0032

Coal File # ACT/007/004
Folder #2

May 30, 1995

RECEIVED
MAY 31 1995
DIV. OF OIL, GAS & MINING

EarthFax

EarthFax
Engineering Inc.
Engineers/Scientists
7324 So. Union Park Ave.
Suite 100
Midvale, Utah 84047
Telephone 801-561-1555
Fax 801-561-1861

Mr. Henry Sower
Soils Specialist
Division of Oil, Gas and Mining
3 Triad Center
Suite 350
Salt Lake City, Utah 84180-1203

Subject: Overburden and Coal Debris Evaluation in Hardscrabble Canyon
Castle Gate Mine, ACT/007/004 #2
Carbon County, Utah

Dear Henry:

Herewith is a proposal for evaluating coal debris and potential alternate topsoil in Hardscrabble Canyon (Figure 1). The major objectives are as follows:

1). To locate and characterize the existing overburden within the disturbed area boundary, and identify material that may be suitable for reclamation purposes.

2). To locate and characterize the coal debris in various spoil piles and pad areas within the canyon.

3). To characterize the existing sediment pond and channel embankments, and evaluate the material where the proposed channel will be after reclamation.

For the purpose of accomplishing the above goals, six trenches will be excavated (Exhibit 1). Trenches will be excavated using either one of the trackhoes currently being used for demolition purposes in the canyon. Logistics will be coordinated by Mr.'s Pappas, McMillan and Minchey. Exhibit 1 gives approximate locations of the proposed trenches (HS-1 through HS-6) and additional soil and coal samples. The exact location of the trenches will depend on a number of factors including; accessibility to various areas, variability of the soil/coal material, and excavation conditions, and will be defined when EarthFax personnel arrive on site.

The trenches will be cut back to approximate angle of repose (~38°) to permit safe entry, eliminate the potential of trapping wildlife, and minimize the potential of sidewall caving. Trenches will, where possible be cut perpendicular to the long axis of the canyon to enable a cross-section examination of material at each particular site. Where this is not possible longitudinal cuts will be made. It is proposed that trenches will remain open pending final reclamation grading.

Samples will be collected to evaluate the inherent property of the overburden/coal debris, and assess its potential for being acid-, or toxic-forming. A total of thirty samples of overburden and twenty of coal debris will be collected from various depths in the trenches, as well as

other additional locations in the canyon (Exhibit 1). Sample locations were selected to allow the best possible characterization of the range of overburden and coal properties. A previous soil sampling program was conducted in Hardscrabble Canyon. Sample locations are shown on Exhibit 1, and analytical results are summarized in Table 1 of Appendix A.

With the exception of selected parameters in H-2 (for example, pH, Ec, Ca, and Mg), there is a distinct homogeneity in physico-chemical properties of overburden in Hardscrabble Canyon (Appendix A, Table 1). Analytical data from Crandall Canyon show a similar pattern, and also show how similar the coal and overburden are (Appendix A, Table 2). This comparison was similarly conducted for coal and overburden in Hardscrabble Canyon (Appendix A, Table 1). With the exception of elevated total organic carbon, and total nitrogen in coal samples, and slightly elevated selenium in H-7 (Goose Island) analytical parameters in all prior samples from Hardscrabble Canyon meet the Division requirements (Appendix A). Based on this data, compositing of samples of similar material is recommended. This will allow characterization of a larger volume of material for reasonable cost.

However, it should be stressed that any unique material will be analyzed discretely. The location of this anomalous material, and its approximate volume, will be annotated.

With this in mind, similar material, based on visual comparison, will be composited on site, and a total of fifteen overburden samples, and five samples of coal debris will be submitted for analysis as per Table 2 in the Division guidelines for topsoil management (Leatherwood and Duce, 1988) (Appendix B). Due to the anticipated high variability of "soil", the exact compositing strategy will be decided in the field, after consultation between yourself and EarthFax personnel. Finally, analyses for fertilizer amendments will be collected at the time of final reclamation grading (as per Section 3.3-4(1) of the Castle Gate Mine reclamation plan). Therefore, the analyses proposed are appropriate at this time.

