CONOCO

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MAY 14 1981
U.S. Nuclear Regulatory Commission
WMUR
Mail Section

May 12, 1981

Mr. Tom Fleming
Project Manager
U.S. Nuclear Regulatory Commission
7915 Eastern Avenue
Silver Spring, Maryland 20910

Re: Conoco's Response to NRC Comments on Sand Rock Mill Project - NRC Docket No. 40-8743

Dear Mr. Fleming:

Enclosed are responses (12 copies) to 49 of the 59 comments listed in D. E. Martin's letter dated April 13, 1980. Under separate cover, three sets of these responses are being forwarded direclty to Dr. M. Kelley at Oak Ridge. Responses to the remaining comments (No. 1, 17, 18, 21, 23, 26, 32, 37, 40, and 49) will be forwarded to you by May 29, 1981.

In paragraph two of Mr. Martin s April 13 letter, Conoco was requested to demonstrate conformance to Appendix A 10 CFR 40 as it appeared in the Federal Register on October 3, 1980. Since the submittal of the Sand Rock application took place in July, 1980, and since the materials in the original submittal were formatted in a manner consistent with existing NRC guidelines, it is a considerable task to list conformance of the July documents into the broad, comprehensive issues raised by the 13 criteria in Appendix A. However, Conoco is working on this request.

Please also keep in mind that Conoco is supporting the AMC's legal challenge to Appendix A. When Conoco submits information demonstrating conformance (in about 10 days), it will by no means negate the support of the AMC's challenge.

If you have any questions regarding the enclosed material, please contact me.

Sincerely,

T. W. Quigley

T. W. Quigley

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Enclosures
cc: J. E. Cearley w/o enc.
D. W. Bollig w/o enc.
Linda Peck w/o enc.
Dan E. Martin w/o enc.
Dr. M. Kelley w/enc.

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Comment No. 2

Provide the aquifer properties, groundwater flow direction, and groundwater quality data for the "68" sand. Is there hydraulic communication (1) between the "68" sand and the ore-bearing "70" sand? (2) between the "68" sand and the "60" sand? (Section 2.7.1)

Response (1)

Well 1823 was drilled in March, 1980 near the cluster of wells in the center of Pit 35S to define the hydraulic conditions in the 68 sand (see ER Figure 2.7-3). This well was drilled to the top of the 68 sand and was cemented in the bottom and in the annulus. The cement plug was drilled out leaving an open-hole completion in the 68 sand. While the 70 sand in t.e area of Pit 35S was being pump-tested, the water level in the 68 sand was monitored through well 1823. Well 1823 is 37.4 feet from pumping well 1814. The following discussion presents the results of this pump test.

A three day pump test was conducted on 8/13-15/80. Well 1814 was pumped at an average discharge rate of 16.8 gpm, while wells 1815, 1816, 1817 and 1823 were observed. All of these wells are 70 sand wells except well 1823, which is a 68 sand well. Tables A-1.50 through A-1.54 and Figures A-1.49 through A-1.52 are taken from the Wyoming DEQ Mine Permit Application (forwarded as a Reference Document on January 8, 1981) for the project. Table A-1.50 presents the pumping and drawdown data for the puming well 1814, while Tables A-1.51, A-1.52 and A-1.53 present the drawdown data for observation wells 1815, 1816 and 1817, respectively. The water level measurements for well 1823, as presented in Table A-1.54, show a typical water level rise in the adjacent acquifer shortly after pumping starts. The water level in the 68 sand then returns to a level close to the static conditions. The rise at the end of the test is probably attributed to a decrease in barometric pressure. Figure A-1.53 presents the barometric pressure during the pump test.

The semi-log of the drawdown in the pumping well is given in Figure A-1.49. The fit of the straight line yields a transmissivity of 2600 gal/day/ft for the transmissivity of the 7C sand near well 1814. Streltsova's type curve for an anisotropic ratio (Kv/Kh) of 0.07 and storage ratio (S/Sy) of 8×10^{-2} matched the drawdown data in observation well 1815. Figure A-1.50 presents this match of the type curve to the drawdown data. Values of 5500 gal/day/ft, 6700 ft/yr and 470 ft/yr were calculated for the transmissivity, horizontal and vertical permeability, respectively. Storage values of 0.014 and 1.1×10^{-3} were computed from the type curve match for the specific yield and storage coefficient.

Drawdown in observation well 1816 reacted very strangely which questions the accuracy of results obtained from this well. Figure A-1.51 presents the match and results from this observation well.

Observation well 1817 is 228 feet from pumping well 1814, and therefore, the confining portion of the unconfined aquifer is the major portion of the drawdown curve observed. Figure A-1.52 presents the results of the match for well 1817.

This test showed that the 70 and 68 sands are not readily hydrologically connected in this area. The elevation difference of the piezometric levels in the 70 and 68 sand aquifers of approximately 47 feet strengthens this conclusion.

Response (2)

The connection between the 68 and 60 sands was not defined. A clay, similar to the one between the 70 and 68 sands, exists in most areas between the 68 and 60 sand. Communication between the 68 and 60 sands is not considered important to this project, because of the lack of communication between the 70 and 68 sands.

The aquifer properties of the 68 sand are discussed on pages 4-24 of Hydro (1980). Permeabilities of 3.0 x 10^{-6} and 3.0 x 10^{-4} cm/sec (3.1 and 306 ft/yr) and transmissivities of 8.5 and 860 square meter/yr (1.9 and 1980 gal/day/ft) were computed for the 68 sand.

The flow direction of the 68 sand is probably similar to the 70 sand because the dip of the beds are the same.

Two water-quality analyses have been collected from well 1823 since the submittal of the ER. The following addendum to Table 2.7-8 presents quality data for water in the 68 sand well 1823. Water quality in the 68 sand well 1823 is similar to the water quality of the 70 sand in this area (see well 1814, Table 2.7-8) except that the radionuclide concentrations are much lower.

TABLE A-1.50 PUMPING AND DRAWDOWN DATA FOR WELL 1814 (70 SAND)

DATE	TIME	TIME SINCE PUMPING STARTED (t, in min.)	WATER LEVEL (ft below MP)	DRAWDOWN	DISCHARGE (gpm)	TOTALIZER (gal)
08/13/80	0958	-	159.40	-	-	-
	1130	PUMP ON				
	1150	20	-	-	17.1	-
	1151	21	-	-	-	171860.6
	1158	28 T = 11.0°C,	COND = 840	μmhos/cm @ 25°C		
	1159	29	-	-	17.1	-
	1212	42	187.23	27.83	-	-
	1222	52	187.84	28.44	-	-
	1223	53	-	-	17.1	-
	1225	55 T = 11.5°C,	COND = 870	-	-	-
	1226	56	-	-	-	172454.1
	1235	65	187.66	28.26	-	-
	1251	71	187.81	28.41	-	-
	1252	72 T = 11.0°C.	COND = 790	-	16.7	-
	1316	96	188.44	29.04	-	-
	1348	128	-	-	16.7	173822.3
	1349	129 T = 11.1°C, COND = 800	188.76	29.36	-	-
	1438	178	189.07	-	-	-
	1441	181	-	-	-	-
	1550	250	189.91	-	-	-
	1726	346	188.73	29.33	17.0	-
	1731	351 T = 12.0°C,	COND = 800	-	-	-
	2004	504	189.42	30.02	16.9	-

TABLE A-1.50 PUMPING AND DRAWDOWN DATA FOR WELL 1814 (70 SAND) (cont'd)

DATE	TIME	TIME SINCE PUMPING STARTED (t, in min.)		WATER LEVEL (ft below MP)	DRAWDOWN	DISCHARGE (gpm)	TOTALIZER (gal)
08/14/80	0156	856	T = 11.0°C, COND = 690	190.88	31.48	-	-
	0706	1166	T = 10.9°C, COND = 700	191.45	32.05	17.6	-
	1228	1488	T = 11.0°C, COND = 730	190.84	31.44	16.9	-
	1612	1712	T = 12.5°C, COND = 760	190.12	30.72	16.3	-
	2305	2125		190.95	31.55	-	-
	2313		PUMP OFF				
	2328		PUMP ON				
08/15/80	0632	2572	T = 10.9°C, COND = 680	189.81	30.41	16.6	-
	1528	3108	T = 12.0°C, COND = 560	189.55	30.15	15.9	-
08/16/80	0900	PUMP WENT OFF IN MIDDLE OF NIGHT					

TABLE A-1.51 DRAWDOWN DATA FOR OBSERVATION WELL 1815 (70 SAND)

DATE	TIME	TIME SINCE PUMPING STARTED (t, in min.)	WATER LEVEL (ft below MP)	DRAWDOWN (ft)
08/13/80	1102	-	161.68	-
	1130	PUMP ON IN WELL 1814		
	1133	3	161.71	.03
	1135.5	5.5	161.78	.10
	1137.5	7.5	161.82	.14
	1139	9	161.84	.16
	1144	14	161.89	.21
	1149	19	161.91	.23
	1156	26	161.94	.26
	1205	35	161.96	.28
	1216	46	162.00	.32
	1230	60	161.98	.30
	1245	75	162.03	.35
	1248	78	162.04	.36
	1259	89	162.04	.36
	1321	111	162.08	.40
	1348	138	162.07	.39
	1448	198	162.16	.48
	1544	254	162.19	.51
	1736	366	162.26	.58
	2012	522	162.37	.69
08/14/80	0148	858	162.54	.86
	0716	1186	162.65	.97
	1240	1510	162.72	1.04
	1559	1719	162.71	1.03
	2253	2133	162.75	1.07
08/15/80	0623	2583	162.87	1.19
	1537	3137	162.95	1.27

TABLE A-1.52 DRAWDOWN DATA FOR OBSERVATION WELL 1816 (70 SAND)

DATE	TIME	TIME SINCE PUMPING STARTED (t, in min.)	WATER LEVEL (ft below MP)	DRAWDOWN (ft)
08/13/80	1047	-	157.28m	-
	1050	-	157.42e	-
	1130	PUMP ON	-	-
	1131	1	157.25	-.03
	1132	2	157.34	.06
	1133	3	157.34	.06
	1134	4	157.42	.14
	1135	5	157.42	.14
	1136	6	157.61	.23
	1137	7	157.59	.21
	1138	8	157.67	.39
	1139	9	157.74	.45
	1140	10	158.99	.71
	1143	13	158.30	1.02
	1146	16	158.45	1.17
	1152	22	158.41	1.13
	1157	27	158.61	1.33
	1207	37	157.80	.52
	1217	47	157.82	.54
	1227	57	157.89	.61
	1242	72	157.97	.69
	1257	87	158.11	.83
	1313	103	158.10	.82
	1350	140	158.26	.98
	1443	193	158.46	1.18
	1537	247	158.55	1.27
	1750	380	159.01	1.73
	2002	512	159.02	1.74

TABLE A-1.52 DRAWDOWN DATA FOR OBSERVATION WELL 1816 (70 SAND) (cont'd)

DATE	TIME	TIME SINCE PUMPING STARTED (t, in min.)	WATER LEVEL (ft below MP)	DRAWDOWN (ft)
08/14/80	0202	872	159.37	2.09
	0710	1180	158.99	1.71
	1231	1501	159.53	2.25
	1602	1711	159.39	2.11
	2250	2119	159.49	2.21
08/15/80	0629	2578	160.15	2.87
	1527	3116	159.71	2.43
08/16	1600	-	158.58	-

NOTES:

e = 1000' Electric Tape used

m = Metal Tape used

TABLE A-1.53 DRAWDOWN DATA FOR OBSERVATION WELL 1817 (70 SAND)

DATE	TIME	TIME SINCE PUMPING STARTED (t, in min.)	WATER LEVEL (ft below MP)	DRAWDOWN (ft)
08/13/80	1112	-	165.09	-
	1130	PUMP ON IN WELL 1814		-
	1141	11	165.15	.06
	1146.5	16.5	165.16	.07
	1153	23	165.18	.09
	1202	32	165.19	.10
	1220	50	165.19	.10
	1237	67	165.19	.10
	1256	86	165.19	.10
	1319	109	165.20	.11
	1353	143	165.19	.10
	1444	194	165.19	.10
	1601	271	165.20	.11
	1741	371	165.18	.09
	1958	508	165.21	.12
08/14/80	0206	876	165.20	.11
	0703	1179	165.26	.17
	1237	1513	165.27	.18
	1608	1724	165.18	.09
	2258	2134	165.20	.11
08/15/80	0627	2583	165.24	.15
	1532	3128	165.28	.19

TABLE A-1.54 DRAWDOWN DATA FOR OBSERVATION WELL 1823 (68 SAND)

DATE	TIME	TIME SINCE PUMPING STARTED (t, in min.)	WATER LEVEL (ft below MP)	DRAWDOWN (ft)
08/13/80	1054	-	112.61m	-
	1054		112.71e#3	-
	1105	-	112.50e#2	-
	1130	PUMP ON	-	-
	1131	1	111.62	-.99
	1134	4	110.86	-1.75
	1136.5	6.5	108.95	-3.66
	1142	12	108.95	-3.66
	1148	18	111.90	-.71
	1154	24	112.70	.09
	1159	29	112.71	.10
	1209	39	112.72	.11
	1220	50	112.59	-.02
	1230	60	112.66	.05
	1237	67	112.37	-.24
	1253	83	112.57	-.04
	1302	92	112.49	-.12
	1315	105	112.52	-.09
	1353	143	112.52	-.09
	1444	194	112.52	-.09
	1540	250	112.50	-.11
	1738	368	112.48	-.13
	2009	519	112.49	-.12
08/14/80	0152	862	112.50	-.11
	0713	1183	112.51	-.10
	1226	1496	112.50	-.11
	1605	1715	112.42	-.19
	2301	2131	112.48	-.13
8/15/80	0637	2589	112.36	-.25
	1529	3121	112.15	-.46

