

0032

SUNNYSIDE COGENERATION ASSOCIATES

POST OFFICE BOX 58087
SALT LAKE CITY, UTAH 84158-0087

October 20, 1993

RECEIVED
OCT 22 1993

DIVISION OF
OIL, GAS & MINING

Mr. Randy Harden
Division of Oil, Gas and Mining
3 Triad Center - Suite 350
Salt Lake City, UT 84180

RE: Sunnyside Cogeneration Associates - Violation No. 93-32-5-2 No. 1 of 2: Failure to remove acid-forming material from the Old Coarse Refuse Road

Dear Randy,

SCA was issued a violation by Henry Sauer of DOGM during the September 15-17, 1993 inspection for, "Failure to place, in a controlled manner, and/or treat acid-forming material. Failure to place coal mine waste in an approved disposal facility." In order to satisfy the violation, SCA is required to: "Remove all acid-forming material from the Old Coarse Refuse Haul Road and place material in an approved disposal facility" no later than 5:00 pm on October 21, 1993.

SCA is formally requesting an extension for the removal of this material until May 30, 1994. Due to the nature of this violation, SCA has not had adequate time to remove the material from the side slopes of the road. The expertise required to remove this material extends beyond that of typical mining construction. Not only does it require specialized equipment (drag line), but it requires specialized equipment operators as well. SCA is in the process of contracting with a local contractor to perform as much of the work as possible with available equipment, but it will be necessary to bring in specialized equipment to complete the work. We have been told by local contractors that mobilization of this type of equipment could take up to a month or more, depending on availability. In addition, it could take an indefinite period of time to remove all of the material, due to unpredictable weather conditions. If it does take as long as anticipated, the November 30th seeding window will be missed and seeding will have to be accomplished in the following growing season.

SCA has reviewed the issue of removing coarse refuse from the Old Coarse Refuse Road and has found information supporting the fact that DOGM did approve the use of coarse coal processing refuse on roads within the area previously permitted by Kaiser Steel Corporation. The issue of placing coarse coal processing refuse on the roads was decided in a Board Hearing on May 15, 1981. The hearing being referred to was initiated by a violation issued to Kaiser Steel Corporation on April 13, 1979 relating to Rule MC 717.17, maintaining and surfacing access roads with coal processing waste material.

Prior to the hearing, Kaiser Steel was required to "...conduct a study to demonstrate that the use of such material as a road surfacing medium does not pose a threat to either public safety or the environment."¹ In order to fulfill this requirement, Kaiser conducted a study of the coarse refuse which was reviewed by the Division staff. The study is also included in the SCA PAP as Appendix 6-3, "Special Coarse Refuse Use Study Report" and we have attached a copy for your review. The study was utilized in the hearing to assist in the decision as to whether coarse refuse could be used as a road surfacing medium. The

Mr. Randy Harden
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DIVISION OF
OIL, GAS & MINING

conclusions of this hearing were:

"The Board finds Kaiser Steel Corporation's continued use of coarse coal processing refuse on roads acceptable."

Since the onset of SCA's operations, there has been no further disturbance of the Old Coarse Refuse Road. The material was placed on the road by Kaiser Steel with approval from the DOGM and has been there for an extensive period of time. SCA has not contributed to this disturbance, nor has SCA been utilizing the Old Coarse Refuse Road for activities other than for general access to areas of the permit site. It has not been used by SCA, at any time, for the hauling of coarse refuse. In addition to being utilized as an access road, the configuration of the road acts as a drainage terrace to capture run-off and route it to the Railcut Pond.

SCA commits to removing this material from the side slopes, but not from the roadway. When the material is removed, SCA will reclaim the slopes. Reclamation will include:

- a. Removal of all acid/toxic forming material from the slopes and placing it on the existing coarse refuse pile.
- b. Hydroseeding all slopes less than or equal to 2(h):1(v) and broadcast seeding all slopes greater than 2(h):1(v) as outlined in Chapter Nine of the PAP. Seeding will be accomplished according to the seed mixture outlined in Appendix 3-3 and during the seeding window outlined in Chapter Nine.
- c. Apply erosion control matting to slopes greater than or equal to 2(h):1(v).

In general, all revegetation procedures will follow the *General Revegetation Procedures* which are outlined in Section 9.9.1, Page 900-13 of the SCA PAP.

We appreciate your consideration of this matter. We look forward to hearing from you. If there are any questions, please feel free to call.

Sincerely,



for David R. Pearce
Authorized Member, Management Committee



Alane E. Boyd, P.E.
Senior Engineer

Enclosure

cc: Brian Burnett, Callister, Duncan & Nebeker

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OCT 22 1993

DIVISION OF
OIL, GAS & MINING

CHAPTER VI
Appendix VI-1

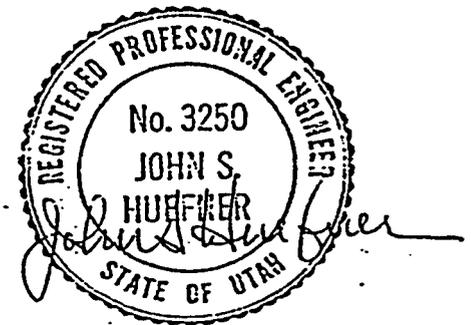
SPECIAL COARSE REFUSE
USE STUDY REPORT

Kaiser Steel Corporation
Sunnyside Mines
Sunnyside, Utah 84539

Prepared by:

John S. Huefner, P.E.
Mining Engineer
Engineering Department

25 February 1981



Special Study Considering the Use of
Coal Refuse Road Construction Material

Mining began at Sunnyside, Utah, about 1900 and has continued actively to the present day. It is not known as to the time of initial use or extent coal waste was used as road material by the previous mine operator; but since Kaiser Steel Corporation purchased the mine and operation in 1950 the coal refuse has been utilized to maintain haul roads used by the large refuse trucks and access roads which received fairly heavy usage and whose natural soil deteriorated very rapidly during periods of rain or snow. Suitable gravels could not be secured locally though some gravel was brought in from pits in the Price-Wellington area. The gravel was unsatisfactory in that the soil, predominantly sandy loam (silts) allowed the gravel to disappear into the soil creating severe ruts, very poor roads and a safety hazard. Consequently coal refuse was used producing an acceptable travel surface for the vehicular traffic by bridging the soil fines and not allowing them to come through the coal waste.

