Harding Lawson Associates

September 23, 1983

HLA Job. No. 6310,008.12

Mr. Richard D. Mico
Vice President/General Manager
Sparton Technology, Inc.
Post Office Box 1784
Albuquerque, New Mexico 87103

RE: Recommendations for Investigations of Soil and Groundwater Contamination at the Sparton Technology Coors Road Facility, Albuquerque, New Mexico

Dear Mr. Mico:

We appreciate being selected to perform an investigation of soil and groundwater contamination at your Coors Road Facility in Albuquerque, New Mexico. The investigation has been planned as a phased succession of study tasks, each one of which will depend on data generated by the previous task.

INTRODUCTION

In May of 1983, Harding Lawson Associates (HLA) installed four groundwater monitoring wells and one piezometer at the Coors Road Facility (see Plates 1 and 2). An analysis of the water table has indicated that the direction of flow in the saturated zone is generally south, with what appears to be a localized trending to the southeast (see Plate 3). Analysis of groundwater samples withdrawn from the monitoring wells has indicated the presence of organic and inorganic contaminants at the site (see Attachment A).

PURPOSE

Sparton has directed HLA to initiate an investigation which will better describe the hydrogeology of the site. The study is to expand on existing information to better define the extent of the contamination, both vertically and laterally. The study is to identify possible sources of contamination, both on-site and off-site. Finally, this study is to assess the potential that contaminants may have migrated off-site.

STRATEGY

A series of 7 soil borings has been planned to provide data for the following purposes:

1. Estimate the rate and direction of flow in the saturated zone.

2. Identify and characterize any relatively fine-grained (clay) units in the unsaturated zone.

3. Determine if a clay unit exists in the saturated zone within 150 feet from the ground surface.

4. Determine if any clay units encountered show evidence of contamination.

Monitoring wells will be installed in each of the 7 borings. Two of the wells will be screened deep in order to permit a better definition of the vertical extent of groundwater contamination. The rest of the wells will be shallow. Two of the shallow wells will be placed to detect groundwater contamination which may be entering the site along the northern boundary. Three of the shallow wells will be placed to better define the lateral extent of contamination and to determine if contaminated groundwater may be migrating off-site.

WORK PLAN: PHASE I

HLA will conduct a detailed hydrogeologic study of the Coors Road Facility and investigate the presence of chemical contaminants in the soil and groundwater. Sparton will contract separately with local firms for drilling, electric logging, surveying and chemical analysis of soil and water samples.

Drilling will be under the direct supervision of an HLA engineer or geologist. The borings will be advanced using a hollow-stemmed auger. Soil samples will be collected for both chemical and physical testing. Samples will be collected with a standard split-spoon or Spraigue and Henwood sampler. The samples should be collected at five-foot intervals to the water table and at 10-foot intervals below the water table. Soil samplers should be decontaminated after each use. Augers should be decontaminated after each boring.

Five of the borings will be drilled to a depth of 150 feet, or to a stratum which is comprised of relatively finer grained material (clay) below the water table. If a clay layer is encountered before 150 feet and is below the water table, the boring should be terminated at that point. Two of the borings will be more shallow, and should be terminated approximately 10 feet below the water table.

Monitoring wells will be installed in each of the seven borings. Plate 4 presents the proposed locations for the seven new monitoring wells (MW-5 through MW-11). Two of the monitoring wells (MW-11 and MW-10) will be screened at the bottom of the 150-foot borings. The other three deep borings (MW-5, MW-6, and MW-8) will be back-filled with bentonite or with a bentonite and cement slurry, to approximately 10 feet below the water table. Shallow monitoring wells will be installed in these three borings. Shallow monitoring wells will also be installed in the two shallow borings (MW-7 and MW-9).

Monitoring well installation and contruction is discussed in Attachment B.

After completion of all the wells, they will be electric-logged for gamma-gamma and neutron-neutron. The information gathered from the "E" logs will help supplement the boring logs.

Twenty-four hours after the wells have been developed, water level measurements should be made and water samples should be collected using either a bailer or a monitoring well pump. Collection methods should be compatible with those described in Sparton's Groundwater Monitoring Plan. Sample bottles should be prepared by the chemical laboratory performing the testing, and according to the requirements of the monitoring plan.

