

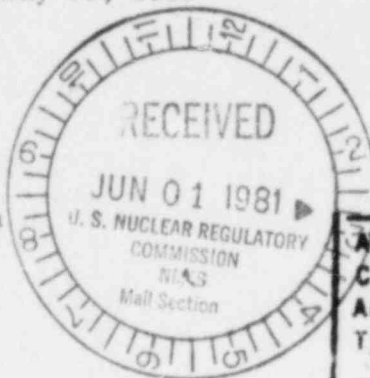
return to: Andre Filbs  
396-55



R. M. Tuthill  
Manager - Uranium

May 19, 1981

Mr. Ross A. Scarano, Chief  
Uranium Recovery Licensing Branch  
Division of Waste Management  
U.S. Nuclear Regulatory Commission  
Washington, D.C. 20555



Dear Mr. Scarano:

Re: Docket No. 040-08714  
Source Material License No. SUA-1352

|                     |         |
|---------------------|---------|
| Applicant           | .....   |
| Check No.           | 8726    |
| Amount/Fee Category | 2B-1360 |
| Type of Fee         | .....   |
| Check Rec'd         | 5/14/81 |
| Received By         | .....   |

The purpose of this letter is to provide the additional information requested in Attachment 1 of your letter of May 6, 1981; to request an amendment to the license to replace Monitor Well 238 with Monitor Well 298. which will monitor for excursion of mining fluids from the southeast quadrant of the well field; and to provide written confirmation that Cleveland-Cliffs will dispose of waste and by-product resins, described in our letter and amendment request dated April 1, 1981, by depositing in a licensed uranium mill tailings disposal area or by alternate methods contained in the program to be submitted pursuant to Appendix A, 10CFR Part 40, as published in the Federal Register, October 3, 1981, and to be subsequently approved by the NRC.

Following is the additional information required regarding Attachment 1 to your letter dated May 6, 1981.

1. Complete mineralogy and geochemistry of the ore zone matrix.

The uranium mineral is a sooty pitchblende. The host rock mineralogy is given below in Table 1. The sample used for mineralogical examination was selected by the analyst from a suite of core segments.

Table 1  
Host Rock Mineralogy

Based on transmitted light examination of the one loose-grain thin section prepared from +20M material, it appeared that the host rock was a lithic (rock fragment) sandstone. The approximate mineralogical composition was as follows:

| Estimate<br>% | Material   |
|---------------|--|
| 45-55         | Quartzo-feldspathic rock fragments   |
| 15-25         | Feldspar (perthite, microcline, Na plagioclase)  |
| 15-25         | Quartz grains, somewhat shattered  |
| 10            | Micas, clay matrix, pyrite, pitchblende (mixed with pyrite, coating grains, and in fractures), and other minor phases. |

The Cleveland-Cliffs Iron Co.

300 Country Club Road - P.O. Box 3140 - Casper, WY 82602 - 307/234-9133

8107280050 810519  
PDR ADOCK 04008714  
C PDR

10/100

Essentially no carbonate minerals were observed.

Petrographic description of a host rock was rather tentative and difficult with only disaggregated, loose-grain samples available.

The geochemistry of the ore zone matrix is based on the chemical analysis of a series of core samples of the ore deposit. The average and range of these analyses are given in Table 2.

2. Complete chemistry of injected lixiviant.

Several times each day, ammonium carbonate/bicarbonate, uranium, and pH levels are determined in the mining solution circuit prior to injection. Calcium and hydrogen peroxide are also frequently analyzed as necessary for optimal operation. Less frequently, a complete analysis of a composite sample of the production stream (pregnant solution) is conducted for research purposes. By removing uranium from the production stream and by adjusting the concentrations of ammonium carbonate/bicarbonate, the production stream is converted to the injection stream. Therefore, by removing uranium from the production stream analysis and by making a representative addition to the ammonia, carbonate, and bicarbonate analyses, a representative analysis of the lixiviant injection stream is derived.

The most recent composite assay of the production stream and adjusted lixiviant injection stream are presented in Table 3. The table shows typical chemical adjustments made to the production stream during uranium removal and mining chemical addition prior to lixiviant injection. Major ion balances are very difficult to determine due to the high ammonium carbonate/bicarbonate levels in the original sample.

3. Complete chemistry of bleed stream (pregnant solution).

The chemistry of the pregnant solution is very similar to the injected lixiviant because all efforts are made to operate a balanced well field; i.e., volume injected equals volume extracted and injected lixiviant is distributed for maximum pattern confinement. The major differences between injected lixiviant and the produced uranium-pregnant solution are that the injected lixiviant contains makeup oxidant and occasionally makeup ammonium bicarbonate/carbonate, and the pregnant solution contains elevated levels of uranium. Table 3 contains a representative chemical analysis of the pregnant solution, based on the most recent assay available of a composite sample.

There are no regular bleed streams withdrawn from the production stream (pregnant solution) and discharged to a waste impoundment area.

4. Analysis of anticipated chemical reactions and interactions in the ore zone during injection.

The mining solution, composed of ammonium carbonate and bicarbonate, and hydrogen peroxide, and/or oxygen, is then introduced to the mineralized zone and the extraction of uranium begins.

Table 2  
 Geochemical Summary of Ore Zone Matrix  
 Collins Draw Ore Zone

| <u>No. of<br/>Samples</u> | <u>Parameter</u> |       | <u>Average</u> | <u>Standard<br/>Deviation</u> | <u>Range</u> |          |
|---------------------------|------------------|-------|----------------|-------------------------------|--------------|----------|
| 168                       | Uranium          | %     | 0.170          | 0.717                         | 0.001        | 6.170    |
| 89                        | Total Iron       | %     | 2.062          | 1.102                         | 0.64         | 6.15     |
| 89                        | Ferrous Iron     | %     | 1.119          | 0.632                         | 0.04         | 3.94     |
|                           | Ferric Iron      | %     | 0.943          | 0.470                         | --           | --       |
| 89                        | Sulfide          | %     | 0.259          | 0.592                         | 0            | 4.230    |
| 89                        | Carbonate        | %     | 0.948          | 1.790                         | 0            | 8.180    |
| 45                        | Calcium          | %     | 1.148          | 1.541                         | 0.250        | 6.610    |
| 72                        | Carbon (organic) | %     | 0.260          | 0.286                         | 0            | 1.06     |
| 52                        | Molybdenum       | ppm   | 2.115          | 0.423                         | 1            | 3        |
| 52                        | Selenium         | ppm   | 24.558         | 47.325                        | 1            | 263      |
| 52                        | Vanadium         | %     | 0.0226         | 0.0268                        | 0.002        | 0.158    |
| 45                        | Arsenic          | ppm   | 5.644          | 5.117                         | 2            | 20       |
| 45                        | Ammonium         | ppm   | 10.000         | 0                             | 10           | 10       |
| 45                        | Chloride         | ppm   | 50.222         | 14.374                        | 40           | 80       |
| 45                        | Mercury          | ppm   | < 0.09         | 0                             | < 0.09       | < 0.09   |
| 45                        | Sulfate          | %     | 0.660          | .858                          | 0.050        | 2.970    |
| 25                        | Thorium 230      | pCi/g | 271.896        | 365.234                       | 3.400        | 1700.000 |
| 68                        | Radium 226       | pCi/g | 274.482        | 605.545                       | 9.800        | 4900.000 |

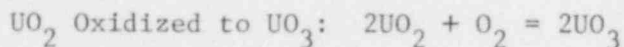
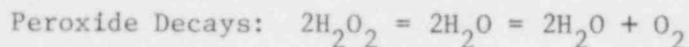
Table 3  
 Chemical Analysis of Injected and Pregnant Mining Solutions

Analyses reported in milligrams per liter except where noted.

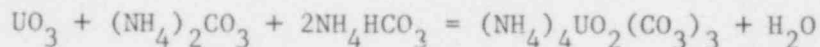
| Parameter                      | Representative Pregnant-Production |                     |
|--------------------------------|------------------------------------|---------------------|
|                                | Injected<br>Lixiviant              | Solution<br>4-19-81 |
| Total Dissolved Solids         | 1112                               | 1112                |
| Sodium                         | 138                                | 138                 |
| Calcium                        | 40                                 | 40                  |
| Magnesium                      | 2                                  | 2                   |
| Sulfate                        | 420                                | 420                 |
| Chloride                       | 475                                | 475                 |
| Carbonate                      | 1-5 g/l                            | 1404                |
| Bicarbonate                    | 1-5 g/l                            | --                  |
| Hydroxide                      | 82                                 | 82                  |
| pH                             | 9.1-9.7                            | 9.1                 |
| Conductivity                   | 4147                               | 4147                |
| Ammonia (NH <sub>4</sub> as N) | 1-4 g/l                            | 420                 |
| Nitrate                        | 10.0                               | 10.0                |
| Nitrite                        | 1.25                               | 1.25                |
| Fluoride                       | 0.57                               | 0.57                |
| Total Alkalinity               | 2582                               | 2582                |
| Total Hardness                 | 108                                | 108                 |
| Boron                          | < 0.01                             | < 0.01              |
| Aluminum                       | < 0.05                             | < 0.05              |
| Arsenic                        | 0.056                              | 0.056               |
| Barium                         | < 0.03                             | < 0.03              |
| Cadmium                        | < 0.002                            | < 0.002             |
| Chromium                       | < 0.01                             | < 0.01              |
| Copper                         | < 0.01                             | < 0.01              |
| Iron                           | < 0.01                             | < 0.01              |
| Lead                           | < 0.01                             | < 0.01              |
| Manganese                      | < 0.01                             | < 0.01              |
| Mercury                        | < 0.0005                           | < 0.0005            |
| Nickel                         | < 0.02                             | < 0.02              |
| Selenium                       | 2.2                                | 2.2                 |
| Zinc                           | < 0.005                            | < 0.005             |
| Molybdenum                     | 0.06                               | 0.06                |
| Uranium                        | 0-2                                | 30-150              |
| Vanadium                       | 4.2                                | 4.2                 |
| Radium 226 pCi/l               | 237±6                              | 237±6               |



There are many uranium minerals, but at Collins Draw the uranium is present as a uranium oxide,  $UO_2$ , with all the uranium in the tetravalent state. The primary uranium reactions are as follows:

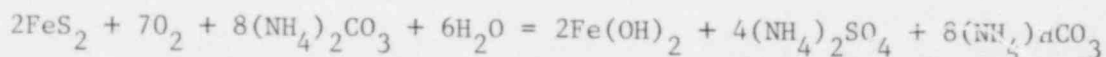


$UO_3$  Complexes with  $CO_3$ :

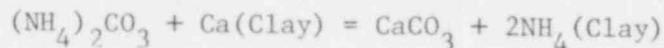


Once the uranium has been oxidized with oxygen and complexed with carbonate, it is water soluble and can be transported, or washed, to the recovery wells with the circulating mining solutions.