Kaiser Steel Corporation was not aware of a problem in the use of the coal refuse as a road material until May 1979 when violation #3 of NOV #79-5-5-1 was issued by Gary Fritz of OSM and DOGM notice of violation #3, letter dated 4-13-79. Kaiser Steel applied for a formal hearing to OSM on 6-7-79 and applied for and was granted a year study period by DOGM on 10-24-79. Please note that the refuse material has not been used since the effective date of the regulation.

Kaiser Steel's letter of 10-16-79 outlined 10 items that ought to be addressed by the study as follows:

- I Water Analysis
- II Creek Bottom Study
- III Natural Vegetation Growth
- IV Analysis of Washed Coal

- V Analysis of Coal Refuse
- VI Availability of Alternate Material Source
- VII Area Soils Analysis
- VIII Road Drainage Patterns
- IX Supporting Material
- X Summary

Items III and VII will be mentioned only briefly in this report since a complete presentation is included in Kaiser Steel's Mine Permit application which will be submitted to DOGM in March 1981.

(III) The predominant vegetation types within the 14,300 acre permit area are: Pinyon-Juniper (30%) , Mountain Brush (19%), Douglas Fir (15%), Sage-Grass (14%), mixture and aspen (20%), and riparian (2%). The roads which have coal refuse are mainly in the Sage-Grass areas.

(VII.) Soil samples were taken at four (4) sites -

- A. Disturbed slope at manshaft area.
- B. Topsoil/pile adjacent to slurry ponds.
- C. Undisturbed soil/adjacent to road in Section 29, T14S, R14E, SLB&M.
- D. Coal refuse fines/adjacent to road (in same Section 29).

as tabulated below (see appendix for actual soil analysis copies):

Factor	A (#3997)	B (#3998)	C (#4368)	D (#4369)	Average
pH	8.2	8.2	8.0	(6.8)	8.13
% Nitrogen	.05	.06	.12	(.45)	.08
Conductivity	1.0	4.1	0.6	3.5	2.3
Phosphorus	2.9	6.9	5.7	8.5	6
Potassium	68	81	(214)	58	69
Sodium	1.7	7.1	0.6	2.8	3.1
Ca & Mg	8.5	56.4	0.5	4.6	17.5
Cation Exch	10.8	8.7	10.2	6.6	9.1
SAR	0.8	1.3	0.1	-0.1	0.6
Texture	Sandy Loam	Loam	Sandy Loam	Sandy	Sandy Loam

The National Weather Service (NWS) installed a small weather station at the mine site in early 1974 where temperature and precipitation have been recorded. The average yearly temperature is 44°F (7°C) with extremes of 96°F and -15°F (1979). The precipitation has been sporadic with no patterns being evident either monthly or yearly. The precipitation per water year (Oct. 1 - Sept. 30) has ranged from 6.94" ('76-'77) to 17.06" ('79-'80) and the annual precipitation has varied from 8.36" ('76) to 18.82" ('80) indicating that Sunnyside is in a semi-arid region. (Tables included in appendix.)

(VI) Since Kaiser Steel previously attempted to use gravels from the general area (35-45 miles distant from the mine site) which proved to be unsatisfactory and there being no local gravels available, this subject was not pursued. With the coal refuse being so readily available and having previously proven its serviceability at minimal cost, it was chosen as the road surfacing material.

(IV) Since the coarse coal refuse is derived from the mining of raw coal and includes some coal along with rock and earth waste, it is of interest to present the fact that the coal is non-toxic and has a low percent of sulfur.

Following is a tabulation of the coal analysis:

<u>ITEM</u>	<u>% AVG</u>	<u>% RANGE</u>
Moisture	7.0	2.8 - 9.2
Fixed Carbon	52.4	48.5 - 57.3
Volatile Matter	40.5	35.7 - 42.7
Ash	6.6	4.3 - 9.8
Sulfur	1.1	.62- 1.8
Nitrogen	1.5	1.2 - 1.8
Oxygen	9.3	7.6 -11.0
Hydrogen	5.5	4.8 - 5.6
Carbon	76	70.3 -82.2

With the Ash being composed of: silica (58.7%), aluminum (24.3%), iron (5.1%), sulfur (2.0%), lime (4.5%), sodium (1.0%), magnesium (0.7%), manganese (0.2%), potassium (0.8%), phosphorus (1.1%), titania (1.2%), strontium (0.2%), barium (0.1%), and chlorine (.05%).

(Some copies of analysis and analysis reports are included in the appendix.)

(V) As previously mentioned, the coarse coal refuse is primarily rock and other earth waste secured by the underground mining operation from the Baum-type washer in the Preparation Plant. Three laboratories have tested the physical analysis of the coarse refuse namely:

1. Utah State Road lab in Price (UDOT).
2. Commerical Testing lab in Helper (CTE).
3. Rollins, Brown and Gunnel lab in Provo (RB&G).

The results indicate the refuse conforms to general standards of road base material for example:

<u>Screen</u>	<u>Design %</u>	<u>Refuse</u>
1"	70-100	87 (UDOT), 74 (CTE)
#4	30-60	32 (UDOT), 38 (CTE)
#40	10-30	11 (CTE)
#200	5-15	2 (UDOT), 5 (CTE)

(See appendix for copies of analysis.)

