APPENDIX 6-2

TYPICAL CORE HOLE QUALITY
IPA#1, IPA#2, IPA#3
S-24, S-25

Information for Appendix 6-2 is ALL hard copies. Electronic copies do not exist for the information contained within the Appendix.

COMMERCIAL TESTING & ENGINEERING CO.
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SINCE 1908
Member of the SGS Group (Société Générale de Surveillance)

PLEASE ADDRESS ALL CORRESPONDENCE TO
4665 PARIS, B-200, DENVER, CO 80239
TEL: (303) 373-4772
FAX: (303) 373-4791

April 7, 1995

INTERMOUNTAIN POWER SERVICE
Room 1164
111 North Hope Street
Los Angeles CA 90012
Bill Engels

Sample identification by
INTERMOUNTAIN POWER SERVICE

AGREEMENT # 301
CORE HOLE # : IPA-1
BEGINNING FOOTAGE : 1655.1
ENDING FOOTAGE : 1657.1
SAMPLE # : ROOF

Kind of sample reported to us: COAL CORE 2'

Sample taken at: HORSE CANYON

Sample taken by: EARTHFAX ENGINEERING INC.

Date sampled: ------

Date received: March 15, 1995

Analysis report no. 72-301124

SHORT PROXIMATE ANALYSIS

	As Received	Dry Basis
% Moisture	2.39	xxxxx
%Ash	9.92	10.16
Btu/lb	12779	13092
% Sulfur	1.06	1.09

MAF Btu/lb.	14573		
Lbs. SO_2/Mill. Btu	1.66	Lbs. Sulfur/Mill. Btu	0.83
% Air Dry Loss	0.79	As Received Net Sample Wt.	3034.30 g

APPARENT SPECIFIC GRAVITY= 1.35

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Manager, Denver Laboratory

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April 7, 1995

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Bill Engels

Sample identification by
INTERMOUNTAIN POWER SERVICE

AGREEMENT # 301
CORE HOLE # : IPA-1
BEGINNING FOOTAGE : 1655.1
ENDING FOOTAGE : 1657.1
SAMPLE # : ROOF

Kind of sample reported to us: COAL CORE

Sample taken at: HORSE CANYON

Sample taken by: EARTHFAX ENGINEERING INC.

Date sampled: ------

Date received: March 15, 1995

Analysis report no. 72-301124

ANALYSIS OF ASH % Weight Ignited Basis

Silica, SiO_2	55.89
Alumina, Al_2O_3	28.77
Titania, TiO_2	1.23
Ferric Oxide, Fe_2O_3	7.56
Lime, CaO	1.77
Magnesia, MgO	0.33
Potassium Oxide, K_2O	0.63
Sodium Oxide, Na_2O	1.47
Sulfur Trioxide, SO_3	1.65
Phosphorous Pentoxide, P_2O_5	0.25
Strontium Oxide, SrO	0.04
Barium Oxide, BaO	0.15
Manganese Oxide, Mn_3O_4	0.03
Undetermined	0.23

Alkalies as Na_2O, Dry Coal Basis=	0.19
Silica Value=	85.26
Base: Acid Ratio=	0.14
T_{250} Temperature=	2900+ °F
Type of Ash=	BITUMINOUS
Fouling Index=	0.21
Slagging Index=	0.15

FORMS OF SULFUR

	As Received	Dry Bas:
% Pyritic Sulfur	0.47	0.4
% Sulfate Sulfur	0.01	0.0
% Organic Sulfur (diff)	0.58	0.6
% Total Sulfur	1.06	1.0

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INTERMOUNTAIN POWER SERVICE
Room 1164
111 North Hope Street
Los Angeles CA 90012

124

AGREEMENT # 301
CORE HOLE # : IPA-1
BEGINNING FOOTAGE : 1657.1
ENDING FOOTAGE : 1667.5
SAMPLE # : MIDDLE

Date Sampled ------
Date Received March 15, 1995

GRINDABILITY DETERMINED ON -8M MATERIAL

Analysis report # 72-301125

PROXIMATE ANALYSIS

	As Received	Dry Basis	EQ Basis
% Moisture	3.10	XXXXXX	3.6
% Ash	5.04	5.20	5.01
% Volatile	38.69	39.93	38.49
% Fixed Carbon	53.17	54.87	52.90
	100.00	100.00	100.00
Btu/lb.	13545	13978	13475
% Sulfur	0.72	0.74	0.71
% Air Dry Loss	1.11		

M.A.F. Btu/lb = 14745

ULTIMATE ANALYSIS

	As Received	Dry Basis	EQ Basis
% Moisture	3.10	XXXXXX	3.6
% Carbon	77.30	79.77	76.90
% Hydrogen	5.19	5.36	5.17
% Nitrogen	1.60	1.65	1.59
% Sulfur	0.72	0.74	0.71
% Ash	5.04	5.20	5.01
% Oxygen	7.05	7.28	7.02
	100.00	100.00	100.00

SULFUR FORMS

	As Received	Dry Basis
% Pyritic	0.18	0.19
% Sulfate	0.01	0.01
% Organic	0.53	0.54
% Total Sulfur	0.72	0.74

FUSION TEMPERATURE OF ASH (°F)

	Reducing	Oxidizing
Initial Deformation	1982	2154
Softening	2025	2172
Hemispherical	2071	2217
Fluid	2251	2370

Grindability Index = 45 @ 1.20 % Moisture

Free Swelling Index = 4.0
Specific Gravity (ASG) = 1.32

ELEMENTAL ANALYSIS OF ASH
(% Weight Ignited Basis)

Silica, SiO_2	41.96
Alumina, Al_2O_3	19.58
Titania, TiO_2	0.97
Ferric Oxide, Fe_2O_3	7.28
Lime, CAO	11.24
Magnesia, MgO	1.27
Potassium Oxide, K_2O	0.23
Sodium Oxide, Na_2O	6.46
Sulfur Trioxide, SO_3	9.86
Phosphorous Pentoxide, P_2O_5	0.68
Strontium Oxide, SrO	0.17
Barium Oxide, BaO	0.14
Manganese Oxide, Mn_3O_4	0.16
Undetermined	0.00
Alks. as Na_2O, Dry Coal Basis	0.34
Base:Acid Ratio	0.42
T250 Temperature	2383

Fouling Index	6.46
Slagging Index	2029.00
Silica Value	67.95
Type of Ash	LIGNITIC
Lbs. SO_2/Mill. Btu	1.06
Lbs. Sulfur/Mill. Btu	0.53
As Received Net Sample Wt.	15730.20 g

Respectfully submitted,
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April 7, 1995

INTERMOUNTAIN POWER SERVICE
Room 1164
111 North Hope Street
Los Angeles CA 90012
Bill Engels

Sample identification by
INTERMOUNTAIN POWER SERVICE

Kind of sample reported to us: COAL CORE 10.4

Sample taken at: HORSE CANYON

Sample taken by: EARTHFAX ENGINEERING INC.

Date sampled: ------

Date received: March 15, 1995

AGREEMENT # 301
CORE HOLE # : IPA-1
BEGINNING FOOTAGE : 1657.1
ENDING FOOTAGE : 1667.5
SAMPLE # : MIDDLE

GRINDABILITY DETERMINED ON -8M MATERIAL

Analysis Report No. 72-301125

PLASTIC PROPERTIES OF COAL GIESELER PLASTOMETER

Maximum Fluidity, D.D.P.M.*	3
Initial Softening Temperature, (1 DDPM) °C	407
Maximum Fluid Temperature, °C	430
Solidification Temperature, °C	463
Temperature Range, °C	56

*Dial Division Per Minute at 40 Gram Inches Torque.

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Manager, Denver Laboratory

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April 7, 1995

INTERMOUNTAIN POWER SERVICE
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Bill Engels

Sample identification by
INTERMOUNTAIN POWER SERVICE

AGREEMENT # 301
CORE HOLE # : IPA-1
BEGINNING FOOTAGE : 1657.1
ENDING FOOTAGE : 1667.5
SAMPLE # : MIDDLE

GRINDABILITY DETERMINED ON -8M MATERIAL

Kind of sample reported to us	COAL CORE
Sample taken at	HORSE CANYON
Sample taken by	EARTHFAX ENGINEERING INC.
Date sampled	------
Date received	March 15, 1995

Analysis Report No. 72-301125

AUDIBERT-ARNU DILATOMETER

% Maximum Contraction	-22
% Maximum Dilatation	-22
Softening Temperature °C	385
Temperature of Maximum Contraction °C	425
Temperature of Maximum Dilatation °C	425

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Manager, Denver Laboratory

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April 7, 1995

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Los Angeles CA 90012
Bill Engels

Sample identification by
INTERMOUNTAIN POWER SERVICE

AGREEMENT # 301
CORE HOLE # : IPA-1
BEGINNING FOOTAGE : 1667.5
ENDING FOOTAGE : 1669.5
SAMPLE # : FLOOR

Kind of sample reported to us: COAL CORE Z, O

Sample taken at: HORSE CANYON

Sample taken by: EARTHFAX ENGINEERING INC.

Date sampled: ------

Date received: March 15, 1995

Analysis report no. 72-301126

SHORT PROXIMATE ANALYSIS

	As Received	Dry Basis
% Moisture	2.59	xxxxx
%Ash	3.38	3.47
Btu/lb	13914	14284
% Sulfur	0.69	0.71

MAF Btu/lb.	14797		
Lbs. SO_2/Mill. Btu	0.99	Lbs. Sulfur/Mill. Btu	0.50
% Air Dry Loss	0.91	As Received Net Sample Wt.	2418.90 gr

APPARENT SPECIFIC GRAVITY= 1.28

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Manager, Denver Laboratory

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Bill Engels

Sample identification by
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AGREEMENT # 301
CORE HOLE # : IPA-1
BEGINNING FOOTAGE : 1667.5
ENDING FOOTAGE : 1669.5
SAMPLE # : FLOOR

Kind of sample reported to us: COAL CORE

Sample taken at: HORSE CANYON

Sample taken by: EARTHFAX ENGINEERING INC.

Date sampled: ------

Date received: March 15, 1995

Analysis report no. 72-301126

ANALYSIS OF ASH	% Weight Ignited Basis
Silica, SiO_2	51.84
Alumina, Al_2O_3	17.16
Titania, TiO_2	0.91
Ferric Oxide, Fe_2O_3	6.44
Lime, CaO	6.30
Magnesia, MgO	0.71
Potassium Oxide, K_2O	0.19
Sodium Oxide, Na_2O	8.43
Sulfur Trioxide, SO_3	7.38
Phosphorous Pentoxide, P_2O_5	0.06
Strontium Oxide, SrO	0.05
Barium Oxide, BaO	0.03
Manganese Oxide, Mn_3O_4	0.04
Undetermined	0.46

Alkalies as Na_2O, Dry Coal Basis=	0.30
Silica Value=	79.40
Base: Acid Ratio=	0.32
T_{250} Temperature=	2525 °F

Type of Ash= LIGNITIC
Fouling Index= 8.43
Slagging Index= xxxxxxx

FORMS OF SULFUR	As Received	Dry Bas
% Pyritic Sulfur	0.11	0.1
% Sulfate Sulfur	0.01	0.0
% Organic Sulfur (diff)	0.57	0.5
% Total Sulfur	0.69	0.7

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April 7, 1995

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Los Angeles CA 90012
Bill Engels

Sample identification by
INTERMOUNTAIN POWER SERVICE

AGREEMENT # 301
CORE HOLE # : IPA-2
BEGINNING FOOTAGE : 1060.0
ENDING FOOTAGE : 1062.0
SAMPLE # : ROOF

Kind of sample reported to us: COAL CORE

Sample taken at: HORSE CANYON

Sample taken by: EARTHFAX ENGINEERING INC.

Date sampled: ------

Date received: March 15, 1995

Analysis report no. 72-301127

SHORT PROXIMATE ANALYSIS

	As Received	Dry Basis
% Moisture	4.14	xxxxx
%Ash	2.32	2.42
Btu/lb	13659	14249
% Sulfur	0.73	0.76

MAF Btu/lb.	14602		
Lbs. SO_2/Mill. Btu	1.07	Lbs. Sulfur/Mill. Btu	0.53
% Air Dry Loss	2.02	As Received Net Sample Wt.	2778.50 gr

APPARENT SPECIFIC GRAVITY= 1.30

Respectfully submitted,
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Manager, Denver Laboratory

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Bill Engels

Sample identification by
INTERMOUNTAIN POWER SERVICE

AGREEMENT # 301
CORE HOLE # : IPA-2
BEGINNING FOOTAGE : 1060.0
ENDING FOOTAGE : 1062.0
SAMPLE # : ROOF

Kind of sample reported to us: COAL CORE

Sample taken at: HORSE CANYON

Sample taken by: EARTHFAX ENGINEERING INC.