In addition to the primary uranium extraction chemical reactions, side reactions with other host sand constituents are possible. Based on laboratory test work to date, interactions with calcium sulfate and iron sulfide are expected.



Finally, interaction with clays present in the host sand is speculated. Clay mineralogy is complex, but it is believed the ammonium ion either simply is absorbed on the surface of the clay by weak inter-molecular forces, or that the ammonium actually replaces the calcium in the clay.



5. Map showing current injection-production well configuration and monitor wells.

The attached Figure 1, Well Field Plan View, shows the current well configuration and monitor wells. Table 4 below contains a list of the current production wells and their production rate, a list of the injection wells and their injection rate, and a list of the monitor wells.

Table 4  
 Current Production Wells, Injection Wells,  
 Monitor Wells, and Flow Rates

| <u>Production Wells</u> | <u>Production Rate</u> | <u>Injection Wells</u> | <u>Injection Rate</u> |
|-------------------------|------------------------|------------------------|-----------------------|
| 273                     | 16 gpm                 | 190                    | 7 gpm                 |
| 286                     | <u>30 gpm</u>          | 233                    | 3 gpm                 |
| Total                   | 46 gpm                 | 234                    | 3 gpm                 |
|                         |                        | 278                    | 3 gpm                 |
| Monitor Wells           |                        | 280                    | 4 gpm                 |
| 230 - Upper Aquifer     |                        | 282                    | 3 gpm                 |
| 238 - Ore Zone Aquifer  |                        | 283                    | 6 gpm                 |
| 239 - Ore Zone Aquifer  |                        | 284                    | 4 gpm                 |
| 240 - Ore Zone Aquifer  |                        | 285                    | 6 gpm                 |
| 241 - Ore Zone Aquifer  |                        | 287                    | <u>7 gpm</u>          |
|                         |                        | Total                  | 46 gpm                |

6. Water levels (plotted) from just prior to start-up of Well Field B to date. This would include monitor wells and injection-production wells.

It is difficult to measure water levels in wells during injection or during pumping, and during operation water levels inside of the B Well Field have not been measured.

Figures 2 to 6 show the water levels for the monitor wells during the past 13 months.

7. Corrective actions taken during current excursion (changes in injection-production patterns).

The following changes in injection and production patterns have been made from January 22, 1981, to the present.

- 01/22/81 - Start daily monitoring of Well 238.
- 01/14/81 to  
 01/26/81 - Pumping Wells 190, 286, 273.  
 Injection Wells 281, 284, 280, 283, 285, 287, 278, 233, 282, 234.
- 01/26/81 - Stop injection into Well 281 and stop pumping from Well 190.  
 Convert Well 190 to an injection well.
- 01/25/81 to  
 02/03/81 - Pumping Wells 286, 273.  
 Injection Wells 284, 280, 283, 285, 287, 278, 233, 282, 234, 190.

Remarks: Sulfate begins trending downward. Excursion appears to be statistical and therefore elevated levels may return to normal in time, as has been the case with other monitor wells.