Chemical testing was done by American Chemical & Research lab in Provo and by Ford Chemical lab in Salt Lake City, and both verified the refuse to be non-toxic and non-acidic. Only one sample of refuse sediment tested by Ford Chemical showed the manganese to be 3 times above the allowable limit, however, this does not show up in other tests or in either Grassy Trail Creek water or sediment analysis (all other parameters are well within tolerances).

These findings indicate that the coarse refuse does satisfy the requirements to allow use of the refuse as a road base and surface material in that the physical gradation is acceptable and the material is not toxic to plant or animal life. Further the Carbon County Commission has allowed its use, by letter dated 6-22-79, on 2.5 miles of the county road lying within Kaiser Steel's permit area.

(II) To assure that there was no adverse affect on the environment by the use of the coarse refuse, specifically to Grassy Trail Creek; Kaiser Corporation contracted Dr. Robert N. Winget of "Environmental Consultants" at Provo, Utah to do an in-depth study of the aquatic resources

of Grassy Trail Creek where it traverses the mine permit area. Dr. Winget's work began 11-1-79 and was completed 11-5-80 and determined that the only apparent effect of the coarse refuse to the creek was a slightly increased contribution of fine sediments and not in any toxic impact. (Dr. Winget's full report is included in the appendix). Kaiser Steel proposed to reduce the sediment loading of the creek of sediment from the road by use of lateral ditches along the road and use of a fabric silt fence on embankments adjacent to the creek and where the ditches outlet to the creek. Dr. Winget's report did find an adverse contribution to the creek from mine water, but this is a separate problem and is in the process of being resolved by use of a special treatment pond (settlement and possible aeration).

As general reference data, water analysis tabulations of both surface and mine water are included in the appendix. These tabulations show that the water quality is within EPA and State limits.

(VIII) At one time or another, it appears coarse refuse was placed on 10.6 miles of road which is about 58% of the total road network within the permit area; however, today there are only 6.5 miles (35%) that are presently surfaced with coarse refuse material and actively used, which includes 1.3 miles of haul road that lies within the previous permitted Refuse Disposal Area and 1.2 miles of County road. Those roads that may need attention and coarse refuse resurfacing are:

	<u>Road</u>	<u>Length</u> (miles)	<u>Area</u> (acres)
A.(1)	Whitmore Canyon (KSC)	.33	1.20
	(2) Whitmore Canyon (County)	1.21	4.40
B.	Manshaft	.14	.34
C.	#2 Canyon	1.70	4.13
D.	Main and Storage area	1.80	6.54
E.	Haul road	<u>1.28</u>	<u>5.04</u>
	Total	6.46 miles	21.65 acres

The surface drainage from these roads passes thru sediment control structures, including straw filters, sedimentation ponds and fabric silt filters prior to being discharged into the natural drainages.

In summary, Kaiser Steel Corporation hereby requests permission to use coarse coal refuse to re-surface those roads that previously had been surfaced with the refuse material. Prior approval from DOGM will be obtained before such material is placed on new areas or areas where this material has not been used in the past. Kaiser Steel Corporation asks the Boards' approval of coarse refuse use with the stipulation that adequate ditching will be employed, sufficient sedimentation ponds will be constructed, and use of a fabric silt fence will be installed in isolated areas, all to properly prevent an increased sediment load of natural stream channels and any perennial streams. It has been proven by four separate laboratories that Kaiser Steel's coarse refuse at the Sunnyside Mines is non-toxic and non-acidic. Also it has been shown that the coarse refuse is durable as a road surface material.

APPENDIX

COMMERCIAL TESTING & ENGINEERING CO.

GENERAL OFFICES: 228 NORTH LA SALLE STREET, CHICAGO, ILLINOIS 60601 • AREA CODE 312 726-8434

REGIONAL DIVISION MANAGER
V. TAYLOR, JR.



PLEASE ADDRESS ALL CORRESPONDENCE TO:
139 SOUTH MAIN, HELPER, UTAH 84526
OFFICE TEL. (801) 472-3537

KAISER STEEL CORP.
Sunnyside Mines
P. O. Box D
Sunnyside, Utah 84539

Sept. 2, 1980

Sample identification
by

Kaiser Steel Corp.

Dry Refuse-Grab Sample

Kind of sample reported to us Refuse
Sample taken at Kaiser Steel Corp.
Sample taken by C. T. & E.
Date sampled 8-22-80
Date received 8-22-80

Analysis report no. 57-4374

SCREEN ANALYSIS

	<u>Percent</u>	<u>Accumulative Percent</u>
Retained on 1" Square	25.7	25.7
Passing 1" Square, retained on 1/4" Square	36.7	62.4
Passing 1/4" Square, retained on 28 Mesh	26.5	88.9
Passing 28 Mesh, retained on 100 Mesh	6.2	95.1
Passing 100 Mesh	4.9	100.0

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Jack Blair,

Jack Blair
Manager, Helper Laboratory



Charter Member

Copy Watermarked
Your Protection

COMMERCIAL TESTING & ENGINEERING CO.

GENERAL OFFICES: 228 NORTH LA SALLE STREET, CHICAGO, ILLINOIS 60601 • AREA CODE 312 726-8434 •

WESTERN DIVISION MANAGER
W. TAYLOR, JR.



PLEASE ADDRESS ALL CORRESPONDENCE TO:
139 SOUTH MAIN, HELPER, UTAH 84526
OFFICE TEL (801) 472-3

Sept. 2, 1980

KAISER STEEL CORP.
Sunnyside Mines
P. O. Box D
Sunnyside, Utah 84539

Sample identification
by

Kaiser Steel Corp.

Fresh Refuse-Grab Sample

Kind of sample
reported to us

Refuse

Sample taken at

Kaiser Steel Corp.