Approximate volumes of coal debris and overburden will be calculated by Bill Hendrickson (P.E.), based upon visual examination of material exposed in the trenches. These will be used to assess the volume of coal debris that needs to be buried, and determine whether enough overburden exists in Hardscrabble Canyon for the purpose of covering the coal debris with sufficient growth medium.

It is proposed that this investigation, and results will be presented to the Division as a stand alone report. The findings may be used to modify the final reclamation plan at a later date.

I realize that you have a busy schedule, and greatly appreciate your attention to this matter. Ideally, EarthFax personnel would like to be in the field by the second week in June to accommodate my schedule (I leave EarthFax June 30 to return to graduate school), and dovetail with the demolition crew schedule (Minchey oral commun., 5/25/95). As I understand it, this timing will also fit your schedule, and our client has expressed the fact that he would appreciate your involvement in this project.

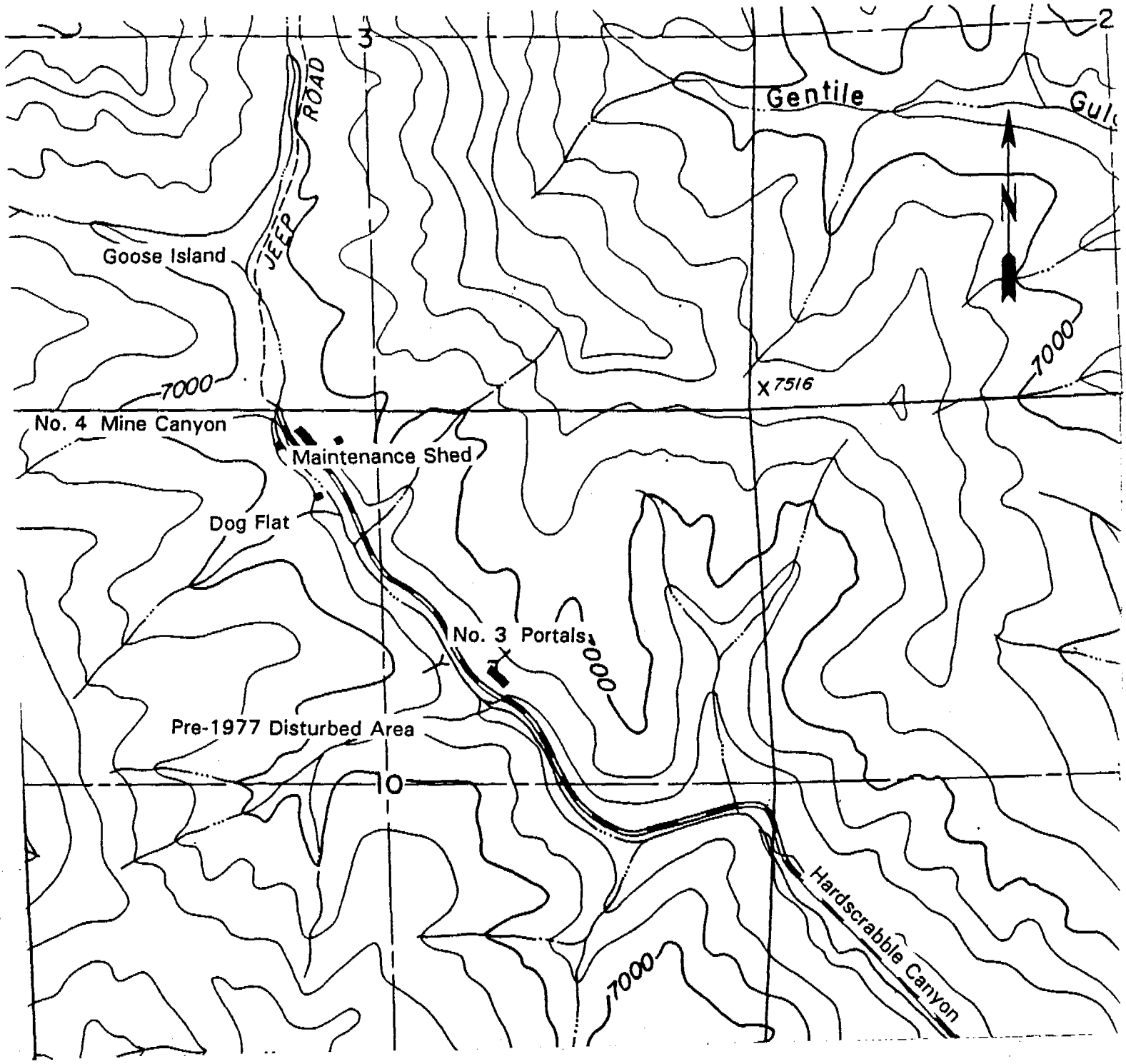
If you have any concerns with this proposal, please contact me soonest, and I will attempt to get the issues resolved prior to your departure.