FIGURE 2

MONITOR WELL 230 WATER LEVELS

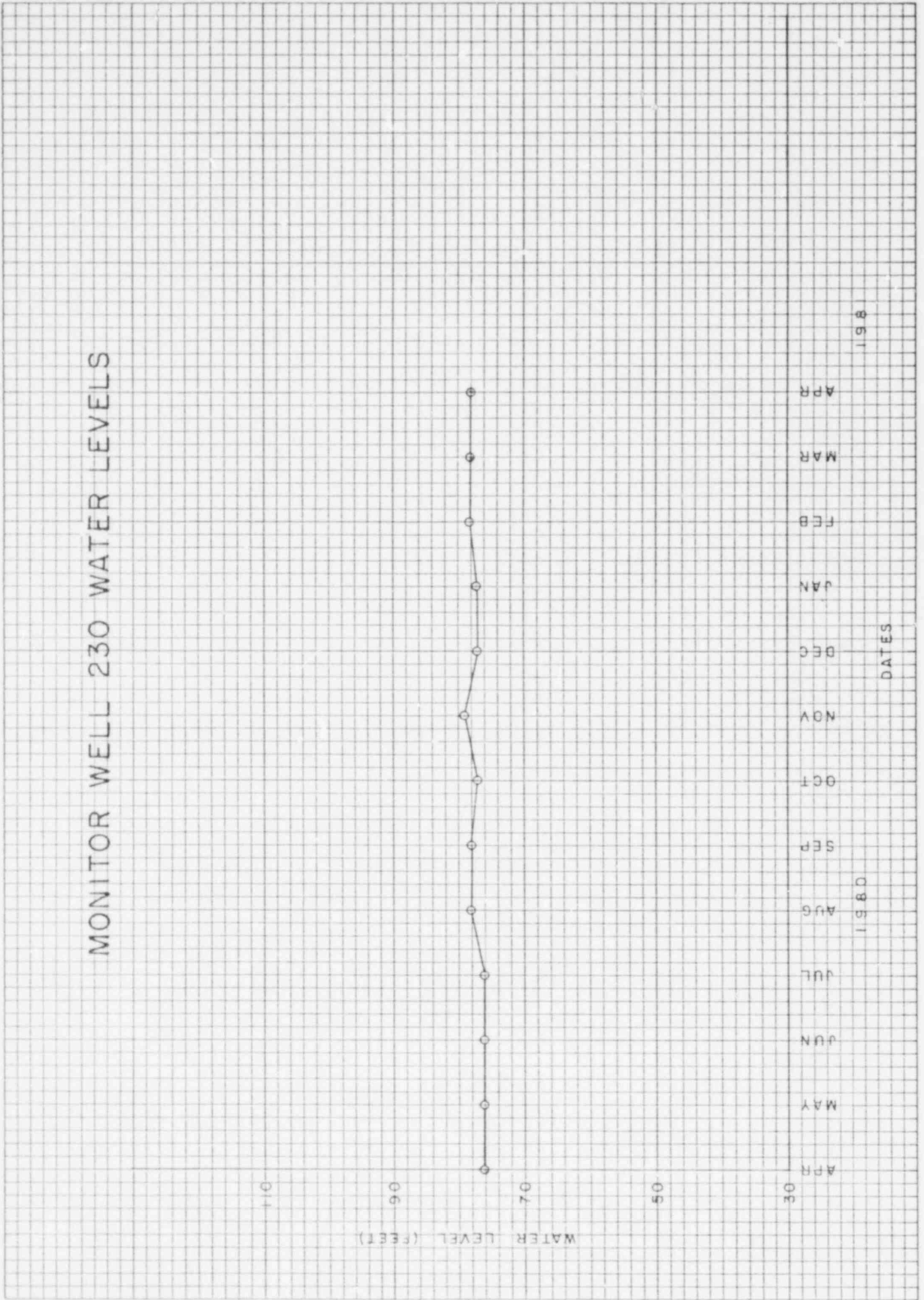


FIGURE 3

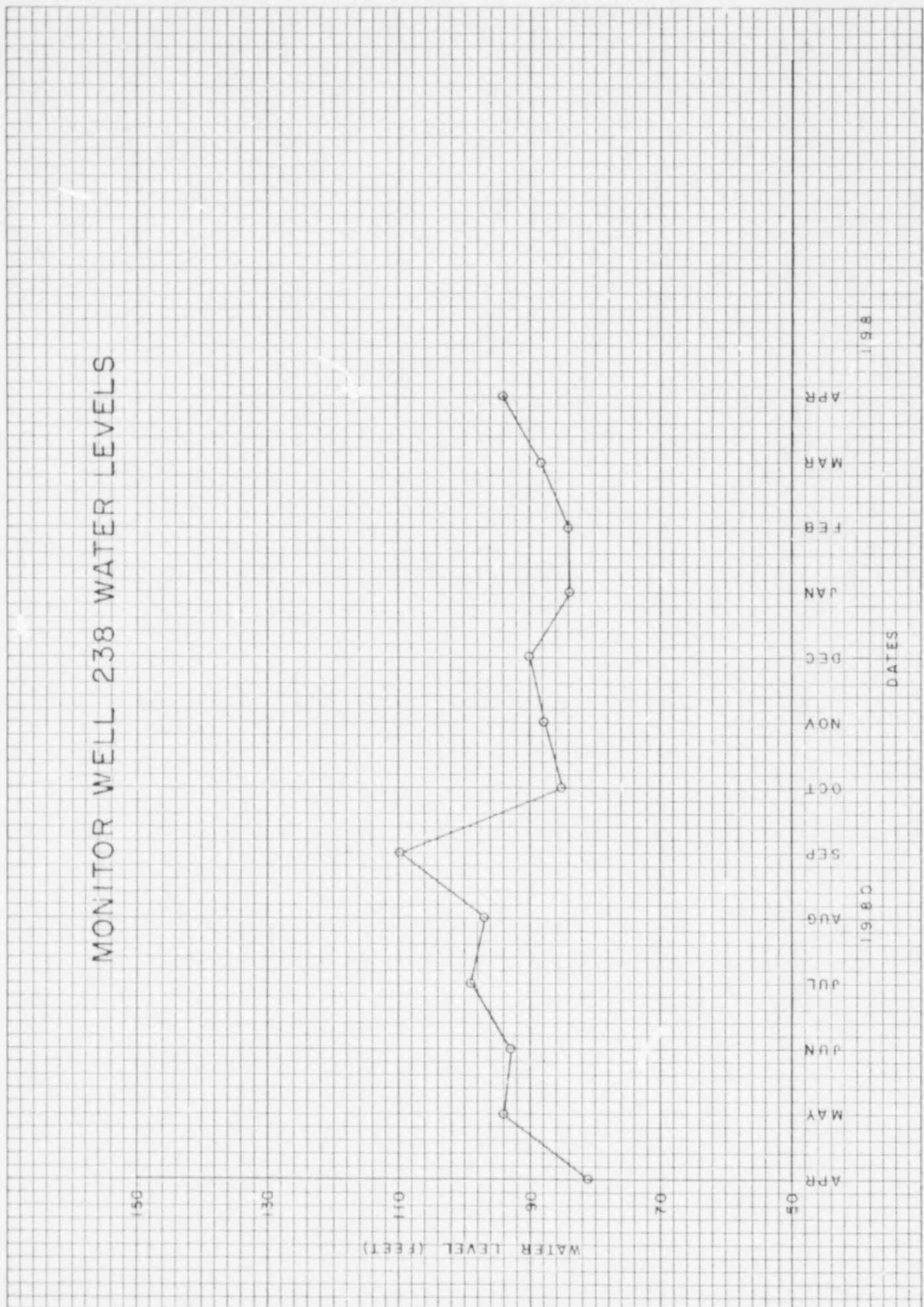




FIGURE 4

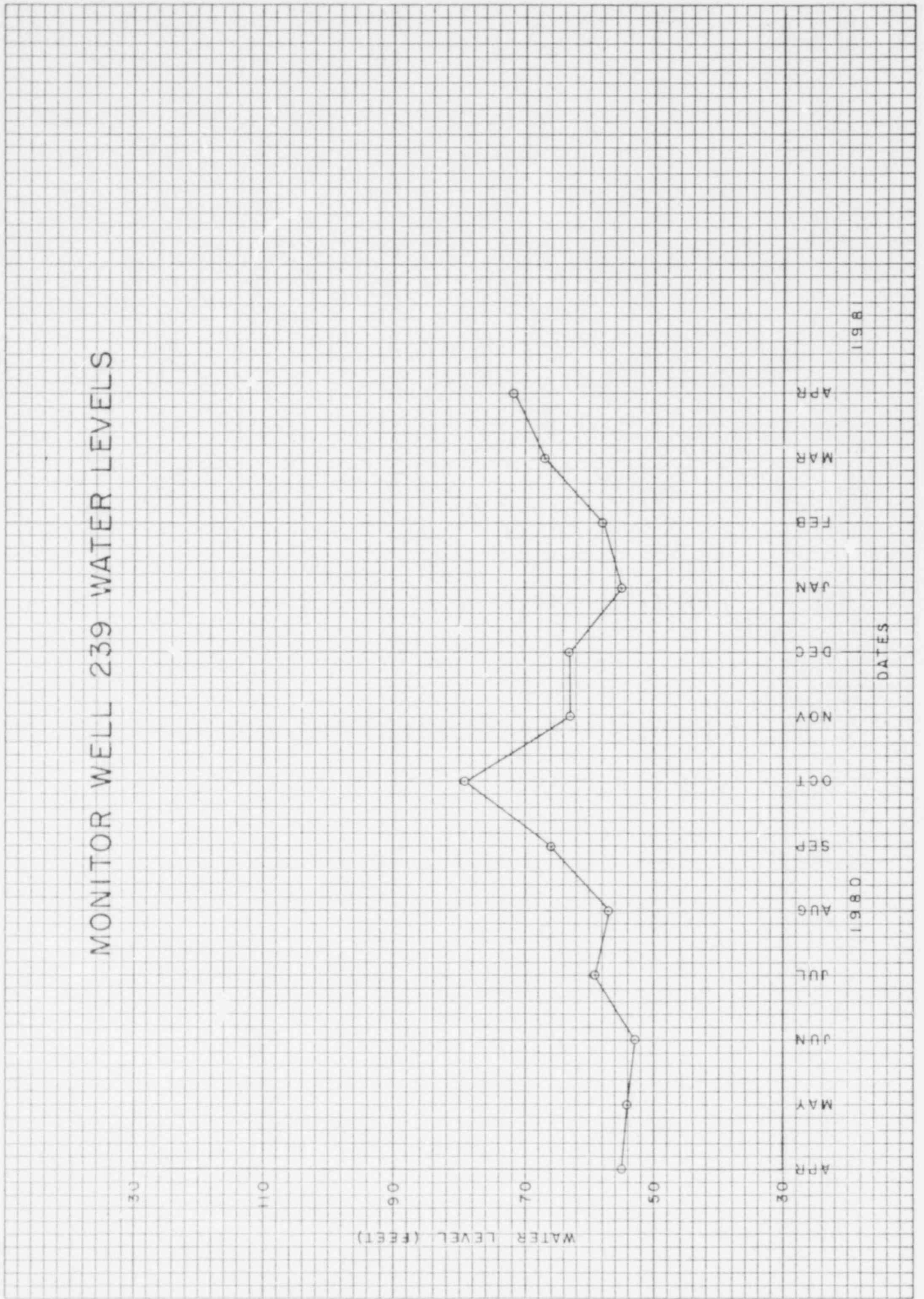


FIGURE 5

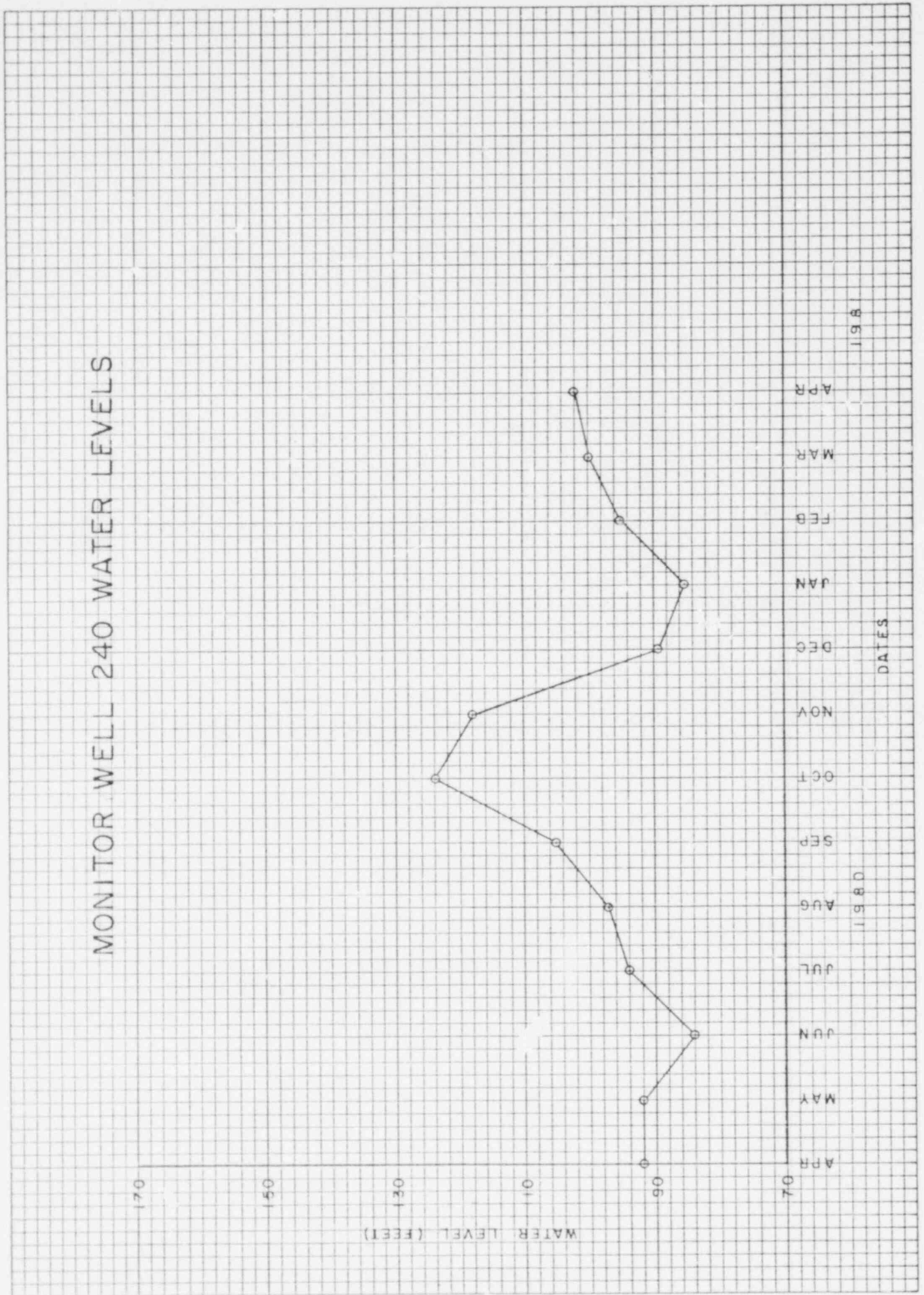
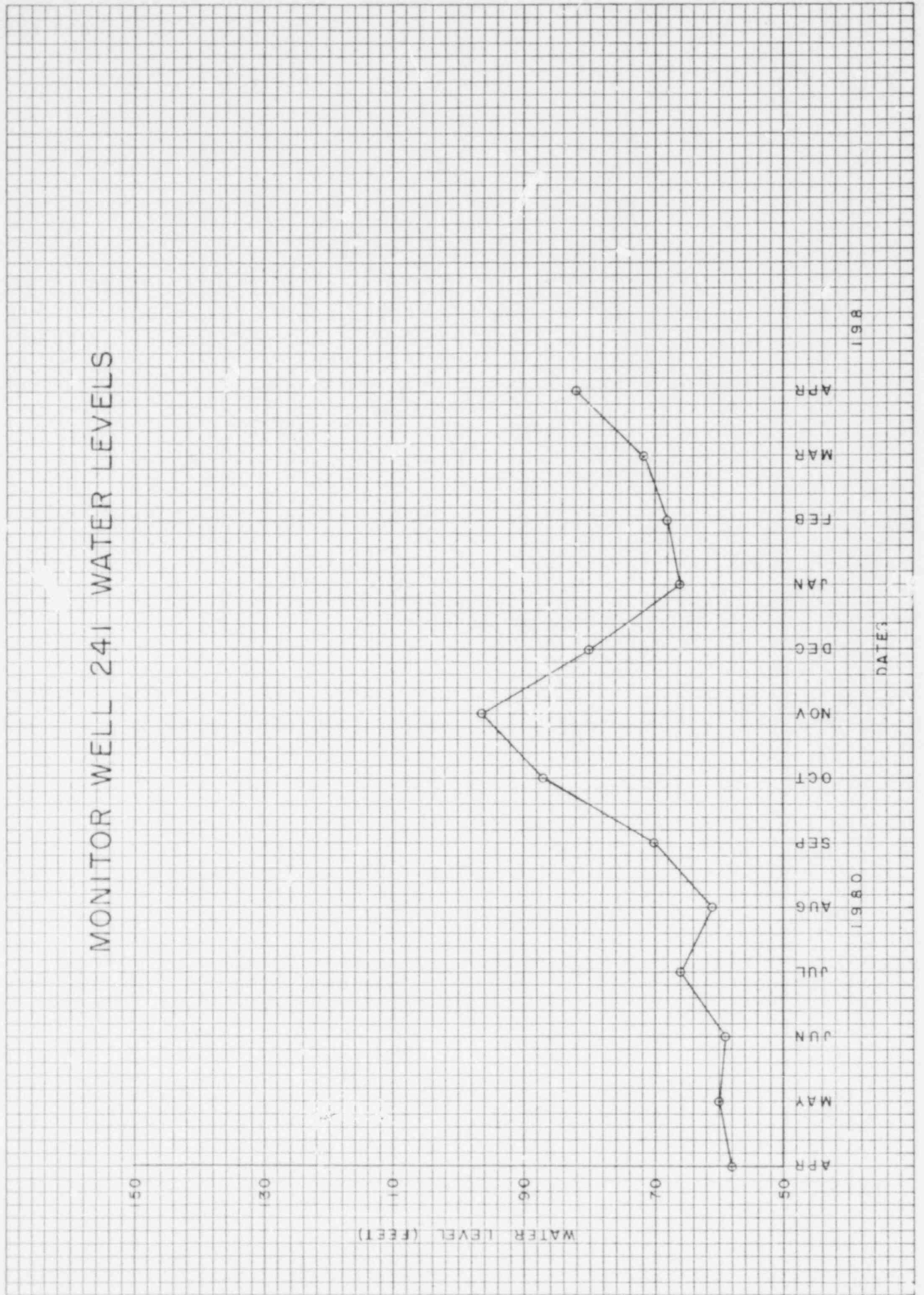


FIGURE 6





02/04/81 - Test work begins in B-3 area. B-3 area does not operate satisfactorily due to calcium plugging of wells.