Sample taken by

C. T. & E.

Date sampled

8-22-80

Date received

8-22-80

Analysis report no. 57-4375

SCREEN ANALYSIS

	<u>Percent</u>	<u>Accumulative Percent</u>
Retained on 1" Square	59.5	59.5
Passing 1" Square, retained on 1/4" Square	23.9	83.4
Passing 1/4" Square, retained on 28 Mesh	13.4	96.8
Passing 28 Mesh, retained on 100 Mesh	1.6	98.4
Passing 100 Mesh	1.6	100.0

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

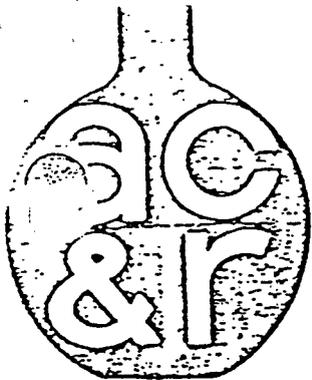
Jack Blair,

Jack Blair
Manager, Helper Laboratory



Charter Member

Copy Watermarked
Your Protection



American & Research Chemical Laboratories

1401 WEST 820 NORTH • PROVO, UTAH 84601
(801) 375-9100

ENVIRONMENTAL SERVICES • ANALYTICAL & AGRICULTURE CHEMISTS

CERTIFICATE OF ANALYSIS Kaiser Steel

January 22, 1980

DESCRIPTION

Old Weathered
New Refuse

ANALYSIS

<u>pH</u>	<u>Conductivity</u>	<u>Sodium Absorption Ratio</u>
6.55	3.685 mMHOS	22.20
7.35	1.679 mMHOS	101.21

Texture

Old Weathered Material

8.80%	Sand
66.40%	Silt
24.80%	Clay

New Refuse

20.40%	Sand
68.00%	Silt
11.60%	Clay

Thank you,

Lowell S. Willis
Lowell S. Willis
Technical Director



July 9, 1979

Kaiser Steel Corporation
Sunnyside, Utah 84539

ATTN: JOHN HUEFNER

Dear John:

Our soils lab has completed its physical analysis of the two soils samples you requested to be tested. This analysis consisted of atterberg limits, mechanical analysis, moisture-density relationships and abrasion tests. The results of these tests are as follows:

A. Surface Material:

1. Atterberg limits - The material was non-plastic. Thus a mechanical analysis was performed on the sample.
2. Mechanical Analysis -
5.6% gravel
44.2% Sand
50.2% finer than no. 200 sieve
Classification - ML or Silt
3. Moisture Density Relationship -
Reference: ASTM D 698-70 C
Maximum Dry Density - 113.0 pcf
at 11.0% moisture
See Fig. 1

B. Coal Waste for possible use as road base:

1. Abrasion Tests using Los Angeles machine
Reference: AASHTO T96, Grade A
% wear = 42.1%
2. Moisture-Density Relationship -
Reference: ASTM D 698-70 C
Maximum Dry Density = 91.2 pcf
at 2.5% moisture
See Fig. 2

CBR value 5.0

If there are any questions concerning these results, please feel free to contact us.

Yours truly,

ROLLINS, BROWN AND GUNNELL, INC.

Mark J. Bowers
Mark T. Bowers



jg/enclosures

FIGURE 1 SOIL MOISTURE DENSITY RELATIONSHIP
ASTM D 698-70 C
MAXIMUM DENSITY 113.0 LBS. PER CU. FT.
OPTIMUM MOISTURE 11 %
PROJECT: _____
LOCATION: _____

DRY UNIT WEIGHT IN LBS. PER CU. FT.