Sincerely yours,

David McMillan

David McMillan
Geochemist

cc: Johnny Pappas (Cyprus-Plateau)
Bill Hendrickson (EarthFax)
UC412\07\hardscra.div



Scale: 1":1000'

FIGURE 1. HARDSCRABBLE CANYON

APPENDIX A

ANALYTICAL DATA FROM OTHER AREAS

TABLE 1

HARDSCRABBLE ANALYTICAL DATA

imL

Inter-Mountain Laboratories, Inc.

2506 West Main Street Farmington, New Mexico 87401 Tel. (505) 326-4737

CASTLE GATE COAL COMPANY
HELPER, UTAH

DATE REPORTED: June 19, 1990

PP = Preparation Plant Area
H = Hardscrabble Canyon
S = Sowbelly Canyon

Lab No.	Location	Depths	pH	EC mmhos/cm @ 25°C	Saturation %	Calcium meq/l	Magnesium meq/l	Sodium meq/l	SAR	Coarse Fragments %	Sand %	Silt %	Clay %	Texture
6816	PP #1	0.0-4.0	7.4	1.97	32.9	8.81	11.1	3.84	1.22	42.9	63.6	27.9	8.5	SANDY LOAM
6817	#2	0.0-4.0	7.6	4.77	40.5	17.8	41.5	15.2	2.79	36.1	52.2	35.6	12.2	SANDY LOAM
6818	PP #(3&4)	0.0-4.0	7.8	1.23	39.2	3.29	3.88	4.22	2.23	33.7	60.0	31.5	8.5	SANDY LOAM
6819	#5	0.0-4.0	8.2	0.65	28.5	1.25	1.58	4.81	4.04	53.0	60.0	28.5	11.5	SANDY LOAM
6820	#6	0.0-4.0	8.2	2.39	31.3	1.99	8.98	14.2	6.06	23.6	57.3	31.4	11.3	SANDY LOAM
6821	#7	0.0-4.0	7.6	0.54	32.8	2.65	1.49	1.27	0.88	22.6	73.6	21.3	5.1	SANDY LOAM
6822	#8	0.0-4.0	7.5	2.28	33.2	12.3	7.91	3.08	0.97	29.9	58.7	32.6	8.7	SANDY LOAM
6823	H-1	0.0-4.0	8.0	0.55	28.5	1.98	0.57	4.08	3.61	46.2	65.1	27.1	7.8	SANDY LOAM
6824	2	0.0-4.0	7.3	4.65	37.0	24.3	23.6	8.29	1.69	57.7	62.4	29.8	7.8	SANDY LOAM
6825	3	0.0-4.0	7.7	1.30	34.5	3.14	2.49	6.64	3.96	55.1	60.5	31.7	7.8	SANDY LOAM
6826	4	0.0-4.0	7.7	0.41	31.6	2.46	1.36	1.08	0.78	58.2	54.2	29.8	16.0	SANDY LOAM
6827	5	0.0-4.0	7.8	0.57	32.5	2.79	2.13	1.92	1.22	57.6	54.2	34.3	11.5	SANDY LOAM
6828	6	0.0-4.0	7.8	1.00	33.7	2.84	4.47	4.18	2.19	44.7	56.0	32.5	11.5	SANDY LOAM
6829	7	0.0-4.0	7.5	2.67	30.7	15.9	11.0	5.06	1.38	52.2	61.5	28.9	9.6	SANDY LOAM
6830	S-1	0.0-4.0	7.9	0.93	34.7	3.11	3.82	3.58	1.92	37.3	51.5	33.6	14.9	LOAM
6831	2	0.0-4.0	7.4	4.50	39.5	14.7	28.6	7.52	1.62	42.9	46.9	38.0	15.1	LOAM
6832	3	0.0-4.0	7.5	1.66	46.5	5.22	7.71	7.50	2.95	32.5	42.4	40.7	16.9	LOAM
6833	4	0.0-4.0	7.8	3.99	41.6	17.6	38.9	13.9	2.62	19.6	40.5	42.6	16.9	LOAM
6834	5	0.0-2.5	7.8	1.76	35.1	4.55	9.30	4.71	1.79	65.8	60.5	29.0	10.5	SANDY LOAM
6835	6	0.0-4.0	7.7	2.23	39.6	6.29	11.6	4.76	1.59	30.2	47.8	37.1	15.1	LOAM