02/03/81 to

02/26/81 - Pumping Wells 288, 286, 273.  
Injection Wells 284, 280, 283, 285, 287, 278, 233, 282, 234, 190, 276, 277, 291, 292.

Remarks: The action appeared to have increased sulfate and TDS in 238.

02/27/81 - Change basic pilot well field plan.

03/01/81 to

03/23/81 - Pumping Wells 273, 278, 283, 287.  
Injection Wells 190, 234, 282, 233, 288, 276, 293, 285, 290, 280, 284, 286.

Remarks: Stop B-3 operation. Try alternative. Little impact on trends in Well 238.

03/24/81 - Change basic pilot well field plan again.

03/24/81 to

04/05/81 - Pumping Wells 190, 233, 273, 283.  
Injection Wells 284, 280, 285, 287, 278, 282, 234, 277, 275, 281, 288, 290, 286.

Remarks: Same as February 27.

04/06/81 - Install pump in 291.

04/06/81 to

04/16/81 - Pumping Wells 190, 233, 273, 283, 291.  
Injection Wells 284, 280, 285, 287, 278, 282, 234, 277, 275, 281, 288, 290, 286, 292.

Remarks: Try to influence Well 238 with pump in 291. No rapid response evident.

04/09/81 - NRC visit site to discuss 238 situation.

04/16/81 - Well 190 turned off. Not related to 238 remedial action.

04/28/81 -

Start drilling Well 298.  
Pumping Wells 233, 273, 283, 291.  
Injection Wells 284, 280, 285, 287, 278, 282, 234, 277, 275, 281, 288, 290, 286, 292.

Remarks: Trend well between 238 and B area difficult due to terrain.

04/30/81 - Discontinue operations in south end of pattern. Operate B-1 and B-2 in limited mode.

Pumping Wells 273, 286.  
Injection Wells 284, 280, 283, 285, 287, 278, 233, 282, 234,  
190.

Remarks: Well 238 being only 100 feet from B area is too close for completion of pilot test under existing NRC excursion definition. Plan to request 238 be converted to trend well status and Well 298 become new monitor well for this quadrant.

05/06/81 -  
Present Establish water quality in 298W.

8. Daily injection-production volumes (plotted) from start-up of Well Field B to date.

The daily injection and production volumes from start-up of Well Field B on November 3, 1980, to date are shown on the attached Figure 7. During operation, injection and production rates have been equalized as much as possible to avoid excess injection and to avoid overproduction and excess wastewater disposal. The higher production levels measured during early operation of Well Field B are thought to be slightly erroneous due to oxygen air bubbles interfering with the production flowmeters.

9. Values of excursion parameters (plotted) for Well 238 from prior to start-up of Well Field B to date.

Values of excursion parameters for Well 238 are plotted in Figures 8 and 9.

Tables 5 to 9 contain the chemical analysis of the full suite of water quality parameters of weekly water samples of Well 238.

During a meeting on April 9, 1981, between Mr. Poole of the NRC and Mr. Loudersback of Cleveland-Cliffs, it was stated that the NRC is currently licensing mine aquifer excursion monitor wells at minimum distances of 200 feet outside of the operating well field. It is believed that Monitor Well 238 is located too close to the operating B Well Field, and this monitor well location does not permit sufficient operating flexibility. Therefore, Cleveland-Cliffs has recently drilled Well 298 at a distance of 200 feet outward from Well 291 in the B Well Field and 100 feet from Monitor Well 238, as shown on the attached Figure 1. A well was not drilled between Well 291 and Well 238 to control the excursion, due to the steep hillside between the wells.

The first sample collected from Well 298 was analyzed for excursion parameters only. Subsequent samples are being analyzed for the full suite of groundwater quality parameters. The excursion parameter analyses from Well 298 are shown in Table 10.

FIGURE 8

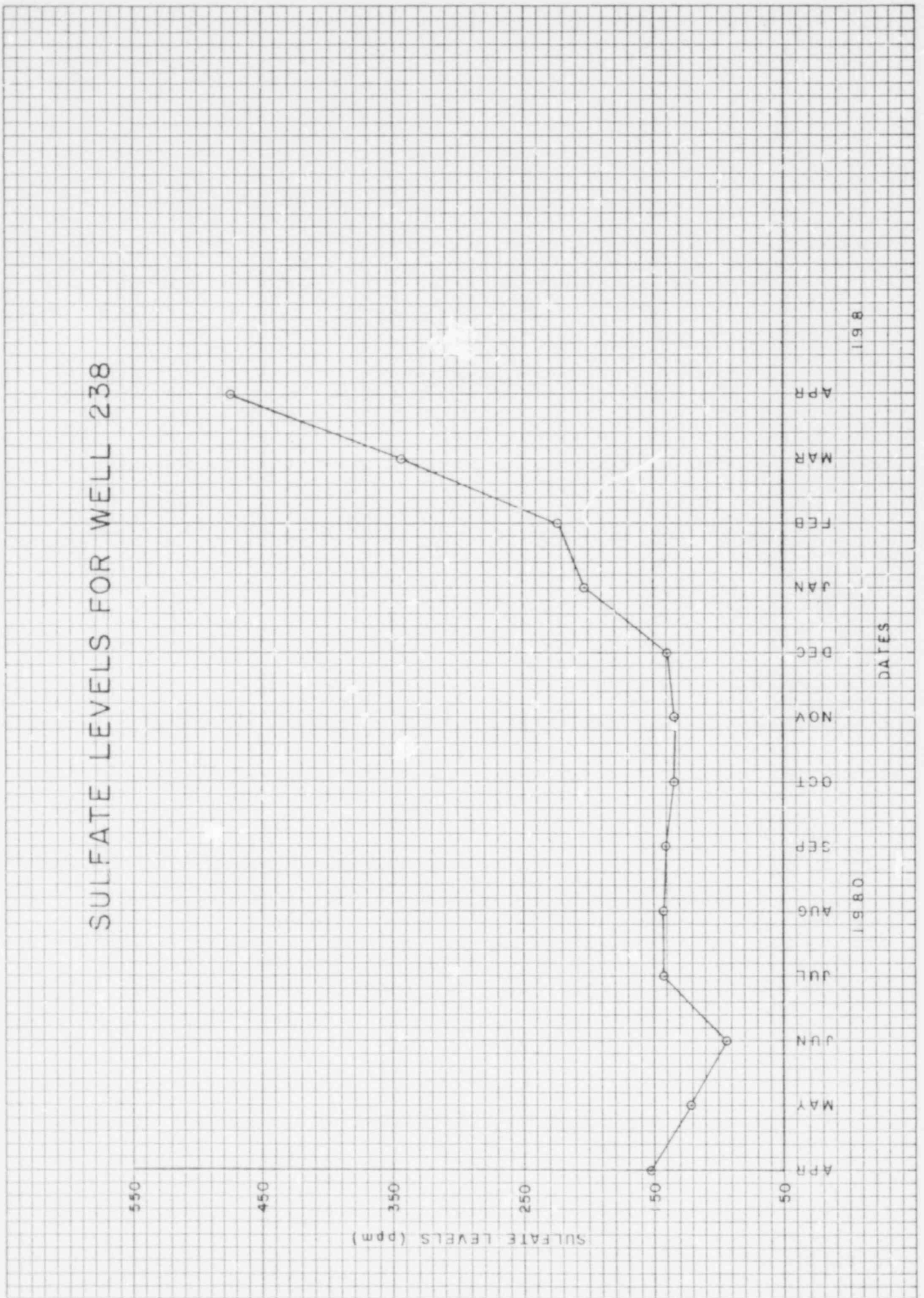
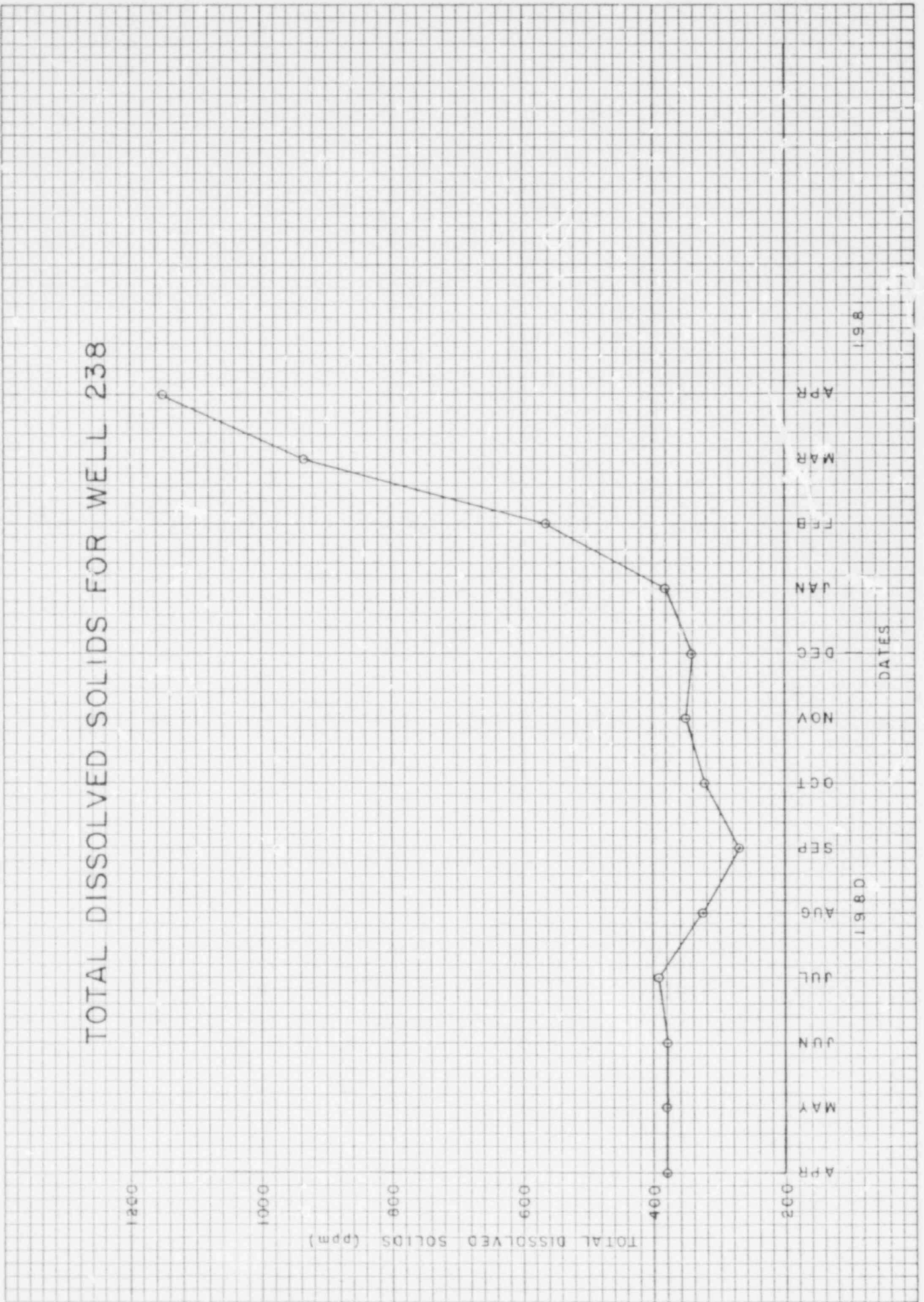


FIGURE 9

TOTAL DISSOLVED SOLIDS FOR WELL 238



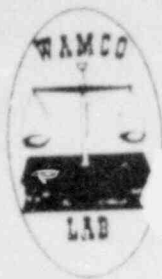


Table 5

# WAMCO LAB

P.O. BOX 3632 • CASPER, WYOMING 82602

## ANALYSIS REPORT

COMPANY: Cleveland-Cliffs Iron Company

DATE: May 11, 1981

| WAMCO NO.   | SAMPLE DESCRIPTION                           |        |  |  |  | Mg/L      |
|---|--|--------|--|--|--|-----------|
| 2334  | Water  | 1      |  |  |  | Detection |
| Analysis reported in Milligrams Per Liter except where noted: |  |        |  |  |  | Limit     |
|   | Total Dissolved Solids *                     | 1246   |  |  |  |           |
|   | Sodium (Na)                                  | 208    |  |  |  |           |
|   | Potassium (K)                                | 11     |  |  |  |           |
|   | Calcium (Ca)                                 | 162    |  |  |  |           |
|   | Magnesium (Mg)                               | 19     |  |  |  |           |
|   | Sulfate (SO <sub>4</sub> )                   | 526    |  |  |  |           |
|   | Chloride (Cl)                                | 139    |  |  |  |           |
|   | Carbonate (CO <sub>3</sub> )                 | 0      |  |  |  |           |
|   | Bicarbonate (HCO <sub>3</sub> )              | 59     |  |  |  |           |
|   | Hydroxide (OH)                               | --     |  |  |  |           |
|   | pH, Units                                    | 8.09   |  |  |  |           |
|   | Conductivity, Micromhos <sup>cm</sup> @25°C. | 1633   |  |  |  |           |
|   | Total Milliequiv, Major Cations              | 18.97  |  |  |  |           |
|   | Total Milliequiv, Major Anions               | 15.83  |  |  |  |           |
|   | Absolute Value, Charged Bal.                 | 9.02** |  |  |  |           |
|   | Ammonia (NH <sub>4</sub> as N)               | ND     |  |  |  |           |
|   | Nitrate (NO <sub>3</sub> as N)               | 10     |  |  |  | 0.05      |
|   | Nitrite (NO <sub>2</sub> as N)               | 2.5    |  |  |  | 0.001     |
|   | Fluoride (F)                                 | .33    |  |  |  | 0.1       |
|   | Total Alkalinity as CaCO <sub>3</sub>        | 48     |  |  |  |           |
|   | Total Hardness as CaCO <sub>3</sub>          | 78     |  |  |  |           |
|   | Boron (B)                                    | ND     |  |  |  | 0.01      |

REMARKS: \*Determined by evaporation @ 180° C  
 \*\* Unable to satisfactorily balance due to unknown ions.

1. #238 4-9-81





# WAMCO LAB

P.O. BOX 3632 • CASPER, WYOMING 82602

## ANALYSIS REPORT

COMPANY: Cleveland-Cliffs Iron Company

DATE: May 11, 1981

| WAMCO NO.  | SAMPLE DESCRIPTION              |         |  |  |  |  | Mg/L      |
|--|---------------------------------|---------|--|--|--|--|-----------|
| 2334   | Water                           | 1       |  |  |  |  | Detection |
| Analysis in Milligrams per Liter except where noted: |                                 |         |  |  |  |  | Limit     |
|  | Aluminum (Al)                   | ND      |  |  |  |  | 0.05      |
|  | Arsenic (As)                    | ND      |  |  |  |  | 0.005     |
|  | Barium (Ba)                     | ND      |  |  |  |  | 0.03      |
|  | Cadmium (Cd)                    | ND      |  |  |  |  | 0.002     |
|  | Chromium (Cr)                   | ND      |  |  |  |  | 0.01      |
|  | Copper (Cu)                     | ND      |  |  |  |  | 0.01      |
|  | Iron (Fe)                       | .03     |  |  |  |  | 0.01      |
|  | Lead (Pb)                       | ND      |  |  |  |  | 0.01      |
|  | Manangese (Mn)                  | .02     |  |  |  |  | 0.01      |
|  | Mercury (Hg)                    | ND      |  |  |  |  | 0.0005    |
|  | Nickel (Ni)                     | ND      |  |  |  |  | 0.02      |
|  | Selenium (Se)                   | .038    |  |  |  |  | 0.005     |
|  | Zinc (Zn)                       | .004    |  |  |  |  | 0.005     |
|  | Molybdenum (Mo)                 | ND      |  |  |  |  | 0.05      |
|  | Uranium (U <sub>308</sub> ) PPB | 525 PPB |  |  |  |  | 1 PPB     |
|  | Vanadium (V <sub>205</sub> )    | ND      |  |  |  |  | 0.05      |
|  | Radium (Ra-226) pCi/l ± Prec.   | 252±    |  |  |  |  | 0.5 pCi/l |
|  |                                 | 9       |  |  |  |  |           |
|  |                                 |         |  |  |  |  |           |
|  |                                 |         |  |  |  |  |           |
|  |                                 |         |  |  |  |  |           |

REMARKS: Analysis performed according to EPA Manual, 1976 and/or Standard Methods for Examination of Water and Wastewater, 14th Edition.

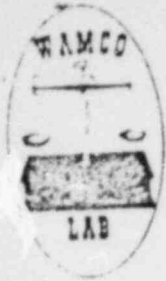


TABLE 6

# WAMCO LAB

P.O. BOX 3632 • CASPER, WYOMING 82602

## ANALYSIS REPORT

COMPANY: CLEVELAND CLIFFS IRON COMPANY

DATE: May 11, 1981

| WAMCO NO.   | SAMPLE DESCRIPTION                           |        |  |  |  |  | Mg/L      |
|---|--|--------|--|--|--|--|-----------|
| 2350  | Water  | 1      |  |  |  |  | Detection |
| Analysis reported in Milligrams Per Liter except where noted: |  |        |  |  |  |  | Limit     |
|   | Total Dissolved Solids *                     | 1213   |  |  |  |  |           |
|   | Sodium (Na)                                  | 199    |  |  |  |  |           |
|   | Potassium (K)                                | 10     |  |  |  |  |           |
|   | Calcium (Ca)                                 | 156    |  |  |  |  |           |
|   | Magnesium (Mg)                               | 24     |  |  |  |  |           |
|   | Sulfate (SO <sub>4</sub> )                   | 480    |  |  |  |  |           |
|   | Chloride (Cl)                                | 162    |  |  |  |  |           |
|   | Carbonate (CO <sub>3</sub> )                 | 0      |  |  |  |  |           |
|   | Bicarbonate (HCO <sub>3</sub> )              | 46     |  |  |  |  |           |
|   | Hydroxide (OH)                               |        |  |  |  |  |           |
|   | pH, Units                                    | 8.20   |  |  |  |  |           |
|   | Conductivity, Micromhos <sup>cm</sup> @25°C. | 1644   |  |  |  |  |           |
|   | Total Milliequiv. Major Cation               | 18.67  |  |  |  |  |           |
|   | Total Milliequiv. Major Anions               | 15.30  |  |  |  |  |           |
|   | Absolute Value, Charged Bal.                 | 9.92** |  |  |  |  |           |
|   | Ammonia (NH <sub>4</sub> as N)               | ND     |  |  |  |  |           |
|   | Nitrate (NO <sub>3</sub> as N)               | 10.0   |  |  |  |  | 0.1       |
|   | Nitrite (NO <sub>2</sub> as N)               | 2.5    |  |  |  |  | 0.05      |
|   | Fluoride (F)                                 | 0.40   |  |  |  |  | 0.1       |
|   | Total Alkalinity as CaCO <sub>3</sub>        | 38     |  |  |  |  |           |
|   | Total Hardness as CaCO <sub>3</sub>          | 488    |  |  |  |  |           |
|   | Boron (B)                                    | ND     |  |  |  |  | 0.01      |

REMARKS: \*Determined by evaporation @ 180° C

1. 238 4-15-81

\*\*unable to satisfactorily balance due to unknown ions





# WAMCO LAB

P.O. BOX 3632 • CASPER, WYOMING 82602

## ANALYSIS REPORT

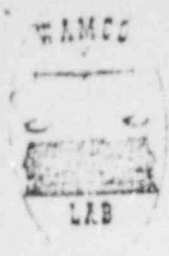
COMPANY: CLEVELAND CLIFFS IRON COMPANY

DATE: May 11, 1981

| WAMCO NO.  | SAMPLE DESCRIPTION                |       |  |  |  | Mg/L      |
|--|-----------------------------------|-------|--|--|--|-----------|
| 2350   | Water                             | 1     |  |  |  | Detection |
| Analysis in Milligrams per Liter except where noted: |                                   |       |  |  |  | Limit     |
|  | Aluminum (Al)                     | .12   |  |  |  | 0.05      |
|  | Arsenic (As)                      | ND    |  |  |  | 0.005     |
|  | Barium (Ba)                       | ND    |  |  |  | 0.03      |
|  | Cadmium (Cd)                      | .003  |  |  |  | 0.0       |
|  | Chromium (Cr)                     | ND    |  |  |  | 0.0       |
|  | Copper (Cu)                       | .01   |  |  |  | 0.01      |
|  | Iron (Fe)                         | .04   |  |  |  | 0.01      |
|  | Lead (Pb)                         | ND    |  |  |  | 0.01      |
|  | Manangese (Mn)                    | ND    |  |  |  | 0.01      |
|  | Mercury (Hg)                      | ND    |  |  |  | 0.0005    |
|  | Nickel (Ni)                       | ND    |  |  |  | 0.02      |
|  | Selenium (Se)                     | 0.61  |  |  |  | 0.005     |
|  | Zinc (Zn)                         | ND    |  |  |  | 0.005     |
|  | Molybdenum (Mo)                   | ND    |  |  |  | 0.05      |
|  | Uranium (U <sub>308</sub> ) - PPB | 575   |  |  |  | 1 PPB     |
|  | Vanadium (V <sub>205</sub> )      | ND    |  |  |  | 0.05      |
|  | Radium (Ra-226) pCi/l ± Prec.     | 147 ± |  |  |  | 0.5 pCi/l |
|  |                                   | 5     |  |  |  |           |

REMARKS: Analysis performed according to EPA Manual, 1976 and/or Standard Methods for Examination of Water and Wastewater, 14th Edition.

TABLE 7



# WAMCO LAB

P. O. BOX 3632 • CASPER, WYOMING 82602

## ANALYSIS REPORT

COMPANY: CLEVELAND CLIFFS IRON COMPANY

DATE: May 11, 1981

| WAMCO NO.   | SAMPLE DESCRIPTION                    |        |  |  |  |  | MU/L      |
|---|---------------------------------------|--------|--|--|--|--|-----------|
| 2357  | Water                                 | 1      |  |  |  |  | Detection |
| Analysis reported in Milligrams per Liter except where noted: |                                       |        |  |  |  |  | Unit      |
|   | Total Dissolved Solids *              | 1279   |  |  |  |  |           |
|   | Sodium (Na)                           | 207    |  |  |  |  |           |
|   | Potassium (K)                         | 11     |  |  |  |  |           |
|   | Calcium (Ca)                          | 168    |  |  |  |  |           |
|   | Magnesium (Mg)                        | 17     |  |  |  |  |           |
|   | Sulfate (SO <sub>4</sub> )            | 516    |  |  |  |  |           |
|   | Chloride (Cl)                         | 152    |  |  |  |  |           |
|   | Carbonate (CO <sub>3</sub> )          | 0      |  |  |  |  |           |
|   | Bicarbonate (HCO <sub>3</sub> )       | 42     |  |  |  |  |           |
|   | Hydroxide (OH)                        | -      |  |  |  |  |           |
|   | pH, Units                             | 7.58   |  |  |  |  |           |
|   | Conductivity, Micromhos/cm @25°C.     | 1949   |  |  |  |  |           |
|   | Total Milliequiv, Major Cation        | 19.06  |  |  |  |  |           |
|   | Total Milliequiv, Major Anions        | 16.71  |  |  |  |  |           |
|   | Absolute Value, Charged Bal.          | 9.63** |  |  |  |  |           |
|   | Ammonia (NH <sub>4</sub> as N)        | ND     |  |  |  |  |           |
|   | Nitrate (NO <sub>3</sub> as N)        | 9      |  |  |  |  | 0.05      |
|   | Nitrite (NO <sub>2</sub> as N)        | 2.5    |  |  |  |  | 0.001     |
|   | Fluoride (F)                          | 0.40   |  |  |  |  | 0.1       |
|   | Total Alkalinity as CaCO <sub>3</sub> | 34     |  |  |  |  |           |
|   | Total Hardness as CaCO <sub>3</sub>   | 539    |  |  |  |  |           |
|   | Boron (B)                             | ND     |  |  |  |  | 0.01      |

REMARKS: \*Determined by evaporation - 180° C \*\* unable to satisfactorily balance due to unknown ions

1. 238 MW 4-22-81



# WAMCO LAB

P.O. BOX 3632 • CASPER, WYOMING 82602

## ANALYSIS REPORT

COMPANY: CLEVELAND CLIFFS IRON COMPANY

DATE: May 11, 1981

| WAMCO NO.  | SAMPLE DESCRIPTION                           |       |  |  |  | Mg/L      |
|--|--|-------|--|--|--|-----------|
| 2357   | Water  | 1     |  |  |  | Detection |
| Analysis in Milligrams per Liter except where noted: |  |       |  |  |  | Limit     |
|  | Aluminum (Al)                                | .10   |  |  |  | 0.05      |
|  | Arsenic (As)                                 | ND    |  |  |  | 0.005     |
|  | Barium (Ba)                                  | ND    |  |  |  | 0.03      |
|  | Cadmium (Cd)                                 | .002  |  |  |  | 0.002     |
|  | Chromium (Cr)                                | ND    |  |  |  | 0.01      |
|  | Copper (Cu)                                  | .01   |  |  |  | 0.01      |
|  | Iron (Fe)                                    | .01   |  |  |  | 0.01      |
|  | Lead (Pb)                                    | ND    |  |  |  | 0.01      |
|  | Manangese (Mn)                               | ND    |  |  |  | 0.01      |
|  | Mercury (Hg)                                 | ND    |  |  |  | 0.0005    |
|  | Nickel (Ni)                                  | ND    |  |  |  | 0.02      |
|  | Selenium (Se)                                | 0.73  |  |  |  | 0.005     |
|  | Zinc (Zn)                                    | ND    |  |  |  | 0.005     |
|  | Molybdenum (Mo)                              | ND    |  |  |  | 0.05      |
|  | Uranium (U <sub>3</sub> O <sub>8</sub> ) PPB | 575   |  |  |  | 1 PPB     |
|  | Vanadium (V <sub>2</sub> O <sub>5</sub> )    | ND    |  |  |  | 0.05      |
|  | Radium (Ra-226) pCi/l ± Prec.                | 159 ± |  |  |  | 0.5 pCi/l |
|  |  | 5     |  |  |  |           |
|  |  |       |  |  |  |           |
|  |  |       |  |  |  |           |
|  |  |       |  |  |  |           |

REMARKS: Analysis performed according to EPA Manual, 1976 and/or Standard Methods for Examination of Water and Wastewater, 14th Edition.



TABLE 8

# WAMCO LAB

P.O. BOX 3632 • CASPER, WYOMING 82602

## ANALYSIS REPORT

COMPANY: CLEVELAND CLIFFS IRON COMPANY

DATE: May 15, 1981

| WAMCO NO.   | SAMPLE DESCRIPTION                    |        |  |  |  | mg/l      |
|---|---------------------------------------|--------|--|--|--|-----------|
| 2381  | Water                                 | 1      |  |  |  | Detection |
| Analysis reported in Milligrams per Liter except where noted: |                                       |        |  |  |  | Limit     |
|   | Total Dissolved Solids *              | 1436   |  |  |  |           |
|   | Sodium (Na)                           | 209    |  |  |  |           |
|   | Potassium (K)                         | 11     |  |  |  |           |
|   | Calcium (Ca)                          | 166    |  |  |  |           |
|   | Magnesium (Mg)                        | 20     |  |  |  |           |
|   | Sulfate (SO <sub>4</sub> )            | 543    |  |  |  |           |
|   | Chloride (Cl)                         | 145    |  |  |  |           |
|   | Carbonate (CO <sub>3</sub> )          | 0      |  |  |  |           |
|   | Bicarbonate (HCO <sub>3</sub> )       | 46     |  |  |  |           |
|   | Hydroxide (OH)                        |        |  |  |  |           |
|   | pH, Units                             | 7.42   |  |  |  |           |
|   | Conductivity, micromhos/cm @25°C.     | 1459   |  |  |  |           |
|   | Total Milliequiv, Major Cations       | 19.29  |  |  |  |           |
|   | Total Milliequiv, Major Anions        | 16.13  |  |  |  |           |
|   | Absolute Value, Charged Bal.          | 8.92** |  |  |  |           |
|   | Ammonia (NH <sub>4</sub> as N)        | ND     |  |  |  |           |
|   | Nitrate (NO <sub>3</sub> as N)        | 10     |  |  |  | 0.05      |
|   | Nitrite (NO <sub>2</sub> as N)        | 2.5    |  |  |  | 0.001     |
|   | Fluoride (F)                          | 0.40   |  |  |  | 0.1       |
|   | Total Alkalinity as CaCO <sub>3</sub> | 38     |  |  |  |           |
|   | Total Hardness as CaCO <sub>3</sub>   | 496    |  |  |  |           |
|   | Boron (B)                             | ND     |  |  |  | 0.01      |

REMARKS: \*Determined by evaporation @ 180° C      \*\*unable to satisfactorily balance due to unknown ions oxidizing agent found in water

1. MW 238 4-29-81



# WAMCO LAB

P.O. BOX 3632 • CASPER, WYOMING 82602

## ANALYSIS REPORT

COMPANY: CLEVELAND CLIFFS IRON COMPANY

DATE: May 15, 1981

| WAMCO NO.  | SAMPLE DESCRIPTION                             |       |  |  |  | Mq/L      |
|--|--|-------|--|--|--|-----------|
| 2381   | Water  | 1     |  |  |  | Detection |
| Analysis in Milligrams per Liter except where noted: |  |       |  |  |  | Limit     |
|  | Aluminum (Al)                                  | 0.08  |  |  |  | 0.05      |
|  | Arsenic (As)                                   | ND    |  |  |  | 0.005     |
|  | Barium (Ba)                                    | ND    |  |  |  | 0.03      |
|  | Cadmium (Cd)                                   | .003  |  |  |  | 0.002     |
|  | Chromium (Cr)                                  | ND    |  |  |  | 0.01      |
|  | Copper (Cu)                                    | .01   |  |  |  | 0.01      |
|  | Iron (Fe)                                      | .04   |  |  |  | 0.01      |
|  | Lead (Pb)                                      | ND    |  |  |  | 0.01      |
|  | Manangese (Mn)                                 | .03   |  |  |  | 0.01      |
|  | Mercury (Hg)                                   | ND    |  |  |  | 0.0005    |
|  | Nickel (Ni)                                    | ND    |  |  |  | 0.02      |
|  | Selenium (Se)                                  | 1.52  |  |  |  | 0.005     |
|  | Zinc (Zn)                                      | .009  |  |  |  | 0.005     |
|  | Molybdenum (Mo)                                | ND    |  |  |  | 0.05      |
|  | Uranium (U <sub>3</sub> O <sub>8</sub> ) • PPB | 760   |  |  |  | 1 PPB     |
|  | Vanadium (V <sub>2</sub> O <sub>5</sub> )      | ND    |  |  |  | 0.05      |
|  | Radium (Ra-226) pCi/l ± Prec.                  | 152 ± |  |  |  | 0.5 pCi/l |
|  |  | 6     |  |  |  |           |

REMARKS: Analysis performed according to EPA Manual, 1976 and/or Standard Methods for Examination of Water and Wastewater, 14th Edition.



