1	28 days
Biological Oxygen Demand	mg/l	2	Dilution Bottle - D.O. Probe	1-405.1; 2-507	1	48 hours
Chemical Oxygen Demand	mg/l	5	Micro Colorimetric	1-410.4; 2-508A	2	28 days
Total Organic Carbon	mg/l	0.1	Oxidation-Infrared Absorption	1-415.1; 2-505	2	28 days
Ammonia as N	mg/l	0.1	Electrode	1-350.3; 2-417E	2	28 days
		0.1	Automated Colorimetric	1-350.1	2	28 days
Total Kjeldahl Nitrogen as N	mg/l	0.1	Digestion - Electrode	1-351.4; 2-420B	2	28 days
		0.1	Digestion - Colorimetric	1-351.2	2	28 days
Total Organic Nitrogen as N	mg/l	0.1	Calculation (TKN - NH_3)	-	-	-
Oil and Grease	mg/l	1	Freon Extraction-Gravimetric	1-413.1; 2-503A	3	28 days
Free Cyanide	mg/l	0.01	Chlorination-Distillation-Colorimetric	1-335.1; 2-412F,D	6	14 days
Total Cyanide	mg/l	0.01	Distillation - Colorimetric	1-335.2; 2-412B,D	6	14 days
Phenolics	mg/l	0.01	Distillation - Colorimetric	1-420.1; 2-510A,B	2	28 days
Fecal Coliform	Colonies/100 ml	1	Membrane Filter	2-909C	8	ASAP
Total Coliform	Colonies/100 ml	1	Membrane Filter	2-909A	8	ASAP
Bromide	mg/l	0.1	Colorimetric	2-405	1	28 days
Residual Chlorine	mg/l	0.05	Amperometric	1-330.2; 2-408C	1	ASAP
Hexavalent Chromium	mg/l	0.01	Colorimetric	1-218.4; 2-312B	1	24 hours
Color	units	5	Pt-Co Colorimetric	1-110.2; 2-204A	1	48 hours
Hardness as $CaCO_3$	mg/l	5	Calculation	2-314A	4	6 months
Nitrite as N	mg/l	0.01	Colorimetric	1-354.1; 2-419	1	48 hours
Sulfide	mg/l	0.05	Titrimetric - Electrode	1-376.1; 2-427B,D	7	7 days
Sulfite	mg/l	2	Titrimetric	1-377.1; 2-428	1	ASAP
MBAS (Surfactants)	mg/l	0.1	Colorimetric	1-425.1; 2-512A	1	48 hours
Turbidity	NTU	0.1	Turbidimeter	1-180.1; 2-214A	1	48 hours

ROCKY MOUNTAIN ANALYTICAL LABORATORY

Inorganic Analytical Methodology (Continued)

References

(1) "Methods for Chemical Analysis of Water and Wastes", EPA-600/4-79-020, EMSL, Cincinnati, 1979.

(2) "Standard Methods for the Examination of Water and Wastewater", 15th Edition, APHA, 1980.

(3) Federal Register, 40 CFR 136, December 3, 1979; USEPA EMSL-Cincinnati, OH 45268.

(4) "Annual Book of ASTM Standards", Part 31, Water, 1980.

Notes

[a] Nominal values are the best achievable with the listed analytical method. Interferences in specific samples may result in a higher detection limit.

[b] Applicable to NPDES wastes as updated by Robert C. Booth, Director, EMSL-Cincinnati, September 22, 1981.

[c] Digestion procedure 1-4.1.4 used for elements determined by ICP Emission Spectroscopy when determining total metals. Digestion procedures for graphite furnace elements included with reference listed.

11/10/82

GUIDELINES FOR SAMPLE BOTTLES AND PRESERVATIVES[a]

Bottle No.	Parameters	Container	Preservative	Notes
1	Cl^-, F^-, $SO_4^=$, Tot. Alk., $CO_3^=$ Alk., HCO_3^- Alk., OH^- Alk., pH, spec. cond., TDS, TSS, TS, TVS, o-PO_4 SiO_2, BOD, Br^-, res. Cl_2, Cr^{+6}, color, NO_2^-, $SO_3^=$, MBAS, Turbidity.	1 liter poly	4° C	Provide unfiltered sample for solids and turbidity.
2	Tot. P, COD, TOC, NH_3, TKN, TON, Phenolics $NO_3 + NO_2$.	500 ml poly	2 ml 50% H_2SO_4, 4°C	
3	O & G	1 liter glass	4 ml 50% H_2SO_4, 4°C	Do not filter, collect directly in bottle.
4	Na, K, Ca, Mg, Al, Sb, As, Ba, Be, B, Cd, Cr, Co, Cu, Fe, Pb, Mn, Hg, Mo, Ni, Se, Ag, Sr, Tl, Sn, Ti, V, Zn, ICP, Hardness.	500 ml poly	5 ml 50% HNO_3	Provide separate samples for total and dissolved sample (filter before adding to bottle.)
5	Alpha, Beta, Ra^{226}, Ra^{228}, U	1 liter poly (no Ra^{228}) ½ gallon poly (with Ra^{228})	10 ml 50% HNO_3 20 ml 50% HNO_3	
6	Free CN, Tot. CN	500 ml poly	2 ml 50% NaOH, 4°C	
7	Sulfide	250 ml poly	1 ml 1 N Zn acetate, 1 ml 50% NaOH, 4°C	
8	Fecal coli., total coli.	8 oz. sterile	4° C	Collect directly in sterile bottle
11	VOA, purgeable organics, THM	2 - 40 ml glass vial	4° C	Completely fill bottle, leave no air bubbles.
12	B/NA	1 liter glass	4° C	
13	Pest./PCB	1 liter glass	4° C	
14	Herbicides	1 liter glass	4° C	
15	TOX	1 liter glass	4° C	

[a]Federal Register, 40 CFR 136, December 3, 1979, as updated by EPA, EMSL-Cincinnati, September 22, 1981.

11/5/82

SPARTON
TECHNOLOGY, INC.

4901 Rockaway Blvd., SE
Rio Rancho, New Mexico 87124
P.O. Box 1784
Albuquerque, New Mexico 87103
Phone (505) 892-5300
TWX 910-989-1657

May 21, 1985

Received by HLA 5/29/85

Mr. Peter Pache
Program Manager
New Mexico E.I.D.
Hazardous Waste Management Section
P.O. Box 968
Santa Fe, N.M. 87504-0968

Dear Mr. Pache:

In accordance with The Alternate Groundwater Monitoring program implemented by Sparton Technology, Inc. at its' Coors Road Facility, enclosed please find the analyses results for the 7th quarterly groundwater samples collected during the period of April 18, 1985 to April 19, 1985.

If you have any questions, please contact Tom Burger, HLA, (713) 789-8050, or myself at (505) 892-5300.

Sincerely,

SPARTON TECHNOLOGY, INC.

R D Mico

R.D. Mico
Vice President & General Manager

RDM/jmf

cc: Tom Burger, Harding Lawson Associated
Cleovis Martinez, Sparton Technology, Inc.
Blair Thompson, Sparton Corporation

ENCLOSURE

SAMPLE DESCRIPTION INFORMATION

for

Sparton Technology, Inc.

RMA Sample No.	Sample Description	Sample Type	Date Sampled	Date Received
4889-01	MW-1	Water	4/19/85	4/20/85
4889-02	MW-4	Water	4/19/85	4/20/85
4889-03	MW-6	Water	4/18/85	4/20/85
4889-04	MW-8	Water	4/19/85	4/20/85
4889-05	MW-9	Water	4/19/85	4/20/85
4889-06	MW-10	Water	4/19/85	4/20/85
4889-07	MW-11	Water	4/18/85	4/20/85

May 9, 1985

ANALYTICAL RESULTS

for

Sparton Technology, Inc.

INORGANIC PARAMETERS

Parameter	Units	Detection Limit	MW-6 4889-03	MW-8 4889-04	MW-9 4889-05	MW-10 4889-06	MW-11 4889-07
pH	units	0.01	7.89	7.78	7.31	7.94	7.95
Specific Conductance at 25°C	umhos/cm	1	871	741	1770	702	752
Total Organic Carbon	mg/l	0.1	1.7	1.3	7.2	1.6	1.7
Total Organic Halogen	$mgCl^-/l$	0.005	0.310	0.150	9.10	0.013	0.010

Parameter	Units	Detection Limit	MW-1 4889-01	MW-4 4889-02
pH Value 1	units	0.01	7.35	7.54
pH Value 2	units	0.01	7.33	7.59
pH Value 3	units	0.01	7.36	7.62
pH Value 4	units	0.01	7.32	7.56
Specific Conductance at 25°C	umhos/cm	1	4190	1430
Specific Conductance at 25°C	umhos/cm	1	4230	1420
Specific Conductance at 25°C	umhos/cm	1	4200	1420
Specific Conductance at 25°C	umhos/cm	1	4200	1420
Total Organic Carbon Value 1	mg/l	0.1	38	9.1
Total Organic Carbon Value 2	mg/l	0.1	38	9.0
Total Organic Carbon Value 3	mg/l	0.1	38	9.0
Total Organic Carbon Value 4	mg/l	0.1	38	9.0
Total Organic Halogen	$mgCl^-/l$	0.005	23.0	12.0

VOLATILE ORGANICS

Parameter	Units	Detection Limit	MW-1 4889-01	MW-4 4889-02	MW-6 4889-03	MW-8 4889-04	MW-8 dup 4889-04 dup	MW-9 4889-05	MW-10 4889-06	MW-11 4889-07
1,1-Dichloroethene	mg/l	0.001	2.48	2.14	0.052	0.020	0.018	ND	ND	ND
Trichloroethylene	mg/l	0.001	35.8	12.6	0.630	0.260	0.290	10.2	0.011	0.006

ND = Not detected. NR = Not requested.

Ground Water Elevation

(Ft. Above Sea Level)

	MW-1	MW-4	MW-6	MW-8	MW-9	MW-10	MW-11
7th Quarter	4979.24	4978.88	4980.54	4979.13	4977.22	4976.90	4976.20

Rocky Mountain Analytical Laboratory

August 14, 1985

Cleoves Martinez
Sparton Technology, Inc.
9621 Coors Road, N.W.
P.O. Box 1784
Albuquerque, New Mexico 87114

Dear Mr. Martinez:

Enclosed are the results for seven groundwater samples collected in July, 1985. Please note that the two volatile vials for sample 51192-05 (your I.D. MW-9) froze and broke in our refrigerator so we were unable to perform the volatile organics analysis on this sample. We have received a replacement sample and will analyze it as soon as possible. You can expect a separate report and invoice when that analysis is complete.

Feel free to call if you have any questions.

Sincerely,

Michael Brooks

Michael Brooks
Section Supervisor
Organic Mass Spectrometry Division

Reviewed By:

Jerry Parr

Jerry Parr
Director
Quality Assurance

MB/JP:lk
Enclosures

RMAL #51192

SUMMARY OF ANALYTICAL RESULTS AND METHODOLOGY

for

Sparton Technology, Inc. - July, 1985 Sampling

A Sample Description Information form is enclosed for your reference.

Results

Results have been reported in mg/L (ppm) for comparison with previous reports.

Data compare favorably with previous reports with the exception of sample 51192-01 (your I.D. MW-1). Inorganic and volatile organic data for this sample are significantly different. The pH value has dropped one whole unit, total organic halogen (TOX), total Kjeldahl nitrogen (TKN), and chromium values have risen. The volatile organics toluene, 1,1,1-trichloroethane, and trichloroethylene also are at significantly higher concentrations.

Sample 51192-06 (your I.D. MW-10) previously had a value of 16 mg/L methylene chloride reported, but is reported here at "Below Detection Limit". Methylene chloride is a common laboratory solvent, and given the amount present in some of the other samples in this project, it is possible the previous sample was contaminated in sampling, shipment or handling in the laboratory.

Analytical Methods

All analyses were conducted according to protocol promulgated by EPA in 40 CFR 136. References for inorganic and organic methodologies are enclosed.

SAMPLE DESCRIPTION INFORMATION

for

Sparton Technology, Inc.

RMA Sample No.	Sample Description	Sample Type	Date Sampled	Date Received
51192-01	MW-1	Groundwater	7/18/85	7/20/85
51192-02	MW-4	Groundwater	7/18/85	7/20/85
51192-03	MW-6	Groundwater	7/18/85	7/20/85
51192-04	MW-8	Groundwater	7/18/85	7/20/85
51192-05	MW-9	Groundwater	7/19/85	7/20/85
51192-06	MW-10	Groundwater	7/18/85	7/20/85
51192-07	MW-11	Groundwater	7/18/85	7/20/85

August 13, 1985

ANALYTICAL RESULTS

for

Sparton Technology, Inc.

INORGANIC PARAMETERS

Parameter	Units	Sparton # RMAL #	MW-1 51192-01		MW-4 51192-02		MW-6 51192-03		MW-8 51192-04	
pH	units		6.74	(0.01)	7.22	(0.01)	7.46	(0.01)	7.42	(0.01)
SpecificConductance at 25°C	umhos/cm		4520	(1)	1010	(1)	833	(1)	715	(1)
Chloride	mg/L		1330	(3)	89	(3)	38	(3)	33	(3)
Nitrate + Nitrite as N	mg/L		ND	(10)	2.1	(0.1)	15	(0.1)	5.5	(0.1)
Sulfate	mg/L		630	(5)	160	(5)	140	(5)	69	(5)
Total Organic Carbon	mg/L		44	(0.1)	3.7	(0.1)	1.4	(0.1)	1.8	(0.1)
Total Organic Halogen	$mgCl^-/L$		49	(0.005)	7	(0.005)	0.40	(0.005)	0.38	(0.005)
Total Kjeldahl Nitrogen as N	mg/L		61	(0.1)	1.2	(0.1)	ND	(0.1)	ND	(0.1)
Hexavalent Chromium	mg/L		30	(0.01)	ND	(0.01)	ND	(0.01)	ND	(0.01)
Trivalent Chromium	mg/L		3	(0.01)	ND	(0.01)	ND	(0.01)	ND	(0.01)

Parameter	Units	Sparton # RMAL #	MW-9 51192-05		MW-10 51192-06		MW-11 51192-07	
pH	units		6.92	(0.01)	7.39	(0.01)	7.57	(0.01)
SpecificConductance at 25°C	umhos/cm		1590	(1)	694	(1)	697	(1)
Chloride	mg/L		210	(3)	28	(3)	29	(3)
Nitrate + Nitrite as N	mg/L		ND	(0.1)	ND	(0.1)	ND	(0.1)
Sulfate	mg/L		300	(5)	125	(5)	130	(5)
Total Organic Carbon	mg/L		4.6	(0.1)	9.0	(0.1)	1.7	(0.1)
Total Organic Halogen	$mgCl^-/L$		6.9	(0.005)	0.050	(0.005)	0.010	(0.005)
Total Kjeldahl Nitrogen as N	mg/L		0.9	(0.1)	ND	(0.1)	ND	(0.1)
Hexavalent Chromium	mg/L		ND	(0.01)	ND	(0.01)	ND	(0.01)
Trivalent Chromium	mg/L		ND	(0.01)	ND	(0.01)	ND	(0.01)

ND = Not detected. Detection limits in parentheses.

ANALYTICAL RESULTS

for

Sparton Technology, Inc.

TRACE METALS

Parameter	Units	Sparton # / RMAL #	MW-1 51192-01		MW-4 51192-02		MW-6 51192-03		MW-8 51192-04	
Boron	mg/L		11	(0.004)	2.0	(0.004)	0.33	(0.004)	0.31	(0.004)
Chromium	mg/L		33	(0.005)	0.005	(0.005)	ND	(0.005)	ND	(0.005)
Manganese	mg/L		3.4	(0.005)	0.11	(0.005)	0.23	(0.005)	ND	(0.005)
Nickel	mg/L		0.15	(0.01)	0.034	(0.01)	ND	(0.01)	ND	(0.01)

Parameter	Units	Sparton # / RMAL #	MW-9 51192-05		MW-10 51192-06		MW-11 51192-07	
Boron	mg/L		7.9	(0.004)	0.15	(0.004)	0.12	(0.004)
Chromium	mg/L		ND	(0.005)	ND	(0.005)	ND	(0.005)
Manganese	mg/L		1.1	(0.005)	1.0	(0.005)	0.98	(0.005)
Nickel	mg/L		0.11	(0.01)	ND	(0.01)	ND	(0.01)

ND = Not detected. Detection limits in parentheses.

ANALYTICAL RESULTS

for

Sparton Technology, Inc.

VOLATILE ORGANICS 624

Parameter	Sparton # / RMAL #	MW-1 51192-01		MW-4 51192-02		MW-6 51192-03		MW-8 51192-04	
		Concentration, mg/L							
3V Benzene		BDL	(2)	BDL	(0.15)	BDL	(0.005)	BDL	(0.005)
5V Bromoform		BDL	(2)	BDL	(0.15)	BDL	(0.005)	BDL	(0.005)
6V Carbon tetrachloride		BDL	(2)	BDL	(0.15)	BDL	(0.005)	BDL	(0.005)
7V Chlorobenzene		BDL	(2)	BDL	(0.15)	BDL	(0.005)	BDL	(0.005)
8V Chlorodibromomethane		BDL	(2)	BDL	(0.15)	BDL	(0.005)	BDL	(0.005)
9V Chloroethane		BDL	(5)	BDL	(0.30)	BDL	(0.010)	BDL	(0.010)
10V 2-Chloroethylvinyl ether		BDL	(2)	BDL	(0.15)	BDL	(0.005)	BDL	(0.005)
11V Chloroform		BDL	(2)	BDL	(0.15)	BDL	(0.005)	BDL	(0.005)
12V Dichlorobromomethane		BDL	(2)	BDL	(0.15)	BDL	(0.005)	BDL	(0.005)
14V 1,1-Dichloroethane		BDL	(2)	BDL	(0.15)	BDL	(0.005)	BDL	(0.005)
15V 1,2-Dichloroethane		BDL	(2)	BDL	(0.15)	BDL	(0.005)	BDL	(0.005)
16V 1,1-Dichloroethylene		2	(2)	1.3	(0.15)	0.027	(0.005)	0.013	(0.005)
17V 1,2-Dichloropropane		BDL	(2)	BDL	(0.15)	BDL	(0.005)	BDL	(0.005)
18V 1,3-Dichloropropylene		BDL	(2)	BDL	(0.15)	BDL	(0.005)	BDL	(0.005)
19V Ethylbenzene		BDL	(2)	BDL	(0.15)	BDL	(0.005)	BDL	(0.005)
20V Methylbromide		BDL	(5)	BDL	(0.30)	BDL	(0.010)	BDL	(0.010)
21V Methylchloride		BDL	(5)	BDL	(0.30)	BDL	(0.010)	BDL	(0.010)
22V Methylene chloride		39	(5)	2.9	(0.30)	BDL	(0.010)	BDL	(0.010)
23V 1,1,2,2-Tetrachloroethane		BDL	(2)	BDL	(0.15)	BDL	(0.005)	BDL	(0.005)
24V Tetrachloroethylene		BDL	(2)	BDL	(0.15)	BDL	(0.005)	BDL	(0.005)
25V Toluene		21	(2)	BDL	(0.15)	BDL	(0.005)	BDL	(0.005)
26V 1,2-trans-Dichloroethylene		BDL	(2)	BDL	(0.15)	BDL	(0.005)	BDL	(0.005)
27V 1,1,1-Trichloroethane		14	(2)	3.8	(0.15)	0.062	(0.005)	0.039	(0.005)
28V 1,1,2-Trichloroethane		BDL	(2)	BDL	(0.15)	BDL	(0.005)	BDL	(0.005)
29V Trichloroethylene		40	(2)	6.6	(0.15)	0.30	(0.005)	0.19	(0.005)
31V Vinyl chloride		BDL	(5)	BDL	(0.30)	BDL	(0.010)	BDL	(0.010)

BDL = Below Detection Limit. Detection limits in parentheses.

ANALYTICAL RESULTS

for

Sparton Technology, Inc.

VOLATILE ORGANICS 624

Parameter	Concentration, mg/L			
Sparton #	MW-10		MW-11	
RMAL #	51192-06		51192-07	
3V Benzene	BDL	(0.005)	BDL	(0.005)
5V Bromoform	BDL	(0.005)	BDL	(0.005)
6V Carbon tetrachloride	BDL	(0.005)	BDL	(0.005)
7V Chlorobenzene	BDL	(0.005)	BDL	(0.005)
8V Chlorodibromomethane	BDL	(0.005)	BDL	(0.005)
9V Chloroethane	BDL	(0.010)	BDL	(0.010)
10V 2-Chloroethylvinyl ether	BDL	(0.005)	BDL	(0.005)
11V Chloroform	BDL	(0.005)	BDL	(0.005)
12V Dichlorobromomethane	BDL	(0.005)	BDL	(0.005)
14V 1,1-Dichloroethane	BDL	(0.005)	BDL	(0.005)
15V 1,2-Dichloroethane	BDL	(0.005)	BDL	(0.005)
16V 1,1-Dichloroethylene	0.005	(0.005)	BDL	(0.005)
17V 1,2-Dichloropropane	BDL	(0.005)	BDL	(0.005)
18V 1,3-Dichloropropylene	BDL	(0.005)	BDL	(0.005)
19V Ethylbenzene	BDL	(0.005)	BDL	(0.005)
20V Methylbromide	BDL	(0.010)	BDL	(0.010)
21V Methylchloride	BDL	(0.010)	BDL	(0.010)
22V Methylene chloride	BDL	(0.010)	BDL	(0.010)
23V 1,1,2,2-Tetrachloroethane	BDL	(0.005)	BDL	(0.005)
24V Tetrachloroethylene	BDL	(0.005)	BDL	(0.005)
25V Toluene	BDL	(0.005)	BDL	(0.005)
26V 1,2-trans-Dichloroethylene	BDL	(0.005)	BDL	(0.005)
27V 1,1,1-Trichloroethane	0.013	(0.005)	BDL	(0.005)
28V 1,1,2-Trichloroethane	BDL	(0.005)	BDL	(0.005)
29V Trichloroethylene	0.041	(0.005)	0.007	(0.005)
31V Vinyl chloride	BDL	(0.010)	BDL	(0.010)

BDL= Below Detection Limit. Detection limits in parentheses.

ROCKY MOUNTAIN ANALYTICAL LABORATORY

Inorganic Analytical Methodology

Parameter	Units	Nominal Detection Limit[a]	Methodology	Reference	Preservation Bottle No.	Maximum Holding Time[b]
MAJOR IONS						
Sodium	mg/l	0.5	ICP Emission Spectroscopy	3	4	6 months
Potassium	mg/l	0.3	ICP Emission Spectroscopy	3	4	6 months
Calcium	mg/l	0.1	ICP Emission Spectroscopy	3	4	6 months
Magnesium	mg/l	0.1	ICP Emission Spectroscopy	3	4	6 months
Chloride	mg/l	3	Manual Titrimetric, $Hg(NO_3)_2$	1-325.3/2-407B	1	28 days
			Automated Colorimetric Ferricyanide	1-325.2	1	28 days
Fluoride	mg/l	0.1	Electrode	1-340.2/2-413B	1	28 days
Sulfate	mg/l	5	Manual Turbidimetric	1-375.4/2-426C	1	28 days
			Automated Colorimetric MTB	1-375.2	1	28 days
Total Alkalinity as $CaCO_3$ at pH 4.5	mg/l	5	Titrimetric	1-310.1/2-403	1	14 days
Carbonate Alkalinity as $CaCO_3$ at pH 8.3	mg/l	5	Titrimetric	1-310.1/2-403	1	14 days
Bicarbonate Alkalinity as $CaCO_3$ at pH 4.5	mg/l	5	Titrimetric	1-310.1/2-403	1	14 days
Hydroxide Alkalinity as $CaCO_3$	mg/l	5	Calculation	2-403	-	-
Nitrate+Nitrite as N	mg/l	0.1	Manual Cd Reduction - Colorimetric	1-353.3/2-418C	2	28 days
		0.1	Automated Cd Reduction - Colorimetric	1-353.2	2	28 days
Total Cations	meq/l	0.1	Calculation	2-104C	-	-
Total Anions	meq/l	0.1	Calculation	2-104C	-	-
Difference	%	0.1	Calculation	2-104C	-	-
RADIOCHEMISTRY						
Gross Alpha	pCi/l	0.1	Proportional Counter	2-703	5	6 months
Gross Beta	pCi/l	0.1	Proportional Counter	2-703	5	6 months
Radium 226	pCi/l	0.1	Separation - Counter	2-705	5	6 months
Radium 228	pCi/l	0.1	Separation - Counter	2-707	5	6 months
Uranium	mg/l	0.005	Fluorimetric	4-D2907-75	5	6 months

ROCKY MOUNTAIN ANALYTICAL LABORATORY

Inorganic Analytical Methodology (Continued)

Parameter	Units	Nominal Detection Limit[a]	Methodology	Reference	Preservation Bottle No.	Maximum HoldingTime[b]
TRACE METALS[c]						
Aluminum	mg/l	0.05	ICP Emission Spectroscopy	3	4	6 months
Antimony	mg/l	0.002	Furnace Atomic Absorption	1-204.2	4	6 months
Arsenic	mg/l	0.002	Furnace Atomic Absorption	1-206.2	4	6 months
Barium	mg/l	0.005	ICP Emission Spectroscopy	3	4	6 months
Beryllium	mg/l	0.001	ICP Emission Spectroscopy	3	4	6 months
Boron	mg/l	0.004	ICP Emission Spectroscopy	3	4	6 months
Cadmium	mg/l	0.002	ICP Emission Spectroscopy	3	4	6 months
Chromium	mg/l	0.005	ICP Emission Spectroscopy	3	4	6 months
Cobalt	mg/l	0.003	ICP Emission Spectroscopy	3	4	6 months
Copper	mg/l	0.002	ICP Emission Spectroscopy	3	4	6 months
Iron	mg/l	0.05	ICP Emission Spectroscopy	3	4	6 months
Lead	mg/l	0.025	ICP Emission Spectroscopy	3	4	6 months
		0.001	Furnace Atomic Absorption	1-239.2	4	6 months
Manganese	mg/l	0.005	ICP Emission Spectroscopy	3	4	6 months
Mercury	mg/l	0.0002	Cold Vapor Atomic Absorption	1-245.1	4	6 months
Molybdenum	mg/l	0.005	ICP Emission Spectroscopy	3	4	6 months
Nickel	mg/l	0.01	ICP Emission Spectroscopy	3	4	6 months
Selenium	mg/l	0.002	Furnace Atomic Absorption	1-270.2	4	6 months
Silver	mg/l	0.003	ICP Emission Spectroscopy	3	4	6 months
Strontium	mg/l	0.005	ICP Emission Spectroscopy	3	4	6 months
Thallium	mg/l	0.002	Furnace Atomic Absorption	1-279.2	4	6 months
Tin	mg/l	0.03	ICP Emission Spectroscopy	3	4	6 months
Titanium	mg/l	0.002	ICP Emission Spectroscopy	3	4	6 months
Vanadium	mg/l	0.002	ICP Emission Spectroscopy	3	4	6 months
Zinc	mg/l	0.004	ICP Emission Spectroscopy	3	4	6 months
INORGANIC PARAMETERS						
pH	units	0.01	Meter	1-150.1; 2-423	1	ASAP
Specific Conductance at 25°C	umhos/cm	1	Bridge	1-120.1; 2-205	1	28 days
Total Dissolved Solids	mg/l	10	Gravimetric, 180°C	1-160.1; 2-209B	1	7 days
Total Suspended Solids	mg/l	2	Gravimetric, 105°C	1-160.2	1	7 days
Total Solids	mg/l	10	Gravimetric, 105°C	1-160.3	1	7 days
Total Volatile Solids	mg/l	10	Gravimetric, 550°C	1-160.4	1	7 days
Ortho-Phosphate as P	mg/l	0.01	Single Reagent Colorimetric	1-365.2; 2-424F	1	48 hours

