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Western Division

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40-8714
RETURN ORIGINAL TO PDR, HQ.

July 25, 1988

Mr. Richard Engelmann
Land Quality Division
WYOMING DEPARTMENT OF ENVIRONMENTAL QUALITY
Herschler Building - Third Floor
122 West 25th Street
Cheyenne, Wyoming 82002

✓ Mr. Gary Konwinski
Uranium Recovery Field Office
Region IV
U.S. NUCLEAR REGULATORY COMMISSION
P.O. Box 25325
Denver, Colorado 80225



Gentlemen:

SUBJECT: COLLINS DRAW - JULY 1988 GROUNDWATER ANALYSES

Enclosed are Energy Labs' analytical results from the July 6 samples of the eleven B-Well Field wells and the five monitor wells. This was the last scheduled sampling period in the one-year, post-H₂S stability monitoring program.

Cliffs and Energy Labs will now compile the data and prepare a report covering the groundwater quality for the various stages at Collins Draw, i.e., pre-mining, post-mining (pre-H₂S), and post-H₂S. The emphasis in the later stages will be on selenium concentrations since that was one parameter of concern to the DEQ which led us to try the H₂S treatment of the groundwater in 1987. The report will be the basis for a formal request from Cleveland-Cliffs that the agencies determine that groundwater at the site has been adequately restored and that we be allowed to proceed with final project termination.

We have been informed that the DEQ is losing Kim Clarkin and that new employees will now be assigned to the Collins Draw review. Since they will need adequate time to review the project files and our forthcoming report, a meeting between Cliffs, its partners, the DEQ, and the NRC will not be feasible until late August or early September. Accordingly, a tentative date of September 7 at 9:30 a.m. in Cheyenne has been set. This set-back represents a potential problem for Cliffs if a decision cannot be made by the

880906-0185 880725
PDR ADOCK 04008714
C PDC

DESIGNATED ORIGINAL

Certified By Mary C. Hood

FEES NOT REQUIRED
Info only

DF03
88-1057

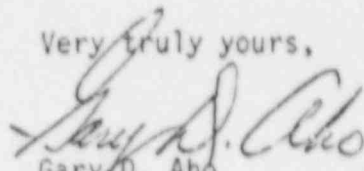
Mr. Richard Engelmann
Mr. Gary Konwinski

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July 25, 1988

agencies shortly after the meeting since it could severely restrict our ability to complete site decontamination work, reclamation, and seeding before winter weather sets in. I believe we all have a goal of seeing this work done in 1988, if the DEQ agrees the groundwater restoration work is adequate. Therefore, your cooperation is requested in seeing that we address the issues before us as promptly as possible.

Very truly yours,



Gary D. Aho
Manager-Western Division

GDA:ms

Enclosure

xc w/encl: H. F. Straw
D. H. France
A. Roeger
P. W. Cain
W. D. Robison
T. C. Levan
T. E. Louderback
w/o encl: R. Wood (DEQ)
R. A. Garling

WATER ANALYSIS REPORT - CLEVELAND CLIFFS

Project: Collins Draw

SAMPLE I.D.: Well #190

	#1	#2	#3	#4	#5	#6	
Sample Round:							
Sample Date:	09-08-87	11-12-87	01-06-88	03-03-88	04-04-88	05-05-88	06-02-88 07-06-88 Det. Limit
Report Date:	09-29-87	12-28-87	01-27-88	03-24-88	05-25-88	05-25-88	06-23-88 07-19-88 % Range
Sample Number:	#1	87-14699	88-0133	88-1924	88-3790	88-5909	88-6915 88-8708
Lab:	WAMCO	ELI	ELI	ELI	ELI	ELI	ELI

MAJOR IONS mg/l:

Ca	7.0	12.7	9.3	7.8		8.6	9.6	0.05
Mg	5.0	5.6	3.0	2.8		3.1	3.7	0.01
Na	99	140	111	110		119	125	0.05
K	211	408	312	253		343	346	0.10
CO3	150	17.3	20.7	23.5		20.1	14.8	0.10
HCO3	449	697	662	641		642	682	0.10
SO4	372	564	397	412		440	481	0.50
Cl	53.0	48.7	44.9	29.9		39.5	36.7	0.10
NH4 (N)	127	121	104	118		105	117	0.05
TDS @ 180 C (Calculated)	952	1545	1343	1305		1429	1510	1.0
pH (units)	8.57	8.73	8.83	8.90		8.83	8.67	1-14
H2S - g							14.4	

TRACE METALS mg/l:

As	0.085	0.118	0.125	0.063		0.128	0.096	0.001
Mo	<0.10	<0.10	<0.10	<0.10		<0.10	<0.10	0.10
Se EPA Pres.	1.420	0.077	0.179	0.248	0.358	0.326	0.434	0.260 0.001
Se Filt. Only				0.530	0.557	0.715	0.729	0.636 0.001
V	<0.10	0.40	0.50	0.40		0.10	0.30	0.10

RADIOMETRIC pCi/l:

U (eq/l)	13.823	11.066	10.094	16.651		13.322	14.400	0.0003
Ra226	65.0	630.6	432.6	631.4		473	714	0.20
Ra Prec. +/-	6.1	7.9	5.2	6.9		18.7	24.4	

Q.A. DATA:

Anion eq:	19.54	25.12	21.08	20.74		21.47	22.73	
Cation eq:	21.59	26.29	20.96	20.32		22.16	23.62	
A/C Balance:	0.905	0.955	1.006	1.021		0.969	0.962	0.95-1.05
WYDER A/C Bal. %	4.98	2.28	-0.29	-1.02		1.58	1.92	-5 - +5

Q.A. MANAGER: Rag/KK.
ENERGY LABORATORIES, INC.

CLEVELAND CLIFFS - DOWNHOLE SAMPLING REPORT

Project: Collins Draw

Well No: 190
Water Level to Casing: 73.71 '
Casing Height: 3.04 '
Water Level: 70.67 '
I.D./Casing I.D.: 485'/5"
Casing Volume: 422.6 Gal
Date Sampled: 07-06-88
Pump Depth: 400'
Pump Type: Downhole Submersible Pump

<u>Date</u>	<u>Time</u>	<u>Meter</u>	<u>Rate</u>	<u>pH</u>	<u>Temp</u>	<u>Uncorrected Cond</u>
07-06-88	10:30	175929		9.04	12.4	580
	11:02	176670	23.2	8.99	14.7	920
	11:15	177005	25.8	8.95	14.7	1110
	11:25	177323	31.8	8.96	15.8	1150

Total Time Pumped: 55 Min
Total Gal. Pumped: 1394
Casing Displacement: 3.30
Time Sampled: 11:25
Sampler: Energy Laboratories, Inc./RAB/KRS

