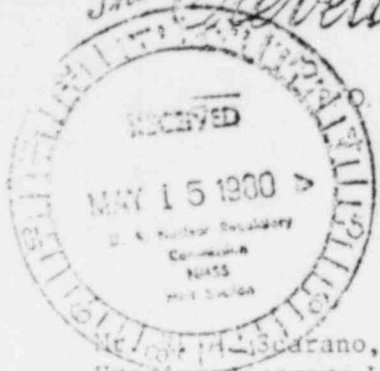


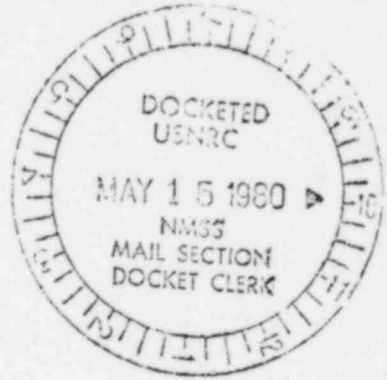
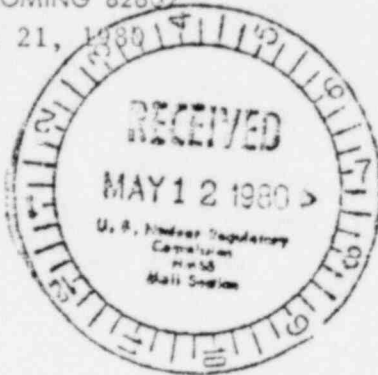
74-0117  
40-8714

# The Cleveland-Cliffs Iron Company PDR



P.O. Box 3140 Phone (307) 234-9133 309 N. McKinley  
CASPER, WYOMING 82602

March 21, 1980



Mr. J. Scarano, Section Leader  
Uranium Recovery Licensing Branch  
Division of Waste Management  
U.S. Nuclear Regulatory Commission  
Washington, D.C. 20555

Dear Mr. Scarano:

Re: Source Materials License No. SUA-1352, Docket No. 40-8714

There have been minor changes in the supportive information submitted in the application for Source Materials License No. SUA-1352 for the uranium solution mining project at the Collins Draw Site in Campbell County, Wyoming. The purpose of this letter and the attached materials is to notify you of the changes and to seek your approval to operate with these modifications. Also, Condition 13 of the Source Materials License requires water sampling and analysis to define premining water quality baseline values before leachant injection is initiated. The results of the baseline analyses are attached.

In November, 1978, The Cleveland-Cliffs Iron Company (Cliffs) submitted "Supportive Information for USNRC Source Materials License Application for a Research and Development Pilot Plant, Collins Draw Project, Campbell County, Wyoming." The following changes have been made since this submittal:

- 2.0, par. 1, p.3: A revised Site Plan is attached.
- 2.1, par. 1, p. 3: The total permit area is approximately 42.5 acres (17.2 hectares) and direct surface disturbance is approximately 19.7 acres (8.0 hectares).
- 3.0, par. 1, p. 35: A revised Uranium Recovery Process Schematic is attached.
- 3.1.1, par. 6, p. 39: Bladder storage will be used as required.
- 3.1.3, par. 7, p. 41: Monitor wells labeled 230, 237, 238, 239, 240, and 241 are shown on the Site Plan.

The procedure to detect and identify lixiviant fluid excursions horizontally in the production zone and vertically into the nonproduction zone is to periodically sample monitor wells and possibly trend wells and analyze the fluid sample for chemical changes which could be indicative of the mining lixiviant invading a region outside the production zone.

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POOR QUALITY PAGES

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Each monitor well will be sampled biweekly in the same fashion as used for baseline sampling or by another means which also insures that the sample collected is representative of the fluid from the desired aquifer. One casing volume will be pumped prior to sample collection.

Each monitor sample collected will be analyzed for total dissolved solids, ammonium, uranium, carbonate, bicarbonate and sulfate. A record of each monitor well's analytical data will be maintained. After approximately six months, the monitor well sample frequency will be reviewed.

An outline of the monitoring procedure is described below:

- Collect representative sample from each monitor well;
- Assay immediately for total dissolved solids ammonium, uranium, carbonate, bicarbonate and sulfate. If immediate assay not possible, preserve samples in accordance with D.E.Q. Guideline No. 4, Supportive handout;
- Review and compare analytical results to ascertain if excursion is indicated. Confirm laboratory results within 48 hours, or two working days, if excursion indicated.
- Notification of L.Q.D.-W.D.E.Q. within 48 hours, or two working days, if excursion confirmed.

3.2.D.3, par. 1, p. 45: The plant will have 50,000 gallons of bladder storage capacity with space available to add more bladders if necessary.