ROCKY MOUNTAIN ANALYTICAL LABORATORY

Inorganic Analytical Methodology (Continued)

Parameter	Units	Nominal Detection Limit[a]	Methodology	Reference	Preservation Bottle No.	Maximum Holding Time[b]
INORGANIC PARAMETERS (Continued)						
Total Phosphorus as P	mg/l	0.06	Digestion; ICP Emission Spectroscopy	1-4.1.4; 3	4	28 days
		0.01	Digestion - Colorimetric	1-365.2; 1-424C,F	2	28 days
Silica as SiO_2	mg/l	0.1	ICP Emission Spectroscopy	3	4	28 days
	mg/l	1	Colorimetric	1-370.1; 2-425C	1	28 days
Biological Oxygen Demand	mg/l	2	Dilution Bottle - D.O. Probe	1-405.1; 2-507	1	48 hours
Chemical Oxygen Demand	mg/l	5	Micro Colorimetric	1-410.4; 2-508A	2	28 days
Total Organic Carbon	mg/l	0.1	Oxidation-Infrared Absorption	1-415.1; 2-505	2	28 days
Ammonia as N	mg/l	0.1	Electrode	1-350.3; 2-417E	2	28 days
		0.1	Automated Colorimetric	1-350.1	2	28 days
Total Kjeldahl Nitrogen as N	mg/l	0.1	Digestion - Electrode	1-351.4; 2-420B	2	28 days
		0.1	Digestion - Colorimetric	1-351.2	2	28 days
Total Organic Nitrogen as N	mg/l	0.1	Calculation (TKN - NH_3)	-	-	-
Oil and Grease	mg/l	1	Freon Extraction-Gravimetric	1-413.1; 2-503A	3	28 days
Free Cyanide	mg/l	0.01	Chlorination-Distillation-Colorimetric	1-335.1; 2-412F,D	6	14 days
Total Cyanide	mg/l	0.01	Distillation - Colorimetric	1-335.2; 2-412B,D	6	14 days
Phenolics	mg/l	0.01	Distillation - Colorimetric	1-420.1; 2-510A,B	2	28 days
Fecal Coliform	Colonies/100 ml	1	Membrane Filter	2-909C	8	ASAP
Total Coliform	Colonies/100 ml	1	Membrane Filter	2-909A	8	ASAP
Bromide	mg/l	0.1	Colorimetric	2-405	1	28 days
Residual Chlorine	mg/l	0.05	Amperometric	1-330.2; 2-408C	1	ASAP
Hexavalent Chromium	mg/l	0.01	Colorimetric	1-218.4; 2-312B	1	24 hours
Color	units	5	Pt-Co Colorimetric	1-110.2; 2-204A	1	48 hours
Hardness as $CaCO_3$	mg/l	5	Calculation	2-314A	4	6 months
Nitrite as N	mg/l	0.01	Colorimetric	1-354.1; 2-419	1	48 hours
Sulfide	mg/l	0.05	Titrimetric - Electrode	1-376.1; 2-427B,D	7	7 days
Sulfite	mg/l	2	Titrimetric	1-377.1; 2-428	1	ASAP
MBAS (Surfactants)	mg/l	0.1	Colorimetric	1-425.1; 2-512A	1	48 hours
Turbidity	NTU	0.1	Turbidimeter	1-180.1; 2-214A	1	48 hours

ROCKY MOUNTAIN ANALYTICAL LABORATORY

Inorganic Analytical Methodology (Continued)

References

(1) "Methods for Chemical Analysis of Water and Wastes", EPA-600/4-79-020, EMSL, Cincinnati, 1979.

(2) "Standard Methods for the Examination of Water and Wastewater", 15th Edition, APHA, 1980.

(3) Federal Register, 40 CFR 136, December 3, 1979; USEPA EMSL-Cincinnati, OH 45268.

(4) "Annual Book of ASTM Standards", Part 31, Water, 1980.

Notes

[a] Nominal values are the best achievable with the listed analytical method. Interferences in specific samples may result in a higher detection limit.

[b] Applicable to NPDES wastes as updated by Robert C. Booth, Director, EMSL-Cincinnati, September 22, 1981.

[c] Digestion procedure 1-4.1.4 used for elements determined by ICP Emission Spectroscopy when determining total metals. Digestion procedures for graphite furnace elements included with reference listed.

11/10/82

GUIDELINES FOR SAMPLE BOTTLES AND PRESERVATIVES[a]

Bottle No.	Parameters	Container	Preservative	Notes
1	Cl^-, F^-, $SO_4^=$, Tot. Alk., $CO_3^=$ Alk., HCO_3^- Alk., OH^- Alk., pH, spec. cond., TDS, TSS, TS, TVS, o-PO_4 SiO_2, BOD, Br^-, res. Cl_2, Cr^{+6}, color, NO_2^-, $SO_3^=$, MBAS, Turbidity.	1 liter poly	4° C	Provide unfiltered sample for solids and turbidity.
2	Tot. P, COD, TOC, NH_3, TKN, TON, Phenolics $NO_3 + NO_2$.	500 ml poly	2 ml 50% H_2SO_4, 4°C	
3	O & G	1 liter glass	4 ml 50% H_2SO_4, 4°C	Do not filter, collect directly in bottle.
4	Na, K, Ca, Mg, Al, Sb, As, Ba, Be, B, Cd, Cr, Co, Cu, Fe, Pb, Mn, Hg, Mo, Ni, Se, Ag, Sr, Tl, Sn, Ti, V, Zn, ICP, Hardness.	500 ml poly	5 ml 50% HNO_3	Provide separate samples for total and dissolved sample (filter before adding to bottle.)
5	Alpha, Beta, Ra^{226}, Ra^{228}, U	1 liter poly (no Ra^{228}) ½ gallon poly (with Ra^{228})	10 ml 50% HNO_3 20 ml 50% HNO_3	
6	Free CN, Tot. CN	500 ml poly	2 ml 50% NaOH, 4°C	
7	Sulfide	250 ml poly	1 ml 1 N Zn acetate, 1 ml 50% NaOH, 4°C	
8	Fecal coli., total coli.	8 oz. sterile	4° C	Collect directly in sterile bottle
11	VOA, purgeable organics, THM	2 - 40 ml glass vial	4° C	Completely fill bottle, leave no air bubbles.
12	B/NA	1 liter glass	4° C	
13	Pest./PCB	1 liter glass	4° C	
14	Herbicides	1 liter glass	4° C	
15	TOX	1 liter glass	4° C	

[a]Federal Register, 40 CFR 136, December 3, 1979, as updated by EPA, EMSL-Cincinnati, September 22, 1981.

11/5/82

ROCKY MOUNTAIN ANALYTICAL LABORATORY

Organic Analytical Methodology

Parameter	Units	Nominal Detection Limit[a]	Methodology	Reference[1]	Preservation Bottle No.	Maximum Holding Time[b]
Purgeables	ug/l	1	Purge & Trap GC/MS	624	11	14 days
Base/Neutrals	ug/l	10	Extraction/GC/MS	625	12	7 days/40 days
Acids	ug/l	10	Extraction/GC/MS	625	12	7 days/40 days
Organochlorine Pesticides/PCB's	ug/l	0.01	Extraction/GC/ECD	608	13	7 days/40 days
		10	Extraction/GC/MS	625	12	7 days/40 days
Phenoxy Herbicides	ug/l	0.01	Extraction/GC/ECD	(2)	14	7 days/40 days
Total Organic Halogen (TOX)	ug/l	5	Adsorbtion/Coulometric	450.1(3)	15	-
Trihalomethanes (THM)	ug/l	1	Extraction/GC/ECD	(4)	11	14 days
		1	Purge & Trap GC/MS	(4)	11	14 days
Dioxin	ug/l	0.005	Extraction/GC/MS/ECD	613	16	7 days/40 days
Purgeable Halocarbons	ug/l	0.01	Purge & Trap/GC/Hall	601	11	14 days
Purgeable Aromatics	ug/l	1	Purge & Trap/GC/PID	602	17	14 days
Acrolein & Acrylonitrile	ug/l	100	Purge & Trap/GC/FID	603	18	14 days
Phenols by GC	ug/l	10	Extraction/GC/FID	604	16	7 days/40 days
Benzidines	ug/l	0.1	Extraction/HPLC	605	19	7 days/40 days
Phthalate Esters	ug/l	10	Extraction/GC/FID	606	12	7 days/40 days
Nitrosamines	ug/l	1	Extraction/GC/NPD	607	20	7 days/40 days
Nitroaromatics/isophorone	ug/l	1	Extraction/GC/FID & GC/ECD	609	12	7 days/40 days
Polynuclear Aromatics	ug/l	0.5	Extraction/HPLC	610	20	7 days/40 days
Haloethers	ug/l	1	Extraction/GC/Hall	611	17	7 days/40 days
Chlorinated Hydrocarbons	ug/l	0.02	Extraction/GC/ECD	612	12	7 days/40 days
Organophosphorus Pesticides	ug/l	0.1	Extraction/GC/NPD	622(5)	12	7 days/40 days
Triazine Pesticides	ug/l	0.1	Extraction/GC/NPD	(6)	12	7 days/40 days

References

(1) Federal Register, Vol. 44, No. 233, Monday, December 3, 1979.
(2) "Method for Chlorinated Phenoxy Acid Herbicides in Industrial Effluents," Federal Register, Vol. 38, No. 75, Part II.
(3) "Total Organic Halide," US EPA-EMSL, Cincinnati, November, 1980.
(4) Federal Register, Vol. 44, No. 231, Thursday, November 29, 1979, Appendix, Part I.
(5) "Method 622- Organophosphorus Pesticides," Proposed EPA Method, 304 (h) Committee.
(6) Federal Register, Vol. 38, No. 75, 1973.

Notes

[a] Nominal values are the best achievable with the listed analytical method for a typical component. Interferrences in specific samples may result in a higher detection limit.

[b] Applicable to NPDES Wastes as updated by Robert C. Booth, Director, EMSL-Cincinnati, September 22, 1981. Where two times are given, the first refers to the time to extraction, the second to the time of instrumental analysis.

ROCKY MOUNTAIN ANALYTICAL LABORATORY

Organic Analytical Methodology (continued)

Preservation Bottle No.	Parameter Group	Bottle	Preservation
11	Purgeables	40 ml glass with teflon lined silicone septum cap	4°C (thiosulfate if Cl_2 present)
17	Purgeables	40 ml glass with teflon lined silicone septum cap	4°C, HCl to pH less than 2 (thiosulfate if Cl_2 present)
18	Purgeables	40 ml glass with teflon lined silicone septum cap	4°C, adjust pH to 4 - 5 (thiosulfate if Cl_2 present)
16	Extractables	1 liter glass with teflon lined cap	4°C (thiosulfate if Cl_2 present)
19	Extractables	1 liter glass with teflon lined cap	4°C, adjust pH to 2 - 7 (thiosulfate if Cl_2 present)
12, 13, 14	Extractables	1 liter glass with teflon lined cap	4°C
20	Extractables	1 liter glass with teflon lined cap	4°C, store in dark (thiosulfate is Cl_2 present)
15	TOX	250 ml glass with teflon lined cap, single	4°C, store in dark (thiosulfate if Cl_2 present)
		1 liter glass with teflon lined cap, quad.	

Rocky Mountain Analytical Laboratory

August 26, 1985

Cleoves Martinez
Sparton Technology, Inc.
9621 Coors Road, NW
P. O. Box 1784
Albuquerque, New Mexico 87114

Dear Mr. Martinez:

Enclosed are the data for the analysis of sample 51192-05 (your ID MW-9) for volatile organics. This sample was received on August 14, 1985 as a replacement for a sample which froze and broke in our laboratory.

Feel free to call if you have any questions.

Sincerely,

Michael Brooks

Michael Brooks
Section Supervisor
Organic Mass Spectrometry Division

Reviewed By:

Jerry Parr

Jerry L. Parr
Director
Quality Assurance

MB/JLP:emf
Enclosures

RMAL #51192

SAMPLE DESCRIPTION INFORMATION

for

Sparton Technology, Inc.

RMA Sample No.	Sample Description	Sample Type	Date Sampled	Date Received
51192-05*	MW-9	Groundwater	7/19/85	7/20/85

*Replacement VOA vial.

August 26, 1985

ANALYTICAL RESULTS

for

Sparton Technology, Inc.

VOLATILE ORGANICS 624

Parameter		Units	51192-05	
3V	Benzene	mg/L	0.007	(0.005)
5V	Bromoform	mg/L	BDL	(0.005)
6V	Carbon tetrachloride	mg/L	BDL	(0.005)
7V	Chlorobenzene	mg/L	BDL	(0.005)
8V	Chlorodibromomethane	mg/L	BDL	(0.005)
9V	Chloroethane	mg/L	BDL	(0.005)
10V	2-Chloroethylvinyl ether	mg/L	BDL	(0.010)
11V	Chloroform	mg/L	0.028	(0.005)
12V	Dichlorobromomethane	mg/L	BDL	(0.005)
14V	1,1-Dichloroethane	mg/L	0.035	(0.005)
15V	1,2-Dichloroethane	mg/L	BDL	(0.005)
16V	1,1-Dichloroethylene	mg/L	1.3	(0.005)
17V	1,2-Dichloropropane	mg/L	BDL	(0.005)
18V	1,3-Dichloropropylene	mg/L	BDL	(0.005)
19V	Ethylbenzene	mg/L	BDL	(0.005)
20V	Methylbromide	mg/L	BDL	(0.10)
21V	Methylchloride	mg/L	BDL	(0.10)
22V	Methylene chloride	mg/L	1.2	(0.10)
23V	1,1,2,2-Tetrachloroethane	mg/L	BDL	(0.005)
24V	Tetrachloroethylene	mg/L	0.028	(0.005)
25V	Toluene	mg/L	0.023	(0.005)
26V	1,2-trans-Dichloroethylene	mg/L	BDL	(0.005)
27V	1,1,1-Trichloroethane	mg/L	6.3	(0.005)
28V	1,1,2-Trichloroethane	mg/L	0.049	(0.005)
29V	Trichloroethylene	mg/L	7.3	(0.005)
31V	Vinyl chloride	mg/L	BDL	(0.005)

BDL = Below detection limits. Detection limits in parentheses.

ROCKY MOUNTAIN ANALYTICAL LABORATORY

Organic Analytical Methodology

Parameter	Units	Nominal Detection Limit[a]	Methodology	Reference[1]	Preservation Bottle No.	Maximum Holding Time[b]
Purgeables	ug/l	1	Purge & Trap GC/MS	624	11	14 days
Base/Neutrals	ug/l	10	Extraction/GC/MS	625	12	7 days/40 days
Acids	ug/l	10	Extraction/GC/MS	625	12	7 days/40 days
Organochlorine Pesticides/PCB's	ug/l	0.01	Extraction/GC/ECD	608	13	7 days/40 days
		10	Extraction/GC/MS	625	12	7 days/40 days
Phenoxy Herbicides	ug/l	0.01	Extraction/GC/ECD	(2)	14	7 days/40 days
Total Organic Halogen (TOX)	ug/l	5	Adsorbtion/Coulometric	450.1(3)	15	-
Trihalomethanes (THM)	ug/l	1	Extraction/GC/ECD	(4)	11	14 days
		1	Purge & Trap GC/MS	(4)	11	14 days
Dioxin	ug/l	0.005	Extraction/GC/MS/ECD	613	16	7 days/40 days
Purgeable Halocarbons	ug/l	0.01	Purge & Trap/GC/Hall	601	11	14 days
Purgeable Aromatics	ug/l	1	Purge & Trap/GC/PID	602	17	14 days
Acrolein & Acrylonitrile	ug/l	100	Purge & Trap/GC/FID	603	18	14 days
Phenols by GC	ug/l	10	Extraction/GC/FID	604	16	7 days/40 days
Benzidines	ug/l	0.1	Extraction/HPLC	605	19	7 days/40 days
Phthalate Esters	ug/l	10	Extraction/GC/FID	606	12	7 days/40 days
Nitrosamines	ug/l	1	Extraction/GC/NPD	607	20	7 days/40 days
Nitroaromatics/isophorone	ug/l	1	Extraction/GC/FID & GC/ECD	609	12	7 days/40 days
Polynuclear Aromatics	ug/l	0.5	Extraction/HPLC	610	20	7 days/40 days
Haloethers	ug/l	1	Extraction/GC/Hall	611	17	7 days/40 days
Chlorinated Hydrocarbons	ug/l	0.02	Extraction/GC/ECD	612	12	7 days/40 days
Organophosphorus Pesticides	ug/l	0.1	Extraction/GC/NPD	622(5)	12	7 days/40 days
Triazine Pesticides	ug/l	0.1	Extraction/GC/NPD	(6)	12	7 days/40 days

References

(1) Federal Register, Vol. 44, No. 233, Monday, December 3, 1979.
(2) "Method for Chlorinated Phenoxy Acid Herbicides in Industrial Effluents," Federal Register, Vol. 38, No. 75, Part II.
(3) "Total Organic Halide," US EPA-EMSL, Cincinnati, November, 1980.
(4) Federal Register, Vol. 44, No. 231, Thursday, November 29, 1979, Appendix, Part I.
(5) "Method 622- Organophosphorus Pesticides," Proposed EPA Method, 304 (h) Committee.
(6) Federal Register, Vol. 38, No. 75, 1973.

Notes

[a] Nominal values are the best achievable with the listed analytical method for a typical component. Interferrences in specific samples may result in a higher detection limit.

[b] Applicable to NPDES Wastes as updated by Robert C. Booth, Director, EMSL-Cincinnati, September 22, 1981. Where two times are given, the first refers to the time to extraction, the second to the time of instrumental analysis.

ROCKY MOUNTAIN ANALYTICAL LABORATORY

Organic Analytical Methodology (continued)

Preservation Bottle No.	Parameter Group	Bottle	Preservation
11	Purgeables	40 ml glass with teflon lined silicone septum cap	4°C (thiosulfate if Cl_2 present)
17	Purgeables	40 ml glass with teflon lined silicone septum cap	4°C, HCl to pH less than 2 (thiosulfate if Cl_2 present)
18	Purgeables	40 ml glass with teflon lined silicone septum cap	4°C, adjust pH to 4 - 5 (thiosulfate if Cl_2 present)
16	Extractables	1 liter glass with teflon lined cap	4°C (thiosulfate if Cl_2 present)
19	Extractables	1 liter glass with teflon lined cap	4°C, adjust pH to 2 - 7 (thiosulfate if Cl_2 present)
12, 13, 14	Extractables	1 liter glass with teflon lined cap	4°C
20	Extractables	1 liter glass with teflon lined cap	4°C, store in dark (thiosulfate is Cl_2 present)
15	TOX	250 ml glass with teflon lined cap, single 1 liter glass with teflon lined cap, quad.	4°C, store in dark (thiosulfate if Cl_2 present)

Certification

PriorityPollutnT™
Quality Control Samples

ALL SAMPLES IN LOT NO. 201 HAVE THIS ⇒

Parameter	era Certified Value	Target Range
	μg/ℓ	μg/ℓ
VOLATILES		
chloroform	12.1	7.7-16
1,2-dichloroethane	25.4	14-37
toluene	58.0	31-85
ethylbenzene	52.5	24-81
methylene chloride	60.9	32-90
1,1,1-trichloroethane	113	62-160
ACIDS		
phenol	99.8	32-160
2,4,6-trichlorophenol	140	62-220
2-nitrophenol	90.7	29-150
2,4-dimethyl phenol	52.6	22-83
BASE/NEUTRALS		
1,2-dichlorobenzene	22.2	9-32
anthracene	71.0	31-110
acenaphthene	156	75-230
hexachlorobutadiene	66.6	18-110
hexachloroethane	48.8	23-74
di-n-butylphthalate	97.7	27-160
bis (2-ethylhexyl) phthalate	44.4	13-72
isophorone	111	53-160
PESTICIDES		
heptachlor	1.5	0.75-2.2
Endosulfan A	1.7	0.93-2.4
dieldrin	0.50	0.30-0.70
p,p'-DDT	8.5	4.7-12
p,p'-DDD	3.1	1.5-4.5
PCBs		
Aroclor 1260	8.9	5.3-12

Environmental Resource Associates
120 East Sauk Trail
South Chicago Heights, Illinois 60411
312/755-6060

Tom

SPARTON
TECHNOLOGY, INC.

4901 Rockaway Blvd., SE
Rio Rancho, New Mexico 87124
P.O. Box 1784
Albuquerque, New Mexico 87103
Phone (505) 892-5300
TWX 910-989-1657

December 10, 1985

Mr. Peter Pache
Program Manager
New Mexico EID
Hazardous Waste Management Section
P.O. Box 968
Santa Fe, New Mexico 87504-0968

Dear Mr. Pache:

As per the Alternate Groundwater Monitoring program implemented by Sparton Technology, Inc. at the Coors Road facility, enclosed you will find analyses reports for the 9th quarterly groundwater samples collected during the period of October 21, 1985 to October 22, 1985.

If you have any questions, contact Tom Burger, HLA, (713) 789-8050, or myself at (505) 892-5300.

Sincerely,

SPARTON TECHNOLOGY, INC.

RDMico

Richard D. Mico
Vice President & General Manager

RDM:kln

cc: Tom Burger, HLA
Cleoves Martinez, STI
Blair Thompson, Sparton Corp.
Jon F. DeWitt, Varnum, Riddering, Schmidt & Howlett

RECEIVED
DEC 16 1985

SAMPLE DESCRIPTION INFORMATION

for

Sparton Technology, Inc.

RMA Sample No.	Sample Description	Sample Type	Date Sampled	Date Received
51479-01	MW-1	Water	10/21/85	10/23/85
51479-02	MW-4	Water	10/21/85	10/23/85
51479-03	MW-6	Water	10/21/85	10/23/85
51479-04	MW-8	Water	10/21/85	10/23/85
51479-05	MW-9	Water	10/21/85	10/23/85
51479-06	MW-10	Water	10/21/85	10/23/85
51479-07	MW-11	Water	10/21/85	10/23/85

November 18, 1985

ANALYTICAL RESULTS

for

Sparton Technology, Inc.

IORGANIC PARAMETERS

arameter	Units	MW-1 51479-01		MW-4 51479-02		MW-6 51479-03		MW-8 51479-04	
H	units	6.96	(0.01)	7.23	(0.01)	7.64	(0.01)	7.45	(0.01)
pecificConductance at 25°C	umhos/cm	4010	(1)	1010	(1)	835	(1)	757	(1)
otal Organic Carbon	mg/L	43	(0.1)	3.8	(0.1)	2.3	(0.1)	1.7	(0.1)
otal Organic Halogen	mg Cl^-/L	43.0	(5)	4.5	(5)	0.260	(5)	0.200	(5)

arameter	Units	MW-9 51479-05		MW-10 51479-06		MW-11 51479-07	
H	units	7.15	(0.01)	7.64	(0.01)	7.70	(0.01)
pecificConductance at 25°C	umhos/cm	1390	(1)	681	(1)	697	(1)
otal Organic Carbon	mg/L	7.9	(0.1)	6.4	(0.1)	2.4	(0.1)
otal Organic Halogen	mg Cl^-/L	3.40	(5)	0.061	(5)	0.031	(5)

D = Not detected. Detection limits in parentheses.

ANALYTICAL RESULTS

for

Sparton Technology, Inc.

URGEABLE ORGANICS METHOD

Parameter	Units	MW-1 51479-01		MW-4 51479-02		MW-6 51479-03*		MW-8 51479-04*	
1,1-Dichloroethene	mg/L	1.6	(0.5)	0.60	(0.13)	0.012	(0.003)	0.006	(0.003)
Trichloroethylene	mg/L	61.0	(0.5)	8.00	(0.13)	0.300	(0.003)	0.240	(0.003)

Parameter	Units	MW-9 51479-05*		MW-10 51479-06		MW-11 51479-07	
1,1,1-Dichloroethene	mg/L	0.65	(0.10)	0.00261	(0.0005)	ND	(0.005)
Trichloroethylene	mg/L	6.6	(0.10)	0.029	(0.0005)	0.004	(0.0005)

ND = Not detected.

Detection limits in parentheses. Detection limit values have been raised according to dilution factors used due to the high levels of the target compounds found in the samples. Normal detection levels of 1,1Dichloroethene and Trichloroethylene are 0.0005 mg/L.

Average of results for two analyses.

GROUNDWATER ELEVATION

(Feet Above Sea Level)

	MW-1	MW-4	MW-6	MW-8	MW-9	MW-10	MW-11
9th Quarter	4979.67	4979.37	4981.05	4979.64	4977.56	4977.09	4976.39

INTER-DEPARTMENT CORRESPONDENCE

SPARTON TECHNOLOGY, INC.

Date December 10, 1985

Subject RESULTS OF NINTH QUARTER GROUNDWATER SAMPLING

To Dick Mico

From Cleoves Martinez

Copies to: Blair Thompson
Jon F. DeWitt
Tom Burger

Attached are results of the ninth quarter sampling per the Alternate Groundwater Monitoring program. Attached you will also find a continuing comparison of previous to present quarterly results.

The only changes seem to be a steady decrease in specific conductance and total halogens in monitoring well number nine.