TABLE 9



# WAMCO LAB

P.O. BOX 3632 • CASPER, WYOMING 82602

## ANALYSIS REPORT

COMPANY: CLEVELAND CLIFFS IRON COMPANY

DATE: May 15, 1981

| WAMCO NO.   | SAMPLE DESCRIPTION                    | 1     | 2    |  |  |  | Mg/l      |
|---|---------------------------------------|-------|------|--|--|--|-----------|
| 2397  | Water                                 |       |      |  |  |  | Detection |
| Analysis reported in Milligrams Per Liter except where noted: |                                       |       |      |  |  |  | Limit     |
|   | Total Dissolved Solids *              | 1317  | 389  |  |  |  |           |
|   | Sodium (Na)                           | 210   | 90   |  |  |  |           |
|   | Potassium (K)                         | 11    | 7    |  |  |  |           |
|   | Calcium (Ca)                          | 140   | 20   |  |  |  |           |
|   | Magnesium (Mg)                        | 22    | 4    |  |  |  |           |
|   | Sulfate (SO <sub>4</sub> )            | 474   | 142  |  |  |  |           |
|   | Chloride (Cl)                         | 129   | 8    |  |  |  |           |
|   | Carbonate (CO <sub>3</sub> )          | 0     | 24   |  |  |  |           |
|   | Bicarbonate (HCO <sub>3</sub> )       | 51    | 84   |  |  |  |           |
|   | Hydroxide (OH)                        |       |      |  |  |  |           |
|   | pH, Units                             | 7.82  | 8.59 |  |  |  |           |
|   | Conductivity, Micromhos/cm @25°C.     | 1297  | 552  |  |  |  |           |
|   | Total Milliequiv. Major Cation        | 18.22 | 5.43 |  |  |  |           |
|   | Total Milliequiv. Major Anions        | 14.34 | 5.36 |  |  |  |           |
|   | Absolute Value, Charged Bal.**        | 11.92 | 0.65 |  |  |  |           |
|   | Ammonia (NH <sub>4</sub> as N)        | ND    | ND   |  |  |  |           |
|   | Nitrate (NO <sub>3</sub> as N)        | 3.0   | 0.05 |  |  |  | 0.05      |
|   | Nitrite (NO <sub>2</sub> as N)        | 2.5   | .005 |  |  |  | 0.001     |
|   | Fluoride (F)                          | 0.27  | 0.36 |  |  |  | 0.1       |
|   | Total Alkalinity as CaCO <sub>3</sub> | 42    | 109  |  |  |  |           |
|   | Total Hardness as CaCO <sub>3</sub>   | 440   | 66   |  |  |  |           |
|   | Boron (B)                             | ND    | ND   |  |  |  | 0.01      |

## REMARKS:

\*Determined by evaporation @ 180° C    \*\*Charge balance not satisfactory due to oxidizing substances

1. 238 5-6-81

2. 298 5-6-81



# WAMCO LAB

P.O. BOX 3632 • CASPER, WYOMING 82602

## ANALYSIS REPORT

COMPANY: CLEVELAND CLIFFS IRON COMPANY

DATE: May 15, 1981

| WAMCO NO.  | SAMPLE DESCRIPTION                |         |         |  |  | Mn/L      |
|--|-----------------------------------|---------|---------|--|--|-----------|
| 2397   | Water                             | 1       | 2       |  |  | Detection |
| Analysis in Milligrams per Liter except where noted: |                                   |         |         |  |  | Limit     |
|  | Aluminum (Al)                     | ND      | ND      |  |  | 0.05      |
|  | Arsenic (As)                      | LT. 001 | LT. 001 |  |  | 0.005     |
|  | Barium (Ba)                       | ND      | ND      |  |  | 0.03      |
|  | Cadmium (Cd)                      | ND      | ND      |  |  | 0.002     |
|  | Chromium (Cr)                     | ND      | ND      |  |  | 0.01      |
|  | Copper (Cu)                       | 0.01    | ND      |  |  | 0.01      |
|  | Iron (Fe)                         | 0.02    | 0.11    |  |  | 0.01      |
|  | Lead (Pb)                         | ND      | ND      |  |  | 0.01      |
|  | Manangese (Mn)                    | ND      | ND      |  |  | 0.01      |
|  | Mercury (Hg)                      | ND      | ND      |  |  | 0.0005    |
|  | Nickel (Ni)                       | ND      | ND      |  |  | 0.02      |
|  | Selenium (Se)                     | 0.860   | .057    |  |  | 0.005     |
|  | Zinc (Zn)                         | ND      | ND      |  |  | 0.005     |
|  | Molybdenum (Mo)                   | ND      | ND      |  |  | 0.05      |
|  | Uranium (U <sub>308</sub> ) • PPB | 901     | 89      |  |  | 1 PPB     |
|  | Vanadium (V <sub>205</sub> )      | ND      | ND      |  |  | 0.05      |
|  | Radium (Ra-226) pCi/l ± Prec.     |         |         |  |  | 0.5 pCi/l |
|  |                                   |         |         |  |  |           |
|  |                                   |         |         |  |  |           |
|  |                                   |         |         |  |  |           |
|  |                                   |         |         |  |  |           |

REMARKS: Analysis performed according to EPA Manual, 1976 and/or Standard Methods for Examination of Water and Wastewater, 14th Edition.



Table 10  
Well 298 Excursion and Baseline Monitoring Groundwater Quality Analyses

|        | Ammonia<br>mg/l<br><u>UCL=0.41</u> | Total Bicarbonate<br>plus Carbonate<br>mg/l<br><u>UCL=190</u> | Sulfate<br>mg/l<br><u>UCL=170</u> | Uranium<br>mg/l<br><u>UCL=1.47</u> | TDS<br>mg/l<br><u>UCL=453</u> | pH<br><u>UCL=10.6</u> |
|--------|------------------------------------|---|-----------------------------------|------------------------------------|-------------------------------|-----------------------|
| May 1  | ND                                 | 139   | 150                               | 0.061                              | 379                           | 8.10                  |
| May 2  | 0.27                               | 122   | 158                               | 0.021                              | 412                           | 8.60                  |
| May 6  | ND                                 | 108   | 142                               | 0.089                              | 389                           | 8.59                  |
| May 13 | ND                                 | 122   | 161                               | 0.023                              | 355                           | 7.9                   |

Tables 11 and 12 contain the full suite of groundwater analyses that have been conducted to date. As can be seen, the excursion parameter concentrations in Well 298 are below the upper control limits for Monitor Well 238. It is believed that the groundwater being sampled at Well 298 is of baseline groundwater quality.

Considering the quality of the water at Well 298 and the current licensing of excursion monitor wells at distances of 200 feet from operating well field, Cleveland-Cliffs requests that, pursuant to 10 CFR40, Source Material License SUA-1352 be amended to permit Well 298 to be the excursion monitor well for the southeast quadrant of the well field and for Well 238 to become a trend well to be used for preliminary excursion indication and control. Until sufficient groundwater quality baseline data are available to define upper control limits (per Condition No. 13 and Condition No. 16 of the license), it is requested that the upper control limits established for Well 238 be used to define mine solution excursions at Well 298. A check for \$760 is enclosed for the Minor, Environmental and Safety Amendment fee.

In regard to ion exchange resins and associated solid waste products from pregnant production solution processing and from wastewater treatment as described in my letter of April 1, 1981, Cleveland-Cliffs will dispose of these resins and associated solid waste products in a licensed uranium mill tailings impoundment, or by alternate methods proposed in the program to be submitted in compliance with Appendix 1, 10CFR40 as published in the Federal Register, October 3, 1980.

On May 18, 1981, we received a letter, via the telecopier, from Mr. Linehan of the NRC, confirming the requirements of License Condition 17. Due to the excursion in Monitor Well 241, a concern was expressed that the excursion has become a major uncontrolled event. Table 13 contains the current excursion monitoring data on Well 241. As can be seen, corrective measures, that have been implemented in the well field, reduced the total dissolved solid concentration to below the upper control limits on May 13, 1980 and TDS has been maintained below the upper control limits, in a nonexcursion status, since this date. Sulfate concentrations have also been decreasing and are soon expected to be below the upper control limits.



TABLE 11

# WAMCO LAB

P.O. BOX 3632 • CASPER, WYOMING 82602

## ANALYSIS REPORT

COMPANY: CLEVELAND CLIFFS IRON COMPANY

DATE: May 15, 1981

| WAMCO NO.   | SAMPLE DESCRIPTION                       |      |  |  |  | Mg/L      |
|---|--|------|--|--|--|-----------|
| 2393  | Water                                    | 1    |  |  |  | Detection |
| Analysis reported in Milligrams Per Liter except where noted: |  |      |  |  |  | Limit     |
|   | Total Dissolved Solids *                 | 412  |  |  |  |           |
|   | Sodium (Na)                              | 96   |  |  |  |           |
|   | Potassium (K)                            | 7    |  |  |  |           |
|   | Calcium (Ca)                             | 26   |  |  |  |           |
|   | Magnesium (Mg)                           | 5    |  |  |  |           |
|   | Sulfate (SO <sub>4</sub> )               | 158  |  |  |  |           |
|   | Chloride (Cl)                            | 11   |  |  |  |           |
|   | Carbonate (CO <sub>3</sub> )             | 24   |  |  |  |           |
|   | Bicarbonate (HCO <sub>3</sub> )          | 98   |  |  |  |           |
|   | Hydroxide (OH)                           |      |  |  |  |           |
|   | pH, Units                                | 8.60 |  |  |  |           |
|   | Conductivity, $\mu\text{mhos/cm}$ @25°C. | 498  |  |  |  |           |
|   | Total Milliequiv, Major Cations          | 6.07 |  |  |  |           |
|   | Total Milliequiv, Major Anions           | 6.01 |  |  |  |           |
|   | Absolute Value, Charged Bal.             | 0.50 |  |  |  |           |
|   | Ammonia (NH <sub>4</sub> as N)           | 0.27 |  |  |  |           |
|   | Nitrate (NO <sub>3</sub> as N)           | 0.1  |  |  |  | 0.05      |
|   | Nitrite (NO <sub>2</sub> as N)           | .005 |  |  |  | 0.001     |
|   | Fluoride (F)                             | 0.18 |  |  |  | 0.1       |
|   | Total Alkalinity as CaCO <sub>3</sub>    | 120  |  |  |  |           |
|   | Total Hardness as CaCO <sub>3</sub>      | 85   |  |  |  |           |
|   | Boron (B)                                | ND   |  |  |  | 0.01      |

REMARKS: \*Determined by evaporation @ 180° C  
 1. MW 298 5-2-81



# WAMCO LAB

P.O. BOX 3632 • CASPER, WYOMING 82602

## ANALYSIS REPORT

COMPANY: CLEVELAND CLIFFS IRON COMPANY

DATE: May 15, 1981

| WAMCO NO.  | SAMPLE DESCRIPTION              |      |  |  |  | Mg/L      |
|--|---------------------------------|------|--|--|--|-----------|
| 2393   | Water                           | 1    |  |  |  | Detection |
| Analysis in Milligrams per Liter except where noted: |                                 |      |  |  |  | Limit     |
|  | Aluminum (Al)                   | ND   |  |  |  | 0.05      |
|  | Arsenic (As)                    | ND   |  |  |  | 0.005     |
|  | Barium (Ba)                     | ND   |  |  |  | 0.03      |
|  | Cadmium (Cd)                    | ND   |  |  |  | 0.002     |
|  | Chromium (Cr)                   | ND   |  |  |  | 0.01      |
|  | Copper (Cu)                     | ND   |  |  |  | 0.01      |
|  | Iron (Fe)                       | .44  |  |  |  | 0.01      |
|  | Lead (Pb)                       | ND   |  |  |  | 0.01      |
|  | Manangese (Mn)                  | ND   |  |  |  | 0.01      |
|  | Mercury (Hg)                    | ND   |  |  |  | 0.0005    |
|  | Nickel (Ni)                     | ND   |  |  |  | 0.02      |
|  | Selenium (Se)                   | .062 |  |  |  | 0.005     |
|  | Zinc (Zn)                       | ND   |  |  |  | 0.005     |
|  | Molybdenum (Mo)                 | ND   |  |  |  | 0.05      |
|  | Uranium (U <sub>308</sub> ) PPB | 21   |  |  |  | 1 PPB     |
|  | Vanadium (V <sub>205</sub> )    | ND   |  |  |  | 0.05      |
|  | Radium (Ra-226) pCi/l ± Prec.   |      |  |  |  | 0.5 pCi/l |
|  |                                 |      |  |  |  |           |
|  |                                 |      |  |  |  |           |
|  |                                 |      |  |  |  |           |

REMARKS: Analysis performed according to EPA Manual, 1976 and/or Standard Methods for Examination of Water and Wastewater, 14th Edition.