Date sampled: ------

Date received: March 15, 1995

Analysis report no. 72-301127

ANALYSIS OF ASH % Weight Ignited Basis

Silica, SiO_2	41.09
Alumina, Al_2O_3	13.74
Titania, TiO_2	0.72
Ferric Oxide, Fe_2O_3	4.99
Lime, CaO	15.93
Magnesia, MgO	0.69
Potassium Oxide, K_2O	0.13
Sodium Oxide, Na_2O	5.57
Sulfur Trioxide, SO_3	15.55
Phosphorous Pentoxide, P_2O_5	0.14
Strontium Oxide, SrO	0.06
Barium Oxide, BaO	0.05
Manganese Oxide, Mn_3O_4	0.15
Undetermined	1.19

Alkalies as Na_2O, Dry Coal Basis=	0.14
Silica Value=	65.53
Base: Acid Ratio=	0.49
T_{250} Temperature=	2317 °F

Type of Ash= LIGNITIC
Fouling Index= 5.57
Slagging Index= xxxxxxx

FORMS OF SULFUR

	As Received	Dry Bas
% Pyritic Sulfur	0.07	0.0
% Sulfate Sulfur	0.01	0.0
% Organic Sulfur (diff)	0.65	0.6
% Total Sulfur	0.73	0.7

Respectfully submitted,
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111 North Hope Street
Los Angeles CA 90012

AGREEMENT # 301
CORE HOLE # : IPA-2
BEGINNING FOOTAGE : 1062.0
ENDING FOOTAGE : 1068.0
SAMPLE # : MIDDLE

Date Sampled ------
Date Received March 15, 1995

GRINDABILITY DETERMINED ON -8M MATERIAL

Analysis report # 72-301128

PROXIMATE ANALYSIS

	As Received	Dry Basis	EQ Basis
% Moisture	4.00	XXXXXX	4.1
% Ash	4.73	4.93	4.73
% Volatile	38.51	40.11	38.47
% Fixed Carbon	52.76	54.96	52.70
	100.00	100.00	100.00
Btu/lb.	13302	13856	13288
% Sulfur	0.97	1.01	0.97
% Air Dry Loss	1.80		

M.A.F. Btu/lb = 14575

ULTIMATE ANALYSIS

	As Received	Dry Basis	EQ Basis
% Moisture	4.00	XXXXXX	4.1
% Carbon	75.38	78.52	75.30
% Hydrogen	5.07	5.28	5.06
% Nitrogen	1.59	1.66	1.59
% Sulfur	0.97	1.01	0.97
% Ash	4.73	4.93	4.73
% Oxygen	8.26	8.60	8.25
	100.00	100.00	100.00

SULFUR FORMS

	As Received	Dry Basis
% Pyritic	0.23	0.24
% Sulfate	0.01	0.01
% Organic	0.73	0.76
% Total Sulfur	0.97	1.01

FUSION TEMPERATURE OF ASH (°F)

	Reducing	Oxidizing
Initial Deformation	2236	2357
Softening	2247	2369
Hemispherical	2265	2414
Fluid	2442	2473

Grindability Index = 47 @ 1.60 % Moisture

Free Swelling Index = 4.5
Specific Gravity (ASG) = 1.31

ELEMENTAL ANALYSIS OF ASH
(% Weight Ignited Basis)

Silica, SiO_2	51.84
Alumina, Al_2O_3	23.11
Titania, TiO_2	1.24
Ferric Oxide, Fe_2O_3	7.43
Lime, CAO	5.87
Magnesia, MgO	0.76
Potassium Oxide, K_2O	0.53
Sodium Oxide, Na_2O	3.25
Sulfur Trioxide, SO_3	4.20
Phosphorous Pentoxide, P_2O_5	0.07
Strontium Oxide, SrO	0.05
Barium Oxide, BaO	0.00
Manganese Oxide, Mn_3O_4	0.06
Undetermined	1.59
Alks. as Na_2O, Dry Coal Basis	0.18
Base:Acid Ratio	0.23
T250 Temperature	2660

Fouling Index	0.75
Slagging Index	0.23
Silica Value	78.66
Type of Ash	BITUMINOUS
Lbs. SO_2/Mill. Btu	1.46
Lbs. Sulfur/Mill. Btu	0.73
As Received Net Sample Wt.	7896.60 g

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Manager, Denver Laboratory

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April 7, 1995

INTERMOUNTAIN POWER SERVICE
Room 1164
111 North Hope Street
Los Angeles CA 90012
Bill Engels

Sample identification by
INTERMOUNTAIN POWER SERVICE

AGREEMENT # 301
CORE HOLE # : IPA-2
BEGINNING FOOTAGE : 1062.0
ENDING FOOTAGE : 1068.0
SAMPLE # : MIDDLE

GRINDABILITY DETERMINED ON -8M MATERIAL

Kind of sample reported to us	COAL CORE
Sample taken at	HORSE CANYON
Sample taken by	EARTHFAX ENGINEERING INC.
Date sampled	------
Date received	March 15, 1995

Analysis Report No. 72-301128

PLASTIC PROPERTIES OF COAL GIESELER PLASTOMETER

Maximum Fluidity, D.D.P.M.*	3
Initial Softening Temperature, (1 DDPM) °C	404
Maximum Fluid Temperature, °C	421
Solidification Temperature, °C	451
Temperature Range, °C	47

*Dial Division Per Minute at 40 Gram Inches Torque.

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Manager, Denver Laboratory

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April 7, 1995

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Los Angeles CA 90012
Bill Engels

Sample identification by
INTERMOUNTAIN POWER SERVICE

AGREEMENT # 301
CORE HOLE # : IPA-2
BEGINNING FOOTAGE : 1062.0
ENDING FOOTAGE : 1068.0
SAMPLE # : MIDDLE

GRINDABILITY DETERMINED ON -8M MATERIAL

Kind of sample reported to us	COAL CORE
Sample taken at	HORSE CANYON
Sample taken by	EARTHFAX ENGINEERING INC.
Date sampled	------
Date received	March 15, 1995

Analysis Report No. 72-301128

AUDIBERT-ARNU DILATOMETER

% Maximum Contraction	-32
% Maximum Dilatation	-32
Softening Temperature °C	390
Temperature of Maximum Contraction °C	440
Temperature of Maximum Dilatation °C	440

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Manager, Denver Laboratory

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April 7, 1995

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Room 1164
111 North Hope Street
Los Angeles CA 90012
Bill Engels

Sample identification by
INTERMOUNTAIN POWER SERVICE

2.°

AGREEMENT # 301
CORE HOLE # : IPA-3
BEGINNING FOOTAGE : 1024.0
ENDING FOOTAGE : 1026.0
SAMPLE # : ROOF

Kind of sample reported to us: COAL CORE

Sample taken at: HORSE CANYON

Sample taken by: EARTHFAX ENGINEERING INC.

Date sampled: ------

Date received: March 15, 1995

Analysis report no. 72-301129

SHORT PROXIMATE ANALYSIS

	As Received	Dry Basis
% Moisture	4.45	xxxxx
%Ash	10.00	10.47
Btu/lb	12405	12983
% Sulfur	1.13	1.18

MAF Btu/lb.	14501		
Lbs. SO_2/Mill. Btu	1.82	Lbs. Sulfur/Mill. Btu	0.91
% Air Dry Loss	2.55	As Received Net Sample Wt.	3055.00 g

APPARENT SPECIFIC GRAVITY= 1.37

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Manager, Denver Laboratory

COMMERCIAL TESTING & ENGINEERING CO.
GENERAL OFFICES: 1919 SOUTH HIGHLAND AVE., SUITE 210-B, LOMBARD, ILLINOIS 60148 • TEL: 708-953-9300 FAX: 708-953-9306
SINCE 1908
Member of the SGS Group (Société Générale de Surveillance)

PLEASE ADDRESS ALL CORRESPONDENCE TO:
4665 PARIS, B-200, DENVER, CO 80239
TEL: (303) 373-4772
FAX: (303) 373-4791

April 7, 1995

INTERMOUNTAIN POWER SERVICE
Room 1164
111 North Hope Street
Los Angeles CA 90012
Bill Engels

Sample identification by
INTERMOUNTAIN POWER SERVICE

AGREEMENT # 301
CORE HOLE # : IPA-3
BEGINNING FOOTAGE : 1024.0
ENDING FOOTAGE : 1026.0
SAMPLE # : ROOF

Kind of sample reported to us: COAL CORE

Sample taken at: HORSE CANYON

Sample taken by: EARTHFAX ENGINEERING INC.

Date sampled: ------

Date received: March 15, 1995

Analysis report no. 72-301129

ANALYSIS OF ASH	% Weight Ignited Basis
Silica, SiO_2	59.35
Alumina, Al_2O_3	27.11
Titania, TiO_2	1.27
Ferric Oxide, Fe_2O_3	4.95
Lime, CaO	2.37
Magnesia, MgO	0.39
Potassium Oxide, K_2O	0.35
Sodium Oxide, Na_2O	0.64
Sulfur Trioxide, SO_3	2.33
Phosphorous Pentoxide, P_2O_5	0.24
Strontium Oxide, SrO	0.05
Barium Oxide, BaO	0.09
Manganese Oxide, Mn_3O_4	0.02
Undetermined	0.84

Alkalies as Na_2O, Dry Coal Basis=	0.09
Silica Value=	88.50
Base: Acid Ratio=	0.10
T_{250} Temperature=	2900+ °F
Type of Ash=	BITUMINOUS
Fouling Index=	0.06
Slagging Index=	0.12

FORMS OF SULFUR

	As Received	Dry Bas
% Pyritic Sulfur	0.29	0.3
% Sulfate Sulfur	0.02	0.0
% Organic Sulfur (diff)	0.82	0.8
% Total Sulfur	1.13	1.1

Respectfully submitted,
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Manager, Denver Laboratory

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INTERMOUNTAIN POWER SERVICE
Room 1164
111 North Hope Street
Los Angeles CA 90012

AGREEMENT # 301
CORE HOLE # : IPA-3
BEGINNING FOOTAGE : 1032.0
ENDING FOOTAGE : 1033.0
SAMPLE # : MIDDLE

10 24-1032

Date Sampled ------
Date Received March 15, 1995

GRINDABILITY DETERMINED ON -8M MATERIAL

Analysis report # 72-301130

PROXIMATE ANALYSIS

	As Received	Dry Basis	EQ Basis
% Moisture	8.32	XXXXXX	4.5
% Ash	5.56	6.06	5.79
% Volatile	36.54	39.86	38.07
% Fixed Carbon	49.58	54.08	51.64
	100.00	100.00	100.00
Btu/lb.	12558	13698	13082
% Sulfur	0.83	0.90	0.86
% Air Dry Loss	6.06		

M.A.F. Btu/lb = 14582

ULTIMATE ANALYSIS

	As Received	Dry Basis	EQ Basis
% Moisture	8.32	XXXXXX	4.5
% Carbon	70.96	77.40	73.92
% Hydrogen	4.85	5.29	5.05
% Nitrogen	1.52	1.66	1.59
% Sulfur	0.83	0.90	0.86
% Ash	5.56	6.06	5.79
% Oxygen	7.96	8.69	8.29
	100.00	100.00	100.00

SULFUR FORMS

	As Received	Dry Basis
% Pyritic	0.15	0.16
% Sulfate	0.01	0.01
% Organic	0.67	0.73
% Total Sulfur	0.83	0.90

FUSION TEMPERATURE OF ASH (°F)

	Reducing	Oxidizing
Initial Deformation	2280	2365
Softening	2307	2397
Hemispherical	2337	2453
Fluid	2480	2512

Grindability Index = 48 @ 2.00 % Moisture

Free Swelling Index = 2.5
Specific Gravity (ASG) = 1.31

ELEMENTAL ANALYSIS OF ASH
(% Weight Ignited Basis)

Silica, SiO_2	56.41
Alumina, Al_2O_3	21.84
Titania, TiO_2	1.12
Ferric Oxide, Fe_2O_3	5.37
Lime, CAO	5.75
Magnesia, MgO	1.21
Potassium Oxide, K_2O	0.46
Sodium Oxide, Na_2O	1.56
Sulfur Trioxide, SO_3	3.86
Phosphorous Pentoxide, P_2O_5	0.70
Strontium Oxide, SrO	0.17
Barium Oxide, BaO	0.09
Manganese Oxide, Mn_3O_4	0.04
Undetermined	1.42
Alks. as Na_2O, Dry Coal Basis	0.11
Base:Acid Ratio	0.18
T250 Temperature	2829

Fouling Index	1.56
Slagging Index	2314.60
Silica Value	82.06
Type of Ash	LIGNITIC
Lbs. SO_2/Mill. Btu	1.32
Lbs. Sulfur/Mill. Btu	0.66
As Received Net Sample Wt.	7474.80 g

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Manager, Denver Laboratory

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April 7, 1995

INTERMOUNTAIN POWER SERVICE
Room 1164
111 North Hope Street
Los Angeles CA 90012
Bill Engels

Sample identification by
INTERMOUNTAIN POWER SERVICE

Kind of sample reported to us: COAL CORE

Sample taken at: HORSE CANYON

Sample taken by: EARTHFAX ENGINEERING INC.

Date sampled: ------

Date received: March 15, 1995

AGREEMENT # 301
CORE HOLE # : IPA-3
BEGINNING FOOTAGE : 1032.0
ENDING FOOTAGE : 1033.0
SAMPLE # : MIDDLE

GRINDABILITY DETERMINED ON -8M MATERIAL

Analysis Report No. 72-301130

PLASTIC PROPERTIES OF COAL GIESELER PLASTOMETER

Maximum Fluidity, D.D.P.M.*	0
Initial Softening Temperature, (1 DDPM) °C	0
Maximum Fluid Temperature, °C	0
Solidification Temperature, °C	0
Temperature Range, °C	xxxxx

*Dial Division Per Minute at 40 Gram Inches Torque.

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Manager, Denver Laboratory

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Sample identification by
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AGREEMENT # 301
CORE HOLE # : IPA-3
BEGINNING FOOTAGE : 1032.0
ENDING FOOTAGE : 1033.0
SAMPLE # : MIDDLE

GRINDABILITY DETERMINED ON -8M MATERIAL

Kind of sample reported to us	COAL CORE
Sample taken at	HORSE CANYON
Sample taken by	EARTHFAX ENGINEERING INC.
Date sampled	------
Date received	March 15, 1995

Analysis Report No. 72-301130

AUDIBERT-ARNU DILATOMETER

% Maximum Contraction	-30
% Maximum Dilatation	-30
Softening Temperature °C	410
Temperature of Maximum Contraction °C	475
Temperature of Maximum Dilatation °C	475

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Manager, Denver Laboratory

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April 7, 1995

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Room 1164
111 North Hope Street
Los Angeles CA 90012
Bill Engels

Sample identification by
INTERMOUNTAIN POWER SERVICE

AGREEMENT # 301
CORE HOLE # : IPA-3
BEGINNING FOOTAGE : 1032.0
ENDING FOOTAGE : 1033.0
SAMPLE # : FLOOR

Kind of sample reported to us: COAL CORE

Sample taken at: HORSE CANYON

Sample taken by: EARTHFAX ENGINEERING INC.