NOTES: e = Electric Tape used m = Metal Tape used

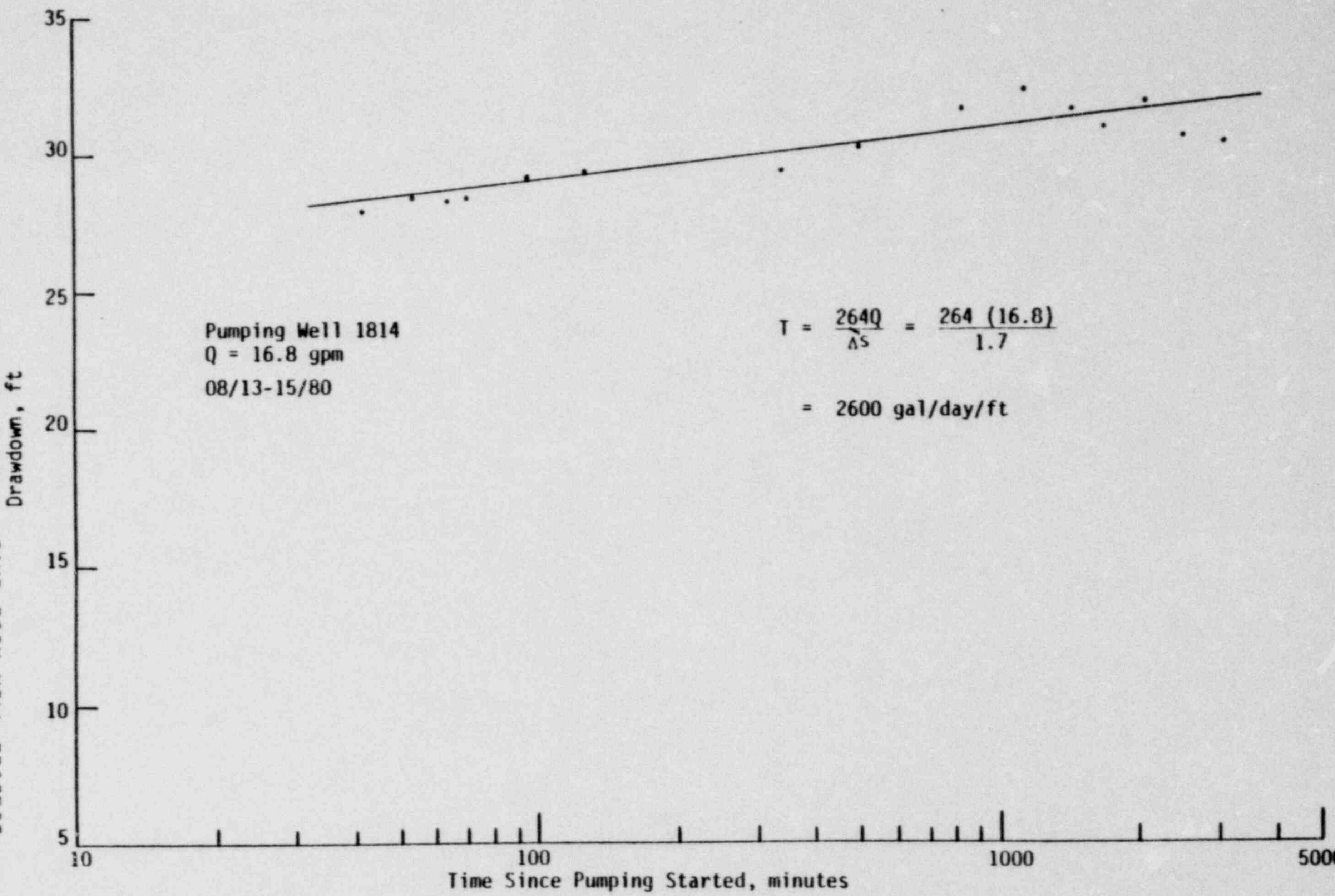

FIGURE A-1.49 DRAWDOWN DATA FOR PUMPING WELL 1814 (70 SAND)

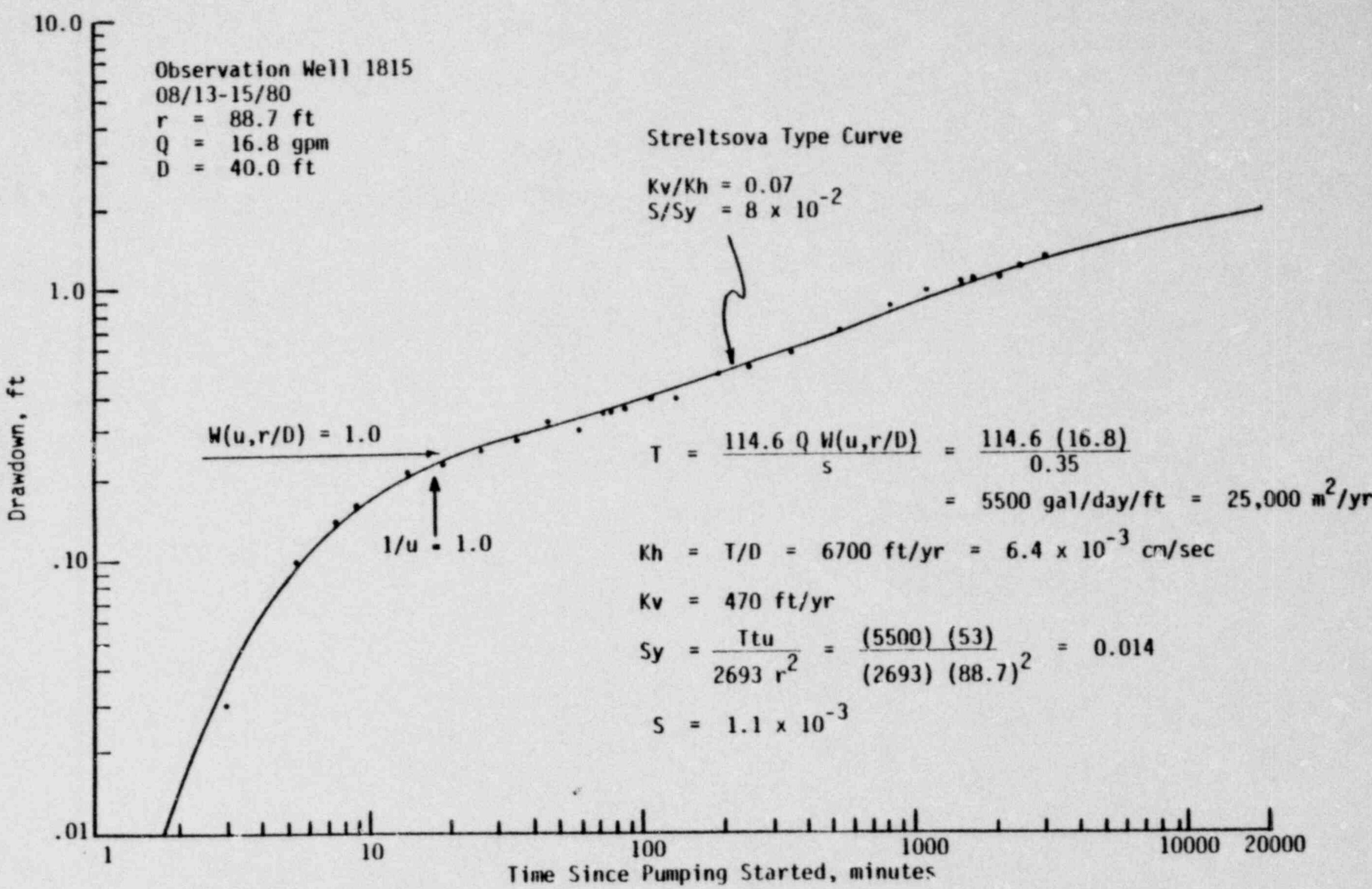

FIGURE A-1.50 DRAWDOWN DATA FOR WELL 1815 FROM PUMPING WELL 1814 (70 SAND)

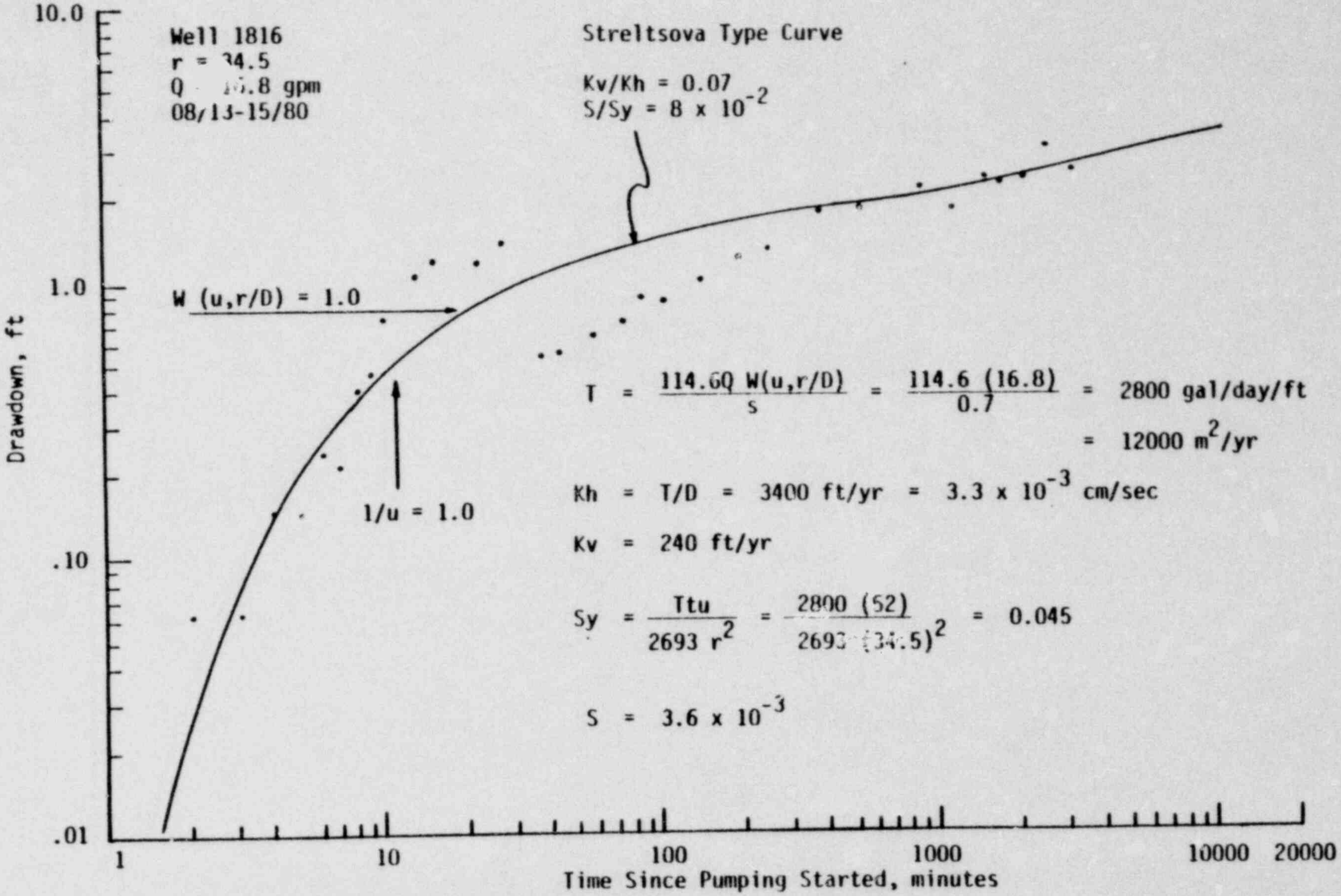

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FIGURE A-1.51 DRAWDOWN DATA FOR WELL 1816 FROM PUMPING WELL 1814 (70 SAND)

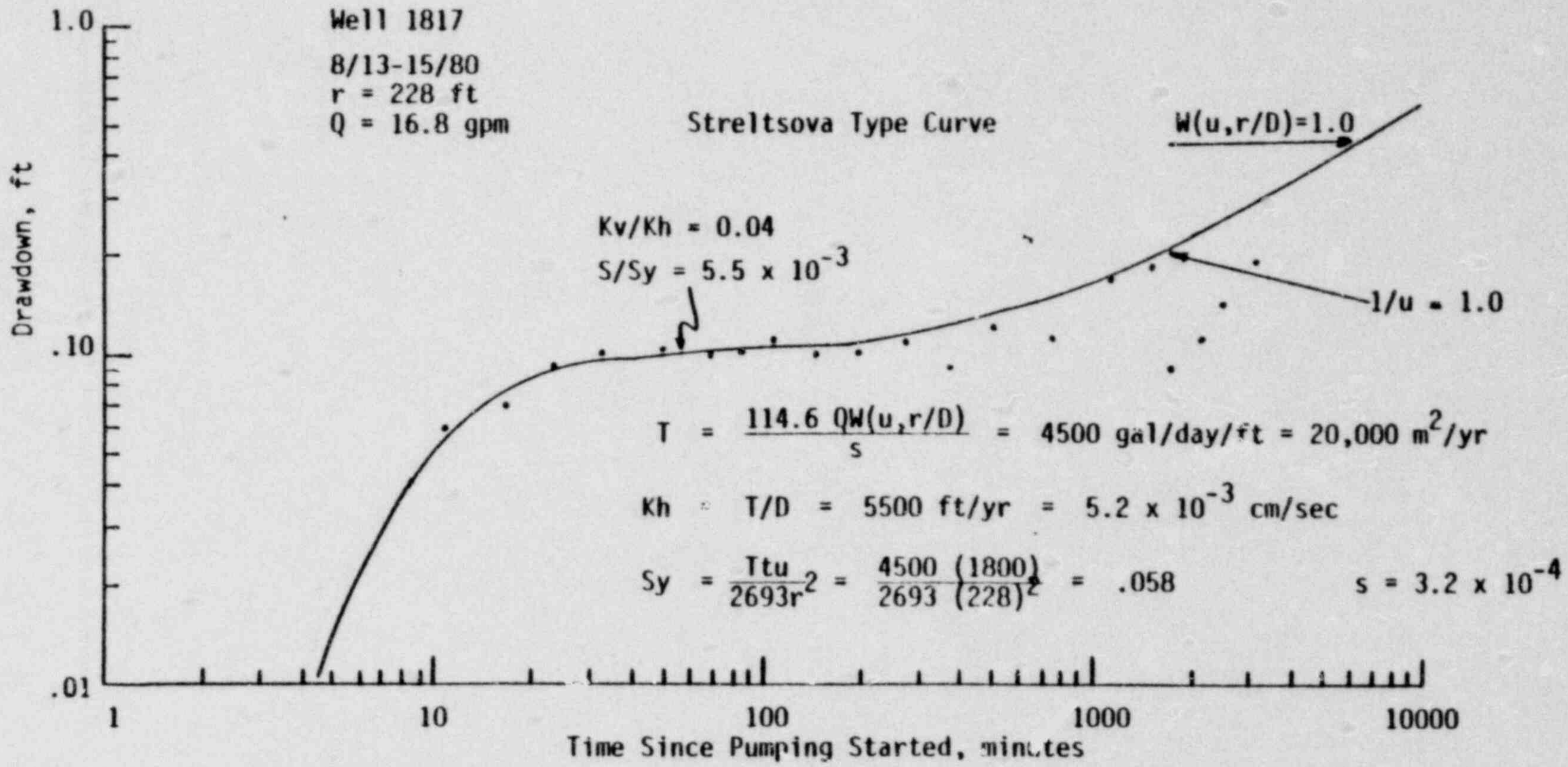

FIGURE A-1.52 DRAWDOWN DATA FOR WELL 1817 FROM PUMPING WELL 1814 (70 SAND)

