0013

State of Utah
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF OIL, GAS AND MINING

Michael O. Leavitt
Governor

Ted Stewart
Executive Director

James W. Carter
Division Director

355 West North Temple
3 Triad Center, Suite 350
Salt Lake City, Utah 84180-1203
801-538-5340
801-359-3940 (Fax)
801-538-5319 (TDD)

October 3, 1995

James Fulton, Chief
Denver Field Division - WRCC
Office of Surface Mining
Reclamation and Enforcement
1999 Broadway, Suite 3320
Denver, CO 80202-5733

Re: Midterm Review Responses, Convulsion Canyon Mine, Southern Utah Fuel Company, ACT/041/002-94A, Folder #2, Sevier County, Utah

Dear Mr. Fulton:

I am enclosing updated pages for the Convulsion Canyon Mine Mining and Reclamation Plan which the Division approved on October 3, 1995 as a result of the midterm review. All issues addressed during the midterm review have been satisfactorily addressed.

If you have any questions, please call me.

Sincerely,

Pamela Grubaugh-Littig
Permit Supervisor

Enclosure
cc: Mark Bailey, BLM, Price
Janette Kaiser, Manti La Sal Forest Service, Price
Tobias Martinez, Fishlake National Forest, Richfield
Mark Page, Water Rights, Price
Dave Ariotti, DEQ, Price
Bill Bates, DWR, Price
Price Field Office
Southern Utah Fuel Company

INCORPORATED
EFFECTIVE:
OCT 03 1995
UTAH DIVISION OIL, GAS AND MINING

Form DOGM - C1 (Last Revised 6/93) File Folder # 3

APPLICATION FOR PERMIT CHANGE

Title of Change: Application Number: 95CGHP

Mid-term Review Response
Submitted April 4, 1995 | Revised September 12, 1995

F:\WORK\GOVT1995\DOGMMRP\FORM1.95C

Permit Number: ACT /041 /002

Mine: SUFCO

Permittee: Coastal States Energy

Description, include reason for change and timing required to implement:

Address changes found by Division in Mid-term Review.

☐ Yes	x No	1. Change in the size of the Permit Area? _____ acres ☐ increase ☐ decrease.
☐ Yes	x No	2. Change in the size of the Disturbed Area? _____ acres ☐ increase ☐ decrease.
☐ Yes	x No	3. Will permit change include operations outside the Cumulative Hydrologic Impact Area?
☐ Yes	x No	4. Will permit change include operations in hydrologic basins other than currently approved?
☐ Yes	x No	5. Does permit change result from cancellation, reduction or increase of insurance or reclamation bond?
☐ Yes	x No	6. Does permit change require or include public notice publication?
☐ Yes	x No	7. Permit change as a result of a Violation? Violation #
☐ Yes	x No	8. Permit change as a result of a Division Order? D.O.#
☐ Yes	x No	9. Permit change as a result of other laws or regulations? Explain:
☐ Yes	x No	10. Does permit change require or include ownership, control, right-of-entry, or compliance information?
☐ Yes	x No	11. Does the permit change affect the surface landowner or change the post mining land use?
☐ Yes	x No	12. Does permit change require or include collection and reporting of any baseline information?
☐ Yes	x No	13. Could the permit change have any effect on wildlife or vegetation outside the current disturbed area?
☐ Yes	x No	14. Does permit change require or include soil removal, storage or placement?
☐ Yes	x No	15. Does permit change require or include vegetation monitoring, removal or revegetation activities?
☐ Yes	x No	16. Does permit change require or include construction, modification, or removal of surface facilities?
x Yes	☐ No	17. Does permit change require or include water monitoring, sediment or drainage control measures?
☐ Yes	x No	18. Does permit change require or include certified designs, maps, or calculations?
☐ Yes	x No	19. Does permit change require or include underground design or mine sequence and timing?
☐ Yes	x No	20. Does permit change require or include subsidence control or monitoring?
x Yes	☐ No	21. Have reclamation costs for bonding been provided or revised for any change in the reclamation plan?
☐ Yes	x No	22. Is permit change within 100 feet of a public road or perennial stream or 500 feet of an occupied dwelling?
☐ Yes	x No	23. Is this permit change coal exploration activity ☐ inside ☐ outside of the permit area?