Date sampled: ------

Date received: March 15, 1995

Analysis report no. 72-301131

SHORT PROXIMATE ANALYSIS

	As Received	Dry Basis
% Moisture	10.17	xxxxx
%Ash	2.91	3.24
Btu/lb	12618	14047
% Sulfur	0.78	0.87

MAF Btu/lb.	14517		
Lbs. SO_2/Mill. Btu	1.24	Lbs. Sulfur/Mill. Btu	0.62
% Air Dry Loss	7.98	As Received Net Sample Wt.	1505.10 gr

APPARENT SPECIFIC GRAVITY= 1.28

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Manager, Denver Laboratory

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Sample identification by
INTERMOUNTAIN POWER SERVICE

AGREEMENT # 301
CORE HOLE # : IPA-3
BEGINNING FOOTAGE : 1032.0
ENDING FOOTAGE : 1033.0
SAMPLE # : FLOOR

Kind of sample reported to us: COAL CORE

Sample taken at: HORSE CANYON

Sample taken by: EARTHFAX ENGINEERING INC.

Date sampled: ------

Date received: March 15, 1995

Analysis report no. 72-301131

ANALYSIS OF ASH % Weight Ignited Basis

Silica, SiO_2	54.24
Alumina, Al_2O_3	27.57
Titania, TiO_2	1.59
Ferric Oxide, Fe_2O_3	6.76
Lime, CaO	2.13
Magnesia, MgO	2.01
Potassium Oxide, K_2O	0.27
Sodium Oxide, Na_2O	1.47
Sulfur Trioxide, SO_3	2.22
Phosphorous Pentoxide, P_2O_5	0.36
Strontium Oxide, SrO	0.07
Barium Oxide, BaO	0.06
Manganese Oxide, Mn_3O_4	0.02
Undetermined	1.23

Alkalies as Na_2O, Dry Coal Basis=	0.05
Silica Value=	83.27
Base: Acid Ratio=	0.15
T_{250} Temperature=	2867 °F
Type of Ash=	BITUMINOUS
Fouling Index=	0.22
Slagging Index=	0.13

FORMS OF SULFUR

	As Received	Dry Bas
% Pyritic Sulfur	0.09	0.1
% Sulfate Sulfur	0.03	0.0
% Organic Sulfur (diff)	0.66	0.7
% Total Sulfur	0.78	0.8

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Manager, Denver Laboratory

Prepared for

Kaiser Steel Corporation

300 Lakeside Drive

P.O. Box 58

Oakland, California 94604

ANALYSES OF VARIOUS ROCK TYPES

Sunnyside, Utah

March 10, 1983

Prepared By

ACZ INC.
Engineering & Environmental Division
737 Lincoln Avenue
P.O. Box 774018
Steamboat Springs, Colorado 80477

VI-45

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INTRODUCTION

At the direction of Mr. Robert Turner of Kaiser Steel Corporation, ACZ INC. studied the analytical results of various rock types for a planned underground mining project near Sunnyside, Utah. The actual analytical work for the various samples was conducted by Bookcliffs Commercial Laboratories, a division of ACZ INC., located in Steamboat Springs, Colorado.

The parameters analyzed along with the procedures used in the testing are set forth in Table 1, List of Parameters and Procedures. The State of Utah - Division of Oil, Gas, and Mining indicated that Kaiser Steel Corporation should analyze roof, floor, and rock tunnel samples for these parameters. All heavy metal analyses were conducted according to E.P. toxicity procedures.

Mr. Alan Czarnowsky, a Principal Engineer for ACZ INC., analyzed and summarized the testing data according to soils and overburden toxicity limitations set forth by the Montana Department of State Lands, by the Wyoming Department of Environmental Quality, Land Quality Division, and/or by Gough and Skocklette (1976). The work by ACZ INC. was directed at determining potential toxicity to revegetation and also at assessing possible water quality degradation to either surface or groundwater.

SUMMARY

The various strata from two (2) Kaiser Steel Corporation drill holes near Sunnyside, Utah were selected to be analyzed for parameters set forth by State of Utah - Division of Oil, Gas, and Mining. These two drill holes are as follows:

- Drill Hole KSC-S-24
- Drill Hole KSC-S-25

Eleven (11) different zones were identified by Kaiser Steel Corporation to correspond to roof and floor areas or merely rock material to be removed during construction of rock entries.

The analyses of the eleven (11) zones show that with the exception of two (2) zones, no acid-forming, toxic-forming, or alkaline-forming rock exists. The two (2) exceptions are:

- Zone 10
- Zone 11

In Zone 10, relatively high amounts of boron were present. If this material were placed on the surface, the high amounts of boron could be detrimental to plant growth. In Zone 11, high amounts of boron and high values for sodium absorption ratio were found. As in Zone 10, the high values of boron and S.A.R. indicate a salt problem. If this material containing high boron and high S.A.R. were placed on the surface, it would be detrimental to revegetation efforts.

Although not considered to be a problem at this time, somewhat high levels of iron and nickel were found throughout the samples. No suspect levels for plant toxicity with respect to iron and nickel were identified; therefore, it is assumed that these values would not be detrimental to plant re-establishment. With regard to water quality, the iron and nickel will probably prove to be water-soluble. Kaiser Steel Corporation might encounter high values of iron and nickel in any

groundwater sampling; however, no drinking water standards should be exceeded even if iron and nickel are leached out from the rock. Any water discharge from the proposed mining areas must be maintained in compliance with National Pollutant Discharge Elimination System standards, which limit the iron levels in the water discharge.

Because most parameters analyzed show no values which potentially could be acid-forming, toxic-forming, or alkaline-forming, Kaiser Steel Corporation should request that future analytical work on the rock in the roof, floor or from the actual development of the rock tunnel be limited to a few selected parameters. Kaiser Steel Corporation should also suggest to the State of Utah - Division of Oil, Gas, and Mining that slightly different analytical procedures be used for any additional testing.

USE OF E.P. TOXICITY TEST FOR ROCK SAMPLES IN UTAH

The E.P. Toxicity test is generally recommended by the Environmental Protection Agency as an extraction procedure for samples from land-fill areas, smelter and mill tailings, toxic wastes, and other similar areas.

E.P. Toxicity extraction tests are generally run where acid or acid-forming conditions might prevail or be prevalent. These conditions are generally not found in the area around Sunnyside, Utah. Therefore, the use of the E.P. toxicity test will probably show higher concentrations of metals than would be expected under normal alkaline conditions.

ACZ INC. would recommend that on any future testing, the E.P. toxicity test not be used for samples, but rather the following standard extraction procedures for the various heavy metals should be used:

- As - DTPA or AB-DTPA Extraction
- Cd - DTPA or AB-DTPA Extraction
- Cu - DTPA or AB-DTPA Extraction
- Fe - DTPA or AB-DTPA Extraction
- Pb - DTPA or AB-DTPA Extraction
- Mn - DTPA or AB-DTPA Extraction
- Ni - DTPA or AB-DTPA Extraction
- Zn - DTPA or AB-DTPA Extraction
- B - Hot Water Extraction
- Se - Hot Water Extraction
- Mo - Acid Ammonia Oxalate Extraction
- Hg - Acid Extraction

DETAILED ANALYSES

From two Kaiser Steel Corporation drill holes near Sunnyside, Utah, a total of twenty-four (24) samples were taken from various strata encountered. Thirty (30) parameters were analyzed to produce a total of 720 different analyses.

The various strata were grouped into eleven (11) zones in order to correspond to roof, floor, and rock entry material. The zone classifications set forth in Table 2, Breakdown of Zones.

The analyses of the independent zones for the various parameters tested are set forth in the discussion below.

Zone 1

There are no problems with regard to plant toxicity or water quality based on the analyses run for the samples in Zone 1 with the possible exception of Manganese (Mn). The mean value for the various parameters along with the maximum and minimum values is set forth in Table 3, Zone 1 - Analytical Summary. Suspect levels along with general comments and recommendations are also included in Table 3.

The mean value for Manganese in Zone 1 was 79.6 ppm with a maximum value of 194 ppm being recorded. Rock with this level of Manganese can be considered detrimental to revegetation. However, because Manganese levels in other zones are quite low, the dilution of rock material through normal operations will cause the overall level of Manganese to be within acceptable limits.

Zone 2

There are no problems with regard to plant toxicity or water quality based on the analyses run for the samples in Zone 2. The mean value for the various parameters along with the maximum and minimum values is set

forth in Table 4, Zone 2 - Analytical Summary. Suspect levels along with general comments and recommendations are also included in Table 4.

Zone 3

There are no problems with regard to plant toxicity or water quality based on the analyses run for the samples in Zone 3. The mean value for the various parameters along with the maximum and minimum values is set forth in Table 5, Zone 3 - Analytical Summary. Suspect levels along with general comments and recommendations are also included in Table 5.

Zone 4

There are no problems with regard to plant toxicity or water quality based on the analyses run for the samples in Zone 4 with the possible exception of boron. The mean value for the various parameters along with the maximum and minimum values is set forth in Table 6, Zone 4 - Analytical Summary. Suspect levels along with general comments and recommendations are also included in Table 6.

The mean value for boron in Zone 4 was 5.6 ppm with a maximum value of 14.8 ppm being recorded. This maximum value caused the average to slightly exceed the suspect level of 5 ppm set by the Wyoming Department of Environmental Quality, Land Quality Division. Mixing of rock material through normal operations should cause the overall level of boron to be acceptable.

Zone 5

There are no problems with regard to plant toxicity or water quality based on the analyses run for the samples in Zone 5 with the possible exception of boron. The mean value for the various parameters along with the maximum and minimum values is set forth in Table 7, Zone 5 - Analytical Summary. Suspect levels along with general comments and recommendations are also included in Table 7.

The mean value for boron in Zone 5 was 5.7 ppm with a maximum value of 14.8 ppm being recorded. This maximum value caused the average to slightly exceed the suspect level of 5 ppm set by the Wyoming Department of Environmental Quality, Land Quality Division. Mixing of rock material through normal operations should cause the overall level of boron to be acceptable.

Zone 6

There are no problems with regard to plant toxicity or water quality based on the analyses run for the samples in Zone 6. The mean value for the various parameters along with the maximum and minimum values is set forth in Table 8, Zone 6 - Analytical Summary. Suspect levels along with general comments and recommendations are also included in Table 8.

Zone 7

There are no problems with regard to plant toxicity or water quality based on the analyses run for the samples in Zone 7. The mean value for the various parameters along with the maximum and minimum values is set forth in Table 9, Zone 7 - Analytical Summary. Suspect levels along with general comments and recommendations are also included in Table 9.

Zone 8

There are no problems with regard to plant toxicity or water quality based on the analyses run for the samples in Zone 8. The mean value for the various parameters along with the maximum and minimum values is set forth in Table 10, Zone 8 - Analytical Summary. Suspect levels along with general comments and recommendations are also included in Table 10.

Zone 9

There are no problems with regard to plant toxicity or water quality based on the analyses run for the samples in Zone 9 with the possible exception of Acid-Base Potential. The mean value for the various parameters along with the maximum and minimum values is set forth in

Table 11, Zone 9 - Analytical Summary. Suspect levels along with general comments and recommendations are also included in Table 11.

The mean value for Acid-Base Potential in Zone 9 was -0.5. Rock with this value for Acid-Base Potential could be considered as potential for creating water problems and also be detrimental to revegetation. However, because Acid-Base Potential values in other zones are well within acceptable levels, the dilution of rock material through normal operations will cause the overall level of values for Acid-Base Potential to also be acceptable.

Zone 10

There are no problems with regard to plant toxicity or water quality based on the analyses run for the samples in Zone 10, with the exception of boron. The mean value for the various parameters along with the maximum and minimum values is set forth in Table 12, Zone 10 - Analytical Summary. Suspect levels along with general comments and recommendations are also included in Table 12.

The mean value for boron in Zone 10 was 9.1 ppm with a maximum value of 17.8 ppm. According to the Wyoming Department of Environmental Quality, Land Quality Division Guidelines rock material with boron levels greater than 5 ppm can be considered toxic to revegetation efforts. Zone 10 rock material will come from development of a rock entry. Recommendations on handling high boron material are set forth later in this report under the heading - "RECOMMENDATIONS".

Zone 11

There are no problems with regard to plant toxicity or water quality based on the analyses run for the samples in Zone 11, with the exception of boron and S.A.R. The mean value for the various parameters along with the maximum and minimum values is set forth in Table 13, Zone 11 - Analytical Summary. Suspect levels along with general comments and recommendations are also included in Table 13.

The mean value for boron in Zone 11 was 15.0 with a maximum value of 21.4. According to the Wyoming Department of Environmental Quality, Land Quality Division Guidelines rock material with boron levels greater than 5 ppm can be considered toxic to revegetation efforts. Zone 10 rock material will come from development of a rock entry. Recommendations on handling high boron material are set forth later in this report under the heading - "RECOMMENDATIONS".

The mean value for S.A.R. in Zone 11 was 46.1 with a maximum value of 76.5. According to the Wyoming Department of Environmental Quality, Land Quality Division Guidelines rock material with S.A.R. levels greater than 10 can be considered toxic to revegetation efforts. Zone 11 rock material will come from development of a rock entry. Recommendations on handling high S.A.R. material are set forth later in this report under the heading - "RECOMMENDATIONS".

RECOMMENDATIONS

The following are general recommendations with regard to the results set forth in this report:

1. If rock material from Zone 10 or Zone 11 is to be deposited on the surface, it should be buried with a minimum of four (4) feet of inert material in order that revegetation can be accomplished. If a disposal area is available on the Mancos Shale, then Kaiser Steel Corporation might consider placing high boron material on a barren Mancos Shale area. If this type of placement is possible, Kaiser Steel should ask the State of Utah - Division of Oil, Gas, and Mining, to allow placement on barren ground without covering by any inert material. If the salt levels are not critically high, revegetation can possibly be accomplished with the use of salt-tolerant or Atriplex species such as four-winged saltbrush and shadscale saltbrush.

2. To confirm and check the analyses completed on rock material from the two (2) drill holes, Kaiser Steel Corporation might suggest to the State of Utah - Division of Oil, Gas, and Mining that some periodic check samples be taken. These periodic samplings would be completed to predict if high boron or S.A.R. material is to be placed on the surface. Hopefully, no covering of inert material would be necessary if additional test samples indicate an overall dilution of boron and S.A.R. levels in all rock removed under normal operations.