REVISED SEP 1991

Appendix

Abbreviations: SAR- Sodium [illegible]

Inter-Mountain Laboratories, Inc.

2506 West Main Street Farmington, New Mexico 87401 Tel. (505) 326-4737

CASTLE GATE COAL COMPANY
HELPER, UTAH

DATE REPORTED: June 19, 1990
PP = Preparation Plant Area
H = Hardscrabble Canyon
S = Sowbelly Canyon

Lab No.	Location	Depths	Organic Matter %	Total Sulfur %	Neut. Pot. t/1000t	Sulfate Sulfur %	Pyritic Sulfur %	Organic Sulfur %	PyrS AB t/1000t	PyrS ABP t/1000t	Nitrate-Nitrogen ppm	Boron ppm	Avail Na meq/100g	Exch Na meq/100g
6816	PP #1	0.0-4.0	9.2	0.07	92.2	<0.01	0.01	0.06	0.31	91.9	8.40	1.84	13.0	12.9
6817	#2	0.0-4.0	5.5	0.19	137.	0.13	0.01	0.05	0.31	137.	8.19	0.93	75.0	74.4
6818	PP #(3&4)	0.0-4.0	5.5	0.07	124.	0.01	0.01	0.05	0.31	124.	5.08	4.00	16.0	15.8
6819	#5	0.0-4.0	<0.1	0.03	191.	<0.01	0.01	0.02	0.31	191.	4.56	0.33	18.0	17.9
6820	#6	0.0-4.0	2.6	0.03	126.	<0.01	0.01	0.02	0.31	126.	5.77	0.66	30.0	29.6
6821	#7	0.0-4.0	3.3	-0.01	213.	<0.01	<0.01	<0.01	-0.01	213.	5.45	2.21	7.00	6.96
6822	#8	0.0-4.0	1.6	0.03	140.	0.03	<0.01	<0.01	-0.01	140.	40.7	0.59	9.00	8.90
6823	H-1	0.0-4.0	2.9	0.03	99.1	<0.01	0.01	0.02	0.31	98.8	6.42	0.69	16.0	15.9
6824	2	0.0-4.0	5.3	0.38	99.5	0.23	0.03	0.12	0.94	98.6	7.35	1.01	20.0	19.7
6825	3	0.0-4.0	9.7	0.20	88.0	0.10	0.03	0.07	0.94	87.0	7.43	1.52	23.0	22.8
6826	4	0.0-4.0	8.1	0.05	98.5	<0.01	<0.01	0.05	-0.01	98.5	7.99	0.42	5.00	4.97
6827	5	0.0-4.0	10.2	0.08	97.4	<0.01	0.01	0.07	0.31	97.1	7.10	1.04	10.0	9.94
6828	6	0.0-4.0	5.2	0.03	77.7	<0.01	<0.01	0.03	-0.01	77.7	5.61	1.15	14.0	13.9
6829	7	0.0-4.0	8.0	0.13	68.1	<0.01	0.02	0.11	0.62	67.5	6.98	0.92	13.0	12.8
6830	S-1	0.0-4.0	2.6	-0.01	72.2	<0.01	<0.01	<0.01	-0.01	72.2	13.4	0.70	13.0	12.9
6831	2	0.0-4.0	4.8	0.05	134.	0.01	0.01	0.03	0.31	134.	5.29	0.95	21.0	20.7
6832	3	0.0-4.0	8.1	0.06	95.9	0.01	<0.01	0.05	-0.01	95.9	5.89	0.95	33.0	32.7
6833	4	0.0-4.0	3.6	0.08	77.5	0.04	0.01	0.03	0.31	77.2	4.72	0.65	32.0	31.4
6834	5	0.0-2.5	6.5	0.03	126.	<0.01	<0.01	0.03	-0.01	126.	4.44	1.14	14.0	13.8
6835	6	0.0-4.0	5.3	0.04	87.9	0.01	0.01	0.02	0.31	87.6	10.4	0.70	15.0	14.8