INCORPORATED
EFFECTIVE:
OCT 03 1995
UTAH DIVISION OIL, GAS AND MINING

X Attach 3 complete copies of proposed permit change as it would be incorporated into the Mining and Reclamation Plan.

I hereby certify that I am a responsible official of the applicant and that the information contained in this application is true and correct to the best of my information and belief in all respects with the laws of Utah in reference to commitments, undertakings, and obligations, herein.

Signed - Kenneth E. May, General Manager, September 12, 1995

Subscribed and sworn to before me this 12th day of Sept., 19 95

Notary Public

My Commission Expires: _____, 19____

Attest: STATE OF _____

COUNTY OF _____

ELLA RUTH WAYMAN
Notary Public
30 North 500 West
Aurora, Utah 84620
My Commission Expires
December 16, 1998
State of Utah

RECEIVED
Received by Oil, Gas & Mining
SEP 14 1995
DIV. OF OIL, GAS & MINING

ASSIGNED PERMIT CHANGE NUMBER

Form DOGM - C2 (Last Revised 6/93) File Folder # 3

Application for Permit Change
Detailed Schedule of Changes to the Permit

Title of Change: Application Number: 95C	Permit Number: ACT /041 /002
Mid-term Review response	Mine: SUFCO
Submitted April 4, 1995 | Revised September 12, 1995	Permittee: Coastal States Energy

Provide a detailed listing of all changes to the mining and reclamation plan which will be required as a result of this proposed permit change. Individually list all maps and drawings which are to be added, replaced, or removed from the plan. Include changes of the table of contents, section of the plan, pages, or other information as needed to specifically locate, identify and revise the exiting mining and reclamation plan. **Include page, section and drawing numbers as part of the description.**

			DESCRIPTION OF MAP, TEXT, OR MATERIALS TO BE CHANGED
☐ ADD	x REPLACE	☐ REMOVE	Pages 5-55 in Chapter 5, Volume 1 of M&RP.
ADD	x REPLACE	☐ REMOVE	Page 5-57 in Chapter 5, Volume 1 of M&RP.
☐ ADD	x REPLACE	☐ REMOVE	Page 5-68 in Chapter 5, Volume 1 of M&RP.
☐ ADD	x REPLACE	☐ REMOVE	Page 5-70 in Chapeter 5, Volume 1 of M&RP.
☐ ADD	x REPLACE	☐ REMOVE	Appendix 5-2, Volume 6 of M&RP.
☐ ADD	☐ REPLACE	☐ REMOVE	
☐ ADD	☐ REPLACE	☐ REMOVE	
☐ ADD	☐ REPLACE	☐ REMOVE	
☐ ADD	☐ REPLACE	☐ REMOVE	
☐ ADD	☐ REPLACE	☐ REMOVE	
☐ ADD	☐ REPLACE	☐ REMOVE	
☐ ADD	☐ REPLACE	☐ REMOVE	
☐ ADD	☐ REPLACE	☐ REMOVE	
☐ ADD	☐ REPLACE	☐ REMOVE	
☐ ADD	☐ REPLACE	☐ REMOVE	
☐ ADD	☐ REPLACE	☐ REMOVE	
☐ ADD	☐ REPLACE	☐ REMOVE	
☐ ADD	☐ REPLACE	☐ REMOVE	
☐ ADD	☐ REPLACE	☐ REMOVE	
☐ ADD	☐ REPLACE	☐ REMOVE	
☐ ADD	☐ REPLACE	☐ REMOVE	

Any other specific or special instructions required for insertion of this proposal into the Mining and Reclamation Plan?

F:\WORK\GOVT1995\DOGMMRP\FORM2.95C

5.4.2 Narratives, Maps, and Plans

5.4.2.1 Reclamation Timetable

A timetable for the completion of each major step in the reclamation plan is presented in Figure 5-2.

5.4.2.2 Plan for Backfilling, Soil Stabilization, Compacting, and Grading

The regrading plan for the waste rock disposal facility is presented in Volume 3. Regrading at the waste rock facility will occur on a continuing basis as the rock is emplaced.

The regrading plan for the East Spring Canyon facility is summarized below. Engineering calculations and design details associated with this regrading plan are presented in Appendix 2-4. The East Spring Canyon regrading plan was designed to meet the objectives of balancing cut and fill quantities, maintaining a geotechnically stable surface configuration, and controlling erosion. Major features of the East Spring Canyon regrading plan are:

- Reduction of the slope at the southern end of the mine-yard fill,
- Removal of the sedimentation pond dam and implementation of interim sediment-control measures,
- Backfilling to remove highwalls and cut slopes to the extent possible within the objectives noted above (cut and fill balance, site stability, and erosion control),~~, except as allowed under a variance from approximate original contour requirements,~~
- Construction of an armored embankment at the inlet of ~~the main reclamation~~ channel, and
- Construction of reclamation diversion channels.

The estimated cut quantity for East Spring Canyon is approximately 74,734 cubic yards with an estimated fill of 71,173 cubic yards (see Appendix 2-4). The ~~difference between these~~ two quantities is anticipated to be balanced by compaction. Regrading activities will continue

until the final surface configuration defined by Plates 5-3 and 5-4 has been achieved. Details regarding topsoil placement and revegetation following regrading are provided in Chapters 2 and 3, respectively.

Building Demolition. Prior to significant regrading activities at the East Spring Canyon facility, existing buildings, walls, utilities, coal-handling facilities, and other above-ground structures will be removed from the area. To the extent possible, these structures and facilities will be salvaged. Those materials requiring off-site disposal will be placed in a licensed landfill. Final decisions regarding salvage or disposal of structures and equipment will be made just prior to reclamation following an assessment of the salvageability of the structures and equipment. If foundations will not interfere with regrading activities, they will be left in place for on-site burial.

Southern Slope Regrading. The present slope at the southern end of the mine yard will be cut from its existing continuous slope of approximately 1.4H:1V to a slope of 2.5H:1V in the center of the slope. The regraded slope will taper along the east and west sides of the slope to blend with the natural slopes. The recontoured slope will have 10-foot wide benches on 80-foot vertical centers to collect slope runoff and minimize the potential for erosion.

Proposed post-reclamation contours of the East Spring Canyon site are presented in Plate 5-3. Analyses presented in Appendix 2-4 indicate that the fill under this configuration will have a minimum static safety factor against failure of 1.51.

Backhoes, loaders, dozers, and other appropriate earthmoving equipment ~~will be used to~~ regrade the southern slope. Material removed from the southern slope will be backfilled as described below to reduce ~~highwalls~~ cut slopes in the mine yard and ~~achieve the final surface~~ configuration presented on Plate 5-3.

Sedimentation Pond and Dam Removal and Interim Sediment Control. The existing sedimentation pond at the base of the mine-yard fill slope will be removed to allow

Approximate Original Contour. ~~A request for a variance from the approximate original contour requirements of the regulations is presented in Appendix 5-2.~~ The pre-SMCRA ~~highwalls~~cut slopes are shown as part of the pre-1977 disturbance on Plate 5-2B. The ~~highwalls~~cut slopes to be retained are shown on Plate 1 of Appendix 5-2 as A-A', B-B', C-C' and D-D'. A study of the existing cliffs in the area (Appendix 5-2) shows that these cut slopes will approximate original contour.

Elimination of Highwalls, Spoil Piles, and Depressions. ~~With the exception of the variance requested in Appendix 5-2,~~ The backfilling and grading plan has been designed to eliminate highwalls at the site. No spoil piles exist. With the exception of the small depressions discussed in Section 5.5.2.1, the only depressions that will remain at the site following reclamation will be the inlet section of the main reclamation channel (which was designed as a sedimentation structure to prevent clogging and subsequent overtopping of the channel - see Section 5.4.2.2) and the stilling basin at the downstream end of the main reclamation channel (which is being retained to reduce the velocity of flows exiting the channel - see Section 5.4.2.2).

Slope Stability. Backfilled and regraded slopes have been designed to not exceed the angle of repose. Final reclamation slopes have been designed with a minimum static safety factor of 1.51 (see Section 5.4.2.2), thus preventing slides.

Erosion and Water Pollution. Temporary sediment-control measures will be implemented following backfilling and regrading as outlined in Section 5.4.2.2. As vegetation becomes established on the reclaimed surfaces, erosion potentials will be further minimized. By minimizing erosion, water pollution will also be precluded. Additional water-quality concerns do not exist at the site (see Chapter 7).

Post-Mining Land Use. The disturbed area will be backfilled and regraded in a manner that supports the approved post-mining land use.

As indicated in Section 5.4.2.2, two terraces will be cut into the southern mine-yard slope during final grading activities. The purpose of these terraces will be to control erosion and ensure stability of the final-graded slope.

5.5.3.5 Highwalls From Previously Mined Areas

~~No~~ Highwalls exist within the permit area that are the result of previous mining operations. ~~These highwalls are the result of surface disturbance in East Spring Canyon by the operator prior to the enactment of SMCRA.~~

5.5.3.6 Approximate Original Contour

~~A request for variance from approximate original contour requirements is provided in Appendix 5-2. This request is based on the following factors:~~ The final reclamation surface is shown on Plate 5-3. This configuration is based on using all available earth materials at the mine site, however several cut slopes will be left along the western edge of the existing pad area based on the following factors:

- The retained ~~highwalls~~cut slopes are not significantly greater in height or length than the dimensions of existing cliffs and the surrounding area,
- The residual ~~highwalls~~cut slopes are similar in structural composition to the pre-existing cliffs in the surrounding area and are compatible with the visual attributes of the area, and
- The residual ~~highwalls~~cut slopes are compatible with the geomorphic processes of the area.

5.5.3.7 Backfilling and Grading - Thin Overburden

No surface coal mining and reclamation activities involving thin overburden occur within the permit area.

5.5.3.8 Backfilling and Grading - Thick Overburden

APPENDIX 5-2

~~HIGHWALL~~CUTSLOPE STUDY FOR COMPLIANCE WITH APPROXIMATE ORIGINAL CONTOUR

NATURAL LEDGE/CLIFF AND MINING ~~HIGHWALL~~CUTSLOPE INVESTIGATION
SUFCo Coal Mine

1.0 INTRODUCTION

- EarthFax Engineering Inc. has located and described natural cliffs and ledges, as well as manmade ~~highwalls~~ cut slopes in the vicinity of the SUFCo Coal Mine. The field investigation was conducted on November 1 and 2, 1991. The purpose of the investigation was to study the natural cliffs/ledges and the mining ~~highwalls~~ cut slopes to determine if retention of the ~~highwalls~~ cut slopes is in compliance with mining regulations. Compliance with the following DOGM mining regulations were studied:

  - o The retained ~~highwall cut slope~~ is not significantly greater in height or length than the dimensions of existing natural cliffs and ledges in the surrounding area (R645-301-553.651);

  - o The residual ~~highwall cut slope~~ is similar in structural composition to the preexisting cliffs in the surrounding area and is compatible with the visual attributes of the area (R645-301-553.652); and

  - o The residual ~~highwall cut slope~~ is compatible with the geomorphic processes of the area (R645-301-553.653).

A total of five natural cliffs/ledges, and four mining ~~highwalls~~ cut slopes were studied during this investigation. General and detailed descriptions of the ~~highwalls~~ cut slopes and the cliffs/ledges appear in sections 3.0 and 4.0, respectively. The locations of the ~~highwalls~~ cut slopes as well as the cliffs/ledges are presented in Plate 1 (Appendix 5-2). Cross-sections of these landforms are found in Plate 2 (Appendix 5-2).

2.0 METHODS

The investigation was initially conducted by visually scanning the study area for exposed bedrock from several vantage points in the portal pad area, and by studying contour maps of the surrounding area. Those exposures closest to the mine ~~highwalls~~ cut slopes were then measured (thickness as well as lateral extent), and described. Lithology, structural deformation (faulting and jointing), stability, and vegetative cover were all investigated.

A number of prominent cliffs/ledges (approximately one dozen) are present in the immediate vicinity of the SUFCo mine ~~highwalls~~ cut slopes. These natural cliffs/ledges are visible from the mine portal pad area. The study area consisted of the mine ~~highwalls~~ cut slopes, and the natural cliffs/ledges lying both stratigraphically above and below the mine portal pad area. This area extended approximately 3500 feet spatially from the portal area, and 150 and 375 feet stratigraphically below and above the ~~highwall~~ cut slope, respectively.

3.0 GENERAL SITE DESCRIPTION

The dominant geographic landform present in the environs of the SUFCo Mine are laterally continuous (several thousand feet) sandstone cliffs/ledges, separated stratigraphically by shale/siltstone slopes. The cliffs/ledges and ~~highwalls~~ cut slopes expose Upper Cretaceous rocks of the Blackhawk Formation which strike northwest-southeast, and dip about 2 degrees to the northwest.

In general, the cliff/ledge lengths vary from 200 to greater than 2000 feet, with heights of 5 to 80 feet. In comparison, the reclamation ~~highwalls~~ cut slopes range from 250 to 1400 feet in length, and 10 to 47 feet in height. Graphic comparisons of these landforms are presented in Plate 2 (Appendix 5-2). Reclamation ~~highwalls~~ cut slopes are labeled A-A,' B-B,' C-C,' and D-D.' Natural cliffs/ledges are labeled E-E,' F-F,' G-G,' H-H,' and I-I.'

Stream downcutting is the dominant cliff forming geomorphic process in the study area. Subsequent cliff erosional processes include rock fall, ravelling, slope wash, rainfall impact, rock sliding, and landsliding. To varying degrees, evidence of these geomorphic processes were identified at each cliff/ledge. Given time, all of the cliffs and ledges, including portions of the Sufco ~~highwalls~~ cut slopes, will degrade to slopes. Thus, the geomorphic processes acting on the Sufco ~~highwall~~ cut slope are identical to the geomorphic processes of the area.

4.0 ~~HIGHWALL~~ CUT SLOPE AND CLIFF/LEDGE LOGS

SECTION A-A' - Mine ~~Highwall~~

General Location:	Immediately west of surface facilities. Elevation is approximately 7575 feet above sea level. This is the largest and most laterally continuous of the four ~~highwalls~~ cut slopes at the mine.
Length:	1300 feet.
Maximum Height:	47 feet.

Aspect: East facing.

Rock Description: Interbedded sandstone and shale. Overall composition is 70% sandstone and 30% shale.

Sandstone: very fine to medium grained, grey weathered, orange brown fresh, trough and ripple cross-stratified, beds 0.5 to 10 feet thick, beds are lenticular in shape, laminae 0.1 to 0.5 inch thick, calcite cement, well cemented, very porous, scolithos burrows.

Shale: grey, laminae < 0.1 inch, very soft and friable. Minor amounts of white clay beds present.

Faults/Joints: Well-developed orthogonal joint network oriented N250°W and N330°E. Joint spacing 1 to 3 feet. Fracturing locally abundant.

Slope: 40 to 80 degrees.

Vegetation: Scarce to non-existent.

Stability: Rock fall present. ~~Highwall Cut slope~~ is dissected by very minor ephemeral stream drainages (flow only during snow melt and during severe storms).

SECTION B-B' - Mine ~~Highwall Cut Slope~~

General Location: Above north end of Section A-A.' Immediately west of stoker coal storage area. Elevation is approximately 7600 feet above sea level. This is a relatively minor and short ~~highwall cut slope~~.

Length: 350 feet.

Maximum Height: 20 feet.

Aspect: East facing.

Rock Description: Interbedded sandstone and shale. Overall composition is 70% sandstone and 30% shale.

Sandstone: very fine to upper medium grained, grey weathered, orange brown fresh, trough and ripple cross-stratified, beds 1.0 to 5 feet thick, beds are lenticular shaped, laminae 0.1 to 0.5 inch thick, calcite cement, well cemented, very porous, scolithos burrows.

Shale: grey, beds 1 to 4 inches thick, laminae < 0.1 inch, very soft and friable.

Faults/Joints: Well-developed orthogonal joint network oriented N30°W and N60° E. Joint spacing 1 to 1.5 feet.

Slope: 60 degrees.

Vegetation: None.

Stability: Minor rock falls present. No drainages present.

SECTION C-C' - Mine ~~Highwall Cut Slope~~

General Location: Directly above section B-B.' Immediately west of stoker coal storage area. Elevation is approximately 7625 feet above sea level. This is a relatively minor and short ~~highwall cut slope~~. Northern third of section is partially covered with talus.

Length: 350 feet.

Maximum Height: 25 feet.

Aspect: East facing.

Rock Description: Interbedded sandstone and shale. Overall composition is 80% sandstone and 20% shale.

Sandstone: fine to medium grained, grey weathered, orange brown fresh, trough and ripple cross-stratified, beds 3 to 8 feet thick, beds are lenticular shaped, mud rip-up clasts present at base of beds, beds fine upwards, laminae 0.1 to 0.5 inch thick, calcite cement, well cemented, very porous, scolithos burrows.

Shale: grey, beds 0.5 to 3 feet thick, laminae < 0.1 inch, very soft and friable.

Faults/Joints: Well-developed orthogonal joint network oriented N35°W and N45°E. Joint spacing is 1.5 feet.

Slope: 65 degrees.

Vegetation: Sparse grass on shaley slopes.

Stability: Minor rock falls present. No drainages present.

SECTION D-D' - Mine ~~Highwall Cut Slope~~

General Location: Directly north of covered storage facility located at north end of portal pad. Elevation is approximately 7580 feet above sea level. This is a relatively minor and short ~~highwall cut slope~~.

Length: 300 feet.

Maximum Height: 25 feet.

Aspect: South facing.

Rock Description: Interbedded sandstone and shale. Overall composition is 40% sandstone and 60% shale.

Sandstone: fine to medium grained, grey weathered, orange brown fresh, trough and ripple cross-stratified, beds 1 to 3 feet thick, beds are lenticular shaped, mud rip-up clasts present at base of beds, beds fine upwards, laminae 0.1 to 0.5 inch thick, calcite cement, well cemented, very porous.

Shale: grey, beds 1 to 4 feet thick, laminae < 0.1 inch, very soft and friable.

Faults/Joints: Well-developed vertical and subvertical orthogonal joint network oriented N30°W and N60°E. Joint spacing is 1.5 feet.

Slope: 58 degrees.

Vegetation: Sparse grass on shaley slopes.

Stability: Minor rock falls present. No drainages present.

