MPC
One of the Minnkota Power Systems
MINNKOTA POWER COOPERATIVE, INC.
MILTON R. YOUNG STATION
P.O. Box 127, Center, ND 58530-0127 • Phone: (701) 794-8711
Fax: (701) 794-7258

February 12, 1998

Mr. Tom Bachman
Division of Environmental Engineering
North Dakota Department of Health
P.O. Box 5520
Bismarck, ND 58506-5520

RE: Coal Analysis

Dear Mr. Bachman:

Enclosed is the information that was requested with regard to sulfur analysis and date of combustion. The enclosed information includes a sheet of coal analyses that were completed during the mid-1970s.

The analysis for drill hole DDH 76 shows a sulfur content of 1.3 percent. The attached maps show the location of the drill hole, and that the area was mined in 1976. This coal would have been combusted during 1976 or early in 1977.

If you have any questions, please contact me at 701/794-8711.

Sincerely,

MINNKOTA POWER COOPERATIVE, INC.

Kevin Thomas
Permitting and Compliance Engineer

skb/stacey/ktcoal

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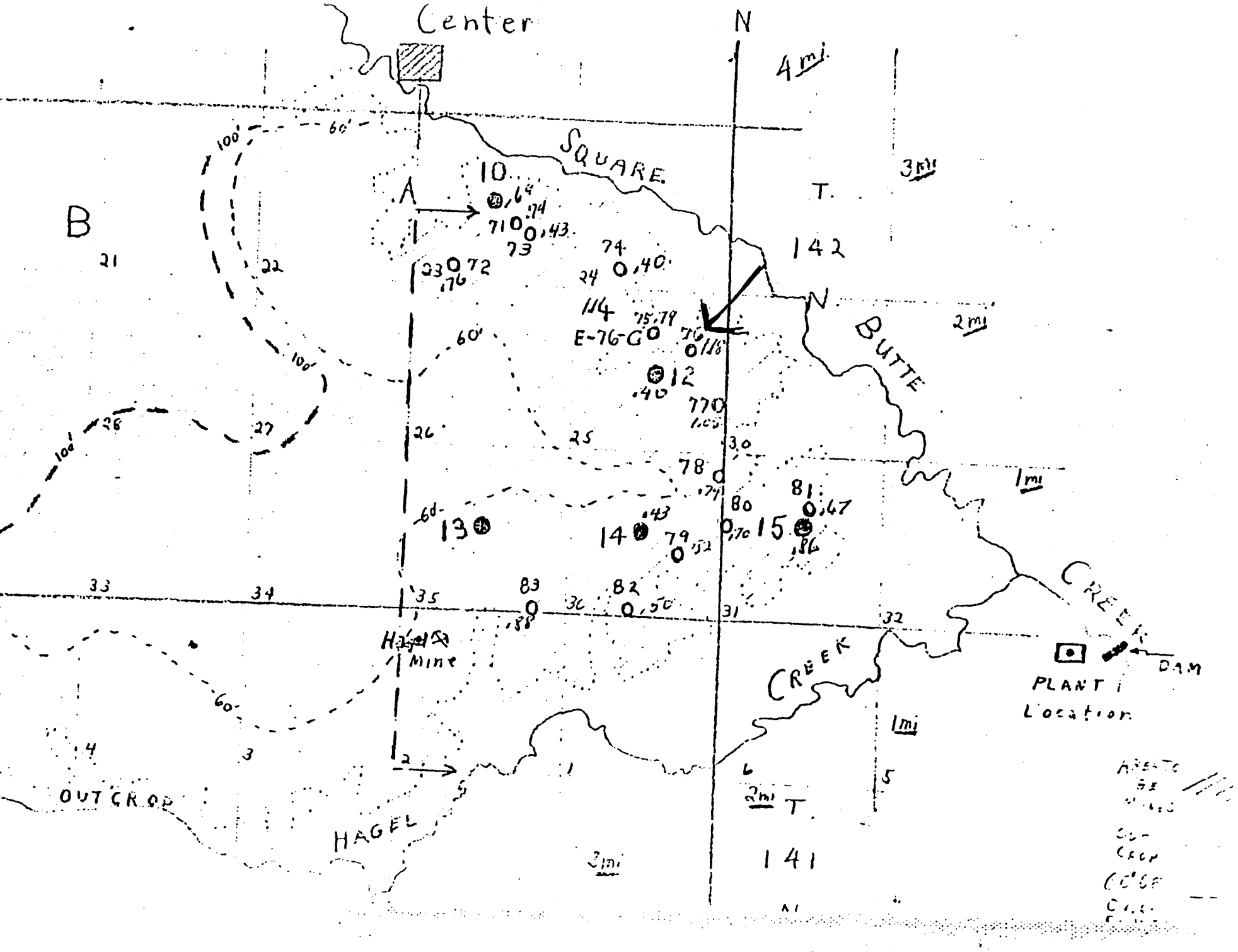
Center
N
4mi
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10
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12
13
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15
Hagel Mine
PLANT Location
DAM
OUTCROP
HAGEL
100'
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21
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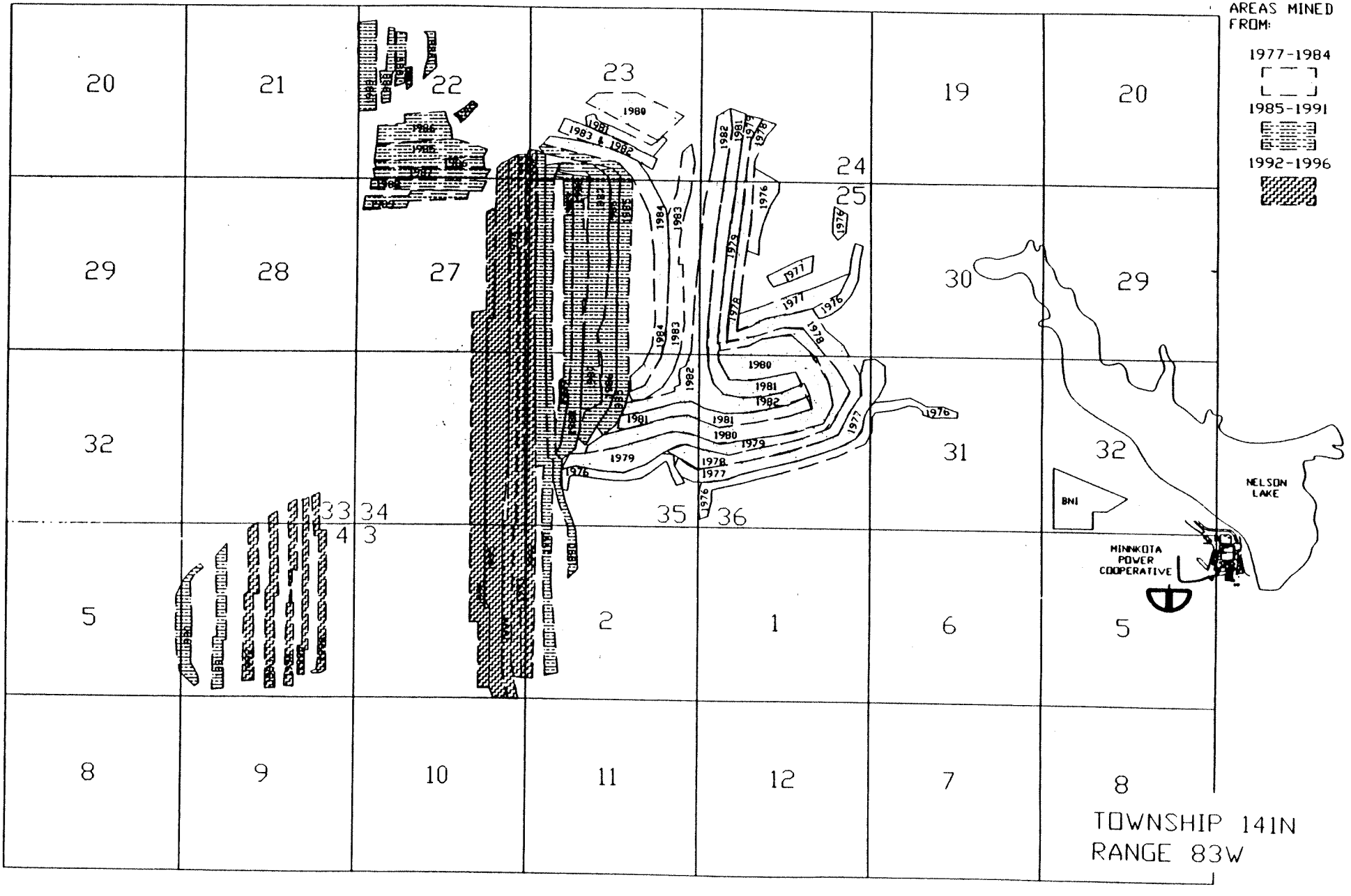