114
112
110
108
106
104
102
100

4 6 8 10 12 14 16 18

MOISTURE IN PERCENT

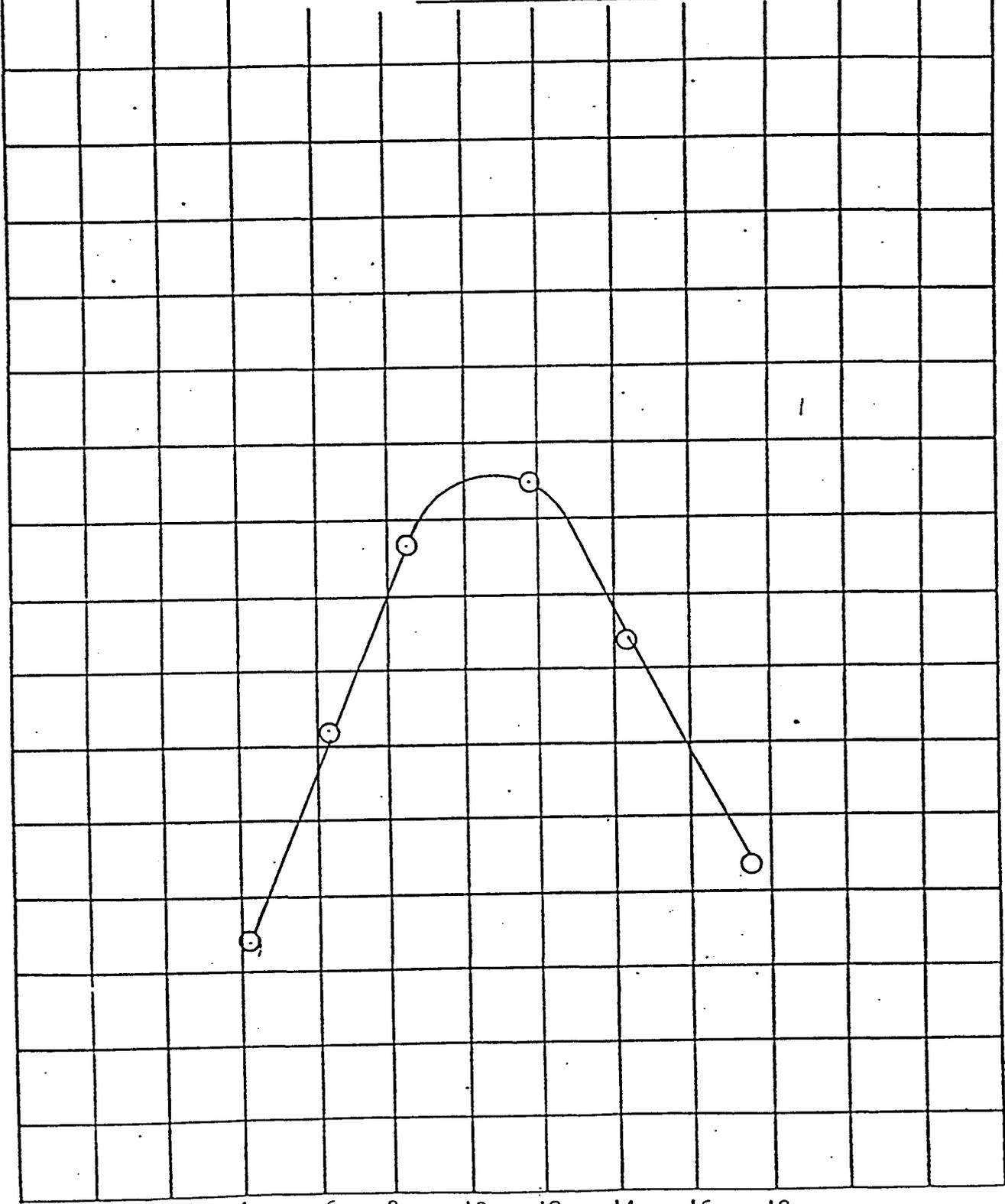
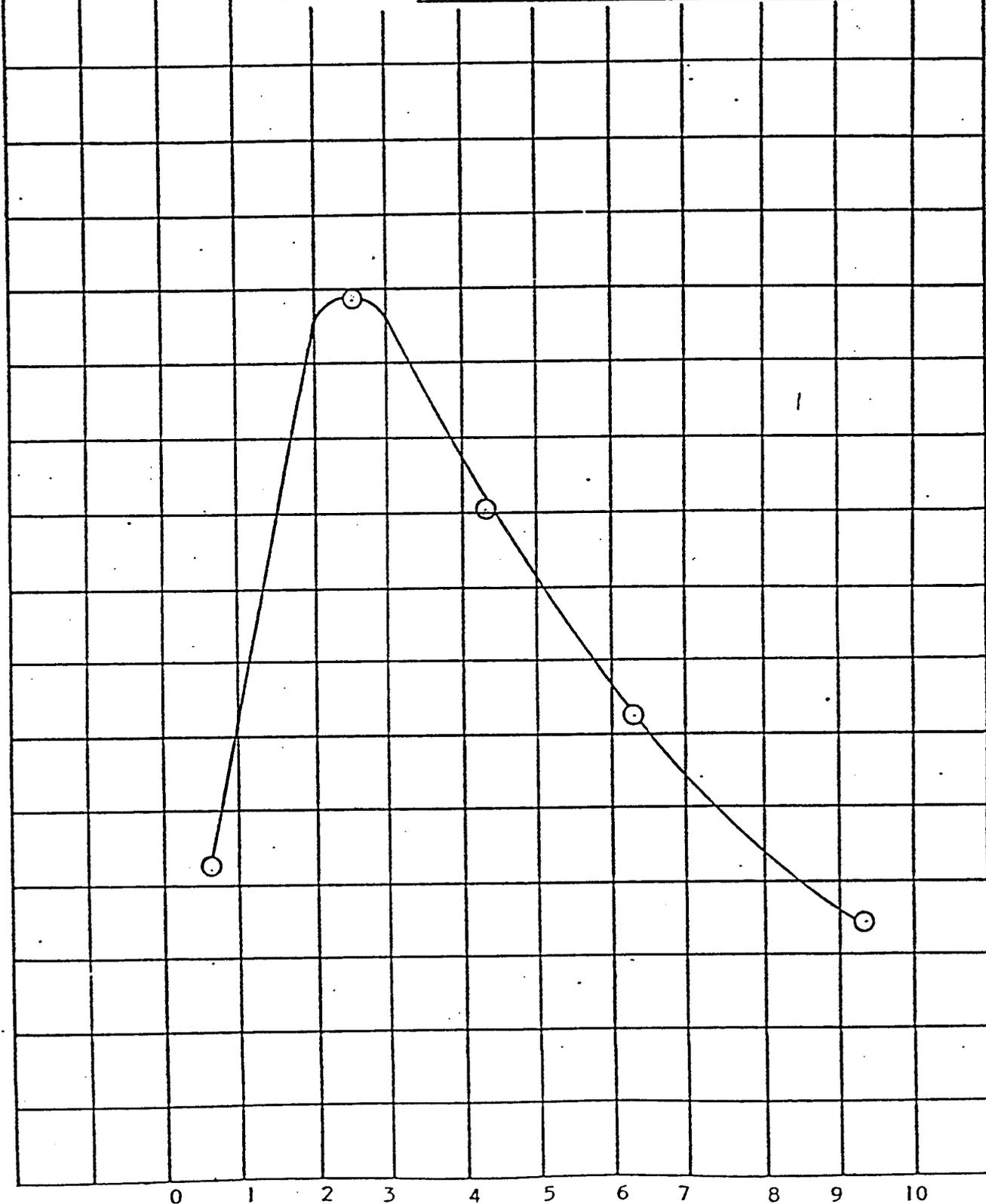
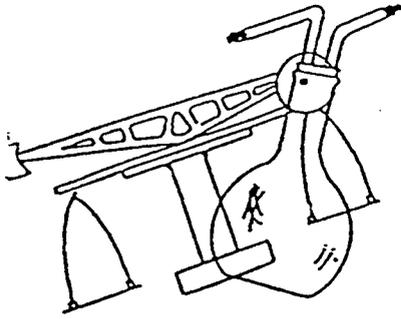


FIGURE 2 SOIL MOISTURE DENSITY RELATIONSHIP
ASTM D 698-70 C
MAXIMUM DENSITY 91.2 LBS. PER CU. FT.
OPTIMUM MOISTURE 2.5 %
PROJECT: _____
LOCATION: _____

DRY UNIT WEIGHT IN LBS. PER CU. FT.