3. Future testing of rock material from the roof and floor and rock entries at the Kaiser Steel Corporation project can possibly be limited to the following parameters:

Boron	S.A.R.
Calcium	Iron
Sodium	Nickel
Magnesium	Electrical Conductivity

These parameters are the ones that might be suspect for revegetation or water quality problems. This suggestion should be discussed with the State of Utah - Division of Oil, Gas, and Mining.

4. Any future heavy metal analytical work should be conducted in accordance with the following procedures rather than the E.P. toxicity test.

- As - DTPA or AB-DTPA Extraction
- Cd - DTPA or AB-DTPA Extraction
- Cu - DTPA or AB-DTPA Extraction
- Fe - DTPA or AB-DTPA Extraction
- Pb - DTPA or AB-DTPA Extraction
- Mn - DTPA or AB-DTPA Extraction
- Ni - DTPA or AB-DTPA Extraction
- Zn - DTPA or AB-DTPA Extraction
- B - Hot Water Extraction
- Se - Hot Water Extraction
- Mo - Acid Ammonia Oxalate Extraction
- Hg - Acid Extraction

This suggestion should also be discussed with the State of Utah - Division of Oil, Gas, and Mining.

BIBLIOGRAPHY

Gough, L. P. and H. T. Skocklette, 1976, Toxicity of Selected Elements to Plants, Animals, and Man; U.S. Geological Survey, Open File Report No. 76-746, 46 pp.

Mountana Department of State Lands; Reclamation Division Soils and Overburden Guidelines.

Wyoming Department of Environment Quality, Land Quality Division, Guidelines 1-3.

Table 1 - Part 1

LIST OF PARAMETERS AND PROCEDURES

Parameter	Procedure
pH	Saturated Paste Extraction, "USDA Handbook No. 60"
E.C.	Saturated Paste Extraction, "USDA Handbook No. 60"
Sat %	Saturated Paste Extraction, "USDA Handbook No. 60"
Ca	Saturated Paste Extraction, AA-Flame, "USDA Handbook No. 60"
Mg	Saturated Paste Extraction, "USDA Handbook No. 60"
Na	Saturated Paste Extraction, "USDA Handbook No. 60"
S.A.R.	Saturated Paste Extraction, "USDA Handbook No. 60"
Sand %	Particle Size by Hydrometer, "USDA Handbook No. 60"
Silt %	Particle Size by Hydrometer, "USDA Handbook No. 60"
Clay %	Particle Size by Hydrometer, "USDA Handbook No. 60"
As	EP Toxicity Test, AA-Furnace, CFR 40, Part 261
Cd	EP Toxicity Test, AA-Flame, CFR 40, Part 261
Cu	EP Toxicity Test, AA-Flame, CFR 40, Part 261
Fe	EP Toxicity Test, AA-Flame, CFR 40, Part 261
Pb	EP Toxicity Test, AA-Flame, CFR 40, Part 261
Mn	EP Toxicity Test, AA-Flame, CFR 40, Part 261
Hg	EP Toxicity Test, AA-Cold Vapor, CFR 40, Part 261
Mo	EP Toxicity Test, AA-Flame, CFR 40, Part 261
Ni	EP Toxicity Test, AA-Flame, CFR 40, Part 261
Se	EP Toxicity Test, AA-Furnace, CFR 40, Part 261

Table 1 - Part 2

LIST OF PARAMETERS AND PROCEDURES

Parameter	Procedure
B	EP Toxicity Test, Azo-H Colorimetric, CFR 40, Part 216
F	EP Toxicity Test, Complexone Colorimetric, CFR 40, Part 261
Organic Sulfur	Forms of Sulfur in Coal, ASTM D 2492-68
Pyritic Sulfur	Forms of Sulfur in Coal, ASTM D 2492-68
Sulfate Sulru	Forms of Sulfur in Coal, ASTM D 2492-68
Total Sulfur	Total Sulfur by Eschka Method, ASTM D 3177-75
Neut. Pot.	Alkaline-Earth Carbonates by Gravimetric Loss ofCo_2, USDA Handbook No. 60
Acid Pot.	Calculation from Total-Sulfate Sulfur
Base Pot.	Calculation from Neutralization Potential
Acid-Base Potential	Calculation from Acid and Base Potential

Table 2

BREAKDOWN OF ROCK ZONES

Zone 1	Samples 13, 12, 11, 10 (Hole 24)	Rock tunnel
Zone 2	Samples 9, 8A (Hole 24)	Rock tunnel
Zone 3	Samples 8, 7, 6 (Hole 25)	Rock tunnel
Zone 4	Samples 13, 12, 11, 10 (Hole 24) Samples 9, 8A (Hole 24)	Rock tunnel
Zone 5	Samples 13, 12, 11, 10 (Hole 24) Samples 9, 8A (Hole 24) Samples 8, 7, 6 (Hole 25)	Rock tunnel
Zone 6	Samples 8, 7, 7A (Hole 24)	Roof & Floor
Zone 7	Samples 5, 4 (Hole 25)	Roof & Floor
Zone 8	Samples 8, 7, 7A (Hole 24) Samples 5, 4 (Hole 25)	Roof & Floor
Zone 9	Sample 6 (Hole 24) Sample 3 (Hole 25)	Top of Sunnyside Sandstone; Rock Tunnel
Zone 10	Samples 2, 1, 1A (Hole 25)	Lower Part of Sunnyside Sandstone; Rock Tunnel
Zone 11	Samples 5, 4, 3, 2, 1 (Hole 24)	Lower Part of Kenilworth Sandstone (Transition zone with Mancos Shale); Rock tunnel

Table 3

ZONE 1 - ANALYTICAL SUMMARY

KAISER STEEL CORPORATION

Sunnyside, Utah

Parameter	Arithmetic Mean	Maximum Value	Minimum Value	Accepted Suitability	Problems Expected	Recommendations
pH	7.5	7.9	7.3	5.0-9.0 (Wyoming DEQ)	None	None
E.C.	3.7	6.5	1.9	Values <8.0 (Wyoming DEQ)	None	None
Sat %	27	31	23	25-80 (Wyoming DEQ)	None	None
Ca	18.7	29.0	7.6	(See notes on S.A.R.)		
Mg	17.6	28.2	8.9	(See notes on S.A.R.)		
Na	3.7	4.9	2.4	(See notes on S.A.R.)		
S.A.R.	0.9	1.3	0.7	Values <10.0 (Wyoming DEQ)	None	None
Sand %	50	68	14	Values <85% (Wyoming DEQ)	None	None
Silt %	32	51	23	No suspect levels found	None	None--Sand & Clay % are OK
Clay %	19	35	8	Values <50% (Wyoming DEQ)	None	None
As (ppm)	<0.04	---	---	Values <40 ppm (Gough & Skocklette)	None	None
Cd (ppm)	0.25	0.38	0.10	Values <1.0 ppm (Montana DSL)	None	None

Table 3 (Continued)

ZONE 1 - ANALYTICAL SUMMARY

KAISER STEEL CORPORATION

Sunnyside, Utah

Parameter	Arithmetic Mean	Maximum Value	Minimum Value	Accepted Suitability	Problems Expected	Recommendations
Cu (ppm)	0.55	1.0	<0.4	Values <40 ppm (Montana DSL)	None	None
Fe (ppm)	124.8	414	1.6	No suspect level found	None Expected	Fe is regulated in water discharge by NPDES permit
Pb (ppm)	3.28	6.4	1.2	Values <20 ppm (Montana DSL)	None	None
Mn (ppm)	79.6	194	22.8	Values <60 ppm (Montana DSL)	Possible plant toxicity	Mixing of all rock material from other zones should dilute high values
Hg (ppm)	<0.02	---	---	Values <0.5 ppm (Montana DSL)	None	None
Mo (ppm)	<4	---	---	Values <1.0 ppm (Montana DSL)	None Expected	Detection limits with flame too high--need to use HGA Furnace
Ni (ppm)	2.15	3.6	0.4	Values <1.0 ppm (Montana DSL)	None Expected	Ni may leach out with groundwater but no drinking water prob.
Se (ppm)	<0.04	---	---	Values <2.0 ppm (Wyoming DEQ)	None	None
Zn (ppm)	2.88	4.53	1.50	No suspect level found	None Expected	None--low values

Table 3 (Continued)

ZONE 1 - ANALYTICAL SUMMARY

KAISER STEEL CORPORATION

Sunnyside, Utah

Parameter	Arithmetic Mean	Maximum Value	Minimum Value	Accepted Suitability	Problems Expected	Recommendations
B (ppm)	6.7	14.8	1.4	Values <8.0 ppm (Montana DSL) Values <5.0 ppm (Wyoming DEQ)	None	None
F (ppm)	4.4	7.2	2.8	No suspect levels found	None	None--low values
Organic Sulfur	0.13	0.24	0.05	No suspect levels found	None	None--low values with neutral pH
Pyritic Sulfur	0.12	0.35	<0.01	No suspect levels found	None	None--low values with neutral pH
Sulfate Sulfur	0.16	0.59	<0.01	No suspect levels found	None	None--low values with neutral pH
Total Sulfur	0.40	0.83	0.05	No suspect levels found	None	None--low values with neutral pH
Neut. Pot.	16.1	32.3	8.6	(See notes on acid-base potential)		
Acid Pot.	8	16	2	(See notes on acid-base potential)		
Base Pot.	161	323	86	(See notes on acid-base potential)		
Acid-Base Potential	153	321	70	Values <-5 (Wyoming DEQ)	None	None

Table 4

ZONE 2 - ANALYTICAL SUMMARY

KAISER STEEL CORPORATION

Sunnyside, Utah

Parameter	Arithmetic Mean	Maximum Value	Minimum Value	Accepted Suitability	Problems Expected	Recommendations
pH	7.55	7.6	7.5	5.0-9.0 (Wyoming DEQ)	None	None
E.C.	2.4	2.5	2.3	Values <8.0 (Wyoming DEQ)	None	None
Sat %	26.5	27	26	25-80 (Wyoming DEQ)	None	None
Ca	18.1	18.9	17.3	(See notes on S.A.R.)		
Mg	13.7	16.6	10.8	(See notes on S.A.R.)		
Na	2.0	2.1	1.8	(See notes on S.A.R.)		
S.A.R.	0.5	0.6	0.4	Values <10.0 (Wyoming DEQ)	None	None
Sand %	76.5	79	74	Values <85% (Wyoming DEQ)	None	None
Silt %	13.5	16	11	No suspect levels found	None	None--Sand & Clay % are OK
Clay %	10	10	10	Values <50% (Wyoming DEQ)	None	None
As (ppm)	<0.04	---	---	Values <40 ppm (Gough & Skocklette)	None	None
Cd (ppm)	0.10	0.10	<0.10	Values <1.0 ppm (Montana DSL)	None	None

Table 4 (Continued)

ZONE 2 - ANALYTICAL SUMMARY

KAISER STEEL CORPORATION

Sunnyside, Utah

Parameter	Arithmetic Mean	Maximum Value	Minimum Value	Accepted Suitability	Problems Expected	Recommendations
Cu (ppm)	<0.4	---	---	Values <40 ppm (Montana DSL)	None	None
Fe (ppm)	64	100	28	No suspect level found	None Expected	Fe is regulated in water discharge by NPDES permit
Pb (ppm)	1.3	2.2	0.4	Values <20 ppm (Montana DSL)	None	None
Mn (ppm)	10.7	17.0	4.4	Values <60 ppm (Montana DSL)	None	None
Hg (ppm)	<0.02	---	---	Values <0.5 ppm (Montana DSL)	None	None
Mo (ppm)	<4	---	---	Values <1.0 ppm (Montana DSL)	None Expected	Detection limits with flame too high--need to use HGA Furnace
Ni (ppm)	0.5	0.6	0.4	Values <1.0 ppm (Montana DSL)	None Expected	Ni may leach out with groundwater but no drinking water prob.
Se (ppm)	<0.04	---	---	Values <2.0 ppm (Wyoming DEQ)	None	None
Zn (ppm)	1.39	1.72	1.06	No suspect level found	None Expected	None--low values

Table 4 (Continued)

ZONE 2 - ANALYTICAL SUMMARY

KAISER STEEL CORPORATION

Sunnyside, Utah

Parameter	Arithmetic Mean	Maximum Value	Minimum Value	Accepted Suitability	Problems Expected	Recommendations
B (ppm)	3.4	5.4	1.4	Values <8.0 ppm (Montana DSL) Values <5.0 ppm (Wyoming DEQ)	None	None
F (ppm)	0.4	0.4	<0.4	No suspect levels found	None	None--low values
Organic Sulfur	0.10	0.11	0.08	No suspect levels found	None	None--low values with neutral pH
Pyritic Sulfur	0.05	0.07	0.03	No suspect levels found	None	None--low values with neutral pH
Sulfate Sulfur	<0.01	---	---	No suspect levels found	None	None--low values with neutral pH
Total Sulfur	0.15	0.18	0.11	No suspect levels found	None	None--low values with neutral pH
Neut. Pot.	3.5	4.0	2.9	(See notes on acid-base potential)		
Acid Pot.	4.5	6	3	(See notes on acid-base potential)		
Base Pot.	35	40	29	(See notes on acid-base potential)		
Acid-Base Potential	30	34	26	Values <-5 (Wyoming DEQ)	None	None

Table 5

ZONE 3 - ANALYTICAL SUMMARY

KAISER STEEL CORPORATION

Sunnyside, Utah

Parameter	Arithmetic Mean	Maximum Value	Minimum Value	Accepted Suitability	Problems Expected	Recommendations
pH	7.5	7.7	7.2	5.0-9.0 (Wyoming DEQ)	None	None
E.C.	3.4	4.6	2.3	Values <8.0 (Wyoming DEQ)	None	None
Sat %	24	25	22	25-80 (Wyoming DEQ)		No real problems expected
Ca	21.3	26.2	12.7	(See notes on S.A.R.)		
Mg	29.0	42.3	17.4	(See notes on S.A.R.)		
Na	2.0	2.3	1.7	(See notes on S.A.R.)		
S.A.R.	0.4	0.4	0.4	Values <10.0 (Wyoming DEQ)	None	None
Sand %	84	86	80	Values <85% (Wyoming DEQ)	None	None
Silt %	10	14	8	No suspect levels found	None	None--Sand & Clay % are OK
Clay %	6	7	5	Values < 50% (Wyoming DEQ)	None	None
As (ppm)	<0.04	---	---	Values <40 ppm (Gough & Skocklette)	None	None
Cd (ppm)	<0.10	---	---	Values <1.0 ppm (Montana DSL)	None	None