HISTORICAL LAYOUT OF BNI MINE PITS

NELSON R. YOUNG STATION
CENTER, ND

DRAWN BY L. GILL
DATE 6-12-96

TABLE II. ANALYSES OF LIGNITE CORES, MAIN BED

	DDH 71	DDH 72	DDH 73	DDH 74	DDH 75	DDH 76	DDH 77	DDH 78	DDH 79	DDH 80	DDH 81	DDH 82	DDH 83	Numerical Average
Location														
Township and Range	142N,84W	142N,84W	142N,84W	142N,84W	142N,84W	142N,84W	142N,83W	142N,84W	142N,84W	142N,83W	142N,83W	141N,84W	142N,84W	
Section	23	23	23	24	25	25	30	36	36	31	31	1	35	
Thickness, inches	156	150	109	107	123	134	129	126	136	140	123	135	115	129
Analysis (As Received)														
Moisture	32.77	31.13	32.94	32.69	32.54	31.62	32.58	40.31	27.56	32.04	32.59	33.67	34.35	32.83
Ash	6.08	7.40	3.98	3.86	5.73	7.30	8.28	4.67	7.01	4.93	5.70	5.23	6.01	5.86
Btu	7,433	7,430	7,328	7,591	7,384	7,388	7,151	6,610	7,828	7,398	7,342	7,238	7,094	7,324
Sulfur	0.80	0.84	0.47	0.44	0.86	1.30	1.15	0.61	0.96	0.77	0.73	0.53	0.94	0.80
Analysis (Dry Basis)														
Ash	9.05	10.74	5.94	5.73	8.50	10.67	12.28	7.82	9.68	7.25	8.46	7.88	9.15	8.70
Btu	11,056	10,789	10,927	11,277	10,946	10,804	10,607	11,074	10,806	10,886	10,891	10,912	10,806	10,906
Sulfur	1.19	1.22	0.70	0.65	1.28	1.90	1.70	1.02	1.33	1.13	1.08	0.80	1.43	1.19
Fusion Temperature of Ash														
Reducing Atmosphere														
Initial Deformation	2,285	2,180	2,350	2,360	2,310	2,235	2,200	2,345	2,330	2,355	2,365	2,435	2,285	2,310
Soft. (H=W)	2,365	2,215	2,410	2,400	2,385	2,290	2,230	2,400	2,405	2,435	2,430	2,470	2,300	2,364
Soft. (H=1/2W)	2,385	2,235	2,460	2,435	2,465	2,335	2,260	2,435	2,440	2,500	2,435	2,475	2,340	2,400
Fluid	2,395	2,250	2,465	2,470	2,555	2,370	2,280	2,470	2,485	2,555	2,440	2,490	2,370	2,430
Oxidizing Atmosphere														
Initial Deformation	2,400	2,210	2,465	2,370	2,425	2,395	2,220	2,415	2,455	2,425	2,405	2,445	2,345	2,383
Soft. (H=W)	2,435	2,240	2,505	2,470	2,460	2,455	2,250	2,460	2,470	2,480	2,440	2,480	2,410	2,427
Soft. (H=1/2W)	2,470	2,275	2,530	2,525	2,495	2,500	2,280	2,495	2,485	2,500	2,470	2,520	2,445	2,461
Fluid	2,500	2,310	2,550	2,585	2,560	2,535	2,305	2,510	2,510	2,566	2,490	2,540	2,480	2,495
Alkalies, as Sodium Oxide, Na_2O	0.53	0.24	0.21	0.07	-	0.23	0.16	0.09	0.16	-	0.06	0.07	0.15	0.18
Hardgrove Grindability	-	39.1	-	-	41.1	-	-	-	-	44.2	-	-	-	-
Equilibrium Moisture	-	35.84	-	-	-	-	-	-	-	-	-	-	-	-
Air Dry Loss	-	3.48	-	-	-	-	-	-	-	-	-	-	-	-
Ash Analysis														
Boron, B	0.21	0.16	0.36	0.29	0.18	0.13	0.15	0.24	0.21	0.28	0.20	0.27	0.23	0.23
Phosphorus pentoxide, P_2O_5	0.11	0.16	0.35	0.04	0.16	0.10	0.07	0.16	0.07	0.08	0.07	0.12	0.19	0.13
Silica, SiO_2	11.75	27.68	14.15	12.16	13.04	14.62	25.34	14.03	17.73	16.19	19.28	18.04	20.27	17.24
Ferric oxide, Fe_2O_3	11.12	10.10	9.25	6.80	13.67	19.21	13.49	10.60	12.16	6.60	10.71	7.60	13.40	11.13
Alumina, Al_2O_3	10.97	12.85	12.64	11.12	8.74	10.00	11.62	11.86	10.07	10.59	11.73	13.26	13.62	11.47
Titania, TiO_2	0.33	0.49	0.38	0.38	0.32	0.30	0.42	0.36	0.35	0.36	0.39	0.41	0.32	0.37
Lime, CaO	24.71	20.92	24.65	32.37	23.24	20.21	18.54	30.69	28.40	34.72	27.65	35.65	19.89	26.66
Magnesia, MgO	6.35	4.17	8.57	9.44	6.20	4.82	5.17	9.58	6.46	8.65	7.18	5.13	6.22	6.76
Sulfur trioxide, SO_3	27.80	20.63	25.46	25.66	27.09	23.08	22.86	21.39	22.74	20.43	21.29	18.61	23.46	23.50
Potassium oxide, K_2O	0.19	1.09	0.28	0.07	0.22	0.36	0.74	0.12	0.32	0.10	0.37	0.22	0.50	0.35
Sodium oxide, Na_2O	5.72	1.54	3.29	1.13	0.55	1.37	0.83	1.11	1.47	1.31	0.44	0.78	1.28	1.64
Undetermined (by diff.)	0.74	0.37	0.62	0.54	0.69	0.26	0.77	0.00	0.02	0.69	0.69	0.18	0.62	0.48