Cleoves Martinez
Environmental/Safety
Engineer

CM:kln

pH VALUES

	WELL #1				$\bar{X}$
1st Quarter	7.31	7.31	7.30	7.30	7.305
2nd Quarter	7.27	7.29	7.31	7.35	7.305
3rd Quarter	7.26	NR	NR	NR	7.26
4th Quarter	7.07	NR	NR	NR	7.07
5th Quarter	7.73	7.75	7.72	7.71	7.73
6th Quarter	7.26	7.26	7.26	7.28	7.265
7th Quarter	7.35	7.33	7.36	7.32	7.34
8th Quarter	6.74	NR	NR	NR	6.74
9th Quarter	6.96	NR	NR	NR	6.96
10th Quarter					
11th Quarter					
12th Quarter					
13th Quarter					
14th Quarter					
15th Quarter					
16th Quarter					

	WELL #2				$\bar{X}$
1st Quarter	7.78	7.78	7.78	7.78	7.78
2nd Quarter	7.93	7.94	7.95	7.93	7.9375
3rd Quarter	7.96	7.98	7.97	7.98	7.9725
4th Quarter	7.75	7.75	7.76	7.76	7.755
5th Quarter	7.50	7.60	7.57	7.59	7.57
6th Quarter	NR	NR	NR	NR	---
7th Quarter	NR	NR	NR	NR	---
8th Quarter	NR	NR	NR	NR	---
9th Quarter	NR	NR	NR	NR	---
10th Quarter					
11th Quarter					
12th Quarter					
13th Quarter					
14th Quarter					
15th Quarter					
16th Quarter					

NR = Not Requested

pH Values Con't.

	WELL #3				$\bar{X}$
1st Quarter	7.13	7.13	7.13	7.14	7.1325
2nd Quarter	7.31	7.30	7.31	7.32	7.31
3rd Quarter	6.90	NR	NR	NR	6.90
4th Quarter	6.80	NR	NR	NR	6.80
5th Quarter	7.48	7.48	7.47	4.48	6.73
6th Quarter	NR	NR	NR	NR	---
7th Quarter	NR	NR	NR	NR	---
8th Quarter	NR	NR	NR	NR	---
9th Quarter	NR	NR	NR	NR	---
10th Quarter					
11th Quarter					
12th Quarter					
13th Quarter					
14th Quarter					
15th Quarter					
16th Quarter					

	WELL #4				$\bar{X}$
1st Quarter	7.56	7.56	7.56	7.56	7.56
2nd Quarter	7.89	7.90	7.90	7.90	7.8975
3rd Quarter	7.56	NR	NR	NR	7.56
4th Quarter	7.23	NR	NR	NR	7.23
5th Quarter	8.17	8.18	8.17	8.17	8.17
6th Quarter	7.63	7.64	7.64	7.64	7.638
7th Quarter	7.54	7.59	7.62	7.56	7.57
8th Quarter	7.22	NR	NR	NR	7.22
9th Quarter	7.23	NR	NR	NR	7.23
10th Quarter					
11th Quarter					
12th Quarter					
13th Quarter					
14th Quarter					
15th Quarter					
16th Quarter					

pH Values Con't.

WELL #5					$\bar{X}$
1st Quarter	NR	NR	NR	NR	---
2nd Quarter	NR	NR	NR	NR	---
3rd Quarter	NR	NR	NR	NR	---
4th Quarter	NR	NR	NR	NR	---
5th Quarter	7.64	NR	NR	NR	7.64
6th Quarter	8.09	NR	NR	NR	8.09
7th Quarter	NR	NR	NR	NR	---
8th Quarter	NR	NR	NR	NR	---
9th Quarter	NR	NR	NR	NR	---
10th Quarter					
11th Quarter					
12th Quarter					
13th Quarter					
14th Quarter					
15th Quarter					
16th Quarter					

WELL #6					$\bar{X}$
1st Quarter					
2nd Quarter					
3rd Quarter					
4th Quarter					
5th Quarter					
6th Quarter					
7th Quarter	7.89	NR	NR	NR	7.89
8th Quarter	7.46	NR	NR	NR	7.46
9th Quarter	7.64	NR	NR	NR	7.64
10th Quarter					
11th Quarter					
12th Quarter					
13th Quarter					
14th Quarter					
15th Quarter					
16th Quarter					

pH Values Con't.

	WELL #8				$\overline{X}$
1st Quarter	NR	NR	NR	NR	---
2nd Quarter	NR	NR	NR	NR	---
3rd Quarter	NR	NR	NR	NR	---
4th Quarter	NR	NR	NR	NR	---
5th Quarter	7.5	NR	NR	NR	7.5
6th Quarter	7.96	NR	NR	NR	7.96
7th Quarter	7.78	NR	NR	NR	7.78
8th Quarter	7.42	NR	NR	NR	7.42
9th Quarter	7.45	NR	NR	NR	7.45
10th Quarter					
11th Quarter					
12th Quarter					
13th Quarter					
14th Quarter					
15th Quarter					
16th Quarter					

	WELL #9				$\overline{X}$
1st Quarter	NR	NR	NR	NR	---
2nd Quarter	NR	NR	NR	NR	---
3rd Quarter	NR	NR	NR	NR	---
4th Quarter	NR	NR	NR	NR	---
5th Quarter	6.7	NR	NR	NR	6.7
6th Quarter	7.00	NR	NR	NR	7.00
7th Quarter	7.31	NR	NR	NR	7.31
8th Quarter	6.92	NR	NR	NR	6.92
9th Quarter	7.15	NR	NR	NR	7.15
10th Quarter					
11th Quarter					
12th Quarter					
13th Quarter					
14th Quarter					
15th Quarter					
16th Quarter					

pH Values Con't.

	WELL #10				$\bar{X}$
1st Quarter	NR	NR	NR	NR	---
2nd Quarter	NR	NR	NR	NR	---
3rd Quarter	NR	NR	NR	NR	---
4th Quarter	NR	NR	NR	NR	---
5th Quarter	7.74	NR	NR	NR	7.74
6th Quarter	7.73	NR	NR	NR	7.73
7th Quarter	7.94	NR	NR	NR	7.94
8th Quarter	7.39	NR	NR	NR	7.39
9th Quarter	7.64	NR	NR	NR	7.64
10th Quarter					
11th Quarter					
12th Quarter					
13th Quarter					
14th Quarter					
15th Quarter					
16th Quarter					

	WELL #11				$\bar{X}$
1st Quarter	NR	NR	NR	NR	---
2nd Quarter	NR	NR	NR	NR	---
3rd Quarter	NR	NR	NR	NR	---
4th Quarter	NR	NR	NR	NR	---
5th Quarter	7.76	NR	NR	NR	7.76
6th Quarter	8.01	NR	NR	NR	8.01
7th Quarter	7.95	NR	NR	NR	7.95
8th Quarter	7.57	NR	NR	NR	7.57
9th Quarter	7.70	NR	NR	NR	7.70
10th Quarter					
11th Quarter					
12th Quarter					
13th Quarter					
14th Quarter					
15th Quarter					
16th Quarter					

SPECIFIC CONDUCTANCE AT 25°C (umhos/cm)

	WELL #1				$\bar{X}$
1st Quarter	3760	3560	3680	3760	3690
2nd Quarter	4420	4440	4430	4440	4432.5
3rd Quarter	4470	NR	NR	NR	4470
4th Quarter	4570	NR	NR	NR	4570
5th Quarter	3450	3420	3410	3410	3422.5
6th Quarter	4200	4250	4270	4270	4247.5
7th Quarter	4190	4230	4200	4200	4205
8th Quarter	4520	NR	NR	NR	4520
9th Quarter	4010	NR	NR	NR	4010
10th Quarter					
11th Quarter					
12th Quarter					
13th Quarter					
14th Quarter					
15th Quarter					
16th Quarter					

	WELL #2				$\bar{X}$
1st Quarter	730	770	800	730	757.5
2nd Quarter	702	695	689	694	695
3rd Quarter	701	695	699	691	696.5
4th Quarter	704	703	690	690	696.75
5th Quarter	714	711	716	710	712.8
6th Quarter	NR	NR	NR	NR	---
7th Quarter	NR	NR	NR	NR	---
8th Quarter	NR	NR	NR	NR	---
9th Quarter	NR	NR	NR	NR	---
10th Quarter					
11th Quarter					
12th Quarter					
13th Quarter					
14th Quarter					
15th Quarter					
16th Quarter					

NR = Not Requested

Specific Conductance at 25° (umhos/cm) Con't.

	WELL #3				$\bar{X}$
1st Quarter	5860	5860	5860	5710	5822.5
2nd Quarter	3440	3450	3450	3440	3445
3rd Quarter	5880	NR	NR	NR	5880
4th Quarter	5150	NR	NR	NR	5150
5th Quarter	4250	4250	4260	4250	4252.5
6th Quarter	NR	NR	NR	NR	---
7th Quarter	NR	NR	NR	NR	---
8th Quarter	NR	NR	NR	NR	---
9th Quarter	NR	NR	NR	NR	---
10th Quarter					
11th Quarter					
12th Quarter					
13th Quarter					
14th Quarter					
15th Quarter					
16th Quarter					

	WELL #4				$\bar{X}$
1st Quarter	1000	1080	1000	1000	1020
2nd Quarter	789	799	798	795	795.25
3rd Quarter	1190	NR	NR	NR	1190
4th Quarter	1470	NR	NR	NR	1470
5th Quarter	996	981	979	978	983.5
6th Quarter	1400	1410	1410	1410	1407.5
7th Quarter	1430	1420	1420	1420	1422.5
8th Quarter	1010	NR	NR	NR	1010
9th Quarter	1010	NR	NR	NR	1010
10th Quarter					
11th Quarter					
12th Quarter					
13th Quarter					
14th Quarter					
15th Quarter					
16th Quarter					

Specific Conductance at 25°C (umhos/cm) Con't.

	WELL #5				$\overline{X}$
1st Quarter	NR	NR	NR	NR	---
2nd Quarter	NR	NR	NR	NR	---
3rd Quarter	NR	NR	NR	NR	---
4th Quarter	NR	NR	NR	NR	---
5th Quarter	721	NR	NR	NR	721
6th Quarter	711	NR	NR	NR	711
7th Quarter	NR	NR	NR	NR	---
8th Quarter	NR	NR	NR	NR	---
9th Quarter	NR	NR	NR	NR	---
10th Quarter					
11th Quarter					
12th Quarter					
13th Quarter					
14th Quarter					
15th Quarter					
16th Quarter					

	WELL #8				$\overline{X}$
1st Quarter	NR	NR	NR	NR	---
2nd Quarter	NR	NR	NR	NR	---
3rd Quarter	NR	NR	NR	NR	---
4th Quarter	NR	NR	NR	NR	---
5th Quarter	763	NR	NR	NR	763
6th Quarter	735	NR	NR	NR	735
7th Quarter	741	NR	NR	NR	741
8th Quarter	715	NR	NR	NR	715
9th Quarter	757	NR	NR	NR	757
10th Quarter					
11th Quarter					
12th Quarter					
13th Quarter					
14th Quarter					
15th Quarter					
16th Quarter					

Specific Conductance at 25°C (umhos/cm) Con't.

	WELL #6				$\overline{X}$
1st Quarter					
2nd Quarter					
3rd Quarter					
4th Quarter					
5th Quarter					
6th Quarter					
7th Quarter	871	NR	NR	NR	871
8th Quarter	833	NR	NR	NR	833
9th Quarter	835	NR	NR	NR	835
10th Quarter					
11th Quarter					
12th Quarter					
13th Quarter					
14th Quarter					
15th Quarter					
16th Quarter					

	WELL #9				$\overline{X}$
1st Quarter	NR	NR	NR	NR	---
2nd Quarter	NR	NR	NR	NR	---
3rd Quarter	NR	NR	NR	NR	---
4th Quarter	NR	NR	NR	NR	---
5th Quarter	2350	NR	NR	NR	2350
6th Quarter	2040	NR	NR	NR	2040
7th Quarter	1770	NR	NR	NR	1770
8th Quarter	1590	NR	NR	NR	1590
9th Quarter	1390	NR	NR	NR	1390
10th Quarter					
11th Quarter					
12th Quarter					
13th Quarter					
14th Quarter					
15th Quarter					
16th Quarter					

Specific Conductance at 25°C (umhos/cm) Con't.

	WELL #10				$\bar{X}$
1st Quarter	NR	NR	NR	NR	---
2nd Quarter	NR	NR	NR	NR	---
3rd Quarter	NR	NR	NR	NR	---
4th Quarter	NR	NR	NR	NR	---
5th Quarter	702	NR	NR	NR	702
6th Quarter	689	NR	NR	NR	689
7th Quarter	702	NR	NR	NR	702
8th Quarter	694	NR	NR	NR	694
9th Quarter	681	NR	NR	NR	681
10th Quarter					
11th Quarter					
12th Quarter					
13th Quarter					
14th Quarter					
15th Quarter					
16th Quarter					

	WELL #11				$\bar{X}$
1st Quarter	NR	NR	NR	NR	---
2nd Quarter	NR	NR	NR	NR	---
3rd Quarter	NR	NR	NR	NR	---
4th Quarter	NR	NR	NR	NR	---
5th Quarter	699	NR	NR	NR	699
6th Quarter	733	NR	NR	NR	733
7th Quarter	752	NR	NR	NR	752
8th Quarter	697	NR	NR	NR	697
9th Quarter	697	NR	NR	NR	697
10th Quarter					
11th Quarter					
12th Quarter					
13th Quarter					
14th Quarter					
15th Quarter					
16th Quarter					

TOTAL ORGANIC CARBON (mg/l)

	WELL #1				$\bar{X}$
1st Quarter	22	24	23	24	23.25
2nd Quarter	45	45	45	45	45
3rd Quarter	44	NR	NR	NR	44
4th Quarter	26	NR	NR	NR	26
5th Quarter	47	49	48	47	47.75
6th Quarter	36	36	36	36	36
7th Quarter	38	38	38	38	38
8th Quarter	44	NR	NR	NR	44
9th Quarter	43	NR	NR	NR	43
10th Quarter					
11th Quarter					
12th Quarter					
13th Quarter					
14th Quarter					
15th Quarter					
16th Quarter					

	WELL #2				$\bar{X}$
1st Quarter	<1*	<1*	1	1	1
2nd Quarter	5.3	5.8	5.6	5.1	5.45
3rd Quarter	3.4	3.8	3.4	3.4	3.5
4th Quarter	1.1	1.0	1.0	1.1	1.05
5th Quarter	1.1	1.0	1.0	1.0	1.03
6th Quarter	NR	NR	NR	NR	---
7th Quarter	NR	NR	NR	NR	---
8th Quarter	NR	NR	NR	NR	---
9th Quarter	NR	NR	NR	NR	---
10th Quarter					
11th Quarter					
12th Quarter					
13th Quarter					
14th Quarter					
15th Quarter					
16th Quarter					

NR = Not Requested

* Computed as equal to one (1)

Total Organic Carbon (mg/l) Con't.

	WELL #3				$\overline{X}$
1st Quarter	220	220	210	220	217.5
2nd Quarter	210	210	210	210	210
3rd Quarter	330	NR	NR	NR	330
4th Quarter	140	NR	NR	NR	140
5th Quarter	86	86	85	85	85.5
6th Quarter	NR	NR	NR	NR	---
7th Quarter	NR	NR	NR	NR	---
8th Quarter	NR	NR	NR	NR	---
9th Quarter	NR	NR	NR	NR	---
10th Quarter					
11th Quarter					
12th Quarter					
13th Quarter					
14th Quarter					
15th Quarter					
16th Quarter					

	WELL #4				$\overline{X}$
1st Quarter	1	2	2	2	1.75
2nd Quarter	4.6	5.0	4.6	4.8	4.75
3rd Quarter	13	NR	NR	NR	13
4th Quarter	9.1	NR	NR	NR	9.1
5th Quarter	1.8	1.8	1.8	1.8	1.8
6th Quarter	10	10	10	10	10
7th Quarter	9.1	9.0	9.0	9.0	9.02
8th Quarter	3.7	NR	NR	NR	3.7
9th Quarter	3.8	NR	NR	NR	3.8
10th Quarter					
11th Quarter					
12th Quarter					
13th Quarter					
14th Quarter					
15th Quarter					
16th Quarter					

Total Organic Carbon (mg/l) Con't.

	WELL #5				$\overline{X}$
1st Quarter	NR	NR	NR	NR	---
2nd Quarter	NR	NR	NR	NR	---
3rd Quarter	NR	NR	NR	NR	---
4th Quarter	NR	NR	NR	NR	---
5th Quarter	3.8	NR	NR	NR	3.8
6th Quarter	0.9	NR	NR	NR	0.9
7th Quarter	NR	NR	NR	NR	---
8th Quarter	NR	NR	NR	NR	---
9th Quarter	NR	NR	NR	NR	---
10th Quarter					
11th Quarter					
12th Quarter					
13th Quarter					
14th Quarter					
15th Quarter					
16th Quarter					

	WELL #6				$\overline{X}$
1st Quarter					
2nd Quarter					
3rd Quarter					
4th Quarter					
5th Quarter					
6th Quarter					
7th Quarter	1.7	NR	NR	NR	1.7
8th Quarter	1.4	NR	NR	NR	1.4
9th Quarter	2.3	NR	NR	NR	2.3
10th Quarter					
11th Quarter					
12th Quarter					
13th Quarter					
14th Quarter					
15th Quarter					
16th Quarter					

Total Organic Carbon (mg/l) Con't.

	WELL #8				$\bar{X}$
1st Quarter	NR	NR	NR	NR	---
2nd Quarter	NR	NR	NR	NR	---
3rd Quarter	NR	NR	NR	NR	---
4th Quarter	NR	NR	NR	NR	---
5th Quarter	5.5	NR	NR	NR	5.5
6th Quarter	2.1	NR	NR	NR	2.1
7th Quarter	1.3	NR	NR	NR	1.3
8th Quarter	1.8	NR	NR	NR	1.8
9th Quarter	1.7	NR	NR	NR	1.7
10th Quarter					
11th Quarter					
12th Quarter					
13th Quarter					
14th Quarter					
15th Quarter					
16th Quarter					

	WELL #9				$\bar{X}$
1st Quarter	NR	NR	NR	NR	---
2nd Quarter	NR	NR	NR	NR	---
3rd Quarter	NR	NR	NR	NR	---
4th Quarter	NR	NR	NR	NR	---
5th Quarter	14	NR	NR	NR	14
6th Quarter	6.1	NR	NR	NR	6.1
7th Quarter	7.2	NR	NR	NR	7.2
8th Quarter	4.6	NR	NR	NR	4.6
9th Quarter	7.9	NR	NR	NR	7.9
10th Quarter					
11th Quarter					
12th Quarter					
13th Quarter					
14th Quarter					
15th Quarter					
16th Quarter					

Total Organic Carbon (mg/l) Con't.

	WELL #10				$\overline{X}$
1st Quarter	NR	NR	NR	NR	---
2nd Quarter	NR	NR	NR	NR	---
3rd Quarter	NR	NR	NR	NR	---
4th Quarter	NR	NR	NR	NR	---
5th Quarter	3.0	NR	NR	NR	3.0
6th Quarter	1.7	NR	NR	NR	1.7
7th Quarter	1.6	NR	NR	NR	1.6
8th Quarter	9.0	NR	NR	NR	9.0
9th Quarter	6.4	NR	NR	NR	6.4
10th Quarter					
11th Quarter					
12th Quarter					
13th Quarter					
14th Quarter					
15th Quarter					
16th Quarter					

	WELL #11				$\overline{X}$
1st Quarter	NR	NR	NR	NR	---
2nd Quarter	NR	NR	NR	NR	---
3rd Quarter	NR	NR	NR	NR	---
4th Quarter	NR	NR	NR	NR	---
5th Quarter	2.2	NR	NR	NR	2.2
6th Quarter	1.7	NR	NR	NR	1.7
7th Quarter	1.7	NR	NR	NR	1.7
8th Quarter	1.7	NR	NR	NR	1.7
9th Quarter	2.4	NR	NR	NR	2.4
10th Quarter					
11th Quarter					
12th Quarter					
13th Quarter					
14th Quarter					
15th Quarter					
16th Quarter					

TOTAL ORGANIC HALOGEN (mg/l)

	WELL #1				$\bar{X}$
1st Quarter	8.8	8.9	8.7	8.9	8.825
2nd Quarter	21.0	21.9	20.8	20.4	21.025
3rd Quarter	20.8	NR	NR	NR	20.8
4th Quarter	32.0	NR	NR	NR	32.0
5th Quarter	45	45	42	39	42.75
6th Quarter	27.0	NR	NR	NR	27.0
7th Quarter	23.0	NR	NR	NR	23.0
8th Quarter	49.0	NR	NR	NR	49.0
9th Quarter	43.0	NR	NR	NR	43.0
10th Quarter					
11th Quarter					
12th Quarter					
13th Quarter					
14th Quarter					
15th Quarter					
16th Quarter					

	WELL #2				$\bar{X}$
1st Quarter	1.4	1.4	1.5	1.4	1.425
2nd Quarter	0.81	0.83	0.90	0.99	0.8825
3rd Quarter	1.88	1.62	1.78	1.87	1.7875
4th Quarter	0.24	0.21	0.19	0.18	0.205
5th Quarter	2.8	2.3	2.7	2.5	2.575
6th Quarter	NR	NR	NR	NR	---
7th Quarter	NR	NR	NR	NR	---
8th Quarter	NR	NR	NR	NR	---
9th Quarter	NR	NR	NR	NR	---
10th Quarter					
11th Quarter					
12th Quarter					
13th Quarter					
14th Quarter					
15th Quarter					
16th Quarter					

NR = Not Requested

Total Organic Halogen (mg/l) Con't.

	WELL #3				$\bar{X}$
1st Quarter	2.9	2.8	2.7	2.7	2.775
2nd Quarter	45.1	46.6	31.7	41.8	41.3
3rd Quarter	104	NR	NR	NR	104
4th Quarter	64	NR	NR	NR	64
5th Quarter	86	68	74	80	77.0
6th Quarter	NR	NR	NR	NR	---
7th Quarter	NR	NR	NR	NR	---
8th Quarter	NR	NR	NR	NR	---
9th Quarter	NR	NR	NR	NR	---
10th Quarter					
11th Quarter					
12th Quarter					
13th Quarter					
14th Quarter					
15th Quarter					
16th Quarter					

	WELL #4				$\bar{X}$
1st Quarter	1.3	1.4	1.5	1.2	1.35
2nd Quarter	3.47	3.31	3.36	3.13	3.3175
3rd Quarter	8.52	NR	NR	NR	8.52
4th Quarter	23	NR	NR	NR	23
5th Quarter	14	14	14	12	13.5
6th Quarter	10	NR	NR	NR	10
7th Quarter	12.0	NR	NR	NR	12.0
8th Quarter	7.0	NR	NR	NR	7.0
9th Quarter	4.5	NR	NR	NR	4.5
10th Quarter					
11th Quarter					
12th Quarter					
13th Quarter					
14th Quarter					
15th Quarter					
16th Quarter					

Total Organic Halogen (mg/l) Con't.

WELL #5					$\overline{X}$
1st Quarter	NR	NR	NR	NR	---
2nd Quarter	NR	NR	NR	NR	---
3rd Quarter	NR	NR	NR	NR	---
4th Quarter	NR	NR	NR	NR	---
5th Quarter	.220	NR	NR	NR	.220
6th Quarter	.210	NR	NR	NR	.210
7th Quarter	NR	NR	NR	NR	---
8th Quarter	NR	NR	NR	NR	---
9th Quarter	NR	NR	NR	NR	---
10th Quarter					
11th Quarter					
12th Quarter					
13th Quarter					
14th Quarter					
15th Quarter					
16th Quarter					

WELL #6					$\overline{X}$
1st Quarter					
2nd Quarter					
3rd Quarter					
4th Quarter					
5th Quarter					
6th Quarter					
7th Quarter	.310	NR	NR	NR	.310
8th Quarter	0.40	NR	NR	NR	0.40
9th Quarter	0.260	NR	NR	NR	0.260
10th Quarter					
11th Quarter					
12th Quarter					
13th Quarter					
14th Quarter					
15th Quarter					
16th Quarter					

Total Organic Halogen (mg/l) Con't.

	WELL #8				$\overline{X}$
1st Quarter	NR	NR	NR	NR	---
2nd Quarter	NR	NR	NR	NR	---
3rd Quarter	NR	NR	NR	NR	---
4th Quarter	NR	NR	NR	NR	---
5th Quarter	.18	NR	NR	NR	.18
6th Quarter	.088	NR	NR	NR	.088
7th Quarter	.150	NR	NR	NR	.150
8th Quarter	0.38	NR	NR	NR	0.38
9th Quarter	0.200	NR	NR	NR	0.200
10th Quarter					
11th Quarter					
12th Quarter					
13th Quarter					
14th Quarter					
15th Quarter					
16th Quarter					

	WELL #9				$\overline{X}$
1st Quarter	NR	NR	NR	NR	---
2nd Quarter	NR	NR	NR	NR	---
3rd Quarter	NR	NR	NR	NR	---
4th Quarter	NR	NR	NR	NR	---
5th Quarter	21	NR	NR	NR	21
6th Quarter	15	NR	NR	NR	15
7th Quarter	9.10	NR	NR	NR	9.10
8th Quarter	6.9	NR	NR	NR	6.9
9th Quarter	3.40	NR	NR	NR	3.40
10th Quarter					
11th Quarter					
12th Quarter					
13th Quarter					
14th Quarter					
15th Quarter					
16th Quarter					

Total Organic Halogen (mg/l) Con't.