SECTION E-E' - Natural Cliff/Ledge

General Location: Directly west and stratigraphically above section A-A.' Elevation is approximately 7925 feet above sea level. This is a natural cliff with appreciable lateral extent.

Length: 1500 feet.

Maximum Height: 30 feet.

Aspect: East facing.

Rock Description: Interbedded sandstone and shale. Overall composition is 95% sandstone and 5% shale.

Sandstone: very fine to medium grained, grey weathered, orange brown fresh, trough cross-stratified, beds 1 to 10 feet thick, beds are lenticular shaped, mud rip-up clasts present at base of beds, beds fine upwards, laminae 0.1 to 0.5 inch thick, calcite cement, well cemented, very porous, scolithos.

Shale: grey, beds 1 to 4 feet thick, laminae < 0.1 inch, fissile, very soft and friable.

Faults/Joints: Well-developed vertical and subvertical orthogonal joint network oriented N30°W and N65°E. Joint spacing 1 to 10 feet.

Slope: 70 to 90 degrees.

Vegetation: Minor amount of grass in fractures and joints.

Stability: Rock falls present. Few minor drainages present.

SECTION F-F' - Natural Cliff/Ledge

General Location: Directly west and stratigraphically above section A-A.' Elevation is approximately 7825 feet above sea level. This is a natural cliff of considerable lateral extent.

Length: 1800 feet.

Maximum Height: 25 feet.

Aspect: East facing.

Rock Description: Interbedded sandstone and shale. Overall composition is 90% sandstone and 10% shale.

Sandstone: fine to coarse grained, grey weathered, orange brown fresh, plane and trough cross-stratified, beds 1 to 10 feet thick, beds are lenticular shaped, mud rip-up clasts up to 1.5 inches diameter and intraformational conglomerate present at base of beds, individual beds fine upwards and are laterally continuous over several hundred yards, laminae 0.1 to 0.5 inch thick, calcite cement, well cemented, very porous, scolithos.

Shale: grey, beds 1 to 4 feet thick, laminae < 0.1 inch, fissile, very soft and friable.

Faults/Joints: Well-developed vertical and subvertical orthogonal joint network oriented N25°W and N60°E. Joint spacing 1 to 8 feet. Fractures parallel and perpendicular to bedding locally abundant.

Slope: 70 to 90 degrees.

Vegetation: Minor amount of grass in fractures and joints.

Stability: Rock falls present. Few minor drainages present.

SECTION G-G' - Natural Cliff/Ledge

General Location: Directly west and stratigraphically above section A-A.' Elevation is approximately 7725 and 7675 feet above sea level. This is a natural cliff of considerable lateral extent.

Length: 2000 feet.

Maximum Height: 15 feet.

Aspect: East facing.

Rock Description: Interbedded sandstone and shale. Overall composition is 90% sandstone and 10% shale.

Sandstone: very fine to coarse grained, grey weathered, orange brown fresh, planar and trough cross-stratified, beds 1 to 10 feet thick, beds are lenticular shaped, mud rip-up clasts up to 4 inches diameter and intraformational conglomerate present at base of beds, individual beds fine upwards and are laterally continuous over several hundred yards, laminae 0.1 to 0.5 inch thick, calcite cement, well cemented, very porous, scolithos.

Shale: grey, beds 1 to 4 feet thick, laminae < 0.1 inch, fissile, very soft and friable.

Faults/Joints: Well-developed vertical and subvertical orthogonal joint network oriented N20°W and N70°E. Joint spacing 1 to 12 feet. Fractures parallel and perpendicular to bedding locally abundant. In fractured zones fracture spacing is as small as 4 inches.

Slope: 70 to 90 degrees.

Vegetation: Minor amount of grass in fractures and joints.

Stability: Rock falls present. Few minor drainages present.

SECTION H-H' - Natural Cliff/Ledge

General Location: South of sediment pond and stratigraphically below section A-A.' Elevation is approximately 7350 feet above sea level. This is a natural cliff of considerable thickness and lateral extent.