3.2.F.1, par. 1, p. 45: The boiler was inspected prior to use by the manufacturer, Williams and Davis Boiler and Welding Company, Inc., Hutchins, Texas.

3.2.F.3, par. 1., p. 46: The fuel for the boiler and the generators will be stored in an approved fuel tank buried below surface in a lined trench.

4.0, pp. 47 and 48: Cliffs has applied to the Wyoming Department of Environmental Quality (WDEQ) for permits to operate a drain field to treat all process and restoration wastewater discharged by the solution mine. This discharge will contain very low-level radioactive material as stated on page 1a of "Supplement No. 1, Questions and Answers Concerning Supportive Information for USNRC Source Materials License Application, Collins Draw Project." The Water Quality Division, W.D.E.Q. has issued a permit for the operation of the process wastewater drain field. We are in the final stages of negotiations with the Land Quality Division for the drain field permit.

4.2, pp. 49 and 50: See Section 4.0 above.

4.2.2, pp. 50 and 51: See Section 4.0 above.

5.4, par. 2, p. 52: Housing will be maintained off-site, nearby for those operators preferring low-cost living.

6.1, par. 3, p. 55: Power lines providing single-phase electricity for lights and light equipment have been installed at the site.

6.2, par. 2, p. 56: There will be no reason to operate outside the fenced area (approximately 19.7 acres).

6.2.c, par. 1, p. 56: See Section 4.0 above.

6.2.e, par. 1, p. 57: See Section 4.0 above.

6.3.d, par. 2, p. 58: See Section 3.2.F.3 above.

In January, 1979, Cliffs submitted "Supplement No. 1, Questions and Answers Concerning Supportive Information for USNRC Source Materials License Application, Collins Draw Project," dated January 15, 1979. The following changes have been made since this submittal.

Introduction, par. 8, p. 1b: The average daily discharge to the process wastewater drain field is estimated to be 1,000 gallons per day or 0.7 gallons per minute. See Section 4.0, Supportive Information above.

Introduction, par. 9, p. 1b: Surface disturbance is estimated to be 19.7 acres.

I.A.2, par. 7, p. 4: Final well field design and well locations for Pattern Area No. 1 are shown on the attached Site Plan.

I.A.3, par. 1, p. 4: Two additional monitor wells are not required by the WDEQ and are not planned at this time.

III.D., p. 8: See the attached table, A Summary of Estimated Process Drain Field Volumes and Compositions for Two-Year Life, and Section 4.0, Supportive Information above.

IV.A., pp. 9 and 10: The surface disturbance is estimated to be approximately 19.7 acres. The components of these estimates are listed below.

Well Field	3.2 Acres
Process Building	0.2
Bladder Area	0.7
Bulk Chemical Storage	0.3
Solid Waste Disposal	1.4
Drain Field	1.6
Topsoil Stockpiles	3.8
Roads	7.0
Sump	1.5

IV.B., p. 10: The permit for the sanitary drain field has been obtained. The permits for the process wastewater drain field have been received from the WQD, WDEQ, but not from the LQD, WDEQ. We believe we are in the final response and negotiation stages for the permit from the LQD.

IX.A., pp. 17 and 18: See the attached table: Tabulation of Estimated Volume and Composition of Discharge to the Process Wastewater Drain Field, and Section 4.0, Supportive Information above.

IX.B., p. 18: See Section IX.a., above.

XX, par. 1, p. 34: The total capacity of the bladder impoundment area will be 50,000 gallons.

Your prompt review of the above-discussed changes would be appreciated. Please contact me at your earliest convenience if you require additional information. To decrease your paperwork and to assist your response, I have included a review response form below.

Sincerely,

THE CLEVELAND-CLIFFS IRON COMPANY

*Truman E. Louderback*  
Truman E. Louderback  
Acting Director/ Environmental  
Affairs and Licensing

TEL:ag

Attachments

S6-ENVI-H

xc: Region IV  
Office of Inspection and Enforcement  
U.S. Nuclear Regulatory Commission  
611 Ryan Plaza Drive-Suite 100  
Arlington, Texas 76012

Mr. Dennis Morrow, District IV Engineer  
Land Quality Division  
Wyoming Department of Environmental Quality  
30 East Grinnell Street  
Sheridan, Wyoming 82801

-----  
Date \_\_\_\_\_

Reviewed on this date, The Cleveland-Cliffs Iron Company March 21, 1980 notification of changes in the supportive information submitted in application for Source Materials License No. SUA 1352 (Docket No. 40-8714) and found them to be acceptable/not acceptable.