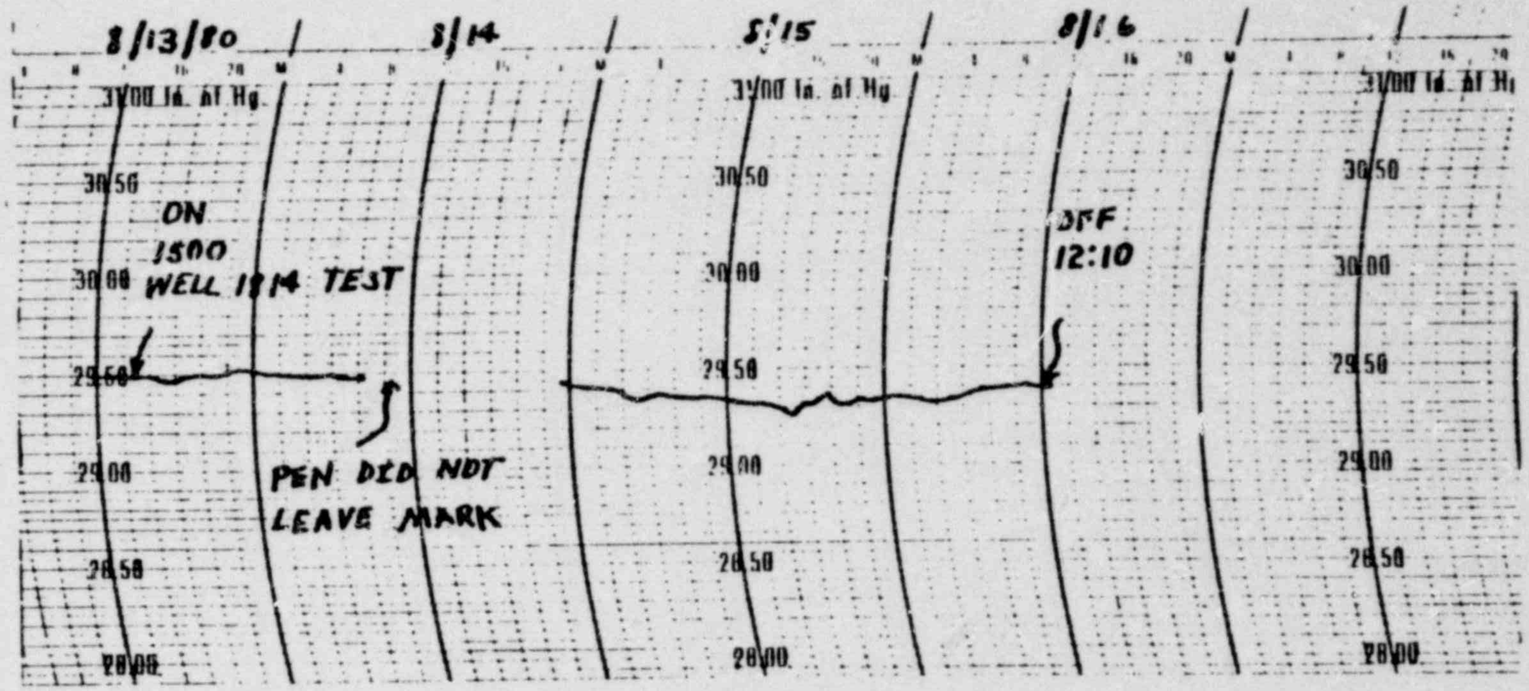

FIGURE A-1.53 BAROMETRIC PRESSURE DURING THE 8/13-15/80 PUMP TEST

ADDENDUM TO:

TABLE 2.7-8

GROUND WATER QUALITY FOR CONOCO'S SAND ROCK MONITORING WELLS

WELL NO.	WELL LOCATION 42N 75W	DATE	TDS	CONDUCTIVITY (μmhos/cm @ 25°C)	TEMPERATURE (°C)	Na	K	Ca	Mg	SO_4	Cl	CO_3
1823	35 SW/SW	10/01/80	1072	1430 (1232)	(13.0)	45	17	218	48	614	9	0
		12/17/80	1070	1400	-	43	15	189	55	640	11	0

ADDENDUM TO:

TABLE 2.7-8
(cont'd)
GROUND WATER QUALITY FOR CONOCO'S SAND ROCK MONITORING WELLS

WELL NO.	WEL' LOCATION 42N 75W	DATE	HCO_3	pH	Al	NH_3 (as N)	As	Ba	Be	B	Cd	Cr	Cu
1823	35 SW/SW	10/01/80	220	(7.1) 7.43	*.05	.15	*.002	*.02	*.005	*1.0	*.005	*.01	.04
		12/17/80	200	7.57	-	.11	-	-	-	-	-	-	-

ADDENDUM TO:

TABLE 2.7-8
(cont'd)

GROUND WATER QUALITY FOR CONOCO'S SAND ROCK MONITORING WELLS

WELL NO.	WELL LOCATION 42N 75W	DATE	F	Fe	Pb	Mn	Hg	Mo	Ni	NO_3	Ag	Se	V
1823	35 SW/SW	10/01/80	.13	13.2	*.05	.11	*.001	*.05	*.01	.97	*.01	*.002	*.05
		12/17/80	*.05	-	-	-	-	-	-	1.20	-	-	-

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ADDENDUM TO:

TABLE 2.7-8
(cont'd)

GROUND WATER QUALITY FOR CONOCO'S SAND ROCK MONITORING WELLS

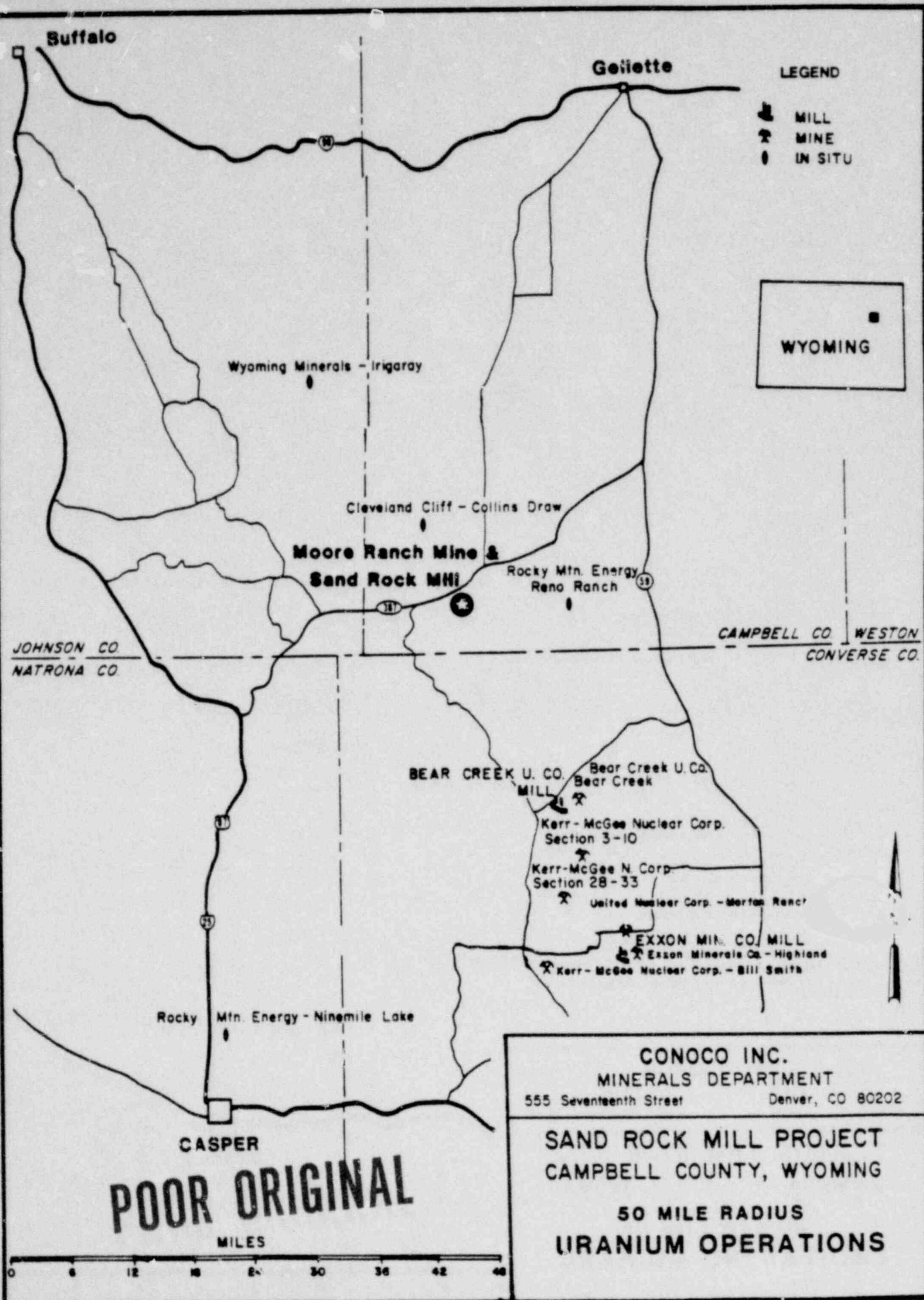
WELL NO.	WELL LOCATION 42N 75W	DATE	Zn	U	Pb210	Po210	Ra-226	Th-230	CHARGE BALANCE
1823	35 SW/SW	10/01/80	.084	1.19	-.1±0.6	-.1±0.6	6.46±.36	-.21±0.29	1.7
		12/17/80	-	-	-	-	-	-	2.1

Comment No. 3

Provide a map indicating the locations of the uranium mills and mines within 50 miles of the project site. (p. 2-12)

Response

Map is attached.



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Comment No. 4

What were the lower . ıts of detection for the analysis results given in Table 2.7-13?

Response

Results presented in this table are the product of three laboratories:

1. WAMCO Laboratories, Casper, 1977 and 1978.

ergy Analytical Laboratories, Casper, 1979 and 1980

3. LFE Laboratories (radionuclides) 1979 and 1980

Lower limits of detection (LLDs) for Lab 1 are shown in Table D-6-34 (copy attached) of Appendix D-6 in Conoco's June, 1979 Mine Permit Application to the State of Wyoming.

LLDs for Lab 2 are presented below:

Parameter	(mg/l)	Parameter	(mg/l)
Sodium	0.01	Lead	0.05
Potassium	0.01	Manganese	0.01
Calcium	0.01	Mercury	0.001
Magnesium	0.01	Molybdenum	0.05
Chloride	1.0	Nickel	0.01
Sulfate	1.0	Selenium	0.002
Carbonate	0.0	Zinc	0.005
Bicarbonate	0.0	Vanadium	0.05
pH	---	Uranium	1.005
Conductivity	---	Boron	1.0
Alkalinity	---	Ammonia	0.05
Nitrate	0.05	Aluminum	0.05
Total Dissolved Solids	---	Arsenic	0.002
Barium	0.02	Cadmium	0.005
Chromium	0.01	Copper	0.01
Iron	0.05		

LLDs for Lab 3 are presented in Sections 6.1.5.3 and 6.1.5.4 (pages 6-43 and 6-44) of the ER.

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Table D-6-34

ANALYTICAL PROCEDURES, BY WAMCO LABORATORY

Analysis	Method	Detection Limit[a]	Reference[b]
Alkalinity	titration	2	EPA, p. 3
Aluminum	atomic absorption	0.1	EPA, p. 92
Ammonia nitrogen	distillation	0.05	EPA, p. 159
Arsenic	colorimetric	0.01	EPA, p. 9
Barium	atomic absorption	0.03	EPA, p. 97
Boron	curcumin	0.01	EPA, p. 13
Cadmium	atomic absorption	0.005	EPA, p. 101
Calcium	EDTA titration	0.01	EPA, p. 19
Chloride	diphenylcarbazone filtration	0.5	EPA, p. 29
Chromium	atomic absorption	0.02	EPA, p. 105
Conductivity	Wheatstone bridge	1 (μmho/cm)	EPA, p. 275
Copper	atomic absorption	0.01	EPA, p. 108
Fluoride	SPADNS	0.1	EPA, p. 59
Hardness	EDTA titration	1	EPA, p. 68
Iron	atomic absorption	0.02	EPA, p. 110
Lead	atomic absorption	0.01	EPA, p. 112
Manganese	atomic absorption	0.01	EPA, p. 114
Magnesium	atomic absorption	0.001	EPA, p. 112
Mercury	atomic absorption (cold vapor)	0.001	EPA, p. 118
Molybdenum	atomic absorption (cold vapor)	0.05	EPA, p. 139
Nickel	atomic absorption (cold vapor)	0.02	EPA, p. 141
Nitrate	brucine	0.1	EPA, p. 197
Nitrite	diazotization	0.01	EPA, p. 215
Phosphorus	ascorbic acid	0.01	EPA, p. 249
Potassium	atomic absorption	0.005	EPA, p. 143
Selenium	atomic absorption	0.01	APHA, p. 159
Sodium	atomic absorption	0.002	EPA, p. 147
Sulfate	turbidometric	1	EPA, p. 27
Total Dissolved Solids	180° C	1	EPA, p. 266
Vanadium	atomic absorption	0.05	APHA, p. 152
Zinc	atomic absorption	0.005	APHA, p. 148

[a] mg/l, except as noted

[b] EPA = Methods for Chemical Analysis of Water and Wastes, 1974

APHA = Standard Methods for the Examination of Water and Wastewater, 14th edition, 1975

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It should be noted that LLDs vary between data presented by Labs 1 and 2. For example, the Boron (B) LLD for Lah 1 is 0.01 mg/l while Lab 2's LLD is 1.0 mg/l. This is due to different analytical techniques which were employed at the two labs.

In reviewing the B results as listed in Table 2.7-13 of the ER, a typographical error has been detected. B results of 39 mg/l reported at the top of the column on page 2-153 should read 0.05mg/l. Added reference to this corrected value can be found in Table D-6-32 (copy attached) of the 1979 Mine Permit Application which was referenced above.

CONTINENTAL OIL COMPANY

MOORE RANCH PROJECT

Table D-6-32

WATER QUALITY OF NINEMILE CREEK*

Site 4

Parameter	Determination, mg/l
Arsenic	<0.05
Chloride	16
Copper	<0.01
Cyanide	<0.02
Fluoride	0.4
Iron, total	0.25
Iron, dissolved	0.25
Manganese	<0.05
Nitrate	0.0
Phenols	0.007
Sulfate	290
Total dissolved solids	770
Zinc	<0.02
M.B.A.S.	<0.01
Barium	<0.5
Cadmium	<0.01
Chromium	<0.1
Lead	<0.1
Selenium	<0.001
Silver	<0.5
pH (units)	8.0
Conductance (umhos/cm)	935
Hardness ($CaCO_3$)	440
Sodium	39
Boron	0.05
Silica (SiO_2)	10
C.O.D.	24
Aluminum	<0.1
Mercury	<0.001
Nickel	<0.1
Total Kjeldahl Nitrogen	1.5
Oil and grease	0.8
Sulfide (S)	<0.001
Solids, suspended	0.0
Total, CO_3	130
Vanadium	0.007
Molybdenum	<0.005
U_3O_8	0.036
Calcium	120
Magnesium	32
Potassium	6.3
Bicarbonate	270

*Sampled April 21, 1977. For necessary constituents, sample bottles were pre-acidifed. No filtering was done.

3/79

Comment No. 5

How far downstream from the project area is the nearest permanent water? Provide available information on the aquatic biota of the upper Cheyenne drainage system. (Section 2.9.3, p. 2-231)

Response

The nearest permanent water appears to be pond locations I-33 (about 0.5 mile south of the permit boundary in Section 11 at the abandoned Van Gordon Ranch) and I-7A (about 2 miles southeast of the permit boundary in Section 18). See Figures 2.7-6 and 2.7-5, respectively of the ER. These ponds have not been reported as "dry" during baseline studies, but it is uncertain as to whether they contain water on a long-term basis.

The Cheyenne River system has a notably depauperate ichthyofauna, particularly in its upper reaches. According to Wyoming Fishes (G. T. Baxter and J. R. Simon 1970, Wyoming Game and Fish Department Bulletin No. 4, Cheyenne), the only species potentially present are the flathead chub Hybopsis gracilis, longnose dace Rhinichthys cataractae, sand shiner Notropis stramineus, plains minno Hybognathus placitus, fathead minnow Pimephalec promelas, golden shiner Notemigoniuc crycoleucus (introduced), river carpsucker Carpiodes carpio, white sucker Catostomus commersoni, mountain sucker C. platyrhynchus, black bullhead Ictalurus [melas]], plains topminnow Fundulus sciadicus, plains killifish F. zebrinus, and green sunfish Lepomis cyanellus.

Comment No. 6

Intermittent streams frequently contain pools where aquatic biota can be found. Temporary ponds can harbor aquatic species which are adapted to this type of habitat. Do any of the temporary aquatic situations in the project area, or directly downstream, contain such aquatic organisms? If so, provide a list of organisms and the locations where they are found. (Section 2.9.4.2, p. 2-231)

Response

A number of temporary stockponds in the area, as well as two permanent natural ponds described in Response 5 above, were seined in 1980 as part of the Sand Rock Project baseline study. The stockponds supported no fish, but the pond in Section 36 contained a large population of larval tiger salamanders *Ambystoma tigrinum*.

In May, 1980, and again in April, 1981, seining of the two permanent ponds produced fathead minnows, which are ubiquitous in the region and particularly well adapted to the variable water conditions associated with small ponds. Both ponds are sufficiently small that seining would have revealed other species (if they had been present).

The ponds and adjacent marshy drainages also provided breeding habitat for the leopard frog *Rana pipiens* and western chorus frog *Pseudacris triseriata*, and potentially for toads and spadefoots. During both 1980 and 1981, however, only the two frogs were observed.

The permanent ponds and adjacent drainage bottoms supported a fairly well developed aquatic flora, including cattails, rushes, arrowleaf, and willows, and a relatively diverse invertebrate fauna. Macroinvertebrate samples were collected in April, 1981; these data will be provided following lab analysis.

Water quality samples were also taken at the two permanent ponds and at a seemingly similar temporary natural pond which does not contain a minnow population. Although lab results are not available at this time, it appears that an important difference may be hardness, which is lower in the permanent ponds than in the temporary ponds. This probably is related to the fact that the permanent ponds may be fed by shallow aquifers, whereas the stockponds are supplied almost totally by surface runoff and subject to constant evaporitic concentration.

The permanent ponds also differed in that they were deep (>2 m) and clear. The artificial stockponds tended to be shallow, turbid, and virtually lacking in aquatic vegetation.

Comment No. 7

The E.R. states (p. 2-16) that antelope have been hunted infrequently in past years, while p. 2-61 states that "Campbell County is ranked second in the state for antelope harvested in 1978". Please resolve this inconsistency.

Response

The statement on page 2-16 refers to the site-specific situation where the local rancher (Lee Moore) has controlled access to this lands. Note that the statement on page 2-61 indicates access to public land is limited.

Comment No. 8

In regard to the possibility of the site being located in an antelope migration corridor: Were observations of high concentration of animals made in the recent severe winter? What evidence is there that these concentrations could have been weather-related? Is the issue under any other investigation? If so, with what result?

Response

The language used on ER page 2-211 may have overstated the aspect of antelope "migration." According to the Wyoming Game and Fish Department, pronghorn are not truly migratory in the Powder River Basin, as they are in some other regions (e.g., the Red Desert of southwestern Wyoming). Powder River Basin pronghorn may form large herds and move relatively short distances in response to short-term forage unavailability related to winter storms. Such almost certainly was the case in the 1977-78 surveys (the last severe winter in the area). (Note: The past winter, 1980-81, was unusually mild, both in temperature and snowfall. For example, December and January mean temperatures were 8.1 and 8.2 F above normal for Casper, and 6.7 and 11.5 F above normal for Gillette, respectively. Winter precipitation was aboud 80 percent of normal for Casper and 74 percent of normal for Gillette.)

The discussion on page 2-11 was not intended to suggest that the site itself is a winter concentration area, but that it may lie within a large area used by antelope during severe winters. However, the Sand Rock Mill has relatively little sagebrush and thus probably does not provide sufficient browse to support antelope winter concentrations. Also, the Wyoming Game and Fish Department has not identified critical winter range in the project area.

The wildlife monitoring program will specifically address winter pronghorn populations during the life of the project. The winter survey completed during early 1981 showed fairly low populations overall, totalling an estimated 20-30. These animals occurred as small, scattered herds. As noted above, the 1980-81 winter was mild, and it is therefore unlikely that pronghorn formed winter concentration herds at any time during the season.

Comment No. 9

Provide a better assessment of site specific impacts on the actual pronghorn herd unit affected. What is the size of the herd unit affected? (Section 2.9.2.3). Provide a detailed evaluation of grazing capacity and actual use of the project land. What fraction of available habitat and grazing capacity in Campbell Caunty does the site represent?

Response

According to Wyoming Game and Fish, the Pumpkin Buttes pronghorn herd numbers about 26,000. Depending on the particular survey, populations for the 16 km^2 Sand Rock permit area are estimated to range from about 20 to 150 animals. The 4.4 km^2 affected area, from which antelope would be excluded by fencing, could be expected to support anywhere from 5 to 45 animals (with long-term use probably closer to the lower figure), based on density estimates during the baseline study. This represents about 0.00019 to 0.0017 percent of the total Pumpkin Buttes herd.

The surface area occupied by the Pumpkin Buttes herd is reported by Wyoming Game and Fish to be 8,835 km^2. Thus, the 4.4 km^2 affected area and 16 km^2 permit area represent only 0.0005 and 0.0018 percent of the total herd habitat, respectively.

It perhaps is somewhat less appropriate to compare the project site to Campbell County, since it is quite close to Johnson and Converse Counties as well; also, Wyoming Game and Fish data are organized into biological rather than political units. Campbell County covers over 12,000 km^2, of which around two-thirds represents antelope habitat. Thus, the 4.4 km^2 affected area is equivalent to approximately 0.00055 percent of pronghorn habitat in the County.

It is difficult to provide a detailed evaluation of pronghorn carrying capacity because pronghorn dietary needs are not fully known. Some data exist, but mostly for tame antelope or sites substantially different from the Sand Rock Study area. However, we have attempted to generate rough approximations, based on baseline vegetation studies conducted earlier for Conoco.

In arriving at these approximations, we have used an average daily intake rate of 2 lbs/acre, assumed 50 percent utilization, assumed that most of the intake will be limited to forbs, subshrubs, and shrubs, and ignored the moderate grazing levels of sheep and cattle on the site. Using this approach, the following estimates were obtained:

Vegetation Unit	Affected Area (acres)	Permit Area (acres)	Capacity (AUMs)
Upland Grassland	925	2,595	0.5
Big Sagebrush Steppe	86	505	2.5
Drainage Meadow	62	259	1.7
Playa Grassland	10	25	0.3
Wheatgrass	0	244	0.6

Using a weighted approach (based on relative extent of each type in the permit area), the total carrying capacity of the permit area is about 250-275 pronghorn. However, with moderate grazing pressure from cattle and sheep, this figure should perhaps be reduced by half or more. Similarly, the affected area carrying capacity is about 60-70 without compensating for domestic livestock.

It is important to re-emphasize that these numbers are approximations. Accurate figures are impossible without a detailed analysis of pronghorn diets on the site and competition with domestic species.

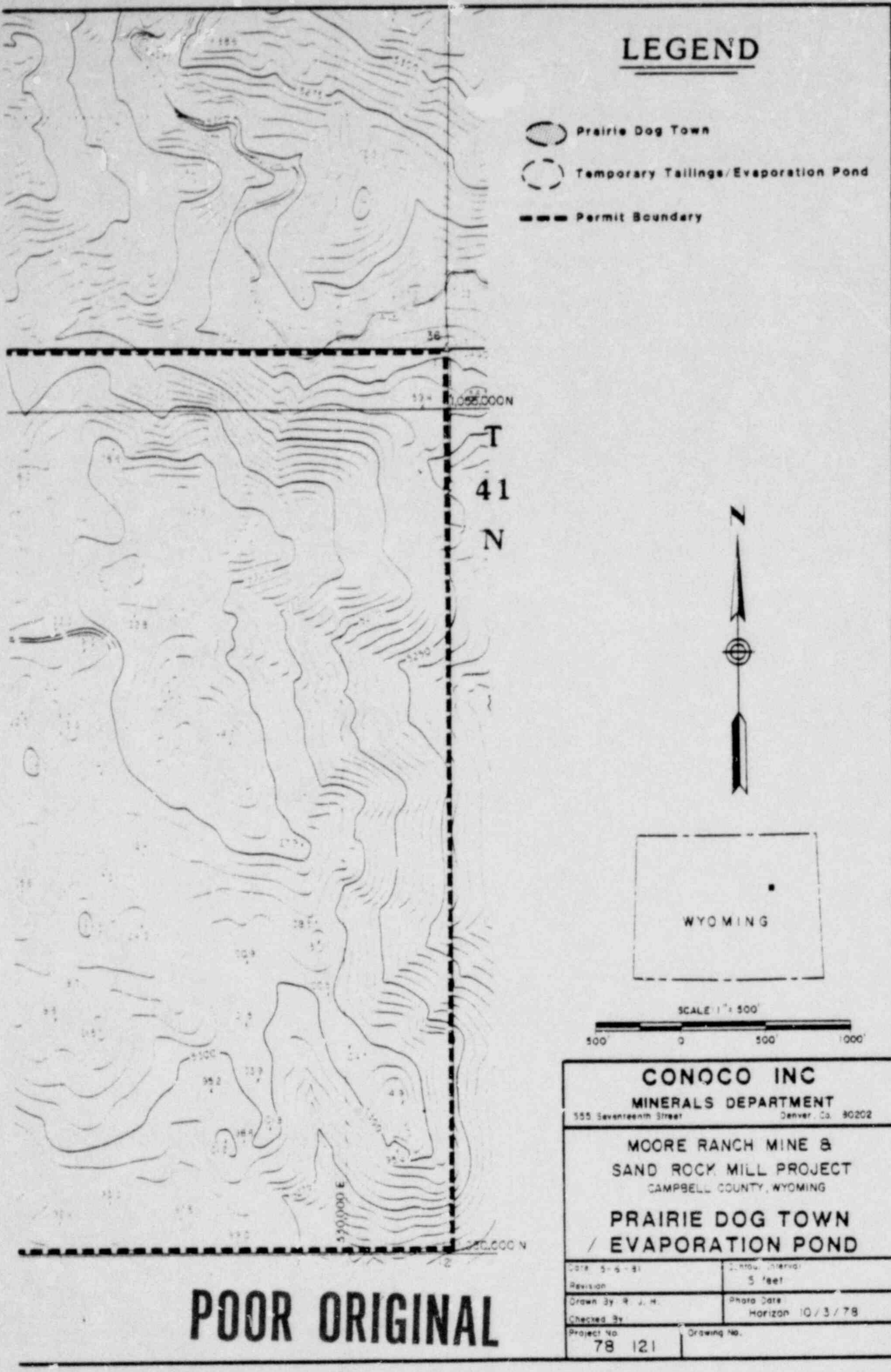
Comment No. 10

Provide a detailed analysis of potential for the occurrence of the black-footed ferret. Provide a map showing the exact location of the prairie dog town relative to the evaporation pond.