Table 5 (Continued)

ZONE 3 - ANALYTICAL SUMMARY

KAISER STEEL CORPORATION

Sunnyside, Utah

Parameter	Arithmetic Mean	Maximum Value	Minimum Value	Accepted Suitability	Problems Expected	Recommendations
Cu (ppm)	0.40	0.40	<0.40	Values <40 ppm (Montana DSL)	None	None
Fe (ppm)	77.2	109	60.9	No suspect level found	None Expected	Fe is regulated in water discharge by NPDES permit
Pb (ppm)	<0.4	---	---	Values <20 ppm (Montana DSL)	None	None
Mn (ppm)	11.6	12.6	10.6	Values <60 ppm (Montana DSL)	None	None
Hg (ppm)	<0.02	---	---	Values <0.5 ppm (Montana DSL)	None	None
Mo (ppm)	<4	---	---	Values <1.0 ppm (Montana DSL)	None Expected	Detection limits with flame too high--need to use HGA Furnace
Ni (ppm)	0.67	1.0	0.4	Values <1.0 ppm (Montana DSL)	None	None
Se (ppm)	<0.04	---	---	Values <2.0 ppm (Wyoming DEQ)	None	None
Zn (ppm)	1.40	1.86	1.14	No suspect level found	None Expected	None--low values

Table 5 (Continued)

ZONE 3 - ANALYTICAL SUMMARY

KAISER STEEL CORPORATION

Sunnyside, Utah

Parameter	Arithmetic Mean	Maximum Value	Minimum Value	Accepted Suitability	Problems Expected	Recommendations
B (ppm)	5.9	7.0	3.7	Values <8.0 ppm (Montana DSL) Values <5.0 ppm (Wyoming DEQ)	None	None
F (ppm)	1.5	1.8	1.2	No suspect levels found	None	None--low values
Organic Sulfur	0.06	0.07	0.05	No suspect levels found	None	None--low values with neutral pH
Pyritic Sulfur	0.07	0.12	0.05	No suspect levels found	None	None--low values with neutral pH
Sulfate Sulfur	<0.01	---	---	No suspect levels found	None	None--low values with neutral pH
Total Sulfur	0.14	0.19	0.10	No suspect levels found	None	None--low values with neutral pH
Neut. Pot.	4.0	5.3	2.3	(See notes on acid-base potential)		
Acid Pot.	4	6	3	(See notes on acid-base potential)		
Base Pot.	40	53	23	(See notes on acid-base potential)		
Acid-Base Potential	36	50	17	Values <-5 (Wyoming DEQ)	None	None

Table 6

ZONE 4 - ANALYTICAL SUMMARY

KAISER STEEL CORPORATION

Sunnyside, Utah

Parameter	Arithmetic Mean	Maximum Value	Minimum Value	Accepted Suitability	Problems Expected	Recommendations
pH	7.5	7.9	7.3	5.0-9.0 (Wyoming DEQ)	None	None
E.C.	3.3	6.5	1.9	Values <8.0 (Wyoming DEQ)	None	None
Sat %	27	31	23	25-80 (Wyoming DEQ)	None	None
Ca	18.5	29.0	7.6	(See notes on S.A.R.)		
Mg	16.3	28.2	8.9	(See notes on S.A.R.)		
Na	3.1	4.9	1.8	(See notes on S.A.R.)		
S.A.R.	0.9	1.3	0.4	Values <10.0 (Wyoming DEQ)	None	None
Sand %	59	79	14	Values <85% (Wyoming DEQ)	None	None
Silt %	26	51	11	No suspect levels found	None	None--Sand & Clay % are OK
Clay %	16	35	8	Values <50% (Wyoming DEQ)	None	None
As (ppm)	<0.04	---	---	Values <40 ppm (Gough & Skocklette)	None	None
Cd (ppm)	0.20	0.38	<0.10	Values <1.0 ppm (Montana DSL)	None	None

Table 6 (Continued)

ZONE 4 - ANALYTICAL SUMMARY

KAISER STEEL CORPORATION

Sunnyside, Utah

Parameter	Arithmetic Mean	Maximum Value	Minimum Value	Accepted Suitability	Problems Expected	Recommendations
Cu (ppm)	0.50	1.0	<0.40	Values <40 ppm (Montana DSL)	None	None
Fe (ppm)	104.5	414	1.60	No suspect level found	None Expected	Fe is regulated in water discharge by NPDES permit
Pb (ppm)	2.62	6.4	0.4	Values <20 ppm (Montana DSL)	None	None
Mn (ppm)	56.6	194	4.4	Values <60 ppm (Montana DSL)	Possible Plant Toxicity	Mixing of all rock material from other zones should dilute high value of 194
Hg (ppm)	<0.02	---	---	Values <0.5 ppm (Montana DSL)	None	None
Mo (ppm)	<4	---	---	Values <1.0 ppm (Montana DSL)	None Expected	Detection limits with flame too high--need to use HGA Furnace
Ni (ppm)	1.6	3.6	0.4	Values <1.0 ppm (Montana DSL)	None Expected	Ni may leach out with groundwater but no drinking water prob.
Se (ppm)	<0.04	---	---	Values <2.0 ppm (Wyoming DEQ)	None	None
Zn (ppm)	2.39	4.53	1.06	No suspect level found	None Expected	None--low values

Table 6 (Continued)

ZONE 4 - ANALYTICAL SUMMARY

KAISER STEEL CORPORATION

Sunnyside, Utah

Parameter	Arithmetic Mean	Maximum Value	Minimum Value	Accepted Suitability	Problems Expected	Recommendations
B (ppm)	5.6	14.8	1.4	Values <8.0 ppm (Montana DSL) Values <5.0 ppm (Wyoming DEQ)	None or Minor	Mixing of rock will dilute high value of 14.8
F (ppm)	3.1	7.2	<0.4	No suspect levels found	None	None--low values
Organic Sulfur	0.12	0.24	0.05	No suspect levels found	None	None--low values with neutral pH
Pyritic Sulfur	0.10	0.35	<0.01	No suspect levels found	None	None--low values with neutral pH
Sulfate Sulfur	0.11	0.59	<0.01	No suspect levels found		None--low values with neutral pH
Total Sulfur	0.31	0.83	0.05	No suspect levels found	None	None--low values with neutral pH
Neut. Pot.	11.9	32.3	2.9	(See notes on acid-base potential)		
Acid Pot.	7	16	2	(See notes on acid-base potential)		
Base Pot.	119	323	29	(See notes on acid-base potential)		
Acid-Base Potential	112	321	26	Values <-5 (Wyoming DEQ)	None	None

Table 7

ZONE 5 - ANALYTICAL SUMMARY

KAISER STEEL CORPORATION

Sunnyside, Utah

Parameter	Arithmetic Mean	Maximum Value	Minimum Value	Accepted Suitability	Problems Expected	Recommendations
pH	7.5	7.9	7.2	5.0-9.0 (Wyoming DEQ)	None	None
E.C.	3.3	6.5	1.9	Values <8.0 (Wyoming DEQ)	None	None
Sat %	26	31	22	25-80 (Wyoming DEQ)	None	None
Ca	19.5	29.0	7.6	(See notes on S.A.R.)		
Mg	20.5	42.3	8.9	(See notes on S.A.R.)		
Na	2.8	4.9	1.7	(See notes on S.A.R.)		
S.A.R.	0.7	1.3	0.4	Values <10.0 (Wyoming DEQ)	None	None
Sand %	67	86	14	Values <85% (Wyoming DEQ)	None	None
Silt %	20	51	8	No suspect levels found	None	None--Sand & Clay % are OK
Clay %	13	35	5	Values <50% (Wyoming DEQ)	None	None
As (ppm)	<0.04	---	---	Values <40 ppm (Gough & Skocklette)	None	None
Cd (ppm)	0.17	0.38	<0.10	Values <1.0 ppm (Montana DSL)	None	None

Table 7 (Continued)

ZONE 5 - ANALYTICAL SUMMARY

KAISER STEEL CORPORATION

Sunnyside, Utah

Parameter	Arithmetic Mean	Maximum Value	Minimum Value	Accepted Suitability	Problems Expected	Recommendations
Cu (ppm)	0.47	1.0	<0.40	Values <40 ppm (Montana DSL)	None	None
Fe (ppm)	95.4	414	1.60	No suspect level found	None Expected	Fe is regulated in water discharge by NPDES permit
Pb (ppm)	1.9	6.4	0.4	Values <20 ppm (Montana DSL)	None	None
Mn (ppm)	41.6	194	4.4	Values <60 ppm (Montana DSL)	Possible Plant Toxicity	Mixing of all rock material from other zones should dilute high value of 194
Hg (ppm)	<0.02	---	---	Values <0.5 ppm (Montana DSL)	None	None
Mo (ppm)	<4	---	---	Values <1.0 ppm (Montana DSL)	None Expected	Detection limits with flame too high--need to use HGA Furnace
Ni (ppm)	1.29	3.6	0.4	Values <1.0 ppm (Montana DSL)	None Expected	Ni may leach out with groundwater but no drinking water prob.
Se (ppm)	<0.04	---	---	Values <2.0 ppm (Wyoming DEQ)	None	None
Zn (ppm)	2.06	4.53	1.06	No suspect level found	None Expected	None--low values

Table 7 (Continued)

ZONE 5 - ANALYTICAL SUMMARY

KAISER STEEL CORPORATION

Sunnyside, Utah

Parameter	Arithmetic Mean	Maximum Value	Minimum Value	Accepted Suitability	Problems Expected	Recommendations
B (ppm)	5.7	14.8	1.4	Values <8.0 ppm (Montana DSL) Values <5.0 ppm (Wyoming DEQ)	None or Minor	Mixing of rock should dilute high value of 14.8
F (ppm)	2.6	7.2	<0.4	No suspect levels found	None	None--low values
Organic Sulfur	0.10	0.24	0.05	No suspect levels found	None	None--low values with neutral pH
Pyritic Sulfur	0.09	0.35	<0.01	No suspect levels found	None	None--low values with neutral pH
Sulfate Sulfur	0.07	0.59	<0.01	No suspect levels found	None	None--low values with neutral pH
Total Sulfur	0.25	0.83	0.05	No suspect levels found	None	None--low values with neutral pH
Neut. Pot.	9.2	32.3	2.3	(See notes on acid-base potential)		
Acid Pot.	6	16	2	(See notes on acid-base potential)		
Base Pot.	92	323	23	(See notes on acid-base potential)		
Acid-Base Potential	86	321	17	Values <-5 (Wyoming DEQ)	None	None

Table 8

ZONE 8 - ANALYTICAL SUMMARY

KAISER STEEL CORPORATION

Sunnyside, Utah

Parameter	Arithmetic Mean	Maximum Value	Minimum Value	Accepted Suitability	Problems Expected	Recommendations
pH	6.9	7.3	6.7	5.0-9.0 (Wyoming DEQ)	None	None
E.C.	4.4	5.8	3.3	Values <8.0 (Wyoming DEQ)	None	None
Sat %	28	31	26	25-80 (Wyoming DEQ)	None	None
Ca	25.5	27.5	22.6	(See notes on S.A.R.)		
Mg	43.7	71.4	23.2	(See notes on S.A.R.)		
Na	3.8	6.2	2.0	(See notes on S.A.R.)		
S.A.R.	0.7	1.1	0.4	Values <10.0 (Wyoming DEQ)	None	None
Sand %	60	79	42	Values <85% (Wyoming DEQ)	None	None
Silt %	25	39	14	No suspect levels found	None	None--Sand & Clay % are OK
Clay %	15	19	7	Values <50% (Wyoming DEQ)	None	None
As (ppm)	<0.04	---	---	Values <40 ppm (Gough & Skocklette)	None	None
Cd (ppm)	0.11	0.12	<0.10	Values <1.0 ppm (Montana DSL)	None	None

Table 8 (Continued)

ZONE 6 - ANALYTICAL SUMMARY

KAISER STEEL CORPORATION

Sunnyside, Utah

Parameter	Arithmetic Mean	Maximum Value	Minimum Value	Accepted Suitability	Problems Expected	Recommendations
Cu (ppm)	0.53	0.80	<0.40	Values <40 ppm (Montana DSL)	None	None
Fe (ppm)	40.7	52.6	30.2	No suspect level found	None Expected	Fe is regulated in water discharge by NPDES permit
Pb (ppm)	1.5	2.0	0.6	Values <20 ppm (Montana DSL)	None	None
Mn (ppm)	29.1	73.8	6.2	Values <60 ppm (Montana DSL)	Possible Plant Toxicity	Mixing of all rock material from other zones should dilute high values
Hg (ppm)	<0.02	---	---	Values <0.5 ppm (Montana DSL)	None	None
Mo (ppm)	<4	---	---	Values <1.0 ppm (Montana DSL)	None Expected	Detection limits with flame too high--need to use HGA Furnace
Ni (ppm)	1.7	2.4	<0.40	Values <1.0 ppm (Montana DSL)	None Expected	Ni may leach out with groundwater but no drinking water prob.
Se (ppm)	0.04	0.04	<0.04	Values <2.0 ppm (Wyoming DEQ)	None	None
Zn (ppm)	2.47	4.34	1.02	No suspect level found	None Expected	None--low values

Table 8 (Continued)

ZONE 6 - ANALYTICAL SUMMARY

KAISER STEEL CORPORATION

Sunnyside, Utah

Parameter	Arithmetic Mean	Maximum Value	Minimum Value	Accepted Suitability	Problems Expected	Recommendations
B (ppm)	3.7	5.4	1.8	Values <8.0 ppm (Montana DSL) Values <5.0 ppm (Wyoming DEQ)	None	None
F (ppm)	0.7	1.0	<0.4	No suspect levels found	None	None--low values
Organic Sulfur	0.26	0.52	0.11	No suspect levels found	None	None--low values with neutral pH
Pyritic Sulfur	0.36	0.74	0.05	No suspect levels found	None	None--low values with neutral pH
Sulfate Sulfur	<0.01	---	---	No suspect levels found	None	None--low values with neutral pH
Total Sulfur	0.62	1.26	0.19	No suspect levels found	None	None--low values with neutral pH
Neut. Pot.	6.8	15.6	1.1	(See notes on acid-base potential)		
Acid Pot.	19	39	6	(See notes on acid-base potential)		
Base Pot.	68	156	11	(See notes on acid-base potential)		
Acid-Base Potential	49	117	-2	Values <-5 (Wyoming DEQ)	None	None