Signed \_\_\_\_\_

Title \_\_\_\_\_

BASELINE WATER QUALITY DATA for WELL NO. 191W, PRODUCTION ZONE

Date Sampled	5/31/78	6/21/78	7/10/78	7/26/78	12/07/79
Date Assay Received	7/24/78	7/23/78	8/14/78	9/25/78	12/31/79
Parameter mg/l					
Total Dissolved Solids (calc)	1011	570	455	400	373
Total Dissolved Solids (105°C)	1031	602	500	419	377
Conductivity 77°F μMohms (Lab)	1410	835	715	625	535
Conductivity μMohms (Field)	3100	1600	2100	920	110
Sodium (calc)	242	150	122	111	93
Sodium (observed)	272	139	141	129	91
Potassium	14	7	7	7	7
Calcium	61	38	27	18	25
Magnesium	14	5	4	6	7
Sulfate	598	258	205	170	152
Chloride	22	16	18	16	12
Carbonate	12	24	0	12	0
Bicarbonate	98	146	146	122	156
pH unit - Lab	8.1	8.6	8.1	8.6	8.0
pH unit - Field	7.9	8.3	7.7	8.5	7.4
Ammonia as N	0.05	0.03	.15	0.16	2.1
Nitrate as N	ND	ND	ND	ND	0.09
Nitrite as N	0.03	ND	.09	0.02	ND
Aluminum(.05)	0.15	ND	ND	ND	0.47
Arsenic(.01)	0.01	ND	ND	ND	ND
Barium(.05)	ND	ND	ND	ND	ND
Boron(1.0)	ND	ND	ND	ND	ND
Cadmium(.002)	ND	ND	ND	ND	ND
Chromium(0.1)	ND	ND	ND	ND	ND
Copper(0.1)	ND	ND	ND	ND	ND
Fluoride	0.14	0.27	.14	0.21	0.30
Iron(.01)	2.38	0.24	1.10	0.71	8.3
Lead(.05)	ND	ND	ND	ND	ND
Manganese(.01)	0.03	ND	0.03	0.02	0.23
Mercury(.001)	ND	ND	ND	ND	ND
Selenium(.01)	ND	ND	ND	ND	ND
Nickel(.04)	ND	ND	ND	ND	ND
Zinc(.01)	ND	ND	ND	ND	0.11
Molybdenum(.05)	ND	ND	ND	ND	ND
Vanadium(.05)	ND	ND	ND	ND	ND
Uranium(.001)	.005	.005	.033	ND	.010
Radium 226 pCi/l		9.62 ± .68	4.24 ± 0.40	15.0 ± 0.3	61.0 ± 3.0
Temperature Field °C		13	11.5	14	12

( ) Detection Limits  
 ND - Not Detected

S6/CDI/E

BASELINE WATER QUALITY DATA for WELL NO. 230W, UPPER AQUIFER

Date Sampled	6/20/78	7/7/78	7/25/78	11/15/79	12/07/79
Date Assay Received	7/25/78	8/14/78	8/28/78	11/30/79	12/31/79
Parameter mg/l					
Total Dissolved Solids (calc)	515	653	460	523	430
Total Dissolved Solids (105°C)	508	626	498	541	435
Conductivity 77°F $\mu$ Mohms (Lab)	820	710	700	730	745
Conductivity $\mu$ Mohms (Field)	1820	2200	800	425	210
Sodium (calc)	131	192	105	140	98
Sodium (observed)	135	187	119	143	98
Potassium	7	7	7	6	7
Calcium	30	39	42	28	37
Magnesium	8	2	6	6	6
Sulfate	12	245	210	258	205
Chloride	255	12	12	10	10
Carbonate	0	0	0	18	0
Bicarbonate	146	317	159	116	137
pH unit - Lab	8.1	7.8	8.0	8.2	7.9
pH unit - Field	7.6	7.4	Meter B/O	7.6	7.2
Ammonia as N	0.22	0.32	0.46	ND	0.10
Nitrate as N	ND	0.02	ND	ND	ND
Nitrite as N	ND	0.12	0.06	ND	ND
Aluminum(.05)	ND	ND	ND	0.09	ND
Arsenic(.01)	ND	.024	ND	ND	ND
Barium(.05)	ND	ND	ND	ND	ND
Boron(1.0)	ND	ND	ND	ND	ND
Cadmium(.002)	ND	ND	ND	ND	ND
Chromium(.01)	ND	ND	ND	ND	ND
Copper(.01)	ND	.01	ND	0.01	ND
Fluoride	0.21	.11	0.08	ND	0.15
Iron(.01)	ND	2.50	3.20	0.19	1.6
Lead(.05)	ND	ND	ND	ND	ND
Manganese(.01)	ND	.03	0.06	0.02	0.14
Mercury(.001)	ND	ND	ND	ND	ND
Selenium(.01)	ND	.016	0.12	ND	ND
Nickel(.04)	ND	ND	ND	ND	ND
Zinc(.01)	ND	.01	ND	0.06	ND
Molybdenum(.05)	ND	ND	ND	ND	ND
Vanadium(.05)	ND	ND	ND	ND	ND
Uranium(.001)	0.060	.020	0.012	ND	0.008
Radium 226 pCi/l	9.31 $\pm$ .56	1.9 $\pm$ .28	2.1 $\pm$ .3	2.8 $\pm$ 0.5	11.3 $\pm$ 0.8
Temperature Field °C	14	14.5	14	12	12