Abbreviations used in acid base accounting: T.S.= Total Sulfur, AB= Acid Base, ABP= Acid Base Potential, PyrS= Pyritic Sulfur, Pyr+Org= Pyritic Sulfur + Organic Sulfur
Neut. utralization Potential
Miscellaneous reviations: SAR= Sodium Adsorption Ratio, CEC= Cation Exchange Capacity, ESP= Exchangeable Sodium Per

REVISED SEP 1991

Appendix 8

imL

Inter-Mountain Laboratories, Inc.

2506 West Main Street Farmington, New Mexico 87401 Tel. (505) 326-4737

CASTLE GATE COAL COMPANY
HELPER, UTAH

DATE REPORTED: June 19, 1990
PP = Preparation Plant Area
H = Hardscrabble Canyon
S = Sowbelly Canyon

Lab No.	Location	Depths	Bulk Density *	Water Retention Difference in/in *	1/3 bar	15 bar	H2O Sol Selenium ppm	Total Kjeldahl Nitrogen %
6816	PP #1	0.0-4.0	1.8	0.1	11.7	7.3	<0.01	0.17
6817	#2	0.0-4.0	2.4	0.1	15.0	9.9	<0.01	0.09
6818	PP #(3&4)	0.0-4.0	2.3	0.1	12.1	7.0	<0.01	0.12
6819	#5	0.0-4.0	2.4	0.1	9.6	5.6	<0.01	0.05
6820	#6	0.0-4.0	2.2	0.1	10.7	6.8	<0.01	0.04
6821	#7	0.0-4.0	2.0	<0.1	6.9	5.6	<0.01	0.05
6822	#8	0.0-4.0	2.4	0.1	10.2	6.6	<0.01	0.07
6823	H-1	0.0-4.0	2.1	<0.1	10.2	6.3	<0.01	0.06
6824	2	0.0-4.0	1.7	<0.1	12.4	7.4	<0.01	0.27
6825	3	0.0-4.0	1.7	<0.1	12.4	7.6	<0.01	0.20
6826	4	0.0-4.0	2.0	0.1	19.7	9.0	<0.01	0.11
6827	5	0.0-4.0	2.1	0.1	20.9	9.0	<0.01	0.17
6828	6	0.0-4.0	2.3	0.1	18.8	8.7	<0.01	0.08
6829	7	0.0-4.0	2.4	0.1	16.4	7.3	0.03	0.21
6830	S-1	0.0-4.0	2.6	0.2	20.7	8.0	<0.01	0.06
6831	2	0.0-4.0	2.1	0.1	20.5	10.2	<0.01	0.07
6832	3	0.0-4.0	3.1	0.2	21.9	11.7	<0.01	0.11
6833	4	0.0-4.0	2.6	0.3	23.4	9.7	<0.01	0.05
6834	5	0.0-2.5	2.5	0.1	21.2	6.8	<0.01	0.08
6835	6	0.0-4.0	2.2	0.2	23.3	9.0	<0.01	0.08

* Air dry bulk density was substituted for 1/3 bar bulk density in calculations.