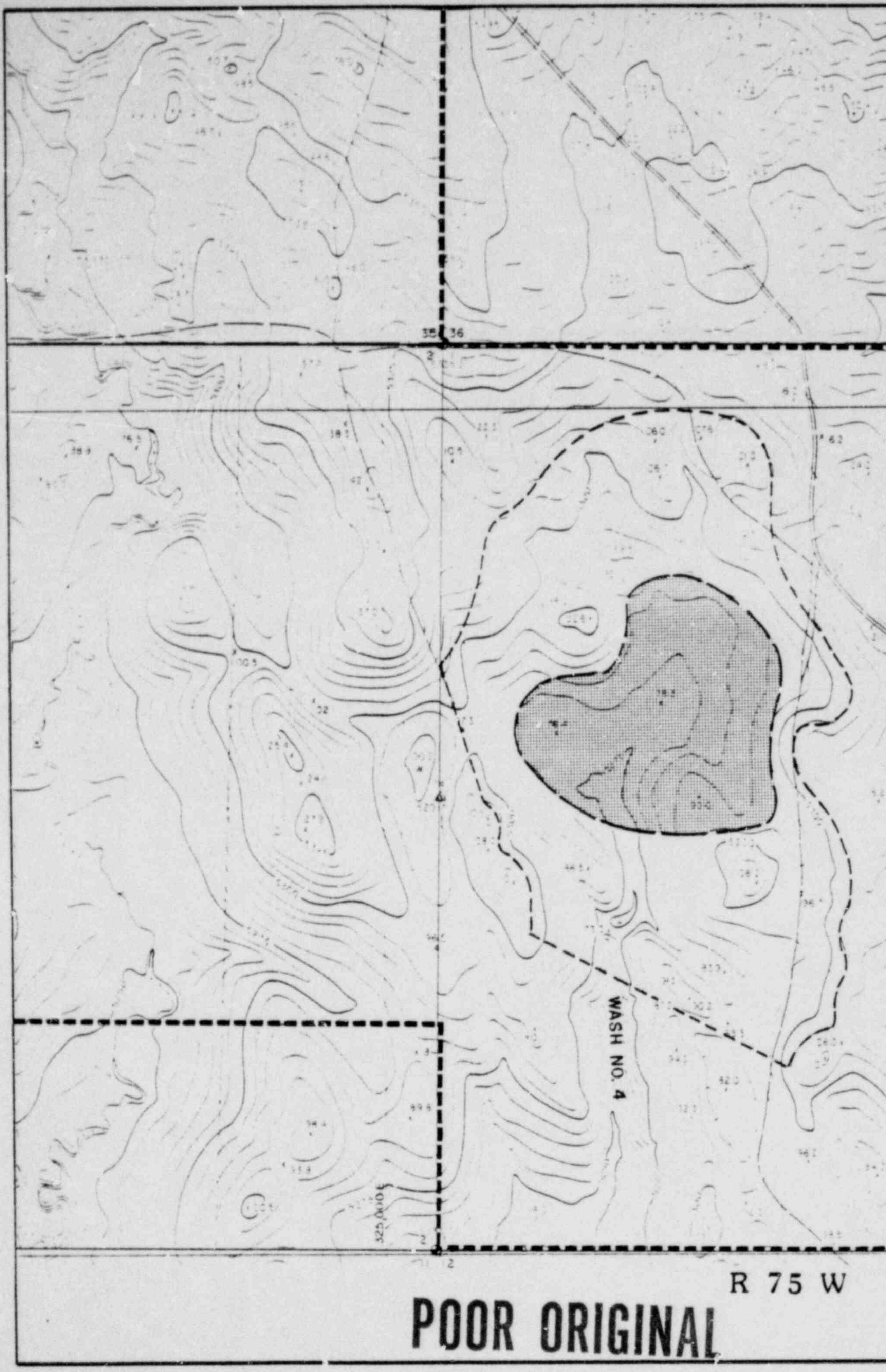
Response

No black-footed ferrets have been reported in northern Wyoming since 1975. The area has been extensively surveyed by the Wyoming Game and Fish Department in 1978, the U.S. Field and Wildlife Service in 1980, and numerous environmental consultants working in conjunction with energy-development projects. It is not reasonable to attempt to attach a numerical probability to the likelihood of occurrence of a ferret in any given site. However, it is reasonable to assume that the probability of occurrence is extremely remote. Conoco has fully complied with approved ferret survey techniques and is committed to including ferret surveys in future monitoring programs.

A map showing the prairie dog town and evaporation pond areas is attached.



POOR ORIGINAL



POOR ORIGINAL

Comment No. 11

In regard to sage grouse abundance, define "sufficient numbers to fall within the 'important' classification" and "not more than a few individuals". What is the distance to the nearest breeding area, and where is it located? Describe efforts that have been made to obtain information of this type. (p. 2-214 - 2-218)

Response

Only three sage grouse were observed during the Sand Rock project baseline study. The species could easily have not been defined as "important" in the study area especially since no courtship areas (leks) or other concentration areas were located. The "important" classification was primarily in reference to the overall statewide value of the species for hunting.

Efforts at locating grouse included specific predawn surveys in early spring, when the birds are most conspicuous, as well as opportunistic observations of individuals or their sign during other field efforts. Surrounding areas were surveyed to the extent that access was available, but it is not possible to state with confidence where the nearest breeding area is located. Certainly, no leks were observed within about one mile of the permit area. If sage grouse do breed nearby, it probably is in denser sagebrush habitats south and east of the Sand Rock site.

Comment No. 12

Since the burrowing owl is a priority 1 species in Wyoming, and it is listed in table 2.9-15 (p. 2-22) as "likely" to occur on site, what efforts have been made to determine whether it is present or not, and with what results?

Response

Every visit to the site included a binocular scan of the Section 1 prairie dog town; this probably amounted to 40-50 individual scans during the course of the Sand Rock baseline studies. On one occasion, in later summer 1980, a mammologist reported a brief glimpse of what "might have been" a burrowing owl. A follow-up visit by an ornithologist failed to produce an observation, and the sighting was therefore considered to be uncorroborated. However, the possible sighting did result in elevating the species from "potential" to "likely." Future field efforts during the monitoring program will include additional scans of the prairie dog town for burrowing owls.

Comment No. 13

What use will be made of information gathered in the "proposed or potential monitoring programs" on prairie dogs, ferret, sage grouse, raptors, deer and antelope?

Response

Monitoring data will be provided to the Wyoming Game and Fish department, Department, as specified in WDEQ Guideline No. 5 (Wildlife). More importantly, however the data will be used to evaluate (a) changes in the fauna of adjacent (unaffected) areas, (b) the effectiveness of mitigation measures, and (c) the success of reclamation programs. If any unanticipated problems arise, appropriate regulatory agencies will be notified and corrective measures taken.

Comment No. 14

Statements in Section 2.4.4 on scenic resources (2-67) are unclear. How do these statements pertain to the site?

Response

The project site itself is not unique in its scenic appearance. Photographs of the project site can be found at the end of Appendicies D-8, D-8A and D-9 of Conoco's November, 1980 Mine Permit Application. This Reference Document (a set of 5 red, three-ring binders) was sent to both the NRC and Oak Ridge on January 8, 1981.

Additional photographs appear on pages 3-4 through 3-6 of the Air Quality and Meteorological Monitoring Plan furnished as Reference Document on October 9, 1980.

Lands under control of BLM (National Resource Lands) are subject to visual resource criteria established by the BLM.

Since the proposed mill is <u>not</u> on BLM land, visual resource criteria are not applicable to the site.

Comment No. 15

Provide copies of the following:

- Archaeological survey of Section 1. (p. 2-66).
- Soil Survey of Section 1. (p. 2-76).
- Vegetation map of Sect. 1. (p. 2-189).
- Discussion of "the potential molybdenum problem" in Appendix D of the permit application (p. 9-17).
- Preliminary Uranium Processing Criteria, Moore Ranch, June 1979, Hazen Research, Inc.

Response

Archaeological Survey of Section 1 - this Reference Document was transmitted to the NRC and Oak Ridge on August 25, 1980. A copy of the cultural clearance letter for Section 1 was transmitted to the NRC on October 7, 1980. The report itself was done by Western Cultural Resource Management.

Soil Survey of Section 1 - this study was included in a Reference Document entitled Conoco Soils Studies (1980) which was sent to both the NRC and Oak Ridge on October 8, 1980. Part IV of this document contains the specific studies done in Section 1. This document is a one volume, red, three-ring binder labelled "Soils Studies."

Additional information on Section 1 soils can be found in Appendix D-7A of Conoco's November, 1980 submittal to the Land Quality Division of Wyoming's Department of Environmental Quality. This document (a set of five, red, three-ring binders) was furnished to both the NRC and Oak Ridge on January 8, 1981.

Vegetation Map of Section 1 - please refer to page 2-189, Figure 2.9-1 of the ER. More detailed information and mapping of Section 1 is available in Appendix D-8A of Conoco's November, 1980 submittal to the State of Wyoming which was described above.

Discussion of "The Potential Molybdenum Problem"- discussion of molybdenum is available in the above referenced November, 1980 document on pages 8, 9 and 20 of Appendix D-5, and on pages 2 and 4 of Appendix D-5A. Additional information is available in Appendix D-5 of Conoco's June, 1979 Mine Permit Application. This document (a set of 4 volumes, red and in three-ring binders) was furnished to the NRC and Oak Ridge as a Reference Document on September 12, 1980.

Preliminary Uranium Processing Criteria, Hazen, June, 1979 - this report was transmitted as a Reference Document on April 30, 1981.

Comment No. 16

Because commuting distance to either Gillette or Casper is 60 to 70 miles, mill employees may choose instead to live in Wright. What information is available concerning the possibility of housing project employees in the Wright area?

Response

Various facets of Wright are discussed in Section 2.3 of the ER (pages 2-30, 2-31, 2-36, 2-38, 2-49 and 2-58). Wright is a planned town owned by ARCO with the intention of providing housing for ARCO's employees involved in coal mining operations. There is a sincere commitment to planned growth by ARCO in this development.

Other companies have participated with ARCO in providing accommodations for a portion of their personnel. For example, Kerr-McKee joined ARCO in the construction of a recreation center at Wright and apparently earned a cooperative arrangement to house some of their employees.

Currently, Conoco has no formal commitment or discussion with ARCO to provide housing. Informal discussions have been held in the past, and the potential of future arrangements with ARCO have not been ruled out.

Comment No. 19

Table 2.7-2 in the Environmental Report indicates that perched groundwater levels exist at elevations higher than 5180 (5180 is the water level in the "70" sands). Backfill in Pit 35N will extend to an elevation of approximately 10 feet above elevation 5180. Consequently, it is possible that the tailings will come into contact with the perched water level. What will be the impacts of placing tailings at elevations where they will come into contact with these perched groundwater zones?

Response

The only perched water table in the 70 sand in the Pit 35N area was observed in well 35N-2A. This well is completed in the upper portion of the 70 sand with a perforated section from elevation 5193 ft to 5178 ft. Perched water in this interval of the 70 sands would still be located in the ore zone backfill below the elevation of the clay liner and tailings. The upper portion of the 70 sand was dry in wells 35N-1C and 35N-7B during the same period. Permeabilities of the upper 70 sand were measured at five sites. Values ranged from 8.2×10^{-6} to 6.3×10^{-7} cm/sec (8.5 - 0.65 ft/yr). Perched water tables observed in other wells in the Pit 35N area are also completed in low permeability units. Seepage into these perched zones with effective lateral drains in the bottom of the 35N pit will be very low. Seepage into the pit wall is discussed on pages 5-69 and 5-74 of the ER.

Comment No. 20

In the pit and evaporation pond, natural clay materials will be relied upon to minimize seepage either in their existing state or as compacted clay liners. Furthermore, tailings solutions will be in direct contact with the evaporation pond embankment. Provide test data to indicate the long-term stability and non-dispersivity of the site-specific clay materials in contact with low pH tailings solution. The data presented for pin hole tests in Appendix C of Chen and Associates' report 6210B-W, July 25, 1980, does not indicate the nature of the water that was used in those tests.

Response

Samples of the underlying claystone below the evaporation pond are currently out for analysis to determine the clay minerals present. An analysis of the long-term stability of this clay with the low-pH tailings solution will be forthcoming once the lab work is completed.

Comment No. 22

It was stated that pit backfill will be placed in lifts of up to three feet in thickness, with 90% compaction. These lift thicknesses appear to be too great to allow 90% compaction to be achieved with normal compaction equipment. What method of quality control will be applied during backfilling operations to ensure that adequate compaction is achieved throughout the entire lift thickness? What would be the ramifications, in terms of feasibility of pit backfilling, if 90% compaction cannot be assured throughout the fill with large lift thicknesses? It should be noted that although the compaction of the backfill is not required for stability purposes, inadequate compaction may have important consequenes with regard to secondary consolidation and settlement.

Response

Please refer to the set of four Reference Documents done by Chen and Associates which were forwarded to the NRC and Oak Ridge on September 3, 1980. These reports (paper bound with dark brown covers) provide geotechnical data and technical specifications for both the pit and evaporation pond. Quality control procedures for Pit 35N are addressed in detail.