( ) Detection Limits  
 ND - Not Detected

S6/CDI/A

BASELINE WATER QUALITY DATA for WELL NO. 234W, PRODUCTION ZONE

Date Sampled	6/21/78	7/6/78	7/25/78	5/31/78	12/19/79
Date Assay Received	7/28/78	8/14/78	8/28/78	7/24/78	01/14/80
Parameter mg/l					
Total Dissolved Solids (calc)	378	353	329	345	352
Total Dissolved Solids (105°C)	436	392	343	382	371
Conductivity 77°F µMolms (Lab)	575	550	520	555	530
Conductivity µMolms (Field)	1180	1580	500	910	760
Sodium (calc)	101	94	83	90	90
Sodium (observed)	96	107	85	101	93
Potassium	6	5	6	7	7
Calcium	27	28	31	27	26
Magnesium	3	2	1	1	4
Sulfate	145	130	118	138	138
Chloride	12	16	12	10	10
Carbonate	12	0	0	0	0
Bicarbonate	146	159	159	146	156
pH unit - Lab	8.5	7.8	7.9	8.1	7.9
pH unit - Field	7.5	7.8	7.4	7.4	7.3
Ammonia as N	0.08	.08	0.13	0.07	0.31
Nitrate as N	ND	ND	ND	ND	ND
Nitrite as N	0.06	ND	ND	0.01	ND
Aluminum(.05)	ND	ND	ND	0.09	ND
Arsenic(.01)	ND	ND	ND	0.01	ND
Barium(.05)	ND	ND	ND	ND	ND
Boron(1.0)	ND	ND	ND	ND	ND
Cadmium(.002)	ND	ND	ND	ND	ND
Chromium(.01)	ND	ND	ND	ND	ND
Copper(.01)	ND	ND	ND	ND	ND
Fluoride	0.26	.18	0.13	0.17	0.22
Iron(.01)	.01	ND	0.07	0.16	0.09
Lead(.05)	ND	ND	ND	ND	ND
Manganese(.01)	ND	ND	0.01	0.01	0.03
Mercury(.001)	ND	ND	ND	ND	ND
Selenium(.01)	ND	ND	ND	ND	ND
Nickel(.04)	ND	ND	ND	ND	ND
Zinc(.01)	ND	ND	ND	ND	0.04
Molybdenum(.05)	ND	ND	ND	ND	ND
Vanadium(.05)	ND	ND	ND	ND	ND
Uranium(.001)	.041	.030	.046	.039	.010
Radium 226 pCi/l	5.67 ± .45	10.2 ± .8	15.1 ± .3		2.0 ± 0.4
Temperature Field °C	13.5	15	14	13	13

