EL DORADO
Chemical Company

2001 ANNUAL GROUND WATER REPORT

EL DORADO CHEMICAL COMPANY
EL DORADO, ARKANSAS

PREPARED BY:

ENVIRONMENTAL
MANAGEMENT SERVICES, INC.

Baton Rouge, Louisiana

February 2002

ADEQ
ARKANSAS
Department of Environmental Quality

August 8, 2002

Mr. Randall Whitmore
El Dorado Chemical Company
4500 North West Ave.
P. O. Box 231
El Dorado, AR 71731

RE: 2001 Annual Groundwater Report

Dear Randall,

The Department received and reviewed the above referenced report. We apologize for the delay in responding but this is due to the many issues surrounding El Dorado Chemical in the past few months. The following comments arise from the review of the report.

In Section 2.0 for Site Geology: The text in the second paragraph is correct but it is important to remember that the descriptions of lithologic units and hydrologic units should not be interchanged. The hydrologic or aquifer units are delineated differently from lithologic units. The units should be described and presented in stratigraphic order with the proper terminology. A table in stratigraphic order that presents the names, descriptions and thickness is encouraged because it may be easier to read and follow the information that is presented.

All of the sampling for the May and October events should be completed at the same time. The May event began in May but extended to June and concluded in August. It is difficult to evaluate the results over that extended timeframe. Every effort should be made to get all of the sampling completed at the same time in order to properly compare the results.

In Section 4.2.1 for Field Parameters: The pH for MW-EDC-7 went from 9.7 in August to 3.5 in October. No explanation was provided. Why is this result "not consistent" as stated in the report? What are consistent values? What is the reason for the wide range of pH values?

In Section 4.2.2 for Analytical Results: The sampling results indicate higher nitrate and ammonia levels north of the plant. What is the explanation for this since these wells are apparently upgradient from the plant? Was any odor present during sampling?

In Section 4.2.2 for Analytical Results: A lower detection limit for lead is needed. The action level is 0.015 mg/l (the MCLG is zero). The laboratory has a detection limit of 0.04 mg/l and this makes it difficult to adequately determine the lead content in the ground water.

In Section 4.2.2 for Analytical Results: The results indicate higher levels of ammonia and nitrate around Lake Kildeer. What is the explanation? What is the interaction between surface water and groundwater in this area? The cross sections (C to C' and D to D') depict a silty sand at the surface and sand at 10-15 feet below ground level at MW-EDC-16 and MW-EDC-14 so the connection between surface and shallow ground water is a great concern for potential migration of contarninants. A topographic map that includes the facility location would be helpful.

Does any background data exist on the ground water at the facility? The location and any data on private, public or other use water wells in the area would be helpful if included in future reports. Additional monitoring wells should be installed on the south side of Lake Kildeer in to determine the extents and amounts of contamination on this portion of the property and potential off-site migration.

The ground water excceds the appropriate MCLs, secondary drinking water standards or action levels (as determined by EPA) for sulfate, nitrate, TDS and possibly lead. Although, the ground water does not appear to be currently used as a drinking water source, it has the potential to be used as a source in the future and will be treated as a source. Additional geological work is needed to determine the hydraulic connections between the surface water, the surface impoundments and the underlying shallow aquifer, prior to making a recommendation on clean-up.

Thank you for your cooperation. Please contact me at 501-682-0642 with any questions.

Sincerely,

Laura Stuart

Laura Stuart-Leslie
Geologist, PG
State Permits Branch, Water Division

cc: file

EASTERN TANK SERVICES

Fort Smith, AR
1-501-646-7189

Wilburton, OK
1-918-465-3330

left message for Randall 6/7 0900am
spoke w/Randall on 6/8/02 11:30am

took May samples - many duplicates to check the odd pH value last year. don't know temp, lab error will get results to me in month
there is a chart that relates pH, temp + ammonia
any odor upon sampling?

told him sending comments and relating to 2001 report. Don't know details of problems w/NPDES, staying out of it unless drag in.

Ills evaluate abs years #'s before proceeding w/plan.
have been approached to use microorganisms to remediate. shown good at surface ponds for hog/swine farms. work w/gw?

4/3 002 Rec

pH change from 8/8/01 to 10/29/01

went from 9.7 to 3.5

any reason, explanation?
(# is mentioned but no expl.)

~~MCLG is zero~~

need lower detection limit for lead

action level is 0.015mg/l,

lab results have 0.04

MCLG is zero; action level determined when tap samples (10%) exceed 0.015mg/l, during a treatment technique / max level which no adverse effect on health would occur

reason for 4,5,6,7,8,9,10,11
exceeding sulfate & or nitrate ←
poss lead ?

these are up gradient from plant

any back ground samples to compare
these results ?: typical conc. of nitrate
nitrite/nitrate-nitrogen

Uranium – found in phosphate in Florida (in enough amts for recovery)

(Arsenic + Molybdenum + Selenium) occur w/ uranium

EPA – land appl.

Cadmium –
Copper
Nickel
Selenium –
Zinc

Phosphorous/phosphate

Oct 96 memo from Dick Casseat to Larry Wilson

Antimony
Barium
Beryllium
Cadmium
Chromium
Lead
Mercury
Selenium
Thallium

Nitrate
Sulfate
Chloride
Ammonia
TDS
pH
Spec conductance
TOC (if elevated run for THMs, SVOCs)

area of review - ~~local~~ water wells nearby?

map of plant

- all wells (18 old, 18 new)
- landfill(s)

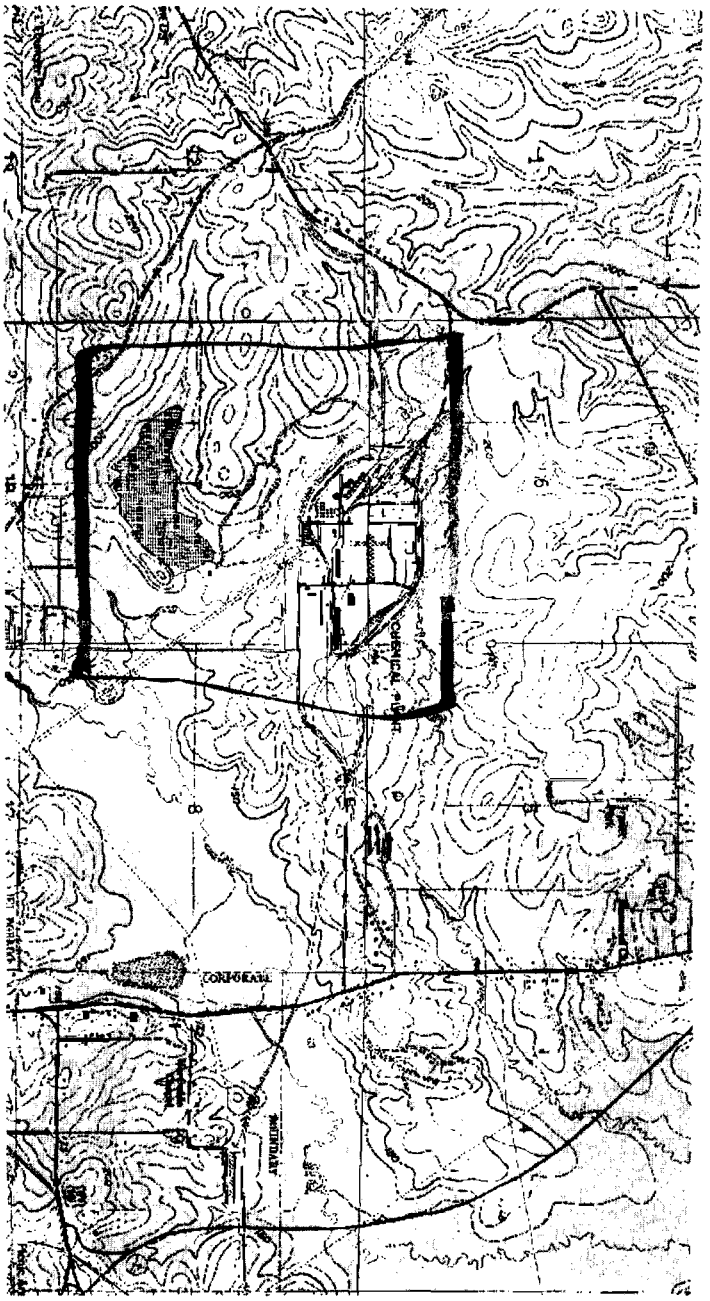
how deep is Lake Killdeer?
any connection w/ underlying Cocktield?

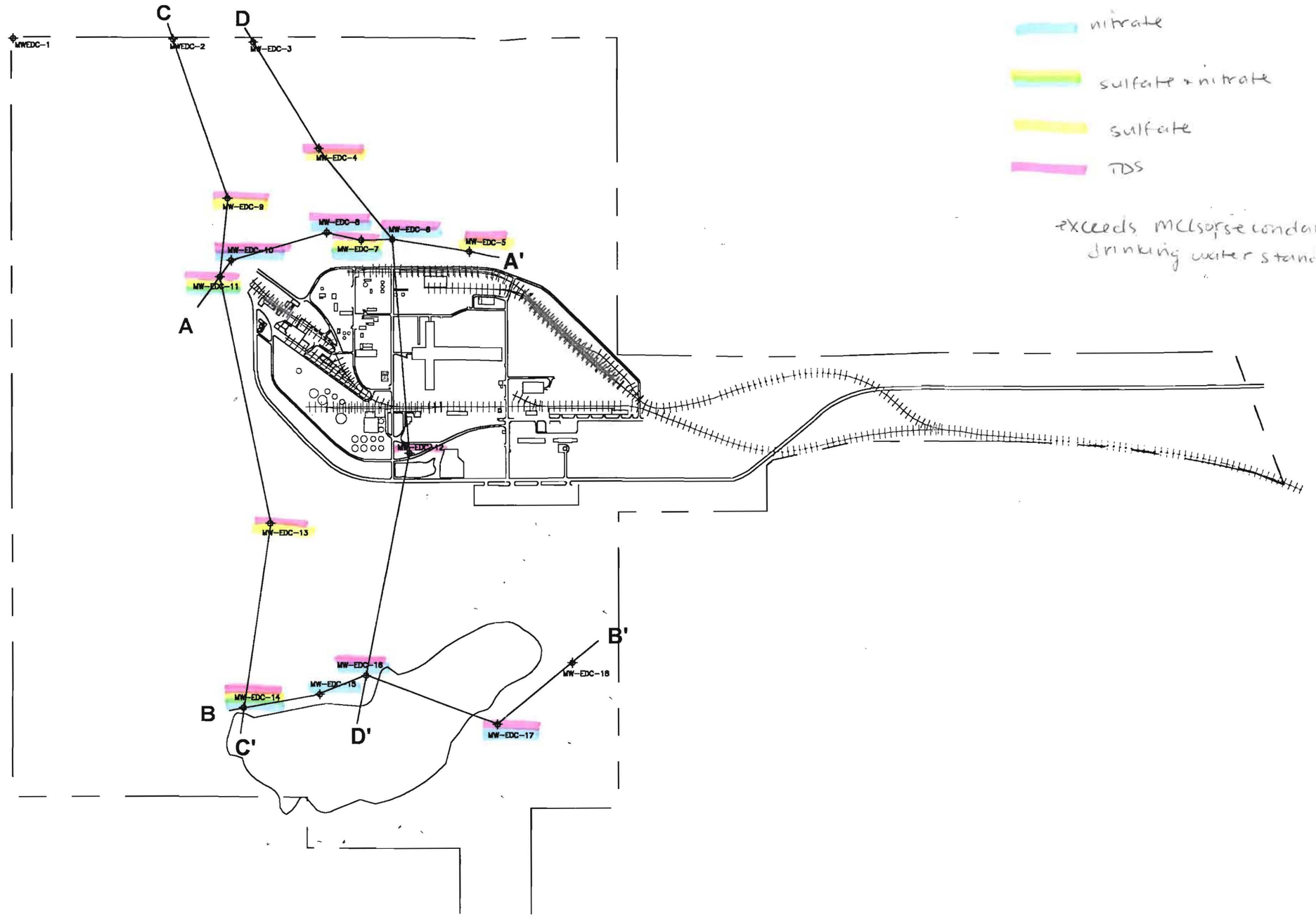
Lake Lee? south MW-EDC-12

any background analysis on Lake Killdeer, Lake Lee

topo map w/ plant location

any of the ponds lined?


CORNFIELD
MOUNTAIN



0 500 1000
SCALE IN FEET

EL DORADO Chemical Company

ENVIRONMENTAL MANAGEMENT SERVICES, INC.

PROJECT NO: 2EC0100	
CROSS SECTION FIGURE1.DWG	
DRAFTED BY: KK/LM	DATE: 02/18/02
APPROVED:	
BY:	DATE:

SITE PLAN/CROSS SECTION LOCATION MAP
2001 ANNUAL GROUND WATER REPORT
EL DORADO CHEMICAL COMPANY
EL DORADO, ARKANSAS

1

C
NORTH

C'
SOUTH

210
200
190
180
170
160
150

MW-EDC-2
MW-EDC-9
MW-EDC-11
MW-EDC-13
MW-EDC-14
TD
?
?