Abbreviations for extractants: PE= Saturated Paste Extract, H2OSol= water soluble, DPTA= [illegible]

REVISED SEP 1991

Appendix 8

COMPARISON OF CHEMICAL ANALYSES OF COAL REFUSE AND ROCK WASTE IN HARDSCRABBLE CANYON AT GOOSE ISLAND

Description of Material

Coal Refuse: Deposited at location during operation of Diamanti coal tipple (1950 - 1975) - coal fines, rock fines, rock boulders
Rock is from No. 5 Mine - Texture: sand - sandy

Rock Waste: Deposited during 1978 - 1979 by Braztah Corporation from No. 3 Mine floor for purpose of refuse covering material - Texture: sand

	MATERIAL: COAL REFUSE					MATERIAL: ROCK WASTE	
			4-25-83			4-25-83	
Sample Dates =	1-25-80	6-2-82	#5 Roof	#5 Floor	2-29-84	#3 Mine Floor	2-29-84
AS	0.011	--	0.001	0.001	--	0.001	--
Se	0.002	--	0.003	0.003	--	0.003	--
Hg	0.04	--	0.0002	0.0002	--	0.001	--
Cd	0.004	--	0.005	0.005	--	0.005	--
Pd	0.05	--	0.05	0.05	--	0.05	--
Cr	0.01	--	0.005	0.005	--	0.005	--
Ag	0.01	--	0.004	0.004	--	0.004	--
Ba	0.8	--	0.27	0.25	--	0.16	--
K	--	0.22	--	--	--	--	--
Na	--	0.34	5.5	1.9	--	42	--
Ca	--	37.0	80	7.1	--	22	--
Mg	--	2.18	5.5	1.9	--	9.8	--
B	--	200.4	--	--	--	--	--
CL	--	0.15	--	--	--	--	--
SO_4	--	1.35	--	--	--	--	--
HCO_3	--	0.11	--	--	--	--	--
%K	--	0.22	--	--	--	--	--
NO_3-N	--	0.85	--	--	--	--	--
P	--	4.1	--	--	--	--	--
Organic Matter %	--	5.4	--	--	--	--	--
pH	--	8.45	--	--	7.7	--	--
EC	--	29.5	--	--	--	--	--
SAR	--	0.24	0.96	2.4	3.85	1.87	1.67
S-Tot	--	--	0.11	0.07	0.18	0.07	0.31
ALK	--	--	193	35	101	28	55
Salinity	--	--	408 (Mg/L)	510 (Mg/L)	0.05 (%)	281 (Mg/L)	0.20 (%)
Acid	0	--	--	--	0	--	--
Spec.Cond.	--	--	637	--	820	439	3,200