Soil samples will be collected from any fine-grained units encountered during drilling. These will be submitted for physical testing and chemical testing. Other soil samples will also be collected for physical testing. Chemical testing will be performed on water samples from the eleven monitoring wells. The following tests are planned:

- Physical soils tests will include permeability and grain size analysis.
- Chemical soils tests will include preparation of an EP extract for Total Organic Carbon, Total Organic Halogens, chloride and sulfate.

- Water tests for organic parameters will include Total Organic Carbon, carbon tetrachloride, methylene chloride, toluene, trichloroethylene and 1,1-dichloroethylene.

- Water tests for inorganic parameters will include pH, specific conductance, iron (+3), manganese, sodium, chloride, fluoride, nitrate, ammonia, phosphate and sulfate.

SUBSEQUENT ON-SITE WORK: PHASE II, et seq.

Based on the findings of this investigation, we hope to better define the extent of contamination and the direction and rate of flow of contaminated groundwater. We believe that we will be able to conclude whether contaminants are emanating from off-site, from on-site or from both. In addition, we should also learn if contaminants have likely migrated off-site.

Supplemental field work may be necessary based on the findings of the Phase I investigation. If better definition of the hydrogeologic conditions or extent of contamination is required, several alternatives exist. Geophysical methods (such as a resistivity survey) can be run without additional drilling to supplement existing data. Another alternative would be to use a new method called "soil gas testing". This involves the driving of sand points into the ground and measuring the gas phase with a portable gas chromatographic unit.

To gather more hydrogeologic data, aquifer testing may be required. As many as three pumping wells could be required to stress the aquifer enough to gather pertinent information. Since the cost of putting in large enough wells would be considerable, these wells should also be placed where they could be used for recovery wells if necessary.

All or part of the supplemental field work would be implemented only if required, and only after recieving Sparton's authorization. If contamination has migrated off-site, then the scope of the supplemental work plan should be changed accordingly.

SCHEDULE FOR IMPLEMENTING THIS PLAN

We recommend that EPA and New Mexico be invited to comment on this proposed work plan. We can begin work within 3 to 4 weeks after the work plan is finalized. The time periods required to complete major sub-tasks after Phase I initiation are estimated below:

TASK	DAYS REQUIRED
Field Exploration	20
Laboratory Testing (physical & chemical)	30
Data Reduction and Report Preparation	30
Total Phase I	80

COST ESTIMATE

We estimate that Sparton's total project costs for the Phase I study will be approximately $43,500. A breakdown of this estimated cost is presented in Attachment C.

PROJECT ORGANIZATION

We will assist Sparton to select certain contractors to provide support in the areas of drilling, chemical analysis, electric logging and field surveying. We will commit key HLA personnel from our Houston, Texas office, and from our Novato, California office to provide the technical and management experience required for this project. Key HLA staff members who have been assigned to this project are described in Attachment D.

We appreciate the opportunity to work with you on this project. If you have any questions or comments about this proposed work plan, please contact either myself or Mr. Charles Garrett at (713) 789-8050.