CLAY
Silty CLAY
CLAY/SILT
SILT
Silty SAND
SAND

0 200 400
SCALE IN FEET

ENVIRONMENTAL MANAGEMENT SERVICES, INC

EL DORADO Chemical Company

PROJECT NO: 2EC0100
CROSS SECTION MW-2 TO MW-14 LMM.DWG
DRAFTED BY: KK/LM DATE: 02/18/02
APPROVED:
BY: DATE: 2/20/02

CROSS SECTION C - C'

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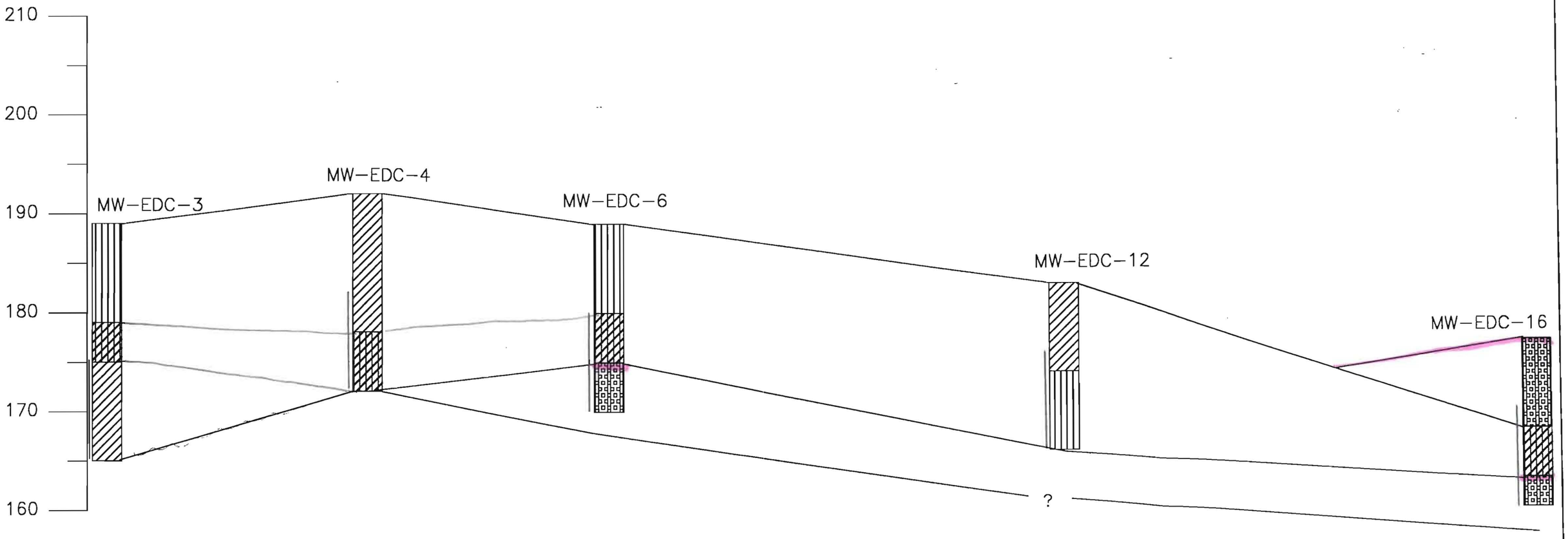
EL DORADO, ARKANSAS

3

D
NORTH

D'
SOUTH



CLAY

Silty CLAY

SILT

Silty SAND

0 200 400
SCALE IN FEET

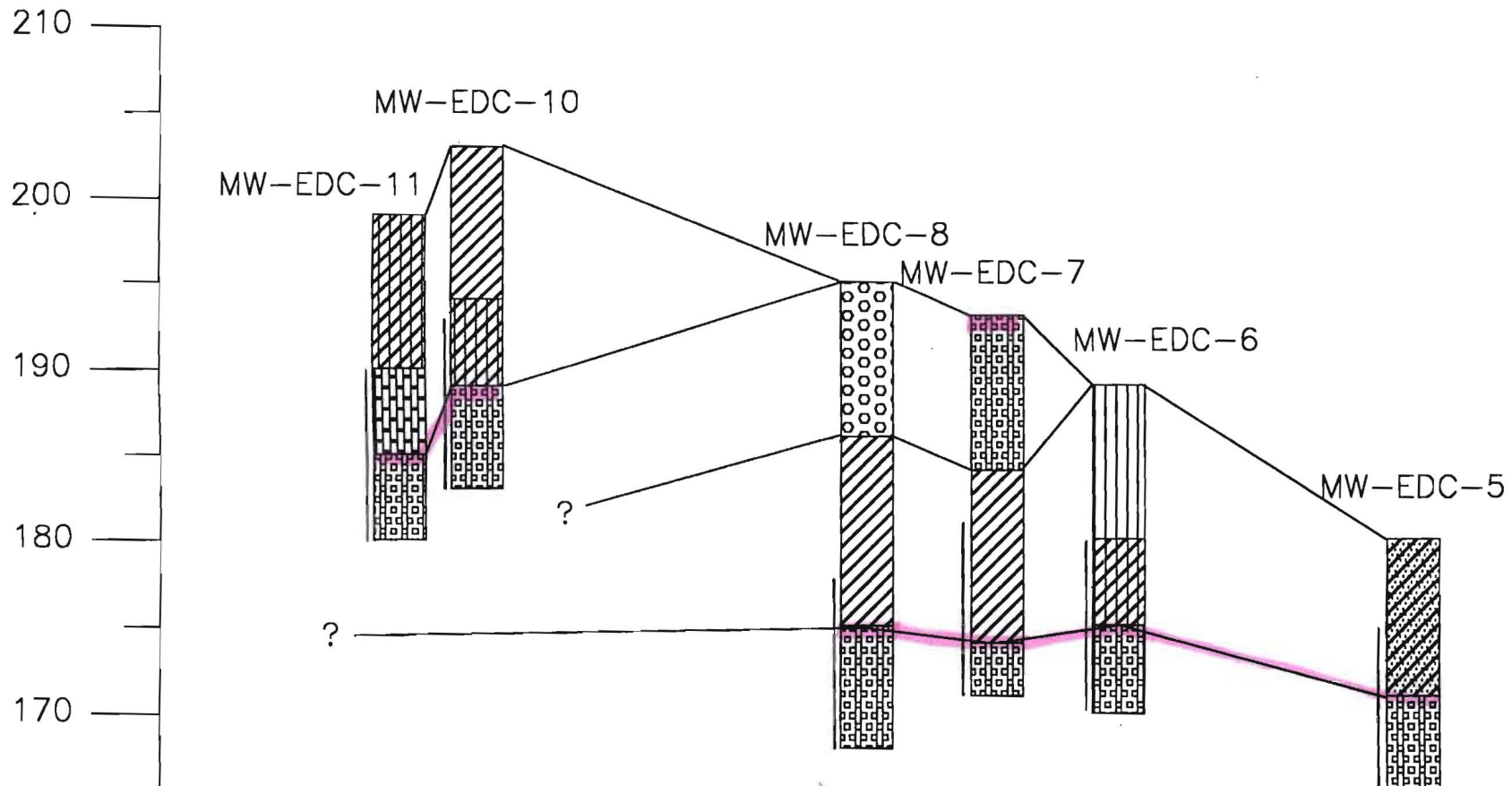
ENVIRONMENTAL MANAGEMENT SERVICES, INC.

EL DORADO Chemical Company

PROJECT NO: 2EC0100 CROSS SECTION MW-3 TO MW-16 LMM.DWG	CROSS SECTION D - D'
DRAFTED BY: KK/LM DATE: 02/18/02	2001 ANNUAL GROUND WATER REPORT
APPROVED: BY: DATE: 2/20/02	EL DORADO CHEMICAL COMPANY EL DORADO, ARKANSAS

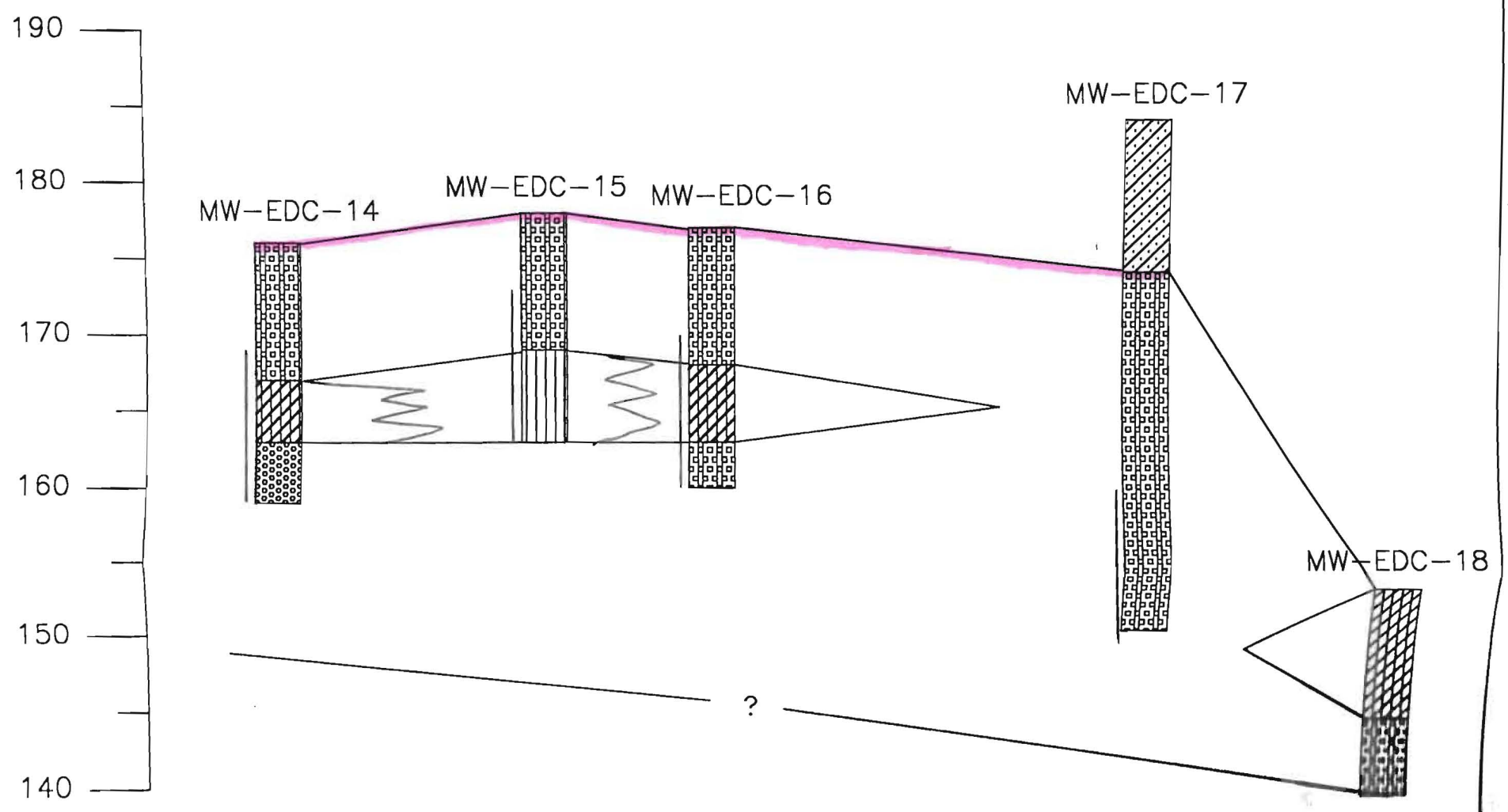
A
WEST

A'
EAST



B
WEST

B'
EAST



CLAY
Clayey SAND
Silty CLAY
Silty SAND
CLAY/SILT
SAND
SILT

200 0 200 400
SCALE IN FEET

ENVIRONMENTAL MANAGEMENT SERVICES, INC.

EL DORADO Chemical Company

PROJECT NO: 2EC0100 FILE NAME: BOTH SHORT SECTIONS.DWG	WEST-EAST CROSS SECTIONS 2001 ANNUAL GROUND WATER REPORT EL DORADO CHEMICAL COMPANY EL DORADO, ARKANSAS
DRAFTED BY: KK/LM DATE: 02/20/02	2
APPROVED: BY: DATE:	

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1.0 INTRODUCTION

This report presents the results of ground water sampling activities conducted at the El Dorado Chemical Company (EDC) facility during 2001. Field sampling techniques, ground water flow and ground water quality are discussed. In addition, boring logs from Woodward-Clyde's June 1996 *Phase II Ground water Investigation* report were evaluated and cross sections constructed to provide further understanding of the site's shallow geology. A site map, which also shows the cross section locations, is provided as Figure 1.

2.0 SITE GEOLOGY

The EDC facility is located west of the Mississippi Embayment in the Gulf Coastal Plain Geostratigraphic Region. Sediments within the region are characterized as a thick sequence of unconsolidated sediments, fluvial-deltaic in origin, and Tertiary in age. In some areas of Union County, unconsolidated alluvial deposits, Quaternary in age, overlay the Tertiary sediments.

Within the Claiborne Group, two units crop out in Union County, the Cook Mountain Formation and the Cockfield Formation. The Cook Mountain is overlain by the Cockfield Formation. The Cook Mountain is uniformly underlain by the Greensand Aquifer of the Sparta ~~Sand~~ Formation. The Cook Mountain is 50 to 200 feet thick and is composed of clay and silty clay containing minor amounts of localized very fine to silty sand. These clays serve as a confining unit between the more permeable overlying Cockfield Formation and the underlying aquifer. The Cockfield Formation, except where overlain by recent alluvium in stream bottomlands, crops out in all portions of the county downslope from the outcrop area of the Cook Mountain. The Cockfield Formation, locally referred to as the "lignite sand", is generally characterized by fine sand, interbedded silty clay and lignite becoming more massive and containing less silt and clay with depth.

Eighteen borings were drilled within the shallow Cockfield Formation during the Phase II investigation. Boring logs containing the detailed lithologic descriptions and geotechnical data are presented in the *Phase II Ground water Investigation*. Four cross sections (Figures 2 through 4) have been constructed from the boring logs to illustrate the shallow geology beneath the facility.

As shown on Figures 2 through 4, the shallow subsurface consists of interbedded sand, silty sand, silt and clay. Patterns observed on the west-east cross sections (Figure 2) indicate a clay/sand/clay/sand sequence with the more southern section (B-B') showing more sand than to the north. The north-south cross sections (Figures 3 and 4) also show alternating sand/silty sand with clay/silty clay. These sections also indicate that there is more clay in the northern area of the property and more sand to the south.

3.0 GROUND WATER SAMPLING

3.1 FIELD SAMPLING

Two ground water sampling events were conducted, one between May and August 2001 and the second in October and November 2001. Ground water elevations used to construct the maps on Figures 5 and 6 were obtained on May 16, 2001 and October 29 through November 1, 2001. Depth to water measurements were collected from each well using an electronic water level indicator. The device was decontaminated between each well to minimize cross-contamination. Depth to water measurements were subtracted from their respective top-of-casing elevations to calculate ground water elevations at each well. Ground water elevations for both sampling events are summarized on Table 1.

The depth to water measurements were used to calculate the volume of water within each well and determine the amount to be purged prior to sampling. Three well volumes were removed from each well or until the well became dry using either a disposable bailer or a Redi-Flo electric pump. When a pump was used, dedicated polyethylene tubing was used for each well to minimize the potential for cross-contamination. Field indicator parameters (pH, conductivity

and temperature) were recorded after removal of each well volume. Field meters used to measure field data were calibrated each day during sampling. Ground water indicator parameter data (final readings only) are summarized on Table 2. Purge water was containerized for proper disposal.

The Phase II wells, with the exception of MW-EDC-8 and MW-EDC-18 were sampled between May 29, 2001 and August 8, 2001. All Phase II wells were sampled in October/November 2001 with the exception of MW-EDC-12. Wells not sampled could not be located during the sampling events. However, these wells have since been located and will be included in future sampling events. Ground water samples were collected using new, clean, dedicated, disposable polyethylene bailers. Ground water samples were placed into laboratory-provided containers with the appropriate preservatives. The containers were packed in ice-chests and shipped to the laboratory under chain-of-custody.

3.2 LABORATORY ANALYSIS

Ground water samples were analyzed by Arkansas Analytical, Inc. in Little Rock, Arkansas. Arkansas Analytical is certified by the Arkansas Department of Environmental Quality. The certificates are included with the analytical reports provided in Appendix A.

Ground water samples were analyzed for the following constituents:

PARAMETER	ANALYTICAL METHOD
Ammonia-N	350.3
Nitrate-N	300.0
Sulfate	300.0
Total Dissolved Solids (TDS)	160.1
Lead	200.7
Chromium	200.7

Field quality assurance/quality control (QA/QC) samples consisted of one blind duplicate sample collected during the October/November 2001 sampling event. Sample MW-EDC-19 was submitted as a duplicate for MW-EDC-7.

4.0 RESULTS

4.1 GROUND WATER FLOW

Ground water elevations in the Phase II monitor wells in May 2001 ranged from 167.27 in MW-EDC-14 located near Lake Kildeer to 202.86 in MW-EDC-1 which is located northwest of the facility. Consistent with previous measurements, the ground water flow direction is from northwest to southeast with the exception of localized areas where shallow perched ground water likely exists. In the second part of 2001, ground water elevations ranged from 155.25 in MW-EDC-17 (southeast corner of map) to 199.28 in MW-EDC-1. Elevations were lower, however, the overall flow pattern was similar to the first half of 2001.

4.2 GROUND WATER QUALITY

4.2.1 Field Parameters

Indicator parameter data are summarized on Table 2. In the first part of 2001, pH values ranged from 4.3 to 9.7, however the majority of the readings were in the range of 4.1 to 5.1. The 9.7 reading in MW-EDC-7 is not consistent with the 3.5 reading measured in October. The October/November pH readings ranged from 4 to 5.5, with most readings consistent with the previous measurement. Conductivities ranged from 46.8 to 7030 μS in the first half of 2001 and from 15 to 8210 in the second half. Second half readings were generally similar to the previous measurement.

4.2.2 Analytical Results

The analytical results are summarized in Tables 3 through 20 and the laboratory reports are provided in Appendix A. A discussion of each constituent is provided below:

Ammonia

The results of the first sampling event show ammonia values ranging from below detection (<0.5) to 184 mg/L in MW-EDC-7. Seven of 16 wells sampled had concentrations above the detection limit. These results are in contrast to the second sampling event, where only MW-EDC-8 had a detection of 0.94 mg/L. Ammonia isoconcentration contours for both sampling events are presented on Figure 7. As shown on Figure 7, the highest ammonia concentrations are located north of the acid and nitrate process areas known as the Production Area. There were also minor concentrations detected on the north and southeast sides of Lake Kildeer.

Nitrate

Results from the first sampling event show values ranging from below the detection limit of 0.5 mg/L to 336 mg/L in MW-EDC-7. Eleven of 16 wells had detections of nitrate. The second sampling event results show concentrations ranging from below detection to 1030 in thirteen of seventeen wells. Isoconcentration contours for each sampling event are illustrated on Figures 8 and 9. As shown on the figures, the highest nitrate concentrations are located north of the acid and nitrate process areas known as the Production Area. Elevated nitrate levels were also present on the north and south sides of Lake Kildeer during both sampling periods.

Sulfate

First sampling event results show concentrations ranging from 3.67 (MW-EDC-1) to 925 mg/L (MW-EDC-4). Second sampling event results are similar to first event concentrations, with sulfate ranging from 3.34 mg/L in MW-EDC-1 to 936 mg/L in MW-EDC-4).

Total Dissolved Solids

TDS concentrations ranged from 42 mg/L (MW-EDC-1) to 5100 mg/L (MW-EDC-4) during the first event and from 43 mg/L (MW-EDC-1) to 5200 mg/L (MW-EDC-4).

Lead

Analytical results from the first sampling event show lead was not present above the detection limit of 0.04 mg/L. A lead concentration of 0.06 mg/L was detected in MW-EDC-4 during the October/November sampling.

Chromium

First sampling event results show detections in two wells at concentrations of 0.032 mg/L (MW-EDC-2) and 0.025 (MW-EDC-10). Chromium concentrations of 0.04, 0.04 and 0.05 were detected in MW-EDC-4, MW-EDC-10 and MW-EDC-18, respectively, during the October/November sampling.

TABLE 1
GROUND WATER ELEVATION DATA
2001 ANNUAL GROUND WATER REPORT
EL DORADO CHEMICAL COMPANY
EL DORADO, ARKANSAS

Monitor Well	Measurement Date	Top of Casing	Depth to Water	Water Elevation
		Feet Mean Sea Level		
MW-EDC-1	5/16/01	213.28	10.42	202.86
MW-EDC-2	5/16/01	196.25	0.00	196.25
MW-EDC-3	5/16/01	192.11	8.92	183.19
MW-EDC-4	5/16/01	194.84	8.13	186.71
MW-EDC-5	5/16/01	182.69	4.50	178.19
MW-EDC-6	5/16/01	191.87	4.46	187.41
MW-EDC-7	5/16/01	195.88	6.80	189.08
MW-EDC-8	5/16/01	197.34	7.13	190.21
MW-EDC-9	5/16/01	198.39	8.71	189.68
MW-EDC-10	5/16/01	205.75	10.67	195.08
MW-EDC-11	5/16/01	201.65	9.17	192.48
MW-EDC-12	5/16/01	184.97	6.17	178.80
MW-EDC-13	5/16/01	177.26	5.83	171.43
MW-EDC-14	5/16/01	178.48	11.21	167.27
MW-EDC-15	5/16/01	180.84	4.83	176.01
MW-EDC-16	5/16/01	180.14	5.42	174.72
MW-EDC-17	5/16/01	185.40	15.54	169.86
MW-EDC-18	NOT MEASURED			
MW-EDC-1	10/29/01	213.28	14.00	199.28
MW-EDC-2	10/29/01	196.25	0.25	196.00
MW-EDC-3	11/1/01	192.11	10.90	181.21
MW-EDC-4	10/30/01	194.84	8.90	185.94
MW-EDC-5	10/29/01	182.69	4.4	178.29
MW-EDC-6	10/30/01	191.87	4.70	187.17
MW-EDC-7	10/29/01	195.88	7.64	188.24
MW-EDC-8	10/29/01	197.34	7.84	189.50
MW-EDC-9	10/29/01	198.39	11.13	187.26
MW-EDC-10	10/30/01	205.75	13.7	192.05
MW-EDC-11	10/29/01	201.65	10.8	190.85
MW-EDC-12	NOT MEASURED			
MW-EDC-13	10/30/01	177.26	6.9	170.36
MW-EDC-14	10/30/01	178.48	13.05	165.43
MW-EDC-15	10/29/01	180.84	5.95	174.89
MW-EDC-16	10/29/01	180.14	6.3	173.84
MW-EDC-17	10/29/01	185.40	30.15	155.25
MW-EDC-18	10/30/01	155.46	5.7	149.76

TABLE 2
GROUND WATER INDICATOR PARAMETER DATA
2001 ANNUAL GROUND WATER REPORT
EL DORADO CHEMICAL COMPANY
EL DORADO, ARKANSAS

MONITOR WELL	SAMPLING DATE	pH	CONDUCTIVITY (uS)	TEMPERATURE (F)
MW-EDC-1	5/29/01	5.1	46.8	60
MW-EDC-2	5/29/01	5.4	371	61
MW-EDC-3	5/29/01	6.2	204	63
MW-EDC-4	8/8/01	4.1	7030	70
MW-EDC-5	8/8/01	4.6	1080	72
MW-EDC-6	8/8/01	4.3	2840	66
MW-EDC-7	8/8/01	9.7	3100	75
MW-EDC-8	NOT SAMPLED			
MW-EDC-9	6/27/01	5.4	1970	65
MW-EDC-10	6/27/01	4.4	1350	68
MW-EDC-11	8/8/01	4.3	1120	74
MW-EDC-12	6/27/01	5.9	696	68
MW-EDC-13	6/5/01	5.6	1665	61
MW-EDC-14	8/8/01	4.3	1110	69
MW-EDC-15	8/8/01	4.3	140	74
MW-EDC-16	6/5/01	4.3	1210	63
MW-EDC-17	6/5/01	4.4	721	65
MW-EDC-18	NOT SAMPLED			
MW-EDC-1	11/1/01	4.8	15	69
MW-EDC-2	11/1/01	5.3	360	68
MW-EDC-3	11/1/01	5.4	230	70
MW-EDC-4	10/30/01	4.3	7450	69
MW-EDC-5	10/29/01	4.7	1110	69
MW-EDC-6	10/30/01	4.3	3370	69
MW-EDC-7	10/29/01	3.5	2350	72
MW-EDC-8	10/29/01	3.9	8210	70
MW-EDC-9	10/29/01	5.5	2140	70
MW-EDC-10	10/30/01	3.9	1640	70
MW-EDC-11	10/29/01	4.0	940	71
MW-EDC-12	NOT SAMPLED			
MW-EDC-13	10/30/01	5.3	1556	69
MW-EDC-14	10/30/01	4.5	903	70
MW-EDC-15	10/29/01	4.3	162	70
MW-EDC-16	10/29/01	3.9	701	71
MW-EDC-17	10/29/01	4.1	990	66
MW-EDC-18	10/30/01	5.4	500	64

TABLE 3
MW-EDC-1 ANALYTICAL SUMMARY
EL DORADO CHEMICAL COMPANY
EL DORADO, ARKANSAS

MW-EDC-1

Sample Date	pH	Ammonia-N	Nitrate-N	Sulfate	TDS	Lead	Chromium	Dissolved Lead	Dissolved Chromium
	s.u.	mg/L							
3/14/96	9.7	--	1.7	4.1	--	0.0037	< 0.005	< 0.002	< 0.005
5/29/01	5.1	< 0.5	1.83	3.67	42	< 0.04	< 0.02	--	--
11/1/01	4.8	< 0.5	2.74	3.34	43	< 0.04	< 0.02	--	--

"--" - Parameter not analyzed

TABLE 4
MW-EDC-2 ANALYTICAL SUMMARY
EL DORADO CHEMICAL COMPANY
EL DORADO, ARKANSAS

MW-EDC-2

Sample Date	pH	Ammonia-N	Nitrate-N	Sulfate	TDS	Lead	Chromium	Dissolved Lead	Dissolved Chromium
	s.u.	mg/L							
3/14/96	9.7	--	< 0.2	17	--	0.018	0.0342	< 0.002	< 0.005
5/29/01	5.4	< 0.5	< 0.5	19.6	340	< 0.04	0.032	--	--
11/1/01	5.3	< 0.5	< 0.5	22.9	300	< 0.04	< 0.02	--	--

"--" - Parameter not analyzed

TABLE 5
MW-EDC-3 ANALYTICAL SUMMARY
EL DORADO CHEMICAL COMPANY
EL DORADO, ARKANSAS

MW-EDC-3

Sample Date	pH	Ammonia-N	Nitrate-N	Sulfate	TDS	Lead	Chromium	Dissolved Lead	Dissolved Chromium
	s.u.	mg/L							
3/14/96	8	--	< 0.2	10	--	0.0027	< 0.005	< 0.002	< 0.005
5/29/01	6.2	< 0.5	< 0.5	10.6	180	< 0.04	< 0.02	--	--
11/1/01	5.4	< 0.5	< 0.5	22.5	240	< 0.04	< 0.02	--	--

"--" - Parameter not analyzed

TABLE 6
MW-EDC-4 ANALYTICAL SUMMARY
EL DORADO CHEMICAL COMPANY
EL DORADO, ARKANSAS

MW-EDC-4

✓ ✓ ✓

Sample Date	pH	Ammonia-N	Nitrate-N	Sulfate	TDS	Lead	Chromium	Dissolved Lead	Dissolved Chromium
	s.u.	mg/L							
3/14/96	8.1	--	1.3	728	--	0.0025	< 0.005	< 0.002	< 0.005
8/8/01	4.1	0.66	< 0.5	925	5100	< 0.04	< 0.02	--	--
10/30/01	4.3	< 0.5	< 0.5	936	5200	0.06	0.04	--	--

"--" - Parameter not analyzed

TABLE 7
MW-EDC-5 ANALYTICAL SUMMARY
EL DORADO CHEMICAL COMPANY
EL DORADO, ARKANSAS

MW-EDC-5

Sample Date	pH	Ammonia-N	Nitrate-N	Sulfate	TDS	Lead	Chromium	Dissolved Lead	Dissolved Chromium
	s.u.	mg/L							
3/13/96	5.8	--	4.4	441	--	< 0.002	< 0.005	< 0.002	< 0.005
8/8/01	4.6	< 0.5	3.54	657	1000	< 0.04	< 0.02	--	--
10/30/01	4.7	< 0.5	3.27	526	980	< 0.04	< 0.02	--	--

"--" - Parameter not analyzed

TABLE 8
MW-EDC-6 ANALYTICAL SUMMARY
EL DORADO CHEMICAL COMPANY
EL DORADO, ARKANSAS

MW-EDC-6

Sample Date	pH	Ammonia-N	Nitrate-N	Sulfate	TDS	Lead	Chromium	Dissolved Lead	Dissolved Chromium
	s.u.	mg/L							
3/13/96	7.7	--	51.1	24	--	0.0026	< 0.005	< 0.002	< 0.005
8/8/01	4.3	0.5	298	18.3	2100	< 0.04	< 0.02	--	--
10/30/01	4.3	< 0.5	326	15.7	2700	< 0.04	< 0.02	--	--

"--" - Parameter not analyzed

TABLE 9
MW-EDC-7 ANALYTICAL SUMMARY
EL DORADO CHEMICAL COMPANY
EL DORADO, ARKANSAS

MW-EDC-7

Sample Date	pH	Ammonia-N	Nitrate-N	Sulfate	TDS	Lead	Chromium	Dissolved Lead	Dissolved Chromium
	s.u.	mg/L							
3/13/96	8.1	--	282	380	--	0.0221	0.0078	0.0185	< 0.005
8/8/01	9.7	184	336	316	1300	< 0.04	< 0.02	--	--
10/30/01	3.5	< 0.5	189	322	1056	< 0.04	< 0.02	--	--
10/30/01		< 0.5	186	325	1100	< 0.04	< 0.02	--	--

"--" - Parameter not analyzed

TABLE 10
MW-EDC-8 ANALYTICAL SUMMARY
EL DORADO CHEMICAL COMPANY
EL DORADO, ARKANSAS

MW-EDC-8

Sample Date	pH	Ammonia-N	Nitrate-N	Sulfate	TDS	Lead	Chromium	Dissolved Lead	Dissolved Chromium
	s.u.	mg/L							
3/13/96	7.9	--	1010	68.3	--	0.0234	< 0.005	0.0238	< 0.005
10/30/01	3.9	0.94	1030	81.1	5000	< 0.04	< 0.02	--	--

"--" - Parameter not analyzed

TABLE 11
MW-EDC-9 ANALYTICAL SUMMARY
EL DORADO CHEMICAL COMPANY
EL DORADO, ARKANSAS

MW-EDC-9

Sample Date	pH	Ammonia-N	Nitrate-N	Sulfate	TDS	Lead	Chromium	Dissolved Lead	Dissolved Chromium
	s.u.	mg/L							
3/14/96	9	--	37.3	621	--	0.004	< 0.005	< 0.002	< 0.005
6/27/01	5.4	< 0.5	28.8	520	1600	< 0.04	< 0.02	--	--
10/30/01	5.5	< 0.5	26.7	514	2600	< 0.04	< 0.02	--	--

"--" - Parameter not analyzed

TABLE 12
MW-EDC-10 ANALYTICAL SUMMARY
EL DORADO CHEMICAL COMPANY
EL DORADO, ARKANSAS

MW-EDC-10

Sample Date	pH	Ammonia-N	Nitrate-N	Sulfate	TDS	Lead	Chromium	Dissolved Lead	Dissolved Chromium
	s.u.	mg/L							
3/13/96	7.7	--	257	89	--	0.0052	< 0.005	0.0039	< 0.005
6/27/01	4.4	< 0.5	156	100	1300	< 0.04	0.025	--	--
10/30/01	3.9	< 0.5	153	134	1400	< 0.04	0.04	--	--

"--" - Parameter not analyzed

TABLE 13
MW-EDC-11 ANALYTICAL SUMMARY
EL DORADO CHEMICAL COMPANY
EL DORADO, ARKANSAS

MW-EDC-11

Sample Date	pH	Ammonia-N	Nitrate-N	Sulfate	TDS	Lead	Chromium	Dissolved Lead	Dissolved Chromium
	s.u.	mg/L							
3/13/96	11.1	--	22.1	578	--	< 0.002	< 0.005	< 0.002	< 0.005
8/8/01	4.3	4.21	7.99	611	1100	< 0.04	< 0.02	--	--
10/30/01	4	< 0.5	21.9	334	610	< 0.04	< 0.02	--	--

"--" - Parameter not analyzed

TABLE 14
MW-EDC-12 ANALYTICAL SUMMARY
EL DORADO CHEMICAL COMPANY
EL DORADO, ARKANSAS

MW-EDC-12

Sample Date	pH	Ammonia-N	Nitrate-N	Sulfate	TDS	Lead	Chromium	Dissolved Lead	Dissolved Chromium
	s.u.	mg/L							
3/13/96	6.1	--	< 0.2	9.6	--	< 0.002	< 0.005	< 0.002	< 0.005
6/27/01	5.9	2.2	< 0.5	13	330	< 0.04	< 0.02	--	--

"--" - Parameter not analyzed

TABLE 15
MW-EDC-13 ANALYTICAL SUMMARY
EL DORADO CHEMICAL COMPANY
EL DORADO, ARKANSAS

MW-EDC-13

Sample Date	pH	Ammonia-N	Nitrate-N	Sulfate	TDS	Lead	Chromium	Dissolved Lead	Dissolved Chromium
	s.u.	mg/L							
3/13/96	5.6	--	0.2	809	--	< 0.002	< 0.005	< 0.002	< 0.005
6/5/01	5.6	< 0.5	< 0.5	538	1400	< 0.04	< 0.02	--	--
10/30/01	5.3	< 0.5	< 0.5	606	1300	< 0.04	< 0.02	--	--

"--" - Parameter not analyzed

TABLE 16
MW-EDC-14 ANALYTICAL SUMMARY
EL DORADO CHEMICAL COMPANY
EL DORADO, ARKANSAS

MW-EDC-14

Sample Date	pH	Ammonia-N	Nitrate-N	Sulfate	TDS	Lead	Chromium	Dissolved Lead	Dissolved Chromium
	s.u.	mg/L							
3/13/96	4.6	--	11.9	139	--	< 0.002	< 0.005	< 0.002	< 0.005
8/8/01	4.3	< 0.5	75	175	1000	< 0.04	< 0.02	--	--
10/30/01	4.5	< 0.5	25.2	211	790	< 0.04	< 0.02	--	--

"--" - Parameter not analyzed

TABLE 17
MW-EDC-15 ANALYTICAL SUMMARY
EL DORADO CHEMICAL COMPANY
EL DORADO, ARKANSAS

MW-EDC-15

Sample Date	pH	Ammonia-N	Nitrate-N	Sulfate	TDS	Lead	Chromium	Dissolved Lead	Dissolved Chromium
	s.u.	mg/L							
3/13/96	6.4	--	34.5	4.4	--	< 0.002	< 0.005	< 0.002	< 0.005
8/8/01	4.3	< 0.5	19.1	7.8	140	< 0.04	< 0.02	--	--
10/30/01	4.3	< 0.5	12.6	10.2	110	< 0.04	< 0.02	--	--

"--" - Parameter not analyzed

TABLE 18
MW-EDC-16 ANALYTICAL SUMMARY
EL DORADO CHEMICAL COMPANY
EL DORADO, ARKANSAS

MW-EDC-16

Sample Date	pH	Ammonia-N	Nitrate-N	Sulfate	TDS	Lead	Chromium	Dissolved Lead	Dissolved Chromium
	s.u.	mg/L							
3/13/96	5.7	--	137	4.6	--	0.0036	< 0.005	0.0034	< 0.005
6/5/01	4.3	4.61	134	5.09	1100	< 0.04	< 0.02	--	--
10/30/01	3.9	< 0.5	58.4	6.44	330	< 0.04	< 0.02	--	--

"--" - Parameter not analyzed

TABLE 19
MW-EDC-17 ANALYTICAL SUMMARY
EL DORADO CHEMICAL COMPANY
EL DORADO, ARKANSAS

MW-EDC-17

Sample Date	pH	Ammonia-N	Nitrate-N	Sulfate	TDS	Lead	Chromium	Dissolved Lead	Dissolved Chromium
	s.u.	mg/L							
3/13/96	4.9	--	45	145	--	< 0.002	< 0.005	< 0.002	< 0.005
6/5/01	4.4	1.16	54.2	87.7	600	< 0.04	< 0.02	--	--
10/30/01	4.1	< 0.5	106	11.5	760	< 0.04	< 0.02	--	--

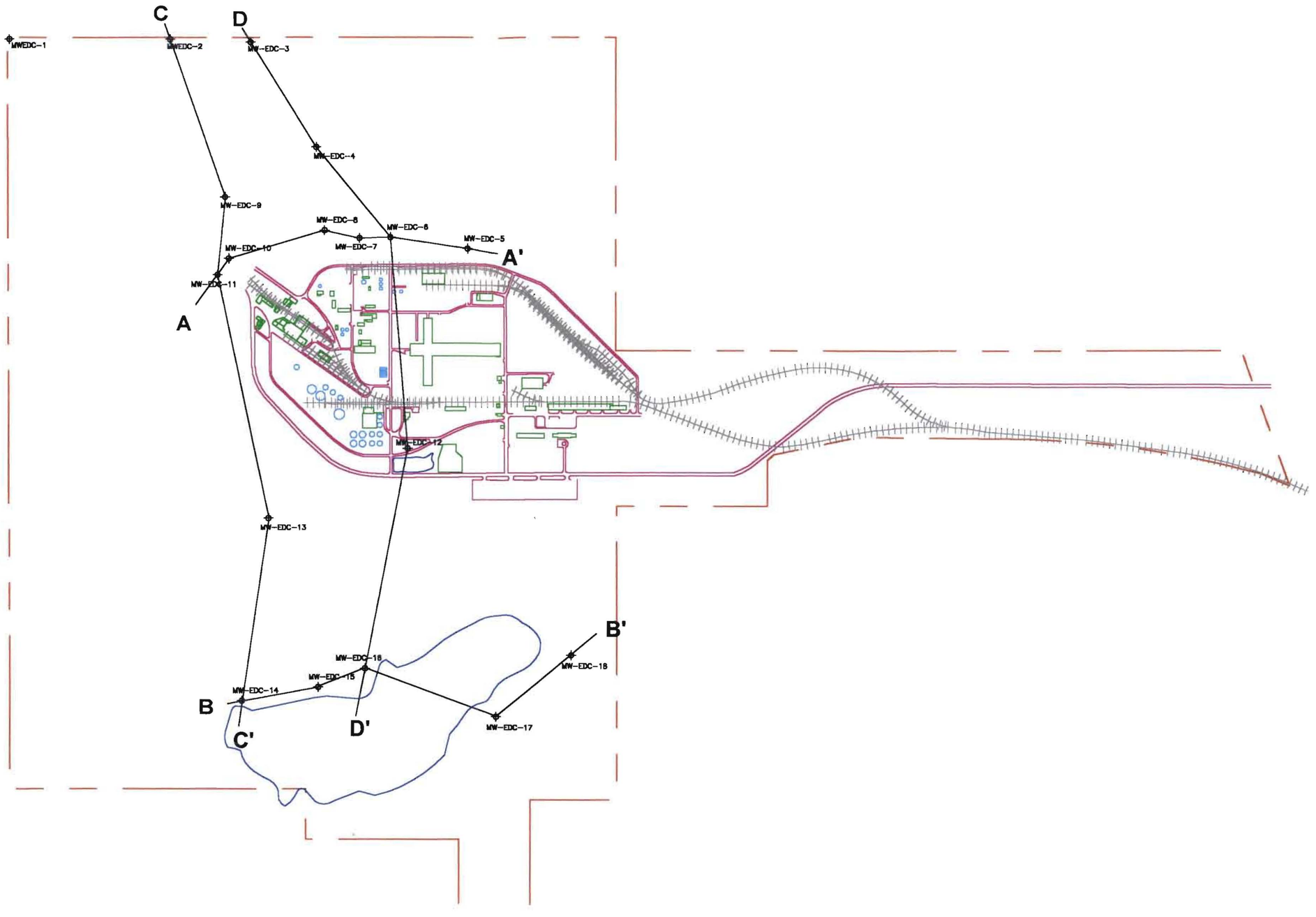
"--" - Parameter not analyzed

TABLE 20
MW-EDC-18 ANALYTICAL SUMMARY
EL DORADO CHEMICAL COMPANY
EL DORADO, ARKANSAS

MW-EDC-18

Sample Date	pH	Ammonia-N	Nitrate-N	Sulfate	TDS	Lead	Chromium	Dissolved Lead	Dissolved Chromium
	s.u.	mg/L							
3/14/96	6.6	--	0.4	3.3	--	0.017	0.0194	< 0.002	< 0.005
10/30/01	5.4	< 0.5	< 0.5	3.74	300	< 0.04	0.05	--	--

"--" - Parameter not analyzed



0 500 1000
SCALE IN FEET

EL DORADO Chemical Company

ENVIRONMENTAL MANAGEMENT SERVICES, INC.

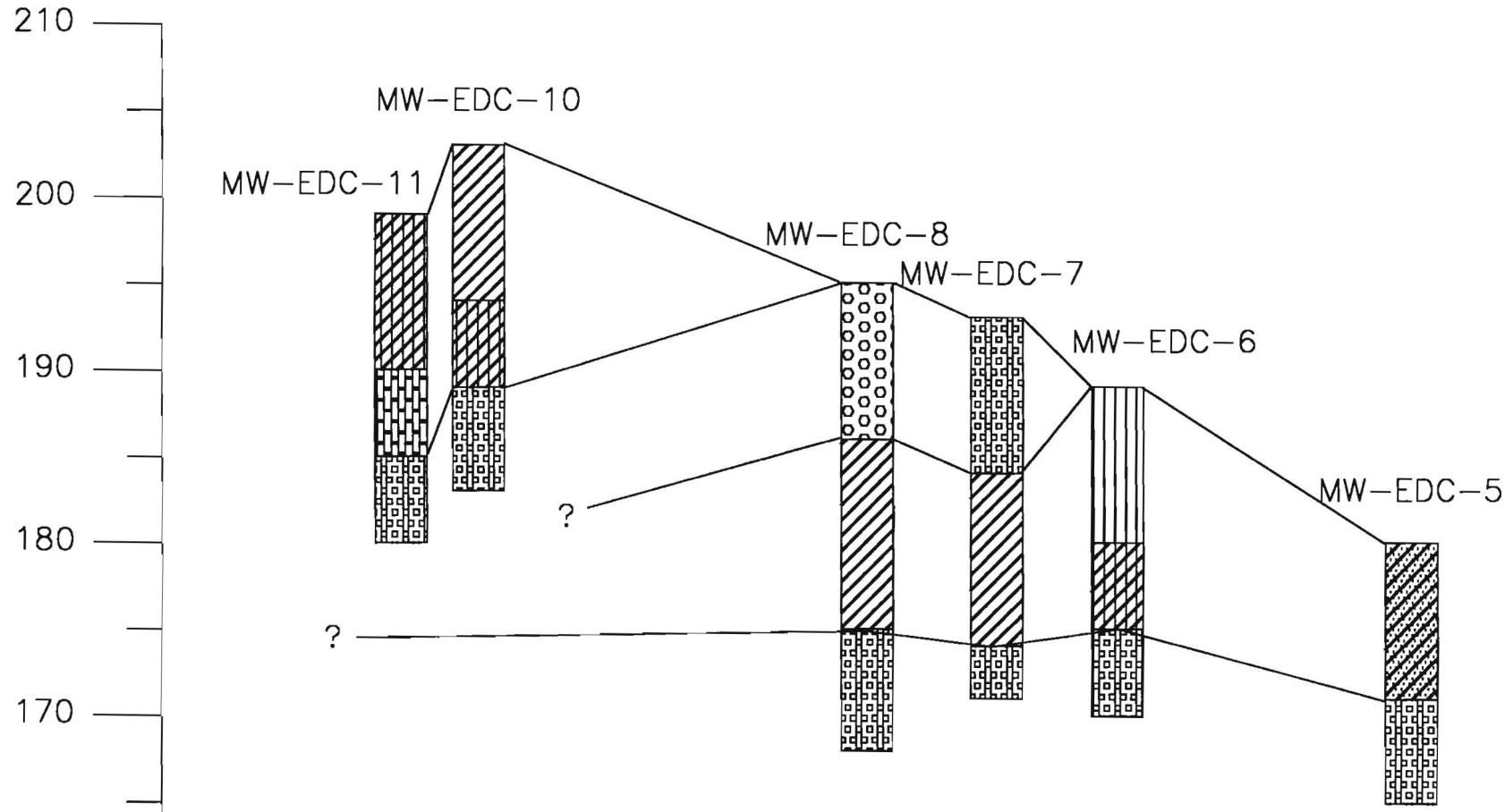
PROJECT NO: 2EC0100	
CROSS SECTION FIGURE1.DWG	
DRAFTED BY: KK/LM	DATE: 02/18/02
APPROVED:	
BY:	DATE:

SITE PLAN/CROSS SECTION LOCATION MAP
2001 ANNUAL GROUND WATER REPORT
EL DORADO CHEMICAL COMPANY
EL DORADO, ARKANSAS

1

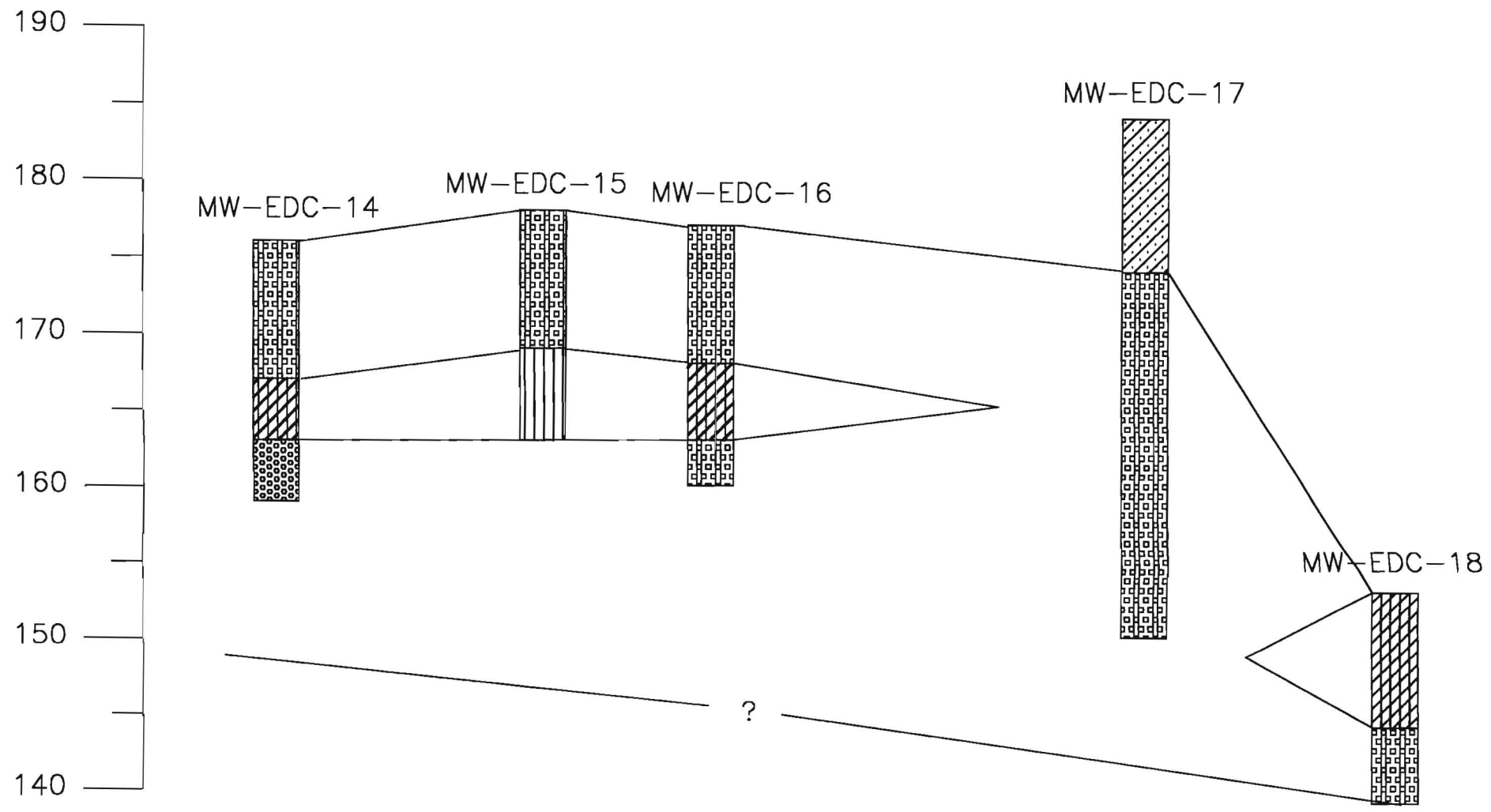
A
WEST

A'
EAST



B
WEST

B'
EAST



CLAY
Clayey SAND
Silty CLAY
Silty SAND
CLAY/SILT
SAND
SILT

0 200 400
SCALE IN FEET

ENVIRONMENTAL MANAGEMENT SERVICES, INC.

EL DORADO Chemical Company

PROJECT NO: 2EC0100 FILE NAME: BOTH SHORT SECTIONS.DWG	
DRAFTED BY: KK/LM DATE: 02/20/02	
APPROVED: BY: DATE:	WEST-EAST CROSS SECTIONS 2001 ANNUAL GROUND WATER REPORT EL DORADO CHEMICAL COMPANY EL DORADO, ARKANSAS
	2

C
NORTH

C'
SOUTH

210
200
190
180
170
160
150

MW-EDC-2
MW-EDC-9
MW-EDC-11
MW-EDC-13
MW-EDC-14
?
?

CLAY
Silty CLAY
CLAY/SILT
SILT
Silty SAND
SAND

0 200 400
SCALE IN FEET

PROJECT NO: 2EC0100
CROSS SECTION MW-2 TO MW-14 LMM.DWG
DRAFTED BY: KK/LM DATE: 02/18/02
APPROVED:
BY: DATE: 2/20/02

ENVIRONMENTAL MANAGEMENT SERVICES, INC.

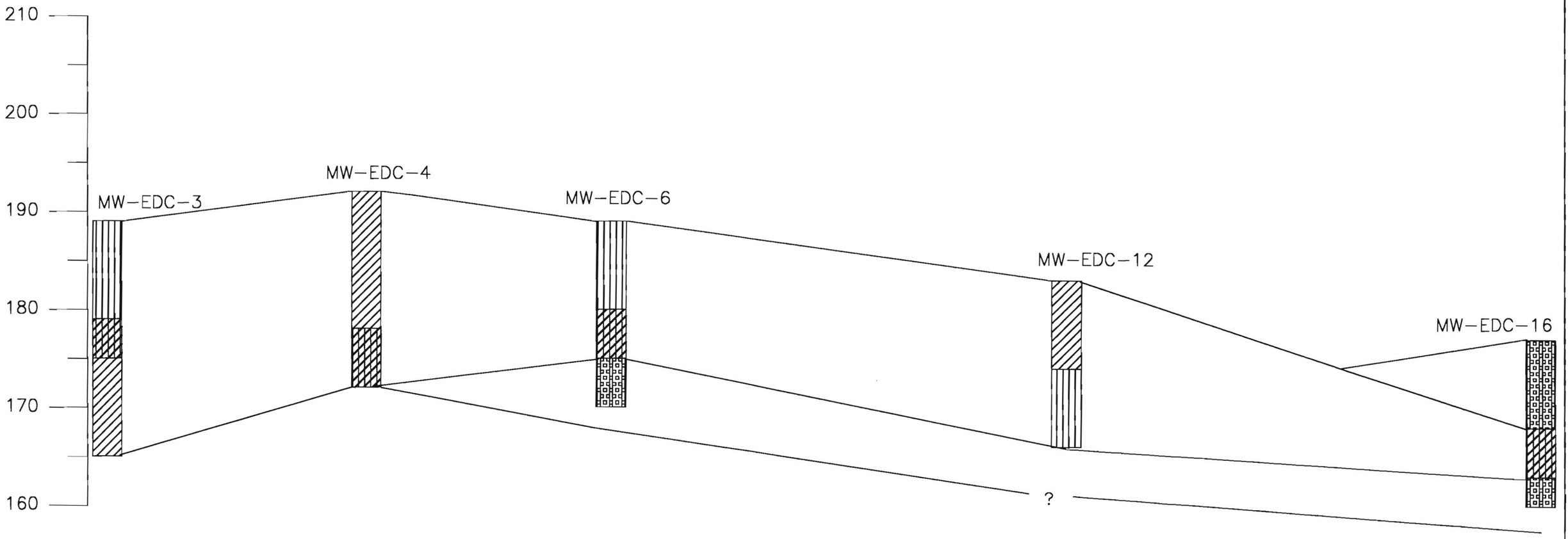
EL DORADO Chemical Company

CROSS SECTION C - C'
2001 ANNUAL GROUND WATER REPORT
EL DORADO CHEMICAL COMPANY
EL DORADO, ARKANSAS

3

D
NORTH

D'
SOUTH



CLAY

Silty CLAY

SILT

Silty SAND

0 200 400
SCALE IN FEET

PROJECT NO: 2EC0100 CROSS SECTION MW-3 TO MW-16 LMM.DWG	
DRAFTED BY: KK/LM	DATE: 02/18/02
APPROVED: BY: jm	DATE: 2/20/02

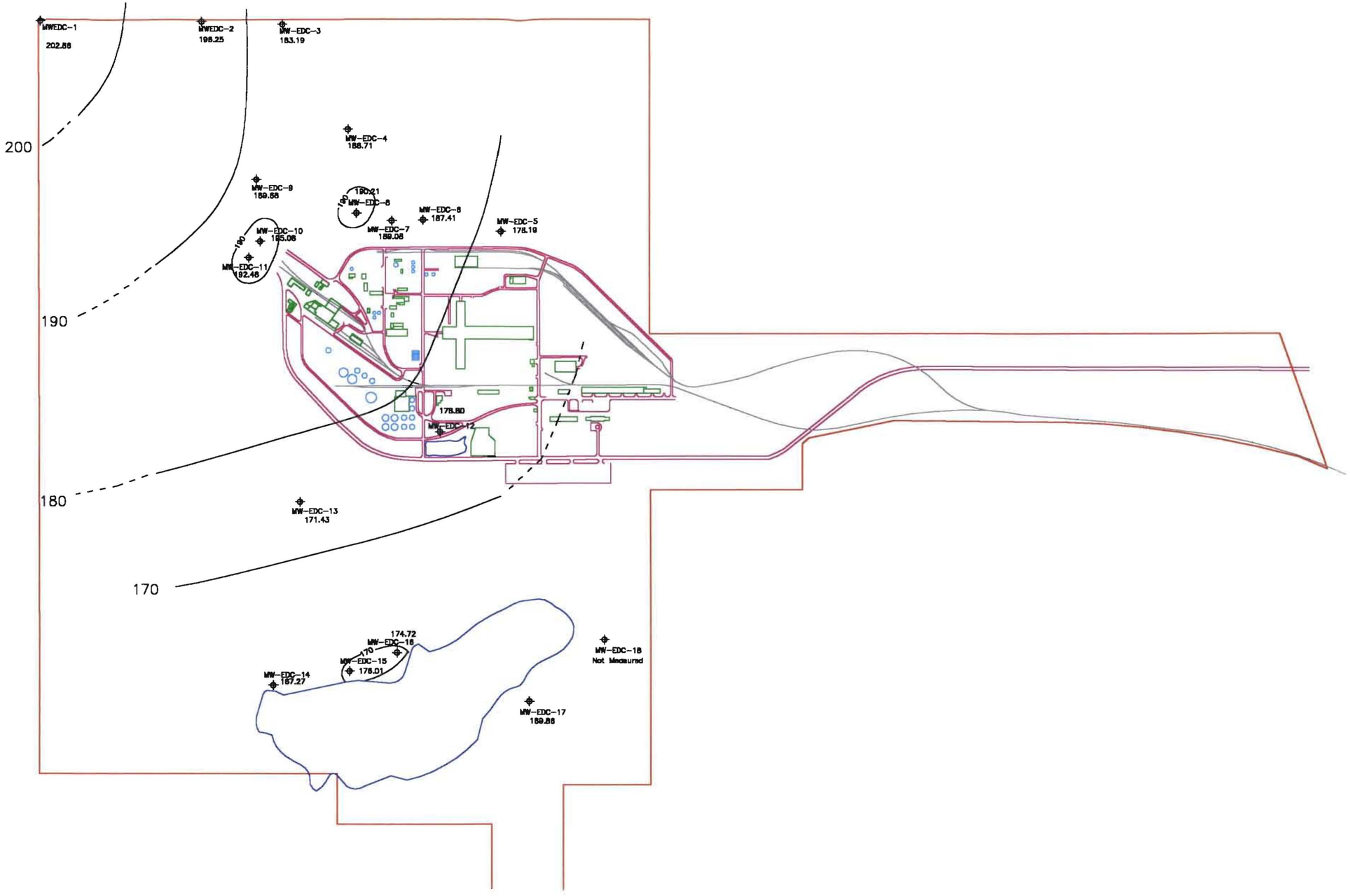
ENVIRONMENTAL MANAGEMENT SERVICES, INC.

EL DORADO Chemical Company

CROSS SECTION D - D'

2001 ANNUAL GROUND WATER REPORT

EL DORADO CHEMICAL COMPANY
EL DORADO, ARKANSAS



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SCALE IN FEET

EL DORADO Chemical Company

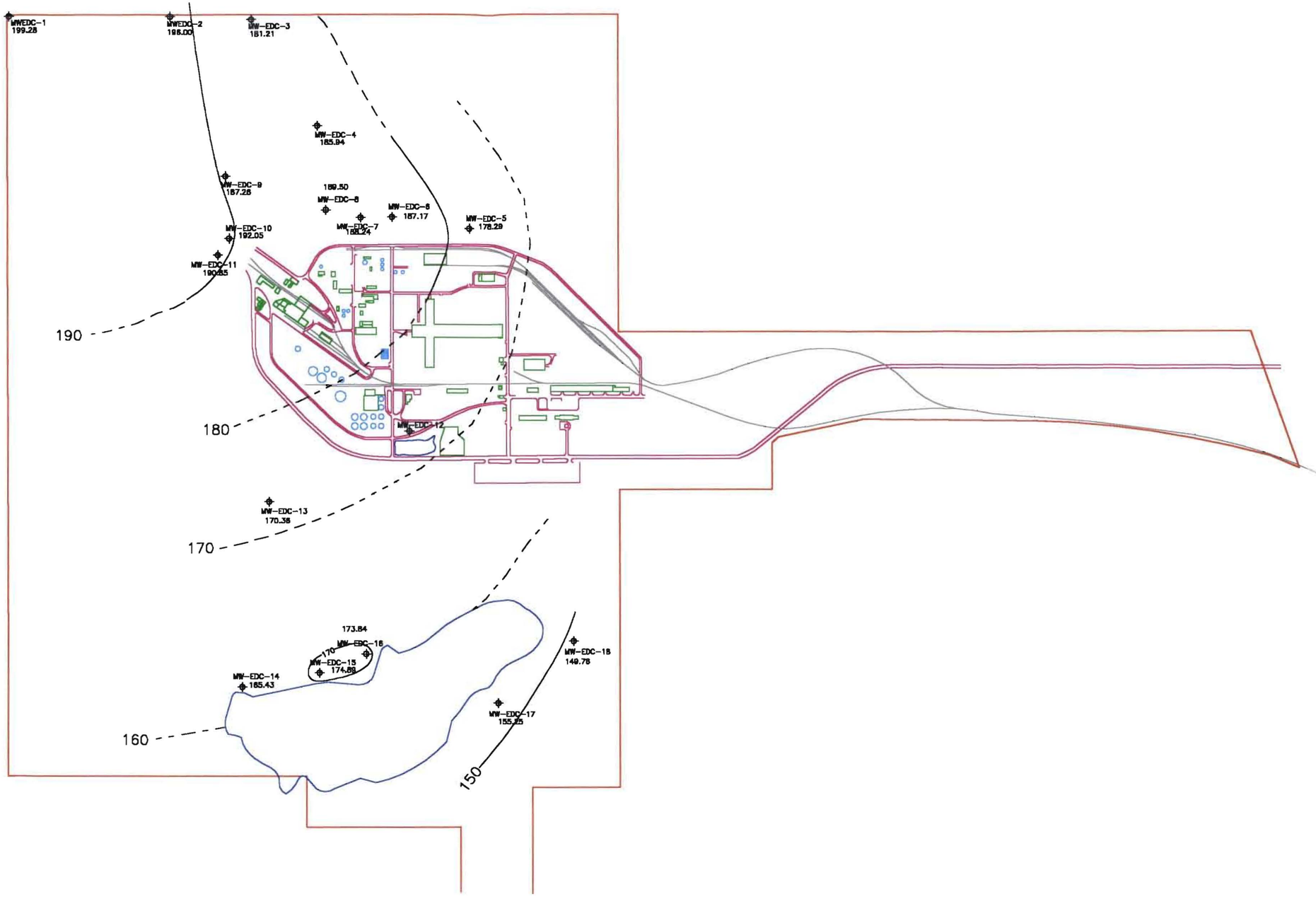
ENVIRONMENTAL MANAGEMENT SERVICES, INC.