Table 9

ZONE 7 - ANALYTICAL SUMMARY

KAISER STEEL CORPORATION

Sunnyside, Utah

Parameter	Arithmetic Mean	Maximum Value	Minimum Value	Accepted Suitability	Problems Expected	Recommendations
pH	7.15	7.2	7.1	5.0-9.0 (Wyoming DEQ)	None	None
E.C.	3.7	4.4	3.0	Values <8.0 (Wyoming DEQ)	None	None
Sat %	27	27	27	25-80 (Wyoming DEQ)	None	None
Ca	20.7	27.8	13.5	(See notes on S.A.R.)		
Mg	37.8	48.1	27.4	(See notes on S.A.R.)		
Na	2.5	2.8	2.1	(See notes on S.A.R.)		
S.A.R.	0.5	0.6	0.3	Values <10.0 (Wyoming DEQ)	None	None
Sand %	64	70	57	Values <85% (Wyoming DEQ)	None	None
Silt %	22	25	18	No suspect levels found	None	None--Sand & Clay % are OK
Clay %	15	18	12	Values <50% (Wyoming DEQ)	None	None
As (ppm)	<0.04	---	---	Values <40 ppm (Gough & Skocklette)	None	None
Cd (ppm)	0.15	0.18	0.12	Values <1.0 ppm (Montana DSL)	None	None

Table 9 (Continued)

ZONE 7 - ANALYTICAL SUMMARY

KAISER STEEL CORPORATION

Sunnyside, Utah

Parameter	Arithmetic Mean	Maximum Value	Minimum Value	Accepted Suitability	Problems Expected	Recommendations
Cu (ppm)	1.0	1.0	1.0	Values <40 ppm (Montana DSL)	None	None
Fe (ppm)	64.3	66.4	62.2	No suspect level found	None Expected	Fe is regulated in water discharge by NPDES permit
Pb (ppm)	1.1	1.4	0.8	Values <20 ppm (Montana DSL)	None	None
Mn (ppm)	26.6	29.2	24.0	Values <60 ppm (Montana DSL)	None	None
Hg (ppm)	<0.02	---	---	Values <0.5 ppm (Montana DSL)	None	None
Mo (ppm)	<4	---	---	Values <1.0 ppm (Montana DSL)	None Expected	Detection limits with flame too high--need to use HGA Furnace
Ni (ppm)	2.9	3.6	2.2	Values <1.0 ppm (Montana DSL)	None Expected	Ni may leach out with groundwater but no drinking water prob.
Se (ppm)	<0.04	---	---	Values <2.0 ppm (Wyoming DEQ)	None	None
Zn (ppm)	4.81	6.06	3.56	No suspect level found	None Expected	None--low values

Table 10

ZONE 8 - ANALYTICAL SUMMARY

KAISER STEEL CORPORATION

Sunnyside, Utah

Parameter	Arithmetic Mean	Maximum Value	Minimum Value	Accepted Suitability	Problems Expected	Recommendations
pH	7.0	7.3	6.7	5.0-9.0 (Wyoming DEQ)	None	None
E.C.	4.1	5.8	3.0	Values <8.0 (Wyoming DEQ)	None	None
Sat %	28	31	26	25-80 (Wyoming DEQ)	None	None
Ca	23.5	27.8	13.5	(See notes on S.A.R.)		
Mg	41.3	71.4	23.2	(See notes on S.A.R.)		
Na	3.3	6.2	2.0	(See notes on S.A.R.)		
S.A.R.	0.6	1.1	0.3	Values <10.0 (Wyoming DEQ)	None	None
Sand %	61	79	42	Values <85% (Wyoming DEQ)	None	None
Silt %	24	39	14	No suspect levels found	None	None--Sand & Clay % are OK
Clay %	15	19	7	Values <50% (Wyoming DEQ)	None	None
As (ppm)	<0.04	---	---	Values <40 (Gough & Skocklette)	None	None
Cd (ppm)	0.12	0.18	<0.10	Values <1.0 ppm (Montana DSL)	None	None

Table 9 (Continued)

ZONE 7 - ANALYTICAL SUMMARY

KAISER STEEL CORPORATION

Sunnyside, Utah

Parameter	Arithmetic Mean	Maximum Value	Minimum Value	Accepted Suitability	Problems Expected	Recommendations
B (ppm)	4.5	5.4	3.6	Values <8.0 ppm (Montana DSL) Values <5.0 ppm (Wyoming DEQ)	None	None
F (ppm)	3.2	3.8	2.6	No suspect levels found	None	None--low values
Organic Sulfur	0.23	0.23	0.23	No suspect levels found	None	None--low values with neutral pH
Pyritic Sulfur	0.32	0.37	0.27	No suspect levels found	None	None--low values with neutral pH
Sulfate Sulfur	<0.01	---	---	No suspect levels found	None	None--low values with neutral pH
Total Sulfur	0.58	0.64	0.51	No suspect levels found	None	None--low values with neutral pH
Neut. Pot.	17.8	23.7	11.9	(See notes on acid-base potential)		
Acid Pot.	18	20	16	(See notes on acid-base potential)		
Base Pot.	178	237	119	(See notes on acid-base potential)		
Acid-Base Potential	160	221	99	Values <-5 (Wyoming DEQ)	None	None

Table 10 (Continued)

ZONE 8 - ANALYTICAL SUMMARY

KAISER STEEL CORPORATION

Sunnyside, Utah

Parameter	Arithmetic Mean	Maximum Value	Minimum Value	Accepted Suitability	Problems Expected	Recommendations
Cu (ppm)	0.72	1.00	<0.40	Values <40 ppm (Montana DSL)	None	None
Fe (ppm)	50.2	66.4	30.2	No suspect level found	None Expected	Fe is regulated in water discharge by by NPDES permit
Pb (ppm)	1.4	2.0	0.6	Values <20 ppm (Montana DSL)	None	None
Mn (ppm)	12.3	73.8	6.2	Values <60 ppm (Montana DSL)	Possible Plant Toxicity	Mixing of all rock material from other zones should dilute high value of 73.8
Hg (ppm)	<0.02	---	---	Values <0.5 ppm (Montana DSL)	None	None
Mo (ppm)	<4	---	---	Values <1.0 ppm (Montana DSL)	None Expected	Detection limits with flame too high--need to use HGA Furnace
Ni (ppm)	2.2	3.6	<0.4	Values <1.0 ppm (Montana DSL)	None Expected	Ni may leach out with groundwater but no drinking water prob.
Se (ppm)	<0.04	---	---	Values <2.0 ppm (Wyoming DEQ)	None	None
Zn (ppm)	3.41	6.06	1.02	No suspect level found	None Expected	None--low values

Table 10 (Continued)

ZONE 8 - ANALYTICAL SUMMARY

KAISER STEEL CORPORATION

Sunnyside, Utah

Parameter	Arithmetic Mean	Maximum Value	Minimum Value	Accepted Suitability	Problems Expected	Recommendations
B (ppm)	4.0	5.4	1.8	Values <8.0 ppm (Montana DSL) Values <5.0 ppm (Wyoming DEQ)	None	None
F (ppm)	1.7	3.8	<0.4	No suspect levels found	None	None--low values
Organic Sulfur	0.25	0.52	0.11	No suspect levels found	None	None--low values with neutral pH
Pyritic Sulfur	0.34	0.74	0.05	No suspect levels found	None	None--low values with neutral pH
Sulfate Sulfur	<0.01	---	---	No suspect levels found	None	None--low values with neutral pH
Total Sulfur	0.60	1.26	0.19	No suspect levels found	None	None--low values with neutral pH
Neut. Pot.	11.2	23.7	1.1	(See notes on acid-base potential)		
Acid Pot.	19	39	6	(See notes on acid-base potential)		
Base Pot.	112	237	11	(See notes on acid-base potential)		
Acid-Base Potential	93	221	-2	Values <-5 (Wyoming DEQ)	None	None

Table 11

ZONE 9 - ANALYTICAL SUMMARY

KAISER STEEL CORPORATION

Sunnyside, Utah

Parameter	Arithmetic Mean	Maximum Value	Minimum Value	Accepted Suitability	Problems Expected	Recommendations
pH	7.5	7.7	7.3	5.0-9.0 (Wyoming DEQ)	None	None
E.C.	1.4	1.4	1.4	Values <8.0 (Wyoming DEQ)	None	None
Sat %	26	26	26	25-80 (Wyoming DEQ)	None	None
Ca	5.25	6.3	4.2	(See notes on S.A.R.)		
Mg	8.0	9.1	6.9	(See notes on S.A.R.)		
Na	2.8	3.8	1.7	(See notes on S.A.R.)		
S.A.R.	1.1	1.6	0.6	Values <10.0 (Wyoming DEQ)	None	None
Sand %	76	89	63	Values <85% (Wyoming DEQ)	None	None
Silt %	12	18	6	No suspect levels found	None	None--Sand & Clay % are OK
Clay %	12	19	5	Values <50% (Wyoming DEQ)	None	None
As (ppm)	<0.04	---	---	Values <40 ppm (Gough & Skocklette)	None	None
Cd (ppm)	<0.10	---	---	Values <1.0 ppm (Montana DSL)	None	None

Table 11 (Continued)

ZONE 9 - ANALYTICAL SUMMARY

KAISER STEEL CORPORATION

Sunnyside, Utah

Parameter	Arithmetic Mean	Maximum Value	Minimum Value	Accepted Suitability	Problems Expected	Recommendations
Cu (ppm)	<0.04	---	---	Values <40 ppm (Montana DSL)	None	None
Fe (ppm)	31.5	34.4	28.6	No suspect level found	None Expected	Fe is regulated in water discharge by NPDES permit
Pb (ppm)	0.50	0.60	<0.40	Values <20 ppm (Montana DSL)	None	None
Mn (ppm)	2.00	3.2	0.8	Values <60 ppm (Montana DSL)	None	None
Hg (ppm)	<0.02	---	---	Values <0.5 ppm (Montana DSL)	None	None
Mo (ppm)	<4	---	---	Values <1.0 ppm (Montana DSL)	None Expected	Detection limits with flame too high--need to use HGA Furnace
Ni (ppm)	0.70	1.0	<0.4	Values <1.0 ppm (Montana DSL)	None Expected	Ni may leach out with groundwater but no drinking water prob.
Se (ppm)	0.04	0.04	<0.04	Values <2.0 ppm (Wyoming DEQ)	None	None
Zn (ppm)	1.17	1.30	1.04	No suspect level found	None Expected	None--low values

Table 11 (Continued)

ZONE 9 - ANALYTICAL SUMMARY

KAISER STEEL CORPORATION

Sunnyside, Utah

Parameter	Arithmetic Mean	Maximum Value	Minimum Value	Accepted Suitability	Problems Expected	Recommendations
B (ppm)	2.8	3.8	1.8	Values <8.0 ppm (Montana DSL) Values <5.0 ppm (Wyoming DEQ)	None	None
F (ppm)	1.3	2.2	<0.4	No suspect levels found	None	None--low values
Organic Sulfur	0.06	0.07	0.04	No suspect levels found	None	None--low values with neutral pH
Pyritic Sulfur	0.02	0.03	<0.01	No suspect levels found	None	None--low values with neutral pH
Sulfate Sulfur	<0.01	---	---	No suspect levels found	None	None--low values with neutral pH
Total Sulfur	0.07	0.07	0.07	No suspect levels found	None	None--low values with neutral pH
Neut. Pot.	0.15	0.2	0.1	(See notes on acid-base potential)		
Acid Pot.	2	2	2	(See notes on acid-base potential)		
Base Pot.	1.5	2	1	(See notes on acid-base potential)		
Acid-Base Potential	-0.5	0	-1.0	Values <-5 (Wyoming DEQ)	Minor	Mix this material with rock zones to dilute Low values

Table 12

ZONE 10 - ANALYTICAL SUMMARY

KAISER STEEL CORPORATION

Sunnyside, Utah

Parameter	Arithmetic Mean	Maximum Value	Minimum Value	Accepted Suitability	Problems Expected	Recommendations
pH	7.5	7.8	7.1	5.0-9.0 (Wyoming DEQ)	None	None
E.C.	3.0	3.7	2.6	Values <8.0 (Wyoming DEQ)	None	None
Sat %	27	28	26	25-80 (Wyoming DEQ)	None	None
Ca	14.2	16.1	10.8	(See notes on S.A.R.)		
Mg	18.3	19.9	15.8	(See notes on S.A.R.)		
Na	9.0	14.5	3.6	(See notes on S.A.R.)		
S.A.R.	2.3	3.4	0.9	Values <10.0 (Wyoming DEQ)	None	None
Sand %	64	76	46	Values <85% (Wyoming DEQ)	None	None
Silt %	26	39	16	No suspect levels found	None	None--Sand & Clay % are OK
Clay %	10	15	7	Values <50% (Wyoming DEQ)	None	None
As (ppm)	<0.04	---	---	Values <40 ppm (Gough & Skocklette)	None	None

Table 12 (Continued)