TABLE 2

CRANDALL CANYON ANALYTICAL DATA

TABLE 2. PHYSICO-CHEMICAL PROPERTIES OF CRANDALL CANYON OVERBURDEN AND TOPSOIL

Parameter	Units	Acceptable DOGM (T.2)	Soil Abundance	TS-1	TS-2	TS-3	TS-4	EF-1-1	EF-1-2	EF-1-3	EF-2-1	EF-2-2	EF-2-3	EF-3-1	EF-3-2
pH	--	6.0-9.0		7.8	7.8	7.8	7.8	8.0	8.1	8.1	7.7	8.1	8.1	7.9	8.0
Ec	Umhos/cm	0-15,000		163	288	189	329	283	490	346	189	316	276	150	161
Saturation	%	25 - 80						35.9	32.6	36.2	33.1	33.0	31.2	31.1	30.5
Phosphorus	mg/kg		40 - 4,500	10	<2	17	<2	na	na	na	na	na	na	na	na
Potassium	mg/kg		0.19 - 6.3%	90	52	84	31	na	na	na	na	na	na	na	na
Nitrogen (Total)	mg/kg			2,300	923	752	846	926	765	5,730	1,120	422	480	960	673
Nitrate	mg/kg			2.7	15.5	4.0	14.0	3.4	2.9	1.5	1.7	3.4	2.5	6.4	1.8
Calcium	mg/kg		0.06 - 32%	317	79	633	97	110	126	236	271	112	168	410	65
Magnesium	mg/kg		0.03 - >10%	45	21	86	17	29	31	38	48	14	20	39	14
Sodium	mg/kg		0.05 - 10%	6.5	4.8	5.9	2.8	56.9	85.6	97.4	2.2	8.2	15.6	19.8	20.4
SAR	--	0 - 12		0.09	0.12	0.06	0.07	1.24	1.77	1.55	0.03	0.19	0.30	0.25	0.60
Exchangeable Na	meq/100gm			na	na	na	na	11	15	8	9	13	10	16	16
Acid/Base Pot.	tons CaCO3	> -5		na	na	na	na	465	936	458	464	927	929	931	92
Avail. H2O	%			na	na	na	na	21	24	26	26	27	25	23	24
Texture	--	all		sl	sl	sl	sl	sl	sl	ls	sl	ls	ls	sl	sl
Rock Frags.	%vols	Var.		13	5	8	9	67	28	57	47	70	73	24	41
Total Org. "C"	mg/kg			na	na	na	na	16900	11700	242000	57500	10200	6720	12000	10540

COAL

TABLE 2. PHYSICO-CHEMICAL PROPERTIES OF CRANDALL CANYON OVERBURDEN AND TOPSOIL

Parameter	Units	Acceptable DOGM (T.2)	Soil Abundance	EF-3-3	EF-4-1	EF-4-2	EF-4-3	EF-4-4	EF-4-5	EF-5-1	EF-5-2	EF-5-3	EF-5-4	EF-5-5	EF-6-1	EF-6-2
pH	--	6.0-9.0		8.0	7.9	8.1	8.1	8.2	8.2	8.0	8.0	7.9	8.1	8.2	8.0	7.9
Ec	Umhos/cm	0-15,000		191	161	158	127	181	151	131	101	180	129	153	147	165
Saturation	%	25 - 80		34.1	30.6	28.1	30.1	24.9	30.3	29.5	28.3	34.5	30.3	28.5	27.9	32.8
Phosphorus	mg/kg		40 - 4,500	na	na	na	na	na	na	na	na	na	na	na	na	na
Potassium	mg/kg		0.19 - 6.3%	na	na	na	na	na	na	na	na	na	na	na	na	na
Nitrogen (Total)	mg/kg			943	549	432	421	393	470	516	510	788	447	486	499	641
Nitrate	mg/kg			1.7	2.6	1.6	1.5	2.9	1.5	2.2	1.6	2.3	3.5	2.4	3.3	2.1
Calcium	mg/kg		0.06 - 32%	444	114	343	321	106	93	65	62	114	90	99	91	300
Magnesium	mg/kg		0.03 - >10%	46	22	50	55	32	30	12	11	29	21	26	17	70
Sodium	mg/kg		0.05 - 10%	33.4	1.5	4.7	4.6	7.8	6.0	0.8	1.3	3.7	1.9	1.9	0.8	6.7
SAR	--	0 - 12		0.40	0.03	0.06	0.06	0.17	0.14	0.02	0.04	0.08	0.05	0.04	0.02	0.09
Exchangeable Na	meq/100gm			12	12	13	12	14	12	13	15	15	10	16	16	19
Acid/Base Pot.	tons CaCO3	> -5		930	932	936	941	940	940	927	943	931	942	937	936	937
Avail. H2O	%			25	22	22	25	23	22	24	21	28	23	23	24	26
Texture	--	all		sl	sl	sl	sl	sl	sl	sl	sl	sl	sl	sl	sl	sl
Rock Frags.	%vols	Var.		36	42	37	36	35	33	34	67	0	33	53	18	34
Total Org. "C"	mg/kg			16100	4540	5020	3420	3680	3130	5700	2530	17800	5150	4490	3310	7300