WATER ANALYSIS REPORT - CLEVELAND CLIFFS

Project: Collins Draw

SAMPLE I.D.: Well #231

	#1	#2	#3	#4	#5	#6	
Sample Round:	09-08-87	11-12-87	01-05-88	03-02-88	04-04-88	05-05-88	06-02-88
Sample Date:	09-29-87	12-28-87	01-27-88	03-24-88	05-25-88	05-25-88	06-13-88
Report Date:							
Sample Number:	#2	87-14700	88-0119	88-1851	88-3791	88-5910	88-6916
Lab:	WAMCO	ELI	ELI	ELI	ELI	ELI	ELI

MAJOR IONS mg/l:

	#1	#2	#3	#4	#5	#6	Det. Limit & Range
Ca	9.0	12.8	14.2	12.3	12.1	10.0	0.05
Mg	6.0	1.5	1.7	1.7	1.7	1.4	0.01
Na	93	84.0	86.4	77.8	81	73.4	0.05
K	163	223	181	146	126	103	0.10
CO3	0	3.5	0	0	0	0	0.10
HCO3	299	327	315	312	265	206	0.10
SO4	452	411	360	286	318	260	0.50
Cl	30.0	21.2	23.5	21.8	20.1	19.1	0.10
NH4 (N)	74.0	58.0	55.2	55.2	51.4	39.3	0.05
TDS @ 180 C (Calculated)	835	921	883	783	757	622	1.0
pH (units)	7.24	8.37	7.94	7.51	7.86	7.84	1-14
H2S - g						27.2	

TRACE METALS mg/l:

	#1	#2	#3	#4	#5	#6	
As	0.008	0.008	0.028	0.020	0.026	0.026	0.001
Mo	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10
Se EPA Pres.	0.039	0.063	0.040	0.016	0.018	0.005	0.001
Se Filt. Only				0.029	0.030	0.023	0.021
V	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10

RADIOMETRIC pCi/l:

	#1	#2	#3	#4	#5	#6	
U (mg/l)	9.752	2.567	3.281	2.306	1.460	1.228	0.0003
Ra226	146.0	106.7	145.2	124.4	116	86.2	0.20
Ra Prec. +/-	9.0	3.3	3.4	3.1	9.3	8.6	

Q.A. DATA:

	#1	#2	#3	#4	#5	#6	
Anion meq	14.45	14.64	13.33	11.71	11.54	9.33	
Cation meq	15.15	14.28	13.19	11.83	11.17	9.26	
A/C Balance	0.954	1.025	1.011	0.990	0.968	1.008	0.95-1.05
WYDEQ A/C Bal.1	2.36	-1.24	-0.53	0.51	-1.63	-0.38	-5 - +5

Q.A. MANAGER: RAG/KK
ENERGY LABORATORIES, INC.

CLEVELAND CLIFFS - DOWNHOLE SAMPLING REPORT

Project: Collins Draw

Well No: 231
Water Level to Casing: 73.71 '
Casing Height: 1.52 '
Water Level: 72.19 '
T.D./Casing I.D.: 485'/5"
Casing Volume: 421.0 Gal
Date Sampled: 07-06-88
Pump Depth: 400'
Pump Type: Downhole Submersible Pump

Date	Time	Meter	Rate	pH	Temp	Uncorrected Cond
07-06-88	14:25	203767				
	14:48	204330	24.5	7.63	15.0	620
	15:00	204580	20.8	7.45	15.3	690
	15:13	204850	20.8	7.51	17.2	670

Total Time Pumped: 48 Min
Total Gal. Pumped: 1083 Gal
Casing Displacement: 2.57
Time Sampled: 15:13
Sampler: Energy Laboratories, Inc./RAG/KRS

WATER ANALYSIS REPORT - CLEVELAND CLIFFS

Project: Collins Draw

SAMPLE I.D.: Well #232

Sample Round:	#1	#2	#3	#4	#5	#6	
Sample Date:	09-08-87	11-12-87	01-05-88	03-02-88	04-04-88	05-05-88	06-02-88 07-06-88 Det. Limit
Report Date:	09-29-87	12-28-87	01-27-88	03-24-88	05-25-88	05-25-88	06-13-88 07-19-88 & Range
Sample Number:	#3	87-14701	88-0120	88-1853	88-3792	88-5911	88-6917 88-8710
Lab:	WAMCO	ELI	ELI	ELI	ELI	ELI	ELI

MAJOR IONS mg/l:

Ca	30.0	38.8	47.2	35.6		33.1	32.9	0.05
Mg	5.0	5.4	5.4	4.4		4.0	3.5	0.01
Na	105	122.0	124	107		103	97.6	0.05
K	181	336	285	197		256	204	0.10
CO3	0	0	0	0		0	0	0.10
HCO3	348	606	546	561		517	498	0.10
SO4	640	630	582	457		416	335	0.50
Cl	27.0	22.5	26.7	25.2		23.0	27.4	0.10
NH4 (N)	85.0	98.0	101	98.0		70.8	72.0	0.05
TDS @ 180 C (Calculated)	983	1457	1467	1249		1185	1054	1.0
pH (units)	7.07	7.87	7.69	7.60		7.99	7.94	1-14
H2S - g							72.8	

TRACE METALS mg/l:

As	0.012	0.007	0.100	0.114		0.071	0.054	0.001
Mo	<0.10	<0.10	<0.10	<0.10		<0.10	<0.10	0.10
Se EPA Pres.	0.086	0.062	0.020	0.014	0.015	0.004	0.010	0.001
Se Filt. Only				0.021	0.036	0.035	0.030	0.029 0.001
V	<0.10	<0.10	<0.10	<0.10		<0.10	<0.10	0.10

RADIOMETRIC pCi/l:

U (ug/l)	12.805	16.157	22.712	24.336		13.322	12.267	0.0003
Ra226	6.4	160.7	276.1	159.3		137	109	0.20
Ra Prec. +/-	6.0	3.6	4.5	3.5		10.1	9.6	

Q.A. DATA:

Anion meq	19.54	23.69	21.83	19.45		17.79	15.91	
Cation meq	21.59	23.31	22.72	19.46		18.09	16.51	
A/C Balance	0.905	1.016	0.961	0.999		0.984	0.964	0.95-1.05
WYDER A/C Bal.%	4.98	-0.81	2.00	0.03		0.84	1.85	-5 - +5

Q.A. MANAGER: Rag/KK.
ENERGY LABORATORIES, INC.