KAISER STEEL CORPORATION

Sunnyside, Utah

Parameter	Arithmetic Mean	Maximum Value	Minimum Value	Accepted Suitability	Problems Expected	Recommendations
Cd (ppm)	0.16	0.20	<0.10	Values <1.0 ppm (Montana DSL)	None	None
Cu (ppm)	0.8	1.0	0.4	Values <40 ppm (Montana DSL)	None	None
Fe (ppm)	220	476	21.4	No suspect level found	None Expected	Fe is regulated in water discharge by NPDES permit
Pb (ppm)	1.6	2.2	0.4	Values <20 ppm (Montana DSL)	None	None
Mn (ppm)	21.5	39.2	2.6	Values <60 ppm (Montana DSL)	None	None
Hg (ppm)	<0.02	---	---	Values <0.5 ppm (Montana DSL)	None	None
Mo (ppm)	<4	---	---	Values <1.0 ppm (Montana DSL)	None Expected	Detection limits with flame too high-need to use HGA Furnace
Ni (ppm)	1.47	2.2	1.0	Values <1.0 ppm (Montana DSL)	None Expected	Ni may leach out with groundwater but no drinking water prob.
Se (ppm)	<0.04	---	---	Values <2.0 ppm (Wyoming DEQ)	None	None
Zn (ppm)	2.53	3.78	1.24	No suspect level found	None Expected	None--low values

Table 12 (Continued)
ZONE 10 - ANALYTICAL SUMMARY
KAISER STEEL CORPORATION
Sunnyside, Utah

Parameter	Arithmetic Mean	Maximum Value	Minimum Value	Accepted Suitability	Problems Expected	Recommendations
B (ppm)	9.1	17.8	1.4	Values <8.0 ppm (Montana DSL) Values <5.0 ppm (Wyoming DEQ)	Possible Plant Toxicity	Bury high boron with with 4 ft. of inert material; plant Atriplex species
F (ppm)	5.5	9.8	3.0	No suspect levels found	None	None--low values
Organic Sulfur	0.08	0.14	0.04	No suspect levels found	None	None--low values with neutral pH
Pyritic Sulfur	0.14	0.30	0.06	No suspect levels found	None	None--low values with neutral pH
Sulfate Sulfur	<0.01	---	---	No suspect levels found	None	None--low values with neutral pH
Total Sulfur	0.22	0.35	0.11	No suspect levels found	None	None--low values with neutral pH
Neut. Pot.	7.8	13.9	0.6	(See notes on acid-base potential)		
Acid Pot.	6	10	3	(See notes on acid-base potential)		
Base Pot.	78	139	6	(See notes on acid-base potential)		
Acid-Base Potential	72	129	0	Values <-5 (Wyoming DEQ)	None	None

Table 13

ZONE 11 - ANALYTICAL SUMMARY

KAISER STEEL CORPORATION

Sunnyside, Utah

Parameter	Arithmetic Mean	Maximum Value	Minimum Value	Accepted Suitability	Problems Expected	Recommendations
pH	8.2	8.7	7.7	5.0-9.0 (Wyoming DEQ)	None	None
E.C.	4.9	6.6	3.2	Values <8.0 (Wyoming DEQ)	None	None
Sat %	28	31	25	25-80 (Wyoming DEQ)	None	None
Ca	6.2	23.1	0.3	(See notes on S.A.R.)		
Mg	5.7	21.6	0.3	(See notes on S.A.R.)		
Na	50.7	68.7	35.1	(See notes on S.A.R.)		
S.A.R.	46.1	76.5	10.4	Values <10.0 (Wyoming DEQ)	Plant Toxicity	Bury high S.A.R. material with 4 ft. of inert material; plant Atriplex species
Sand %	52	62	40	Values <85% (Wyoming DEQ)	None	None
Silt %	29	32	25	No suspect levels found	None	None--Sand & Clay % are OK
Clay %	19	28	13	Values <50% (Wyoming DEQ)	None	None
As (ppm)	<0.04	---	---	Values <40 ppm (Gough & Skocklette)	None	None

Table 13 (Continued)
KAISER STEEL CORPORATION
Sunnyside, Utah

Parameter	Arithmetic Mean	Maximum Value	Minimum Value	Accepted Suitability	Problems Expected	Recommendations
Cd (ppm)	0.33	0.38	0.22	Values <1.0 ppm (Montana DSL)	None	None
Cu (ppm)	1.1	1.9	0.8	Values <40 ppm (Montana DSL)	None	None
Fe (ppm)	364	583	226	No suspect level found	None Expected	Fe is regulated in water discharge by NPDES permit
Pb (ppm)	3.9	4.6	3.2	Values <20 ppm (Montana DSL)	None	None
Mn (ppm)	54.9	106	24.4	Values <60 ppm (Montana DSL)		
Hg (ppm)	<0.02	---	---	Values <0.5 ppm (Montana DSL)	None	None
Mo (ppm)	<4	---	---	Values <1.0 ppm (Montana DSL)	None Expected	Detection limits with flame too high--need to use HGA Furnace
Ni (ppm)	3.0	4.3	1.8	Values <1.0 ppm (Montana DSL)	None Expected	Ni may leach out with groundwater but no drinking water prob.
Se (ppm)	<0.04	---	---	Values <2.0 ppm (Wyoming DEQ)	None	None
Zn (ppm)	3.52	6.0	2.60	No suspect level found	None Expected	None--low values

Table 13 (Continued)

ZONE 11 - ANALYTICAL SUMMARY

KAISER STEEL CORPORATION

Sunnyside, Utah

Parameter	Arithmetic Mean	Maximum Value	Minimum Value	Accepted Suitability	Problems Expected	Recommendations
B (ppm)	15.0	21.4	10.2	Values <8.0 ppm (Montana DSL) Values <5.0 ppm (Wyoming DEQ)	Possible Plant Toxicity	Bury high boron with 4 ft. of inert material; plant Atriplex species
F (ppm)	4.3	7.6	1.0	No suspect levels found	None	None--low values
Organic Sulfur	0.20	0.66	0.01	No suspect levels found	None	None--low values with neutral pH
Pyritic Sulfur	0.31	0.67	0.05	No suspect levels found	None	None--low values with neutral pH
Sulfate Sulfur	<0.01	---	---	No suspect levels found	None	None--low values with neutral pH
Total Sulfur	0.47	1.13	0.10	No suspect levels found	None	None--low values with neutral pH
Neut. Pot.	24.8	30.4	17.7	(See notes on acid-base potential)		
Acid Pot.	14	35	3	(See notes on acid-base potential)		
Base Pot.	248	304	177	(See notes on acid-base potential)		
Acid-Base Potential	233	278	171	Values <-5 (Wyoming DEQ)	None	None

Date: 2/23/83

BOOKCLIFFS COMMERICAL LABORATORIES

OVERBURDEN ANALYSIS REPORT

Client: Kaiser Steel Corporation
Address: Sunnyside Mine
Sunnyside, Utah 84539
Attn: Mr. Robert Turner
Hole: KSC-S-24

Sample Date: Unknown
Date Received: 2/14/83
Project: South Lease Coal Property
P.O. Number: 28076166

Sample I.D.	Lab No.	*pH	*E. C.[1]	*Sat. %	*Soluble Cations (meq/l) Ca	Mg	Na	S.A.R.	Sand %	Silt %	Clay %
Sample 1 547.7-548.8	83-0328-0B	8.7	3.5	31	0.3	0.3	41.9	76.5	40	32	28
Sample 2 524.8-525.3	83-0329-0B	7.8	6.2	28	6.5	5.1	68.7	28.5	56	29	15
Sample 3 507.1-508.0	83-0330-0B	8.4	5.2	25	0.8	0.7	58.7	67.8	50	30	20
Sample 4 479.9-481.2	83-0331-0B	8.5	3.2	26	0.4	0.7	35.1	47.3	52	30	18
Sample 5 458.3-459.4	83-0332-0B	7.7	6.6	28	23.1	21.6	49.2	10.4	62	25	13
Sample 6 166.5-168.2	83-0333-0B	7.7	1.4	26	4.2	6.9	3.8	1.6	63	18	19
Sample 7A 148.1-149.1	83-0334-0B	6.8	5.8	28	27.5	71.4	3.3	0.5	58	23	19
Sample 7 144.4-145.1	83-0335-0B	6.7	4.1	31	22.6	36.5	6.2	1.1	42	39	19
Sample 8 136.8-137.8	83-0336-0B	7.3	3.3	26	26.3	23.2	2.0	0.4	79	14	7
Sample 8A 125.6-126.6	83-0337-0B	7.5	2.5	26	18.9	16.6	1.8	0.4	79	11	10
Sample 9 103.1-105.0	83-0338-0B	7.6	2.3	27	17.3	10.8	2.1	0.6	74	16	10
Sample 10 85.0-87.0	83-0339-0B	7.3	3.7	27	29.0	28.2	4.3	0.8	62	23	15
Sample 11 54.9-56.4	83-0340-0B	7.5	1.9	31	10.5	10.8	2.4	0.7	55	28	17
Sample 12 28.0-30.0	83-0341-0B	7.3	6.5	28	27.8	8.9	3.2	0.7	14	51	35
Sample 13 22.0-24.0	83-0342-0B	7.9	2.8	23	7.6	22.4	4.9	1.3	68	24	8

*From Saturated Paste Procedure

[1] mmhos/cm @ 25°C

Ralph V. Poulsen

Ralph V. Poulsen, Director

BOOKCLIFFS
COMMERCIAL LABORATORIES

Date: 2/23/83

BOOKCLIFFS COMMERICAL LABORATORIES

OVERBURDEN ANALYSIS REPORT

Client: Kaiser Steel Corporation
Address: Sunnyside Mine
Sunnyside, Utah 84539
Attn: Mr. Robert Turner
Hole: KSC-S-24

Sample Date: Unknown
Date Received: 2/14/83
Project: South Lease Coal Property
P.O. Number: 28076166

Sample I.D.	Lab No.	As[3] ppm	Cd[3] ppm	Cu[3] ppm	Fe[3] ppm	Pb[3] ppm	Mn[3] ppm	Hg[3] ppm	Mo[3] ppm	Ni[3] ppm	Se[1] ppm	Zn[1] ppm
Sample 1 547.7-548.8	83-0328-0B	< 0.04	0.36	1.9	226	4.6	106	< 0.02	< 4	4.3	< 0.04	3.02
Sample 2 524.8-525.3	83-0329-0B	< 0.04	0.22	0.6	234	3.2	24.4	< 0.02	< 4	2.6	< 0.04	2.60
Sample 3 507.1-508.0	83-0330-0B	< 0.04	0.36	0.8	258	3.8	42.0	< 0.02	< 4	3.0	< 0.04	2.78
Sample 4 479.9-481.2	83-0331-0B	< 0.04	0.38	1.2	521	4.4	46.2	< 0.02	< 4	3.2	< 0.04	6.00
Sample 5 458.3-459.4	83-0332-0B	< 0.04	0.32	1.0	583	3.6	55.8	< 0.02	< 4	1.8	< 0.04	3.20
Sample 6 166.5-168.2	83-0333-0B	< 0.04	< 0.10	< 0.4	34.4	0.6	0.8	< 0.02	< 4	< 0.4	< 0.04	1.04
Sample 7A 148.1-149.1	83-0334-0B	< 0.04	0.12	< 0.4	52.6	2.0	73.8	< 0.02	< 4	2.4	< 0.04	2.06
Sample 7 144.4-145.1	83-0335-0B	< 0.04	0.10	0.8	39.4	0.6	7.4	< 0.02	< 4	2.4	0.04	4.34
Sample 8 136.8-137.8	83-0336-0B	< 0.04	< 0.10	< 0.4	30.2	2.0	6.2	< 0.02	< 4	< 0.4	< 0.04	1.02
Sample 8A 125.6-126.6	83-0337-0B	< 0.04	< 0.10	< 0.4	28.0	0.4	4.4	< 0.02	< 4	0.4	< 0.04	1.06
Sample 9 103.1-105.0	83-0338-0B	< 0.04	0.10	< 0.4	100	2.2	17.0	< 0.02	< 4	0.6	< 0.04	1.72
Sample 10 85.0-87.0	83-0339-0B	< 0.04	0.27	1.0	414	3.5	75.5	< 0.02	< 4	2.8	< 0.04	4.53
Sample 11 54.9-56.4	83-0340-0B	< 0.04	0.10	0.4	65.2	1.2	26.0	< 0.02	< 4	0.4	< 0.04	3.24
Sample 12 28.0-30.0	83-0341-0B	< 0.04	0.26	< 0.4	1.60	2.0	22.8	< 0.02	< 4	1.8	< 0.04	1.50
Sample 13 22.0-24.0	83-0342-0B	< 0.04	0.38	0.4	18.4	6.4	194	< 0.02	< 4	3.6	< 0.04	2.26

[3]EP Toxicity Extraction. Results expressed in ppm of solid material.