	WELL #10				$\bar{X}$
1st Quarter	NR	NR	NR	NR	---
2nd Quarter	NR	NR	NR	NR	---
3rd Quarter	NR	NR	NR	NR	---
4th Quarter	NR	NR	NR	NR	---
5th Quarter	.040	NR	NR	NR	.040
6th Quarter	.013	NR	NR	NR	.013
7th Quarter	.013	NR	NR	NR	.013
8th Quarter	0.050	NR	NR	NR	0.050
9th Quarter	0.061	NR	NR	NR	0.061
10th Quarter					
11th Quarter					
12th Quarter					
13th Quarter					
14th Quarter					
15th Quarter					
16th Quarter					

	WELL #11				$\bar{X}$
1st Quarter	NR	NR	NR	NR	---
2nd Quarter	NR	NR	NR	NR	---
3rd Quarter	NR	NR	NR	NR	---
4th Quarter	NR	NR	NR	NR	---
5th Quarter	.006	NR	NR	NR	.006
6th Quarter	.032	NR	NR	NR	.032
7th Quarter	.010	NR	NR	NR	.010
8th Quarter	0.010	NR	NR	NR	0.010
9th Quarter	0.031	NR	NR	NR	0.031
10th Quarter					
11th Quarter					
12th Quarter					
13th Quarter					
14th Quarter					
15th Quarter					
16th Quarter					

1,1-Dichloroethene

(Maximum allowable concentration = .005 mg/L, per N.M. Water Quality Control Commission Regulations)

WELL #1	mg/L
1st Quarter	1.07
2nd Quarter	3.4
3rd Quarter	NR
4th Quarter	2.7
5th Quarter	1.4
6th Quarter	2.30
7th Quarter	2.48
8th Quarter	BDL
9th Quarter	1.6

WELL #4	mg/L
1st Quarter	1.31
2nd Quarter	2.0
3rd Quarter	NR
4th Quarter	2.8
5th Quarter	1.0
6th Quarter	3.2
7th Quarter	2.14
8th Quarter	BDL
9th Quarter	0.60

WELL #5	mg/L
1st Quarter	NR
2nd Quarter	.018
3rd Quarter	NR
4th Quarter	NR
5th Quarter	.007
6th Quarter	.007
7th Quarter	NR
8th Quarter	NR
9th Quarter	NR

ND = Non-Detected

NR = Non-Requested

BDL= Below Detectable Limits

1,1-Dichloroethene Con't.

WELL #6	mg/L
1st Quarter	
2nd Quarter	
3rd Quarter	
4th Quarter	
5th Quarter	
6th Quarter	
7th Quarter	.052
8th Quarter	BDL
9th Quarter	0.012

WELL #8	mg/L
1st Quarter	NR
2nd Quarter	ND
3rd Quarter	NR
4th Quarter	NR
5th Quarter	22
6th Quarter	.010
7th Quarter	.020
8th Quarter	BDL
9th Quarter	0.006

WELL #9	mg/L
1st Quarter	NR
2nd Quarter	2.5
3rd Quarter	NR
4th Quarter	NR
5th Quarter	1.2
6th Quarter	1.8
7th Quarter	ND
8th Quarter	0.035
9th Quarter	0.65

1,1-Dichloroethene Con't.

WELL #10	mg/L
1st Quarter	NR
2nd Quarter	ND
3rd Quarter	NR
4th Quarter	NR
5th Quarter	ND
6th Quarter	ND
7th Quarter	ND
8th Quarter	BDL
9th Quarter	0.00261

WELL #11	mg/L
1st Quarter	NR
2nd Quarter	ND
3rd Quarter	NR
4th Quarter	NR
5th Quarter	1.0
6th Quarter	ND
7th Quarter	ND
8th Quarter	BDL
9th Quarter	ND

Trichloroethylene

(Maximum allowable concentration = 0.1 mg/L,
per N.M. Water Quality Control Commission Regulations)

WELL #1	mg/L
1st Quarter	2.58
2nd Quarter	33
3rd Quarter	NR
4th Quarter	30
5th Quarter	23
6th Quarter	32
7th Quarter	35.8
8th Quarter	40.0
9th Quarter	61.0

WELL #4	mg/L
1st Quarter	2.29
2nd Quarter	7.3
3rd Quarter	NR
4th Quarter	12
5th Quarter	7.4
6th Quarter	12.5
7th Quarter	12.6
8th Quarter	6.6
9th Quarter	8.0

WELL #5	mg/L
1st Quarter	NR
2nd Quarter	.17
3rd Quarter	NR
4th Quarter	NR
5th Quarter	.14
6th Quarter	.24
7th Quarter	NR
8th Quarter	NR
9th Quarter	NR

ND = Non-Detected

NR = Non-Requested

Trichloroethylene Con't.

WELL #6	mg/L
1st Quarter	
2nd Quarter	0.630
3rd Quarter	
4th Quarter	
5th Quarter	
6th Quarter	
7th Quarter	.630
8th Quarter	0.30
9th Quarter	0.300

WELL #8	mg/L
1st Quarter	NR
2nd Quarter	.042
3rd Quarter	NR
4th Quarter	NR
5th Quarter	.25
6th Quarter	.140
7th Quarter	.260
8th Quarter	0.19
9th Quarter	0.240

WELL #9	mg/L
1st Quarter	NR
2nd Quarter	21
3rd Quarter	NR
4th Quarter	NR
5th Quarter	9.6
6th Quarter	13.9
7th Quarter	10.2
8th Quarter	7.3
9th Quarter	6.6

Trichloroethylene Con't.

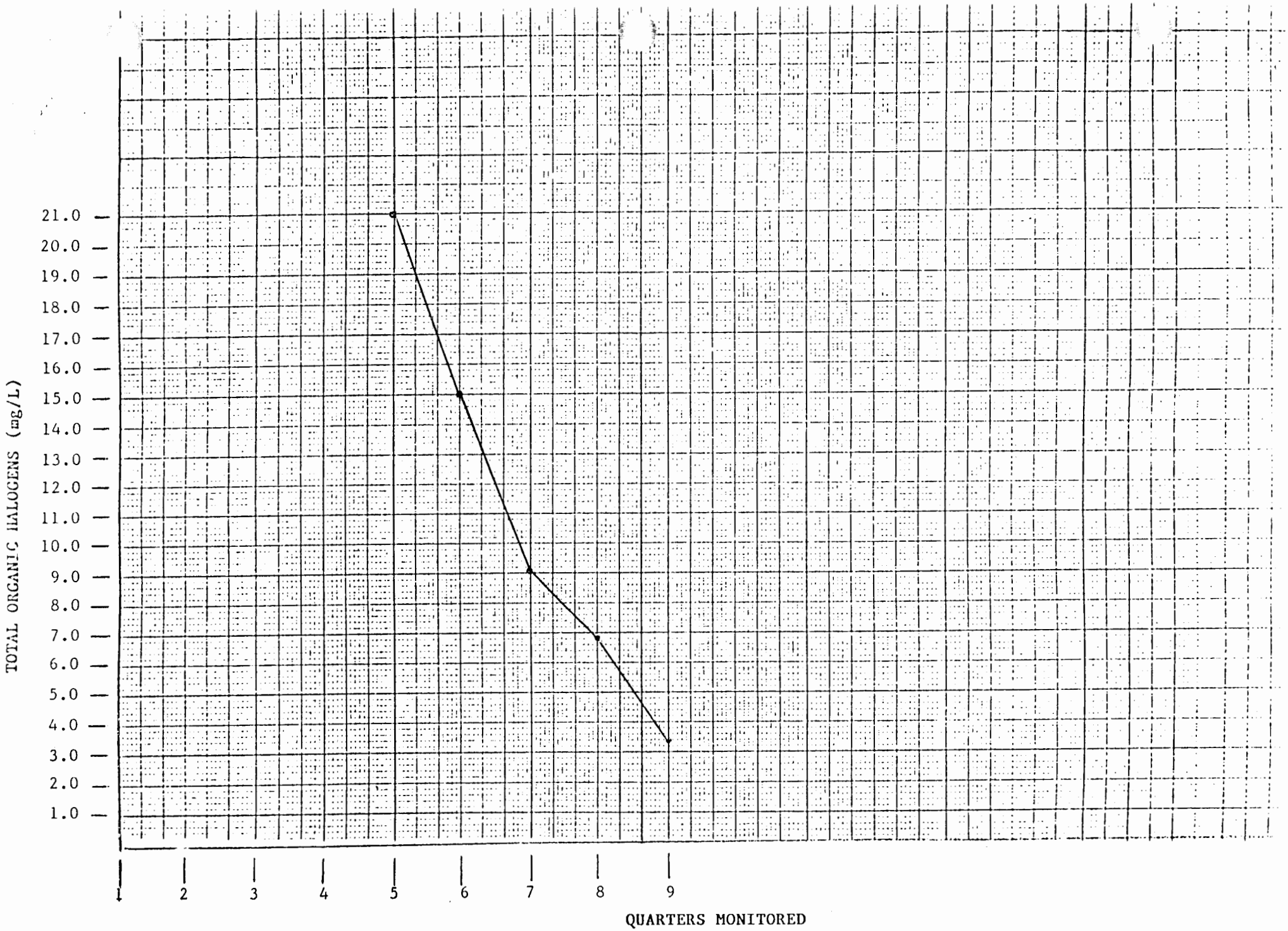
WELL #10	mg/L
1st Quarter	NR
2nd Quarter	.027
3rd Quarter	NR
4th Quarter	NR
5th Quarter	.012
6th Quarter	.007
7th Quarter	.011
8th Quarter	0.041
9th Quarter	0.029

WELL #11	mg/L
1st Quarter	NR
2nd Quarter	.84
3rd Quarter	NR
4th Quarter	NR
5th Quarter	7.4
6th Quarter	.004
7th Quarter	.006
8th Quarter	0.007
9th Quarter	0.004

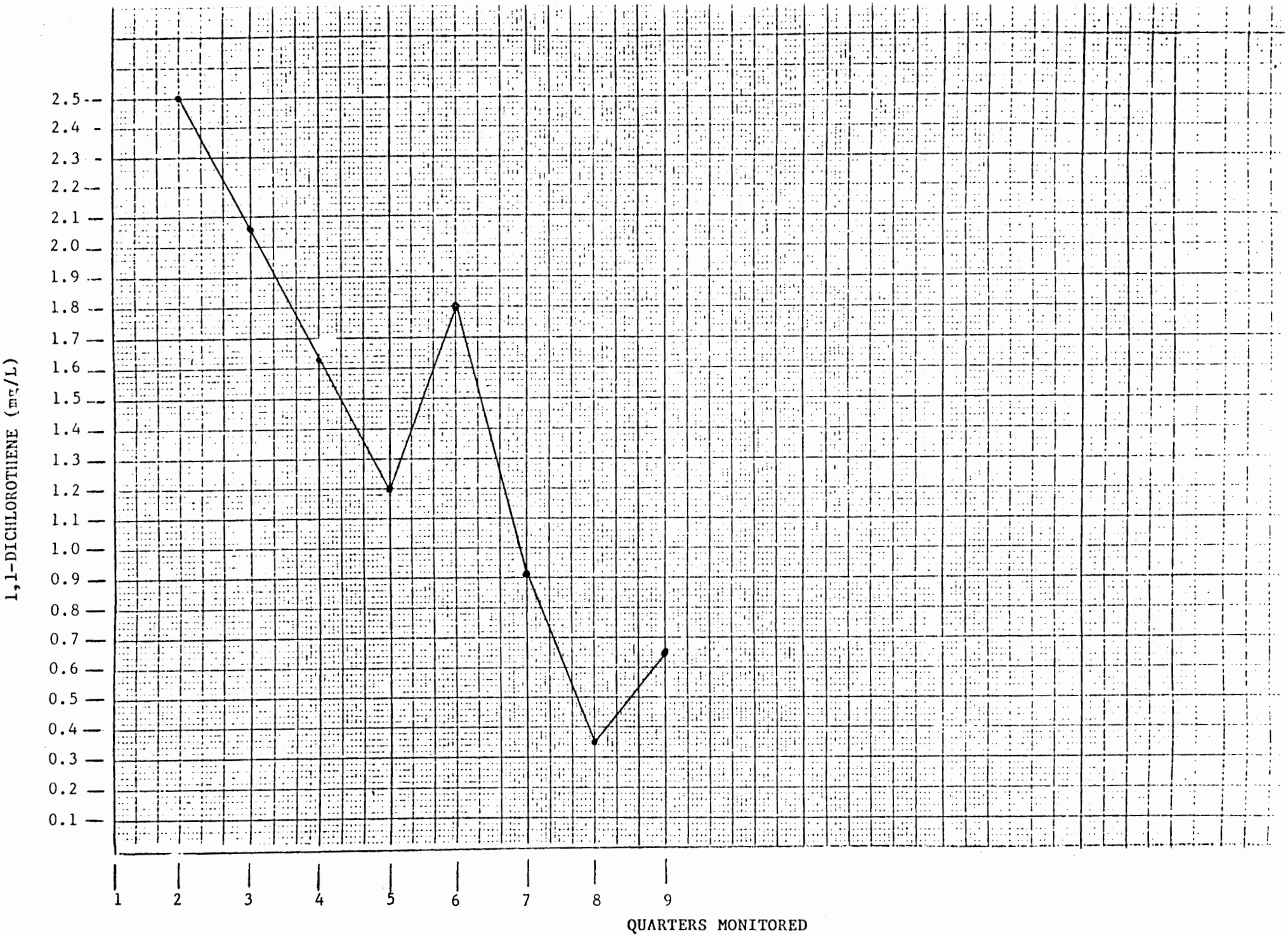
GROUND WATER ELEVATION

(Ft. Above Sea Level)

	MW-1	MW-4	MW-5	MW-6	MW-8	MW-9	MW-10	MW-11
6th Quarter	4978.93	4977.19	4980.57		4978.14	4976.52	4983.40	4975.
7th Quarter	4979.24	4978.88	N/A	4980.54	4979.13	4977.22	4976.90	4976.20
8th Quarter	4979.89	4979.81	N/A	4981.13	4980.19	4979.95.	4977.61	4976.79
9th Quarter	4979.67	4979.37	N/A	4981.05	4979.64	4977.56	4977.09	4976.39

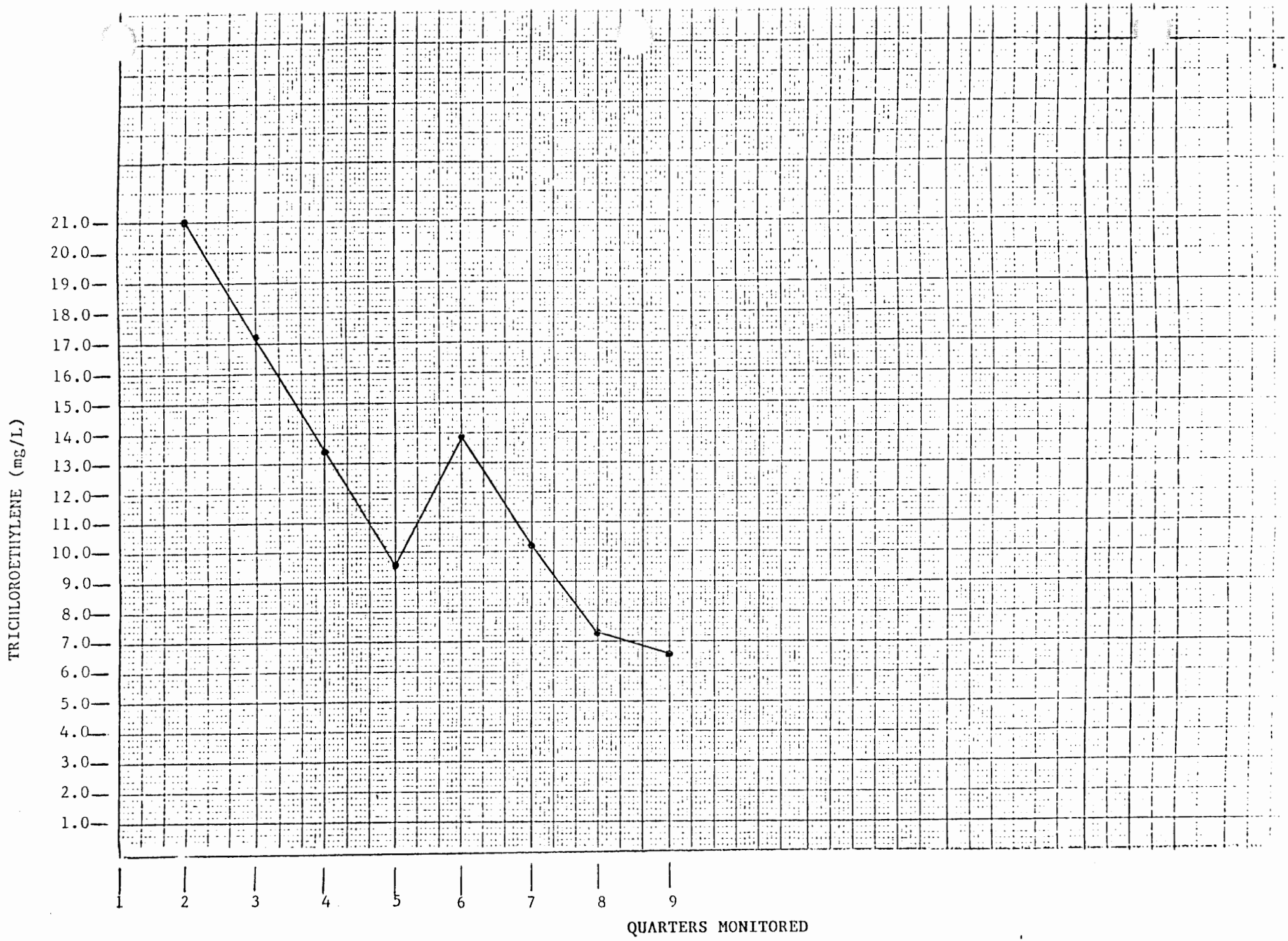


DATA DERIVED FROM MW-9 QUARTERLY SAMPLING



DATA DERIVED FROM MW-9 QUARTERLY MONITORING

(CONCENTRATIONS FOR 3rd, 4th, AND 7th QUARTERS WERE EXTRAPOLATED FROM AVAILABLE DATA)



DATA DERIVED FROM MW-9 QUARTERLY SAMPLING

(CONCENTRATIONS FOR 3rd AND 4th QUARTERS WERE EXTRAPOLATED FROM AVAILABLE DATA)

APPENDIX C
to
ATTACHMENT 7

Maximum Concentrations of Hazardous Constituents

17. Chemical Information Summary

Material Name	m-Xylene
Chemical Constituent	C_8H_{10}
Information Reference/Page	Hazardline (Sax)

Likely Encounter

Source (1)	SI, GW, Soil
Physical State (2)	Liquid

Concentrations

Measured or Estimated?	Measured
Media	Groundwater
Maximum Value	.033 mg/l
Minimum Value	ND

Pure Chemical Characteristics

Water Solubility	0.00003%
Vapor Density	3.7
Flash Point	84°F (Sax)
Vapor Pressure	6 mm Hg (Hazardline) 10 mm Hg (Sax)
LEL	1.1% (Sax) 1.0% (Hazardline)
UEL	7%

Hazard Specifics of Pure Chemical

STEL	-
TLV	100 ppm (ACGIH TWA)
LD50/LC50	LD50 - 5000mg/kg LCLo - 8000 ppm/4 hours
IDLH Level	10,000 ppm
Odor Threshold	0.5 ppm
Hazard Property(3)	toxic, ignitable, persistence
Exposure Route (4)	inhale, ingest, absorb, skin and eye contact
Toxic Effects (5)	see Hazardline
Respirator Level	1000 ppm CCROVF

(1) Tank, drum, soil, ground water, surface impoundment, etc.
(2) Liquid, soild, gas, vapor, dust, fume, mist, sludge
(3) Corrosive, ignitable, toxic, volatile, reactive, radioactive, carcinogencic, infections, etc. Fill in all that apply.
(4) Inhalation, Skin Absorption, Ingestion, Skin and Eye Contact
(5) Exposure symptoms and effects

17. Chemical Information Summary

APPENDIX A

Material Name	o,p-Xylene
Chemical Constituent	C_8H_{10}
Information Reference/Page	Hazardline (Sax)

Likely Encounter

Source (1)	SI, GW, Soil
Physical State (2)	Liquid

Concentrations

Measured or Estimated?	Measured
Media	Groundwater
Maximum Value	0.042 mg/l
Minimum Value	ND

Pure Chemical Characteristics

Water Solubility	0.00003%
Vapor Density	3.7
Flash Point	81°F (Sax)
Vapor Pressure	9 mm Hg
LEL	1.1%
UEL	7%

Hazard Specifics of Pure Chemical

STEL	-
TLV	100 ppm (ACGIH TWA)
LD50/LC50	LD50 - 5000 mg/kg LCLo - 4912 ppm/24 hours
IDLH Level	10,000 ppm
Odor Threshold	0.05 ppm
Hazard Property(3)	toxic, ignitable
Exposure Route (4)	inhale, ingest, absorb, skin and eye contact
Toxic Effects (5)	see Hazardline
Respirator Level	1000 ppm CCROV

(1) Tank, drum, soil, ground water, surface impoundment, etc.
(2) Liquid, soild, gas, vapor, dust, fume, mist, sludge
(3) Corrosive, ignitable, toxic, volatile, reactive, radioactive, carcinogencic, infections, Fill in all that apply.
(4) Inhalation, Skin Absorption, Ingestion, Skin and Eye Contact
(5) Exposure symptoms and effects

17. Chemical Information Summary

APPENDIX A

Material Name	Boron
Chemical Constituent	B
Information Reference/Page	Hazardline

Likely Encounter

Source (1)	SI, GW, Soil
Physical State (2)	Crystal, Powder

Concentrations

Measured or Estimated?	Measured
Media	Groundwater
Maximum Value	32.0 mg/l
Minimum Value	ND

Pure Chemical Characteristics

Water Solubility	insoluble
Vapor Density	-
Flash Point	NA
Vapor Pressure	-
LEL	-
UEL	-

Hazard Specifics of Pure Chemical

STEL	-
TLV	none established
LD50/LC50	-
IDLH Level	none established
Odor Threshold	-
Hazard Property(3)	toxic, ignitable, reactive, persistence
Exposure Route (4)	inhale, ingest, skin and eye contact
Toxic Effects (5)	see Hazardline
Respirator Level	no level set

(1) Tank, drum, soil, ground water, surface impoundment, etc.
(2) Liquid, soild, gas, vapor, dust, fume, mist, sludge
(3) Corrosive, ignitable, toxic, volatile, reactive, radioactive, carcinogencic, infections, etc. Fill in all that apply.
(4) Inhalation, Skin Absorption, Ingestion, Skin and Eye Contact
(5) Exposure symptoms and effects

17. Chemical Information Summary

APPENDIX A

Material Name	Manganese
Chemical Constituent	Mn
Information Reference/Page	Hazardline

Likely Encounter

Source (1)	SI, GW, Soil
Physical State (2)	metal

Concentrations

Measured or Estimated?	Measured
Media	Groundwater
Maximum Value	4.2 mg/l
Minimum Value	ND

Pure Chemical Characteristics

Water Solubility	decomposes
Vapor Density	-
Flash Point	flammable
Vapor Pressure	1 mm Hg
LEL	NA
UEL	NA

Hazard Specifics of Pure Chemical

STEL	-
TLV	5 mg/m^3
LD50/LC50	-
IDLH Level	10,000 ppm
Odor Threshold	-
Hazard Property(3)	toxic, ignitable, reactive, persistence
Exposure Route (4)	inhale, ingest, absorb
Toxic Effects (5)	see Hazardline
Respirator Level	25 mg/m^3 DM/DMXS

(1) Tank, drum, soil, ground water, surface impoundment, etc.
(2) Liquid, soild, gas, vapor, dust, fume, mist, sludge
(3) Corrosive, ignitable, toxic, volatile, reactive, radioactive, carcinogencic, infections, etc. Fill in all that apply.
(4) Inhalation, Skin Absorption, Ingestion, Skin and Eye Contact
(5) Exposure symptoms and effects

17. Chemical Information Summary

APPENDIX A

Material Name	Nickel
Chemical Constituent	Ni
Information Reference/Page	Hazardline

Likely Encounter

Source (1)	Si, GW, Soil
Physical State (2)	Metal

Concentrations

Measured or Estimated?	Measured
Media	Groundwater
Maximum Value	0.73 mg/l
Minimum Value	ND

Pure Chemical Characteristics

Water Solubility	insoluble
Vapor Density	-
Flash Point	NA
Vapor Pressure	0.0
LEL	NA
UEL	NA

Hazard Specifics of Pure Chemical

STEL	-
TLV	1 mg/m^3
LD50/LC50	LDLo 12 mg/kg
IDLH Level	none specified
Odor Threshold	-
Hazard Property(3)	toxic, ignitable, persistence
Exposure Route (4)	inhale, ingest, skin and eye contact
Toxic Effects (5)	see Hazardline
Respirator Level	5 mg/m^3 DM 50 mg/m^3 CCROVHIEP

(1) Tank, drum, soil, ground water, surface impoundment, etc.
(2) Liquid, soild, gas, vapor, dust, fume, mist, sludge
(3) Corrosive, ignitable, toxic, volatile, reactive, radioactive, carcinogencic, infections, etc. Fill in all that apply.
(4) Inhalation, Skin Absorption, Ingestion, Skin and Eye Contact
(5) Exposure symptoms and effects

17. Chemical Information Summary

APPENDIX A

Material Name	Sodium
Chemical Constituent	Na
Information Reference/Page	Hazardline

Likely Encounter

Source (1)	SI, GW, Soil
Physical State (2)	Metal

Concentrations

Measured or Estimated?	Measured
Media	Groundwater
Maximum Value	210.0 mg/l
Minimum Value	38.0 mg/l

Pure Chemical Characteristics

Water Solubility	decomposes
Vapor Density	-
Flash Point	NA
Vapor Pressure	1.2 mm at 752°F
LEL	-
UEL	-

Hazard Specifics of Pure Chemical

STEL	-
TLV	none established
LD50/LC50	-
IDLH Level	none specified
Odor Threshold	-
Hazard Property(3)	toxic, ignitable, reactive
Exposure Route (4)	ingestion
Toxic Effects (5)	see Hazardline
Respirator Level	no level set

(1) Tank, drum, soil, ground water, surface impoundment, etc.
(2) Liquid, soild, gas, vapor, dust, fume, mist, sludge
(3) Corrosive, ignitable, toxic, volatile, reactive, radioactive, carcinogencic, infections, Fill in all that apply.
(4) Inhalation, Skin Absorption, Ingestion, Skin and Eye Contact
(5) Exposure symptoms and effects

17. Chemical Information Summary

APPENDIX A

Material Name	Ethyl Benzene
Chemical Constituent	C_8H_{10}
Information Reference/Page	Hazardline

Likely Encounter

Source (1)	SI, GW, Soil
Physical State (2)	Liquid

Concentrations

Measured or Estimated?	Measured
Media	Groundwater
Maximum Value	0.086 mg/l
Minimum Value	ND

Pure Chemical Characteristics

Water Solubility	0.015 G
Vapor Density	3.7
Flash Point	59°F
Vapor Pressure	7.1 mm Hg
LEL	1%
UEL	6.7%