1. MW 298 5-2-81



TABLE 12

# WAMCO LAB

P.O. BOX 3632 • CASPER, WYOMING 82602

## ANALYSIS REPORT

COMPANY: CLEVELAND CLIFFS IRON COMPANY

DATE: May 15, 1981

| WAMCO NO.   | SAMPLE DESCRIPTION                           |        |  |  |  |  | Mg/L      |
|---|--|--------|--|--|--|--|-----------|
| 2397  | Water  | 1      |  |  |  |  | Detection |
| Analysis reported in Milligrams Per Liter except where noted: |  |        |  |  |  |  | Limit     |
|   | Total Dissolved Solids *                     | 389    |  |  |  |  |           |
|   | Sodium (Na)                                  | 90     |  |  |  |  |           |
|   | Potassium (K)                                | 7      |  |  |  |  |           |
|   | Calcium (Ca)                                 | 20     |  |  |  |  |           |
|   | Magnesium (Mg)                               | 4      |  |  |  |  |           |
|   | Sulfate (SO <sub>4</sub> )                   | 142    |  |  |  |  |           |
|   | Chloride (Cl)                                | 8      |  |  |  |  |           |
|   | Carbonate (CO <sub>3</sub> )                 | 24     |  |  |  |  |           |
|   | Bicarbonate (HCO <sub>3</sub> )              | 84     |  |  |  |  |           |
|   | Hydroxide (OH)                               |        |  |  |  |  |           |
|   | pH, Units                                    | 8.59   |  |  |  |  |           |
|   | Conductivity, Micromhos <sup>cm</sup> @25°C. | 552    |  |  |  |  |           |
|   | Total Milliequiv, Major Cation               | 5.43   |  |  |  |  |           |
|   | Total Milliequiv, Major Anions               | 5.36   |  |  |  |  |           |
|   | Absolute Value, Charged Bal.                 | 0.65** |  |  |  |  |           |
|   | Ammonia (NH <sub>4</sub> as N)               | ND     |  |  |  |  |           |
|   | Nitrate (NO <sub>3</sub> as N)               | 0.05   |  |  |  |  | 0.05      |
|   | Nitrite (NO <sub>2</sub> as N)               | .005   |  |  |  |  | 0.001     |
|   | Fluoride (F)                                 | 0.36   |  |  |  |  | 0.1       |
|   | Total Alkalinity as CaCO <sub>3</sub>        | 109    |  |  |  |  |           |
|   | Total Hardness as CaCO <sub>3</sub>          | 66     |  |  |  |  |           |
|   | Boron (B)                                    | ND     |  |  |  |  | 0.01      |

REMARKS: \*Determined by evaporation @ 180° C \*\*Charge balance not satisfactory due to oxidizing substances  
 1. 298 5-6-81



# WAMCO LAB

P.O. BOX 3632 • CASPER, WYOMING 82602

## ANALYSIS REPORT

COMPANY: CLEVELAND CLIFFS IRON COMPANY

DATE: May 15, 1981

| WAMCO NO.  | SAMPLE DESCRIPTION                           |        |  |  |  | Mg/L      |
|--|--|--------|--|--|--|-----------|
| 2397   | Water  | 1      |  |  |  | Detection |
| Analysis in Milligrams per Liter except where noted: |  |        |  |  |  | Limit     |
|  | Aluminum (Al)                                | ND     |  |  |  | 0.05      |
|  | Arsenic (As)                                 | LT.001 |  |  |  | 0.005     |
|  | Barium (Ba)                                  | ND     |  |  |  | 0.03      |
|  | Cadmium (Cd)                                 | ND     |  |  |  | 0.002     |
|  | Chromium (Cr)                                | ND     |  |  |  | 0.01      |
|  | Copper (Cu)                                  | ND     |  |  |  | 0.01      |
|  | Iron (Fe)                                    | 0.11   |  |  |  | 0.01      |
|  | Lead (Pb)                                    | ND     |  |  |  | 0.01      |
|  | Manangese (Mn)                               | ND     |  |  |  | 0.01      |
|  | Mercury (Hg)                                 | ND     |  |  |  | 0.0005    |
|  | Nickel (Ni)                                  | ND     |  |  |  | 0.02      |
|  | Selenium (Se)                                | .057   |  |  |  | 0.005     |
|  | Zinc (Zn)                                    | ND     |  |  |  | 0.005     |
|  | Molybdenum (Mo)                              | ND     |  |  |  | 0.05      |
|  | Uranium (U <sub>3</sub> O <sub>8</sub> ) PPB | 89     |  |  |  | 1 PPB     |
|  | Vanadium (V <sub>2</sub> O <sub>5</sub> )    | ND     |  |  |  | 0.05      |
|  | Radium (Ra-226) pCi/l ± Prec.                |        |  |  |  | 0.5 pCi/l |
|  |  |        |  |  |  |           |
|  |  |        |  |  |  |           |
|  |  |        |  |  |  |           |
|  |  |        |  |  |  |           |

REMARKS: Analysis performed according to EPA Manual, 1976 and/or Standard Methods for Examination of Water and Wastewater, 14th Edition.  
 1. 298 5-6-81



Table 13  
 Excursion Monitoring  
 MONITOR WELL 241

|          | TDS UCL = 488 ppm         |                                      | SO <sub>4</sub> UCL = 161 ppm |                          |
|----------|---------------------------|--------------------------------------|-------------------------------|--------------------------|
|          | <u>TDS</u><br><u>mg/l</u> | <u>SO<sub>4</sub></u><br><u>mg/l</u> | <u>As</u><br><u>mg/l</u>      | <u>Se</u><br><u>mg/l</u> |
| 04/14/81 | 694                       | 255                                  | --                            | --                       |
| 04/24/81 | 724                       | 246                                  | --                            | --                       |
| 04/27/81 | 630                       | 238                                  | <.001                         | .092                     |
| 04/29/81 | 763                       | 288                                  | <.001                         | .112                     |
| 04/30/81 | 764                       | 288                                  | <.001                         | .138                     |
| 05/01/81 | 622                       | 232                                  | <.001                         | .084                     |
| 05/02/81 | 612                       | 228                                  | <.001                         | .088                     |
| 05/03/81 | 620                       | 228                                  | <.001                         | .122                     |
| 04/04/81 | 588                       | 224                                  | <.001                         | .116                     |
| 05/05/81 | 605                       | 228                                  | <.001                         | .036                     |
| 05/06/81 | 625                       | 204                                  | <.001                         | .075                     |
| 05/07/81 | 682                       | 255                                  | <.001                         | .036                     |
| 05/08/81 | 563                       | 204                                  | <.001                         | .036                     |
| 05/09/81 | 530                       | 192                                  | <.001                         | .042                     |
| 05/10/81 | 526                       | 192                                  | <.001                         | .060                     |
| 05/11/81 | 30                        | 192                                  | <.001                         | .066                     |
| 05/12/81 | 32                        | 192                                  | <.001                         | .077                     |
| 05/13/81 | 469                       | 173                                  | <.001                         | .092                     |
| 05/14/81 | 476                       | 228                                  | --                            | --                       |
| 05/15/81 | 401                       | 184                                  | --                            | --                       |
| 05/16/81 | 384                       | 184                                  | --                            | --                       |
| 05/17/81 | 455                       | 210                                  | --                            | --                       |
| 05/18/81 | 435                       | 200                                  | --                            | --                       |

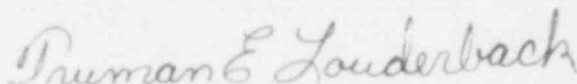
R. A. Scarano  
May 19, 1981  
Page 32

It is true that Cleveland-Cliffs does attempt to operate the solution mine with balanced injection and production, and that we do not have great capacity for excess overproduction. However, we do maintain very tight controls on fluid movement and we do not believe the excursion conditions that exist at the present time can be considered a major uncontrolled event.

Your rapid review of the above-requested license amendment in regard to Monitor Wells 238 and 298 would be greatly appreciated. As you know, we are on a very limited schedule in regard to the 120-day requirement of license Condition No. 17. Please contact me personally at your earliest convenience if we may provide additional information.

Sincerely,

THE CLEVELAND-CLIFFS IRON COMPANY



Truman E. Louderback  
Administrator of Environmental Affairs

TEL:ag

Attachments

XC: Region IV, Office of Inspection and Enforcement  
U. S. Nuclear Regulatory Commission



Docket No. 40-8714

MC: 10100

04008714 A065

William O. Miller, License Fee Management Branch, ADM

MATERIALS LICENSE AMENDMENT CLASSIFICATION

Applicant: Cleveland Cliffs

License No: SUA-1352 Fee Category: 2B

Application Dated: \_\_\_\_\_ Received: \_\_\_\_\_

Applicant's Classification: MINOR STE

The above application for amendment has been reviewed by NMSS in accordance with §170.31 of Part 170, and is classified as follows:

1. Safety and Environmental Amendments to Licenses in Fee Categories 1A through 1H, 2A, 2B, 2C, and 4A
  - (a) \_\_\_\_\_ Major safety and environmental
  - (b)  Minor safety and environmental
  - (c) \_\_\_\_\_ Safety and environmental (Categories 1D through 1G only)
  - (d) \_\_\_\_\_ Administrative

2. Justification for reclassification: \_\_\_\_\_

3. The application was filed (a) \_\_\_\_\_ pursuant to written NRC request and the amendment is being issued for the convenience of the Commission, or (b) \_\_\_\_\_ Other (State reason): \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

CK # 3726  
rec'd BPF

Signature J. Zucker  
Uranium Recovery Licensing Branch

Date 5/27/81

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