TABLE 2. PHYSICO-CHEMICAL PROPERTIES OF CRANDALL CANYON OVERBURDEN AND TOPSOIL

Parameter	Units	Acceptable DOGM (T.2)	Soil Abundance	EF-6-3	EF-6-4	EF-6-5	EF-7-1	EF-7-2	EF-7-3	EF-7-4	EF-7-5	Avg.
pH	--	6.0-9.0		8.0	8.1	8.1	8.1	8.1	8.1	8.0	8.1	8.0
Ec	Umhos/cm	0-15,000		128	177	175	156	191	304	280	316	209
Saturation	%	25 - 80		23.2	25.9	26.7	33.5	34.0	33.3	31.0	34.0	30.9
Phosphorus	mg/kg		40 - 4,500	na	na	na	na	na	na	na	na	1
Potassium	mg/kg		0.19 - 6.3%	na	na	na	na	na	na	na	na	8
Nitrogen (Total)	mg/kg			383	443	359	462	389	750	464	594	536
Nitrate	mg/kg			1.6	1.8	2.5	2.6	1.6	2.1	1.5	3.3	3
Calcium	mg/kg		0.06 - 32%	68	201	81	62	77	74	111	138	167
Magnesium	mg/kg		0.03 - >10%	12	45	22	10	9	11	15	20	29
Sodium	mg/kg		0.05 - 10%	3.2	7.1	4.8	1.7	11.8	9.5	8.9	13.3	13.6
SAR	--	0 - 12		0.09	0.12	0.12	0.05	0.34	0.27	0.21	0.28	0.27
Exchangeable Na	meq/100gm			11	18	9	13	14	13	17	22	12
Acid/Base Pot.	tons CaCO3	> -5		942	947	939	935	944	946	944	944	755
Avail. H2O	%			19	20	20	27	29	27	26	28	21
Texture	--	all		ls	l	sl	sl	sl	sl	sl	sl	0
Rock Frags.	%vols	Var.		62	22	18	38	35	31	18	7	34
Total Org. "C"	mg/kg			1340	3130	1740	5440	5530	6790	5920	5510	14701

APPENDIX B

ANALYTICAL PARAMETERS

TABLE 2 OF THE DIVISION GUIDELINES FOR MANAGEMENT OF TOPSOIL AND OVERBURDEN

Table 2. Overburden Evaluation for Vegetative Root Zone*

Parameters	Good	Fair	Poor	Unacceptable
pH	6.1-8.2	5.1 to 6.1 8.2 to 8.4	4.5 to 5.0 8.5 to 9.0	less than 4.5 greater than 9.0
Ec mmhos/cm 25°C	0 to 2	2 to 8	8 to 15	greater than 15
Saturation %	25%-80%		less than 25% greater than 80%	
Texture	sl, l, sil, scl, vfsl, fsl	c, sicl, sc ls, lfs	sic, s, sc, c, cos, fs, vfs	g, vcos
SAR	0-4	5-10	10-12 Fine Texture 10-15 Coarse Texture	12 Fine Texture 15 Coarse Texture
Selenium	less than 0.1 mg/Kg			greater than 0.1 mg/Kg
Boron	less than 5.0 mg/Kg			greater than 5.0 mg/Kg
Acid/Base Potential	greater than -5 tons $CaCO_3$ 1,000 tons material			Less than -5 tons $CaCO_3$ 1,000 tons material
% Coal fines	Undetermined at this time			
Available water capacity (in/in)	greater than 0.10	0.05-0.10	less than 0.05	
Rock Fragments (% volumes)				
3 inches	0-15	15-25	25-30	greater than 30
3-10 inches	0-15	15-25	25-30	greater than 30
10 inches	0-3	3-7	7-10	greater than 10

* Many native species have their roots in soils that are determined unsuitable by these values. Occasionally soil materials rated good by these standards have poor vegetation success. Therefore plant growth trails may be required where reestablishment of native species is desirable.

Document Information Form

Mine Number: C/007/0004

File Name: Incoming - Castle Gate

To: Henry Sower - DOGM

From:

Person David McMillan

Company EarthFax

Date Received: May 31, 1995

Explanation: Exhibit 1 overburden and Coal Sample Locations (Map)

cc: