Appendix 5-19

Slope Stability Investigation Portal Pad

SLOPE STABILITY INVESTIGATION
PORTAL PADS AND PORTAL ACCESS ROADS
GENWAL COAL MINE
HUNTINGTON, UTAH

RECEIVED
DEC 22 1981
DIVISION OF
OIL, GAS & MINING

Prepared for

GENWAL COAL COMPANY
P. O. Box 1201
Huntington, Utah 84528

APRIL 15, 1986 REVISIONS REPLACE FORMER ITEM 12-6

JOB [illegible]

November 27, 1982

137 West 2260 South, Salt Lake City, Utah 84115 Telephone (801) 487-7754

Delta
GEOTECHNICAL CONSULTANTS INC.

November 27, 1981

Mr. William C. Wollen, Vice President
Genwal Coal Company
P. O. Box 1201
Huntington, Utah 84528

Dear Bill:

We have completed our geotechnical studies for the proposed Genwal Coal Mine portal pads and access road facilities in accordance with our agreement of October 30, 1981. Data gathered during our investigation, the analyses of these data along with our conclusions and recommendations are presented in the attached report.

We appreciate the opportunity of working with you on this project. If you have any question, please call us.

Sincerely yours,

DELTA GEOTECHNICAL CONSULTANTS, INC.

David T. Price

David T. Price, P.E., Ph.D.
Partner

DTP/tt

Submitted in 3 copies

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137 West 2260 South, Salt Lake City, Utah 84115 Telephone (801) 487-7754

Delta
GEOTECHNICAL CONSULTANTS INC.

December 8, 1981

Mr. William C. Wollen, Vice President
Genwal Coal Company
P. O. Box 1201
Huntington, Utah 84528

Subject: Cut Slopes and Safety Factors for Portal Pads and Access Roads to Genwal Coal Mine

Delta Job No. 1169

Dear Bill,

This letter summarizes our previous recommendations concerning cut slopes and cut slope safety factors for the proposed access roads and portal pads. Please refer to our report dated November 27, 1981 for details.

Material to be Cut	Recommended Slope	Safety Factor
Competent Bedrock	¼:1 to vertical	The dip of the potential sliding planes slope away from the proposed alignments; therefore rock cuts are considered stable and a numerical safety factor against sliding is inappropriate.
Fractured Bedrock	½:1	Same as above.
Shallow Surficial Deposits (less than 4 feet deep) Overlying Bedrock	1:1	a. 1.10 to less than 1 for the shallow surficial deposits. b. Same as above for bedrock.

INTRODUCTION

This report presents the results of a geotechnical investigation of the proposed portal pads and portal access roads for the Genwal Coal Mine. The mine is located in Crandall Canyon, which is approximately 15 miles west of Huntington, Utah. The objectives of this study were to evaluate the subsurface conditions at the site and to provide recommendations to aid in the design and construction of the proposed facilities. The purpose and scope of work was discussed with Mr. Bill Wollen of Genwal Coal Company during a site reconnaissance on October 29, 1981. The investigation included site reconnaissance, library research, subsurface exploration, geologic mapping, laboratory testing, and preparation of this report.

PROJECT DESCRIPTION

The project is near the south center portion of Section 5, T 16 S, R 7 W, Salt Lake Base and Meridian. Two portal pads, two access roads to the portal pads, and one sediment pond are proposed for construction. Preliminary data provided show the elevations of the lower and upper portal pads to be 7885.61 and 7940.58 feet respectively. The grades for both access roads were assumed to be 10%. Our calculations for access road cut depths were based on the assumption that the portals remained level until the point where the portal began to narrow from 30 feet to the access road width of 20 feet. Access road and portal widths and lengths are shown on Figure 14 as prepared by Boyle Engineering Corporation of Salt Lake City. Using the above assumptions and the topographical map provided, cuts up to 35 feet are anticipated. We understand the proposed access roads and portal facilities will not be paved but will be constructed of a gravel surface underlain by suitable base and subbase material.

SITE CONDITIONS

The site is situated on a south facing slope below a prominant ridge. The ridge is an extension of the mountain to the east. The elevation of the ridge varies from a high of about 10,000 feet to a low of around 7,000 feet where the Crandall Canyon Creek drains into Huntington Creek. The general trend of the ridge is east-west. The proposed portal and access road facilities are located at the base of this ridge, between approximately elevations 7940 and 7860 feet. The mountain slopes between these elevations vary in steepness from 30 to 40 degrees to over vertical where the bedrock is exposed. The ground surface near the creek is covered by blue spruce, aspen, Douglas fir, and various grasses. The steeper slopes, further uphill, are less vegetated and are sparsely covered with wheat grass, juniper, and pinyon pine. Boulders and cobbles are also scattered on the higher grounds. Many areas evidence moderate erosion from rapid runoff of snow melt and rain water. The erosion areas are also characterized by numerous small slump failures, and were often found in a wet condition at the time of this investigation (November 6, 1981). Seepage was found above the haul road, near station 80+00 and between stations 74+00 and 75+80. Refer to Figure 14. Seepage should also be anticipated in other areas of the proposed excavation during construction.

GEOLOGY

Two major geologic formations were exposed in the area of the proposed project: the Star Point Sandstone and the Blackhawk Sandstone. The Star Point formation is the lower of the two and consists of yellow to gray, massive, cliff forming sandstone often in several tongues separated by thick beds of yellow to gray slope forming shale. The Blackhawk formation

consists of alternating slope and cliff forming units. The cliff forming units are yellow to gray or white sandstones which weather to tan or yellowish brown. Some of the sandstone is reddened by the natural burning of nearby coal seams. The slope forming materials of the Blackhawk formation consist mainly of shale with several coal beddings. The shale is soft to hard and granular (sandy). In general, the exposed formations strike in a north-east direction and dip slightly to the north or away from the proposed cut slopes. No faults were observed at the site during our field investigation.

SURFACE AND SUBSURFACE SITE EXPLORATION

The field work portion of our study consisted of a preliminary field reconnaissance and a subsequent three day site investigation that included test pit excavations, soil sampling and classifications, mapping of bedrock outcrops and seepage areas, and observations of general site conditions. Data from the surface reconnaissance is shown on Figure 14.

Three test pits were excavated at the proposed site. Because of access difficulties our test pit excavations were limited to the lower elevations. Shallow test pits were hand excavated at higher elevations. The backhoe excavated test pits ranged in depth from seven to thirteen feet. The subsoils were classified in the field and relatively undisturbed and disturbed samples were taken from the test pits and sent to our laboratory for further examination and testing. The subsoil conditions are discussed under the SUBSURFACE CONDITIONS section of this report.

LABORATORY TESTING

A laboratory program was conducted to further identify the sampled subsoils, and to determine subsoil properties for use in engineering

analysis. Gradation, Atterburg limits, natural moisture and density, and Proctor density tests were performed to accomplish our objectives. The results of these tests are shown in Figures 12 through 13. The soil parameters used in our sliding block (or mudflow) stability analysis are shown on Figure 7.

SUBSURFACE CONDITIONS

Three distinct subsoil conditions, from an engineering standpoint, exist along the proposed raodway and portal alignments. The three types of subsoil conditions are: (1) areas of exposed bedrock, (2) areas where bedrock is covered by 10 to 40 inches ± of surficial deposits, and (3) areas covered by 15 feet ± of alluvium deposits. Test pit 3 indicated the alluvium consisted mainly of silt and fine gravel between 0 to 4 feet; dense silty sand with some gravel and cobbles between 4 and 12 feet; and boulders with silty sand to the bottom of the excavation. Area 2 surficial deposits consisted of silty sand with gravel, and cobbles. The alluvium deposits (area 3 soils) are mainly located below elevation 7860, which is in the area of the haul road. No major cuts for the portal pads or access roads are anticipated in area 3 type subsoil conditions. The lower access road is expected to be in area 2 type subsoil conditions, and all of the upper access road and both portal pads are expected to be in area 1 and 2 type subsoil conditions.

CUT SLOPE RECOMMENDATIONS

The following cut slopes are recommended for the proposed access roads and portal pads. These recommendations are based on our observation of surface and subsurface conditions, a sliding block type slope stability analysis and our experience with similar soil conditions:

Type of Material	Cut Slope (H:V)
Competent Bedrock	½:1 to vertical
Fractured Bedrock	½:1
Surficial Deposits less than 4 feet deep (area 2 type)	1:1
Surficial Deposits greater than 4 feet deep (area 3 type)	2:1

Cut slope profiles for four different locations are shown on Figures 2 through 5. These profiles indicate typical surface and subsurface conditions that may be expected along the proposed alignments. The profiles also show some of the problems associated with flatter excavations such as 1:1 cut slopes. As shown on Figures 4 and 5, a 1:1 cut slope could undercut the upper access road. The flatter slopes will also unnecessarily scar the hillside, and create large erosion paths. Flatter slopes will also increase the cost of construction. We, therefore, do not recommend cut slopes flatter than ½:1, except under the conditions outlined in our recommendations above.

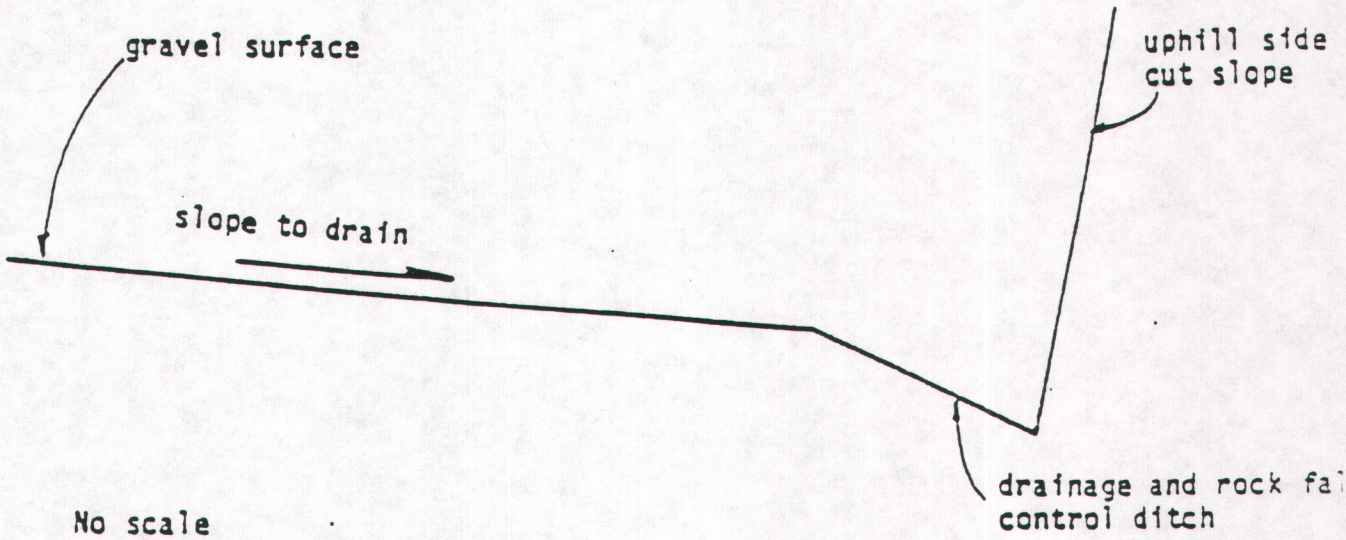
ROADWAY CROSS-SECTION AND DRAINAGE RECOMMENDATIONS

Control of surface runoff and rock falls from higher elevations, in our opinion, are the two most critical factors to be incorporated in the design and construction of the proposed facilities. Uncontrolled surface runoff will saturate surficial deposits, particularly in the areas of shallow bedrock, and will cause major slides (or mud flows) in these areas. These slides not only would delay the mine operations, but could cause major damage to men and equipment. The results of our "sliding block" slope stability analyses, which confirms our opinion, are presented on Figure 7. Rock falls, on the other hand, are unpredictable. Rock fall

Design details for the recommended diversions and culverts outlined within the original Delta Engineering report are no longer valid as the hydrology sections of the permit have been rewritten by Earthfax Engineering, Inc. Refer to changes in Chapters 3 and 7 for diversion and culvert design.

Insert this page prior to Page 6, Item 12-b. Response to DOGM letter dated 5-27-86, Page 15 Item 13.

could occur any time of the year due to weathering of the overhanging cliffs, and erosive forces causing the stranded rocks to loosen and roll downward. Both problems, in our opinion, can be minimized by providing a drainage (or rock fall ditch) as illustrated below. Details of the ditch construction are presented on Figure 6.



TYPICAL ROADWAY CROSS SECTION

The following design and construction details should also be observed:

(1) The construction activities will unavoidably alter and block the natural drainage paths along the proposed alignments. We recommend that culverts or other drainage means be provided for these areas.

(2) The roadway should be graded toward the drainage (or rock fall) ditch to prevent ponding of water in the roadway.

(3) The drainage ditch should be paved or properly lined with a suitable material to prevent penetration of water into the subsoils or surficial deposits. Where the roadway is underlain by claystone or impervious sandstone, ditch lining will not be required.

(4) The excavated material should not be dumped over the downhill side of the cuts as this will lower the stability of the hillside.

(5) The drainage ditch should be cleaned and maintained periodically to insure that the system remains functional at all times.

(6) The natural soil cover and vegetation should be protected as much as possible to prevent erosion.

EMBANKMENTS

Embankments will be required where the proposed alignments cross several draws as shown by Figure 14. Embankments, up to 20 feet high, constructed of sandy gravelly materials should be stable on 2:1 slopes if the following recommendations are followed:

(1) Remove all topsoil and weak or loose surficial deposits underlying the embankment areas.

(2) As stated earlier in this report, provide properly sized culverts in the natural drainage areas to prevent water from ponding against or penetrating into the embankments. Culverts should be founded on well compacted soils or on bedrock.

(3) Compact all embankment soils to 95% of the maximum laboratory dry density as determined by ASTM D-1557-70 method.

LIMITATIONS AND PROJECT INSPECTION

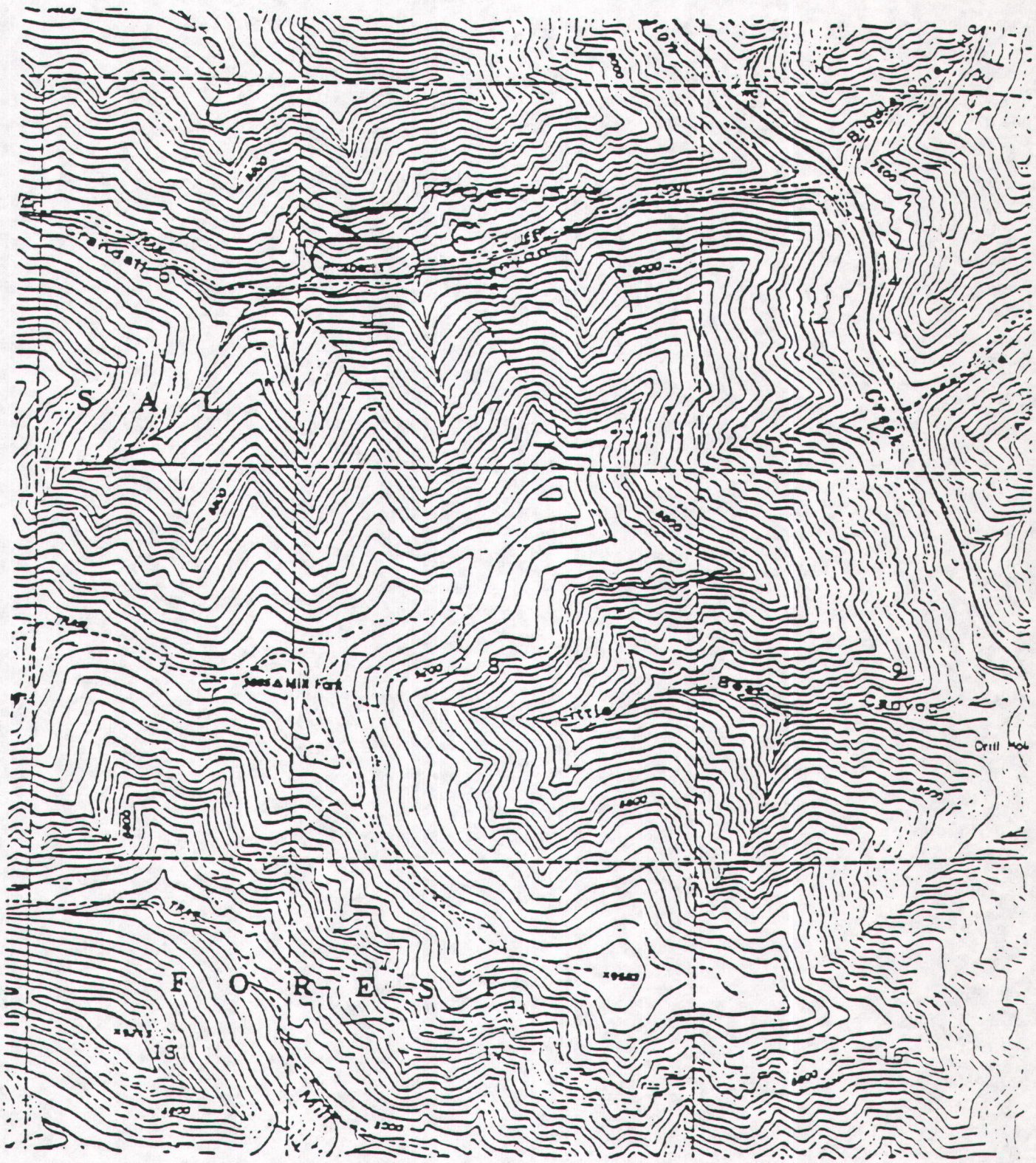
Our subsurface exploration program consisted of three test pits and several shallow, hand excavated test holes. Our surface reconnaissance consisted of mapping of bedrock outcrops and water saturated areas. However, considerable variation may still occur between the sampled and mapped locations. This report does not reflect any material variations which might occur between these observed locations. Variations in subsoil conditions are sometimes sufficient to necessitate design modifications. We, therefore, recommend that a competent soils engineer be retained to periodically inspect the excavations.

DELTA GEOTECHNICAL CONSULTANTS, INC.

David T. Price, P.E., Ph.D.
Partner

David T. Price

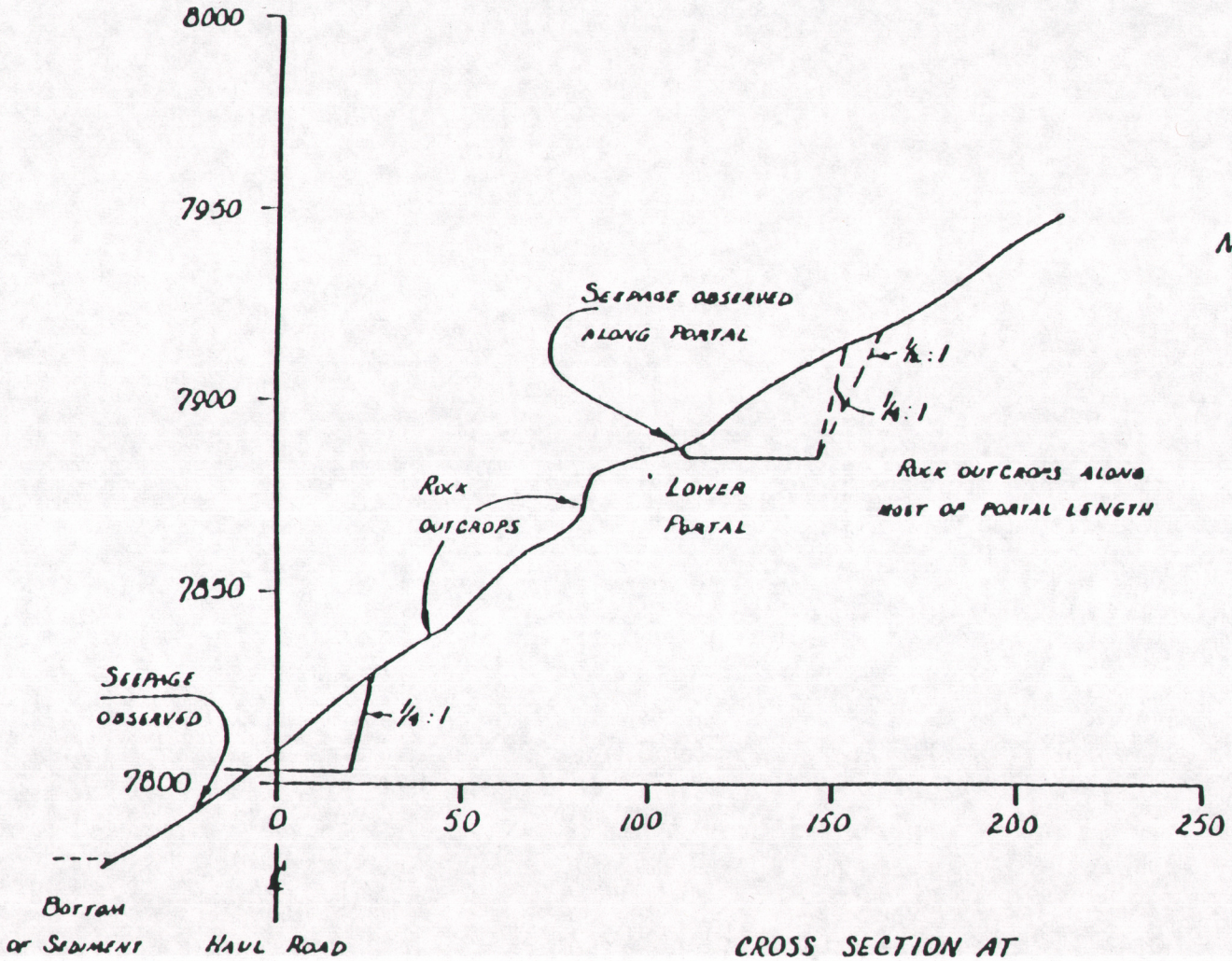
Hovik Bagdasarian, P.E., Ph.D.
Partner



VICINITY MAP

SCALE 1" = 2000'

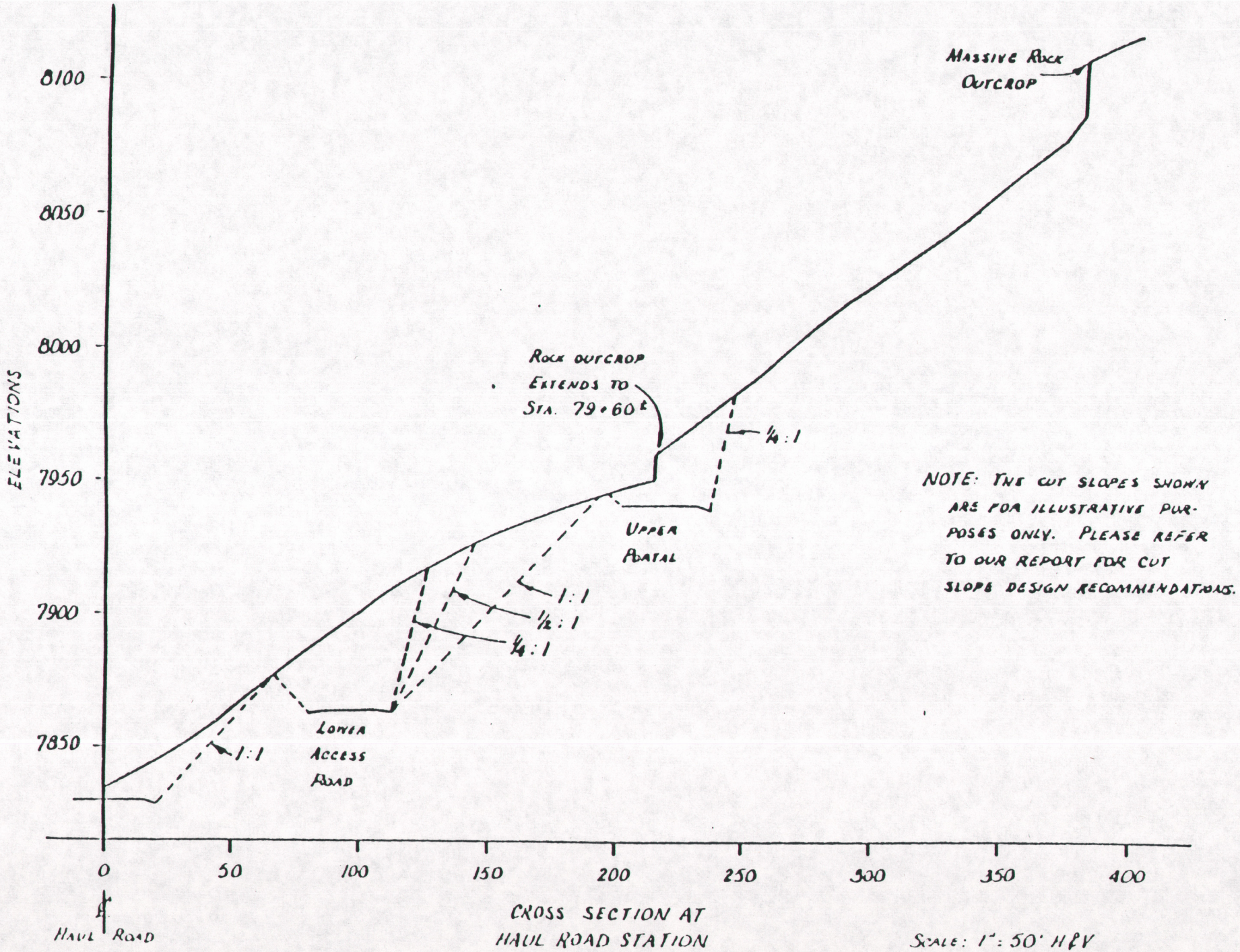
JOB NO. 1165



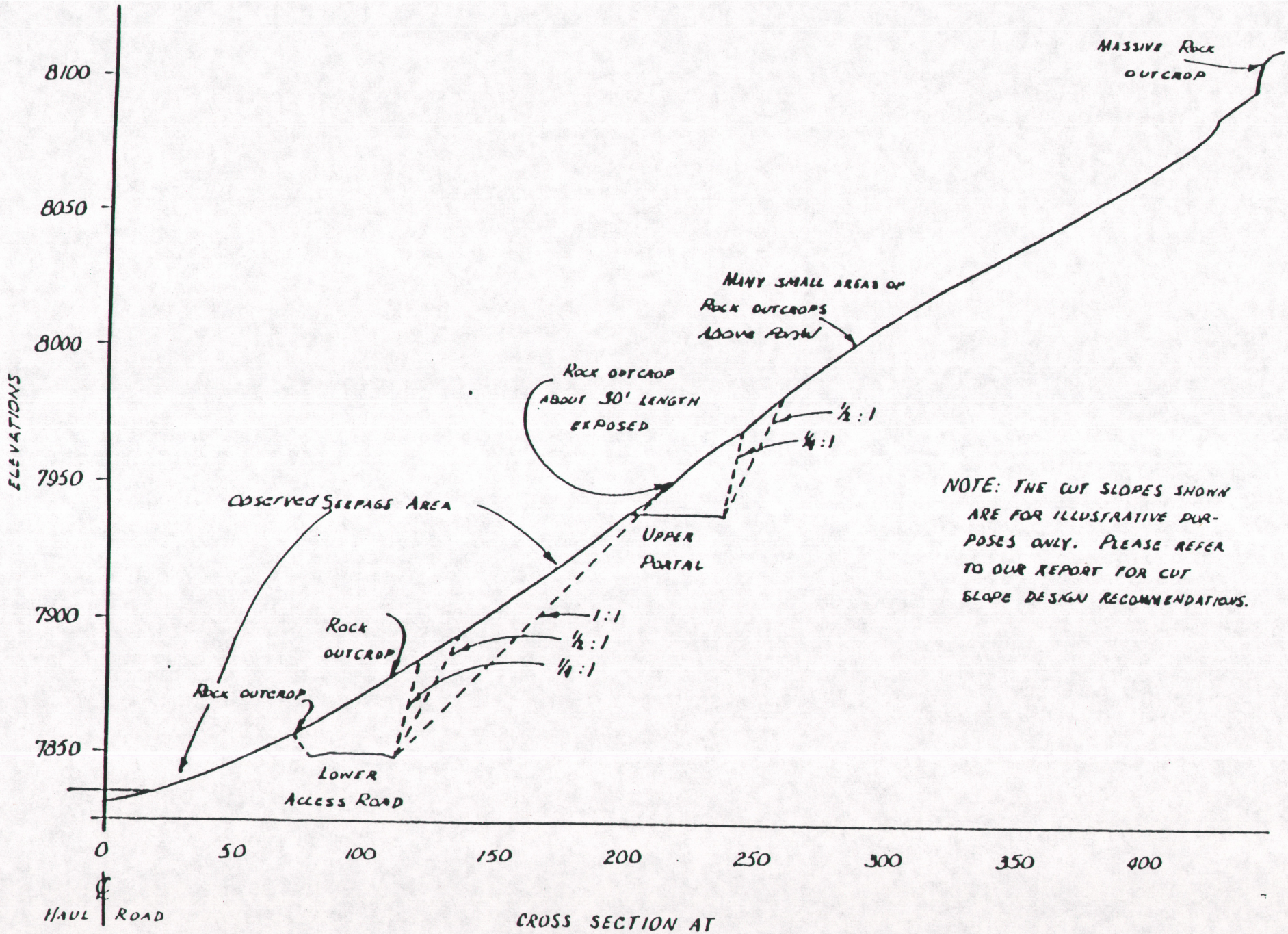
NOTE: THE CUT SLOPES SHOWN ARE FOR ILLUSTRATIVE PURPOSES ONLY. PLEASE REFER TO OUR REPORT FOR CUT SLOPE DESIGN RECOMMENDATIONS.

CROSS SECTION AT
HAUL ROAD STATION
75+00

SCALE: 1" = 50' H&V



CROSS SECTION AT HAUL ROAD STATION 79+00

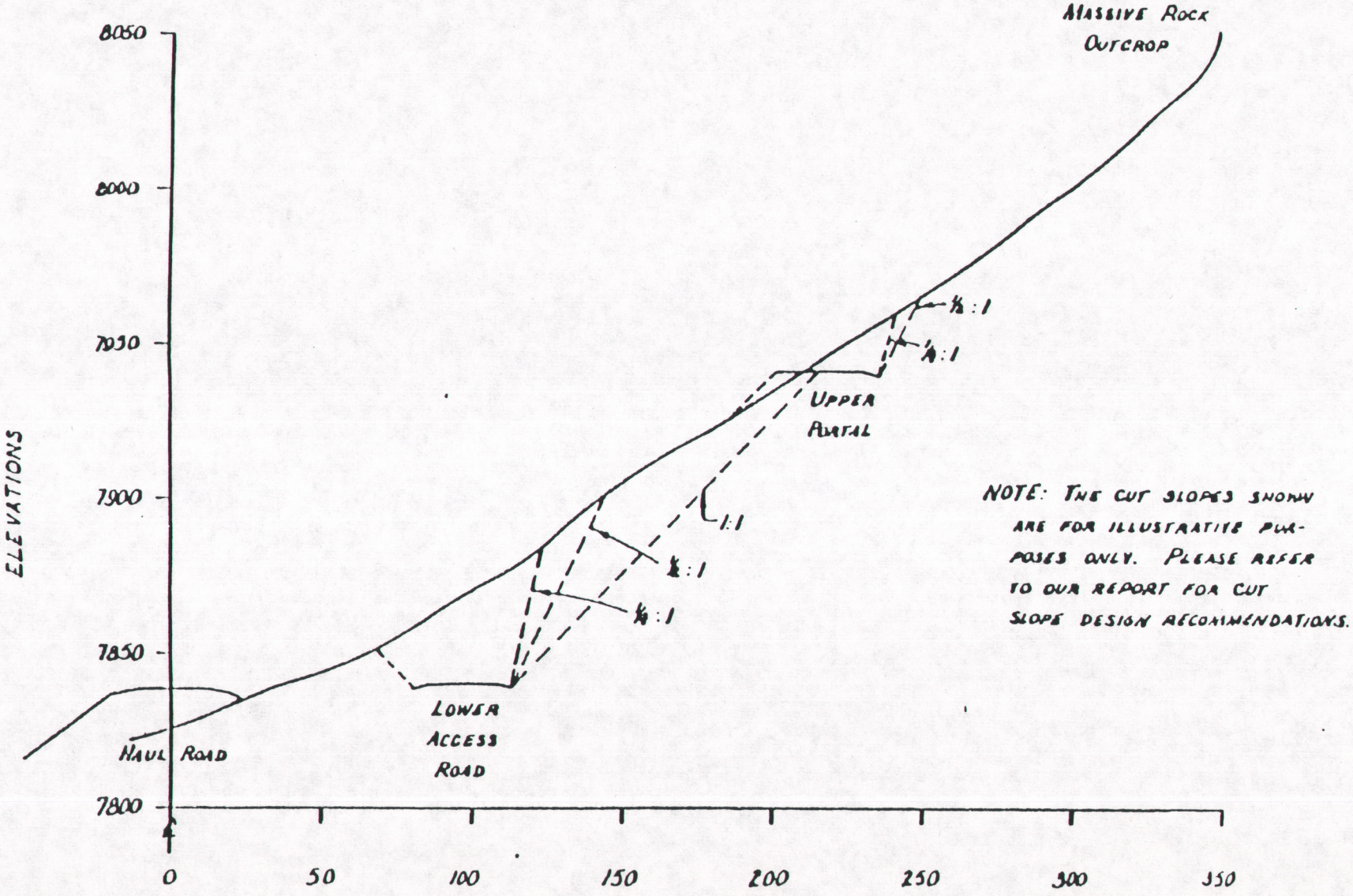


NOTE: THE CUT SLOPES SHOWN ARE FOR ILLUSTRATIVE PURPOSES ONLY. PLEASE REFER TO OUR REPORT FOR CUT SLOPE DESIGN RECOMMENDATIONS.

CROSS SECTION AT
HAUL ROAD STATION
80+23

SCALE: 1" = 50' H & V

JOB NO 1169

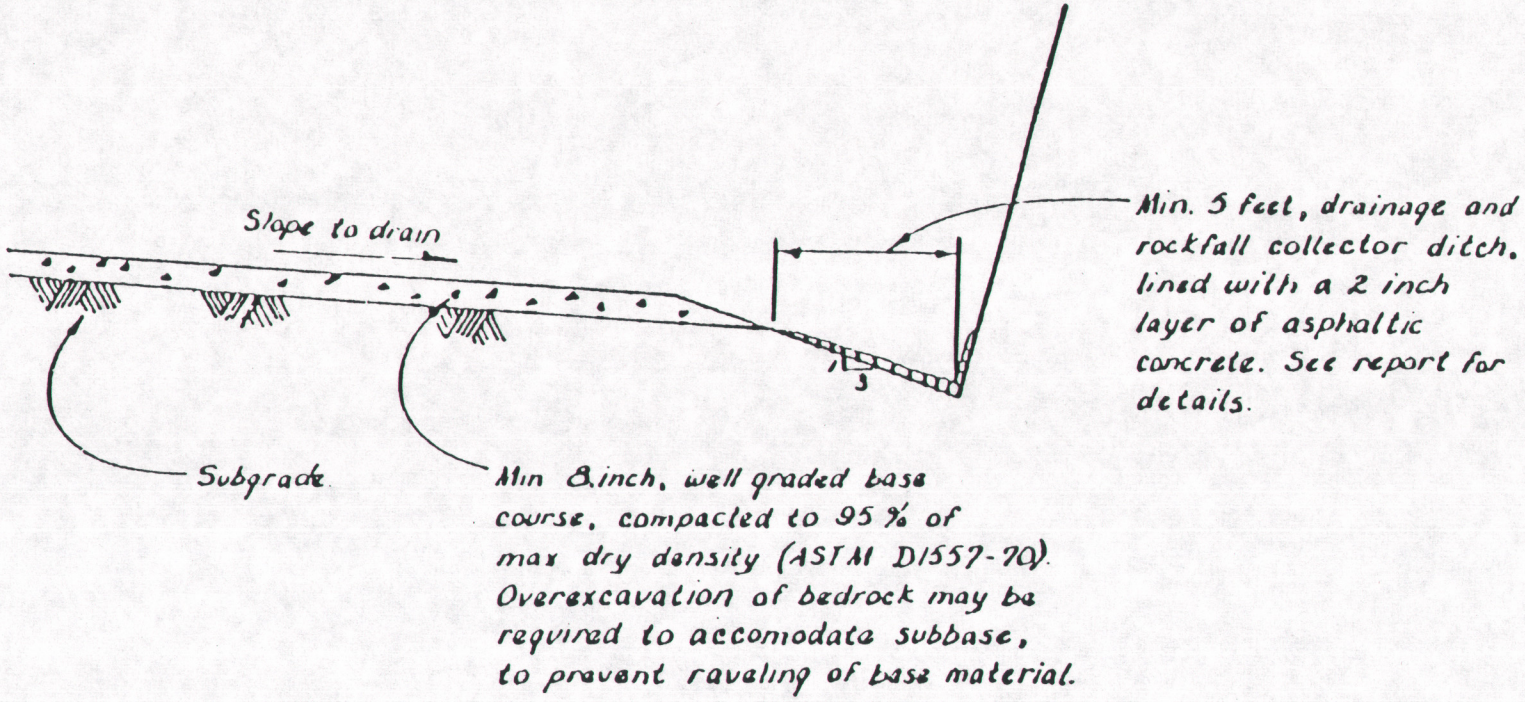


NOTE: THE CUT SLOPES SHOWN ARE FOR ILLUSTRATIVE PURPOSES ONLY. PLEASE REFER TO OUR REPORT FOR CUT SLOPE DESIGN RECOMMENDATIONS.

CROSS SECTION AT HAUL ROAD STATION 8+23

SCALE: 1" = 50' H & V

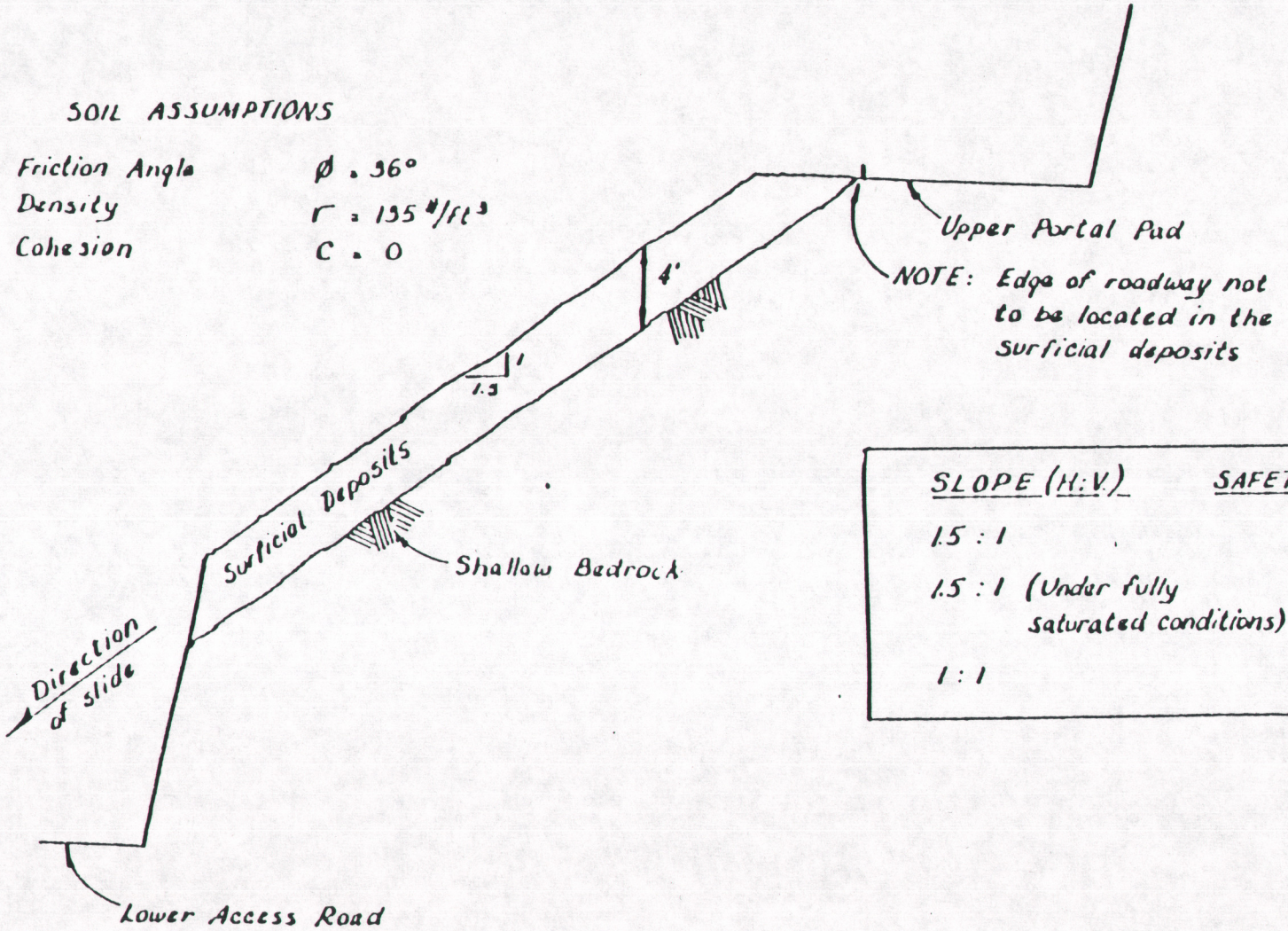
Tom No. 110



PROPOSED DRAINAGE AND
ROCKFALL
COLLECTOR DITCH

SOIL ASSUMPTIONS

Friction Angle	$\phi = 36°$
Density	$\gamma = 135\ \#/ft^3$
Cohesion	$C = 0$



SLOPE (H:V)	SAFETY FACTOR
1.5 : 1	1.10
1.5 : 1 (Under fully saturated conditions)	0.64
1 : 1	0.72

SLIDING BLOCK OR "MUDFLOW" STABILITY ANALYSIS

JOB No 1169

FIGURE 7

Delta

TEST PIT NO. 1

ELEVATION 7784

DEPTH IN FEET	LL	PI	W	DD	OTHER TESTS	SOIL DESCRIPTION
0						COAL: waste from old mine
	22.1	3.1			-200=50.8	SAND AND SILT (SP-ML), medium dense, wet to moist, fine grained, tan
5		NP	7.3	98.4		SAND (SP), silty, gravelly, medium dense to dense, moist to dry. Slightly calcareous.
10						

LOG OF TEST PIT

JOB NO 1169

FIGURE 3

Delta

TEST PIT NO. 2

ELEVATION 7780

DEPTH IN FEET	LL	PI	W	DD	OTHER TESTS	SOIL DESCRIPTION
0						SAND (SM), silty with some clay. Medium dense, wet to moist. Roots to 2'6" depth.
5						SAND (SP) with gravel, cobbles, and boulders, dense.
10						

LOG OF TEST PIT

JOB NO 1169

FIGURE 9

Delta

TEST PIT NO. 3

ELEVATION 7838

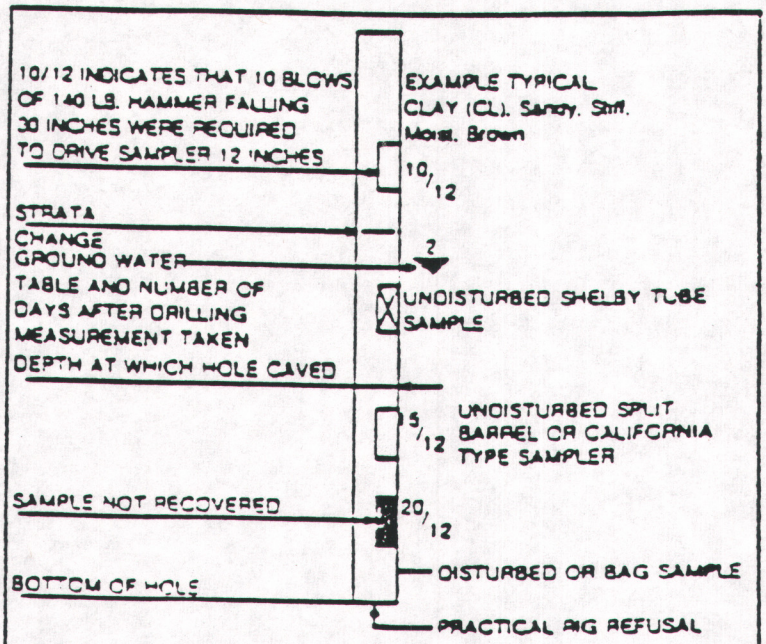
DEPTH IN FEET	LL	PI	W	DD	OTHER TESTS	SOIL DESCRIPTION
0						TOPSOIL: Silt and fine sand. Roots.
						SILT (ML), with fine gravel, medium dense, dry.
5						SAND (SM), silty with some gravel and cobbles, dense, dry. A few boulders.
10						
						BOULDERS in silty sand, very dense, dry.
15						

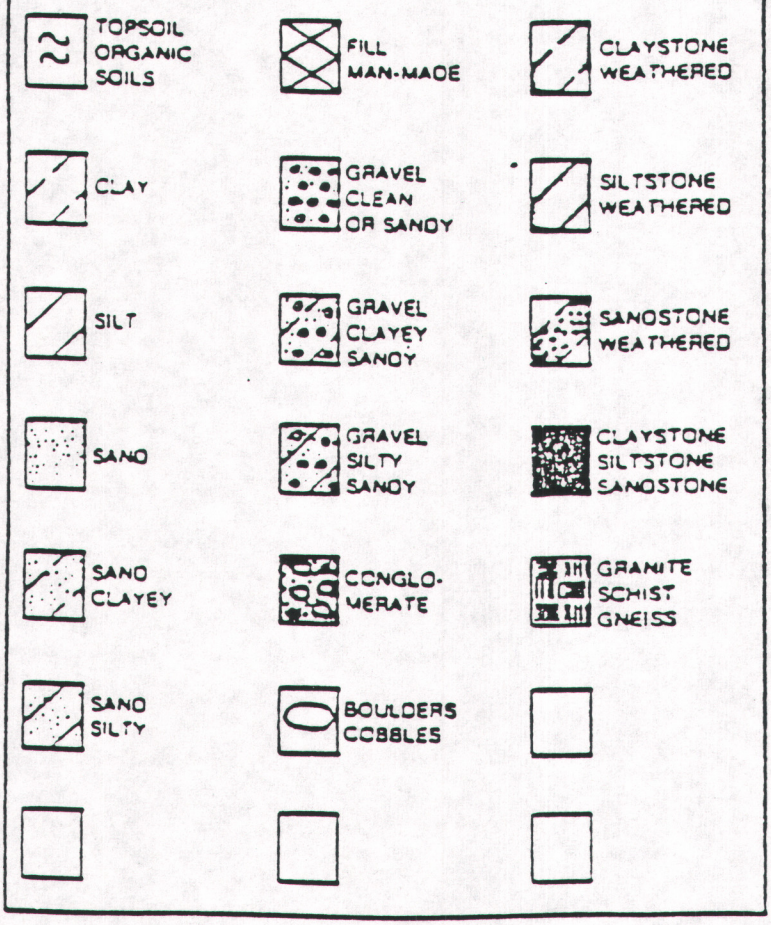
LOG OF TEST PIT

JOB NO 1169

FIGURE 10

KEY TO TEST PIT





RELATIVE DENSITY (SAND & SILT)

VERY LOOSE	LESS THAN 4 BLOWS / FOOT
LOOSE	4 TO 10 BLOWS / FOOT
MEDIUM DENSE	10 TO 30 BLOWS / FOOT
DENSE	30 TO 50 BLOWS / FOOT
VERY DENSE	MORE THAN 50 BLOWS / FOOT

CONSISTENCY (CLAY)

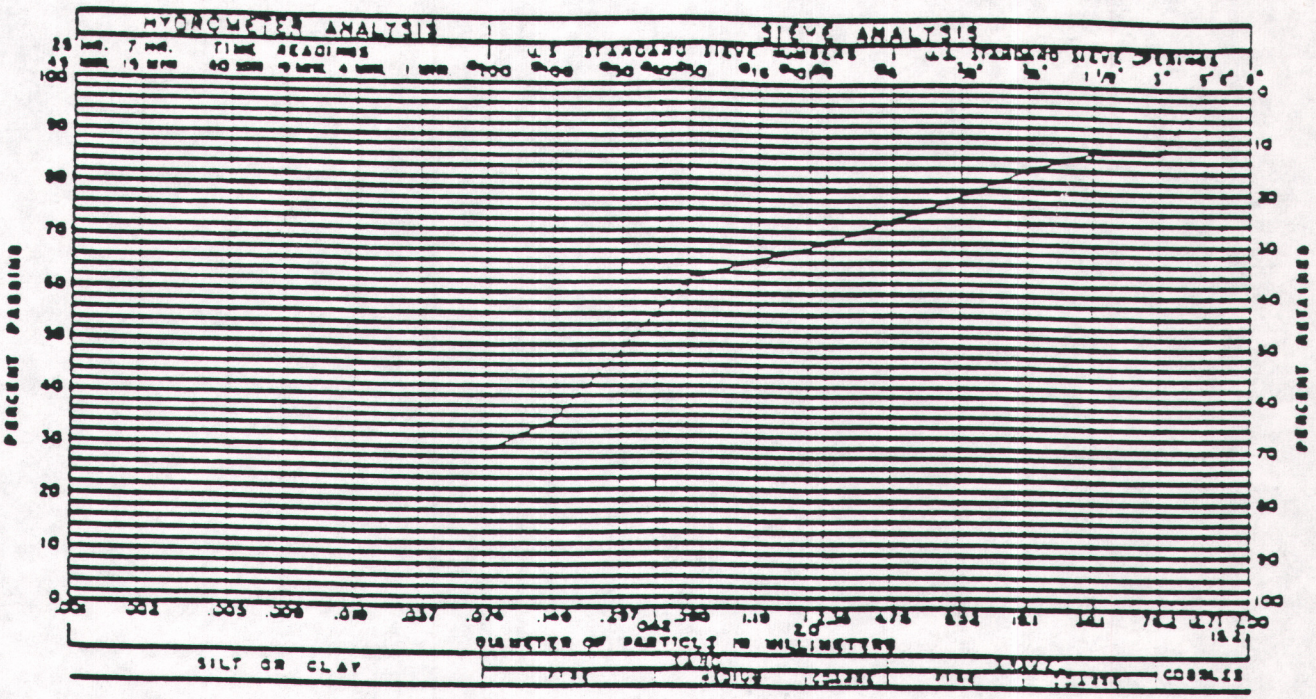
VERY SOFT	LESS THAN 2 BLOWS / FOOT
SOFT	2 TO 4 BLOWS / FOOT
MEDIUM STIFF	4 TO 8 BLOWS / FOOT
STIFF	8 TO 15 BLOWS / FOOT
VERY STIFF	15 TO 30 BLOWS / FOOT
HARD	MORE THAN 50 BLOWS / FOOT

ABBREVIATIONS

- LL - LIQUID LIMIT (%)
- PI - PLASTIC INDEX
- W - NATURAL MOISTURE CONTENT (%)
- DD - DRY DENSITY (PCF)
- NP - NONPLASTIC
- -200 - PERCENT PASSING NO 200 SIEVE
- UC - UNCONFINED COMPRESSION STRENGTH (PSF)
- Ø - FRICTION ANGLE (DEGREES)
- C - COHESION (PSF)

NOTE: Test pits were excavated by a backhoe on November 5, 1981.

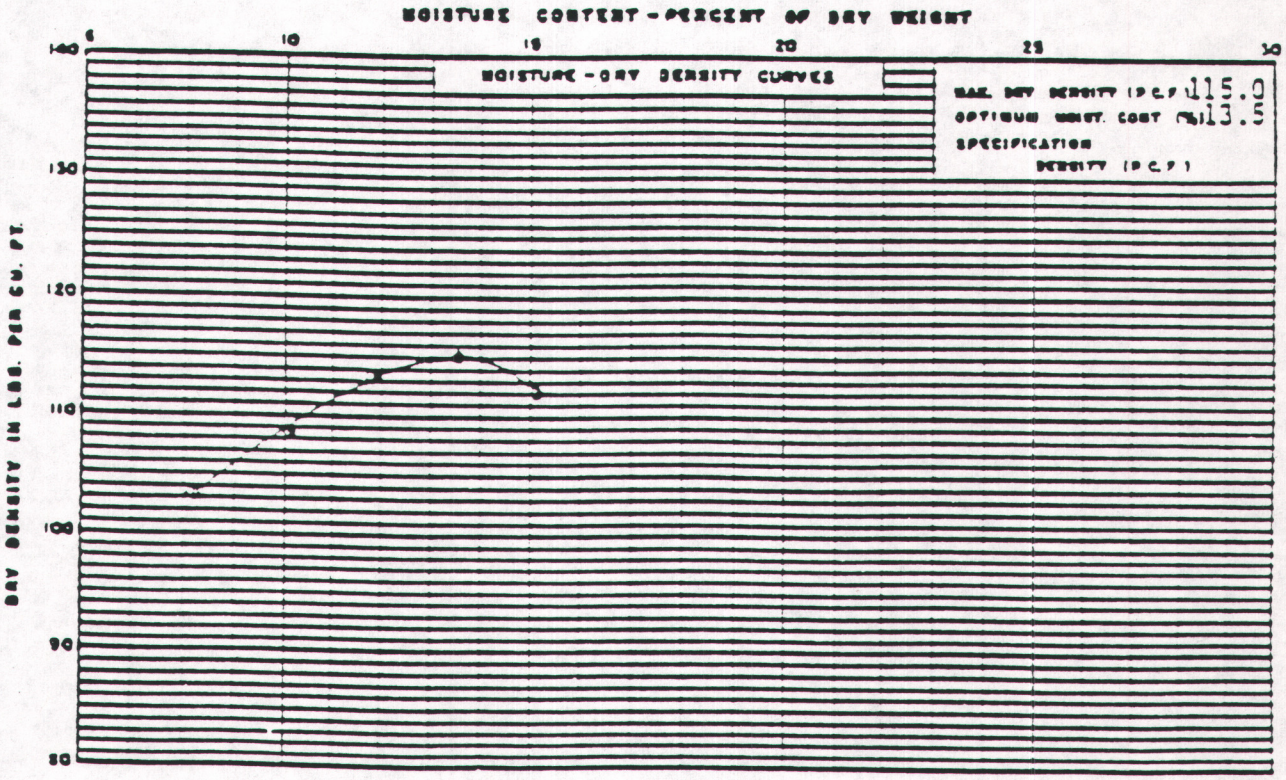
Delta



GRADATION TEST RESULTS

GRAVEL 25.9 % SAND 44.4% SILT AND CLAY 29.7 %

LIQUID LIMIT % PLASTICITY INDEX NP %



COMPACTION TEST RESULTS

COMPACTION TEST PROCEDURE ASTM D 698-70, Method C

SAMPLE OF silty, gravelly, sand

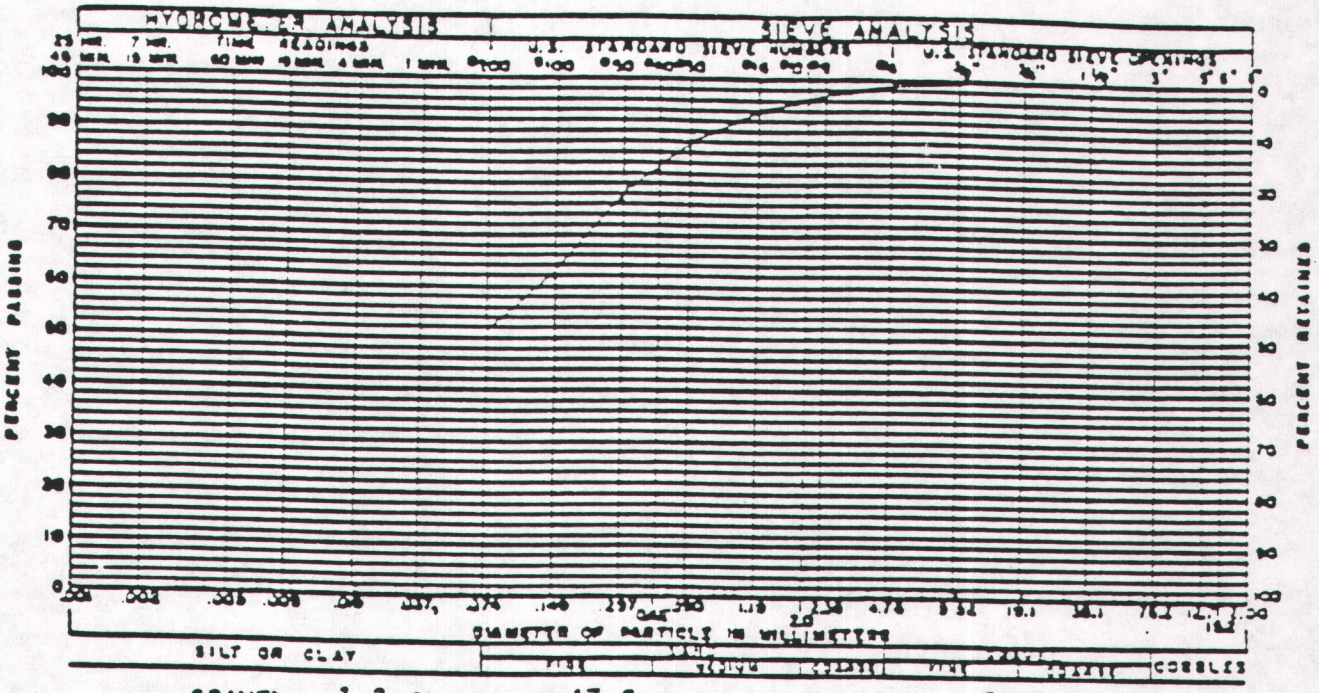
FROM Test Pit 1 DEPTH 4' - 8'

NOTE: This data appli
to Sediment Pond Area.
not use for access roa
materials control.

JOB NO. 1169

Figure 12

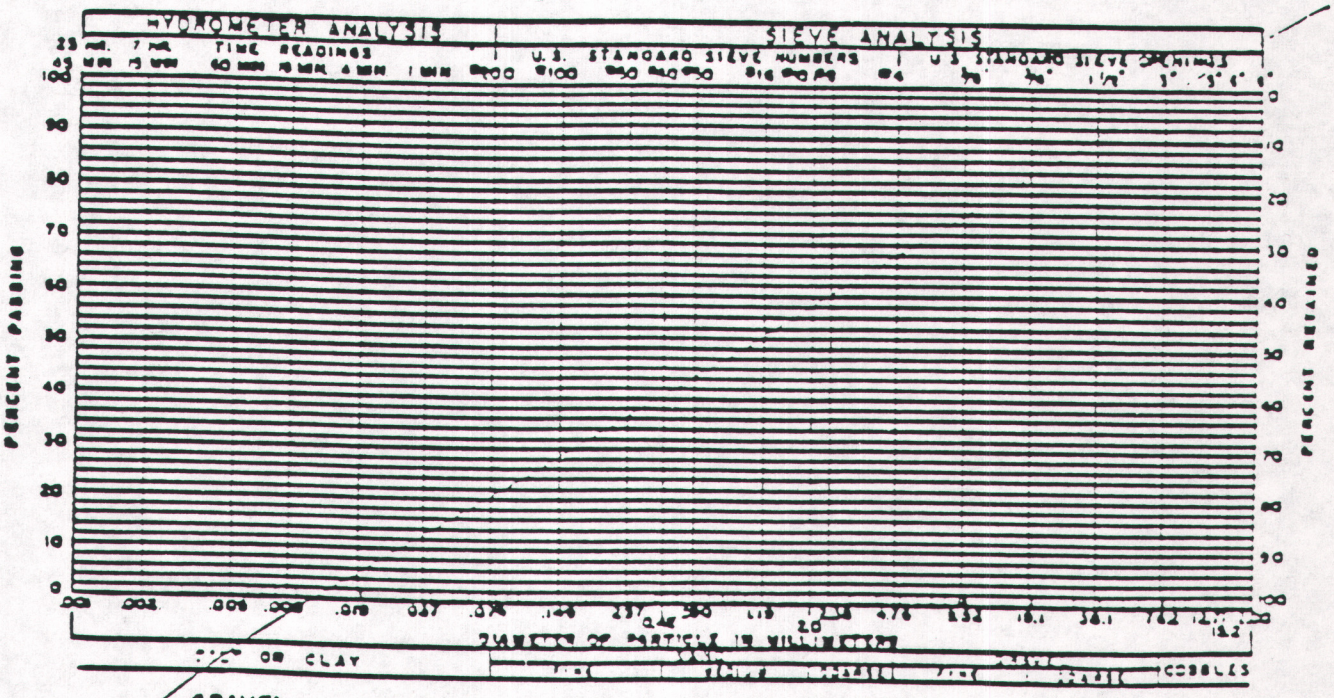
Delta



GRAVEL 1.3 % SAND 47.9 % SILT AND CLAY 50.8 %

LIQUID LIMIT 22.1 % PLASTICITY INDEX 3.3 %

SAMPLE OF sand and silt FROM Test Pit 1 @ 1' - 2'



GRAVEL % SAND % SILT AND CLAY %

LIQUID LIMIT % PLASTICITY INDEX %

SAMPLE OF FROM

GRADATION TEST RESULTS

JOB NO. 1163

October 3, 1985
8185 S. Willow St
Englewood, CO 80[illegible]

Mr. Wayne Hedberg
Department of Natural Resources
Division of Oil, Gas and Mining
355 West North Temple
3 Triad Center
Suite 350
Salt Lake City, Utah 84180-1203

Dear Wayne:

This letter is in response to your letter dated September 12, 1985 regarding the Revised Subsidence Control Plan for Genwal Coal Company's Crandall Canyon Mine Tract I and Tract II permit applications. I have addressed each item of concern in this cover letter as well as in the enclosed permit inserts. I have enclosed eighteen copies of each item which should be sufficient for both applications.

Plate XII-3 has been redrawn to include a detailed legend, the permit boundaries for each application and the mine development has been labeled according to the mining sequence presented on page XII-3. The permit and lease boundaries shown on this map were obtained from actual field surveys of the section corners and were not obtained from USGS topographic maps which are slightly inaccurate. Please destroy former Plate XII-3 and insert the enclosed copy.

Areas of questionable roof support have not been encountered in the mine are not expected to occur within Tract II.

Item XII-13 is to replaced with the aerial photographs numbered XII-13a and XII-13b which are of better quality. Please replace page 7 with the revised page 7 which references these photographs.

The SME Engineering reference to page 13-104 states that as the ratio of width to height approaches 12, the pillars are regarded as being able to bear any load. The statement is included as a limiting factor for the Holland-Gaddy formula but still remains applicable to any pillar which is designed and was referenced as a consideration to be used in the Obert Formula design within the permit. No changes have been made within the permit text as the reasoning is correct for any pillar design regardless of the initial formula used.

A statement has been added to page XII-11 under section 12.4.3

regarding the possible impact of subsidence on the grazing potential of the permit area. Please replace pages 11 and 12 with the revised pages XII-11 and XII-12 included within this submittal.

The water rights owned by the US Forest Service are not affected whether subsidence occurs or not as the USFS is entitled to the quantity of water granted by these rights within the Crandall Creek drainage basin. The applicant is not using nor transporting this water out of the drainage basin. Springs 93-1407 and 93-1409 are not within the limits of anticipated subsidence and will not require monitoring. Spring 93-1408 was not found in the location shown on Figure 7-3 in the Tract II permit application during the Spring and Seep Survey as described by Item XII-13. This apparent discrepancy can be explained after referring to the spring description in Appendix 7-1 which only gives a general location in a 40 acre area. Due to the even questionable occurrence of subsidence this distance from the active workings and the failure of locating the spring during a field survey the applicant does not propose monitoring spring 93-1408. Please remove pages XII-9 and XII-10 and replace them with the enclosed revised pages.

Quantity of discharge of Spring SP-30 will be monitored as described in Chapter VII on Page VII-22.

If additional information is needed ~~please~~ do not hesitate to call me at 303-799-1045.

Sincerely,

Leonard Witkowski

August 15, 1985
8185 S. Willow St.

Original Permit 12-20-85

The enclosed letter dated 10-3-85 refers to a spring monitoring committment for SP-30 on Page 7-22. The correct page number should be 7-30.

Insert this page after the October 3, 1985 letter in Item 12-7.

Englewood, CO 80112

Mr. Wayne Hedberg
Department of Natural Resources
Division of Oil, Gas and Mining
355 West North Temple
3 Triad Center
Suite 350
Salt Lake City, Utah 84180-1203

Dear Wayne:

This letter is in response to the letter dated July 17, 1985 from Mr. Lowell Braxton regarding the Revised Subsidence Control Plan for Genwal Coal Company's Crandall Canyon Mine. Thank you for extending the deadline from July 31, 1985 to this week. I have addressed the questions, errors and deletions itemized in the aforementioned letter within this letter as well as in the attached report.

I have included the area north of the currently permitted area known as Tract II within this submittal. I hope this will avoid confusion and inconsistency.

The location of the anticipated maximum vertical movement of 3.9 feet is now shown on Item XII-5 as well as described within the text. The possible vertical movement of surface subsidence in feet is shown as contour lines on Item XII-5 in one foot increments. The thickness of the Hiawatha seam varies from 5.5-6.5 feet throughout the mine area except for the area shown in the shaded region on Item XII-2. No coal isopach lines are shown on any map.

The anticipated effects of planned subsidence is described within the text. The Spring and Seep Inventory completed by Earthfax Engineering, Inc.on June 12, 1985 is incorporated within the report. Slope failure is not expected to occur within the permit area. The mitigation of subsidence effects will be minimal as described within the text as no diminution of value or foreseeable use of lands is expected to occur.

The Statement of Fact has been removed from this submission as it becomes unnecessary when the permit in total must be submitted with an officer's acknowledgment of permit content. The information contained within the Statement has been incorporated within the text.

Extended description, revised calculations and factor of safety justification have been provided within the text in greater detail as requested. The success in removing the pillars in the First South Panel area without premature pillar failure is evidence of prudent and satisfactory pillar design. The

results obtained from the equations used form a basis to design pillars of extended life.

The discrepancy between the text and Item XII-8 has been corrected in regards to the vertical distance between Crandall Creek and the lease boundary.

A 50 foot barrier pillar has been left intact along the southern boundary increasing to 80 feet at the northern boundary of the permit area covered in Tract I. The angle of draw will initiate from the bleeder pillars position as shown on Item XII-8.

As described within the text, the 115 foot radius drawn from the southwest corner of the lease area can not be used on Item XII-5 because of the declining topography as the creek is approached as shown on Item XII-8.

If I can be of further assistance or if additional information is needed please feel free to contact me directly at 303-799-1045. Upon approval, send notification to the address on file for the mine. Thank you for your time and consideration.

Sincerely,

Leonard Witkowski

May 15, 1985
8185 S. Willow St.
Englewood, CO 80112

Mr. Wayne Hedberg
Department of Natural Resources
Division of Oil, Gas and Mining
355 West North Temple
3 Triad Center
Suite 350
Salt Lake City, Utah 84180-1203

Dear Wayne:

It was a pleasure meeting with you and Mr. Lowell Braxton last week in regards to the subsidence monitoring plan for Genwal Coal Company, Inc. Enclosed is the revised plan for your review and approval.

As you are aware, Mr. Andrew King and I have been working with Genwal Coal Company in organizing and compiling the currently approved Mining and Reclamation Plan as well as in preparing an updated version of the permit which will encompass the previously permitted area plus the recently leased 80 acre area for your review. We anticipate that a reorganized version of the currently approved package will be completed within the next two months.

It has been determined from the recently completed drilling program that the coal in the upper seams is not of mineable thickness. These unexpected results have changed the conclusions reached in the Subsidence Control Plan For Genwal Coal Company, Inc. as prepared by Mr. David Skidmore and L.G. Manwaring of COAL SYSTEMS, INC. and which is currently approved within the Mining and Reclamation Plan. Please accept the enclosed report as a modification to the existing permit and discard the original report in its entirety. This report is to be resubmitted in the reorganized permit to be filed within the next two months.

If I can be of further assistance or if additional information is needed please feel free to contact me directly at 303-799-1045. Upon approval, send notification to the address on file for the mine. Thank you for your time and consideration.

Sincerely,

Leonard Witkowski

Original Permit 12-20-85

STATE OF UTAH
NATURAL RESOURCES
Oil Gas & Mining

Norman H. Bangerter, Gov.
Dee C. Hansen, Executive D
Dianne R. Nielson, Ph.D., Division D

355 W. North Temple • 3 Triad Center • Suite 350 • Salt Lake City, UT 84180-1203 • 801-538-5340

November 12, 1985

CERTIFIED RETURN RECEIPT REQUESTED
(P402 457 255)

Mr. Leonard Witkowski
Genwal Coal Company, Inc.
8185 South Willow Street
Englewood, Colorado 80112

Dear Mr. Witkowski:

RE: Revised Subsidence Control Plan, Genwal Coal Company, Inc., Crandall Canyon Mine, ACT/015/032, #3, Emery County, Utah

The Division has completed its review of Genwal's latest (October 3, 1985) response to our September 12, 1985 letter which identified deficiencies in the Revised Subsidence Control Plan for the Crandall Canyon Mine. The following concerns still exist and must be addressed prior to completion of the review and approval of this proposal:

UMC 817.52(a), 817.124(a) - DC

The location of springs 93-1408 and 93-1407 must be accurately defined in order to determine if they are located within the limits of anticipated subsidence. The U. S. Forest Service water rights associated with these springs, apply to the springs specifically and are not a basin wide appropriation. If the springs are located within the limits of anticipated subsidence, a commitment from the operator to mitigate any contamination, interruption or diminution of these springs due to subsidence must be submitted.

Additionally, the Division of Wildlife Resources has ranked the seeps and springs associated with the mine plan area as being of critical value to local wildlife. The operator must submit a monitoring plan that will be representative of all springs within the limits of anticipated subsidence. The operator must also commit to mitigation of any contamination, interruption or diminution of any springs that are affected due to subsidence.

Please provide a response to these remaining concerns by December 12, 1985. As before, please provide your response in a format which would reference and allow direct insertion by replacement page and date to those sections of the most recent plans on file with this office. Should you have questions, please contact me or Dave Cline of the technical staff.

Sincerely,

D. Wayne Hedberg
Permit Supervisor/
Reclamation Hydrologist

btb
cc: Allen Klein
Reed Christensen
Andy King
Lowell Braxton
Dave Cline
Dave Lof
8992R-66 & 67

STATE OF UTAH
NATURAL RESOURCES
Oil, Gas & Mining

Norman H. Bangerter, Go
Dee C. Hansen, Executive D
Dianne R. Nielson, Ph.D., Division D.

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September 12, 1985

CERTIFIED RETURN RECEIPT REQUESTED
P-592-429-564

Mr. Leonard Witkowski
Genwal Coal Company, Inc.
8185 South Willow Street
Englewood, Colorado 80112

Dear Mr. Witkowski

Re: Revised Subsidence Control Plan, Genwal Coal Company, Inc., Crandall Canyon Mine, ACT/015/032, #3, Emery County, Utah

The Division has completed its review of Genwal's latest (August 16, 1985) response to our July 17, 1985 letter which identified deficiencies in the Revised Subsidence Control Plan for the Crandall Canyon Mine. The following concerns still exist and must be addressed prior to completion of the review and approval of this proposal:

UMC 771.23 - PGL

1. There should be a detailed legend clearly explaining all appropriate distinguishing items on the map (e.g., permit boundary, development, recovery, mined out areas, etc.). Plate XII-3 is difficult to easily understand. The permit boundary must be indicated. It is difficult to follow items #21-23 on Plate XII-3, as stated on page 3.

2. The text states that proper supports will be placed in areas of questionable roof control. Thers areas should be delineated on the appropriate map (page 2).

3. Please label Item XII-13 more clearly. It is difficult to identify any feature (or lack thereof) on this item. A recent photo (more recent than June 4, 1980) would be best to include in the report.

UMC 784.20 - PGL

1. "Occurance of subsidence will not produce material damage or diminution of value or foreseeable use of land", is concluded on page 7 of the report. The narrative continues and states that "land is used for domestic grazing in the areas of gentle slope and wildlife habitat over the total acreage". Grazing could be negatively impacted by subsidence. A statement should be included stating that if the grazing is impacted by subsidence, the operator will compensate the owner or other appropriate party for the damages.

2. Page 5 justified the lower factor of safety by stating that the "SME Engineering Handbook (pg 13-104) states that as this ratio approaches 12 that the pillars are regarded as being able to bear any load". This rationale related to use of the Holland-Gaddy formula not the Obert Formula. Please modify the reasoning.

UMC 817.52(a), 817.124(a) - DC

1. The permit application for the Tract 2 lease, Crandall Canyon Mine submitted by Genwal on August 15, 1985 indicates that three springs in the area adjacent to the mine permit area have water rights owned by the U.S. Forest Service (Vol. 2, Table 7-2 and Figure 7-3). The operator must state what measures will be taken to insure that these water rights will not be affected. The operator should incorporate these springs into a monitoring program in order to identify any interruption or diminution to the springs caused by subsidence. Additionally, the operator must address any mitigation of these water rights should they become affected by the mining activities.

2. Page 10 of the Subsidence Control Plan states that spring SP-30 will be monitored as described in this permit. Please clarify how the quantity of discharge from this spring will be monitored.

Please provide a response to these remaining questions by October 3, 1985. Thank you for your assistance and cooperation in resolving these permitting matters. If possible, please provide your response in a format which would reference and allow direct insertion by replacement page and date to those sections of the most recent plans on file with this office. Please contact me, Dave Cline, or Pam Grubaugh-Littig should you have questions concerning this review.

Sincerely,

D. Wayne Hedberg

D. Wayne Hedberg
Permit Supervisor/
Reclamation Hydrologist

dwh
cc: Allen Klein
Reed Christensen
Andy King
Lowell Braxton
Pam Grubaugh-Littig
Dave Cline
Dave Lof
8992R-62-64

STATE OF UTAH
NATURAL RESOURCES
Oil Gas & Mining

Norman H. Bangerter, Gov.
Dee C. Hansen, Executive Dir.
Dianne R. Nielson, Ph.D., Division Dir.

355 W. North Temple • 3 Triad Center • Suite 350 • Salt Lake City, UT 84180-1203 • 801-538-5340

July 17, 1985

CERTIFIED RETURN RECEIPT REQUESTED
(P402 457 195)

Mr. Leonard Witkowski
Genwal Coal Company, Inc.
8185 South Willow Street
Englewood, Colorado 80112

Dear Mr. Witkowski:

RE: Revised Subsidence Control Plan, Genwal Coal Company, Inc., Crandall Canyon Mine, ACT/015/032, #3, Emery County, Utah

The Division has completed its review of the revised subsidence control plan received May 16, 1985 for Genwal Coal Company's Crandall Canyon Mine. Please accept our apologies for the delay in forwarding our comments to you. The following comments and concerns still must be addressed prior to the Division completing the approval process for this proposal.

UMC 784.20 Subsidence Control Plan

(a)(2) The Division interprets "extent" to mean, "the anticipated maximum vertical movement and lateral incidence of surface subsidence as derived from the calculations." These values should be given in feet and shown on an appropriate map as contours (e.g., Item XII-4).

(b)(2) The subsidence control plan must include the anticipated effects of planned subsidence (e.g., surface cracking, slope failure, etc.). The statement "there appears to be no springs or creeks. . . ." needs more justification. Please include recent spring and seep survey and the associated impacts due to subsidence.

(c) The subsidence control plan must include a detailed description of the measures to be taken to mitigate the effects of any material damage or diminution of value or foreseeable use of lands which may occur.

The statement of fact on page 12 (Item XIII-1) must be signed and notarized in the submittal to the Division.

The equations for the pillar sizing use the Obert Formula (referenced in the SME Mining Engineering Handbook, page 13-104, Volume 1). A factor of safety of at least 4 is suggested in the Handbook. Revised calculations should be submitted for the pillar sizing or justification provided for use of the safety factor provide in the calculations of the subsidence control plan.

UMC 817.121-.126

1. Item XII-3 contradicts the statement on page 5 of vertical relationship between Crandall Creek and the lease boundary.

2. The 50 foot barrier pillar designated on Figure 1 is undefined in relation to the lease boundary. The angle of draw should coincide with the position of the barrier pillar.

3. The relationship between the areas of maximum subsidence mentioned on page 9 with Item XII-2 is unclear. Please submit maps of seam thickness and a contour map of anticipated subsidence prepared using the same scale.

4. The depth of overburden used in the calculations used for the northwest corner of the lease area on page 8 does not correspond with the overburden isopachs on Item XII-4.

5. The maximum break line angle of 15.5° at the Geneva Mine mention on Figure 2 is not defined on page 4 or page 34 of U. S. Geological Survey (USGS) Professional Paper 969. Please clarify.

6. The calculations of the subsidence limit for the southwest corner of page 8 delineates a radius of 160 feet from the corner. If this radius is used on Item XII-4, it is within 70 feet of Crandall Creek. Please include the amount of subsidence at all locations from the lease boundary on a contour map.

7. The explanation for not calculating the amount and limits of subsidence for the southeast corner on page 8 is unclear. Please clarify and include on an anticipated subsidence contour map.

Please provide a response to these deficiency comments within two weeks of receipt or by July 31, whichever comes first. Thank you for your cooperation in resolving these remaining concerns. Should you have any questions, please feel free to contact me or D. Wayne Hedberg of the permitting staff.

Sincerely,

Lowell P. Braxton

Lowell P. Braxton
Administrator
Mineral Resource Development
and Reclamation Program

DWH/btb
cc: Allen Klein
Reed Christiansen
Kenneth Rhea
Ron Naten
Andrew King
Dave Cline
Pam Grubaugh-Littig
Wayne Hedberg
Sue Linner
Dave Lof
Rick Smith
Rick Summers
8992R-75-77