Hazard Specifics of Pure Chemical

STEL	125 ppm (ACGIH)
TLV	100 ppm
LD50/LC50	LCLo 4000 ppm/4 hours
IDLH Level	2000 ppm
Odor Threshold	140 ppm
Hazard Property(3)	toxic, ignitablility, persistence
Exposure Route (4)	inhale, ingest, absorb, skin and eye contact
Toxic Effects (5)	see Hazardline
Respirator Level	1000 ppm CCROVF

(1) Tank, drum, soil, ground water, surface impoundment, etc.
(2) Liquid, soild, gas, vapor, dust, fume, mist, sludge
(3) Corrosive, ignitable, toxic, volatile, reactive, radioactive, carcinogencic, infections, etc. Fill in all that apply.
(4) Inhalation, Skin Absorption, Ingestion, Skin and Eye Contact
(5) Exposure symptoms and effects

17. Chemical Information Summary

APPENDIX A

Material Name	Methyl Chloride
Chemical Constituent	CH_3Cl
Information Reference/Page	Hazardline

Likely Encounter

Source (1)	SI, GW, Soil
Physical State (2)	Gas Compresses to liquid

Concentrations

Measured or Estimated?	Measured
Media	Groundwater
Maximum Value	16.0 mg/l
Minimum Value	ND

Pure Chemical Characteristics

Water Solubility	0.74%
Vapor Density	1.8
Flash Point	less than 32°F
Vapor Pressure	4.8 mm Hg
LEL	7.6%
UEL	19%

Hazard Specifics of Pure Chemical

STEL	300 ppm 5 minute peak
TLV	100 ppm/8 hours (TWA); 200 ppm ceiling
LD50/LC50	3146 ppm/7 hr (mouse)
IDLH Level	10,000 ppm
Odor Threshold	10 ppm
Hazard Property(3)	toxic, ignitable, persistence
Exposure Route (4)	inhale, skin and eye contact
Toxic Effects (5)	see Hazardline
Respirator Level	1000 SA/SCBA

(1) Tank, drum, soil, ground water, surface impoundment, etc.
(2) Liquid, soild, gas, vapor, dust, fume, mist, sludge
(3) Corrosive, ignitable, toxic, volatile, reactive, radioactive, carcinogencic, infections, Fill in all that apply.
(4) Inhalation, Skin Absorption, Ingestion, Skin and Eye Contact
(5) Exposure symptoms and effects

17. Chemical Information Summary

Material Name	Methylene Chloride
Chemical Constituent	CH_2Cl_2
Information Reference/Page	Hazardline (Sax)

Likely Encounter

Source (1)	SI, GW, Soil
Physical State (2)	Liquid

Concentrations

Measured or Estimated?	Measured
Media	Groundwater
Maximum Value	57. mg/l
Minimum Value	ND

Pure Chemical Characteristics

Water Solubility	slight
Vapor Density	2.9
Flash Point	none
Vapor Pressure	350 mm Hg
LEL	10% (Sax) 12% (Hazardline)
UEL	unavailable

Hazard Specifics of Pure Chemical

STEL	2000 ppm 5 minute peak
TLV	75 ppm (NIOSH)
LD50/LC50	LD50 2136 mg/kg
IDLH Level	5000 ppm
Odor Threshold	200 ppm
Hazard Property(3)	toxic, reactive, persistence
Exposure Route (4)	inhale, ingest, skin and eye contact
Toxic Effects (5)	see Hazardline
Respirator Level	500 ppm SAF/SCBAF

(1) Tank, drum, soil, ground water, surface impoundment, etc.
(2) Liquid, soild, gas, vapor, dust, fume, mist, sludge
(3) Corrosive, ignitable, toxic, volatile, reactive, radioactive, carcinogencic, infections, etc. Fill in all that apply.
(4) Inhalation, Skin Absorption, Ingestion, Skin and Eye Contact
(5) Exposure symptoms and effects

17. Chemical Information Summary APPENDIX A

Material Name	1,1,2,2-Tetrachloroethane
Chemical Constituent	$C_2H_2Cl_4$
Information Reference/Page	Hazardline

Likely Encounter

Source (1)	SI, GW, Soil
Physical State (2)	Liquid

Concentrations

Measured or Estimated?	Measured
Media	Groundwater
Maximum Value	0.086 mg/l
Minimum Value	ND

Pure Chemical Characteristics

Water Solubility	0.19%
Vapor Density	5.8
Flash Point	not combustible
Vapor Pressure	5 mm Hg
LEL	not combustible
UEL	not combustible

Hazard Specifics of Pure Chemical

STEL	-
TLV	5 ppm (OSHA) Skin Notation 1 ppm (ACGIH)
LD50/LC50	LCLo 1000 ppm/4 hours
IDLH Level	150 ppm
Odor Threshold	3 ppm
Hazard Property(3)	toxic, persistence
Exposure Route (4)	inhale, ingest, absorb, skin and eye contact
Toxic Effects (5)	see Hazardline
Respirator Level	50 ppm CCROV/SA/SCBA

(1) Tank, drum, soil, ground water, surface impoundment, etc.
(2) Liquid, soild, gas, vapor, dust, fume, mist, sludge
(3) Corrosive, ignitable, toxic, volatile, reactive, radioactive, carcinogencic, infections, Fill in all that apply.
(4) Inhalation, Skin Absorption, Ingestion, Skin and Eye Contact
(5) Exposure symptoms and effects

17. Chemical Information Summary

APPENDIX A

Material Name	Tetrachloroethylene
Chemical Constituent	C_2Cl_4
Information Reference/Page	Hazardline

Likely Encounter

Source (1)	SI, GW, Soil
Physical State (2)	Liquid

Concentrations

Measured or Estimated?	Measured
Media	Groundwater
Maximum Value	0.50 mg/l
Minimum Value	ND

Pure Chemical Characteristics

Water Solubility	0.015 g/ml
Vapor Density	5.8
Flash Point	not combustible
Vapor Pressure	15.8 mm Hg
LEL	not combustible
UEL	not combustible

Hazard Specifics of Pure Chemical

STEL	300 ppm 5 minute peak (OSHA)
TLV	100 ppm (OSHA) (TWA) 200 ppm Ceiling 50 ppm (ACGIH)
LD50/LC50	LD50 - 8850 mg/kg (rat) LDLo 4000 ppm/4 hours (rat)
IDLH Level	500 ppm
Odor Threshold	50 ppm
Hazard Property(3)	toxic, persistence
Exposure Route (4)	inhale, ingest, skin and eye contact
Toxic Effects (5)	see Hazardline
Respirator Level	500 ppm CCROV/GMOV/SA/SCBAF

(1) Tank, drum, soil, ground water, surface impoundment, etc.
(2) Liquid, soild, gas, vapor, dust, fume, mist, sludge
(3) Corrosive, ignitable, toxic, volatile, reactive, radioactive, carcinogencic, infections, etc. Fill in all that apply.
(4) Inhalation, Skin Absorption, Ingestion, Skin and Eye Contact
(5) Exposure symptoms and effects

17. Chemical Information Summary

APPENDIX A

Material Name	Toluene
Chemical Constituent	C_7H_8
Information Reference/Page	Hazardline

Likely Encounter

Source (1)	SI, GW, Soil
Physical State (2)	Liquid

Concentrations

Measured or Estimated?	Measured
Media	Groundwater
Maximum Value	3.2 mg/l
Minimum Value	ND

Pure Chemical Characteristics

Water Solubility	0.05 G
Vapor Density	3.2
Flash Point	40°F
Vapor Pressure	22 mm Hg
LEL	1.3%
UEL	7.1%

Hazard Specifics of Pure Chemical

STEL	500 ppm 10 minute peak (OSHA) 200 ppm/10 minutes (NIOSH)
TLV	200 ppm (OSHA TWA) 100 ppm (ACGIH TWA) Skin Note
LD50/LC50	LD50 - 5000 mg/kg (rat) LC50 - 4000 ppm/4 hours (rat) Skin 14g/k (rabbit)
IDLH Level	2000 ppm
Odor Threshold	2 ppm
Hazard Property(3)	toxic, ignitable, persistence
Exposure Route (4)	inhale, ingest, absorb, skin and eye contact
Toxic Effects (5)	see Hazardline
Respirator Level	500 ppm CCROV/SA/SCBA

(1) Tank, drum, soil, ground water, surface impoundment, etc.
(2) Liquid, soild, gas, vapor, dust, fume, mist, sludge
(3) Corrosive, ignitable, toxic, volatile, reactive, radioactive, carcinogencic, infections, Fill in all that apply.
(4) Inhalation, Skin Absorption, Ingestion, Skin and Eye Contact
(5) Exposure symptoms and effects

17. Chemical Information Summary

Material Name	1,2-Dichloroethylene
Chemical Constituent	$C_2H_2Cl_2$
Information Reference/Page	Hazardline

Likely Encounter

Source (1)	SI, GW, Soil
Physical State (2)	Liquid

Concentrations

Measured or Estimated?	Measured
Media	Groundwater
Maximum Value	0.011 mg/l
Minimum Value	ND

Pure Chemical Characteristics

Water Solubility	0.35 - 0.636
Vapor Density	3.4
Flash Point	43°F
Vapor Pressure	400 mm Hg
LEL	9.7%
UEL	12.8%

Hazard Specifics of Pure Chemical

STEL	250 ppm (ACGIH)
TLV	200 ppm (OSHA)
LD50/LC50	770 mg/kg (rat)
IDLH Level	4000 ppm
Odor Threshold	0.085 ppm
Hazard Property(3)	toxic, ignitable, reactive, persistence
Exposure Route (4)	inhale, ingest, skin and eye contact
Toxic Effects (5)	see Hazardline
Respirator Level	1000 ppm CCROVF

(1) Tank, drum, soil, ground water, surface impoundment, etc.
(2) Liquid, soild, gas, vapor, dust, fume, mist, sludge
(3) Corrosive, ignitable, toxic, volatile, reactive, radioactive, carcinogencic, infections, etc. Fill in all that apply.
(4) Inhalation, Skin Absorption, Ingestion, Skin and Eye Contact
(5) Exposure symptoms and effects

17. Chemical Information Summary

APPENDIX A

Material Name	1,1,1-Trichloroethane
Chemical Constituent	$C_2H_3Cl_3$
Information Reference/Page	Hazardline

Likely Encounter

Source (1)	SI, GW, Soil
Physical State (2)	Liquid

Concentrations

Measured or Estimated?	Measured
Media	Groundwater
Maximum Value	27.0 mg/l
Minimum Value	ND

Pure Chemical Characteristics

Water Solubility	0.07%
Vapor Density	999
Flash Point	184°F
Vapor Pressure	100 mm Hg
LEL	8%
UEL	10.5%

Hazard Specifics of Pure Chemical

STEL	450 ppm (ACGIH)
TLV	350 ppm
LD50/LC50	-
IDLH Level	1000 ppm
Odor Threshold	20 ppm
Hazard Property(3)	toxic, reactive, persistence
Exposure Route (4)	inhale, ingest, skin and eye contact
Toxic Effects (5)	see Hazardline
Respirator Level	500 ppm CCROV/SA/SCBA

(1) Tank, drum, soil, ground water, surface impoundment, etc.
(2) Liquid, soild, gas, vapor, dust, fume, mist, sludge
(3) Corrosive, ignitable, toxic, volatile, reactive, radioactive, carcinogencic, infections, Fill in all that apply.
(4) Inhalation, Skin Absorption, Ingestion, Skin and Eye Contact
(5) Exposure symptoms and effects

17. Chemical Information Summary

APPENDIX A

Material Name	1,1,2-Trichloroethane
Chemical Constituent	$C_2H_3Cl_3$
Information Reference/Page	Hazardline

Likely Encounter

Source (1)	SI, GW, Soil
Physical State (2)	Liquid

Concentrations

Measured or Estimated?	Measured
Media	Groundwater
Maximum Value	0.42 mg/l
Minimum Value	ND

Pure Chemical Characteristics

Water Solubility	0.45
Vapor Density	4.6
Flash Point	non-flammable
Vapor Pressure	19 mm Hg
LEL	6%
UEL	15.5%

Hazard Specifics of Pure Chemical

STEL	-
TLV	10 ppm Skin notation
LD50/LC50	LD50 - 1140 mg/kg LC50 - 500 ppm/8 hours
IDLH Level	500 ppm
Odor Threshold	sweet odor like chloroform
Hazard Property(3)	toxic, persistence
Exposure Route (4)	inhale, ingest, absorb, skin and eye contact
Toxic Effects (5)	see Hazardline
Respirator Level	500 ppm SAF/SCBAF

(1) Tank, drum, soil, ground water, surface impoundment, etc.
(2) Liquid, soild, gas, vapor, dust, fume, mist, sludge
(3) Corrosive, ignitable, toxic, volatile, reactive, radioactive, carcinogencic, infections, etc. Fill in all that apply.
(4) Inhalation, Skin Absorption, Ingestion, Skin and Eye Contact
(5) Exposure symptoms and effects

17. Chemical Information Summary

APPENDIX A

Material Name	Trichloroethylene
Chemical Constituent	C_2HCl_3
Information Reference/Page	Hazardline

Likely Encounter

Source (1)	SI, GW, Soil
Physical State (2)	Liquid

Concentrations

Measured or Estimated?	Measured
Media	Groundwater
Maximum Value	59.0 mg/l
Minimum Value	ND

Pure Chemical Characteristics

Water Solubility	0.1%
Vapor Density	-
Flash Point	90°F
Vapor Pressure	58 mm Hg
LEL	12.5%
UEL	90%

Hazard Specifics of Pure Chemical

STEL	300 ppm 5 minute peak
TLV	100 ppm (OSHA), 50 ppm (ACGIH), 200 ppm ceiling
LD50/LC50	-
IDLH Level	1000 ppm
Odor Threshold	50 ppm
Hazard Property(3)	toxic, ignitable, persistence
Exposure Route (4)	inhale, ingest, skin and eye contact
Toxic Effects (5)	see Hazardline
Respirator Level	500 ppm CCROV/SA/SCBA

(1) Tank, drum, soil, ground water, surface impoundment, etc.
(2) Liquid, soild, gas, vapor, dust, fume, mist, sludge
(3) Corrosive, ignitable, toxic, volatile, reactive, radioactive, carcinogencic, infections, Fill in all that apply.
(4) Inhalation, Skin Absorption, Ingestion, Skin and Eye Contact
(5) Exposure symptoms and effects

17. Chemical Information Summary

APPENDIX A

Material Name	Acetone
Chemical Constituent	C_3H_6O
Information Reference/Page	Hazardline

Likely Encounter

Source (1)	SI, GW, Soil
Physical State (2)	Liquid

Concentrations

Measured or Estimated?	Measured
Media	Groundwater
Maximum Value	56.0 mg/l
Minimum Value	ND

Pure Chemical Characteristics

Water Solubility	soluble
Vapor Density	2.0
Flash Point	4°F
Vapor Pressure	26 mm Hg
LEL	2.15%
UEL	18%

Hazard Specifics of Pure Chemical

STEL	1000 ppm (ACGIH)
TLV	1000 ppm (OSHA): 250 ppm (NIOSH)
LD50/LC50	LD50 - 3000 mg/kg (mouse), LC50 - 16000 ppm/4 hours (rat), Skin 20 g/kg (rabbi
IDLH Level	20,000 ppm
Odor Threshold	2.0 ppm
Hazard Property(3)	toxic, ignitable
Exposure Route (4)	inhale, ingest, absorb, skin and eye contact
Toxic Effects (5)	see Hazardline
Respirator Level	5000 ppm G MOV

(1) Tank, drum, soil, ground water, surface impoundment, etc.
(2) Liquid, soild, gas, vapor, dust, fume, mist, sludge
(3) Corrosive, ignitable, toxic, volatile, reactive, radioactive, carcinogencic, infections, etc. Fill in all that apply.
(4) Inhalation, Skin Absorption, Ingestion, Skin and Eye Contact
(5) Exposure symptoms and effects

17. Chemical Information Summary

APPENDIX A

Material Name	Benzene
Chemical Constituent	C_6H_6
Information Reference/Page	Hazardline

Likely Encounter

Source (1)	SI, GW, Soil
Physical State (2)	Liquid

Concentrations

Measured or Estimated?	Measured
Media	Groundwater
Maximum Value	0.083 mg/l
Minimum Value	ND

Pure Chemical Characteristics

Water Solubility	820 ppm
Vapor Density	2.8
Flash Point	12°F
Vapor Pressure	75 mm Hg
LEL	1/3%
UEL	7.1% (Hazardline)

Hazard Specifics of Pure Chemical

STEL	50 ppm 10 minute peak (OSHA), 25 ppm (ACGIH)
TLV	10 ppm 25 ppm ceiling (OSHA)
LD50/LC50	LD50 - 4700 mg/kg (mouse) LC50 - 10,000 ppm /7 hours (rat)
IDLH Level	2000 ppm
Odor Threshold	1.5 - 5 ppm
Hazard Property(3)	flammable, carcinogenic
Exposure Route (4)	inhale, absorb, ingest, skin and eye contact
Toxic Effects (5)	see Hazardline
Respirator Level	10 ppm SA/SCBA

(1) Tank, drum, soil, ground water, surface impoundment, etc.
(2) Liquid, soild, gas, vapor, dust, fume, mist, sludge
(3) Corrosive, ignitable, toxic, volatile, reactive, radioactive, carcinogencic, infections, Fill in all that apply.
(4) Inhalation, Skin Absorption, Ingestion, Skin and Eye Contact
(5) Exposure symptoms and effects

17. Chemical Information Summary

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Material Name	Chlorobenzene
Chemical Constituent	C_6H_5Cl
Information Reference/Page	Hazardline

Likely Encounter

Source (1)	SI, GW, Soil
Physical State (2)	Liquid

Concentrations

Measured or Estimated?	Measured
Media	Groundwater
Maximum Value	0.060 mg/l
Minimum Value	ND

Pure Chemical Characteristics

Water Solubility	0.1 g/100 g water
Vapor Density	3.9
Flash Point	84°F
Vapor Pressure	8.8 mm Hg
LEL	1.3 %
UEL	9.6%

Hazard Specifics of Pure Chemical

STEL	-
TLV	75 ppm
LD50	2910 mg/kg (rat)
IDLH Level	2400 ppm
Odor Threshold	0.21 ppm
Hazard Property(3)	toxic, ignitable, persistence
Exposure Route (4)	inhale, ingest, absorb, skin and eye contact
Toxic Effects (5)	see Hazardline
Respirator Level	1000 ppm CCROVF

(1) Tank, drum, soil, ground water, surface impoundment, etc.
(2) Liquid, soild, gas, vapor, dust, fume, mist, sludge
(3) Corrosive, ignitable, toxic, volatile, reactive, radioactive, carcinogencic, infections, etc. Fill in all that apply.
(4) Inhalation, Skin Absorption, Ingestion, Skin and Eye Contact
(5) Exposure symptoms and effects

17. Chemical Information Summary

APPENDIX A

Material Name	Chloroform
Chemical Constituent	$CHCl_3$
Information Reference/Page	Hazardline

Likely Encounter

Source (1)	SI, GW, Soil
Physical State (2)	Liquid

Concentrations

Measured or Estimated?	Measured
Media	Groundwater
Maximum Value	0.16 mg/l
Minimum Value	ND

Pure Chemical Characteristics

Water Solubility	0.8 G
Vapor Density	4.12
Flash Point	non-flammable
Vapor Pressure	160 mm Hg
LEL	incombustible
UEL	incombustible

Hazard Specifics of Pure Chemical

STEL	50 ppm
TLV	50 ppm (OSHA) 10 ppm (ACGIH)
LD50/LC50	LD50 - 1194 mg/kg LC50 - 8000 ppm/4 hours
IDLH Level	1000 ppm
Odor Threshold	100 ppm
Hazard Property(3)	toxic, persistence
Exposure Route (4)	inhale, ingest, absorb, skin and eye contact
Toxic Effects (5)	see Hazardline
Respirator Level	500 ppm SA/SCBA

(1) Tank, drum, soil, ground water, surface impoundment, etc.
(2) Liquid, soild, gas, vapor, dust, fume, mist, sludge
(3) Corrosive, ignitable, toxic, volatile, reactive, radioactive, carcinogencic, infections, etc. Fill in all that apply.
(4) Inhalation, Skin Absorption, Ingestion, Skin and Eye Contact
(5) Exposure symptoms and effects

17. Chemical Information Summary

APPENDIX A

Material Name	1,1-Dichloroethane
Chemical Constituent	CH_3CHCl_2
Information Reference/Page	Hazardline

Likely Encounter

Source (1)	SI, GW, Soil
Physical State (2)	Liquid

Concentrations

Measured or Estimated?	Measured
Media	Estimated
Maximum Value	0.12 mg/l
Minimum Value	ND

Pure Chemical Characteristics

Water Solubility	0.1 G
Vapor Density	3.4
Flash Point	22°F
Vapor Pressure	182 mm Hg
LEL	6%
UEL	16%

Hazard Specifics of Pure Chemical

STEL	250 ppm (ACGIH)
TLV	100 ppm
LD50/LC50	LD50 - 725 mg/kg
IDLH Level	4000 ppm
Odor Threshold	5.0 ppm
Hazard Property(3)	toxic, ignitable, persistence
Exposure Route (4)	inhale, ingest, absorb, skin and eye contact
Toxic Effects (5)	see Hazardline
Respirator Level	1000 ppm CCROV/SA/SCBA

(1) Tank, drum, soil, ground water, surface impoundment, etc.
(2) Liquid, soild, gas, vapor, dust, fume, mist, sludge
(3) Corrosive, ignitable, toxic, volatile, reactive, radioactive, carcinogencic, infections, etc. Fill in all that apply.
(4) Inhalation, Skin Absorption, Ingestion, Skin and Eye Contact
(5) Exposure symptoms and effects

17. Chemical Information Summary

APPENDIX A

Material Name	Chromium
Chemical Constituent	CR
Information Reference/Page	Hazardline

Likely Encounter

Source (1)	SI, GW, Soil
Physical State (2)	Metal

Concentrations

Measured or Estimated?	Measured
Media	Groundwater
Maximum Value	22.0 mg/l
Minimum Value	ND

Pure Chemical Characteristics

Water Solubility	insoluble
Vapor Density	-
Flash Point	autoignition 752°F
Vapor Pressure	0.0
LEL	0.230%
UEL	dust is explosive

Hazard Specifics of Pure Chemical

STEL	-
TLV	1 mg/m^3
LD50/LC50	-
IDLH Level	500 mg/m^3
Odor Threshold	-
Hazard Property(3)	persistence
Exposure Route (4)	inhale, ingest, skin and eye contact
Toxic Effects (5)	see Hazardline
Respirator Level	2.5 mg/m^3 DMXS

(1) Tank, drum, soil, ground water, surface impoundment, etc.
(2) Liquid, soild, gas, vapor, dust, fume, mist, sludge
(3) Corrosive, ignitable, toxic, volatile, reactive, radioactive, carcinogencic, infections, Fill in all that apply.
(4) Inhalation, Skin Absorption, Ingestion, Skin and Eye Contact
(5) Exposure symptoms and effects

17. Chemical Information Summary

APPENDIX A

Material Name	Trichlorotriflouroethane
Chemical Constituent	$C_2Cl_3F_3$
Information Reference/Page	Hazardline

Likely Encounter

Source (1)	SI, GW, Soil
Physical State (2)	Liquid

Concentrations

Measured or Estimated?	Measured
Media	Groundwater
Maximum Value	0.47 mg/l
Minimum Value	ND

Pure Chemical Characteristics

Water Solubility	0.028%
Vapor Density	-
Flash Point	non-flammable
Vapor Pressure	284mm
LEL	not combustible
UEL	not combustible

Hazard Specifics of Pure Chemical

STEL	-
TLV	1000 ppm
LD50/LC50	LD50 - 43g/kg LCLo - 87000 ppm/6 hours
IDLH Level	4500 ppm
Odor Threshold	-
Hazard Property(3)	toxic, reactive
Exposure Route (4)	inhale, ingest
Toxic Effects (5)	see Hazardline
Respirator Level	4500 ppm SA/SCBA

(1) Tank, drum, soil, ground water, surface impoundment, etc.
(2) Liquid, soild, gas, vapor, dust, fume, mist, sludge
(3) Corrosive, ignitable, toxic, volatile, reactive, radioactive, carcinogencic, infections, etc. Fill in all that apply.
(4) Inhalation, Skin Absorption, Ingestion, Skin and Eye Contact
(5) Exposure symptoms and effects

17.. Chemical Information Summary

APPENDIX A

Material Name	1,1-Dichloroethylene
Chemical Constituent	$C_2H_2Cl_2$
Information Reference/Page	Hazardline

Likely Encounter

Source (1)	SI, GW, Soil
Physical State (2)	Liquid Gas

Concentrations

Measured or Estimated?	Measured
Media	Groundwater
Maximum Value	22.0 mg/l
Minimum Value	ND

Pure Chemical Characteristics

Water Solubility	2250 mg/l
Vapor Density	3.4
Flash Point	3°F
Vapor Pressure	600 mm Hg
LEL	7.3%
UEL	16%

Hazard Specifics of Pure Chemical

STEL	20 ppm (ACGIH)
TLV	5 ppm (ACGIH TWA) 1 ppm (NIOSH)
LD50/LC50	LCLo - 10,000 ppm/24 hours
IDLH Level	200 mg/kg (LD50 oral rat)
Odor Threshold	-
Hazard Property(3)	toxic, ignitable, reactive
Exposure Route (4)	inhale, ingest, absorb, skin and eye contact
Toxic Effects (5)	see Hazardline
Respirator Level	no level mentioned

(1) Tank, drum, soil, ground water, surface impoundment, etc.
(2) Liquid, soild, gas, vapor, dust, fume, mist, sludge
(3) Corrosive, ignitable, toxic, volatile, reactive, radioactive, carcinogencic, infections, Fill in all that apply.
(4) Inhalation, Skin Absorption, Ingestion, Skin and Eye Contact
(5) Exposure symptoms and effects

ATTACHMENT 8

HAZARDOUS WASTE FACILITY POST-CLOSURE CARE PLAN
COORS ROAD PLANT
ALBUQUERQUE, NEW MEXICO

December 17, 1985

A Report Prepared for:

Sparton Corporation
2400 East Ganson Street
Jackson, Michigan 49402

HAZARDOUS WASTE FACILITY
POST CLOSURE CARE PLAN
COORS ROAD PLANT
ALBUQUERQUE, NEW MEXICO

HLA Job No. 6310,012.12

by

Richard Cunningham
Senior Geophysicist

Thomas S. Burger, R.P.S.
Associate Environmental Engineer

Harding Lawson Associates
6220 Westpark Drive, Suite 100
Houston, Texas 77057
Telephone: (713) 789-8050

December 17, 1985

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SPARTON POST-CLOSURE PLAN

A. Introduction

In accordance with New Mexico Hazardous Waste Management Regulations (Section 206.C.2), Sparton Technology, Inc. (Sparton) will follow the post-closure plan for a period of 30 years following closure to control, minimize, eliminate, or prevent, to the extent necessary, threats to human health and the environment, post-closure escape of hazardous wastes, hazardous waste constituents, leachate, contaminated rainfall, or waste decomposition products to the ground or surface waters or to the atmosphere.