Very truly yours,

HARDING LAWSON ASSOCIATES

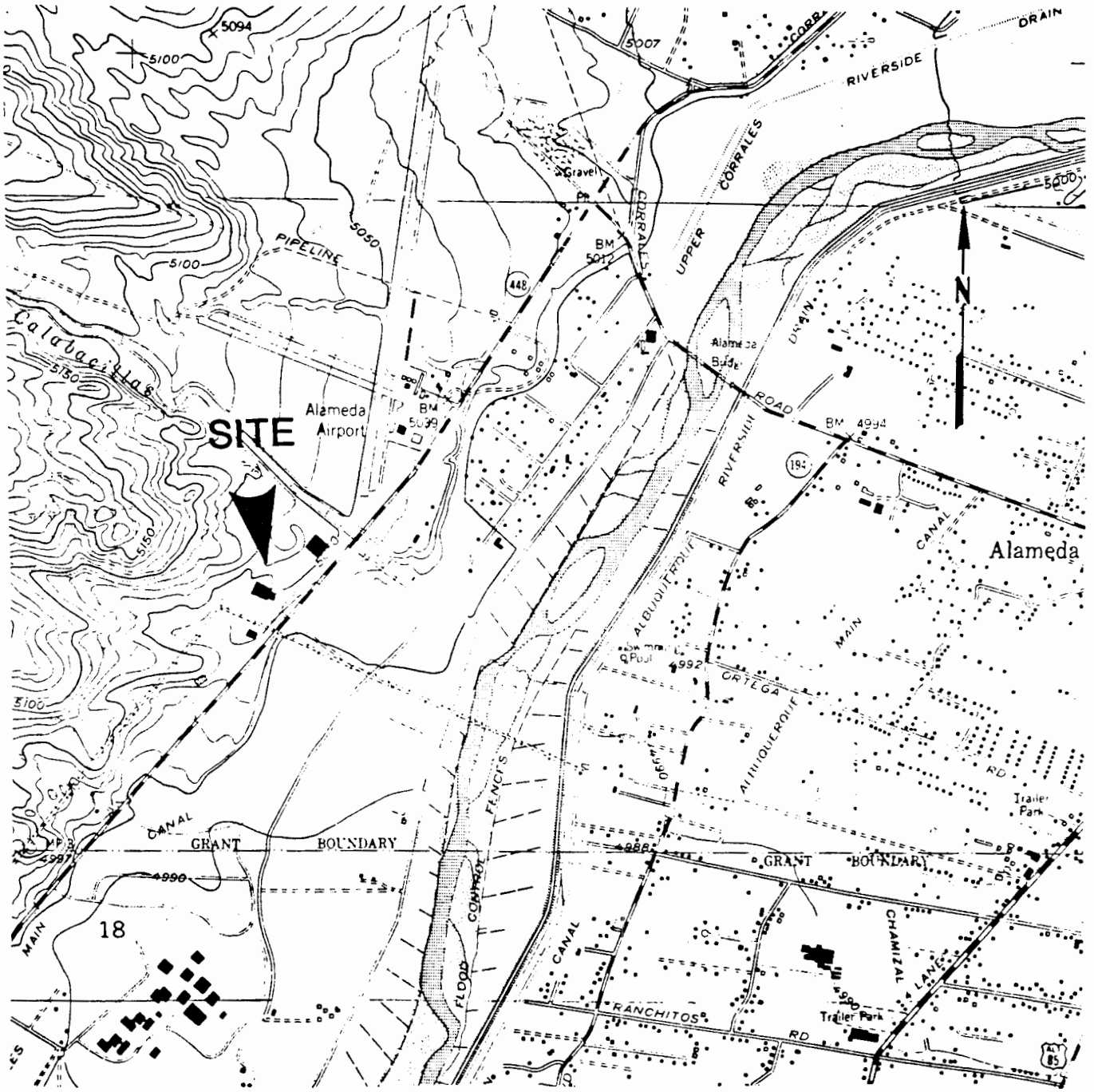
Thomas S. Burger

Thomas S. Burger, R.P.S.
Senior Environmental Specialist

TSB:dhw

cc: Blair Thompson
Cleovis Martinez
Eric Lapalla
Charles Garrett

Enclosures:
Attachment A - Monitoring Results
Attachment B - Monitoring Well Construction
Attachment C - Project Costs
Attachment D - Project Personnel



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
ARM	6310,008.12	A.R.O'M.	6/83		

ATTACHMENT A

GROUNDWATER MONITORING RESULTS

ENTION Albuquerque, NM 87103
CE NO. Cleoves Martinez cc: Harding Lawson Assoc
306192 Houston, TX 77057