Ralph V. Poulsen
Ralph V. Poulsen, Director

BOOKCLIFFS
COMMERCIAL LABORATORIES

Date:

BOOKCLIFFS COMMERICAL LABORATORIES

OVERBURDEN ANALYSIS REPORT

Client: Kaiser Steel Corporation

Address: Sunnyside Mine

Sunnyside, Utah 84539

Attn: Mr. Robert Turner

Hole: KSC-S-24

Sample Date: Unknown

Date Received: 2/14/83

Project: South Lease Coal Property

P.O. Number: 28076166

Sample I.D.	Lab No.	Sulfur Organic	Sulfur Pyritic	Sulfur Sulfate	Sulfur Total	Neut.Pot. % (as $CaCO_3$)	Acid[2] Potential	Base[2] Potential	Acid-Base[2] Potential	B[3] ppm	F[3] ppm
Sample 1 547.7-548.8	83-0328-0B	0.05	0.05	<0.01	0.10	19.8	3	198	195	12.0	7.6
Sample 2 524.8-525.3	83-0329-0B	0.16	0.48	<0.01	0.64	29.8	20	298	278	10.2	3.4
Sample 3 507.1-508.0	83-0330-0B	0.66	0.67	<0.01	1.13	30.4	35	304	269	11.4	5.4
Sample 4 479.9-481-2	83-0331-0B	0.01	0.19	<0.01	0.20	17.7	6	177	171	20.0	4.0
Sample 5 458.3-459.4	83-0332-0B	0.10	0.17	<0.01	0.27	26.2	8	262	254	21.4	1.0
Sample 6 166.5-168.2	83-0333-0B	0.07	<0.01	<0.01	0.07	0.1	2	1	-1	3.8	<0.4
Sample 7A 148.1-149.1	83-0334-0B	0.52	0.74	<0.01	1.26	15.6	39	156	117	5.4	1.0
Sample 7 144.4-145.1	83-0335-0B	0.11	0.29	<0.01	0.40	1.1	13	11	-2	3.8	0.6
Sample 8 136.8-137.8	83-0336-0B	0.14	0.05	<0.01	0.19	3.7	6	37	31	1.8	<0.4
Sample 8A 125.6-126.6	83-0337-0B	0.08	0.03	<0.01	0.11	2.9	3	29	26	1.4	0.4
Sample 9 103.1-105.0	83-0338-0B	0.11	0.07	<0.01	0.18	4.0	6	40	34	5.4	<0.4
Sample 10 85.0-87.0	83-0339-0B	0.15	0.35	<0.01	0.50	8.6	16	86	70	14.8	2.8
Sample 11 54.9-56.4	83-0340-0B	0.09	0.12	<0.01	0.21	9.3	7	93	86	6.0	3.6
Sample 12 28.0-30.0	83-0341-0B	0.24	<0.01	0.59	0.83	14.0	7	140	133	4.4	7.2
Sample 13 22.0-24.0	83-0342-0B	0.05	<0.01	<0.01	0.05	32.3	2	323	321	1.4	4.0

[2]Tons $CaCO_3$/1,000 Tons Material

Ralph V. Poulsen

Ralph V. Poulsen, Director

BOOKCLIFFS COMMERCIAL LABORATORIES

Date: 2/23/83

BOOKCLIFFS COMMERICAL LABORATORIES

OVERBURDEN ANALYSIS REPORT

Client: Kaiser Steel Corporation
Address: Sunnyside Mine
Sunnyside, Utah 84539
Attn: Mr. Robert Turner
Hole: KSC-S-25

Sample Date: Unknown
Date Received: 2/14/83
Project: South Lease Coal Property
P.O. Number: 28076166

Sample I.D.	Lab No.	*pH	*E. C.[1]	*Sat. %	*Soluble Cations (meq/l) Ca	Mg	Na	S.A.R.	Sand %	Silt %	Clay %
Sample 1A 567.2-568.3	83-0343-OB	7.6	3.7	28	16.1	19.9	14.5	3.4	46	39	15
Sample 1 532.0-523.2	83-0344-OB	7.8	2.6	27	10.8	15.8	9.0	2.5	70	23	7
Sample 2 494.5-495.6	83-0345-OB	7.1	2.7	26	15.6	19.1	3.6	0.9	76	16	8
Sample 3 467.0-469.0	83-0346-OB	7.3	1.4	26	6.3	9.1	1.7	0.6	89	6	5
Sample 4 456.5-458.0	83-0347-OB	7.2	3.0	27	13.5	27.4	2.8	0.6	57	25	18
Sample 5 449.7-451.6	83-0348-OB	7.1	4.4	27	27.8	48.1	2.1	0.3	70	18	12
Sample 6 440.7-442.7	83-0349-OB	7.5	3.4	24	25.1	27.4	2.1	0.4	86	9	5
Sample 7 427.7-428.8	83-0350-OB	7.7	2.3	25	12.7	17.4	1.7	0.4	80	14	6
Sample 8 392.8-399.8	83-0351-OB	7.2	4.6	22	26.2	42.3	2.3	0.4	85	8	7

*From Saturated Paste Procedure
[1] mmhos/cm @ 25°C

Ralph V. Poulsen

Ralph V. Poulsen, Director

BOOKCLIFFS
COMMERCIAL LABORATORIES

Date: 2/23/83

BOOKCLIFFS COMMERICAL LABORATORIES

OVERBURDEN ANALYSIS REPORT

Client: Kaiser Steel Corporation
Address: Sunnyside Mine
Sunnyside, Utah 84539
Attn: Mr. Robert Turner
Hole: KSC-S-25

Sample Date: Unknown
Date Received: 2/14/83
Project: South Lease Coal Property
P.O. Number: 28076166

Sample I.D.	Lab No.	As[3] ppm	Cd[3] ppm	Cu[3] ppm	Fe[3] ppm	Pb[3] ppm	Mn[3] ppm	Hg[3] ppm	Mo[3] ppm	Ni[3] ppm	Se[1] ppm	Zn[1] ppm
Sample 1A 567.2-568.3	83-0343-0B	<0.04	0.20	1.0	476	2.2	39.2	<0.02	<4	2.2	<0.04	3.78
Sample 1 532.0-523.2	83-0344-0B	<0.04	0.18	1.0	164	2.2	22.8	<0.02	<4	1.2	<0.04	2.56
Sample 2 494.5-495.6	83-0345-0B	<0.04	<0.10	0.4	21.4	0.4	2.6	<0.02	<4	1.0	<0.04	1.24
Sample 3 467.0-469.0	83-0346-0B	<0.04	<0.10	<0.4	28.6	<0.4	3.2	<0.02	<4	1.0	0.04	1.30
Sample 4 456.5-458.0	83-0347-0B	<0.04	0.12	1.0	66.4	0.8	29.2	<0.02	<4	3.6	<0.04	6.06
Sample 5 449.7-451.6	83-0348-0B	<0.04	0.18	1.0	62.2	1.4	24.0	<0.02	<4	2.2	<0.04	3.56
Sample 6 440.7-442.7	83-0349-0B	<0.04	<0.10	0.4	61.6	<0.4	10.6	<0.02	<4	0.4	<0.04	1.86
Sample 7 427.7-428.8	83-0350-0B	<0.04	<0.10	0.4	109	<0.4	12.6	<0.02	<4	1.0	<0.04	1.14
Sample 8 392.8-399.8	83-0351-0B	<0.04	<0.10	<0.4	60.9	<0.4	11.5	<0.02	<4	0.6	<0.04	1.20

[3]EP Toxicity Extraction. Results expressed in ppm of solid material.

Ralph V. Poulsen

Ralph V. Poulsen, Director

BOOKCLIFFS
COMMERCIAL LABORATORIES

Date:

BOOKCLIFFS COMMERICAL LABORATORIES

OVERBURDEN ANALYSIS REPORT

Client: Kaiser Steel Corporation
Address: Sunnyside Mine
Sunnyside, Utah 84539
Attn: Mr. Robert Turner
Hole: KSC-S-25

Sample Date: Unknown
Date Received: 2/14/83
Project: South Lease Coal Property
P.O. Number: 28076166

Sample I.D.	Lab No.	Sulfur Organic	Sulfur Pyritic	Sulfur Sulfate	Sulfur Total	Neut.Pot. % (as $CaCO_3$)	Acid[2] Potential	Base[2] Potential	Acid-Base[2] Potential	B[3] ppm	F[3] ppm
Sample 1A 567.2-568.3	83-0343-0B	0.05	0.30	<0.01	0.35	13.9	10	139	129	17.8	3.8
Sample 1 532.0-523.2	83-0344-0B	0.04	0.07	<0.01	0.11	8.9	3	89	86	8.0	9.8
Sample 2 494.5-495.6	83-0345-0B	0.14	0.06	<0.01	0.20	0.6	6	6	0	1.4	3.0
Sample 3 467.0-469.0	83-0346-0B	0.04	0.03	<0.01	0.07	0.2	2	2	0	1.8	2.2
Sample 4 456.5-458.0	83-0347-0B	0.23	0.27	<0.01	0.51	23.7	16	237	221	5.4	3.8
Sample 5 449.7-451.6	83-0348-0B	0.23	0.37	<0.01	0.64	11.9	20	119	99	3.6	2.6
Sample 6 440.7-442.7	83-0349-0B	0.07	0.05	<0.01	0.12	4.5	4	45	41	7.0	1.6
Sample 7 427.7-428.8	83-0350-0B	0.05	0.05	<0.01	0.10	5.3	3	53	50	7.0	1.8
Sample 8 392.8-399.8	83-0351-0B	0.07	0.12	<0.01	0.19	2.3	6	23	17	3.7	1.2

[2]Tons $CaCO_3$/1,000 Tons Material

Ralph V. Poulsen, Director

BOOKCLIFFS
COMMERCIAL LABORATORIES

Dep 6-2

UtahAmerican Energy, Inc.

April 22, 2002

Pam Grubaugh-Littig
Permit Coordinator
DOGM
1594 West North Temple, Suite 1210
Salt Lake, Utah 84114-5801

Subject: ACT/007/013 Acid Toxic Testing Wavier

Dear Ms Grubaugh Littig:

Pursuant to the provisions of R645-301-626, UtahAmerican Energy, Inc. respectfully requests that the requirements of R645-301.300 be waved based on other information available to the Division of equal value or effect.

UtahAmerican Energy, Inc. believes that a wavier is reasonable because of the following reasons:

1) With over 100 years of mining in the Sunnyside Mining Operation there have been no proven problems with acid-or toxic-forming materials. The Blackhawk Formation does not have any history of producing acid or toxic drainage. The BLM found that "Experience from over 80 years of operation at the Sunnyside Mine indicates that none of the horizons contains sufficient acid-forming alkaline or toxic materials as to be considered a problem in production or waste disposal". (Bureau of Land Management, Environmental Analysis Record, dated 6/9/76. Related to Kaiser Steel's Federal Lease No. U-32083.)

2) The existence of acid and toxic analysis from two drill holes only two miles south of UEI's lease area. The data was collected from drill holes S-24 and S-25 which are located in the same strata as Lila Canyon. Detailed acid and toxic tests were run for the strata immediately above and below the coal seam as well as for the project slope material. The data from S-24 and S-25 was more extensive than what would be required at Lila Canyon. The data from S-24 and S-25 includes data for the strata from the Mancos Shale through the coal seam up to the surface of Little Park. The Lila Canyon slopes will start at the top of the Mancos and only be driven to the coal seam and not to the surface of Little Park.

3) UEI has committed to treating all material removed from the coal seam or from the rock slopes as if it did contain acid and toxic forming materials. UEI has committed to placing all underground development waste in the refuse pile and be covered with a minimum of 4' of non-acid and non-toxic forming material.

4) To ensure that surface and ground waters will not be polluted by acid or toxic materials UEI has committed to test the slope rock material as necessary to determine acid- and -toxic forming potential.

If you have any questions please call me.

Sincerely,

R. Jay Marshall

R. Jay Marshall

P.O. Box 986 Price, Utah 84501 Telephone (435) 637 5032 x 724 Fax (435) 613 0805 email: jmarshall@coalsource.com

Appendix 6-2

Lila Fan Portal Floor Rock Analyses	
Parameter	Results
pH, saturated paste	5.0
Conductivity, saturated paste	2.32 mmhos/cm
Calcium, soluble	15.97 meq/l
Magnesium, soluble	20.40 meq/l
Sodium, soluble	1.13 meq/l
Sodium Absoption Ratio	.3
Boron, soluble	0.8 mg/kg
Selenium, soluble	0.05 mg/kg
Sulfur, organic	0.22%
Sulfur, pyritic	0.07%
Sulfur, total	0.30%
Sulfur, sulfate	0.01%
Neutralization Potential	2.2% as $CaCO_3$
Acid-Base Potential ($CaCO_3$	12 Tons/1000T

Lila Fan Portal Roof Rock Analyses	
Parameter	Results
pH, saturated paste	7.2
Conductivity, saturated paste	5.83 mmhos/cm
Calcium, soluble	15.47 meq/l
Magnesium, soluble	86.54 meq/l
Sodium, soluble	5.91 meq/l
Sodium Absoption Ratio	.8
Boron, soluble	5.6 mg/kg
Selenium, soluble	0.035 mg/kg
Sulfur, organic	0.09%
Sulfur, pyritic	0.01%
Sulfur, total	0.52%
Sulfur, sulfate	0.42%
Neutralization Potential	32.2% as $CaCO_3$
Acid-Base Potential ($CaCO_3$	306 tons/1000T

CHEMTECH

CHEMICAL AND BACTERIOLOGICAL ANALYSES

DATE: 11-07-90

Refuse Pile

TO: JBR Consultants
1952 E. Fort Union Blvd. STE 209
Salt Lake City, UT 84121

SAMPLE ID: Lab #U055883 - Horse Canyon - HC-101290-17.
Submitted 10-19-90

CERTIFICATE OF ANALYSIS

PARAMETER	DETECTED
pH Units	7.96
Conductivity, mmhos/cm	2.375
Saturation, %	32.5
SAR	0.035
Soluble Calcium as Ca, mg/Kg	115
Soluble Magnesium as Mg, mg/Kg	13.2
Soluble Sodium as Na, mg/Kg	1.5
Selenium as Se, mg/Kg	0.14
TKN (T), mg/Kg	3,690
Nitrate as NO_3-N, mg/Kg	1.4
Boron as B, mg/Kg	<5
Max. Acid Potential, Tons $CaCO_3$/Tons Soil	<.2
Neutral Potential, Tons $CaCO_3$/Tons Soil	56.8
Organic Carbon, %	>10
Sulfate as SO_4, mg/Kg	1,370
Available Water, in/in	0.18
Sieve:	
Rock, %	61.7
Sand, %	33.1
Silt/Clay, %	5.2

Rex Henderson

CHEMTECH

CHEMICAL AND BACTERIOLOGICAL ANALYSES

DATE: 11-07-90

Refuse Pile

TO: JBR Consultants
1952 E. Fort Union Blvd. STE 209
Salt Lake City, UT 84121

SAMPLE ID: Lab #U055882 - Horse Canyon - HC-101290-16.
Submitted 10-19-90

CERTIFICATE OF ANALYSIS

PARAMETER	DETECTED
pH Units	7.04
Conductivity, mmhos/cm	2.809
Saturation, %	34.9
SAR	0.014
Soluble Calcium as Ca, mg/Kg	457
Soluble Magnesium as Mg, mg/Kg	60.8
Soluble Sodium as Na, mg/Kg	1.2
Selenium as Se, mg/Kg	0.15
TKN, mg/Kg	2.800
Nitrate as NO_3-N, mg/Kg	8.9
Boron as B, mg/Kg	<5
Max. Acid Potential, Tons $CaCO_3$/Tons Soil	<.2
Neutral Potential, Tons $CaCO_3$/Tons Soil	17.1
Organic Carbon, %	>10
Sulfate as SO_4, mg/Kg	3,900
Available Water, in/in	0.15
Sieve:	
Rock, %	85.9
Sand, %	12.6
Silt/Clay, %	1.5

Rex Henderson