This post-closure plan shall be followed after the facility closure plan has been implemented as outlined in Section B-5 of this document. As there is some subsurface water contamination, and wastes are to be left in place in the impoundments, this plan will cover the area which contained the two ponds and the sump.

Activities required by regulation, and included in this plan, are outlined as follows:

- General information (i.e., closure review, remedial actions, facility description, ground water and process information).
- Post-closure period contact;

- Security plan;
- Inspection plan;
- Monitoring plan;
- Maintenance plan;
- Training of personnel;
- Official notice to local land authority;
- Notice in the deed of the property;
- Amendments; and
- Post-closure cost estimates.

B. General Information

1. Facility Description

a.	Owner and Operator:	Sparton Technology, Inc.
b.	EPA I.D. No.:	NMD083212332
c.	Mailing Address:	Post Office Box 1784
		Albuquerque, New Mexico 87103
d.	Facility Location:	9621 Coors Road, N.W.
		Albuquerque, New Mexico 87114
e.	Telephone:	(505) 892-5300
f.	Type of Facility:	Hazardous Waste Storage

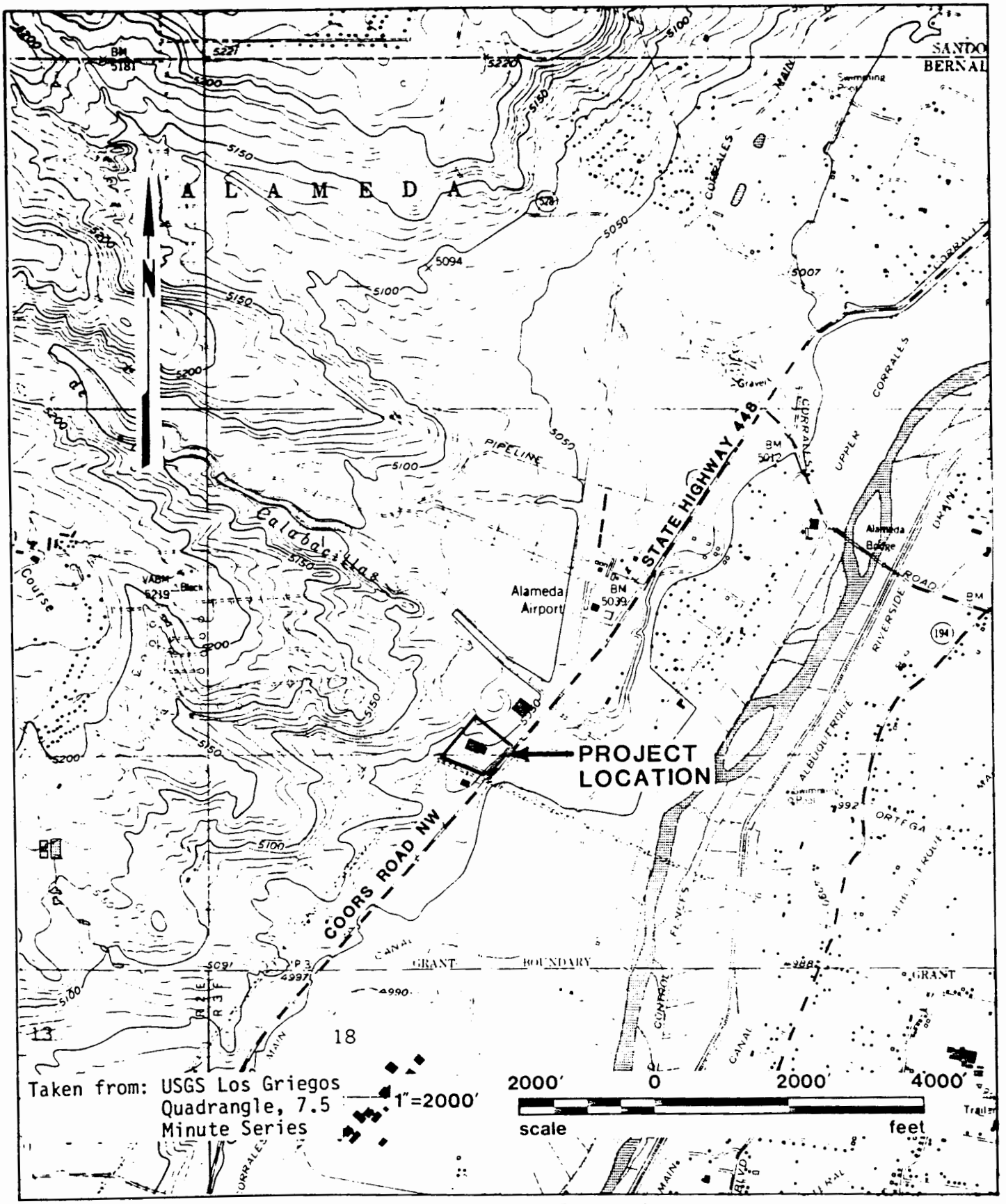
2. Background Information

The Coors Road facility is located on an approximately 12-acre parcel and consists of an approximately 64,000-square-foot building constructed in 1961. The site is located about 2,500 feet northwest of the Rio Grande River on the west side of Coors Road, N.W. (see

Plate 1). Locally, the area is hilly and slopes in several wide terraces toward the river. The site is approximately 60 feet above the Rio Grande River, and 40 to 60 feet lower than the Paradise Park residential area, which is located approximately 4,000 feet west of the site. Approximately 200 feet southeast of the site, and across Coors Road, is the Coralles Canal. The Calabacilla Arroyo is located about 1,000 feet north of the site.

Ground surface elevations at the site vary from elevation 5052 feet Mean Sea Level (MSL) on the northern edge of the property to elevation 5041 feet MSL on the southern edge of the property (see Plate 2). An overall surface gradient from the northernmost portion of the site to the southernmost portion of the site is approximately 1.7 percent.

Buildings within 1/2 mile of the Coors Road plant are generally commercial and light industrial. The nearest residence is located across Coors Road, approximately 1,400 feet northeast of the site. The next nearest residences are located in the Paradise Park residential area. A horticultural nursery is located to the immediate south of the plant property. To the north is a commercial building which has been used in the past for electronics manufacturing. Land to the west is undeveloped in the area between the plant and Paradise Park. Land to the east, across Coors Road, includes undeveloped and agricultural land.



Taken from: USGS Los Griegos Quadrangle, 7.5 Minute Series 1"=2000'

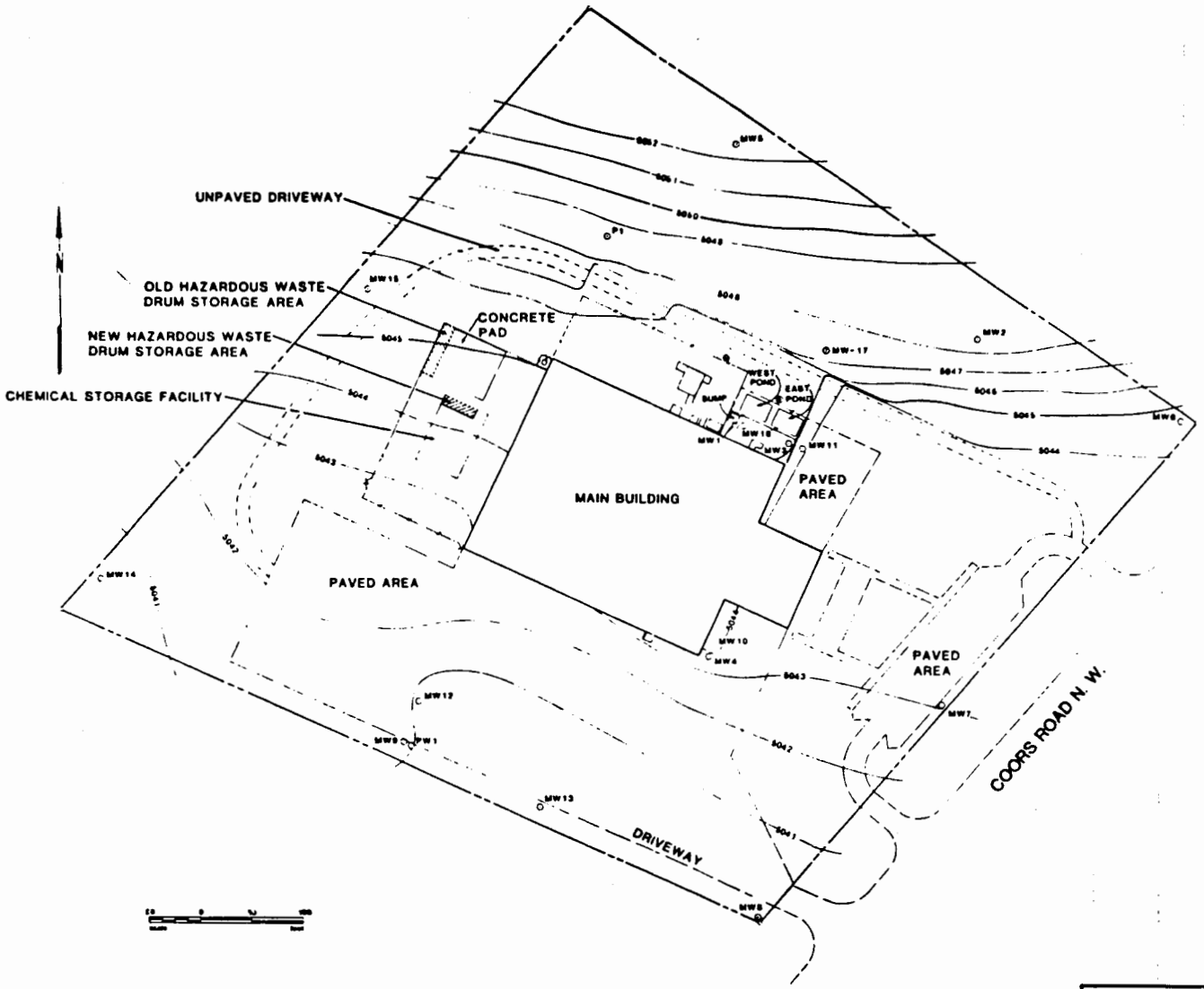
Harding Lawson Associates
Engineers Geologists & Geophysicists

LOCATION MAP

Sparton Technology, Inc.
Albuquerque, New Mexico

1

DRAWN	JOB NUMBER	APPROVED	DATE		DATE
SP	6310,012.12				12-17-85



LEGEND

- MONITOR WELL LOCATION
- WATER METER
- GAS METER
- CHAIN LINK FENCE
- LIMITS OF PAVEMENT
- UNPAVED DRIVEWAY
- 5045 ELEVATION CONTOURS (MSL)
- PROPERTY LINE

HLA Harding Lawson Associates Engineers, Geologists & Geophysicists

PLOT PLAN

SPARTON TECHNOLOGY, INC.
ALBUQUERQUE, NEW MEXICO

2

MK | 0810.012.12 | 12-17-86

Site geological conditions are based on previous field investigations by Harding Lawson Associates (HLA). In general, the plant is located on unconsolidated sand and gravel deposits with occasional fine-grained layers of silt and clay located at specific depths. The stratigraphy of these deposits is characteristic of valley fill alluvium and colluvium of the unconsolidated aquifer in the Rio Grande Valley. The flat, subrounded gravels are indicative of a meandering stream, which deposited sand and gravel in the main channel and fine-grained sediments on a relatively broad floodplain. Some of these fine-grained layers appear almost continuously beneath the site.

The subsurface at the Sparton site can be divided into a series of sand and gravel units separated by fine-grained layers. The upper sand and gravel unit extends from the land surface to approximately 70 feet below grade, where an upper fine-grained layer appears to be present continuously, or almost continuously, underneath the site. The upper fine-grained layer is approximately 10 feet thick. Extending beneath it is a second sand and gravel unit which is approximately 60 feet thick. Underlying the second sand and gravel unit, at a total depth of about 140 feet, is a second fine-grained unit. The thickness and areal extent of this unit is presently unknown, but it was as thin as 1 foot in at least one boring.

The site is underlain by at least two distinctly different aquifers. The upper aquifer (water table aquifer) is a relatively thin, unconfined system which is present above the upper fine-grained layer mentioned above. Another aquifer is present beneath this unit which exhibits semi-confined characteristics.

3. Process Information

a. Manufacturing

Sparton manufactures commercial, industrial, and military electronics, which include circuit board assemblies, transducers, sensors, and pressure systems. Facility operations include machine and model shops, printed circuit board manufacturing facilities, assembly areas, testing laboratory, engineering, and drafting.

The printed circuit manufacturing process at the Coors Road plant employs metal plating which generates an aqueous plating waste that is classified as hazardous due to heavy metals and low pH. Waste solvents (chlorinated and nonchlorinated) are generated primarily from cold solvent cleaning of electronic components. The waste solvents, which are listed hazardous wastes, have always been managed separately from the plating wastes.

b. Hazardous Waste Management Units

Sparton has operated four hazardous waste storage units at its Coors Road facility which have received wastes since November 19, 1980. These units include two lined surface impoundments (ponds) and two drum storage areas, as shown in Plate 2. Sparton has submitted a Part A application for a hazardous waste permit to operate these units. The operation and subsequent closure/post-closure care of the ponds and of the drum storage area is subject to the New Mexico Hazardous Waste Management (HWM) Regulations.

Sparton also operated a waste solvent storage sump, which was closed in October 1980. Since this date is prior to the effective date of the hazardous waste regulations contained in 40 CFR 265, Subtitle C, this sump is not regulated under New Mexico's HWM regulations.

c. Ground-Water Monitoring

See Section E, Monitoring.

4. Review of Closure Plan

a. Drum Storage Area

Sparton has notified the New Mexico Environmental Improvement Division (EID) of its intention to cease storage of containerized hazardous waste for periods of longer than 90 days and to withdraw its Part A application. In order to convert to short term

storage, the drum storage areas are to be closed in accordance with the HWM regulations. Therefore, the closure plan presents the steps necessary to close the old and new drum areas in a manner which provides for their subsequent reuse.

b. Pond and Sump Area

The two ponds (East Pond and West Pond) are located in the same area as the closed sump. The ponds have been used exclusively for storage of aqueous plating wastes. The two ponds were in use on a regular basis until August 1983, when Sparton ceased discharging to either pond and removed the remaining plating wastes. At that time, the liners were visually inspected and appeared to be intact.

The sump was used exclusively for the storage of waste solvents until its closure in October 1980. Sump closure consisted of removing residual wastes and filling with sand. The removed wastes were containerized and disposed as a hazardous waste at an appropriate off-site disposal facility.

Pond and sump closure will consist of backfilling the ponds and construction of an asphaltic concrete cap. This cap will divert surface water and rainfall from the pond and sump area, thus minimizing infiltration of surface water into the ground.

5. Remedial Action

Remedial investigations are underway to determine the extent and rate of migration of contaminants in the vadose zone and the ground water. The results of these investigations, together with the results of previous investigations, will be used to establish numerical flow models in the saturated and unsaturated zones. We will also undertake an Alternative Concentration Limits (ACL) demonstration.

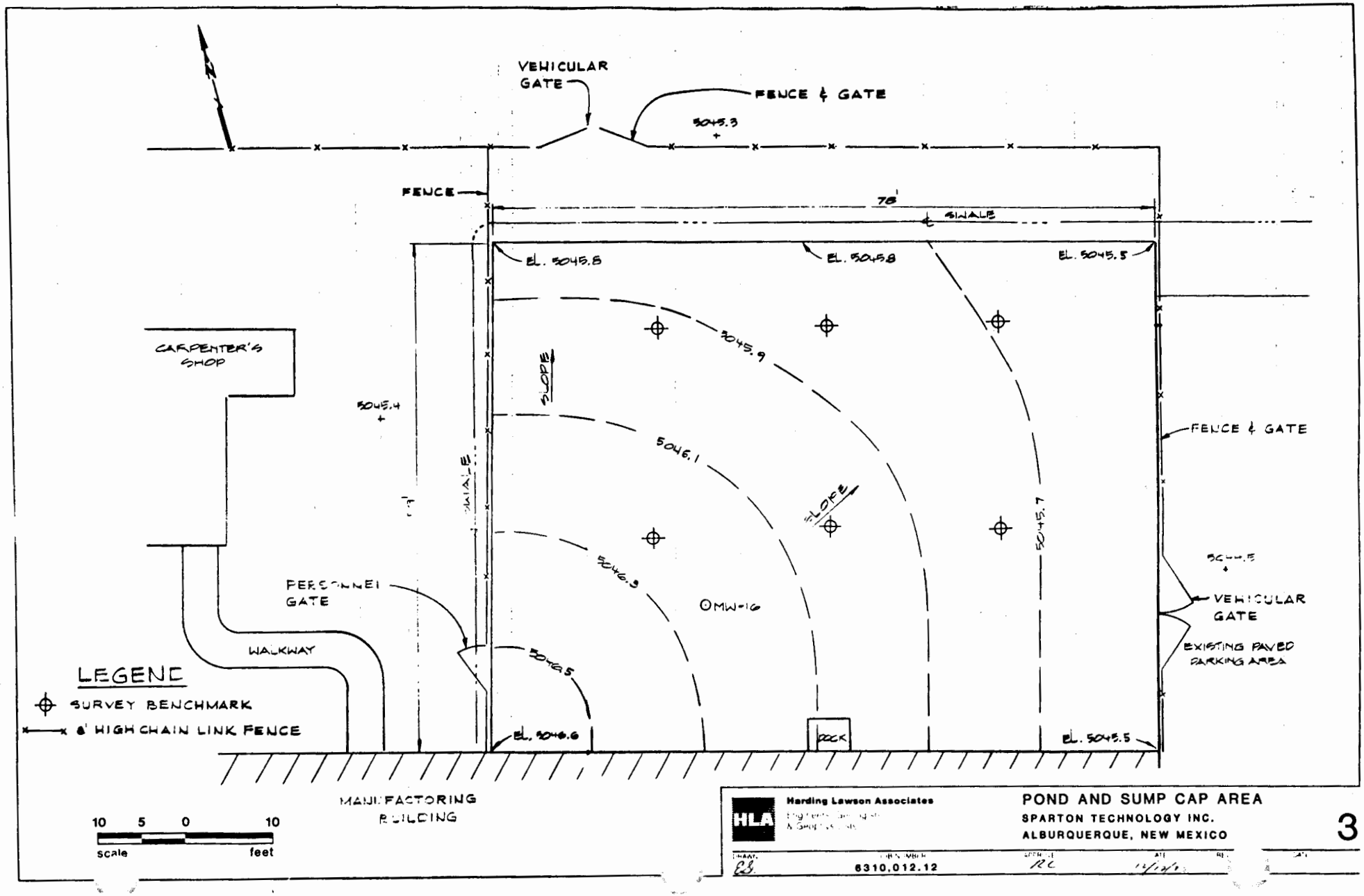
Based on the results of the remedial investigations, numerical ground-water modeling, and ACL demonstration, a feasability study will be completed to select a site remedial program. It is anticipated that the remedial program will involve withdrawal of contaminated ground water. Ground water may be treated by one or more of the following technologies: air stripping, clarification, carbon polishing, and/or biological treatment. Treated water will likely be disposed through one or more infiltration galleries installed on site. Infiltration galleries may be located lateral to, or hydraulically upgradient from, the pond and sump area. Alternatively, Sparton may elect to demonstrate the feasibility of using an infiltration gallery to promote induced hydraulic flushing of contaminated soils of the vadose zone. Induced pneumatic flushing (air venting) of the vadose zone may also be considered.

C. Post-Closure Period Contact

Office of the Vice President and General Manager
Sparton Technology, Inc.
Post Office Box 1784
Albuquerque, New Mexico 87103
(505) 892-5300

D. Security

After closure, the area will be bounded by the operating facility on one side and an 8-foot-high chain link fence on the other three sides. Access to the area will be by a locking personnel gate in the fence on the southwest side and two vehicular gates on the northwest side and the southeast side, respectively (Plate 3). Signs will be posted at all gates reading "Closed, Hazardous Waste Management Area, Unauthorized Personnel Keep Out" in English and Spanish. The signs will have black letters on a yellow background, and will be visible from at least 25 feet in all approaching directions. Security inspections of the fences, gates, locks, and signs will take place on a quarterly basis to assure equipment integrity and to look for evidence of vandalism and/or tampering. Should any security problem be found during inspection, or by notification to the facility security office, appropriate personnel will be immediately informed and repairs and/or replacement will commence as soon as possible and be completed prior to the next quarterly inspection. A security checklist component is included in the overall post-closure care inspection checklist provided in Appendix A.


VEHICULAR GATE
FENCE & GATE
5045.3
FENCE
78'
SWALE
EL. 5045.8
EL. 5045.8
EL. 5045.5
CARPENTER'S SHOP
5045.9
SLOPE
5045.4
5046.1
FENCE & GATE
SWALE
SLOPE
5045.7
5046.3
PERSONNEL GATE
OMW-16
VEHICULAR GATE
WALKWAY
5046.5
EXISTING PAVED PARKING AREA
LEGEND
SURVEY BENCHMARK
8' HIGH CHAIN LINK FENCE
EL. 5046.6
ROCK
EL. 5045.5
MANUFACTORING BUILDING
10 5 0 10
scale feet
Harding Lawson Associates
HLA
POND AND SUMP CAP AREA
SPARTON TECHNOLOGY INC.
ALBURQUERQUE, NEW MEXICO
3
6310.012.12
RC

E. Inspection Plan

After closure, and in addition to the security inspection, a general inspection of the condition of the surface of the area will be made on a semi-annual basis. To facilitate this inspection, vehicular access to the area will be restricted for a length of time sufficient to complete a thorough inspection. This inspection will include the drainage swale on the north and west sides of the area to assure that it is clear of debris and that the sides are physically intact. A visual inspection of the entire 3-inch-thick asphalt wearing surface will also be performed. The location of any gouges, cracks, surface movement, and/or pavement deterioration (chemical or natural) will be noted. Any such breaches of the wearing surface which expose (however slightly) the asphalt base will be repaired and will commence immediately. Undisturbed wearing surface material, for a distance of 6 inches in all directions around the breach, will be removed and this area resurfaced as specified for the initial paving in the Closure Plan. If, at any time between inspections, any sort of breach of the wearing surface is reported, there will be an immediate inspection to determine if repair is necessary.

Inspection of the ground-water monitoring wells will include the working order of the security caps and physical damage to the protective casing or surface grouting. If, during the ground-water sampling, it is determined that a well has become inoperable, the well

will be plugged and a replacement well drilled and developed (in accordance with the specifications in the Closure Plan) prior to the next sampling period. A recommended inspection checklist component for monitoring wells is included in Appendix A.

F. Monitoring Plan

The monitoring plan is comprised of two programs: (1) ground-water monitoring; and (2) facility monitoring.

1. Ground-Water Monitoring

An alternative ground-water monitoring program (AGMP) has already been implemented by Sparton. The AGMP, which is outlined in Appendix C, consists of quarterly ground-water monitoring for a number of indicator parameters and annual monitoring for a more expanded list of parameters. From time to time, the AGMP will be adjusted to reflect the results of the hydrogeological investigation or to serve special monitoring requirements of the site remedial program. All proposed adjustments to the AGMP will be submitted to the EID for prior approval.

2. Facility Monitoring

Facility monitoring will concentrate on the possibility for subsidence of the cap area. Six brass survey benchmarks will be placed in the wearing surface at positions approximately located on

Plate 3. These benchmarks will be tied in horizontally and vertically to the plant grid. At least semi-annually, or after notice of suspected subsidence has been given, a registered state surveyor will verify the elevations of these benchmarks. Access to the cap by vehicles will be totally restricted while the survey is taking place.

Prior to the survey, water will be introduced, preferrably from a fire hose, on the up-slope sides of the cap and allowed to run down-slope. This will confirm that the grade is sufficient to allow drainage and may indicate areas of pavement subsidence, by the ponding of water, on what is supposed to be a slope. Any suspected areas of subsidence will be surveyed to determine the extent of the problem. If subsidence is indicated on the cap, the EID will be notified immediately, and a determination will be made as to the cause of subsidence and subsequent plan of action.

G. Maintenance Plan

The maintenance plan will take effect if and when inspection of the area covered by post-closure indicates the need. Maintenance may include the drainage swale southwest of the cap, the chain-link fence, gates, locks, signs, the asphalt wearing surface of the cap, and the ground-water monitoring wells. The drainage swale will be kept clear of debris and its structural integrity assured. All security devices will be maintained to a level which assures their integrity,

visibility, and proper working order. The asphalt wearing surface will be maintained to a thickness of 3 inches, and any repair or repaving will be in accordance to the specifications in the Closure Plan. Should any of the ground-water monitoring wells become inoperable, a replacement well will be installed within a 25-foot radius of the plugged well. The replacement well will be of the same construction and screened interval as the plugged well.

All maintenance activities will be carried out by personnel familiar with the tasks at hand. Any repair and/or replacement of the wearing surface pavement will be contracted to professionals in that field. Repair or replacement of ground-water monitoring wells will also be contracted to experienced ground-water professionals.

H. Personnel Training

No special training of personnel will be necessary to carry out the security and general inspection requirements of the post-closure plan; however, individuals responsible for certain tasks must be proficient in their respective fields. Security inspections can be carried out by members of the facility's security force using the checklist included in Appendix A. General inspections can be carried out by members of the facility's engineering department using the same checklist.

Ground-water sampling and measurements will normally be performed by site environmental personnel. The site environmental manager will be responsible for providing this training or obtaining such training from professionals in the field of ground-water investigations.

I. Financial Assurance for Post-Closure Care

As owner/operator of the facility, Sparton will establish and maintain a mechanism for financial assurance for the post-closure care of the facility.