Length: 1300 feet.

Maximum Height: 80 feet.

Aspect: East and south facing.

Rock Description: Interbedded sandstone and shale. Overall composition is 90% sandstone and 10% shale.

Sandstone: very fine to medium grained, grey weathered, orange brown fresh, planar and trough cross-stratified, beds 1 to 20 feet thick, beds are lenticular shaped, mud rip-up clasts up to 4 inches diameter and intraformational conglomerate present at base of beds, individual beds fine upwards and are laterally continuous

over several hundred yards, laminae 0.1 to 0.5 inch thick, calcite cement, well cemented, very porous.

Shale: grey, beds 1 to 4 feet thick, laminae < 0.1 inch, fissile, very soft and friable.

Faults/Joints: Well-developed vertical and subvertical orthogonal joint network oriented N20°W and N50 E. Joint spacing 1 to 20 feet. Minor amount of fracturing present.

Slope: 70 to 90 degrees.

Vegetation: Minor amount of grass and small shrubs present in fractures and joints.

Stability: Rock falls present. Few minor drainages present.

SECTION I-I' - Natural Cliff/Ledge

General Location: Southeast of sediment pond and stratigraphically below section A-A.' Elevation is approximately 7525 feet above sea level. This is a natural cliff of considerable thickness and lateral extent.

Length: 1750 feet.

Maximum Height: 70 feet.

Aspect: South facing.

Rock Description: Interbedded sandstone and shale. Overall composition is 90% sandstone and 10% shale.

Sandstone: very fine to medium grained, grey weathered, orange brown fresh, planar and trough cross-stratified, beds 1 to 20 feet thick, beds are lenticular shaped, mud rip-up clasts up to 4 inches diameter and intraformational conglomerate present at base of beds, individual beds fine upwards and are laterally continuous over several hundred yards, laminae 0.1 to 0.5 inch thick, calcite cement, well cemented, very porous.

Shale: grey, beds 1 to 4 feet thick, laminae < 0.1 inch, fissile, very soft and friable.

Faults/Joints: Well-developed vertical and subvertical orthogonal joint network oriented N20°W and N50 E. Joint spacing 1 to 20 feet. Minor amount of fracturing present.

Slope: 70 to 90 degrees.

Vegetation: Minor amount of grass and small shrubs present in fractures and joints.

Stability: Rock falls present. Few minor drainages present.

5.0 RETENTION OF MINING ~~Highwall~~ CUT SLOPE

Both natural cliffs/ledges and mining ~~highwalls~~ cut slopes at the SUFCo Mine have been measured and described to determine if the ~~highwalls~~ cut slopes satisfy DOGM mining regulations ~~governing highwall retention (R645-301-553.650)~~. The ~~highwalls~~ cut slopes have been found to comply with mining regulations ~~governing highwall retention~~. The SUFCo ~~highwalls~~ cut slopes are found to not be significantly greater in height or length than the dimensions of existing natural cliffs and ledges in the surrounding area ~~(R645-301-553.651)~~. In fact, the SUFCo ~~highwalls~~ cut slopes are smaller than many of the immediately surrounding natural cliffs/ledges (Plate 2 of Appendix 5-2). The ~~highwalls~~ cut slopes are similar in structural composition to the preexisting cliffs in the surrounding area, are compatible with the visual attributes of the area ~~(R645-301-553.652)~~, and are compatible with the geomorphic processes of the area ~~(R645-301-553.653)~~(Section 4).

~~Highwalls~~ Cut slopes on the west side of East Spring Canyon created by mining prior to 1977 will be retained. These ~~highwalls~~ cut slopes are shown on Plate 1 of Appendix 5-2 as A-A', B-B', C-C' and D-D'. ~~The retention of these highwalls cut slopes is consider to be in harmony with approximate original contour requirements and does not require a variance.~~