PROJECT NO: 2EC010D	
CROSS SECTION POT_MAPS.DWG	
DRAFTED BY: KK/LM	DATE: 02/18/02
APPROVED:	
BY:	DATE: 2/20/02

WATER ELEVATION MAP MAY 2001

2001 ANNUAL GROUND WATER REPORT

EL DORADO CHEMICAL COMPANY
EL DORADO, ARKANSAS



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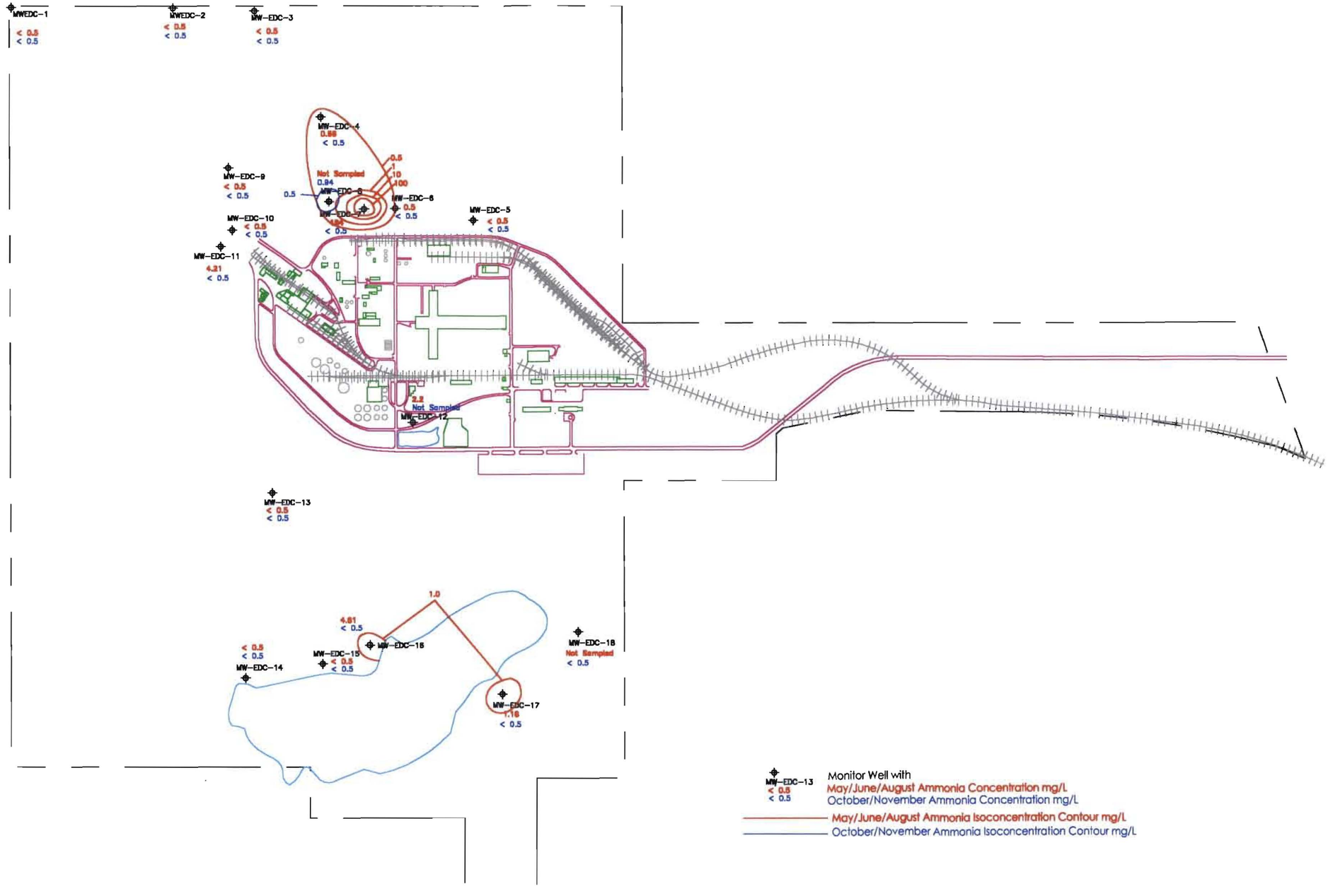
SCALE IN FEET

EL DORADO Chemical Company

ENVIRONMENTAL MANAGEMENT SERVICES, INC.

PROJECT NO: 2EC0100	
CROSS SECTION POT_MAPS.DWG	
DRAFTED BY: KK/LM	DATE: 02/18/02
APPROVED: BY:	DATE: 2/20/02

WATER ELEVATION MAP OCT/NOV 2001
2001 ANNUAL GROUND WATER REPORT
EL DORADO CHEMICAL COMPANY
EL DORADO, ARKANSAS



0 500 1000
SCALE IN FEET

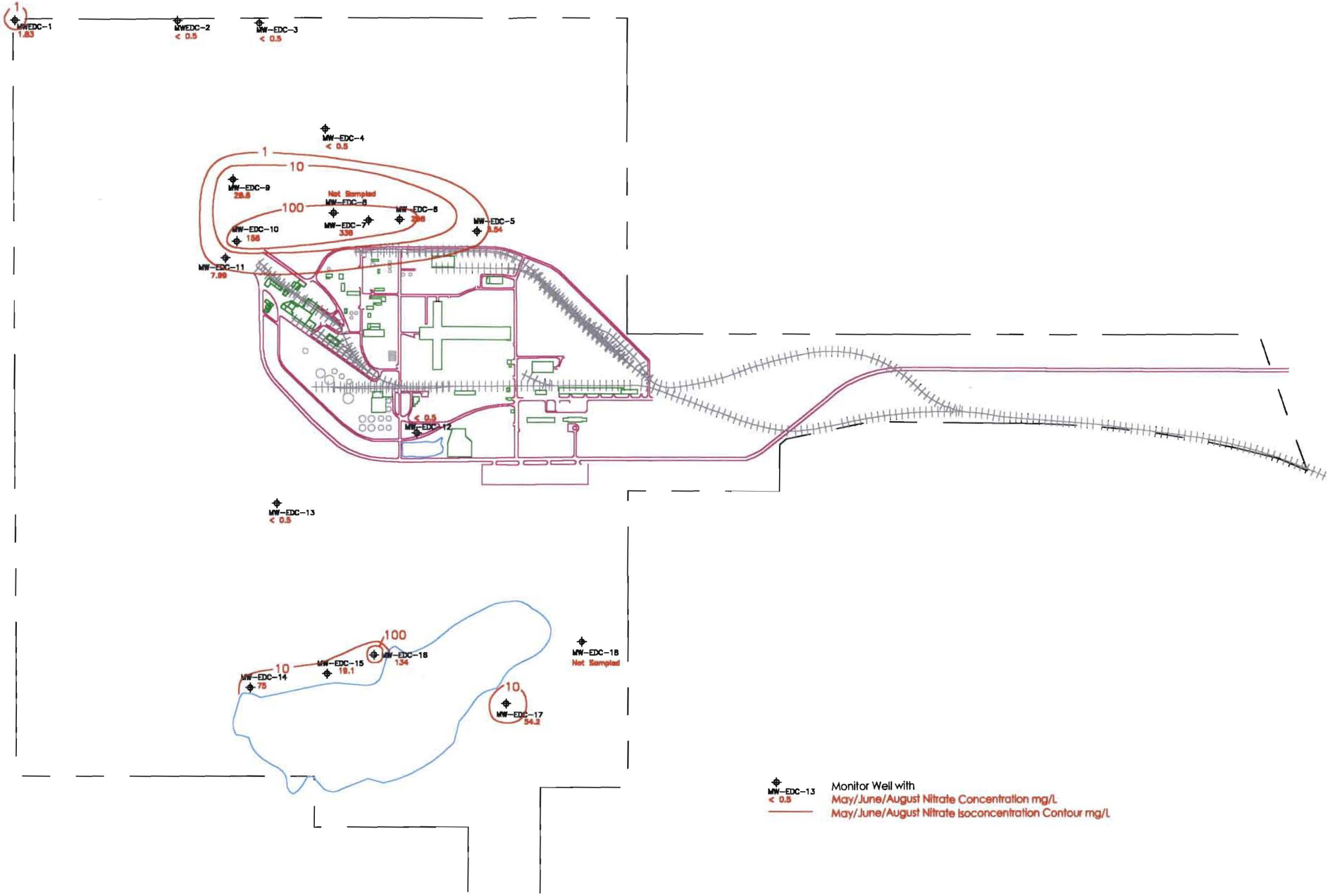
EL DORADO Chemical Company

ENVIRONMENTAL MANAGEMENT SERVICES, INC.

PROJECT NO: 2EC0100 ISOCON_MAPS.DWG	
DRAFTED BY: KK/LM	DATE: 02/18/02
APPROVED: BY:	DATE: 2/20/02

AMMONIA ISOCONCENTRATION MAP

2001 ANNUAL GROUND WATER REPORT
EL DORADO CHEMICAL COMPANY
EL DORADO, ARKANSAS



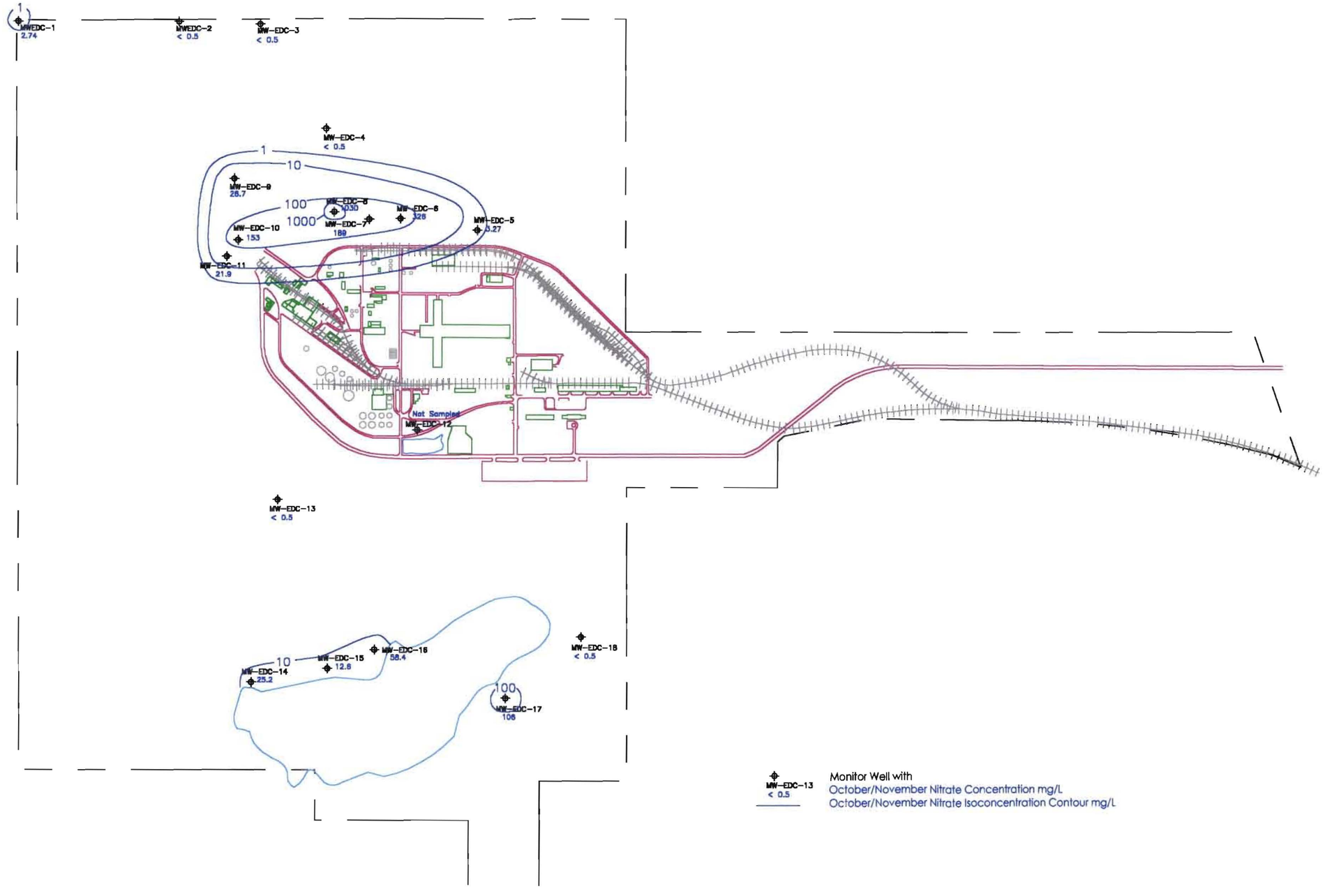
EL DORADO Chemical Company

ENVIRONMENTAL MANAGEMENT SERVICES, INC.

PROJECT NO: 2EC0100 ISOCON_MAPS.DWG	
DRAFTED BY: KK/LM	DATE: 02/18/02
APPROVED: BY:	DATE: 2/20/02

NITRATE ISOCONCENTRATION MAP
MAY/JUNE/AUGUST 2001

2001 ANNUAL GROUND WATER REPORT
EL DORADO CHEMICAL COMPANY
EL DORADO, ARKANSAS



EL DORADO Chemical Company

ENVIRONMENTAL MANAGEMENT SERVICES, INC.

PROJECT NO: 2EC0100 ISOCON_MAPS.DWG	
DRAFTED BY: KK/LM	DATE: 02/18/02
APPROVED: BY:	DATE: 2/20/02

NITRATE ISOCONCENTRATION MAP
OCTOBER/NOVEMBER 2001
2001 ANNUAL GROUND WATER REPORT
EL DORADO CHEMICAL COMPANY
EL DORADO, ARKANSAS

6/12/01

Arkansas Analytical Inc.

11701 I-30 Bldg. 1, Ste. 115 • Little Rock, AR 72209
501.455.3233 • Fax 501.455.6118

El Dorado Chemical Inc.
4500 Northwest Avenue
El Dorado, AR 71731
Attn: Wes Morgan

Description: Three water samples received 5/31/01

ANALYTICAL RESULTS

Lab Number:		**K105643**	**K105644**	**K105645**	
Sample ID:		**MW-01**	**MW-02**	**MW-03**	**Date/Time**
Date/Time Collected:		5/29/01,1415	5/29/01,1515	5/29/01,1600	**Analyzed**
Ammonia-N	mg/L	< 0.5	< 0.5	< 0.5	6/7/01,1500
TDS	mg/L	42	340	180	5/13/01,0800
Nitrate-N	mg/L	1.83	< 0.5	< 0.5	5/31/01,1155
Sulfate	mg/L	3.67	19.6	10.6	5/31/01,1155
Lead	mg/L	< 0.04	< 0.04	< 0.04	6/4/01,0900
Chromium	mg/L	< 0.02	0.032	< 0.02	6/4/01,0900

QUALITY CONTROL RESULTS

	mg/L Blank	Percent Variance Duplicates	Percent Recovery Matrix Spike	Percent Recovery Control Spike	Method of Analysis
Ammonia-N	< 0.5	1.6	94.4	97.5	350.3
TDS	< 1.0	0.00	NA	95.8	160.1
Nitrate-N	< 0.5	0.200	82.2	100	300.0
Sulfate	< 1.0	0.601	82.3	99.8	300.0
Lead	< 0.04	1.58	85.6	91.2	200.7
Chromium	< 0.02	1.41	90.4	99.6	200.7

NA means not analyzed.
SM means Standard Method, 18th edition.
Methods are from EPA 600/4-79-020, Revised March, 1983
Instrument calibration and quality control samples performed at or above frequency specified in analytical method.

Metals analyzed by: Rodney Williams
Rodney Williams

Ammonia - N analyzed by: Joel Ledbetter
Joel Ledbetter

Anions analyzed by: Tracy Bounds (R2)
Tracy Bounds

TDS analyzed by: Stuart Berryhill
Stuart Berryhill

:NT I. MAT	:t De tion	Ti nd Tir	eserv odes
El Dorado Chemical Company		(CIRCLE ONE)	1. Cool, 4 degrees Centigrade / 4. Thiosulfate for dechlorination
4500 Northwest Avenue	Reporting Information	24 hour	2. Sulfuric Acid, pH <2 / 5. Hydrochloric Acid for VOA
El Dorado, AR. 71730	Telephone: 870-863-1484	48 hour	3. Nitric Acid, pH <2 / 6. Sodium Hydroxide, pH >12
	FAX: 870-863-1499	routine	
Attn: Wes Morgan	Bill to/P.O.	Preservative Code:	

Samplers:(Signature/s) Wes Morgan

Samplers:(Printed) Wes Morgan

Field Number	Sample Collection Date/s	Time/s	Grab	Comp	# of Containers	Sample Matrix	SAMPLE IDENTIFICATION/ DESCRIPTION	Preservative Code: 1,2	1	1,2							Arkansas Analytical Lab #
									TDS, NO3, SO4	Lead, Chromium							
	5/29/01	2:15 pm	X		3	mw	MW-01	NH3	✓	✓							K105643
	5/29/01	3:15 pm	X		3	mw	MW-02		✓	✓							K105644
	5/29/01	4:00 pm	X		3	mw	MW-03		✓	✓							K105645

1 Relinquished by:(Signature)	Date/Time	1.Received by:(Signature)
Wes		
2.Relinquished by:(Signature)	Date/Time	2.Received by laboratory :(Signature)
	5-31-01 0941	Chris Sullivan

For completion by laboratory

Condition of samples:	yes	no
A. Containers Correct:?	✓	
B. Preservation Correct:?	✓	
C. Seals Intact:?	NA	

REMARKS

6/13/01

Arkansas Analytical Inc.

11701 I-30 Bldg. 1, Ste. 115 • Little Rock, AR 72209
501.455.3233 • Fax 501.455.6118

El Dorado Chemical Inc.
4500 Northwest Avenue
El Dorado, AR 71731
Attn: Wes Morgan

Description: Three water samples received 6/6/01

ANALYTICAL RESULTS

		Lab Number:	K106062	K106063	K106064	
		Sample ID:	MW-13	MW-16	MW-17	Date/Time
		Date/Time Collected:	6/5/01,0945	6/5/01,1015	6/5/01,1114	Analyzed
Ammonia-N	mg/L		< 0.5	4.61	1.16	6/7/01,1500
TDS	mg/L		1400	1100	600	6/11/01,1600
Nitrate-N	mg/L		< 0.5	134	54.2	6/6/01,1253
Sulfate	mg/L		538	5.09	87.1	6/6/01,1253
Lead	mg/L		< 0.04	< 0.04	< 0.04	6/7/01,0800
Chromium	mg/L		< 0.02	< 0.02	< 0.02	6/7/01,0800

QUALITY CONTROL RESULTS

	mg/L Blank	Percent Variance Duplicates	Percent Recovery Matrix Spike	Percent Recovery Control Spike	Method of Analysis
Ammonia-N	< 0.5	1.6	94.4	97.5	350.3
TDS	< 1.0	2.62	NA	99.6	160.1
Nitrate-N	< 0.5	0.111	87.8	89.8	300.0
Sulfate	< 1.0	0.456	88.2	87.7	300.0
Lead	< 0.04	1.83	92.8	105	200.7
Chromium	< 0.02	0.064	96.7	91.0	200.7

NA means not analyzed.
SM means Standard Method, 18th edition.
Methods are from EPA 600/4-79-020, Revised March, 1983
Instrument calibration and quality control samples performed at or above frequency specified in analytical method.

Metals analyzed by: Rodney Williams
Rodney Williams

Ammonia - N analyzed by: Joel Ledbetter
Joel Ledbetter

Anions analyzed by: Tracy Bounds
Tracy Bounds

TDS analyzed by: Stuart Berryhill
Stuart Berryhill

CHAIN OF CUSTODY RECORD

CLIENT INFORMATION	Project Description	Turnaround Time (CIRCLE ONE)	Preservation Codes:
El Dorado Chemical		24 hour	1. Cool, 4 degrees Centigrade; 4. Thiosulfate for dechlorination
	Reporting Information	48 hour	2. Sulfuric Acid, pH <2; 5. Hydrochloric Acid for VOA
	Telephone:	routine	3. Nitric Acid, pH <2; 6. Sodium Hydroxide, pH >12
	FAX:	Preservative Code:	
	Bill to/P.O.		

Samplers:(Signature/s): Wes Morgan

Samplers:(Printed): Wes Morgan

Field Number	Sample Collection Date/s	Time/s	Grab	Comp	# of Containers	Sample Matrix	SAMPLE IDENTIFICATION/ DESCRIPTION	TEST PARAMETERS: 1 TDS	1 NO_3, SO_4	1,3 Pb, Cr	1,2 NH3	Arkansas Analytical Lab #
	6/5/01	945/A	✓		3	W	MW-13	✓	✓	✓	✓	K106062
	6/5/01	1015/A	✓		3	W	MW-16	✓	✓	✓	✓	K106063
	6/5/01	1114/A	✓		3	W	MW-17	✓	✓	✓	✓	K106064

1.Relinquished by:(Signature)	Date/Time	1.Received by:(Signature)

2.Relinquished by:(Signature)	Date/Time	2.Received by laboratory :(Signature)
	6/6/01 0954	

For completion by laboratory

Condition of samples:	yes	no
A. Containers Correct:?	✓	
B. Preservation Correct:?	✓	
C. Seals Intact:?	✓	

REMARKS

7/5/01

Arkansas Analytical Inc.

11701 I-30 Bldg. 1, Ste. 115 • Little Rock, AR 72209
501.455.3233 • Fax 501.455.6118

El Dorado Chemical Inc.
4500 Northwest Avenue
El Dorado, AR 71731
Attn: Wes Morgan

Description: Three water samples received 6/28/01

ANALYTICAL RESULTS

		Lab Number:	**K106537**	**K106538**	**K106539**	
		Sample ID:	**MW-12**	**MW-10**	**MW-9**	**Date/Time**
		Date/Time Collected:	**6/27/01,0940**	**6/27/01,1050**	**6/27/01,1120**	**Analyzed**
Ammonia-N	mg/L		2.2	< 0.5	< 0.5	6/28/01,0830
TDS	mg/L		330	1300	1600	7/2/01,1500
Nitrate-N	mg/L		< 0.5	156	28.8	6/28/01,1000
Sulfate	mg/L		13.0	100	520	6/28/01,1000
Lead	mg/L		< 0.04	< 0.04	< 0.04	6/27/01,1130
Chromium	mg/L		< 0.02	0.025	< 0.02	6/27/01,1130

QUALITY CONTROL RESULTS

	mg/L Blank	Percent Variance Duplicates	Percent Recovery Matrix Spike	Percent Recovery Control Spike	Method of Analysis
Ammonia-N	< 0.5	4.32	91.8	92.4	350.3
TDS	< 1.0	0.282	NA	95.4	160.1
Nitrate-N	< 0.5	0.505	99.4	99.0	300.0
Sulfate	< 1.0	1.02	96.6	98.0	300.0
Lead	< 0.04	0.983	90.2	89.3	200.7
Chromium	< 0.02	1.19	98.2	96.5	200.7

NA means not analyzed.
SM means Standard Method, 18th edition.
Methods are from EPA 600/4-79-020, Revised March, 1983
Instrument calibration and quality control samples performed at or above frequency specified in analytical method.

Metals analyzed by: Rodney Williams
Rodney Williams

Ammonia - N analyzed by: Joel Ledbetter
Joel Ledbetter

Anions analyzed by: Jeff Curry
Jeff Curry

TDS analyzed by: Stuart Berryhill by RG
Stuart Berryhill

CHAIN OF CUSTODY RECORD

CLIENT INFORMATION

El Dorado Chemical
P.O. Box 231
El Dorado AR 71731

Project Description

Reporting Information

Telephone: 870 863-1484
FAX: 870 863-1489
Bill to/P.O.

Turnaround Time (CIRCLE ONE)
24 hour
48 hour
routine
Preservative Code

Preservation Codes:

1. Cool, 4 degrees Centigrade
2. Sulfuric Acid, pH <2
3. Nitric Acid, pH <2
4. Thiosulfate for dechlorination
5. Hydrochloric Acid for VOA
6. Sodium Hydroxide, pH >12

Samplers:(Signature/s) Walt

Samplers:(Printed) Wes Morgan

Field Number	Sample Collection Date/s	Time/s	Grab	Comp	# of Containers	Sample Matrix	SAMPLE IDENTIFICATION/ DESCRIPTION	TEST PARAMETERS: 1 TDS	1 NO_3, SO_4	1,3 Pb, Cr	Arkansas Analytical Lab #
	6/27/01	940/A	✓		3	W	MW-12	✓	✓	✓	K106537
	6/27/01	1050/A	✓		3	W	MW-10	✓	✓	✓	K106538
	6/27/01	1120/A	✓		3	W	MW-9	✓	✓	✓	K106539

1.Relinquished by:(Signature)	Date/Time	1.Received by:(Signature)
		✓
2.Relinquished by:(Signature)	Date/Time	2.Received by laboratory :(Signature)
✓	6/28/01 0900	Barry Young

For completion by laboratory

Condition of samples:	yes	no
A. Containers Correct:?	✓	
B. Preservation Correct:?	✓	
C. Seals Intact:?	✓	

REMARKS

Phone:(501)455-3233**Fax:(501)455-6118

8/20/01

Arkansas Analytical Inc.

11701 I-30 Bldg. 1, Ste. 115 • Little Rock, AR 72209
501.455.3233 • Fax 501.455.6118

El Dorado Chemical Inc.
4500 Northwest Avenue
El Dorado, AR 71731
Attn: Wes Morgan

Description: Seven water samples received 8/10/01

ANALYTICAL RESULTS

Lab Number:		K108212	K108213	K108214	
Sample ID:		EDC-6	EDC-7	EDC-4	Date/Time
Date/Time Collected:		8/8/01,1235	8/8/01,1325	8/8/01,1400	Analyzed
Ammonia-N	mg/L	0.50	184	0.66	8/14/01,1630
TDS	mg/L	2100	1300	5100	8/15/01,0800
Nitrate-N	mg/L	298	336	< 0.5	8/10/01,0900
Sulfate	mg/L	18.3	316	925	8/10/01,0900
Lead	mg/L	< 0.04	< 0.04	< 0.04	8/10/01,1700
Chromium	mg/L	< 0.02	< 0.02	< 0.02	8/10/01,1700

Lab Number:		K108215	K108216	K108217	
Sample ID:		EDC-11	EDC-15	EDC-14	Date/Time
Date/Time Collected:		8/8/01,1420	8/8/01,1515	8/8/01,1605	Analyzed
Ammonia-N	mg/L	4.21	< 0.50	< 0.50	8/14/01,1630
TDS	mg/L	1100	140	1000	8/19/01,0800
Nitrate-N	mg/L	7.99	19.1	75.0	8/10/01,0900
Sulfate	mg/L	611	7.80	175	8/10/01,0900
Lead	mg/L	< 0.04	< 0.04	< 0.04	8/10/01,1700
Chromium	mg/L	< 0.02	< 0.02	< 0.02	8/10/01,1700

Lab Number:		K108218	
Sample ID:		EDC-5	Date/Time
Date Collected:		8/8/01	Analyzed
Ammonia-N	mg/L	< 0.50	8/14/01,1630
TDS	mg/L	1000	8/19/01,0800
Nitrate-N	mg/L	3.54	8/10/01,0900
Sulfate	mg/L	657	8/10/01,0900
Lead	mg/L	< 0.04	8/10/01,1700
Chromium	mg/L	< 0.02	8/10/01,1700

8/20/01

El Dorado Chemical Inc.
4500 Northwest Avenue
El Dorado, AR 71731
Attn: Wes Morgan

Description: Seven water samples received 8/10/01

QUALITY CONTROL RESULTS

	mg/L Blank	Percent Variance Duplicates	Percent Recovery Matrix Spike	Percent Recovery Control Spike	Method of Analysis
Ammonia-N	< 0.5	1.92	91.1	93.9	350.3
TDS	< 1.0	4.38	NA	97.3	160.1
Nitrate-N	< 0.5	2.47	111	101.2	300.0
Sulfate	< 1.0	1.39	99.2	100.5	300.0
Lead	< 0.04	4.61	89.8	88.1	200.7
Chromium	< 0.02	3.60	89.4	87.9	200.7

NA means not analyzed.
Methods are from EPA 600/4-79-020, Revised March, 1983
Instrument calibration and quality control samples performed at or above frequency specified in analytical method.

Metals analyzed by: Rodney Williams
Rodney Williams

Ammonia - N analyzed by: Joel Ledbetter
Joel Ledbetter

Anions analyzed by: Tracy Bounds
Tracy Bounds

TDS analyzed by: Stuart Berryhill by SB
Stuart Berryhill

Arkansas Analytical Inc.

CHAIN OF CUSTODY RECORD

CLIENT INFORMATION	Project Description	Turnaround Time (CIRCLE ONE)
El Dorado Chemical		24 hour
El Dorado, Ark.	Reporting Information	48 hour
	Telephone:	routine
	FAX:	Preservative Code:
	Bill to/P.O. 234993	

Preservation Codes:
1. Cool, 4 degrees Centigrade
2. Sulfuric Acid, pH <2
3. Nitric Acid, pH <2
4. Thiosulfate for dechlorination
5. Hydrochloric Acid for VOA
6. Sodium Hydroxide, pH >12

Samplers:(Signature/s)

Samplers:(Printed)

Field Number	Sample Collection Date/s	Time/s	Grab	Comp	# of Containers	Sample Matrix	SAMPLE IDENTIFICATION/ DESCRIPTION	TEST PARAMETERS: TDS	NO_3, SO_4	Pb, Cr	NH3	Arkansas Analytical Lab #
EDC-6	8/8/01	12:35	✓		3	Water	MW - Water	✓	✓	✓	✓	K108212
EDC-7	8/8/01	13:25	✓		3	Water	" "	✓	✓	✓	✓	K108213
EDC-4	8/8/01	14.00	✓		3	Water	" "	✓	✓	✓	✓	K108214
EDC-11	8/8/01	14:20	✓		3	Water	" "	✓	✓	✓	✓	K108215
EDC-15	8/8/01	15:15	✓		3	Water	" "	✓	✓	✓	✓	K108216
EDC-MW-H	8/8/01	16:05	✓		3	Water	" "	✓	✓	✓	✓	K108217

1.Relinquished by:(Signature)	Date/Time	1.Received by:(Signature)
Mark Deacon	8/9/01 8.40	
2.Relinquished by:(Signature)	Date/Time	2.Received by laboratory :(Signature)
Velocity Express	8-10-01 0807	Chris Sullivan

For completion by laboratory

Condition of samples:	yes	no
A. Containers Correct:?	✓	
B. Preservation Correct:?	✓	
C. Seals Intact:?		✓

REMARKS

temp 1°C

...INC. ** 11704 I-30, Bldg 4, Suite 115**Little Rock, Arkansas 72209**phone(501)455-3233**Fax(501)455-6118

CHAIN OF CUSTODY RECORD

CLIENT INFORMATION

El Dorado Chemical
El Dorado, Ark

Project Description

Reporting Information

Telephone:

FAX:

Bill to/P.O. 234993

Turnaround Time
(CIRCLE ONE)
24 hour
48 hour
routine
Preservative Code

Preservation Codes:

1. Cool, 4 degrees Centigrade
2. Sulfuric Acid, pH <2
3. Nitric Acid, pH <2
4. Thiosulfate for dechlorination
5. Hydrochloric Acid for VOA
6. Sodium Hydroxide, pH >12