CLEVELAND CLIFFS - DOWNHOLE SAMPLING REPORT

Project: Collins Draw

Well No: 232
Water Level to Casing: 73.00 '
Casing Height: 2.02 '
Water Level: 70.98 '
I.D./Casing I.D.: 485'/5"
Casing Volume: 422.3 Gal
Date Sampled: 07-06-88
Pump Depth: 400'
Pump Type: Downhole Submersible Pump

<u>Date</u>	<u>Time</u>	<u>Meter</u>	<u>Rate</u>	<u>pH</u>	<u>Temp</u>	<u>Uncorrected Cond</u>
07-06-88	15:25	204850				
	15:37	205000	12.5	7.85	15.3	1000
	16:05	205350	10.9	7.81	15.3	1000
	16:11	205495	24.1	7.75	16.9	1060
	16:52	205950	11.1	7.75	15.2	1060
	17:05	206038	12.6	7.82	15.9	1050

Total Time Pumped: 100 Min
Total Gal. Pumped: 1188
Casing Displacement: 2.81
Time Sampled: 17:05
Sampler: Energy Laboratories, Inc./RAG/KRS

WATER ANALYSIS REPORT - CLEVELAND CLIFFS

Project: Collins Draw

SAMPLE I.D.: Well #233

Sample Round:	#1	#2	#3	#4	#5	#6	
Sample Date:	09-08-87	11-12-87	01-05-88	03-03-88	04-04-88	05-05-88	06-02-88 07-06-88 Det. Limit
Report Date:	09-29-87	12-28-87	01-27-88	03-24-88	05-25-88	05-25-88	06-13-88 07-19-88 & Range
Sample Number:	#4	87-14702	88-0123	88-1925	88-3793	88-5912	88-5912 88-8711
Lab:	WAMCO	ELI	ELI	ELI	ELI	ELI	ELI

MAJOR IONS mg/l:

Ca	19.0	49.9	72.6	73.7		77.9	75.9	0.05
Mg	4.0	7.5	5.4	10.0		10.0	9.8	0.01
Na	102	128.0	130	127		132	123	0.05
K	172	306	323	259		312	301	0.10
CO3	0	0	0	0		0	0	0.10
HCO3	653	627	564	600		568	575	0.10
SO4	386	666	720	772		748	646	0.50
Cl	36.0	31.2	30.2	33.4		29.3	36.6	0.10
NH4 (M)	94.0	108	115	124		99.0	100	0.05
TDS @ 180 C (Calculated)	956	1505	1691	1741		1720	1617	1.0
pH (units)	7.23	7.92	7.68	7.80		7.73	7.59	1-14
H2S - g							34.4	

TRACE METALS mg/l:

As	0.420	0.010	0.247	0.065		0.174	0.052	0.001
Mo	<0.10	<0.10	<0.10	<0.10		<0.10	<0.10	0.10
Se EPA Pres.	0.045	0.118	0.026	0.011	0.013	0.008	0.013	0.002 0.001
Se Filt. Only				0.029	0.028	0.024	0.022	0.016 0.001
V	<0.10	<0.10	<0.10	<0.10		<0.10	<0.10	0.10

RADIOMETRIC pCi/l:

U (mg/l)	36.465	11.288	13.122	14.090		8.711	8.807	0.0003
Ra226	37.0	492.4	725.3	617.8		722	751	0.20
Ra Prec. +/-	4.6	6.3	6.7	6.7		23.2	22.7	

Q.A. DATA:

Anion meq:	16.83	25.03	25.10	26.89		25.72	23.92	
Cation meq:	19.76	24.24	26.22	25.92		25.54	24.82	
A/C Balance:	0.852	1.033	0.957	1.037		1.007	0.964	0.95-1.05
WYDEQ A/C 2al.1	8.01	-1.60	2.18	-1.84		-0.35	1.85	-5 - +5

Q.A. MANAGER: RAG/KK
ENERGY LABORATORIES, INC.

CLEVELAND CLIFFS - DOWNHOLE SAMPLING REPORT

Project: Collins Draw

Well No: 233
Water Level to Casing: 71.71
Casing Height: 1.92
Water Level: 69.79
I.D./Casing I.D.: 485'/5"
Casing Volume: 423.5
Date Sampled: 07-06-88
Pump Depth: 400'
Pump Type: Downhole Submersible Pump

Date	Time	Meter	Rate	pH	Temp	Uncorrected Cond
07-06-88	11:50	177323				
	12:03	177500	13.6	7.36	13.7	1100
	12:26	177792	12.7	7.49	15.3	1030
	12:44	177950	8.8	7.54	15.4	1020
	13:07	178220	11.7	7.46	15.8	1020
	13:15	178310	11.3	7.60	16.7	1360

Total Time Pumped: 85 Min
Total Gal. Pumped: 987 Gal
Casing Displacement: 2.33
Time Sampled: 13:15
Sampler: Energy Laboratories, Inc./RAG/KRS

WATER ANALYSIS REPORT - CLEVELAND CLIFFS

Project: Collins Draw

SAMPLE I.D.: Well #234

Sample Round:	#1	#2	#3	#4	#5	#6	
Sample Date:	09-08-87	11-12-87	01-06-88	03-03-88	04-04-88	05-05-88	06-02-88 07-06-88 Det.Limit
Report Date:	09-29-87	12-28-87	01-27-88	03-24-88	05-25-88	05-25-88	06-13-88 07-19-88 & Range
Sample Number:	#5	87-14703	88-0134	88-1926	88-3794	88-5913	88-6919 88-8712
Lab:	WAMCO	ELI	ELI	ELI	ELI	ELI	ELI

MAJOR IONS mg/l:

Ca	15.0	21.8	24.7	29.0		38.0	42.0	0.05
Mg	6.0	4.4	4.1	4.7		5.0	5.2	0.01
Na	106	109.0	95.6	102		106	100	0.05
K	179	280	228	195		241	245	0.10
CO3	0	0	0	0		5.7	6.0	0.10
HCO3	409	503	466	508		488	493	0.10
SO4	466	528	445	464		498	467	0.50
Cl	40.0	33.4	31.2	31.6		31.9	34.8	0.10
NH4 (N)	92.0	102.0	93.0	108		91.2	97.0	0.05
TDS @ 180 C (Calculated)	982	1228	1164	1223		1287	1273	1.0
pH (units)	7.14	8.19	7.92	8.24		8.40	8.42	1-14
H2S - g							28.8	

TRACE METALS mg/l:

As	0.088	0.008	0.136	0.009		0.069	0.044	0.001
Mo	<0.10	<0.10	<0.10	<0.10		<0.10	<0.10	0.10
Se EPA Pres.	0.023	0.308	0.396	0.498	0.594	0.570	0.615	0.590 0.001
Se Filt. Only				0.655	0.746	1.024	0.917	0.870 0.001
V	<0.10	<0.10	<0.10	<0.10		<0.10	<0.10	0.10

RADIOMETRIC pCi/l:

U (ug/l)	14.840	12.394	8.832	11.528		8.455	8.267	0.0003
Ra226	52.0	127.8	140.1	173.9		204	203	0.20
Ra Prec. +/-	5.4	3.2	2.9	3.6		12.4	13.1	

Q.A. DATA:

Anion meq:	17.00	20.19	17.79	18.92		19.46	18.99	
Cation meq:	17.73	20.67	18.22	19.28		19.61	19.73	
A/C Balances	0.959	0.977	0.976	1.019		0.997	0.962	0.95-1.05
WYDER A/C Bal.1	2.10	1.17	1.19	0.94		0.38	1.91	-5 - +5

Q.A. MANAGER: Rag/KK
ENERGY LABORATORIES, INC.

CLEVELAND CLIFFS - DOWNHOLE SAMPLING REPORT

Project: Collins Draw

Well No: 234
Water Level to Casing: 71.58 '
Casing Height: 1.80 '
Water Level: 69.78 '
T.D./Casing I.D.: 485' / 5"
Casing Volume: 423.5 Gal
Date Sampled: 07-06-88
Pump Depth: 400'
Pump Type: Downhole Submersible Pump

<u>Date</u>	<u>Time</u>	<u>Meter</u>	<u>Rate</u>	<u>pH</u>	<u>Temp</u>	<u>Uncorrected Cond</u>
07-06-88	11:00	200800				
	11:02	200885	42.5	8.78	13.3	810
	11:16	201260	26.8	8.70	14.8	990
	11:36	201660	20.0	8.68	15.1	1000
	11:44	201890	28.75	8.64	17.2	1025

Total Time Pumped: 44 Min
Total Gal. Pumped: 1090 Gal
Casing Displacement: 2.57
Time Sampled: 11:44
Sampler: Energy Laboratories, Inc./RAG/KRS

WATER ANALYSIS REPORT - CLEVELAND CLIFFS

Project: Collins Draw

SAMPLE I.D.: Well #237

	#1	#2	#3	#4	#5	#6	
Sample Round:							
Sample Date:	09-08-87	11-12-87	01-06-88	03-03-88	04-04-88	05-05-88	06-02-88 07-06-88 Det. Limit
Report Date:	09-29-87	12-28-87	01-27-88	03-24-88	05-25-88	05-25-88	06-13-88 07-19-88 & Range
Sample Number:	#6	87-14704	88-0137	88-1927	88-3795	88-5914	88-5920 88-8713
Lab:	WAMCO	ELI	ELI	ELI	ELI	ELI	ELI

MAJOR IONS mg/l:

Ca	50.0	51.3	56.7	63.9		104	133	0.05
Mg	3.0	7.2	6.7	8.4		11.7	14.3	0.01
Na	118	118	111	112		135	146	0.05
K	228	275	257	240		287	326	0.10
CO3	0	0	0	0		0	0	0.10
HCO3	744	740	651	694		722	766	0.10
SO4	500	508	445	540		711	759	0.50
Cl	7.0	30.8	30.3	28.8		31.7	41.3	0.10
NH4 (N)	107	105	90.6	112		103	108	0.05
TDS @ 180 C (Calculated)	1145	1360	1335	1508		1787	1646	1.0
pH (units)	8.06	8.24	8.07	8.08		7.81	7.71	1-14
H2S - g							27.6	

TRACE METALS mg/l:

As	0.220	0.027	0.028	0.032		0.098	0.035	0.001
Mo	<0.10	<0.10	<0.10	<0.10		<0.10	<0.10	0.10
Se EPA Pres.	1.420	0.461	0.253	0.074	0.065	0.028	0.037	0.025 0.001
Se Filt. Only				0.114	0.095	0.076	0.078	0.053 0.001
V	0.15	<0.10	<0.10	<0.10		<0.10	<0.10	0.10

RADIOMETRIC pCi/l:

U (ug/l)	2.883	15.271	12.366	35.064		22.033	22.933	0.0003
Ra226	123.0	182.0	193.6	292.1		351	374	0.20
Ra Prec. +/-	8.3	3.9	3.4	4.7		16.2	17.8	

Q.A. DATA:

Anion meq:	21.36	23.58	20.80	23.47		27.54	29.53	
Cation meq:	22.80	22.83	21.38	23.84		27.10	30.26	
A/C Balance:	0.937	1.033	0.977	0.984		0.984	0.976	0.95-1.05
WYDEQ A/C Bal.1	3.26	-1.62	1.38	0.78		-0.81	1.22	-5 - +5

Q.A. MANAGER: *Rag/KK*
ENERGY LABORATORIES, INC.

CLEVELAND CLIFFS - DOWNHOLE SAMPLING REPORT

Project: Collins Draw

Well No: 237
Water Level to Casing: 73.67 '
Casing Height: 1.71 '
Water Level: 71.96 '
I.D./Casing I.D.: 485'/5"
Casing Volume: 421.3 Gal
Date Sampled: 07-06-88
Pump Depth: 400'
Pump Type: Downhole Submersible Pump

Date	Time	Meter	Rate	pH	Temp	Uncorrected Cond
07-06-88	13:25	178320				
	13:42	178680	21.2	7.41	15.6	1200
	14:04	178980	13.6	7.45	15.3	1340
	14:37	179500	15.6	7.45	17.8	1510

Total Time Pumped: 72 Min
Total Gal. Pumped: 1180
Casing Displacement: 2.80
Time Sampled: 14:37
Samplers: Energy Laboratories, Inc./RAG/KRS

WATER ANALYSIS REPORT - CLEVELAND CLIFFS

Project: Collins Draw

SAMPLE I.D.:	238	239	240	230M	Det. Limit
Sample Date:	07-05-88	07-05-88	07-05-88	07-07-88	
Report Date:	07-20-88	07-20-88	07-20-88	07-20-88	
Date Received:	07-07-88	07-07-88	07-07-88	07-08-88	
Sample Number:	88-8723	88-8724	88-8725	88-9242	

Trace Metals ug/l:					
Se Filter only	0.009	<0.001	<0.001	<0.001	0.001
HN03	0.012	<0.001	<0.001	<0.001	

Q.A. MANAGER: *RAg/kk*
Energy Laboratories, Inc.

CLEVELAND CLIFFS - DOWNHOLE SAMPLING REPORT

Project: Collins Draw

Well No: 238 (M)
Water Level to Casing: 89.79 '
Casing Height: 3.42 '
Water Level: 86.37 '
I.D./Casing I.D.: 485'/5"
Casing Volume: 406.6 Gal
Date Sampled: 07-05-88
Pump Depth: 400'
Pump Type: Downhole Submersible Pump

<u>Date</u>	<u>Time</u>	<u>Meter</u>	<u>Rate</u>	<u>pH</u>	<u>Temp</u>	<u>Uncorrected Cond</u>
07-05-88	12:40	197232				
	12:42	197300	34	7.79	14.8	225
	13:02	197795	24.8	7.91	15.6	235
	13:29	198480	25.4	7.88	15.8	242
	13:30	198510	30.0	7.71	15.4	242
		Sampled				

Total Time Pumped: 50 Min
Total Gal. Pumped: 1278
Casing Displacement: 3.14
Time Sampled: 13:30
Sampler: Energy Laboratories, Inc./RAG/KRS

CLEVELAND CLIFFS - DOWNHOLE SAMPLING REPORT

Project: Collins Draw

Well No: 239 (R)
Water Level to Casing: 50.21 '
Casing Height: 2.71 '
Water Level: 47.50 '
T.D./Casing I.D.: 485'/5"
Casing Volume: 446.2 Gal
Date Sampled: 07-05-88
Pump Depth: 400'
Pump Type: Downhole Submersible Pump

Date	Time	Meter	Rate	pH	Temp	Uncorrected Cond
07-05-88	14:05	198876				
	14:11	198930	9.0	7.78	15.8	240
	14:44	199285	10.8	7.55	15.7	248
	15:15	199593	9.9	7.65	16.1	250
	15:37	199790	8.9	7.69	15.1	245
	15:38	199794				

Total Time Pumped: 93 Min
Total Gal. Pumped: 918 Gal
Casing Displacement: 2.06
Time Sampled: 15:38
Sampler: Energy Laboratories, Inc./RAG/KRS

CLEVELAND CLIFFS - DOWNHOLE SAMPLING REPORT

Project: Collins Draw

Well No: 240 (H)
Water Level to Casing: 78.83
Casing Height: 3.50
Water Level: 75.33
T.D./Casing I.D.: 485'/5"
Casing Volume: 417.8 Gal
Date Sampled: 07-05-88
Pump Depth: 400'
Pump Type: Downhole Submersible Pump

Date	Time	Meter	Rate	pH	Temp	Uncorrected Cond
07-05-88	10:46	172509				
	10:50	172510		7.77	15.8	210
	11:24	172810	8.8	8.08	14.8	210
	11:35	172913	9.4	8.12	14.3	210
	11:55	173090	8.9	7.77	14.6	210
	12:18	173292	8.8	7.76	15.1	219
	12:29	173380	8.0	7.86	14.3	215
		Sampled				

Total Time Pumped: 91 Min
Total Gal. Pumped: 871
Casing Displacement: 2.08
Time Sampled: 12:29
Sampler: Energy Laboratories, Inc./RA/KRS

CLEVELAND CLIFFS - DOWNHOLE SAMPLING REPORT

Project: Collins Draw

Well No: 230 (SM)
Water Level to Casing: 75.00 '
Casing Height: 2.83 '
Water Level: 72.2 '
T.D./Casing I.D.: 270'/5"
Casing Volume: 201.8 Gal
Date Sampled: 07-07-88
Pump Depth: 200'
Pump Type: Downhole Submersible Pump

Date	Time	Meter	Rate	pH	Temp	Uncorrected Cond
07-07-88	12:41	173380				
	12:43	173395	7.5	7.49	15.3	320
	13:01	173450	3.1	7.43	17.1	342
	13:28	173480	1.1	7.49	20.5	365
	13:45	173497	1.0			
	15:45	173497				
	16:12	173571	1.1	7.34	19.6	395
	16:43	173600	0.94	7.47	20.9	399
	17:05	173622	1.0	7.46	21.0	400
	17:10	173627	1.0			
07-06-88	16:21	180257				
	16:54	180327		8.06	16.4	680
	17:05	180335				
07-07-88	13:35	180330				
	14:10	180430		7.73	16.9	332
	14:30	180454		7.96	19.2	630

Total Time Pumped: 220 Min
Total Gal. Pumped: 941 Gal
Casing Displacement: 2.19
Time Sampled: 14:30
Sampler: Energy Laboratories, Inc./RAG/KRS

WATER ANALYSIS REPORT - CLEVELAND CLIFFS

Project: Collins Draw

SAMPLE I.D.: WELL #241 M

Sample Date:	03-04-88	05-09-88	06-01-88	07-06-88	Det. Limit
Report Date:	04-30-88	05-31-88	06-13-88	07-19-88	& Range
Lab Number:	88-1937	88-5965	88-6901	88-8719	

MAJOR IONS mg/l:

Ca	30.1	30.9	30.5	0.05
Mg	2.9	3.3	3.4	0.01
Na	107	101	102	0.05
K	3.8	4.2	4.7	0.10
CO3	0	0	0	0.10
HCO3	126	128	125	0.10
SO4	178	184	174	0.50
Cl	32.2	23.9	17.2	0.10
NH4 (N)	0.22	0.22	0.48	0.05
NO2 (N)	<0.01	0.01		0.01
NO3 (N)	0.30	<0.01		0.01
F	0.20	0.20		0.10
SiO2	10.9	10.5		1.00
TDS @ 180 C	402	396	402	1.0
Cond. (umho/cm)	675	646		1.0
Alk-CaCO3	103	105		0.1
pH (units)	7.81	8.17	8.01	1-14

TRACE METALS mg/l:

Al	<0.10	<0.10		0.10
As	<0.001	0.003	0.002	0.001
Ba	<0.10	<0.10		0.10
B	<0.10	<0.10		0.10
Cd	<0.01	<0.01		0.01
Cr	<0.05	<0.05		0.05
Cu	<0.01	<0.01		0.01
Fe	<0.05	<0.05		0.05
Pb	<0.05	<0.05		0.05
Mn	0.02	0.02		0.01
Hg	<0.001	<0.001		0.001
Mo	<0.10	<0.10	<0.10	0.10
Ni	<0.05	<0.05		0.05
Se EPA Pres.	0.050	0.143	0.157	0.092
Se Filt. only			0.163	0.121
V	<0.10	<0.10		<0.10
Zn	<0.01	<0.01		0.01

RADIOMETRIC pCi/l:

U (mg/l)	0.6404	0.0475	0.0630	0.0003
Ra226	2.1	2.5	3.2	0.20
Ra Prec +/-	0.5	1.6	2.0	

Q.A. DATA:

Anion Meg:	6.71	6.62	6.16	
Cation meg:	6.49	6.32	6.40	
A/C Balance:	1.033	1.047	0.962	0.95-1.05
WYDEQ A/C Bal. %		-2.32	1.92	-5 - +5
Calc TDS mg/l:	429	422	395	
TDS A/C Bal:	0.936	0.938	1.018	0.90-1.10

Q.A. MANAGER: *RAg/KK*
Energy Laboratories, Inc.