ANALYSIS

PLES RECEIVED 6/10/83 | CUSTOMER ORDER NUMBER

E OF ANALYSIS Water

(7/20/83) EID MW-1 EID MW-2 EID MW-3 MW-4

VOLATILES:	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
Acrolein		ND		ND		ND		ND
Acrylonitrile		ND		ND		ND		ND
Benzene	110	78		ND	150	195		ND
Bis (chloromethyl) ether		ND		ND		ND		ND
Bromoform		ND		ND		ND		ND
Carbon tetrachloride	<5	1,150		ND	<5	1,980	<5	660
Chlorobenzene	8	4.8		ND	53	53		ND
Chlorodibromethane		ND		ND		ND		ND
Chloroethane		ND		ND		23		ND
2-Chloroethylvinyl ether		ND		ND		ND		ND
Chloroform	540	260		ND	450	334	9	11
Dichlorobromomethane		ND		ND		ND		ND
Dichlorodifluoromethane		ND		33		ND		ND
1,1-Dichloroethane	470	308		ND	270	230	<5	20
1,2-Dichloroethane	60	30		ND	150	109		ND
1,1-Dichloroethylene	2590	1,010	9	87	8270	3,900	1320	1,310
1,2-Dichloropropane		ND		ND		20		ND
1,3-Dichloropropene		ND		ND		ND		ND
Ethylbenzene	510	236		ND	460	355		ND
Methyl bromide		ND		ND		ND		ND
Methyl chloride		ND		ND		ND		ND
Methylene chloride	32700	1,130	6	ND	9170	2,430	2070	730
1,1,2,2-Tetrachloroethane	43	22		ND	250	268		ND
Tetrachlorethylene	160	64		ND	680	487	36	48
Toluene	6490	2,900	5	79	3490	2,180	11	104
1,2-Trans-dichlorothylene		ND		ND		20		ND
1,1,1,-Trichloroethane	12700	3,750	58	352	6490	ND	4490	2,800
1,1,2-Trichloroethane	70	21		ND	130	138		ND
Trichloroethylene	700	2,580	180	658	21700	3,500	6300	2,290
Trichlorofluoromethane		ND		ND		ND		ND
Vinyl chloride		ND		ND		ND		ND

ND - Non-detected

APPROVED BY Thomas Mendes

6/28/83

Thomas Mendes, Mgr. Tech. Services

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Telephone 505/982-9841

ATTENTION Albuquerque, NM 87103
INVOICE NO. Cleoves Martinez cc: Harding Lawson Assoc
306192 Houston, TX 77057

ANALYSIS

DATE COLLECTED 6/8/83

	TYPE OF ANALYSIS	MW1	MW2	MW3	MW4
		mg/l			
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
X	Sodium	120	48	400	48
X	Specific Conductance Umhos/Cm X 4	3760/3560 3680/3760	730/770 800/730	5860/5860 5860/5710	1000/1080 1000/1000
X	Sulfate	330	94	1110	96
-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
-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

CITY Albuquerque, NM 87103
ATTENTION Cleoves Martinez cc: Harding Lawson Assoc
INVOICE NO. 306192 Houston, TX 77057

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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CITY Albuquerque, NM 87103
ATTENTION Cleoves Martinez cc: Harding Lawson Assoc
INVOICE NO. 306192 Houston, TX 77057

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.

6/28/83

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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

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Thomas Mendes, Manager, Technical Services
8/12/83 PAGE 1 OF 7 PAGE

Controls for Environmental Pollution, Inc.
P.O. Box 5351 • 1925 Rosina • Santa Fe, New Mexico 87502
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ADDRESS 5021 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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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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INVOICE NO. 308052

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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8/12/83 PAGE 4 OF 7 PAGE

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ADDRESS [illegible]
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RESULTS 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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RESULTS 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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Thomas Mendes, Manager, Technical Services

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CUSTOMER
ADDRESS 9621 Coors Rd., N.W.
CITY Albuquerque, NM 87103
ATTENTION Cleoves Martinez
INVOICE NO 308052

RESULTS OF ANALYSIS

SAMPLES RECEIVED 7/21/83 | CUSTOMER ORDER NUMBER

TYPE OF ANALYSIS Water

Volatiles: (7/21/83 E/D 4512)	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	110 ND	ND	150 24	ND
Bis (chloromethly) ether	ND	ND	ND	ND
Bromoform	ND	ND	ND	ND
Carbon tetrachloride	<5 28	4.6	<5 860	<5 26
Chlorobenzene	8 ND	ND	53 7.4	ND
Chlorodibromethane	ND	ND	ND	ND
Chloroethane	ND	ND	ND	ND
2-Chloroethylvinyl ether	ND	ND	ND	ND
Chloroform	540 26	ND	450 66	9 ND
Dichlorobromomethane	ND	ND	ND	ND
Dichlorodifluoromethane	ND	ND	ND	ND
1,1-Dichloroethane	470 24	ND	270 41	<5 23
1,2-Dichloroethane	60 7.8	ND	150 44	ND
1,1-Dichloroethylene	2570 12.8	9 ND	8270 660	1320 ND
1,2-Dichloropropane	ND	ND	ND	ND
1,3-Dichloropropane	ND	ND	ND	ND
Ethylbenzene	510 7.4	ND	480 41	ND
Methyl bromide	ND	ND	ND	ND
Methyl chloride	ND	ND	ND	ND
Methylene chloride	32000 3200	6 55	9170 ND	2070 171
1,1,2,2-Tetrachloroethane	45 9.5	ND	250 94	ND
Tetrachlorethylene	160 ND	ND	600 59	36 ND
Toluene	6400 390	5 140	2400 910	11 150
1,2-Trans-dichlorothylene	ND	ND	ND	ND
1,1,1-Trichloroethane	12,700 120	58 20	1840 2800	2470 120
1,1,2-Trichloroethane	30 6.3	ND	20 46	ND
Trichloroethylene	25600 440	15 47	21700 3300	620 95
Trichlorofluoromethane	ND	ND	ND	ND
Vinyl chloride	ND	ND	ND	ND