Samplers:(Signature/s)

Samplers:(Printed)

Field Number	Sample Collection Date/s	Time/s	Grab	Comp	# of Containers	Sample Matrix	SAMPLE IDENTIFICATION/ DESCRIPTION	TEST PARAMETERS: 1 TDS	1 NO_3, SO_4	1,3 Pb, Cr	1,2 NH_3	Arkansas Analytical Lab #
EDC-5	8/8/01	[illegible]	✓		3	W	MW - water	✓	✓	✓	✓	K108218

1.Relinquished by:(Signature): Mark Pearson
Date/Time: 8/9/01
1.Received by:(Signature):

2.Relinquished by:(Signature): Velocity Express
Date/Time: 8-10-01 0807
2.Received by laboratory :(Signature): Chris Sullen

For completion by laboratory

Condition of samples:	yes	no
A. Containers Correct:?	✓	
B. Preservation Correct:?	✓	
C. Seals Intact:?		✓

REMARKS

temp 1°C

[illegible] Rd. # 11204 I-30, Bldg 4, Suite 115**Little Rock, Arkansas 72209**phone(501)455-3233**Fax(501)455-6118

11/14/01

Arkansas Analytical Inc.
11701 I-30 Bldg. 1, Ste. 115 • Little Rock, AR 72209
501.455.3233 • Fax 501.455.6118

El Dorado Chemical Inc.
4500 Northwest Avenue
El Dorado, AR 71731
Attn: Randall Whitmore

Description: Sixteen water samples received 10/31/01

ANALYTICAL RESULTS

Lab Number:	K111002	K111003	K111004	K111005	
Sample ID:	MW-14	MW-19	MW-13	MW-9	Date/Time
Date/Time Collected:	10/30/01,1143	10/30/01,1503	10/30/01,1253	10/30/01,1525	Analyzed
Units:	mg/L	mg/L	mg/L	mg/L	
Ammonia-N	< 0.5	< 0.5	< 0.5	< 0.5	11/1/01,0900
Nitrate-N	25.2	186	< 0.5	26.7	11/1/01,0830
Sulfate	211	325	606	514	11/1/01,0830
TDS	790	1100	1300	2600	11/2/01,1000
Lead	< 0.04	< 0.04	< 0.04	< 0.04	11/7/01,0800
Chromium	< 0.02	< 0.02	< 0.02	< 0.02	11/7/01,0800

Lab Number:	K111006	K111007	K111008	K111009	
Sample ID:	MW-4	MW-8	MW-10	MW-18	Date/Time
Date/Time Collected:	10/30/01,1326	10/30/01,1512	10/30/01,1603	10/30/01,1820	Analyzed
Units:	mg/L	mg/L	mg/L	mg/L	
Ammonia-N	< 0.5	0.94	< 0.5	< 0.5	11/1/01,0900
Nitrate-N	< 0.5	1030	153	< 0.5	11/1/01,0830
Sulfate	936	81.1	134	3.74	11/1/01,0830
TDS	5200	5000	1400	300	11/2/01,1000
Lead	0.06	< 0.04	< 0.04	< 0.04	11/7/01,0800
Chromium	0.04	< 0.02	0.04	0.05	11/7/01,0800

Lab Number:	K111010	K111011	K111012	K111013	
Sample ID:	MW-11	MW-17	MW-5	Trip Blank	Date/Time
Date/Time Collected:	10/30/01,1555	10/30/01,1230	10/30/01,1430	NA	Analyzed
Units:	mg/L	mg/L	mg/L	mg/L	
Ammonia-N	< 0.5	< 0.5	< 0.5	< 0.5	11/1/01,0900
Nitrate-N	21.9	106	3.27	< 0.5	11/1/01,0830
Sulfate	334	11.5	526	< 1.0	11/1/01,0830
TDS	610	760	980	< 1.0	11/2/01,1000
Lead	< 0.04	< 0.04	< 0.04	< 0.04	11/7/01,0800
Chromium	< 0.02	< 0.02	< 0.02	< 0.02	11/7/01,0800

11/14/01

El Dorado Chemical Inc.
4500 Northwest Avenue
El Dorado, AR 71731
Attn: Randall Whitmore

Description: Sixteen water samples received 10/31/01

ANALYTICAL RESULTS

Lab Number:	K111014	K111015	K111016	K111017	
Sample ID:	MW-16	MW-7	MW-6	MW-15	Date/Time
Date/Time Collected:	10/30/01,1205	10/30/01,1500	10/30/01,1445	10/30/01,1151	Analyzed
Units:	mg/L	mg/L	mg/L	mg/L	
Ammonia-N	< 0.5	< 0.5	< 0.5	< 0.5	11/1/01,0900
Nitrate-N	58.4	189	326	12.6	11/1/01,0830
Sulfate	6.44	322	15.7	10.2	11/1/01,0830
TDS	330	1056	2700	110	11/2/01,1000
Lead	< 0.04	< 0.04	< 0.04	< 0.04	11/7/01,0800
Chromium	< 0.02	< 0.02	< 0.02	< 0.02	11/7/01,0800

QUALITY CONTROL RESULTS

	mg/L Blank	Percent Variance Duplicates	Percent Recovery Matrix Spike	Percent Recovery Control Spike	Method of Analysis
Ammonia-N	< 0.5	2.17	88.5	92.0	350.3
Nitrate-N	< 0.5	0.489	106	102	300.0
Sulfate	< 1.0	0.990	123	101	300.0
TDS	< 1.0	5.88	NA	95.4	160.1
Lead	< 0.04	2.12	94.9	102	200.7
Chromium	< 0.04	2.05	98.3	96.5	200.7

NA means not analyzed.
Methods are from EPA 600/4-79-020, Revised March, 1983.
Instrument calibration and quality control samples performed at or above frequency specified in analytical method.

Anioins analyzed by: Tracy Bounds
Tracy Bounds

Ammonia - N analyzed by: Joel Ledbetter by Christy Sullivan
Joel Ledbetter, Christy Sullivan

TDS analyzed by: Stuart Berryhill
Stuart Berryhill

Metals analyzed by: Rodney Williams
Rodney Williams

Arkansas Analytical Inc.

ENVIRONMENTAL MANAGEMENT SERVICES, INC.

CHAIN-OF-CUSTODY RECORD

1 of 2

Page 1 of 2

Project Name/No.: El Dorado Chemical Co.
Location:
P.O. Number: Groundwater Sampling
Shipping Container ID:
Sampler(s):

Routing Instructions:
☐ E-mail results to _____ @ _____
☐ Fax results to
Mail original to:

Send Report to: Randall Whitsenant, El Dorado Chemical Co
4500 N. West Ave
El Dorado, AR 71730

Sample Identity	Date	Time	Comp	Grab	Ammonia	Nitrate	Sulfate	TDS	Lead	Chromium			No. of Containers	Remarks/Condition on Receipt
MW-14	10/30	~~11:45~~ 1143	✓		✓	✓	✓	✓	✓	✓			3	K111002
MW-15	10/30	~~11:45~~ 1151	✓		✓	✓	✓	✓	✓	✓			3	017
MW-16	10/30	~~12:01~~ 1205	✓		✓	✓	✓	✓	✓	✓			3	014
MW-17	10/30	~~12:16~~ 1230	✓		✓	✓	✓	✓	✓	✓			3	011
MW-13	10/30	12:53	✓		✓	✓	✓	✓	✓	✓			3	004
MW-4	10/30	~~13:28~~ 1324	✓		✓	✓	✓	✓	✓	✓			3	006
MW-5	10/30	~~14:26~~ 1439	✓		✓	✓	✓	✓	✓	✓			3	012
MW-6	10/30	~~14:30~~ 1445	✓		✓	✓	✓	✓	✓	✓			3	016
MW-7	10/30	~~14:52~~ 1450	✓		✓	✓	✓	✓	✓	✓			3	015
MW-19	10/30	~~15:03~~ 1080	✓		✓	✓	✓	✓	✓	✓				003
Transporter:		Airbill/Invoice No.							Total Containers:					

SAMPLE TRANSFER (Retain original with samples)

		(Name)	(Organization)	(Date/Time)		(Name)	(Organization)	(Date/Time)
1.	Relinquished by:	Mark Tesson,	EMS	10/31	Received by:	[signature]	EDC	11/3/01 12:15PM
2.	Relinquished by:	[signature]	EDC	10/31/01	Received by:			
3.	Relinquished by:				Received by:			

Notes: Per Wes Morgan, the times on bottle were used. The times for sampling were different from COC; SS 11-5-01

ENVIRONMENTAL MANAGEMENT SERVICES, INC.

CHAIN-OF-CUSTODY RECORD

2 of 2

Page 2

Project Name/No.: El Dorado Chemical Co
Location:
P.O. Number: Groundwater Sampling
Shipping Container ID:
Sampler(s):

Routing Instructions:
☐ E-mail results to _____ @ _____
☐ Fax results to
Mail original to:

send Report to: Randall Whitmore
El Dorado Chemical Co
4300 N. West Ave
El Dorado, AR 71730

Sample Identity	Date	Time	Sample Comp	Sample Grab	Ammonia	Nitrate	Sulfate	TDS	Lead	Chromium			No. of Containers	Remarks/Condition on Receipt
MW-8	10/30	15:~~07~~ 12	✓		✓	✓	✓	✓	✓	✓			3	007
MW-9	10/30	15:~~20~~ 25	✓		✓	✓	✓	✓	✓	✓			3	005
MW-11	10/30	15:~~50~~ 55	✓		✓	✓	✓	✓	✓	✓			3	010
MW-10	10/30	16:~~02~~ 03	✓		✓	✓	✓	✓	✓	✓			3	008
MW-18	10/30	18:~~32~~ 20	✓		✓	✓	✓	✓	✓	✓			3	009
Trip Blank			✓		✓	✓	✓	✓	✓	✓			3	013

Transporter: Airbill/Invoice No. Total Containers:

SAMPLE TRANSFER (Retain original with samples)

		(Name)	(Organization)	(Date/Time)		(Name)	(Organization)	(Date/Time)
1.	Relinquished by:	Mark Tessom	EMS	10:31	Received by:	[signature]	EDCC	10/31/01 12:15 PM
2.	Relinquished by:	[signature]	EDCC		Received by:			
3.	Relinquished by:				Received by:			

Notes: Per Wes Morgan, the times on bottle were used. The times for sampling were different from COC; SV 11-5-01

11/16/01

Arkansas Analytical Inc.

11701 I-30 Bldg. 1, Ste. 115 • Little Rock, AR 72209
501.455.3233 • Fax 501.455.6118

El Dorado Chemical Inc.
4500 Northwest Avenue
El Dorado, AR 71731
Attn: Randall Whitmore

CORRECTED REPORT
Description: Four water samples received 11/2/01

ANALYTICAL RESULTS

Lab Number:	K111034	K111035	K111036	K111037	
Sample ID:	MW-3	MW-2	MW-1	Blank	Date/Time
Date/Time Collected:	11/1/01,1130	11/1/01,1150	11/1/01,1221	NA	Analyzed
Units:	mg/L	mg/L	mg/L	mg/L	
Ammonia-N	< 0.5	< 0.5	< 0.5	< 0.5	11/7/01,1300
Nitrate-N	< 0.5	< 0.5	2.74	< 0.5	11/2/01,1030
Sulfate	22.5	22.9	3.34	< 1.0	11/2/01,1030
TDS	240	300	43	< 1.0	11/7/01,1200
Lead	< 0.04	< 0.04	< 0.04	< 0.04	11/7/01,0800
Chromium	< 0.02	< 0.02	< 0.02	< 0.02	11/7/01,0800

QUALITY CONTROL RESULTS

	mg/L Blank	Percent Variance Duplicates	Percent Recovery Matrix Spike	Percent Recovery Control Spike	Method of Analysis
Ammonia-N	< 0.5	0.985	99.3	101.5	350.3
Nitrate-N	< 0.5	0.489	106	102	300.0
Sulfate	< 1.0	0.990	123	101	300.0
TDS	< 1.0	6.67	NA	94.2	160.1
Lead	< 0.04	2.12	94.9	102	200.7
Chromium	< 0.02	2.05	98.3	96.5	200.7

NA means not analyzed.
Methods are from EPA 600/4-79-020, Revised March, 1983.
Instrument calibration and quality control samples performed at or above frequency specified in analytical method.

Anions analyzed by: _____
Tracy Bounds

Ammonia - N analyzed by: _____
Joel Ledbetter, Christy Sullivan

TDS analyzed by: _____
Stuart Berryhill

Metals analyzed by: _____
Rodney Williams

ENVIRONMENTAL
MANAGEMENT SERVICES, INC.

CHAIN-OF-CUSTODY RECORD

Page 1 of 1

Project Name/No.: El Dorado Chemical Co.
Location:
P.O. Number:
Shipping Container ID:
Sampler(s): Mark Tesson; Jon Tarner

Routing Instructions:
☐ E-mail results to _____ @ _____
☐ Fax results to
Mail original to:

Send Report To: Randall Whitmore
El Dorado Chemical Co.
4500 N. West Ave.
El Dorado AR 71730

Sample Identity	Date	Time	Sample Comp	Sample Grab	Ammonia	Nitrate	Sulfate	TDS	Lead	Chromium			No. of Containers	Remarks/Condition on Receipt
MW-3	11/1	11:30	✓		✓	✓	✓	✓	✓	✓			1	K 1 11 034
MW-2	11/1	11:50	✓		✓	✓	✓	✓	✓	✓			1	035
MW-1	11/1	12:21	✓		✓	✓	✓	✓	✓	✓			1	036
BLANK	~~11/21~~	NA			✓	✓	✓	✓	✓	✓				037

Transporter: | Airbill/Invoice No. | Total Containers:

SAMPLE TRANSFER (Retain original with samples)

		(Name)	(Organization)	(Date/Time)		(Name)	(Organization)	(Date/Time)
1.	Relinquished by:	Mark Tesson	EMS	11/1	Received by:	[signature]	AR Analytical	11/2/01 0820
2.	Relinquished by:				Received by:			
3.	Relinquished by:				Received by:			

Notes: _____

State of Arkansas
Department of Environmental Quality
Laboratory Certification Program

Be it known that **Arkansas Analytical, Inc.**
Little Rock, Arkansas
has earned certification by this Department for the period of

November 6, 2001 **to** **October 30, 2002**

The following parameters are certified:

Alkalinity	Oil & Grease	Turbidity	Iron	Tin
Ammonia	Orthophosphate	Aluminum	Lead	Titanium
BOD	pH	Antimony	Magnesium	Vanadium
Bromide	Phenol	Arsenic	Manganese	Zinc
CBOD	Phosphorus	Barium	Mercury	Fecal Coliform
Chloride	Specific Conductance	Beryllium	Molybdenum	Herbicides
Chlorine	Sulfate	Boron	Nickel	Pesticides and PCBs
COD	Surfactants	Cadmium	Potassium	Semi-volatiles
Cyanide	TDS	Calcium	Selenium	TPHC
Fluoride	TKN	Chromium	Silver	Volatile Organics
Hardness	TOC	Cobalt	Sodium	Acute Toxicity
Nitrate	Total Solids	Copper	Strontium	Chronic Toxicity
Nitrite	TSS	Hexavalent Chromium	Thallium	

November 6, 2001
Date

Jeffrey M. Ruehr
Quality Assurance Officer

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