MOISTURE IN PERCENT



Ford Chemical

LABORATORY, INC.
Bacteriological and Chemical Analysis

40 WEST LOUISE AVENUE
SALT LAKE CITY, UTAH 84115
PHONE 485-5761

RECEIVED

MAY 27 1980

KAISER STEEL
SUNNYSIDE, UTAH

DATE: 05/23/80

CERTIFICATE OF ANALYSIS

KAISER STEEL CORP.
SUNNYSIDE, UTAH

80-009706

84539

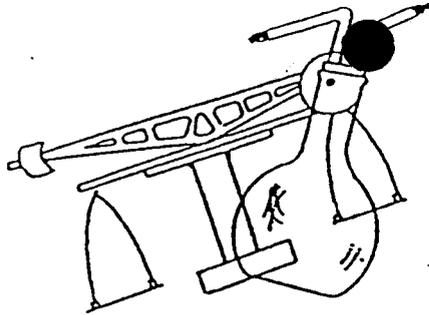
SAMPLE: SEDIMENT FROM SUNNYSIDE MINE, ROAD BED DARK RECEIVED 4-30-80
UNDER P.O. 28063534.

Arsenic as As (Tot) PPM	.002	Barium as Ba PPM	20.650
Boron as B PPM	10.650	Cadmium as Cd (Tot) PPM	<.001
Calcium as Ca %	20.250	Chloride as Cl %	1.250
Chromium as Cr (Tot) PPM	.009	Copper as Cu PPM	<.001
Fluoride as F PPM	.450	Iron as Fe (Tot) PPM	1,850.000
Lead as Pb (Tot) PPM	<.001	Magnesium as Mg PPM	15.68
Manganese as Mn (Tot) PPM	6.850	Mercury as Hg PPM	<.0001
Nickel as Ni (Tot) PPM	.025	Potassium as K PPM	150.500
Selenium as Se (Tot) PPM	<.001	Silicon as SiO2 %	74.400
Silver as Ag (Tot) PPM	<.001	Sodium as Na %	.945
Sulfate as SO4 PPM	10,650	Zinc as Zn PPM	.860

Steve Ford
FORD CHEMICAL LABORATORY, INC.

Sample from U. S. B. E. (S. E.)

All reports are submitted as the confidential property of clients. Authorization for publication of our reports, conclusions, or, extracts from or regarding them, is reserved pending our written approval as a mutual protection to clients, the public and ourselves.



Ford Chemical
LABORATORY, INC.
Bacteriological and Chemical Analysis
 40 WEST LOUISE AVENUE
 SALT LAKE CITY, UTAH 84115
 PHONE 485-5761

RECEIVED
 MAY 27 1980
 KAISER STEEL
 SUNNYSIDE, UTAH

DATE: 05/23/80

CERTIFICATE OF ANALYSIS

KAISER STEEL CORP.
 SUNNYSIDE, UTAH

80-009976

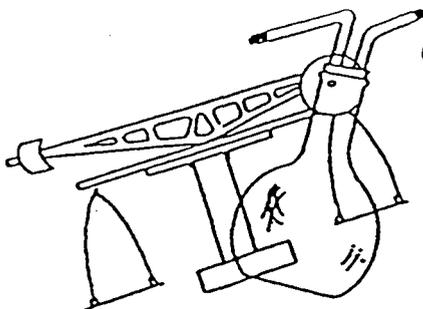
84539

SAMPLE: SEDIMENT FROM SUNNYSIDE MINE, ROAD BED, DARK AREA, RECEIVED
 ON 4/30/80 UNDER P.O. # 28063534.

WATER
 SOLUBLE
 RESULTS

=====	
Arsenic as As (Tot) PPM	<.001
Barium as Ba PPM	4.650
Boron as B PPM	2.350
Cadmium as Cd (Tot) PPM	<.001
Calcium as Ca PPM	265.40
Chloride as Cl PPM	22.85
Chromium as Cr (Tot) PPM	.002
Copper as Cu PPM	<.001
Fluoride as F PPM	.150
Iron as Fe (Tot) PPM	165.800
Lead as Pb (Tot) PPM	<.001
Magnesium as Mg PPM	.25
Manganese as Mn (Tot) PPM	.013

All reports are submitted as the confidential property of clients. Authorization for publication of our reports, conclusions, or, extracts from or regarding them, is reserved pending our written approval as a mutual protection to clients, the public and ourselves.



Ford Chemical
LABORATORY, INC.
Bacteriological and Chemical Analysis

40 WEST LOUISE AVENUE
 SALT LAKE CITY, UTAH 84115
 PHONE 485-5761

MAY 27 1980
 KAISER STEEL
 SUNNYSIDE, UTAH

PAGE: 2

CERTIFICATE OF ANALYSIS
 80-009978

WATER
 SOLUBLE
 RESULTS

Mercury as Hg PPM	<.0002
Nickel as Ni (Tot) PPM	.003
Potassium as K PPM	36.950
Selenium as Se (Tot) PPM	<.001
Silica as SiO2 PPM	350.400
Silver as Ag (Tot) PPM	<.001
Sodium as Na PPM	350.400
Sulfate as SO4 PPM	2.855
Zinc as Zn PPM	.139

Ray Ford
 FORD CHEMICAL LABORATORY, INC.