In addition to the procedures specified in the Reference Documents, Conoco proposed to construct a test pad prior to the time of backfilling operations. If 90% compaction cannot be obtained, Conoco will adjust the thickness of the lifts.

Conoco has also obtained some information on compaction experiences from other Wyoming uranium operations. In construction of the Sweetwater Project's tailings site, 120 ton trucks with normal compacting equipment were able to achieve 90 to 95% compaction.

Comment No. 24

Submit computations for the design of underdrains to verify that all filter materials meet filter criteria, and that the system will function reliably and effectively.

Response

The filter material will be the coarse fraction of the cycloned tailings at the evaporation pond. A sample of the coarse fraction of cycloned tailings taken from Rocky Mountain Energy's Bear Creek Mine was analyzed for particle size. Bear Creek tailings and crushed Sand Rock ore samples have nearly identical grain-size distribution. Figure 5.7-10A presents the sieve curve for this analysis. Median diameter is 0.48 mm and the uniformity coefficient (D60/D10) is 3.4. The coarse portion of the cycloned tailings at Sand Rock is expected to be similar to this sand sizing. The fifty percent size of the filter pack should be approximately two times greater than the median size of the tailings material. Filter packs can generally be 4 to 6 times greater than the size of the tailings material before problems associated with tailings infiltration develop. The use of a filter pack whose size is only two times greater than the median tailings size should prevent tailings from excessively infiltrating the sand pack. The sand pack, with uniformity coefficient of approximately 3.5 and a median diameter of 0.48 mm should have a permeability of 3×10^{-3} to 1×10^{-2} (30,000 to 100,000 ft/yr). The permeability of the sand-pack material will be at least 10 times as great as the horizontal permeability of the tailings material. This difference indicates that the transmitting capability of the sand pack will be adequate. A No. 20 (0.020 inches) slot size was selected as the performation size in the drain pipe.

SAND ROCK MILL PROJECT
NRC DOCKET NO. 40-8743
MAY, 1981

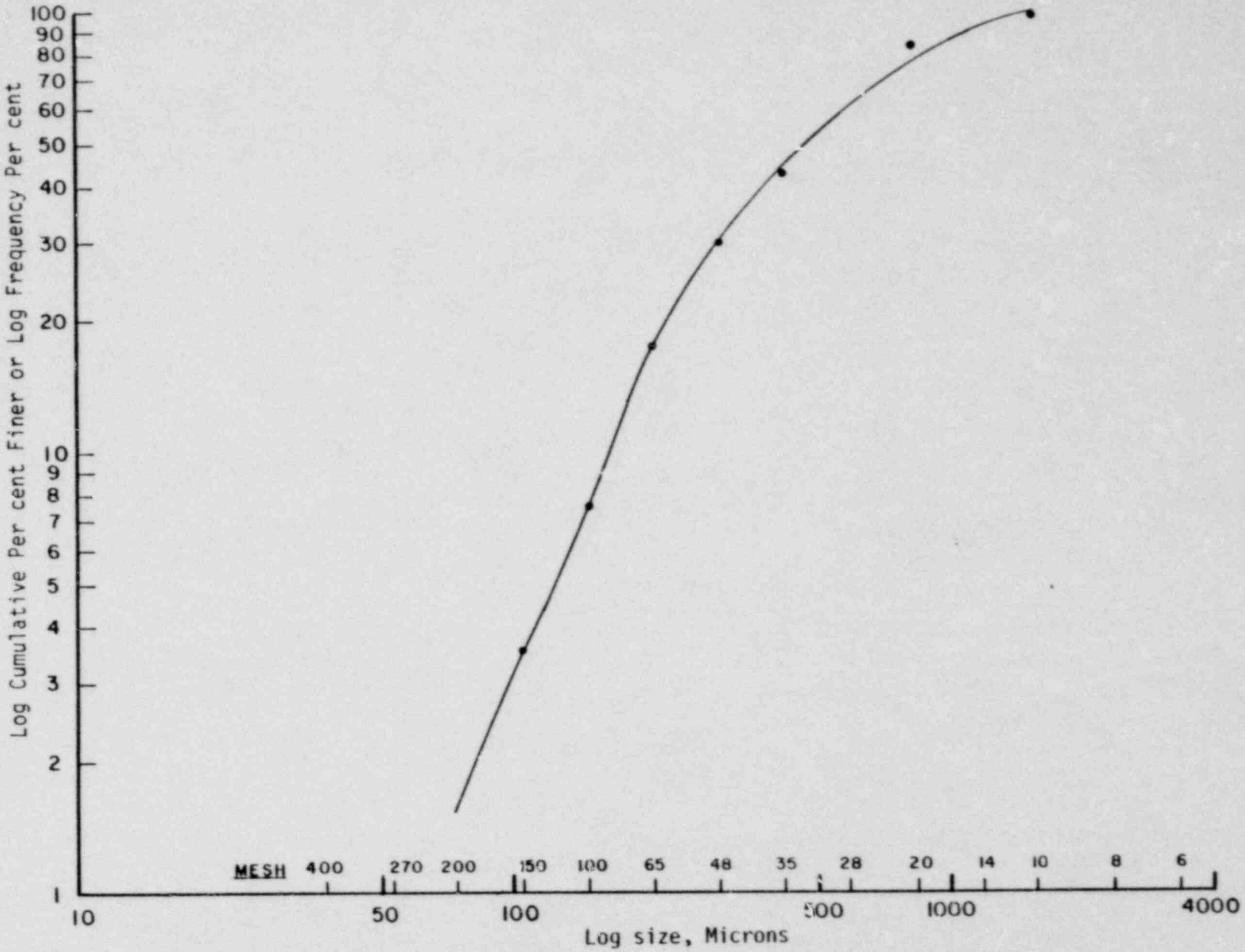


FIGURE 5.7-10A SIEVE-ANALYSIS FOR THE COARSE PORTION OF TAILING CYCLONE

Comment No. 25

On page 2-86 of the Environmental Report, it is stated that the maximum probable seismic event would be of magnitude 5 with a ground acceleration of 0.1g. Provide justification for this conclusion on the basis of the data included in the report.

Response

The site is located in a relatively stable portion of the Powder River Basin. Epicenters within this tectonic province tend to float, although there is some tendency to fall close to the axis or west side of the Basin. A review of earthquakes whose epicenters are located within a 320 km (198.8 mile) radius of the site show a maximum magnitude of 4.9. This record extends from 1895 to the present. The maximum event occurred at a distance of approximately 85 miles from the site. Earthquakes of magnitude 4.8 have been recorded with epicentral distances of as little as 16 miles from the site.

From a review of the available data, it appears unlikely that the site will be subjected to an event larger than magnitude 5. If the nearest epicentral distance is assumed to be a causitive fault with the ability to generate an earthquake of magnitude 5, the acceleration of the ground at the site would probably not exceed 0.10 g during such an event.

Another estimate of acceleration can be obtained from Figure 2.6-1 (page 2-87) of the ER. Noting the statistical reference shown here, acceleration should not exceed 0.04 g.

Comment No 27

An integral part of the proposed deposition plan is the placement of tailings in a thickened state (e.g., on page 3-51 of the Environmental Report it is stated that the thickened discharge method will reduce the period of disposal in the evaporation pond to about three years). What would be the consequences in terms of available volume, sequencing of operations, seepage losses, water balance, and other factors, if the thickened discharge method is, in fact, not feasible or if thickened tailings cannot be transported economically? If the consequences of the thickened discharge method not being feasible would preclude implementation of the proposed tailings management plan, provide sufficient information to assure that the thickened discharge method will function adequately for these tailings.

Response

The thickened discharge method allows placement of the tailings to rest at its natural angle of repose, thereby eliminating the need for large solution storage in the tailings disposal facility. Tailings placed in the pit in a thickened state will require less disposal volume than a conventional slurry disposal system. The advantages to the thickened discharge method is that the tailings will lie approximatly at a 4 percent slope.

If the tailings do not lie at the increased slope and lie at an angle of 1 to 2 percent, the disposal time in the evaporation pond would still be about 3 years. The available volume in the pit is satisfactory to handle the tailings in the sequencing of operations from a 2 to 6 percent slope. The only effect would be tailings staying in the evaporation pond approximately 3 years and 3 months based upon a reduction of slope from 4 percent to 2 percent. The 2 percent slope would be maintained by a 50 percent solids by weight slurry. At this point there would be increased segregation of the solids and the fines, but it would not be detrimental and would only reduce the permeability of certain areas of the overall tailings formation.

Because of the course nature of the tailings and the homogeneous non-segregating consistency resulting from the adaption of the thickened tailings discharge, the tailings consolidate rapidly and uniformally. The rate of consolidation is so rapid that almost no excess pour water rises even after the discharge of 75 feet of tailings during the phase II tailings disposal. Therefore, it is concluded that the schedule may be varied at will without damaging effects on the deposit. However, in reclamation it would be very advantageous to discharge the final 12 feet of tailings at a rate not exceeding that at a production rate of 1,095,000 tons dry weight per year. This quantity represents a 12 foot thick layer placed over the entire available area at Pit 35 N.

The water balance would be affected but not detrimentally by reducing the tailings percent solids from 55 to 50 percent solids. The filter drains in decant system have been over-designed to handle this increased water volume if for some reason or another it occurs during the operation. In a typical thickened operation it is not unusual to have a thickener vary from 53 to 57 percent solids during the operation, and that these effects would be averaged over an entire year.

The pumps and other items have included a design factor over and above the schedule of nromal operation, which would include down time and other factors. If required, the design factor could be increased to handle down to 30 percent solids being discharged into the pit.

As far as the thickened tailings being transported economically, tests show that the tailings do not suffer a large power increase up to 59 percent solids, and that the tailings would be capable of being pumped to the evaporation pond or to Pit 35N without any detriment in power consumption. This is one of the overall advantages of the thickened discharge system, that it requires less power to pump the smaller amount of solution to the tailings disposal area.

The consequences of the thickened discharge method not being feasible would only be a reduction of the slope of the tailings disposed in Pit 35N. It still would preclude any large volume of water in Pit 35N, thus reducing the amount of water available the seepage. The method of placing thickened tailings in a pit can work no matter what the percent solids is as long as it is coming from thickener discharge.

The only thing that is in question is whether a 4 to 6 percent slope can be maintained in the pit. The reduction as stated early from 4 percent to 2 percent would not be severe in terms of available volume, sequencing of operation, seepage losses, water balance, or any other factors that can be anticipated at this time. If for some reason the tailings could not be thickened during plant operations, the process circuit is by countercurrent decantation and the secret of this method to have high uranium recovery is to maintain a maximum density in the thickener circuit. As a rule of thumb, for every 1 percent reduction in the thickener underflow a resulting loss of 1 percent uranium is lost to the tailings circuit.

For a complete discussion of test data performed on the thickened tailings concept, please refer to Robinsky Reference Document forwarded to both Oak Ridge and the NRC on September 8, 1980. Please also refer to the second Robinsky study dated November, 1980 which was transmitted as a Reference Document on May 7, 1981.

Comment No. 28

Figure 3.3-2 of the Environmental Report indicates the annual water balance, but does not reflect seasonal fluctuations and evaporation rates for deposition. Provide a monthly inflow-outflow analysis for the evaporation pond and tailings pit water balance. The effects of tributary runoff on the water balance of the evaporation pond should also be included.

Response

A monthly water balance for the evaporation pond is attached. Assumptions used in these estimates include plant output of 300,000 m^3, 93 acres of water surface in the pond, and 150,000 m^3 runoff in the pond area. The plant effluent figures also taken into account recycle and evaporation in Pit 35N. Pond level changes are assumed to take place during the month and pond level elevations are estimated for the beginning of each month.

Additional information regarding seasonal water balance within Pit 35N is included in Thickened Tailing Discharge For The Sand Rock Mill Project by Robinsky, November, 1980, which was furnished as a Reference Document on May 7, 1981.

MONTHLY WATER BALANCE
EVAPORATION POND

Month	Evaporation inches	Precipitation inches	Net Evap inches	Net Evap meters	Net Evap km^3	Plant Output km^3	Runoff km^3	Pond Level Change - m	Pond Level Elev - ft.
Jan	1.10	0.65	0.45	.011	4.1	25.0	-	+0.056	5298.0
Feb	1.14	0.74	0.40	.010	3.8	25.0	-	+0.056	5298.2
Mar	2.02	0.89	1.13	.029	10.9	25.0	-	+0.038	5298.4
Apr	3.46	1.33	2.13	.054	20.3	25.0	5.2	+0.026	5298.5
May	5.34	1.67	3.67	.093	35.0	25.0	2.1	-0.021	5298.6
Jun	6.21	1.13	5.08	.129	48.5	25.0	1.4	-0.059	5298.5
Jul	7.65	0.72	6.93	.176	66.2	25.0	0.9	-0.107	5298.3
Aug	7.28	1.13	6.15	.156	58.6	25.0	1.4	-0.085	5298.0
Sep	5.01	1.13	3.88	.099	37.2	25.0	1.4	-0.029	5287.7
Oct	3.05	1.36	1.69	.043	16.2	25.0	1.7	+0.028	5297.6
Nov	1.65	0.69	0.96	.024	9.0	25.0	0.9	+0.45	5297.7
Dec	1.09	0.56	0.53	.014	5.3	25.0	-	+0.052	5297.8
TOTAL	45.00	12.00	33.00	.838	315.0	300.0	15.0	-0-	5298.0

Comment No. 29

Provide detailed subsurface characterisics and cross-sections of the stratigraphy beneath the area selected for the evaporation pond. (Section 3.5.7.2)

Response

This information is contained in a Reference Document Document entitled: "Geotechnical Investigation for the Proposed Evaporation Pond and Temporary Disposal Area, Chen and Associates, June, 1980."

This document was transmitted to Oak Ridge and the NRC on September 3, 1980. Additional copies were also presented to the NRC at the October, 1980 Scoping Meeting in Casper. The document should be readily recognizable in your files as the thickest of a set of four documents with brown paper covers, all authored by Chen and Associates.