APPROVED BY Thomas Mendes, Manager of Technical Services
8/12/83 PAGE 7 OF 7 PAGE

Controls for Environmental Pollution, Inc.
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Telephone 505/982-9841

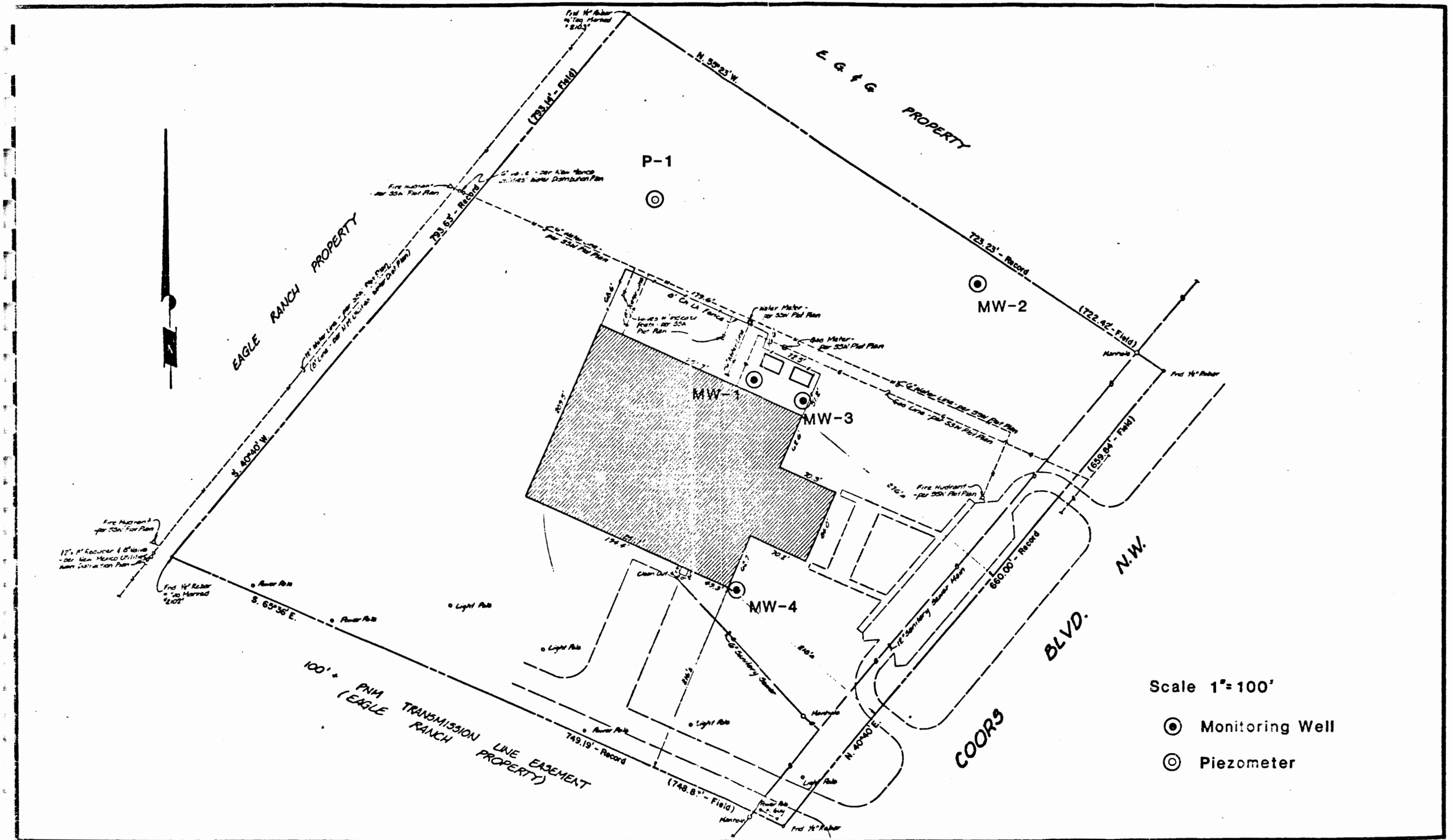
ATTACHMENT B

MONITORING WELL CONSTRUCTION

The wells should be constructed using 2 inch flush threaded PVC casing and screen. The screen length should be 5 feet long. For shallow wells, the screen should be set within the interval of 5 feet to 10 feet below the water table to monitor any contaminants near the top of the water table. The deep wells should be screened at the bottom of the boring or above any clay layer encountered below the top of the water table.

The screen and casing should be installed through the hollow stem augers. The auger should be pulled 4 to 5 feet above the top of the screen and clear water should be pumped into the well to flush the boring and insure that the screen is open. This will also cause the sand and gravel to collapse around the screen to form a sand-pack. The augers should then be pulled to the surface and a tremie pipe lowered to the top of the sand-pack. A cement and bentonite slurry should be pumped through the tremie pipe into the annulus up to the surface to ensure a good seal around the casing.

After the wells have been constructed they should be developed by the air-lift method for a 1 to 2 hour period. This method requires the lowering of an air hose into the well and pumping compressed air into the well to surge and evacuate water added during drilling and will help develop a good sand-pack around the screen.

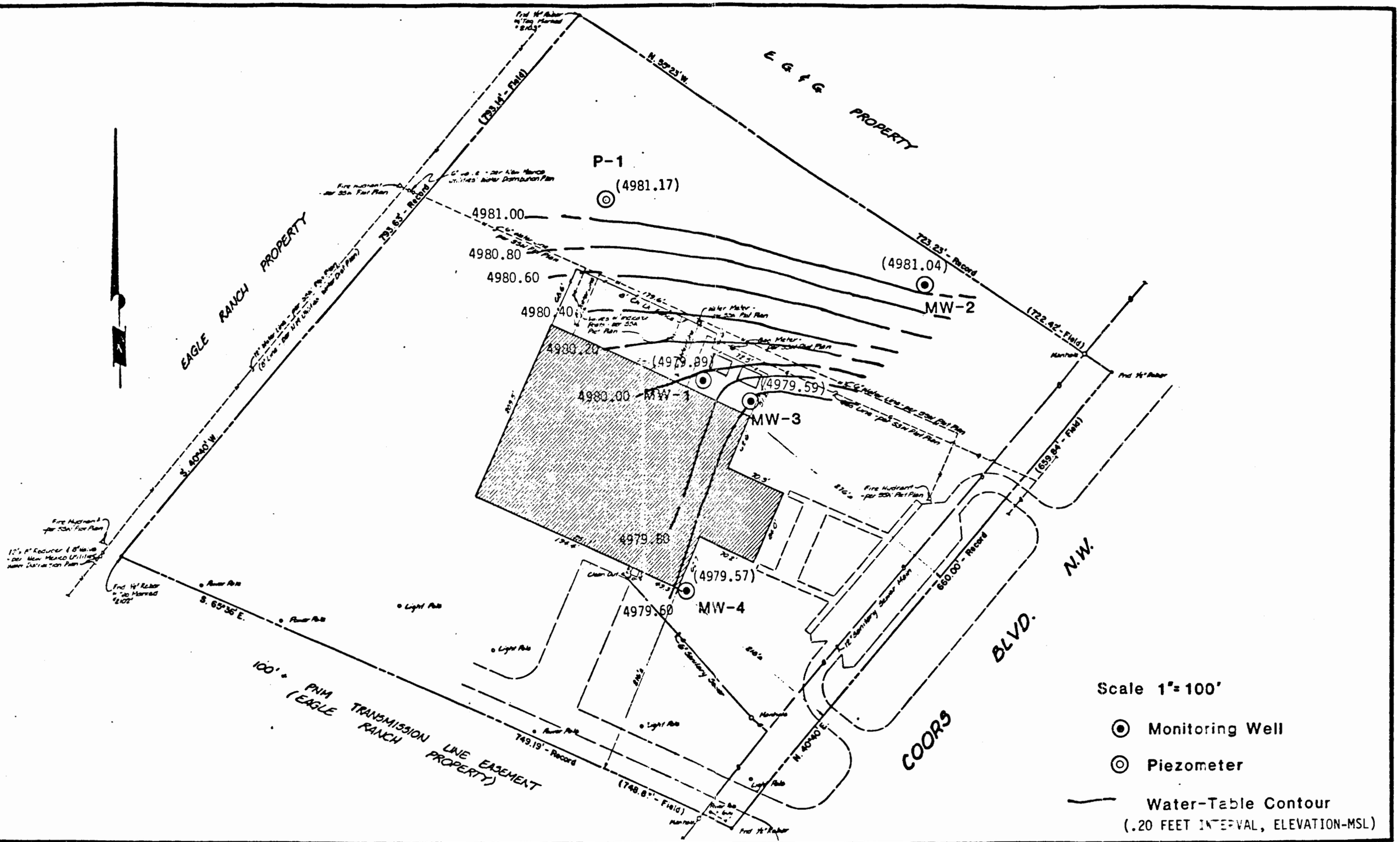


Harding Lawson Associates
Engineers, Geologists & Geophysicists

PLOT PLAN
SPARTON SOUTHWEST, INC.
ALBUQUERQUE, NEW MEXICO

PLATE 2

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
ARM	6310,008.12	A.R.G.	6/83		



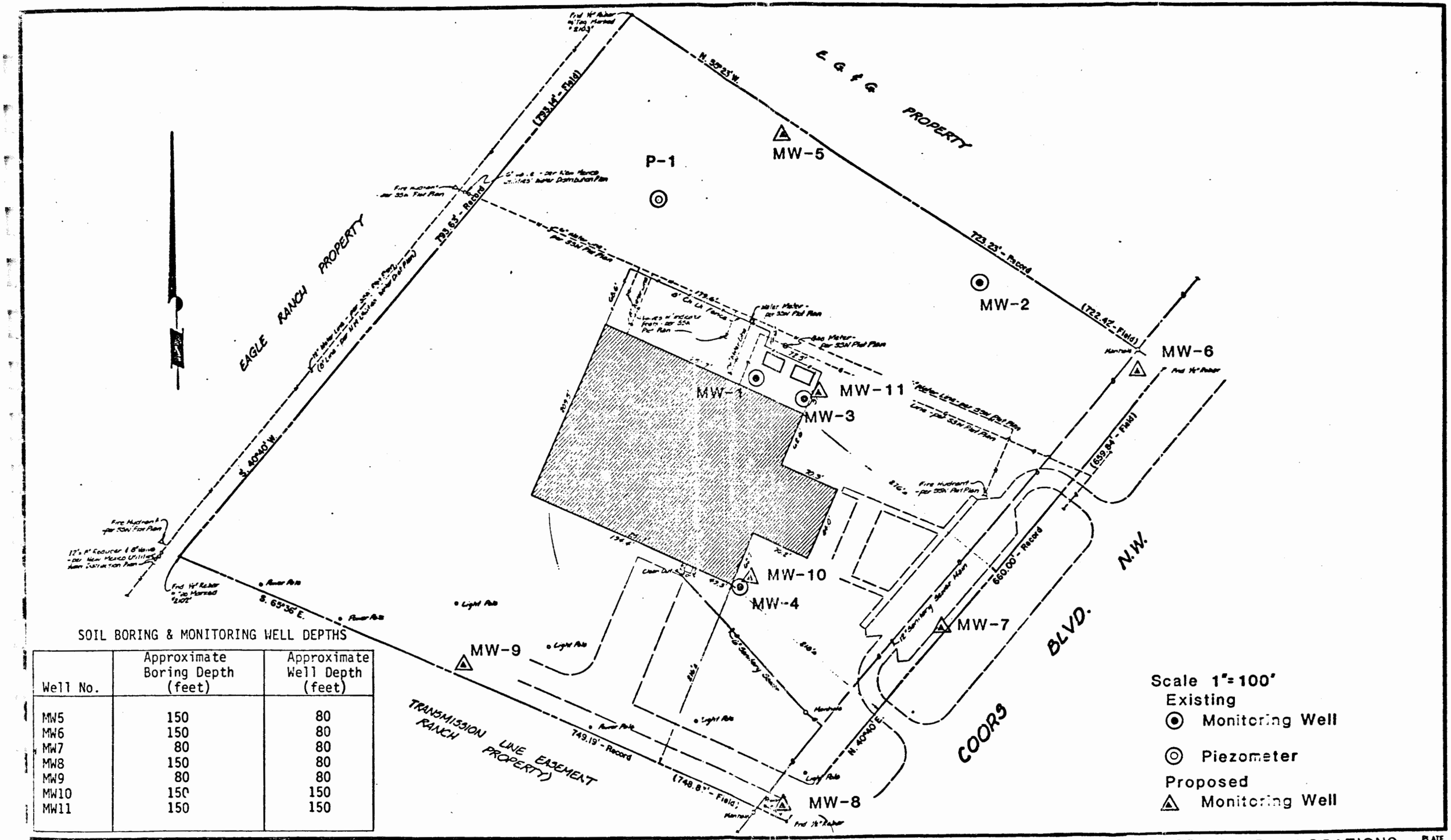
Harding Lawson Associates
Engineers, Geologists & Geophysicists