CLEVELAND CLIFFS - DOWNHOLE SAMPLING REPORT

Project: Collins Draw

Well No: 241 (M)
Water Level to Casing: 57.63
Casing Height: 2.00
Water Level: 55.63
T.D./Casing I.D.: 485'/5"
Casing Volume: 437.9
Date Sampled: 07-06-88
Pump Depth: 400'
Pump Type: Downhole Submersible Pump

<u>Date</u>	<u>Time</u>	<u>Meter</u>	<u>Rate</u>	<u>pH</u>	<u>Temp</u>	<u>Uncorrected Cond</u>
07-06-88	7:58	199798				
	8:03	199835	7.4	7.74	13.0	245
	08:23	199964	6.45	8.02	14.0	251
	08:47	200111	6.125	7.97	14.3	258
	09:04	200199	5.18	8.03	14.2	253
	09:23	200307	5.60	8.02	14.2	267
	09:56	200494	6.72	8.02	14.1	270
	10:18	200626	6.00	8.02	14.3	282
	10:40	200735	4.95			

Total Time Pumped: 162 Min
Total Gal. Pumped: 937 Gal
Casing Displacement: 1.93
Time Sampled: 10:40
Sampler: Energy Laboratories Inc./KRS/RAG

WATER ANALYSIS REPORT - CLEVELAND CLIFFS

Project: Collins Draw

SAMPLE I.D.: Well #260

	#1	#2	#3	#4	#5	#6	
Sample Round:							
Sample Date:	09-08-87	11-12-87	01-05-88	03-02-88	04-04-88	05-05-88	06-02-88 07-06-88 Det. Limit
Report Date:	09-29-87	12-28-87	01-27-88	03-24-88	05-25-88	05-25-88	06-13-88 07-19-88 & Range
Sample Number:	#7 87-14705	88-0118	88-1934	88-3796	88-5917	88-5921	88-8714
Lab:	WAMCO	ELI	ELI	ELI	ELI	ELI	ELI

MAJOR IONS mg/l:

Ca	29.0	35.4	32.5	32.8		41.2	34.2	0.05
Mg	4.0	3.7	3.4	3.6		3.9	3.8	0.01
Na	100	103	107	99.7		103	94.0	0.05
K	169	249	276	146		165	164	0.10
CO3	0	0	0	0		0	0	0.10
HCO3	323	498	342	451		401	357	0.10
SO4	490	492	349	337		372	334	0.50
Cl	39.0	28.7	27.6	32.6		27.1	25.0	0.10
NH4 (N)	92.0	78.0	70.8	70.2		56.4	49	0.05
TDS @ 180 C (Calculated)	922	1166	967	964		985	897	1.0
pH (units)	7.00	8.06	7.63	7.67		7.84	7.73	1-14
H2S - g							36.4	

TRACE METALS mg/l:

As	0.007	0.005	0.012	0.005		0.012	0.026	0.001
Mo	<0.10	<0.10	<0.10	<0.10		<0.10	<0.10	0.10
Se EPA Pres.	0.060	0.176	0.032	0.007	0.006	<0.001	0.011	0.002 0.001
Se Filt. Only				0.011	0.012	0.005	0.005	0.007 0.001
V	<0.10	<0.10	<0.10	<0.10		<0.10	<0.10	0.10

RADIOMETRIC pCi/l:

U (mg/l)	7.293	5.312	4.795	2.721		1.307	0.828	0.0003
Ra226	59.0	157.4	170.7	162.3		139	130	0.20
Ra Prec. +/-	5.7	3.6	3.6	3.5		10.2	10.6	

Q.A. DATA:

Anion meq:	17.03	19.22	13.65	15.35		15.09	13.52	
Cation meq:	16.59	18.73	13.64	15.10		15.11	13.82	
A/C Balance:	1.027	1.026	1.001	1.017		0.998	0.977	0.95-1.05
MYDEQ A/C Bal.1	-1.31	-1.29	-0.04	-0.82		0.07	1.10	-5 - +5

Q.A. MANAGER: *RAG/KK*
ENERGY LABORATORIES, INC.

CLEVELAND CLIFFS - DOWNHOLE SAMPLING REPORT

Project: Collins Draw

Well No: 260
Water Level to Casing: 76.88 '
Casing Height: 3.58 '
Water Level: 73.30 '
T.D./Casing I.D.: 485'/4.33"
Casing Volume: 314.9 gal
Date Sampled: 07-06-88
Pump Depth: 400'
Pump Type: Downhole Submersible Pump

<u>Date</u>	<u>Time</u>	<u>Meter</u>	<u>Rate</u>	<u>pH</u>	<u>Temp</u>	<u>Uncorrected Cond</u>
07-06-88	13:07	202616				
	13:26	203069	23.8	7.28	15.3	770
	13:40	203250	12.9	7.23	15.6	800
	14:02	203555	13.9	7.26	15.6	820
	14:11	203685	14.4	7.20	16.8	900

Total Time Pumped: 64 Min
Total Gal. Pumped: 1069 Gal
Casing Displacement: 3.39
Time Sampled: 14:11
Sampler: Energy Laboratories, Inc./rAG/KRS

WATER ANALYSIS REPORT - CLEVELAND CLIFFS

Project: Collins Dr 3-1

SAMPLE I.D.: Well #276

Sample Round:	#1	#2	#3	#4	#5	#6	
Sample Date:	09-08-87	11-12-87	01-05-88	03-02-88	04-04-88	05-05-88	06-02-88 07-06-88 Det.Limit
Report Date:	09-29-87	12-28-87	01-27-88	03-24-88	05-25-88	05-25-88	06-13-88 07-19-88 & Range
Sample Number:	#8 87-14707	88-0121	88-1852	88-3797	88-5918	88-6922	88-8712
Lab:	WAMCO	ELI	ELI	ELI	ELI	ELI	ELI

MAJOR IONS mg/l:

Ca	21.0	91.0	123	117		121	101	0.05
Mg	9.0	11.3	14.4	15.0		14.6	14.0	0.01
Ka	103	140	154	148		140	124	0.05
K	169	291	328	278		317	290	0.10
CO3	0	0	0	0		0	0	0.10
HCO3	427	581	615	699		621	561	0.10
SO4	426	726	840	854		832	691	0.50
Cl	38.0	36.3	35.6	28.1		20.8	35.1	0.10
NH4 (N)	96.0	103	103	120		96.0	85.0	0.05
TDS @ 180 C (Calculated)	1018	1586	1915	1958		1879	1648	1.0
pH (units)	7.69	7.49	7.59	7.22		7.63	7.44	1-14
H2S - g							21.6	

TRACE METALS mg/l:

As	0.350	0.292	0.203	0.119		0.045	0.034	0.001
Mo	<0.10	<0.10	<0.10	<0.10		<0.10	<0.10	0.10
Se EPA Pres.	0.434	0.034	0.023	0.020	0.010	0.005	0.008	0.001
Se Filt. Only				0.028	0.019	0.011	0.011	0.001
V	<0.10	<0.10	<0.10	<0.10		<0.10	<0.10	0.10

RADIOMETRIC pCi/l:

U (mg/l)	28.833	13.280	9.337	8.166		4.279	3.148	0.0003
Ra226	52.0	739.1	1193	1623		1288	1061	0.20
Ra Prec. +/-	5.4	7.8	8.9	10.9		31.2	30.3	

Q.A. DATA:

Anion meq:	17.46	25.67	28.58	30.06		28.10	24.58	
Cation meq:	16.93	26.40	29.81	29.44		28.34	25.14	
A/C Balance:	1.031	0.972	0.959	1.021		0.992	0.978	-0.95-1.05
MYDEQ A/C Bal.%	-1.54	1.40	2.11	-1.04		0.43	1.13	-5 - +5

Q.A. MANAGER: *RAG/KK*
ENERGY LABORATORIES, INC.