UTAH STATE UNIVERSITY
Soils Laboratory
 Logan, Utah
SOIL ANALYSIS REPORT

LMC AS
 LOGAN, UT. 84322.
 750-2217
 Russ Tomborne.

COLLECTED BY Kaiser Steel Corp. DATE 9/28/79 LOCATION Sunnyside, Utah 84539
Samples collected 8-23-79 & mailed (LTH) *Result received 10-6-79*

LABORATORY NUMBER	COLLECTOR'S NUMBER	DEPTH IN INCHES	HORIZON	PARTICLE SIZE DISTRIBUTION (in mm.) (percent)										TEXTURAL CLASS	
				VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.02-0.002	> 2mm.			
79-3997	1. slopes			<i>at upper bathhouse / Disturbed slope</i>										sandy loam	
3998	2. stock-piles			<i>topsoil near slurry ponds. / stockpile Topsoil.</i>										loam	
		pH		ORGANIC MATTER				TOTAL SOLUBLE SALTS %	ELECTRICAL CONDUCTIVITY EC x 10 ³ MILLIMHOS PER CM @ 25°C	CaCO ₃ equivalent	GYPSUM		MOISTURE TENSIONS		NaHCO ₃ P ppm
	SATURATED PASTE	1.5	ORGANIC MATTER %	ORGANIC CARBON %	NITROGEN %	C/N	me./100g SOIL				%	1/3 ATMOS. %	15 ATMOS. %		
3997	8.2	-			.05			1.0	++					2.9	
3998	8.2	1.21			.06			4.1	++					6.9	
		CATION EXCHANGE CAPACITY	extractable CATIONS				(SAR)	SATURATION EXTRACT SOLUBLE					PER CENT MOISTURE AT SATURATION	NaHCO ₃ K ppm	
			Ca	Mg	Na	K	Sodium Ads. Ratio	Na	K	Ca & Mg	HCO ₃	Cl			SO ₄
		← milliequivalents per 100g soil →				Ratio ←	milliequivalents per liter →								
3997	10.8			.1	.8	1.7			8.5				29	68	
3998	8.7			.4	1.3	7.1			56.4				26	81	

R. J. [Signature]

UTAH STATE UNIVERSITY

Soils Laboratory

Logan, Utah

SOIL ANALYSIS REPORT

COLLECTED BY Kaiser Steel Corp.

DATE 10/15/79

LOCATION Sunnyside, Utah

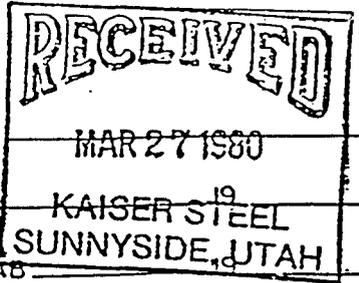
samples collected 10-10-79 & mailed (USD)

Result received 12-11-79

LABORATORY NUMBER	COLLECTOR'S NUMBER	DEPTH IN INCHES	HORIZON	PARTICLE SIZE DISTRIBUTION (in mm.) (percent)										TEXTURAL CLASS
				VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY <0.002	0.02-0.002	> 2mm.		
4368	1	<i>UNDISTURBED SOIL (Grassy Trail Creek floodplain)</i>										sandy loam		
4369	2	<i>RD. RUNOFF SILTS (Coal Refuse fines)</i>										sand		
		pH		ORGANIC MATTER				TOTAL SOLUBLE SALTS %	ELECTRICAL CONDUCTIVITY EC x 10 ³ MILLIMHOS PER CM @ 25°C	CaCO ₃ equivalent per cent	GYPSUM		MOISTURE TENSIONS	
		SATURATED PASTE	1:5	ORGANIC MATTER %	ORGANIC CARBON %	NITROGEN %	C/N				me./100g SOIL	%	1/3 ATMOS. %	15 ATMOS. %
4368		8.0				.12		.6	++					
4369		6.8				.45		3.5	0					
		CATION EXCHANGE CAPACITY meq/100g	SAR				SATURATION EXTRACT SOLUBLE					Exchangeable Sodium Percentage		
			Ca	Mg	P	K	Sodium Ads. Ratio	Na	K	Ca & Mg	HCO ₃		Cl	SO ₄
						ppm				milliequivalents per liter				
4368	10.2			5.7	214	.1	.6	.52				<.1		
4369	6.6			8.5	58	<.1	2.8	4.6				<.1		

RSJ

UTAH STATE DEPARTMENT OF HIGHWAYS
MATERIALS AND TESTS DIVISION
BASE AND SURFACE AGGREGATE



PROJECT NAME CARBON COUNTY PROJECT NO. MAR 27 1980
 LABORATORY NO. 79-4-A-127 SAMPLED KAISER STEEL
 IDENTIFICATION MARKS _____ REC'D AT LAB SUNNYSIDE, UTAH
 SUBMITTED BY C.V.R. REPORTED 11-1 19 79
 RESPECT LOCATION, PIT, STATION WASTE DUMP FROM MINE USED AS ROAD
BASE ON COUNTY ROAD UP WHITMORE CANYON ABOVE KAISER MINE
 TEST FOR GRADATION & WEAR