( ) Detection Limits  
 ND - Not Detected

S6/CDI/I

BASELINE WATER QUALITY DATA for WELL NO. 2384, PRODUCTION ZONE MONITOR WELL

Date Sampled	6/2/78	6/22/78	7/12/78	7/31/78	11/16/79
Date Assay Received	7/24/78	7/24/78	8/14/78	9/25/78	11/30/79
Parameter mg/l					
Total Dissolved Solids (calc)	367	356	360	376	339
Total Dissolved Solids (105°C)	391	320	350	394	346
Conductivity 77°F µMohms (Lab)	555	555	555	575	455
Conductivity µMohms (Field)	1090	1200	320	600	340
Sodium (calc)	105	100	99	103	90
Sodium (observed)	105	97	95	97	90
Potassium	9	7	7	7	6
Calcium	21	24	25	23	22
Magnesium	1	0	0	3	5
Sulfate	138	135	143	148	125
Chloride	12	12	14	14	10
Carbonate	24	12	0	12	0
Bicarbonate	116	134	146	134	165
pH unit - Lab	8.6	8.5	8.0	8.3	8.12
pH unit - Field	8.0	7.9	8.5	8.4	7.3
Ammonia as N	0.03	.36	.07	.12	ND
Nitrate as N	0.51	ND	ND	.01	ND
Nitrite as N	ND	ND	.15	.02	ND
Aluminum(.05)	ND	ND	ND	ND	0.05
Arsenic(.01)	ND	ND	.01	ND	ND
Barium(.05)	ND	ND	ND	ND	ND
Boron(1.0)	ND	ND	ND	ND	ND
Calcium(.002)	ND	ND	ND	ND	ND
Chromium(.01)	ND	ND	ND	ND	ND
Copper(.01)	0.02	ND	ND	ND	0.01
Fluoride	0.11	.23	.10	0.17	0.19
Iron(.01)	ND	ND	.07	0.02	0.01
Lead(.05)	ND	ND	ND	ND	ND
Manganese(.01)	ND	ND	ND	ND	0.03
Mercury(.001)	ND	ND	ND	ND	ND
Selenium(.01)	ND	ND	ND	ND	ND
Nickel(.04)	ND	ND	ND	ND	ND
Zinc(.01)	ND	ND	ND	ND	0.01
Molybdenum(.05)	ND	ND	ND	ND	ND
Vanadium(.05)	ND	ND	ND	ND	ND
Uranium(.001)	0.45	.466	.406	.370	0.081
Radium 226 pCi/l	.15 ± .1	6.99 ± .51	23.6 ± 1.1	17.1 ± 0.27	2.9 ± 1.7
Temperature Field °C	15	13	15	15	12

( ) Detection Limits  
 ND - Not Detected

S6/CDI/J



BASELINE WATER QUALITY DATA FOR WELL NO. 239W, PRODUCTION ZONE MONITOR WELL

Parameter	7/31/78 9/25/78	6/22/78 7/24/78	6/5/78 7/24/78	7/12/78 8/14/78	11/15/79 11/30/79
Total Dissolved Solids (calc)	458	445	519	430	336
Total Dissolved Solids (105°C)	438	446	494	446	345
Conductivity 77°F (Lab)	665	770	909	650	500
Conductivity (Field)	707	1200	1750	1020	360
Sodium (calc)	112	98	120	98	87
Sodium (observed)	99	106	112	99	85
Potassium	8	8	9	8	6
Calcium	47	52	61	50	24
Magnesium	3	5	2	3	6
Sulfate	136	130	155	125	113
Chloride	44	56	64	50	13
Carbonate	9	0	0	0	0
Bicarbonate	220	195	220	195	177
pH unit - Lab	7.7	7.9	8.1	7.6	7.9
pH unit - Field	7.8	7.0	6.9	6.0	7.8
Ammonia as N	.10	0.14	.01	.04	ND
Nitrate as N	ND	ND	ND	ND	ND
Nitrite as N	.02	ND	.01	.23	ND
Aluminum(.05)	ND	ND	ND	ND	ND
Arsenic(.01)	ND	ND	ND	ND	ND
Barium(.05)	ND	ND	ND	ND	ND
Boron(1.0)	ND	ND	ND	ND	ND
Cadmium(.002)	ND	ND	ND	ND	ND
Chromium(.01)	ND	ND	ND	ND	ND
Copper(.01)	ND	ND	.01	ND	ND
Fluoride	0.19	0.25	.11	.14	0.01
Iron(.01)	0.18	.04	ND	.19	0.20
Lead(.05)	ND	ND	ND	ND	0.13
Manganese(.01)	0.04	.05	.06	.05	ND
Mercury(.001)	ND	ND	ND	ND	0.05
Selenium(.01)	ND	ND	ND	ND	ND
Nickel(.04)	ND	ND	ND	ND	ND
Zinc(.01)	ND	ND	ND	ND	0.09
Molybdenum(.05)	ND	ND	ND	ND	ND
Vanadium(.05)	ND	ND	ND	ND	ND
Uranium(.001)	0.18	.050	.061	.049	0.004
Radium 226 pCi/l	6.99 ± 0.27	5.03 ± .43	2.81 ± .31	2.81 ± .31	2.8 ± 0.5
Temperature Field °C	13	14.5	13.5	15	12.5

( ) Detection Limits  
 ND - Not Detected

S6/CDI/K

BASELINE WATER QUALITY DATA for WELL NO. 240H, PRODUCTION ZONE MONITOR WELL

Date Sampled	5/23/78	6/7/78	6/22/78	7/11/78	
Date Assay Received	6/26/78	6/27/78	7/24/78	8/14/78	7/31/78
Parameter mg/l					
Total Dissolved Solids (calc)	391	308	343	340	369
Total Dissolved Solids (105°C)	430	442	344	378	342
Conductivity 77°F µMhos (Lab)	610	620	590	560	525
Conductivity µMhos (Field)	1009	1180	1050	980	600
Sodium (calc)	112	112	98	94	103
Sodium (observed)	100	111	106	113	104
Potassium	6	6	5	6	6
Calcium	26	29	24	22	24
Magnesium	0	2	1	2	1
Sulfate	143	139	125	128	145
Chloride	20	34	20	16	18
Carbonate	12	12	0	0	0
Bicarbonate	146	146	153	146	146
pH unit - Lab	8.2	8.2	8.1	7.2	8.0
pH unit - Field	7.6	7.4	7.7	7.8	8.0
Ammonia as N	0.05	0.03	0.07	0.11	0.12
Nitrate as N	ND	0.28	ND	ND	ND
Nitrite as N	ND	ND	ND	0.16	.03
Aluminum(.05)	ND	ND	ND	ND	ND
Arsenic(.01)	ND	ND	ND	ND	ND
Barium(.05)	ND	ND	ND	ND	ND
Boron(1.0)	ND	ND	ND	ND	ND
Cadmium(.002)	ND	ND	ND	ND	ND
Chromium(.01)	ND	ND	ND	ND	ND
Copper(.01)	ND	ND	ND	ND	ND
Fluoride	.17	.18	.26	0.13	0.13
Iron(.01)	.18	ND	ND	0.04	0.14
Lead(.05)	ND	ND	ND	ND	ND
Manganese(.01)	0.02	ND	ND	0.01	.01
Mercury(.001)	ND	ND	ND	ND	ND
Selenium(.01)	ND	ND	ND	ND	ND
Nickel(.04)	ND	ND	ND	ND	ND
Zinc(.01)	0.01	ND	ND	0.03	ND
Molybdenum(.05)	ND	ND	ND	ND	ND
Vanadium(.05)	ND	ND	ND	ND	ND
Uranium(.001)	.020		.003	.029	ND
Radium 226 pCi/l		.86 ± .18	1.14 ± .22	2.09 ± 0.27	2.36 ± 0.29
Temperature Field °C		15	16.5	15	12

( ) Detection Limits  
 ND - Not Detected

BASELINE WATER QUALITY DATA for WELL NO. 241W, PRODUCTION ZONE MONITOR WELL

Date Sampled	6/5/78	6/22/78	7/11/78	7/28/78	11/16/79
Date Assay Received	<u>7/24/78</u>	<u>7/24/78</u>	<u>8/14/78</u>	<u>9/25/78</u>	<u>11/30/79</u>
Parameter mg/l					
Total Dissolved Solids (calc)	401	382	346	376	356
Total Dissolved Solids (105°C)	424	361	371	353	360
Conductivity 77°F µMhms (Lab)	665	600	545	575	445
Conductivity µMhms (Field)	1500	1250	600	meter B/O	600
Sodium (calc)	98	105	90	100	95
Sodium (observed)	94	96	93	95	94
Potassium	8	7	7	7	5
Calcium	40	30	28	30	24
Magnesium	1	0	2	1	5
Sulfate	140	130	123	140	130
Chloride	36	20	18	14	13
Carbonate	12	24	12	12	0
Bicarbonate	134	134	134	146	171
pH unit - Lab	8.5	8.4	8.3	8.3	8.1
pH unit - Field	7.5	7.7	8.0	8.2	7.5
Ammonia as N	0.01	0.12	ND	.09	ND
Nitrate as N	0.50	0.14	ND	ND	0.5
Nitrite as N	0.05	ND	.34	.04	0.02
Aluminum(.05)	ND	ND	ND	ND	0.17
Arsenic(.01)	.02	ND	ND	ND	ND
Barium(.05)	ND	ND	ND	ND	ND
Boron(1.0)	ND	ND	ND	ND	ND
Cadmium(.002)	ND	ND	ND	ND	ND
Chromium(.01)	ND	ND	ND	ND	ND
Copper(.01)	.01	ND	ND	ND	ND
Fluoride	.15	.27	.16	.16	0.36
Iron(.01)	ND	ND	.07	.28	0.14
Lead(.05)	ND	ND	ND	ND	ND
Manganese(.01)	ND	ND	.01	ND	0.02
Mercury(.001)	ND	ND	ND	ND	ND
Selenium(.01)	ND	ND	ND	ND	ND
Nickel(.04)	ND	ND	ND	ND	ND
Zinc(.01)	ND	ND	.01	ND	0.09
Molybdenum(.05)	ND	ND	ND	ND	ND
Vanadium(.05)	ND	ND	ND	ND	ND
Uranium(.001)	.054	.042	.071	.027	0.005
Radium 226 pCi/l	.42 ± .13	.40 ± .15	2.07 ± 0.30	2.93 ± 0.31	3.9 ± 0.6
Temperature Field °C	12.5	15.5	13	14	12

( ) Detection Limits  
 ND - Not Detected

S6/CDI/M

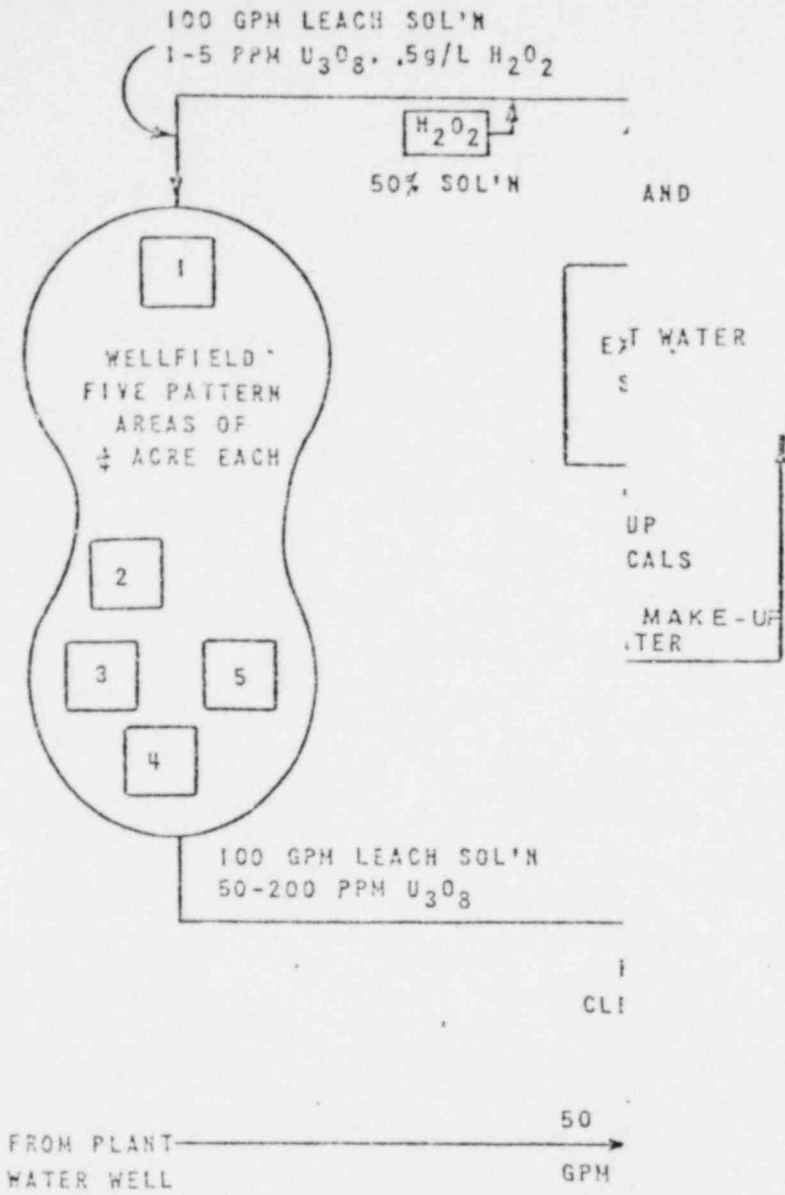


FIGURE MP-4.1



URANIUM RECOVERY  
PROCESS SCHEMATIC

SUMMARY of ESTIMATED PROCESS DRAIN FIELD VOLUMES  
and COMPOSITIONS for TWO-YEAR LIFE

Volume Summary

Total Gallons to Drain Field over Project Life (2 Yr.) 731,400 gallons  
=  $2.77 \times 10^6$  liters

Approximate Average Gallons/Day to Drain Field over  
2 Years Including Final Cleanup 1,000 gallon/day

Composition Summary

<u>Element or Compound to Drain Field</u>	<u>Approximate Total Pounds After 2 Yrs. to Drain Field</u>	<u>Average gm/liter for 2 Yrs. to Drain Field</u>
Na	5,500	0.88
Ca	1,152	0.18
Fe	1.2	$1.9 \times 10^{-4}$
Mg	131	0.02
NH <sub>4</sub>	277	0.04
(NH <sub>4</sub> ) <sub>2</sub> CO <sub>3</sub>	26,400	4.2
Mo	126.3	0.02
Se	4.1	$6.6 \times 10^{-4}$
As	3.7	$6.0 \times 10^{-4}$
SO <sub>4</sub> <sup>=</sup>	5,396	0.8
Cl <sup>-</sup>	3,800	0.6
U <sub>3</sub> O <sub>8</sub>	4.64	$7 \times 10^{-4}$
Ra <sub>226</sub>	$52 \times 10^{-9}$ lbs	8 pCi/liter
	$23.4 \times 10^6$ pCi	$8 \times 10^{-12}$ gm/liter
	$23.4 \times 10^{-6}$ gm	

TABULATION of ESTIMATED VOLUME & COMPOSITION of DISCHARGE to the PROCESS WASTEWATER DRAIN FIELD

Task No.	Task Description	Gal./Day to Drain Field (2 Yr. Ave.)	Approx. Major Ion Component	Approx. Ion Conc. Range (mg/liter)	Max. Conc. Before Treatment (mg/liter)	Probable Conc. to Drain Field (mg/liter)	Probable lbs./day Ions to Drain Field	Total Gal. Over 2 Yrs. Drain Field	Maximum Total Lbs. Over 2 Yrs. Drain Field	Average pH Range
1	Water Softeners to Protect R.O. Unit*	15	Ca <sup>++</sup>	1,000-1,750	(---)**	1,500	0.183	11,000	137	6- 8
2	Housekeeping, Washdown Plant R.O. Water	50	---	---	(---)**	---	---	36,500	---	6- 8
3	Boiler Blowdown	20	Fe <sup>++</sup> Ca <sup>++</sup>	5-10 5-15	(---)** (---)**	10 15	1.67x10 <sup>-3</sup> 2.5x10 <sup>-3</sup>	14,600	1.2 1.8	6- 7.5 6- 7.5
4	Process by IX Unit***, Clean Well Water for Plant Makeup, Elutions, Well Field Pre-Conditioning	110	Cl <sup>+</sup> Mg <sup>++</sup>	1,000-2,000 100-300	--- ---	1,500 200	1.38 0.13	80,300	1010 131	6- 8
5	Decant Water from Precipitation Yellow Cal. Using R.O. Unit	450	U <sub>3</sub> O <sub>8</sub> SO <sub>4</sub> <sup>=</sup> Cl <sup>-</sup> NH <sup>+</sup> Mo	10-50 100-500 100-300 10-200 1-10	50 500 300 200 10	1.0 300 200 100 5	3.76x10 <sup>-3</sup> 1.13 0.75 0.38 0.02	329,000	2.74 825 548 277 14.6	7- 8.5
6	Periodic Resin Cleanup (NaOH)	15	U <sub>3</sub> O <sub>8</sub> Na	--- 40,000-80,000	4 80,000	4 60,000	0.5x10 <sup>-3</sup> 7.5	11,000	0.4 5500	9-11
7	Cleanup of Four Well Fields, After Well Field Transfer, by R.O. Cleanup	170	U <sub>3</sub> O <sub>8</sub> SO <sub>4</sub> <sup>=</sup> Cl <sup>-</sup> Mo Se As Ra <sub>226</sub>	1-10 200-500 50-150 1-10 0.5-1.5 0.1-0.5 10-50 pCi/l	10 500 150 10 1.5 0.5 50 pCi/l	1.0 300 100 5 0.5 0.1 25 pCi/l	1.4x10 <sup>-3</sup> 0.43 0.14 0.005 0.7x10 <sup>-3</sup> 0.1x10 <sup>-3</sup> 16x10 <sup>-3</sup> pCi/d	124,000	1.0 314 102 3.7 0.5 0.07 25.8x10 <sup>-9</sup> lbs	8- 9
8	Cleanup of Last (5th) Well Field with IX Followed by R.O. Concentration	(90-day Ave.) 1400	U <sub>3</sub> O <sub>8</sub> Mo Se As SO <sub>4</sub> <sup>=</sup> Cl <sup>-</sup> Ca <sup>++</sup> (NH <sub>4</sub> ) <sub>2</sub> CO <sub>3</sub> Ra <sub>226</sub>	10-20 50-150 1-5 1-5 2,000-6,000 2,000-4,000 1-5 1x10 <sup>4</sup> -3x10 <sup>4</sup> 10-50 (pCi/liter)	20 150 5 5 6,000 4,000 5 3x10 <sup>4</sup>	1 100 3.0 3.0 4,000 3,000 3.0 2.5x10 <sup>4</sup> 25 pCi/l	0.01 1.2 0.04 0.04 47 35 0.04 293 0.13x10 <sup>6</sup> pCi/d 2.9x10 <sup>-10</sup> lb/d	126,000	0.9 108 3.6 3.6 4230 3150 3.6 26,400 (13.2 tons) 11.7x10 <sup>6</sup> pCi 26x10 <sup>-9</sup> lb	8- 9

\*Reverse Osmosis Unit  
\*\*No. Treatment Necessary  
\*\*\*Ion Exchange Unit