WATER-TABLE CONTOUR MAP

SPARTON SOUTHWEST, INC.
ALBUQUERQUE, NEW MEXICO

PLATE 3

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
ARM	6310,008.12	a.R.M.	6/83		



SOIL BORING & MONITORING WELL DEPTHS

Well No.	Approximate Boring Depth (feet)	Approximate Well Depth (feet)
MW5	150	80
MW6	150	80
MW7	80	80
MW8	150	80
MW9	80	80
MW10	150	150
MW11	150	150

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Engineers, Geologists & Geophysicists

PROPOSED MONITORING WELL LOCATIONS

SPARTON SOUTHWEST, INC.
ALBUQUERQUE, NEW MEXICO

PLATE 4

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
ARM	6310,008.12	A.R.G./RJB	6/83	9/83	

ATTACHMENT C

PROJECT COSTS

Item	Item Cost	Totals
HLA Charges		
Field Investigation	$ 6,600	
Materials	3,800	
Travel, Subsistence & Freight	3,900	
Soils Lab Testing	2,050	
Analysis of Data	4,150	
Report Preparation	1,900	$22,400
Outside Services		
Drilling Contractor	$8,800	
Electric Logging	700	
Surveying	500	
Chemical Testing	8,200	
Materials	2,900	21,100
Total Phase I Project Costs		$43,500
Estimates for Possible Supplemental Work		
Geophysical Restistivity Survey	$12,000	
Soil-Gas Testing	7,500	
Aquifer Testing (per each pumping well)*	18,600	

*1 to 3 pumping wells may be required

ATTACHMENT D

PROJECT PERSONNEL

Project Consultant

Mr. James B. McCutchan, P.E., will serve as the Project Consultant for this study. Prior to joining HLA, Mr. McCutchan was the technical manager for the largest hazardous waste landfill site in Texas, and is currently Manager of HLA's Houston Waste Management Division. He has served as project manager in designing the BFI 6,000-acre waste treatment, storage and disposal facility near Last Chance, Colorado, and the BFI Fort Mojave Indian Reservation landfill project at Needles, California. Mr. McCutchan also has an extensive site evaluation and groundwater contamination analysis background. Mr. McCutchan will provide management review, monitor the project, and ensure that the Project Manager has the resources he needs to complete the project.

Technical Consultant

Mr. Eric G. Lapalla will serve as the Technical Consultant for this study. Mr. Lapalla is a nationally recognized expert in hydrogeology. He has managed numerous hydrogeologic projects and has served as technical advisor for projects in hazardous waste and hydrogeology, with emphasis on unsaturated zone studies, modeling, and other complex problems. He has been responsible for researching, developing, and carrying out field tests using state-of-the-art field techniques. Mr. Lapalla has specific experience in the Albuquerque, New Mexico area. He will be the Technical Consultant for this study and will review the final report.

Project Manager

Mr. Charles E. Garrett, Jr., P.E. will serve as Project Manager for this study. Mr. Garrett has over 7 years of experience as a project engineer and project manager performing geotechnical investigations for existing and proposed waste management facilities. He has extensive experience in the design and installation of groundwater monitoring networks and the implementation of groundwater contamination studies. Mr. Garrett will be responsible for coordinating all aspects of the field work, and will perform the final office analysis.

Environmental Manager

Mr. Thomas S. Burger will serve as Environmental Manager for the project. Mr. Burger will provide liaison for Sparton and will coordinate all contacts with regulatory agencies. Mr. Burger has considerable experience with state and federal agencies and is well-qualified for the task.