Detailed logs of the geotechnical exploration holes along with physical properties of selected intervals are shown in Figures 5B through 25B in the document. Physical testing results are shown in Figures 26B through 147B. Subsurface cross-sections below the main embankment and the secondary dike embankment are shown in Figure 148B. Subsurface cross-sections through the evaporation pond are shown in Appendix "B" of the document.

Comment No. 30

Describe provisions for directing seepage and precipitation from the mine ore stockpile. (Section 3.3.1)

Response

The ore stockpile pad will be constructed with a slight crown to direct precipitation away from the center of the stockpile area. Runoff from the ore piles will be collected in ditches located around the perimeter of the stockpile area and will be directed to the reservoir area behind Dam 2, where any accumulated water can be used as mill make-up water.

Comment No. 31

The E.R. states that "Any of the alternative evaporation pond sites could be used for temporary storage of tailings solids, but only one was considered suitable for permanent storage of solids" (p. 10-9). But p. 3-53, Section 3.5.7.2 and p. 10-43 indicate that solids will be removed from the evaporation pond prior to reclamation. Clarify this inconsistency.

Response

As is explained on page 10-9, 14 potential sites were evaluated for use in the tailings disposal system, 11 surface sites and the three open pit mines on the property (see ER Fig. 10.2-1). The 11 surface sites were considered as a location of the evaporation and temporary tailings pond. For obvious operational reasons, the three open pits were not considered for storage of solutions, only permanent storage of tailings solids.

In the tailings disposal plan the temporary evaporation/tailings pond is required to hold only the initial three year's quantity of tailings, after which time the tailings will be placed in Pit 35N. All 11 surface sites have adequate capacity to hold the process solutions and the initial quantity of tailings.

The "one site" referred to in the statement on page 10-9 as being suitable for permanent storage of tailings is not one of the 11 surface sites, but Pit 35N - one of the three open pits. At the end of the project, tailings will be removed from the evaporation pond and placed in Pit 35N for permanent storage. The temporary evaporation/tailings pond site can then be reclaimed to its previous land use, and the total volume of tailings can be managed at one site.

Comment No. 33

Provide an assessment of the impacts of the passage of a 10-year or larger flood through the emergency spillways of Dams la and lb to surface water and aquatic biota below the project area. (Section 3.7.5)

Response

Dam 1A and 1B will be operated with the capacity to contain the 10-yr/24-hr storm runoff. The high sediment input and erosion capability of an event of this magnitude will be lessened considerably. The two dams' spillways are designed to safely convey the 100-yr peak discharge. Therefore, these two reservoirs should decrease the sediment in runoff and decrease the peak flows of floods with recurrence intervals greater than 10 years. They should therefore dampen the impacts to surface water and aquatic biota from runoff events greater than the 10-yr storm.

Comment No. 34

Written verification from the Soil Conservation Service that there are no prime or unique farmlands on the site is required. Provide this verification.

Response

The letter of verification is attached.

United States
Department of
Agriculture

Soil
Conservation
Service

P. O. Box 2440
Casper, WY 82602
April 30, 1981

Ms. Jean MacCubbin
James P. Walsh & Associates, Inc.
Suite 250
1722 Fourteenth Street
Boulder, CO 80302

Dear Ms. MacCubbin:

We have reviewed the material that you submitted to us. Our comments refer to Sections 25, 26, 27, 33, 34, and 35; T42N; R75W; and Sections 1, 2, 3, and 4; T41N; R75W.

The area does not contain any unique or prime farmland. There is not any unique farmland in Wyoming. The area would have to be irrigated to qualify as prime farmland.

Sincerely,

George W. Hartman
State Soil Scientist

Enclosures

SAND ROCK MILL PROJECT
NRC DOCKET NO. 40-8743
MAY, 1981

Comment No. 35

The E.R. states (p. 1-6) that "Studies indicate that the erosion potential in the permit area is low". This does not agree with the soil data provided on p. 2-80 and 2-81, which lists many soil types as having moderate to severe erosion potential. Clarify this inconsistency.

Response

Three site specific studies indicate that the erosion potential in the permit area is low. "Erosion Potential of the Sand Rock Mill Project Site" (Western Resource Development Corp., 1980) concludes: "a number of techniques for quantifying erosional procsses were used to estimate past and present rates in the area, mostly ranging from 0.8 to 2.5 feet per 1000 years."

Erodibility factors (K factors) and Wind Erodibility Groups for soils in affected areas (exclusive of Section 1) are shown on Table 9.0-4 of the Wyoming DEQ application and are mostly rated good or fair. The K factors, calculated based on site specific textural data, are all rated good. The Wind Erodibility Groups, estimated based on SCS data of soil texture, are rated mostly good or fair. Only the subsoils of the Bidman and Kim Soils are rated poor.

Erodibility factors (K factors) and Wind Erodibility groups for the soils of Section 1 are shown on Table D-7A-4 of the Wyoming DEQ application (transmitted to the NRC on January 8, 1981) and are mostly rated good or fair. The K factors, calculated from site specific laboratory textural data and detailed pedon descriptions, are all rated good with the exception of the subsoil of the Shingle series.

Wind Erodibility Groups, estimated from soil textural classes or from the SCS, are all rated good to fair with the exception of the subsoil of the Ustic Torripsamments. The Ustic Torripsamments are rated fair-poor and are of limited occurrence on the site.

The data on Erosion Hazard provided on Table 2.5-2 (pages 2-80 and 2-81) are from the SCS. The data are not site specific but are for the entire State of Wyoming The Erosion Hazard is a combination of both wind and water hazards, and address the erosion hazard under agricultural land uses.

Comment No. 36

The total affected area is given as 1100 acres on p. 1-6, while p. 2-75 gives a figure of 660 acres as the area for which soils suitable for reclamation are available. P. 5-51 then gives a figure of 855 acres as the area of maximum disturbance. Explain the differences between the various categories and provide a breakdown of which areas are or are not part of the reclamation plan, with an explanation when they are not. A single table with an appropriate reference map would suffice.

Response

The figure on page 1-6 should be 841 acres which is the total disturbed area according to the reclamation plan submitted to WDEQ in November, 1980. The figure of 660 acres on page 2-75 is correct for the 1979 permit area as indicated in the heading of Section 2.5.3.1. The additional disturbed area in Section 1 brings the total area disturbed to 841 acres. On page 5-51, the correct figures for disturbance by the end of the eighth year and total disturbance should be 841 acres (340 ha).

Please be advised that the Reclamation Plan included in Conoco's November, 1980 submittal to the state contains more detailed information beyond what was presented in the ER concerning acreages and reclamation. Conoco transmitted a copy of the November Mine Permit Application to the NRC and Oak Ridge on January 8, 1981 The following table lists an appropriate sequence for integration of data presented in the November 1980 Reclamation Plan into Section 9.0 discussion of the ER. This sequence should provide a more accurate assessment of acreages and the Reclamation Plan in general.

Table from November 1980 Application to State	Sequence for Substitution Into Sand Rock ER
RP-5	9A
RP-1	9B
RP-6	9C
RP-7	9D
RP-8	9E
RP-3	9.4-2
RP-4	9.4-3

Comment No. 38

The E.R. states that operation of the mill will not impact aquatic ecosystems. Has this conclusion included consideration of temporary streams and ponds created by pumping out and treating for release that contents of on-site pits? Have playas been evaluated as aquatic habitats?

Response

Please refer to ER Section 5.3 (pages 5-40 and 5-41). Note that the project will operate as a closed system with no discharges contemplated beyond the project perimeter.

Aquatic habitats were considered to include only permanent or temporary ponds or streams presently supporting aquatic vegetation and at least some aquatic animals--i.e., the ponds and marshy drainages along Simmons Draw and Ninemile Creek south of the permit area. Standing water without associated aquatic macroinvertebrates, fish, amphibians, or plants was not included under considerations of aquatic habitats.

Playas are best thought of as grasslands that are more moist in the early growing season than adjacent uplands, but which are dry for virtually the entire year. They do not support an aquatic flora, nor do they attract aquatic wildlife.

Comment No. 39

How are the exhausted effluents ensured of being cleaned by the baghouse operation prior to atmospheric discharge? Describe methods/equipment employed to detect mechanical failure, defects, improper sealing, etc. (Section 3.5.5)

Response

The baghouse will be equipped with a manometer and a pressure differential alarm. The pressure differential across the baghouse ensures that it is operating efficiently and effectively. If there is a low pressure alarm this would indicate a mechanical failure in one of the bags. A high pressure alarm would indicate that the bags are presently ladened with dust and need to be backflushed to deposit the yellowcake in the lower hopper of the dust collection unit. The differential pressure alarm system would also detect if the exhaust fan on the baghouse were to shut down a door on the yellowcake baghouse not being closed, or a plug of any of the dust collection lines throughout the system. This differential pressure system will be directly tied into an interlock with the product storage bin and product filling system.

Comment No. 41

Why isn't hydrochloric acid usage addressed in the E.R.? Why are chemicals discussed in the E.R. and not mentioned in Table 5.6-1?

Also, the annual chemical requirements in Table 5.6-1 do not agree with the daily use rate (if extrapolated) in Table 7.3-1 Chemical Storage (example: ammonia). Verify all figures.

Response

Hydrochloric acid usage has not been addressed because it is used only as a utility chemical to clean the mill water heater. The annual consumption could be assumed to be somewhere between 35 and 70 gallons per year based on the heat exchanger being utilized an entire year. It is currently being anticipated that the mill water heater would only be utilized during the severe cold winter months.

All chemicals used within the process plant have been addressed. No laboratory re-agents or other small quantities less than 500 lbs. per year have been identified as far as an annual chemical requirement for the operation. The chemicals that have been identified in Table 5.6-1 would be subject to long-term contracts. The remaining chemicals would be out of stock from chemical supply houses.

The annual chemical requirements for the operation of Sand Rock Mill in Table 5.6-1 has been mislabeled. The annual consumptions should be listed as daily consumptions. There are minor disagreements with the daily consumptions of each of the chemicals. The differences that arise throughout the chemical requirements for the mill operation are a result of the difference in calculation method. The daily requirements shown in Table 5.6-1 are based on an annual mill throughput of 1,095,000 dry tons, or an average daily rate of 3,000 tons. The daily consumptions shown in Table 7.3-1 are based on the design rate shown in Table 3.3-1 (Process Flow Sheet) and Appendix 3A. The design rate for the flowsheet is 3,300 tons of ore per day which includes a 10 percent design factor. This design factor is for items such as scheduled maintenance shutdown and other operational contingencies. The mill is to operate 365 days per year and the scheduled maintenance and other related mechanical failures throughout the mill will lower this to a design rate of 350 days per year.

Items have been verified, and with regard to the differences, variation of design values versus actual operating values account for the differences in all of the listed chemicals. There is one other major difference between Tables 3.7-1 and 5.6-1. This difference is in the labeling of kerosene in Table 5.6-1 and organic solvent listed in 7.3-1. This variance in consumption arises in the anticipated organic solvent loss within the solvent extraction circuit. The use rate will depend on the crud formation in the solvent extraction circuit and should not vary between these extremes. Diesel oil is listed in Table 7.3-1 and is not shown in the chemical requirements for the mill in Table 5.6.1. Diesel oil will be utilized in the firing of the multi-hearth dryer and has not been assumed to be a chemical requirement.

Comment 42 Provide a stoichiometric balance for each reactant and product used.

Response

Conoco has identified several different uranium minerals within the deposit on the property. Each of the different chemical compositions of the uranium ore require reaction mechanisms. The majority of the ore is urananite coffinite, and some form of pitchblende. Uranium is associated with the calcite and clay cement. Occasionally, however, uranium is associated with the wood fragments. The uranium mineralogy is an oxide and occurs with both iron and ilmenite (titanium).

The free acid concentration is sufficient to attack the uranium minerals without dissolving an excess amount of the associated gangue minerals in ore. To achieve this a sufficient amount of acid must be added to neutralize carbonate gangue materials which react before the uranium minerals. Depending upon the type of uranium mineral present, free acid concentrations of 1 to 90 grams of acid per liter may be required continously during the contact period for dissolution for the Sand Rock ore the average free acid concentration is approximately 50 grams per liter. After the uranium is dissolved some excess acid must remain to prevent reprecipitation.

The maintenance of proper oxidizing conditions during leaching is next in importance to acid concentration in achieving high uranium extractions. The principal oxidant used for the Sand Rock Mill is sodium chlorate. Ferric ions are effective oxidants and need the presence of iron in solution before sodium chlorate becomes effective as an oxidant for the tetravalient uranium. The ratio of ferric to ferrous iron has been found to be an effective dissolution of UO_2 extraction decreasing with the increasing amounts of Fe^{++} at constant levels of Fe^{+++}.

Choosing one of the many forms on which uranium can and may occur

U_3C_8 (form of pitchblende).

$$2\ U_3O_8 + 6\ H_2SO_4 + (O_2) = 6\ UO_2SO_4 + 6\ H_2O$$

Thus 0.3492 lb H_2SO_4/lb U_3O_8.

If calcium carbonate present

$$CaCO_3 + H_2SO_4 = CASO_4 + H_2O + CO_2$$

0.98 lb H_2SO_4/lb $CaCO_3$

Also, H_2SO_4 is needed to maintain the free acid level in the leach and needed for acid consuming gangue.