J. Notice to Local Land Authority

Within 90 days after closure is complete, Sparton will submit to the County Clerk and to the EID a survey plat indicating the location and dimensions of disposal areas with respect to permanently surveyed benchmarks. This plat will be prepared and certified by a professional land surveyor. The plat filed with the County Clerk will contain a note, prominently displayed, which states the owner's or operator's obligation to restrict disturbance of the site. In addition, facility management will submit to EID and the County Clerk a record of the type, location, and quantity of hazardous wastes disposed of at the facility. Changes in type, location, and quantity of hazardous wastes disposed of at the facility, which occur after the survey plat and record of wastes have been filed, will be reported to EID and the County Clerk.

K. Notice in Deed to Property

In accordance with state law, Sparton will record on the deed to the facility property, or on some other instrument which is normally examined during title search, a notation that will notify any potential purchaser of the property that the land has been used to manage hazardous waste, and that its use is, therefore, restricted.

If, at any time, Sparton or any subsequent owner removes the waste and waste residues, liners, construction debris, and all contaminated underlying and surrounding soil, the notation on the deed to the facility property, or other instrument normally examined during title search, will be deleted.

L. Amendments to the Plan

The Post-Closure Plan will be amended, as necessary, to reflect changes in operating plans or facility designs, or in closure or post-closure operations. The amended Post-Closure Plan will be submitted to the EID for approval.

M. Administration

All records from the post-closure period will be maintained for 5 years after the cecessation of the post-closure care period. These records will include, as a minimum, all inspection checklists,

laboratory reports, survey reports, maintenance records, relevant invoices, and all post-closure related communications records.

N. Post-Closure Care Costs

The post-closure care cost estimates are presented in Appendix B. These cost estimates may require periodic revisions. EID will be promptly notified of any revisions to the cost estimates.

DISTRIBUTION

1 copy to:	Sparton Corporation 2400 East Ganson Street Jackson, Michigan 49202
Attention:	Mr. Blair Thompson
2 copies to:	Sparton Technology, Inc. 4901 Rockaway Boulevard, S.E. Rio Rancho, New Mexico 87124
Attention:	Mr. Richard Mico
2 copies to:	Varnum, Riddering, Schmidt & Howlett 171 Monroe Avenue, N.W. Grand Rapids, Michigan 49503
Attention:	Mr. Jon F. DeWitt
5 copies to:	Environmental Improvement Division Ground Water and Hazardous Waste Bureau Harold Reynolds Building 1190 St. Francis Drive Santa Fe, New Mexico 87504-0968
Attention:	Mr. Peter H. Pache

QUALITY CONTROL REVIEW:

J. Michael Huls

J. Michael Huls
Senior Environmental Scientist

APPENDIX A
to
ATTACHMENT 8

Post-Closure Quarterly Inspection Checklist

POST-CLOSURE QUARTERLY INSPECTION CHECKLIST

Facility: Sparton Technology, Inc.
9621 Coors Road, N.W.
Albuquerque, New Mexico 87103

Date of Inspection: _____

Type of Inspection: Maintenance ___ Wells ___ Subsidence ___ Security ___

Name of Inspector: _____ Name of Surveyor: _____

ITEM	DESCRIPTION	PROBLEM Y/N	REMARKS	ACTION TAKEN	DATE
Maintenance:	1. Wearing surface				
	2. Gouges				
	3. Deterioration				
	4. Subsidence				
General:	1. Ponding on cap				
	2. Rainfall run-on				
	3. Condition of swale				
Subsidence:	1. Benchmark survey				
Monitor Well:	1. Surface leakage to wells				
	2. Rusting or broken well covers				
	3. Integrity of locks				
	4. Indication of well plugging				
Security:	1. Integrity of fences and gates				
	2. Integrity of locks				
	3. Integrity and status of signs				
	4. Evidence of vandalism				
	5. Integrity of benchmarks				

INSPECTOR'S SIGNATURE: _____ DATE: _____

OWNER/OPERATOR'S SIGNATURE: _____ DATE: _____

APPENDIX B
to
ATTACHMENT 8

Post-Closure Care Costs

APPENDIX B

POST-CLOSURE CARE COSTS

Post-closure care costs have been estimated by Sparton's consultant, Harding Lawson Associates (HLA). Laboratory costs are based on current prices charged by NUS Corporation, Laboratory Services Division. Costs related to earthwork and construction were obtained from Means' Site Work Cost Data, 1986 edition. The date of this cost estimate is December 5, 1985. The post-closure care cost estimate will be adjusted annually using an inflation factor derived from the annual Implicit Price Deflator for Gross National Product, as published by the U. S. Department of Commerce Survey of Current Business. The inflation factor is the result of dividing the latest published annual Deflator by the Deflator for the previous year. The adjustment will be made by multiplying the most recent post-closure cost care estimate or adjusted cost estimate by the inflation factor.

The post-closure care cost, based on current 1985 costs, is estimated to be $388,248. A cost breakdown is presented in Table B-1.

TABLE B-1
Pond and Sump Area Post-Closure Cost Estimate
(1985 Basis)

Item	Units	Cost/Unit	Cost
Security			
Install warning signs	3 signs	$25.00	$ 75.00
Install gate locks	3 locks	10.00	30.00
Subtotal			$ 105.00
Inspections			
1 man/1/2 day x 2/yr x 30 yrs	240 hrs	$10.00	$ 2,400.00
Subtotal			2,400.00
Ground-water Monitoring			
Sample Collection:			
32/yr x 30 yr	960 samples	$ 40	$ 38,400.00
Quarterly Analyses:			
24/yr x 30 yr	720 samples	$226	$162,720.00
Annual Analyses:			
8/yr x 30 yr	240 samples	$495	$118,800.00
Reporting:			
4/yr x 30 yr	120 reports	$ 80	$ 9,600.00
Subtotal			$329,520.00
Subsidence Surveys:			
Install benchmarks	6 benchmarks	$ 50	$ 300.00
Survey 2/yr x 30 yrs	60 surveys	250	15,000.00
Reporting 2/yr x 30 yrs	60 reports	100	6,000.00
Subtotal			$ 21,300.00
Maintenance:			
General	30 years	$150	$ 4,500.00
Repaving (square yards)	est. 511 s.y.	6.70	3,423.00
Monitor well plugging	est. 4 wells	1,000	4,000.00
Monitor well replacement	est. 4 wells	5,000	20,000.00
Subtotal			$ 31,923.00
Administration:			
General	30 years	$100	$ 3,000.00
Subtotal			$ 3,000.00
TOTAL			$388,248.00

APPENDIX C
to
ATTACHMENT 8

Alternative Ground-Water Monitoring Program

APPENDIX C

ALTERNATIVE GROUND-WATER MONITORING PROGRAM

Sparton Technology, Inc. (Sparton) has reason to believe ground-water contamination exists at its Coors Road facility in Albuquerque, New Mexico. Therefore, an Alternative Ground-Water Monitoring Program (AGMP) has been implemented as provided in the New Mexico Hazardous Waste Management Regulations 206.C.1.a(4).

The frequency of sample collection, analytical parameters, and monitoring wells to be sampled are consistent with Sparton's commitment to the EID, as expressed in Sparton's letter to Mr. Steven Asher on July 24, 1984. Two modifications have been made. Nickel has been added to the list of annual parameters. MW-5 has been substituted for MW6 as the upgradient well. The reason for this substitution is that MW6 has gone dry at least once in the past, and therefore may not provide a reliable continuous record of upgradient ground-water quality.

The AGMP consists of the following:

1. Monitoring Wells MW1, MW4, MW5, MW6, MW8, MW9, MW10, and MW11 will be sampled quarterly and annually. During closure of the pond and sump area, MW1, MW4, and MW11 will be removed. MW16, which is located adjacent to MW1, will be added to the AGMP at that time. No other replacement wells are planned.

2. Quarterly parameters will include:

pH	specific conductance
total organic carbon	total organic halogen
trichloroethylene	1,1-dichloroethylene

3. In addition, annual parameters will include:

chloride	sodium
nitrate (as N)	boron
Kjeldahl nitrogen	manganese
sulfate	nickel
chromium (trivalent and hexavalent)	
volatile organic hydrocarbon scan	

4. The depths of the monitoring wells (together with other well construction details) have previously been supplied to EID in reports prepared by Harding Lawson Associates (HLA), Sparton's consultant:

a. MONITORING WELL INSTALLATION REPORT, SPARTON SOUTHWEST, INC., COORS ROAD FACILITY, Harding Lawson Associates, June 29, 1983
b. INVESTIGATION OF SOIL AND GROUND-WATER CONTAMINATION, SPARTON TECHNOLOGY, COORS ROAD FACILITY, ALBUQUERQUE, NEW MEXICO, Harding Lawson Associates, March 19, 1984

c. HYDROGEOLOGIC CHARACTERIZATION AND REMEDIAL INVESTIGATION, SPARTON TECHNOLOGY, INC., 9261 COORS ROAD, NORTHWEST, ALBUQUERQUE, NEW MEXICO, Harding Lawson Associates, March 13, 1985

Ground-water sampling and analytical methods are presented in Appendix C of the March 13, 1985 report.

5. Previous investigations, and the reports thereof, are considered by Sparton to be an integral part of the AGMP. Evaluation procedures employed in those past investigations are contained within the respective reports. Sparton remains committed to any schedule of implementation contained in those reports.

6. Sparton has already implemented its long-term ground-water monitoring strategy. The concentrations of hazardous waste constituents in the ground water have already been determined.

7. An assessment is underway of the rate and extent of migration of hazardous waste constituents in the ground water. Historical data from on-site monitoring is being evaluated in an empirical approach. Numerical ground-water models are being established to evaluate the rate and extent of migration of hazardous waste constituents as well as other parameters of concern. The most notable other parameters of concern include a number of volatile organic constituents which are being evaluated by a combination of three techniques, including evaluation of historical on-site data, ground-water modeling, and soil-gas testing.

Additional site investigations are underway, including an assessment of the vertical distribution of contaminants in ground water and an assessment of vadose zone contamination.

8. Sparton will continue to make determinations of ground-water quality according to the schedule indicated above until final closure of the facility and until completion of the anticipated ground-water remedial program, or until completion of the 30 year post-closure care period, which ever occurs latest. Sparton will continue to comply with the recordkeeping and reporting requirements specified in the regulations.

9. Modifications of this plan may become necessary, based on the results of the additional site investigations and the ground-water modeling. Any such modifications will be submitted to the EID for prior approval.

ATTACHMENT 9

POST-CLOSURE CARE PLAN COMMENTS
AS PROVIDED BY NMEID, February 17, 1986

SPARTON'S RESPONSE, March 21, 1986

TONEY ANAYA
GOVERNOR

DENISE D. FORT
DIRECTOR

HEALTH & ENVIRONMENT department

STATE OF NEW MEXICO

ENVIRONMENTAL IMPROVEMENT DIVISION
P.O. Box 968, Santa Fe, New Mexico 87504-0968
(505) 984-0020

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

February 17, 1986

FEB 19 1986 RECEIVED

Mr. R.P. Mico
Vice President and General Manager
SPARTON TECHNOLOGY, INC.
P.O.Box 1784
Albuquerque, New Mexico 87103

Re: Closure Plan Modifications

Dear Mr. Mico:

The Environmental Improvement Division (EID) has completed a review of the closure and post-closure plans submitted December 20, 1985, by Harding Lawson Associates (HLA) as agents for Sparton Technology, Inc.. These plans were submitted in response to EID's comments on the May 7, 1985 closure plan submittal. This letter is EID's notice that, based on this review, the closure and post-closure plans as submitted are deficient in some areas. The purpose of this letter is to delineate in writing those defiencies identified during this review, and to modify the closure and post-closure plans accordingly. These modifications are made pursuant to Section 206.C.2.c.(4) of the New Mexico Hazardous Waste Management Regulations (HWMR-2) and will be incorporated in the final closure and post-closure plans.

Following public notice of Sparton's closure and termination of interim status, a comment period of 45 days is provided for public response. An opportunity for the public to request a hearing will also be made available during this period. Any comments submitted regarding Sparton's closure/post-closure activities shall be reviewed by EID and possibly included with the modifications delineated in this letter. Closure activities shall be initiated immediately following final approval of the plans.

Closure plan comments are as follows:

page 8 paragraph 2

"Preliminary results from the vadose zone investigation indicate that, although metallic and organic constituents are detectable in soils at most depths, no concentrated reservoirs of contamination appear to exist above the water table. Some metals in soil samples are detected in the low ppm range..."

The hydrological report submitted on May 7, 1985 stated that EP Toxic levels of hexavalent chromium was detected between 35 and 40 feet below the surface (boring 16). It would seem unlikely that, given the climate and the hydrological conditions present at the site, these levels of chromium would have decreased from toxic to "low ppm" levels in one year. It is also likely that there are similar areas of concentrations elsewhere in the vadose zone.

page 13 paragraph 3

"Pond and sump closure will consist of some excavation of potentially contaminated surface soils prior to placement of a relatively impervious asphaltic concrete cap."

As a result of Spraton's loss of interim status on November 8, 1985, no hazardous waste may be placed in the surface impoundments without first receiving a full RCRA permit prior to placement. The surface impoundments must also meet the minimum technology requirements. Sparton may choose to leave the sump and surrounding soils undisturbed rather than rendering them non-hazardous and placing them in the surface impoundments. If Sparton chooses this alternative, any further reference to sump and surrounding soil removal in the closure/post-closure plans must be deleted.

page 20 B. Closure Standard

This section is to include the following statement: "Grading of the asphalt surface away from the building and grading of the drainage swale to receive any run-off from the cap will function as run-on and run-off control."

page 21 paragraph 2

Insert before the last sentence: "Depending on the extent of contamination , Sparton will either 'clean close' or close as a landfill pursuant to HWMR-2 Section 206.C. " .

page 21 paragraph 3

"If any contamination is discovered within the storage facility..."

Action will be taken if contamination is discovered as a result of the storage unit - not just within the unit.

page 24 paragraphs 3 and 4

"EID will be promptly notified upon any amendment to the schedule."

Change to read:"Any amendment to the schedule will be promptly proposed to EID for their approval. No amendments are to be effected until EID approval is received."

"EID will be promptly notified of any revisions to the cost estimates."

Change to read:"Any amendment to the cost estimates will be promptly proposed to EID for their approval. No amendments are to be effected until EID approval is received."

Appendix D

"Introduction"

"Rocky Mountain Analytical Laboratory will continue to provide support for the Alternative Ground Water Monitoring Program at Sparton Technology, Inc."

If Rocky Mountain Analytical Laboratory will be utilized, add "as well as for the closure and post closure activities as needed" to this sentence. If they will not be employed, the lab intended for this support should be named..

Guidelines for Sample Bottles and Preservatives

Sparton is to report results of samples collected for metals analyses as total metals. The sampling technique is to be no filtration and acidification of the sample immediately upon collection.

page 7 Sample Collection and Preservation paragraph 2

The soil samples collected during the vadose zone investigation were collected in 250 ml. glass jars and composited from the sampler with a spoon. The sampling procedure delineated in this section is inaccurate, and is to be rewritten to reflect the actual procedure.

Appendix F

Item #24

"Disposal method to be determined based on analysis of soil..."

Immediately following this sentence, add:"If any hazardous constituents are found to be present in the soil, the soil will be disposed of as a hazardous waste."

"Appendix A- Item 17. Chemical Information Summary
Hazard Specifics of Pure Chemical
Hazard Property (3)"

Many of these compounds would also be considered volatile and are to be described as such.

Appendix G

"Three soil samples will be collected from the ground surface in the old hazardous waste drum storage area."

A minimum of eight samples will be required to verify the contamination status of the soils in this area. Composite sampling is inappropriate in this investigation.

Also, the samples will be analyzed for cadmium in addition to the parameters listed.

Appendix I

Old Drum Area Closure Cost Estimate

Table I-1

Closure costs are to include an additional 10% of the total cost for contingency plan activities should contamination be found and 10% for laboratory costs.

New Drum Area Closure Cost Estimate

Table I-2

Disposal of drums of wash water would require a fingerprinting analysis, which is estimated at $125.00/waste stream, and, for 10 or more drums, disposal costs near $150.00/drum. Disposal of drums of more concentrated hazardous waste could be as much as $200.00/drum. Laboratory and disposal costs are to reflect this additional expense.

Pond and Sump Surface Removal Cost Estimate

Table I-3

Title is to include the term closure and not include "Sump Surface Removal" if Sparton chooses to leave the sump and surrounding soils in place.

Costs are to also reflect the sampling and disposal of decontamination wastes (additional 10 - 15% of total cost for lab charges and estimated $150.00-$200.00/drum disposal charges).

As previously mentioned, contingency costs are to also be included in closure cost estimates (additional 10% of total cost).

In addition to these deficiencies, the assumption that certain soils will be considered hazardous and some nonhazardous by virtue of their location rather than through the use of actual data is arbitrary and unacceptable. Final determination of the area to be paved will be decided following the submission of the vadose zone model results, soil moisture characteristics, soil boring results, and any other data necessary to define the limits of the contaminated vadose zone and the probable fate of the contaminants in this area. Closure costs may need to be adjusted accordingly.

Also, due to the incompatibility of organic solvents and asphalt, the use of asphalt will only be approved if vadose zone venting is to be included in the remedial activities.

Post-closure plan comments are as follows:

page 11 paragraph 1

"Any such breaches of the wearing surface which expose (however slightly) the asphalt base will be repaired and will commence immediately."

On page 14, the post-closure plan agrees to maintain a 3" wearing surface - not wait until the base was exposed. This is preferable to the plan prescribed on page 11; page 11 is to be amended accordingly.

paragraph 1

This paragraph is to be followed by a paragraph regarding the quarterly air sampling of the building. This sampling is to take place directly after the building has been inactive for overnight or a weekend to insure that hazardous levels of volatile vapors have not entered the building via subsurface migration. Should levels be detected that could present a hazard, immediate action will be taken to correct the problem, including the installation of a gas control/venting system.

page 15 paragraph 3

"Changes in type, location, and quantity of hazardous waste disposed of at the facility, which occur after the survey plat and record of wastes have been filed, will be reported to EID and the County Clerk."

There will be no additional hazardous waste disposed of at this facility without first obtaining a RCRA permit for such activity.

page 16 paragraph 3

"The Post-Closure Plan will be amended, as necessary, to reflect changes in operating plans or facility designs, or in closure or post-closure operations. The amended Post-Closure Plan will be submitted to EID for approval."

Delete the last sentence and add to the first sentence:"following EID approval.".

page C-1 paragraph 3

"During closure of the pond and sump area, MW1, MW4, and MW11 will be removed."

Following conversations with HLA and receipt of Sparton's January 1986 Progress Report, MW1, MW2, MW3 MW4, and P-1 will be plugged and abandoned. The closure plan should be corrected to include all the appropriate wells.

page C-1 #3

"no other replacement wells are planned."

Preliminary results of the vertical profiling indicate substantial contamination increasing with depth (phone conversation between Tom Burger, HLA, and Kent Bostick, EID, January 9, 1986) in the deeper saturated zone as indicated in well #14. Sparton will install packers at the elevation of the upper fine-grained unit which separates the upper and lower saturated zones to reduce the hydrualic connection between the two zones. Should it become evident that this procedure is ineffective in substantially reducing the downward flow component, Sparton will, at least partially, plug any monitor well which is screened in both the upper and lower saturated zone. Monitoring of the lower saturated zone will still be required. In addition to this issue, Sparton will be submitting a post-closure permit application in March, 1986. It will be necessary for Sparton to maintain a ground-water monitoring system pursuant to the requirements of HWMR-2 Section 206.D. Under the corrective action order to be issued, both on and off-site ground-water monitoring will be required to accurately define the extent of contamination and the progress of the remedial action. Clearly, "replacement wells", and possibly other wells will be required during this post-closure period.

page C-2 #2

Quarterly parameters are to also include cadmium, chromium (hexavalent and trivalent) lead, and nickel.

page C-3 #6

"The concentration of hazardous waste constituents in the ground water have already been determined."

Concentrations in the lower saturated zones have not been clearly defined. Additional deeper wells screened in discrete flow zones will be necessary to address this issue.

In addition to the above mentioned issues, closure and post-closure plans relating to landfills must consider the following issues:

-- the estimated amount of hazardous waste and hazardous waste constituents in the area to be closed; and

--the mobility and expected rate of migration of the hazardous waste and hazardous waste constituents.

As previously discussed, closure activities will commence immediately following final approval of the plans with these and any other modifications that result from the public notice included.

If you have any questions regarding this notice, please contact Ms. Alice Barr, Hazardous Waste Section, New Mexico Environmental Improvement Division, Harold Runnels Building, 1190 St. Francis Drive, P.O.Box 968, Santa Fe, New Mexico 87504-0968 or call (505) 827-2934.

Sincerely,

Peter H. Pache
Program Manager
Hazardous Waste Section

cc: Duff Westbrook, EID Legal
Kent Bostick, EID Groundwater Section
Richard Mitzelfelt, District I EID
Buddy Parr, EPA Region VI
Thomas Burger, Harding Lawson Associates

6310,013.12

J Berger

SPARTON
TECHNOLOGY, INC.

4901 Rockaway Blvd., SE
Rio Rancho, New Mexico 87124
P.O. Box 1784
Albuquerque, New Mexico 87103
Phone (505) 892-5300
TWX 910-989-1657

FEDERAL EXPRESS

March 21, 1986

MAR 26 1986
RECEIVED

State of New Mexico
Environmental Improvement Division
1190 St. Francis Drive
Santa Fe, New Mexico 87504

Attention: Mr. Peter H. Pache

Dear Mr. Pache:

Sparton Technology, Inc. (Sparton) has received the New Mexico Environmental Improvement Division (EID) "Closure Plan Modifications" letter dated February 17 and the "Public Notice" dated February 20. Sparton submits these comments in response to those communications. In doing so, Sparton reserves all its remedies and the right to contest any or all proposed modifications should the parties be unable to agree on a Closure Plan or Post Closure Plan.

Sparton's comments on EID's Closure Plan comments are as follows:

Page 8, Paragraph 2

The comment of EID is acknowledged.

Page 13, Paragraph 3

We cannot agree with EID's comments and the implications of those comments. For Sparton to build the desired cap to appropriate specifications, Sparton has to remove some of the sump area. Placing the removed materials in the impoundment is clearly a better environmental choice than leaving them undisturbed as suggested by EID. Furthermore, to move those materials from one area about fifteen feet to the impoundment area is not a "disposal" under RCRA which would require a permit. We realize the cost estimate has already been increased by $3,400 to reflect EID's proposed modification. On reflection, that adjustment and modification seems wholly unnecessary and the $3,400 could be better spent on remediation.

Page 21, Paragraph 2

We believe it would be more appropriate to state that Sparton will respond to the contamination in accordance with the regulations. We do not feel it is appropriate to characterize the site as a landfill.

Page 21, Paragraph 3

We propose to add at the end of the paragraph: "If any contamination has migrated out of the facility, Sparton will follow the same procedures as described under 'A. Old Drum area' above."

Page 24, Paragraphs 3 and 4

We agree with the proposed modifications.

Appendix D

We currently intend to use Rocky Mountain Analytical Laboratory in Arvada, Colorado and NUS Laboratory in Houston, Texas for the closure and post-closure activities. We reserve the right to use any other qualified laboratory that meets formal EID criteria.

Guidelines for Sample Bottles and Preservatives

We cannot agree to acidify ground-water samples for metals prior to filtration. There is no regulatory basis for such a requirement. Furthermore, this would have the effect of releasing into solution both mineral metals and adsorbed metallic ions. The result would be falsely elevated values which do not represent the in situ ground-water conditions.

Sample Collection and Preservation

Soil samples collected for laboratory analysis of volatile constituents will be collected in chemically clean, wide-mouth glass jars of sufficient capacity to allow at least one repeat analysis. Screw caps which have teflon liners will be used. Care will be taken to clean the sample jar rim of any soil particles, prior to screwing on the cap. Soil samples collected for analysis of volatile organic constituents will be immediately refrigerated or stored in an ice chest after collection.

Appendix F - Item #24

Soil cuttings will be analyzed with an HNU meter in the field. If a higher than background reading is obtained, the soil will be disposed either as backfill within the lined surface impoundments to be closed (see our comment under "Page 13, Paragraph 3") or off site as a hazardous waste.

Appendix F - "Appendix A - Item 17. Chemical Information Summary."

It should be noted that the Chemical Information Summaries provide the vapor pressure for each organic substance.

Appendix G

We agree with the proposed modification.

Appendix I

We have revised all cost estimates to reflect EID's proposed modifications.

Comments at Top of Page 5, EID Letter

We agree that the area to be paved may need to be modified based on the results of the vadose investigation and other relevant data. Closure costs will be adjusted according to any such modification agreed to by Sparton and EID.

Vadose zone venting is a relatively new technology for the reduction of dissolved volatile organic compounds in ground-water. This technique is most promising when used in conjunction with other remedial technologies, and has the effect of shortening the duration of ground-water cleanup. This technology will be considered in the design of the site remedial program.

We disagree that the integrity of the asphalt cap would be threatened by organic vapors in the soil. The subgrade, which will be a granular material, will provide passive venting of the area around the cap. If the presence of the organic vapors in the soil were deletereous to asphalt, this effect would have already been noted in the northwest parking lot, near the surface impoundments, and in the south parking lot. These parking lots, which are constructed of asphalt, overlay concentrated regions of the contaminant plume.

Page 11, Paragraph 1

Sparton's comments on EID's Post-Closure Plan comments are as follows:

We agree with the first two paragraphs.

With respect to air sampling in the building, Sparton already performs air monitoring within the building as part of its industrial hygiene program. If the presence of an impermeable barrier at the ground surface were likely to cause the concentration of organic vapors in the underlying soils such that these vapors could enter the building and cause a health threat, this would already have been detected by the ongoing air monitoring program. The building floor is such an impermeable barrier, which has been in place for many years, and which covers a far greater areal extent than the projected cap.

Sparton will continue air sampling under its industrial hygiene program. Obviously, if any hazardous conditions are detected, immediate action will be taken to correct same and to protect our employees' health.

Page 15, Paragraph 3

We do not believe our proposed plan involves any "disposal" of hazardous waste at the site. We agree that hazardous wastes, if any, generated at Sparton, will not be disposed of on site without the appropriate RCRA permit. See our comments under Closure Plan, Page 13, Paragraph 3.

Page 16, Paragraph 3

We agree with the modifications.

Pace C-1, Paragraph 3

We agree with the modifications.