CLEVELAND CLIFFS - DOWNHOLE SAMPLING REPORT

Project: Collins Draw

Well No: 276
Water Level to Casing: 73.21 '
Casing Height: 2.54 '
Water Level: 70.67 '
I.D./Casing I.D.: 485'/4.33"
Casing Volume: 316.9
Date Sampled: 07-06-88
Pump Depth: 400'
Pump Type: Downhole Submersible Pump

<u>Date</u>	<u>Time</u>	<u>Meter</u>	<u>Rate</u>	<u>pH</u>	<u>Temp</u>	<u>Uncorrected Cond</u>
07-06-88	12:03	201935				
	12:25	202285	12.5	7.27	15.8	1110
	12:42	202435	8.8	7.28	16.1	1090
	13:00	202605	9.4	7.39	16.7	1080

Total Time Pumped: 57 Min
Total Gal. Pumped: 670 Gal
Casing Displacement: 2.11
Time Sampled: 13:00
Sampler: Energy Laboratories, Inc./RAG/KRS

WATER ANALYSIS REPORT - CLEVELAND CLIFFS

Project: Collins Draw

SAMPLE I.D.: Well #277

Sample Round:	#1	#2	#3	#4	#5	#6	
Sample Date:	09-08-87	11-12-87	01-05-88	03-02-88	04-04-88	05-05-88	06-02-88 07-06-88 Det.Limit
Report Date:	09-29-87	12-28-87	01-27-88	03-24-88	05-25-88	05-25-88	06-13-88 07-19-88 & Range
Sample Number:	#8	87-14706	88-0122	88-1654	88-3798	88-5919	88-6923 88-8716
Lab:	WAMCO	ELI	ELI	ELI	ELI	ELI	ELI

MAJOR IONS mg/l:

Ca	15.0	17.7	22.2	21.9		26.1	26.3	0.05
Mg	3.0	4.1	3.2	3.7		3.9	4.6	0.01
Na	98	119	104	111		110	104	0.05
K	165	249	229	180		220	235	0.10
CO3	0	0	0	0		0	0	0.10
HCO3	342	515	468	517		441	412	0.10
SO4	426	480	403	413		481	473	0.50
Cl	32.0	28.7	24.9	23.2		25.4	26.0	0.10
NH4 (N)	92.0	86.0	80.2	93.0		76.8	82.0	0.05
TDS @ 180 C (Calculated)	915	1156	1116	1138		1186	1188	1.0
pH (units)	7.00	8.03	7.79	7.58		7.85	7.70	1-14
H2S - g							34.0	

TRACE METALS mg/l:

As	0.114	0.025	0.325	0.119		0.157	0.041	0.001
Mo	<0.10	<0.10	<0.10	<0.10		<0.10	<0.10	0.10
Se EPA Pres.	0.434	0.164	0.093	0.033	0.031	0.011	0.017	0.004 0.001
Se Filt. Only				0.054	0.047	0.022	0.034	0.026 0.001
V	<0.10	<0.10	<0.10	<0.10		<0.10	<0.10	0.10

RADIOMETRIC pCi/l:

U (mg/l)	18.156	9.738	10.851	10.687		7.942	7.468	0.0003
Ra226	38.0	124.7	206.1	242.2		268	498	0.20
Ra Prec. +/-	4.6	3.2	3.7	4.4		14.3	15.4	

Q.A. DATA:

Anion meq:	16.05	19.25	16.93	17.94		17.97	17.34	
Cation meq:	15.37	18.93	17.50	17.75		17.54	18.10	
A/C Balance:	1.044	1.017	0.967	1.011		1.025	0.958	0.95-1.05
WYDEQ A/C Bal.%	-2.16	-0.84	1.66	-0.53		-1.21	2.14	-5 - +5

Q.A. MANAGER: *RAG/KK*
ENERGY LABORATORIES, INC.

CLEVELAND CLIFFS - DOWNHOLE SAMPLING REPORT

Project: Collins Draw

Well No: 277
Water Level to Casing: 73.63 '
Casing Height: 3.50 '
Water Level: 70.13 '
T.D./Casing I.D.: 485'/4.33'
Casing Volume: 317.4
Date Sampled: 07-06-88
Pump Depth: 400'
Pump Type: Downhole Submersible Pump

<u>Date</u>	<u>Time</u>	<u>Meter</u>	<u>Rate</u>	<u>pH</u>	<u>Temp</u>	<u>Uncorrected Cond</u>
07-06-88	14:55	179530				
	15:37	179950	10.0	7.82	16.1	1010
	16:04	180150	6.1	7.68	15.7	1090
	16:17	180250	7.69	7.86	16.9	1080

Total Time Pumped: 82 Min
Total Gal. Pumped: 720 Gal
Casing Displacement: 2.27
Time Sampled: 16:17
Sampler: Energy Laboratories, Inc./RAB/KRS

WATER ANALYSIS REPORT - CLEVELAND CLIFFS

Project: Collins Draw

SAMPLE I.D.: Well #285

Sample Round:	#1	#2	#3	#4	#5	#6	
Sample Date:	09-08-87	11-12-87	01-06-88	03-03-88	04-04-88	05-05-88	06-02-88 07-06-88 Det. Limit
Report Date:	09-29-87	12-28-87	01-27-88	03-24-88	04-08-88	05-25-88	06-13-88 07-19-88 & Range
Sample Number:	#10	87-14708	88-0135	88-1928	88-3799	88-5920	88-6924 88-8717
Lab:	WAMCO	ELI	ELI	ELI	ELI	ELI	ELI

MAJOR IONS mg/l:

Ca	6.0	12.2	17.1	14.9	15.6	14.4	0.05
Mg	4.0	3.7	4.3	4.2	4.7	4.4	0.01
Na	115	140	167	171	178	170	0.05
K	168	256	333	298	394	402	0.10
CO3	0	6.9	0	0	0	0	0.10
HCO3	500	593	639	656	648	645	0.10
SO4	350	426	600	647	698	650	0.50
Cl	43.0	35.9	37.7	28.2	26.5	33.4	0.10
NH4 (N)	92.0	97.0	103	122	103	100	0.05
TDS @ 180 C (Calculated)	886	1177	1591	1641	1773	1739	1.0
pH (units)	8.04	8.40	8.24	8.25	8.28	8.23	1-14
H2S = g						8.8	

TRACE METALS mg/l:

As	0.032	0.085	0.054	0.034	0.058	0.061	0.001
Mo	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10
Se EPA Pres.	1.050	0.062	0.002	0.110	0.147	0.123	0.165
Se Filt. Only				0.171	0.147	0.117	0.187
V	0.35	<0.10	0.20	0.10	<0.10	<0.10	0.10

RADIOMETRIC pCi/l:

U (mg/l)	14.077	13.943	8.832	15.371	11.785	13.600	0.0003
Ra226	94.0	340.2	605.1	595.6	625	532	0.20
Ra Prec. +/-	7.3	5.4	6.1	6.7	21.5	21.3	

Q.A. DATA:

Anion meq:	16.50	19.84	24.04	25.05	25.91	25.06	
Cation meq:	16.69	20.50	24.37	25.27	26.37	25.97	
A/C Balance:	0.989	0.968	0.986	0.991	0.983	0.967	0.95-1.05
WYDEQ A/C Bal.X	0.57	1.64	0.68	0.44	0.88	1.71	-5 - +5

Q.A. MANAGER: *RAG/KK*
ENERGY LABORATORIES, INC.

CLEVELAND CLIFFS - DOWNHOLE SAMPLING REPORT

Project: Collins Draw

Well No: 283
Water Level to Casing: 74.69 '
Casing Height: 3.04 '
Water Level: 71.65 '
I.D./Casing I.D.: 485'/4.33"
Casing Volume: 316.2 Gal
Date Sampled: 07-06-88
Pump Depth: 400'
Pump Type: Downhole Submersible Pump

<u>Date</u>	<u>Time</u>	<u>Meter</u>	<u>Rate</u>	<u>pH</u>	<u>Temp</u>	<u>Uncorrected Cond</u>
07-06-88	09:47	174288				
	09:55	174710	52.7	8.48	14.1	1000
	10:04	175040	36.7	8.44	15.5	1050
	10:20	175545	21.0	8.45	14.6	1000
	10:28	175815	33.75	8.46	15.3	1080

Total Time Pumped: 41 Min
Total Gal. Pumped: 1527
Casing Displacement: 4.83
Time Sampled: 10:28
Sampler: Energy Laboratories, Inc./RAG/KRS

WATER ANALYSIS REPORT - CLEVELAND CLIFFS

Project: Collins Draw

SAMPLE I.D.: Well #285

Sample Round:	#1	#2	#3	#4	#5	#6	
Sample Date:	09-08-87	11-12-87	01-06-88	03-03-88	04-04-88	05-05-88	06-02-88 07-06-88 Det. Limit
Report Date:	09-29-87	12-28-87	01-27-88	03-24-88	04-08-88	05-25-88	06-13-88 07-19-88 & Range
Sample Number:	#11	87-14707	88-0136	88-1929	88-3800	88-5921	88-6925 88-8718
Lab:	WAMCO	ELI	ELI	ELI	ELI	ELI	ELI

MAJOR IONS mg/l:

Ca	36.0	84.2	95.2	95.5		93.5	85.0	0.05
Mg	5.0	8.9	9.4	10.4		10.7	9.9	0.01
Na	102	127	138	140		141	130	0.05
K	176	269	285	259		292	290	0.10
CO3	0	0	0	0		0	0	0.10
HCO3	451	597	617	661		602	571	0.10
SO4	444	648	684	739		703	655	0.50
Cl	96.0	32.4	32.0	33.7		38.0	37.6	0.10
NH4 (N)	105	109.0	99.0	112		93.0	93.0	0.05
TDS @ 180 C (Calculated)	1006	1468	1689	1760		1699	1621	1.0
pH (units)	7.25	7.71	7.59	7.73		7.62	7.54	1-14
H2S - g							17.6	

TRACE METALS mg/l:

As	0.500	0.234	0.206	0.054		0.148	0.060	0.001
Mo	<0.10	<0.10	<0.10	<0.10		<0.10	<0.10	0.10
Se EPA Pres.	0.032	0.006	0.023	0.033	0.028	0.030	0.067	0.001
Se Filt. Only				0.079	0.086	0.098	0.147	0.001
V	<0.10	<0.10	<0.10	<0.10		<0.10	<0.10	0.10

RADIOMETRIC pCi/l:

U (ug/l)	21.201	12.616	7.571	13.609		9.736	8.267	0.0003
Ra226	109	1094	1112	1079		1081	865	0.20
Ra Prec. +/-	7.8	9.8	8.2	10.3		28.6	27.2	

Q.A. DATA:

Anion meq:	19.35	24.20	26.11	27.21		25.59	24.07	
Cation meq:	18.66	25.17	25.92	26.71		25.82	24.81	
A/C Balance:	1.037	0.961	1.007	1.019		0.991	0.970	0.95-1.05
WYDEQ A/C Bal.1	-1.22	1.96	-0.37	-0.93		0.45	1.51	-5 - +5
Calc TDS mg/l:		1468	1689					
TDS A/C Bal:		0.939	0.925					0.90-1.10

Q.A. MANAGER: Rag/KK.
ENERGY LABORATORIES, INC.

CLEVELAND CLIFFS - DOWNHOLE SAMPLING REPORT

Project: Collins Draw

Well No: 285
Water Level to Casing: 73.17 '
Casing Height: 2.67 '
Water Level: 70.5 '
I.D./Casing I.D.: 485'/4.33"
Casing Volume: 317.1
Date Sampled: 07-06-88
Pump Depth: 400'
Pump Type: Downhole Submersible Pump

<u>Date</u>	<u>Time</u>	<u>Meter</u>	<u>Rate</u>	<u>pH</u>	<u>Temp</u>	<u>Uncorrected Cond</u>
07-06-88	7:58	173623				
	8:05	173688	9.3	7.39	12.9	750
	08:25	173820	6.6	7.42	14.0	800
	08:49	173967	6.13	7.44	14.3	790
	09:06	174070	6.06	7.43	14.6	850
	09:25	174185	6.05	7.45	14.3	850
	09:40	174275	6.00	7.58	16.1	900

Total Time Pumped: 102 min.
Total Gal. Pumped: 652 gal.
Casing Displacement: 2.06
Time Sampled: 09:40
Sampler: Energy Laboratories, Inc./RAG/KRS