			SCREEN ANALYSIS		
			BEFORE CRUSHING		
LIQUID LIMIT _____	SPECS _____		SIEVE SIZE	PERCENT RETAINED	PERCENT PASSING
ELASTIC INDEX _____	_____		3"	_____	_____
TOTAL ABSORPTION _____ %	_____		2"	_____	_____
WELL PASSING NO 10 _____ "	_____		1"	_____	_____
BRASON, L. A. MACHINE <u>44.2</u> %	_____		3/8"	_____	_____
FRACTURED FACE COUNT _____ %	_____		#4	_____	_____
FINENESS LOSS + NO. 4 _____ %	_____		#4	_____	_____
FINENESS LOSS - NO. 4 _____ %	_____				
WEIGHTED LOSS _____ %	_____				
LOSS BY DRY SCREENING _____ %	_____				
			AFTER CRUSHING TO _____ MAX. SIZE:		
			OR NATURAL GRADING _____ SPECS		
			2"	_____	<u>100</u>
			1 1/2"	_____	<u>95</u>
			1"	_____	<u>87</u>
			3/4"	_____	<u>80</u>
			1/2"	_____	<u>66</u>
			3/8"	_____	<u>55</u>
			#4	_____	<u>37</u>
			#8-10	_____	<u>9</u>
			#16	_____	<u>4</u>
			#50- 40	_____	<u>2.0</u>
			#200	_____	<u>2.0</u>
			#200	<u>2.0</u>	_____

EMARKED OUT

LABORATORY

NOTE: (*) INDICATES SAMPLE DOES NOT MEET REQUIREMENTS OF THE STANDARD SPECIFICATIONS.
 (*) GRADING FOR BASE.
 (*) GRADING FOR SURFACING
 (*) OTHER

GEOLOGIC TYPE OF MATERIAL

SANDSTONE, Coal

- _____ PRELIMINARY
- _____ CONTROL
- _____ RECORD- PROGRESS
- _____ RECORD- FINAL

[Handwritten Signature]

Quality Specifications

	TYPICAL	
	Dry Basis	As Received
Total Moisture	—	7.5%
Volatile Matter	41.3%	38.2%
Ash	6.5%	6.0%
Fixed Carbon	52.2%	48.3%
Sulfur	1.00%	0.93%
Gross Btu/lb	13,700 Btu	12,700 Btu

	LIMIT	
	Dry Basis	As Received
Total Moisture	—	8.5% (Max.)
Volatile Matter	—	—
Ash	7.0% (Max.)	6.8% (Max.)
Fixed Carbon	—	—
Sulfur	1.15% (Max.)	1.10% (Max.)
Gross Btu/lb	—	12,000 Btu (Min.)

Ultimate Analysis

	Dry Basis	As Received
C	77.42%	71.62%
H	5.46%	5.05%
N	0.84%	0.78%
Cl	0.00%	0.00%
S	1.00%	0.93%
Ash	6.50%	6.00%
O (By Difference)	8.78%	8.12%

Water Soluble Alkalies

	Dry Basis	As Received
Na ₂ O	0.011%	0.010%
K ₂ O	0.003%	0.003%

TYPICAL

Gieseler Fluidity
(Constant Torque)
Maximum Fluidity
@ Temperature

120 ddm
432°C

Free Swelling Index

5

Petrographic Analysis

Reactives (By Volume)

Vitrinoids—V6	9.1%
V7	48.7%
V8	24.8%
Semi-fusinoids	1.0%
Resinoids	—
Exinoids	2.0%
Total Reactives	85.6%

Inerts (By Volume)

Fusinoids	1.6%
Semi-fusinoids	2.1%
Micrinoids	7.2%
Mineral Matter	3.5%
Total Inerts	14.4%

Mean Reflectance

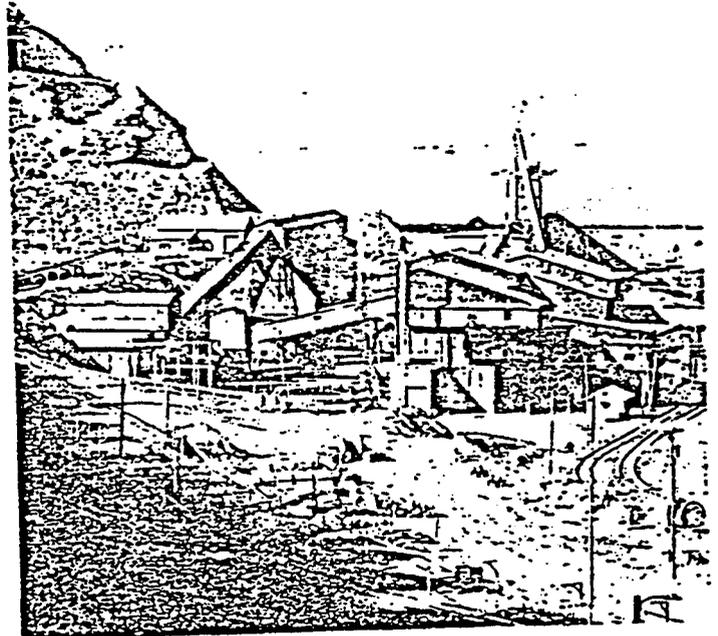
0.762

Strength Index

2.75

Comp. Balance Index

0.50



TYPICAL

Ash Composition (Dry Ash Basis)

SiO ₂	58.56%
Al ₂ O ₃	22.88%
TiO ₂	1.00%
Fe ₂ O ₃	7.63%
CaO	4.26%
MgO	0.56%
K ₂ O	0.52%
Na ₂ O	1.11%
SO ₃	2.09%
P ₂ O ₅	1.21%
Undetermined	0.18%

Ash Fusion Temperatures

	Reducing Atmosphere	Oxidizing Atmosphere
Initial Deformation	2,300°F	2,440°F
Softening (H=W)	2,370°F	2,485°F
Hemispheric (H=½W)	2,520°F	2,580°F
Fluid	2,640°F	2,680°F

Hardgrove Grindability Index 48

Size Consist

Nominal Size	2 inch x 0
Maximum +2 inch	5%

KAISER
STEEL
RAW MATERIALS GROUP