Page C-1, #3

Concerning the EID comments regarding the use of packers in wells which are screened in both the upper and lower saturated zones, the use of packers is intended as a temporary measure until we can resolve questions about the vertical distribution of contamination and the hydraulics of the saturated zone. Investigations are already underway to answer these questions. However, if it becomes evident that any of these wells are

worsening the ground-water condition and that the packers are ineffective at substantially reducing the problem, Sparton will, at least partially, plug any such monitoring well.

The ongoing investigations include computer modeling of ground-water flow and of solute transport in the saturated zone. These models will be used to determine, in consultation with EID, the need for any additional on-site monitoring wells. We agree that monitoring of the lower saturated zone will be necessary in any event.

Concerning the EID comments in the last two sentences beginning with "under the corrective action order to be issued" we are compelled to make the following response, since our silence might be construed as agreement with your statements:

First, Sparton wishes to repeat its desire to appropriately resolve and remediate the contamination on the Sparton site. Sparton has been very aggressive in its studies and plans for doing so and has already spent in excess of $600,000 in this effort and in trying to satisfy the demands of the regulations and the EID. We do not and cannot agree that a corrective action order is appropriate or applicable, for reasons we have previously discussed. Nor does Sparton feel a corrective action order is necessary to achieve reasonable remediation goals. Such an order will simply impose one more layer of costly bureaucratic procedures on a problem that has already gone too long without addressing the substance of clean-up. We are expending significant amounts of money that could better be spent removing the contamination. Our previous plan for solving the problem has been rejected and we are about to spend another $140,000 on a Closure Plan that does little, if anything, to remediate the contamination. Surely, there must be a better way.

Page C-2, #2

We do not see great value in adding specific metals to the quarterly parameters, since dissolved metals will travel with the specific-conductance plume. Annual evaluation of metals would provide sufficient information about the progress of ground-water reclamation. However in the spirit of compromise, we are willing to add cadmium, total chromium, and nickel to the quarterly parameters. Lead has been evaluated in ground-water samples by the EPA, by the EID, and by two contract laboratories retained by Sparton. Lead has never been detected in any ground-water sample obtained from the site.

Page C-3, #6

We agree that our ongoing investigation will determine the need, if any, for additional deeper wells screened in discrete flow zones.

Finally, with respect to the list of issues on Page 7, we feel it is misleading to call this site a landfill. We cannot possibly estimate, with any level of reliability, the amount of hazardous waste or hazardous waste constituents in the area to be closed. The mobility and rate of migration can be roughly estimated and will be a part of our ongoing investigation.

We respectfully request that EID revise its proposed modifications to reflect the above comments, before Sparton implements the closure activities.

Very truly yours,

SPARTON TECHNOLOGY, INC.

R.D. Mico

Richard D. Mico
Vice President and General Manager

cc: Mr. Blair Thompson
Mr. Jon DeWitt
Mr. Tom Burger

RDM:mds

ATTACHMENT 10

FINANCIAL RESPONSIBILITY REQUIREMENT RESPONSES

Tom

SPARTON
TECHNOLOGY, INC.

4901 Rockaway Blvd., SE
Rio Rancho, New Mexico 87124
P.O. Box 1784
Albuquerque, New Mexico 87103
Phone (505) 892-5300
TWX 910-989-1657

March 21, 1985

Director
New Mexico Environmental Improvement Division
725 St. Michael Drive
Santa Fe, New Mexico 87504-0968

Attention: Hazardous Waste Section

Subject: Financial Responsibility Requirements

Gentlemen:

Sparton Technology, Inc. (Sparton) has operated a hazardous waste storage facility (NMD083212332) at 9621 Coors Road, Albuquerque, New Mexico. In compliance with New Mexico Hazardous Waste Regulations [206.C.3.h.(2)], Sparton previously has obtained liability insurance for sudden and non-sudden accidental occurrences.

In January, our Insurance carrier, Stuart Smith Mid-America, advised us of non-renewal of their current EIL (nonsudden) policy. During January, Shand-Morahan, a previously significant market for this coverage, announced a lack of capacity for the required limits, and shortly thereafter withdrew from the market altogether. National Union Fire Insurance Company (NUFIC) of the AIG Group has made a proposal for our required coverage. The proposed annual premium was 3.27 times the cost of the expiring policy. Further, the proposed minimum retention was $100,000, or double that of the expiring policy. In addition, the proposed coverage was limited to legal liability excluding provision for clean-up costs, and excluded claims for known contamination or pending litigation, thus eliminating coverage for future claims arising from the current situation at our Coors Road facility. Swett and Crawford were also requested to quote, and declined. Other possible markets were considered, but none can provide the required insurance. While coverage is available (at high cost) for impairments which may occur in the future, no coverage is available for known events leading to future liability.

Sparton no longer operates the surface impoundments or the solvent sump at its Coors Road facility. All hazardous wastes are currently being stored in containers for less than 90 days. Therefore, any environmental impairment has already occurred, and would be excluded from the proposed NUFIC policy. Simply stated, the available EIL coverage would provide no useful protection and would not meet regulatory requirements.

We have reviewed the financial tests for self-insurance as described in 206.C.3.h.(6). In our opinion we are unable to meet these tests.

Therefore, at this time, we are notifying you of our difficulty in meeting the regulatory requirements. Our policy with Stuart Smith expired on March 15, 1985. As you can see, the unavailability of additional EIL insurance is entirely beyond our control. We request any information on how Sparton can meet its regulatory obligations, and will cooperate to the fullest extent possible.

Very truly yours,

SPARTON TECHNOLOGY, INC.

R. D. Mico

Richard D. Mico
Vice President and General Manager

RDM:mds

cc: Mr. Blair Thompson (2)
Mr. Tom Burger

CORRECTED COPY 750

SPARTON
TECHNOLOGY, INC.

4901 Rockaway Blvd., SE
Rio Rancho, New Mexico 87124
P.O. Box 1784
Albuquerque, New Mexico 87103
Phone (505) 892-5300
TWX 910-989-1657

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

July 2, 1985

RECEIVED
JUL 08 1985
HLA - HOUSTON

Mr. C. Kelley Crossman
Environmental Scientist
Hazardous Waste Section
State of New Mexico
Environmental Improvement Division
P.O. Box 968
Santa Fe, New Mexico 87504-0968

Dear Mr. Crossman:

As noted in your letter of June 10, Sparton Corporation, including its various divisions, lost its environmental liability insurance coverage due to non-renewal by the insurance carrier, Stewart Smith, effective March 15, 1985. Recent investigation by our insurance agent has resulted in no progress. We are advised that there has been no positive change in the availability or cost of the insurance sought since our letter of March 21, 1985, informing you of our difficulty in securing such coverage as is required to maintain compliance with New Mexico Hazardous Waste Regulations [206.C.3.h.(2)].

As a result of these recent efforts to restore our environmental liability insurance coverage, we must advise you that our position remains as expressed on March 21. Again, we request any information on how Sparton can meet its regulatory obligations, with our assurance of cooperation with your department to the fullest extent possible.

Sincerely,

SPARTON TECHNOLOGY, INC.

R D Mico

Richard D. Mico
Vice President and General Manager

cc: Mr. B. Thompson - Sparton Corporation
Mr. T. Burger - Harding Lawson Assoc.
Mr. J. DeWitt - Varnum, Riddering, Schmidt & Howlett

RDM:mds

file 6310,011.12

SPARTON TECHNOLOGY, INC.

4901 Rockaway Blvd., SE
Rio Rancho, New Mexico 87124
P.O. Box 1784
Albuquerque, New Mexico 87103
Phone (505) 892-5300
TWX 910-989-1657

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

July 2, 1985

Mr. C. Kelley Crossman
Environmental Scientist
Hazardous Waste Section
State of New Mexico
Environmental Improvement Division
P.O. Box 968
Santa Fe, New Mexico 87504-0968

Dear Mr. Crossman:

As noted in ~~your~~ Last letter of June 10, Sparton Corporation, including its various divisions, washed its environmental liability insurance coverage due to non-renewal by the insurance carrier, Stewart Smith, effective March 15, 1985. Recent investigation by our insurance agent has resulted in no progress. We are advised that there has been no positive change in the availability or cost of the insurance sought since our letter of March 21, 1985, informing you of our difficulty in securing such coverage as is required to maintain compliance with New Mexico Hazardous Waste Regulations [206.C.3.h.(2)].

As a result of these recent efforts to restore our environmental liability insurance coverage, we must advise you that our position remains as expressed on March 21. Again, we request any information on how Sparton can meet its regulatory obligations, with our assurance of cooperation with your department to the fullest extent possible.

Sincerely,

SPARTON TECHNOLOGY, INC.

R D Mico

Richard D. Mico
Vice President and General Manager

cc: Mr. B. Thompson - Sparton Corporation
Mr. T. Burger - Harding Lawson Assoc.
Mr. J. DeWitt - Barnum, Riddering, Schmidt & Howlett

RDM:mds

ATTACHMENT 11

WIND ROSE FOR ALBUQUERQUE, NEW MEXICO

U. S. DEPARTMENT OF COMMERCE
Weather Bureau

WIND SUMMARY

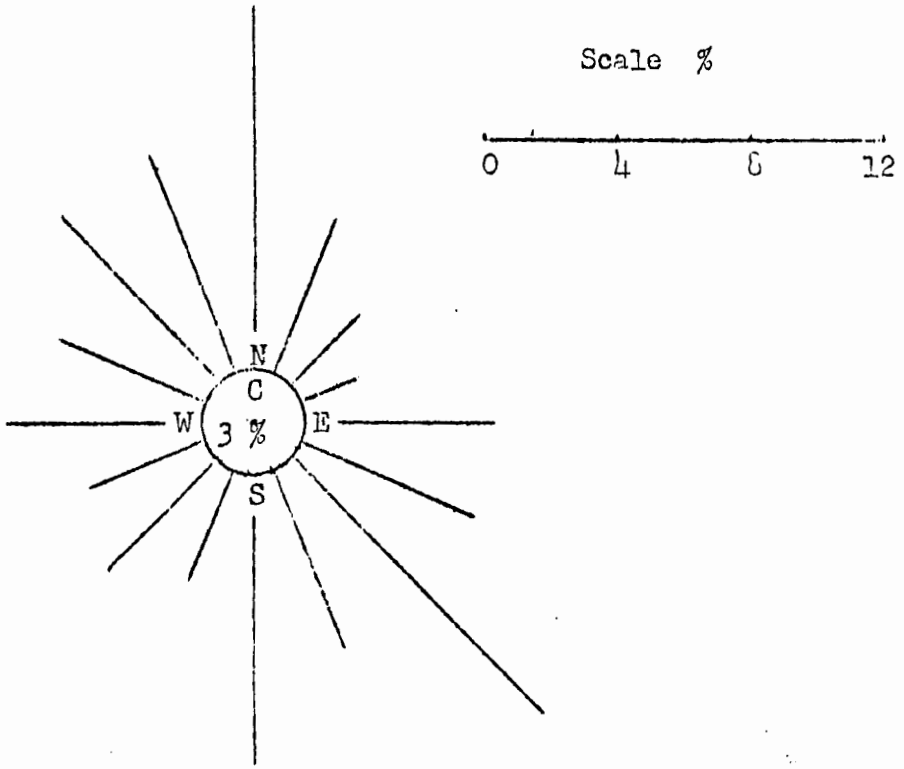
ALBUQUERQUE	BERNALILLO COUNTY	NEW MEXICO
Lat: 35° 03' N.	Long: 106° 37' W.	Elev: 5310 Ft.

The wind records summarized cover the 10 year period January 1, 1949 through December 31, 1958, a total of 87,648 hourly observations. The records were made at the Weather Bureau Airport Station located at the Municipal airport. Wind instruments were exposed on a support 22.5 feet above the roof of the Administration Building and 47.5 feet above ground level. There were no higher nearby obstructions to affect the wind records.

The Municipal airport and Kirtland Field is located about 4 miles southeast of downtown Albuquerque near the western edge of a nearly flat mesa which rises gradually towards the east to the base of the Sandia and Manzano mountains about 8 miles distant. These mountains form a north-south chain with peaks above 10,000 feet. Tijeras pass between the mountain ranges lies almost directly east of the station and under certain synoptic conditions gives rise to moderate to strong easterly winds. About 1/8 mile west and northwest the land falls off rapidly to the Rio Grande valley floor which slopes to the river some 2 miles west of the station. West of the river the terrain rises gradually to the continental divide some 90 miles distant and approximately 8,000 feet above sea level. The Rio Grande valley runs north-south, narrowing upstream to a canyon some 60 miles north and widening out to the south.

G. F. Von Eschen
State Climatologist
Weather Bureau Airport Station
Albuquerque, New Mexico

ANNUAL WIND ROSE
(Period of record Jan. 1, 1949 - Dec. 31, 1958)



ALBUQUERQUE NEW MEXICO

WIND SUMMARY

AVERAGE HOURLY WIND VELOCITY-mph
(Period of record Jan. 1, 1949 - Dec. 31, 1958)

DIR:	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANN.
N	7.7	7.8	7.8	8.2	8.4	7.8	7.7	6.8	6.8	6.9	7.7	7.6	7.6
NNE	6.6	6.7	6.7	6.9	7.2	6.7	6.6	6.6	6.4	6.4	6.3	6.7	6.6
NE	5.2	5.1	5.3	5.9	6.5	5.9	6.7	6.2	6.0	5.5	5.4	5.3	5.7
ENE	7.5	5.7	7.5	9.8	9.0	8.5	9.5	9.1	8.8	8.3	7.8	6.4	8.2
E	11.7	13.8	13.9	16.5	15.1	15.4	14.7	12.9	14.2	12.9	13.1	9.7	13.9
ESE	9.6	11.3	9.2	14.1	12.5	12.4	12.4	11.1	11.9	9.6	8.4	6.9	11.0
SE	6.3	6.4	7.4	8.6	9.0	9.1	9.9	8.5	7.8	7.3	6.0	5.7	7.7
SSE	8.9	8.5	9.4	10.6	11.5	11.4	10.0	9.2	9.5	10.2	7.7	7.5	9.6
S	9.5	8.4	10.6	11.1	11.3	11.1	9.2	8.4	9.2	9.4	8.0	7.3	9.6
SSW	8.1	7.7	8.8	10.4	11.1	9.6	8.5	7.4	7.2	7.4	6.5	6.4	8.5
SW	6.6	7.4	9.0	9.7	9.1	8.8	7.5	7.0	6.9	6.3	6.2	6.8	7.7
WSW	8.4	8.4	10.2	10.9	9.5	9.1	7.5	7.2	6.7	8.0	8.8	7.4	8.7
W	9.3	9.3	12.8	12.0	10.4	8.6	6.8	6.5	6.6	7.9	7.6	8.3	9.2
WNW	8.8	10.9	13.5	13.1	11.1	9.4	7.9	7.4	7.4	8.4	8.1	9.7	10.2
NW	8.5	10.1	13.6	12.8	9.6	8.9	7.1	6.6	7.1	7.6	8.8	9.5	9.4
NNW	9.5	9.8	10.8	10.6	9.1	9.0	7.9	7.6	7.6	7.7	8.6	8.6	9.0
10.	7.9	8.3	9.9	10.9	10.1	9.6	8.9	7.8	8.2	8.0	7.4	7.0	8.7

ALBUQUERQUE NEW MEXICO

WIND SUMMARY

PERCENT OF TIME WIND FROM INDICATED DIRECTION
(Period of record Jan. 1, 1949 - Dec. 31, 1958)

DIR:	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANN.
N	15	13	9	8	9	8	8	10	9	12	16	17	11
NNE	7	7	5	3	4	4	5	4	4	5	7	8	5
NE	4	4	3	2	2	2	3	3	3	3	4	5	3
ENE	2	2	1	2	2	2	2	2	3	2	2	2	2
E	4	4	4	7	7	6	7	7	8	7	6	4	6
ESE	5	5	4	7	7	7	7	7	7	7	6	5	6
SE	10	11	9	10	9	10	13	11	13	13	10	12	11
SSE	6	5	7	6	7	7	7	7	7	7	6	6	6
S	8	7	9	9	10	10	9	8	10	11	7	6	9
SSW	3	3	4	4	5	5	4	4	4	3	2	2	4
SW	4	3	5	5	6	7	6	6	5	5	4	3	5
WSW	3	3	5	6	5	6	5	5	4	4	2	2	4
W	4	5	8	8	7	7	6	6	5	4	3	4	6
WNW	4	6	8	8	6	6	5	4	4	3	3	3	5
NW	7	9	8	7	6	5	5	6	6	5	8	7	7
NNW	10	10	8	6	6	6	6	6	5	6	9	8	7
CALM	4	3	3	2	2	2	2	4	3	3	5	6	3

ALBUQUERQUE NEW MEXICO

WIND SUMMARY

NUMBER OF OBSERVATIONS BY DIRECTION & VELOCITY
(Period of record Jan. 1, 1949 - Dec. 31, 1958)

	MILES PER HOUR								
DIR:	0-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	47+
N	1255	4229	3308	825	122	27	4		1
NNE	688	2356	1345	178	17	10			
NE	652	1506	452	63	10		2		
ENE	314	722	356	267	69	13	2		
E	479	977	801	1342	941	391	79	21	1
ESE	548	1754	1169	1008	576	210	51	15	5
SE	1214	4187	3191	693	182	66	20	6	
SSE	523	1871	1937	969	269	106	27	6	
S	825	2667	2205	1332	443	142	53	10	1
SSW	378	1278	906	423	115	44	4		1
SW	674	1869	1251	404	106	37	6	7	
WSW	503	1379	1120	507	147	42	16		1
W	859	1759	1121	755	315	128	29	4	1
WNW	564	1412	1099	791	368	139	35	4	2
NW	1002	2083	1101	921	464	175	27	6	
NNW	729	2312	1751	999	323	87	7	1	
CALM	2951								
TOT:	14158	32361	23113	11477	4467	1617	362	80	13

ALBUQUERQUE WIND ROSE : 48-78

January

HOUR	N	NE	E	SE	S	SW	W	NW	CALM
0- 3	31	13	8	17	10	4	4	7	6
3- 6	33	14	7	15	9	5	5	6	6
6- 9	34	14	7	13	11	4	5	7	6
9-12	34	6	4	7	15	8	9	13	5
12-15	21	4	4	7	17	13	13	17	4
15-18	22	5	5	10	18	11	11	14	5
18-21	29	9	9	18	11	6	6	7	4
21-24	30	12	9	17	10	4	5	7	5
TOT	29	10	6	13	12	7	7	10	5

February

HOUR	N	NE	E	SE	S	SW	W	NW	CALM
0- 3	24	13	10	19	11	5	6	8	5
3- 6	27	13	9	18	10	5	5	8	5
6- 9	31	11	7	15	11	5	5	8	7
9-12	27	5	4	7	13	12	11	16	4
12-15	14	3	5	6	15	15	17	23	3
1[illegible] 8	17	4	5	7	15	12	14	24	2
1[illegible]-21	28	9	8	16	11	6	8	12	2
21-24	26	11	10	18	10	5	7	9	4
TOT	24	9	7	13	12	8	9	13	4

March

HOUR	N	NE	E	SE	S	SW	W	NW	CALM
0- 3	19	8	9	19	14	8	9	9	3
3- 6	20	10	9	20	14	6	8	7	5
6- 9	25	9	8	16	15	6	6	9	6
9-12	18	5	5	4	16	15	17	17	3
12-15	10	3	3	4	16	17	21	23	1
15-18	11	2	3	5	17	14	20	26	1
18-21	21	6	6	13	15	8	14	17	1
21-24	22	6	11	16	15	7	12	9	2
TOT	18	6	7	12	15	10	14	15	3

Numbers are percentages

ALBUQUERQUE WIND ROSE : 48-78

April

HOUR	N	NE	E	SE	S	SW	W	NW	CALM
0- 3	18	9	12	20	13	8	9	9	3
3- 6	20	10	13	24	12	6	6	7	3
6- 9	25	8	9	15	15	9	8	8	4
9-12	13	3	6	7	16	20	18	15	2
12-15	7	2	3	7	18	22	21	19	1
15-18	8	2	3	8	20	17	20	22	1
18-21	16	4	6	13	18	11	14	17	0
21-24	17	6	13	17	13	8	12	12	2
TOT	15	5	8	14	16	13	14	14	2

May

HOUR	N	NE	E	SE	S	SW	W	NW	CALM
0- 3	14	7	16	25	14	6	8	7	2
3- 6	17	11	14	25	13	6	6	5	3
6- 9	24	7	9	14	15	9	8	9	4
9-12	10	3	5	7	18	23	19	13	2
12-15	6	2	3	5	19	25	24	14	1
15-18	8	3	4	8	20	20	20	16	1
18-21	12	5	7	13	21	13	13	15	1
21-24	16	6	15	21	16	7	10	8	1
TOT	13	5	9	15	17	14	13	11	2

June

HOUR	N	NE	E	SE	S	SW	W	NW	CALM
0- 3	13	7	17	25	17	7	6	5	3
3- 6	15	12	17	28	13	4	3	5	3
6- 9	26	8	10	12	14	10	7	10	4
9-12	12	5	4	6	14	23	22	12	2
12-15	9	3	3	6	17	23	24	15	1
15-18	8	3	5	8	18	20	21	14	1
18-21	11	5	9	15	21	14	13	12	1
21-24	14	7	16	24	16	6	8	7	1
TOT	14	6	10	16	16	13	13	10	2

Numbers are percentages

ALBUQUERQUE WIND ROSE : 48-78

July

HOUR	N	NE	E	SE	S	SW	W	NW	CALM
0- 3	14	8	17	26	18	4	5	5	3
3- 6	18	12	15	25	14	3	3	5	4
6- 9	25	9	9	15	15	7	6	9	4
9-12	13	5	5	7	13	19	20	15	2
12-15	9	4	5	9	14	19	23	16	1
15-18	7	4	10	14	15	18	19	12	1
18-21	9	6	12	23	20	14	9	7	1
21-24	11	7	15	29	20	6	5	5	1
TOT	13	7	11	18	16	11	11	9	2

August

HOUR	N	NE	E	SE	S	SW	W	NW	CALM
0- 3	14	10	16	27	16	4	4	6	4
3- 6	21	13	13	23	14	3	4	5	6
6- 9	28	11	8	14	13	5	6	8	6
9-12	15	4	4	6	14	18	19	15	3
12-15	9	4	5	6	14	20	25	15	2
1[illegible]8	9	5	8	10	13	20	20	13	1
1[illegible]21	10	6	12	20	20	13	11	7	1
21-24	12	7	16	28	19	6	5	6	2
TOT	15	8	10	17	16	11	12	9	3

September

HOUR	N	NE	E	SE	S	SW	W	NW	CALM
0- 3	12	12	17	28	14	5	4	5	4
3- 6	20	13	16	24	12	2	3	4	5
6- 9	30	11	10	15	12	4	3	8	6
9-12	16	5	6	7	17	19	14	13	3
12-15	7	3	5	7	17	22	22	14	1
15-18	8	3	7	10	17	20	21	13	2
18-21	10	5	11	22	24	11	7	7	2
21-24	11	7	18	29	18	5	4	5	3
TOT	14	7	11	18	16	11	10	9	3

Numbers are percentages

ALBUQUERQUE WIND ROSE : 48-78

October

HOUR	N	NE	E	SE	S	SW	W	NW	CALM
0- 3	19	13	15	25	12	3	4	4	5
3- 6	25	15	12	23	10	3	2	4	5
6- 9	33	12	10	14	12	4	3	5	7
9-12	19	4	7	7	17	16	11	15	5
12-15	7	3	5	8	21	22	18	13	2
15-18	8	3	5	10	25	20	16	12	2
18-21	11	6	13	29	21	7	6	5	2
21-24	14	9	16	27	14	5	5	5	4
TOT	17	8	10	18	16	10	8	8	4

November

HOUR	N	NE	E	SE	S	SW	W	NW	CALM
0- 3	26	15	11	19	9	5	4	6	6
3- 6	31	15	9	15	10	4	4	6	7
6- 9	35	12	7	13	10	4	5	7	7
9-12	28	5	5	5	14	11	10	16	6
12-15	16	3	5	7	19	17	13	16	4
15-18	15	3	5	9	22	16	12	13	5
18-21	20	8	11	25	13	5	6	8	4
21-24	23	11	14	21	10	3	6	8	5
TOT	24	9	8	14	13	8	7	10	5

December

HOUR	N	NE	E	SE	S	SW	W	NW	CALM
0- 3	30	15	8	15	10	5	4	7	7
3- 6	33	14	7	12	10	4	4	7	8
6- 9	36	13	7	12	10	4	4	7	7
9-12	35	7	3	6	12	9	9	14	5
12-15	21	4	3	7	17	13	12	17	6
15-18	21	5	4	10	18	13	11	12	6
18-21	25	10	9	22	12	6	5	7	6
21-24	28	14	8	17	10	5	6	7	6
TOT	28	10	6	13	12	7	7	10	6

Numbers are percentages

ALBUQUERQUE WIND ROSE : 48-78

Annual

HOUR	N	NE	E	SE	S	SW	W	NW	CALM
0- 3	20	11	13	22	13	5	5	6	4
3- 6	23	13	12	21	12	4	4	6	5
6- 9	29	10	8	14	13	6	6	8	6
9-12	20	5	5	6	15	16	15	14	3
12-15	11	3	4	7	17	19	19	17	2
15-18	12	4	5	9	18	17	17	16	2
18-21	17	7	9	19	17	10	9	10	2
21-24	19	9	13	22	14	6	7	7	3
TOT	19	8	9	15	15	10	10	11	4

Numbers are percentages

ATTACHMENT 12

ALTERNATIVE GROUNDWATER MONITORING PROGRAM DOCUMENTATION

6. Sparton has already implemented its long-term ground-water monitoring strategy. The concentrations of hazardous waste constituents in the ground water have already been determined.

7. Sparton intends to assess the rate and extent of migration of hazardous waste constituents in the ground water by a combination of two methods. Historical data from on-site monitoring will be evaluated in an empirical approach. Ground-water modeling will also be used to evaluate the rate and extent of migration of hazardous waste constituents as well as other parameters of concern. The most notable other parameters of concern include a number of volatile organic constituents which will be evaluated by a combination of three techniques, including evaluation of historical on-site data, ground-water modeling, and soil-gas testing.

   Additional information, including an assessment of the vertical distribution of contaminants and an assessment of vadose zone contamination, will be obtained in the next site investigation.

8. Sparton will continue to make determinations of ground-water quality according to the schedule indicated above until final closure of the facility and until completion of the anticipated ground-water remedial program. Sparton will continue to comply with the record-keeping and reporting requirements specified in the regulations.