The iron present

$$Fe^o + H_2SO_4 + 1/2\ O_2 = FeSO_4 + H_2O$$

$$2\ Fe^o + 3\ H_2SO_4 = 11/2\ O_2 = Fe_2(SO_4)_3 + 3\ H_2O$$

Therefore 1.7547 lb H_2SO_4/lb Fe

Chlorate Consumption

For U_3O_8:

$NaClO_3 = NaCl + 3/2\ O_2$ (2.2179 lb $NaClO_3$/lb O_2

Therefore 0.0421 lb $NaClO_3$/lb U_3O_8

For Free Chlorate:

$$2\ H_2O + Cl^- = ClO_3^- + 6H^+ + 6e^-$$

$$C_{NaClO_3} = (C_{NaCl}) \frac{(10\ EXP\ -6\ (E - E_o - 0.1984\ TpH))}{(0.1984T)}$$

Where T = Temp, ^oK

pH = pH of solution

$E - E_o$ = Eh of solution

C_{NaCl} = Concentration NaCl

C_{NaClO_3} = Concentration sodium chlorate needed

For Iron:

$NaClO_3 + 3\ Fe^{o} + 3\ H_2SO_4 = 3\ FeSO_4 + NaCl + 3\ H_2O$

Therefore 0.23361 lb $NaClO_3$/lb $FeSO_4$

$6\ FeSO_4 + NaClO_3 + 3\ H_2SO_4 = 3Fe_2(SO_4)_3 + NaCl + 3\ H_2O$

Therefore 0.0887 lb $NaClO_3$/lb $Fe\ (SO_4)_3$

The separation of clarified solutions from leach pulps by means of countercurrent decantation followed by solvent extraction to concentrate and purify the uranium is the most representative of the Sand Rock Mill. This choice is predominantly based on the relative ease on which the solvent extraction process can operate in continuous countercurrent flow as contrast by either semibatch operations of most semi-ion exchange plants. Uranium may be extracted from sulfuric acid leach solutions by either cationic or anionic liquid ion exchange since both ionic forms are present as UO_2^{++}, $(UO_2\ (SO_4 2)_2)^{--}$ and $(UO_2(SO_4)_3^{-4}$. Extraction of either the cationic or anionic or ionic form will cause a shift in the equilibria to form more of the removed ions until the extraction is complete. Extraction of the neutral uranial sulfate molecule by a mechanism known as ion pair transfer has been used in conventional uranium ore processing.

The proposed reagent for the Sand Rock Mill is a alamine 336 which is tricaparal and is a trade name of General Mills. It is basically a tertiary amine used in the extraction of the uranium from the sulfuric acid solution.

Uranium may be removed from the loaded solvent by utilizing ammonium sulfate strip at a concentration of 150 grams per liter. The solution will be gradually raised in pH from a pH of less than 1.5 to a pH range of about 4.0 to 4.3. The resulting strip solution will contain ammonium sulfate and uranal sulfate. The uranal sulfate is precipitated in the precipitation circuit by means of adding ammonia and air. The pH is raised from the range of 4.0 to 4.3 to 7.0 to 7.5. The addition of ammonia precipitates ammonium diuranate commonly referred to as yellowcake. The yellowcake is then washed in the yellowcake thickener and then dried in a multihearth dryer, removing ammonia from the ammonium sulfate and forming uranium oxide commonly referred to as U_3O_8.

There are many publications and books addressing the balances for each uranium mineral although it is unconventional in the uranium industry to go into deep theoretical uses when a conventional or nonconventional mineral is used. Laboratory work is directly scaled up to the full scale operation and the means of scale-up is very reliable.

Comment 43 Are any plume opacity problems anticipated with the use of ammonia gas to precipitate ADU capitalization, coupled with the use of hydrochloric acid in the plant.

Response

As stated in Question #41, hydrochloric acid is only used as a cleaning agent around the mill water heater. There is no place in the circuit where hydrochloric acid and ammonia come into contact. Ammonia is stored outside the plant and the hydrochloric acid will be stored in the warehouse in carboys. There will be no physical contact and therefore there will be no plume opacity problems.

Comment No. 44

To what extent will the sulfur content of the coal used at the plant vary? Will the coal be certified?

Response

Sulfur content will range from 0.3 to 1.0% with an average value of 0.5%.

Coal used at the project will be "compliance" coal.

Comment No. 45

Provide references to demonstrate that lands similar in soils and climate to the project area ahve been successfully reclaimed. (Section 9.2)

Response

The following references report data from areas in and around the Powder River Basin and demonstrate the reclaimability of disturbed sites there:

Sindelar, B. W., R. Atkinson, M. E. Majerus, and K. Proctor. 1975. Surface mined land reclamation research at Colstrip, Montana: progress report, 1973-1974. Montana Agric. Exp. Sta. Res. Rpt. 69, Mt. State Univ., Bozeman, MT.

Power, J. F., F. M. Sandoval, and R. E. Ries. 1978. Restoration productivity to disturbed land in the norther Great Plains. In: The reclamation of disturbed 1 lands, R. A. Wright (ed.), University of New Mexico Press, Albuquerque.

Richardson, B. Z., E. E. Farmer, R. W. Brown, and P. E. Packer. 1975. Rehabilitation research and its application on a surface-mined area of eastern Montana. In: Proc. Fort Union Coal Field Symposium, Mont. Acad. Sci. 3: 247-265. Billings, MT.

In addition, prior to the appearance of significant amounts of disturbance related to coal mining in the Prwder River Basin, a body of knowledge had developed regarding range restoration, a very similar process to mine revegetation. This information can be accessed through the following references:

Lang, R. F., F. Rauzi, W. Seamands, and G. Howard. 1975. Guidelines for seeding range pasture and disturbed lands. Wyoming Agric. Exp. Sta. Publ. B-621, Univ. of Wyoming, Laramie, WY.

U.S. Department of Agriculture, Soil Conservation Service. 1976. Wyoming technical guide to range seeding (Section IV.A). USDA, Soil Conservation Service, Wyoming Field Offices.

Comment No. 46

The E.R. states (p. 9-17) that "most of the material (soil for reclamation) is rated overall as good or fair." Quantify "most".

Response

The statement on page 9-17 of the ER reads "most of the material is rated overall as good or fair." Each horizon of each soil type in the permit area was rated, but only those rated good or fair will be used for reclamation. The statement could be revised to read "all of the material to be used for reclamation is rated good or fair."

Comment No. 47

Identify the individuals contacted in the various agencies listed on p. 12-1, 12-6, and 12-7.

Response

The following individuals were consulted by Conoco or Conoco's consultants/contractors during the period between January 1979 and July, 1980.

NRC - Hub Miller, Dan Martin, George Gnugnoli , Ted Johnson Ray Gonzales, George Eadie, Pete Garcia, Betty Fisher, Ron Kaufmann, John Rothfleisch, Kathy Hamill.

BLM - Michael Georgian, F. Littrell, Stan Speht, Bob Bennett

DEQ/LQD - W. Ackerman, Gary Beach, Bob Dorn, Becky Matthisen, Jim Wolf, Dennis Morrow, Glenn Mooney, Roger Shaeffer, Marjorie Hulburt, Joe Hereford.

DEQ/AQD - Chuck Collins, Gerald Blackwell.

Wyo. St. Eng. - Phil Velez.

Wyo. Industrial Siting Council - Blaine Dinger.

Wyo. Game and Fish Commission - Harry Harju.

State Hwy. Dept. - J.D. Warburton, L. Menghini.

Wyo. Dept. of Economic Planning and Development - John Logan.

Wyo. Recreation Commission - Greg Kendrick, David Eckles.

Burlington Northern RR - Beverly Adams.

Natrona County Fire Dept. - Dorothy Apodaca.

Campbell County Parks and Rec. Dept. - Daniel Barks.

Campbell County Memorial Hospt. - John Belecky.

Natrona County School District 1 - Herman Boner

City of Gillette Public Works Dept. - Karen Cyrus.

Campbell County Engineer - William Flaherty.

Gillette City Administrators Office - Ms. Hayworth.

Campbell County Sheriff's Office - S. Hladky.

Gillette/Campbell County Joint Fire Dept. - Dave Mueller.

Wright Water and Sewer District - Frank Novak.

Gillette/Campbell County, Farmer Planning Direction - Joe Racine.

Campbell County School District 1 - D. O. Reed.

Heritage Conservation and Recreation Service - K. Czarnomski, W. Michaels.

Other agency contacts (not originally listed in Chapter 12)

include:

U.S. Fish and Wildlife Service (Ferret Recovery Team) Steve Martin.

Soil Conservation Service (Gillette) Sue Arnold.

USGS (Denver) - Martha Reheis.

Comment No. 48

Provide corrected figures for average controlled particulate releases, incorrectly stated as "0.21 kg/hr (46 lbs/hr)" on page 3-28

Response

The numerical estimate should read "0.21 kg/hr (0.46 lbs/hr)".

Comment No. 50

What are CONOCO's plans for final disposal of contaminated clay liner and subsoil materials from the evaporation pond?

Response

The majority of the excavated base of the evaporation pond will be the in-place claystone-siltstone bedrock that's located below the thin surface alluvium and sand stone. During final reclamation, any contaminated layer of this claystone, or any contaminated clay liner present, will be stripped and deposited in the permanent tailings disposal site in Pit 35N. The extent of stripping necessary will be determined through surveys made at the time of final reclamation and will be consistent with the decommissioning and reclamation criteria established in Section 9.2.3 of the ER.

Comment 51 Why does Conoco propose to transfer the final one meter of evaporation pond fluid (remaining after tailings transfer) to Pit 35N rather than allowing that fluid to evaporate away in the pond.

Response

Conoco has proposed to transfer the final one meter of evaporation pond fluid to Pit 35 [illegible] the overall reclamation time. After the solution has been allowed to evaporate the acid will continually concentrate in the pond and thus reduce the evaporation rate slowly. It is unlikely that the solutions will completely evaporate leaving a dry pond. Once the water level drops to a level as low as one meter, there will probably be enough reclaimed surface area in the remaining area of the evaporation pond to provide runoff recharge to the small remaining pond.

The final one meter of evaporation pond solution will be neutralized with hydrated lime by the stoichiometric ratio that is required based on the analysis of the solution. The resulting mud or paste based on four parts solution or semisolid material will be transferred to the pit via front-end loaders and trucks. This hopefully will shorten the overall reclamation period from an anticipated five years to a proposed two years after the shutdown of the Sand Rock Mill.

Comment No. 52

Provide an evaluation of the long-term erosion potential of the Pit 35N area with respect to long-term geomorphological processes. Is the general area presently a depositional or erosional environment?

Response

Please refer to the Reference Document entitled Erosion Potential of the Sand Rock Mill Site which was forwarded to both the NRC and Oak Ridge on September 15, 1980. This report was also presented to the NRC at the October 16, 1980 Scoping Meeting in Casper. A supplement to this report (radiocarbon dating in Wash No. 2) was transmitted to both the NRC and Oak Ridge on January 16, 1981.

Both depositional and erosional processes for the general area are addressed in the above referenced document.

Wash 2, which passes through the Pit 35N area, appears to be in a depositional phase. Currently, the wash is stable as exhibited by its meanders and vegetated side-slopes.

Comment No. 53

What is the "ready-line" in Figure 2.1-3?

Response

The ready-line is an area where the operational mining equipment can be parked when not in use, or where equipment needing maintenance can be parked until space becomes available in the shop building. Most ready-lines in Wyoming are winterized with electrical hookups for engine block and oil heaters and compressed air lines for air-starting of equipment engines.

Comment No. 54

What provisions have been made to ensure transferability of all surface and subsurface rights to the final tailings disposal area to the cognizant government agency upon license termination?

Response

Conoco has acquired an option to purchase the surface estate of the final tailings disposal area. We will negotiate the purchase of subsurface rights.

Comment No. 55

Provide an analysis of long-term seepage potential and impacts for Pit 35N inview of the probability of groundwater recharge in the area during the winter months when precipitation exceeds evaporation.

Response

Mean (1964-78) Net Evaporation (evaporation-rainfall) at Pathfinder reservoir is lowest in January at 0.89 inches. The total mean precipitation at Pathfinder reservoir is similar to that received at the Sand Rock site. Therefore, evaporation usually greatly exceeds available water for infiltration. The horizontal permeability of the overburden which will be placed on top of the clay layer which tops the tailings will be much larger than the vertical permeability of the clay. Therefore, water which is able to infiltrate through the overburden will have much less resistance to horizontal flow in the overburden than to vertical flow through the clay to the tailings.

Comments No. 56

Provide an explanation as to the vali ity of the stated tornado probability and recurrence inte. /al in view of the fact that Pit 35N, and the site in general, is not a "single point".

Response

Section 6.1.15 of th~ License Application indicates tornado probability for the site is estimated at 1.6×10^{-4} with a recurrence interval of about 6,250 years. This estimate is based on the Thom Technique which considered 1° rectangles of latitude/longitude (Section 2.2.1.8). The statistics, therefore, are applicable to the 1° rectangle in which the project site is located and include all features within the project area.

Comment No. 57

Was there a piezometer hole P-14 drilled in the evaporation area? (Table 2.3-1)

Response

Piezometer P-14 was planned to be located in the center of the drainage upstream from piezometer P-18 (see ER Figure 2.7-3). It was intended to be perforated in the alluvium layer to determine its hydrologic properties. However, when the hole was drilled, no alluvium layer was encountered; only 7 feet of clayey soil and the bedrock lignite and claystone. The piezometer was, therefore, not installed.

Comment No. 58

Figure 2.3-3 does not show locations of all holes listed in Tables 2.3-1 and 2.3-2. Provide a map showing all 47 piezometers and wells listed in these two tables.

Response

40 wells and piezometers are listed in Tables 2.7-2 and 2.7-3. The only locations not individually shown on Figure 2.7-3 are holes 35N-1C through 35N-1E, 35N-2A through 35N-2C, and 35N-7A through 35N-7G. This is because these are piezometer nests each having three, three, and seven piezometers, respectively, located within a few feet of each other. Each piezometer is perforated in a different lithologic unit, as is shown in the above-mentioned tables.

These three piezometer nests are identified by locations 35N-1, 35N-2 and 35N-7 in Figure 2.7-3.

Comment No. 59

What are the expected radioactivity levels in the surface runoff water that will be used for dust control? Where will such water be used and what will be the net radiological impacts to employees?

Response

Please refer to page 3-78 of the ER for a discussion of Conoco's dust control plan. Since the on-site surface impoundments will be monitored, water used for dust control will not contain elevated levels of radionuclides. The radioactivity levels of surface runoff are expected to be similar to values determined as background for the surface water of the area (see Table 2.7-13).

During actual operation, it is anticipated that most on-site impoundments will be dry for long periods of time. Therefore, the mill water supply wells will provide the major portion of water used in dust control. Since potable water is also drawn from the main mill water supply system, it will be carefully monitored during operations.