COAL MINING AND RECLAMATION OPERATIONS FOR 1992

(Must be submitted to the Division by March 31, 1993)

State of Utah
Department of Natural Resources
Division of Oil, Gas and Mining
3 Triad Center, Suite 350
355 West North Temple
Salt Lake City, Utah 84180-1203
(801) 538-5340

RECEIVED
MAR 2 4 1993
DIVISION OF
OIL GAS & MINING

Permittee: Coastal States Energy Company

Mine Name: SUFCO Mine

Mailing Address: 397 South 800 West, Salina, Utah 84654

Company Representative: Wesley K. Sorensen

Resident Agent: Ken Payne

Permit Number: ACT/041/002

MSHA ID Number: 42-00089

Date of Initial Permanent Program Permit: May 19, 1987

Date of Permit Renewal: May 1992

Quantity of Coal Mined (tonnage) 1992: 2,580,095

Attach Updated Mine Sequence Map(s) showing mine development through December 31, 1992. (Same as Lease Royalty Payment Map and/or MSHA Progress Map)

All monitoring activities during the report period to be submitted with this report (including, but not limited to):

A. Summarized Water Monitoring Data:

1. **List of monitoring points and their locations and respective frequencies of monitoring (monthly, quarterly, etc.) as approved in the PAP;**
2. **UPDES permit number, UPDES discharge points and their locations;**
3. **Summary of findings based on water monitoring during 1992; and**
4. **Submit water monitoring as database files (ASCII, Lotus, dBase, etc.) (Please contact Ken Wyatt if you have any questions).**

B. Precipitation or Other Climatological Data (please submit as database files: ASCII, Lotus, dBase, etc.-- Contact Ken Wyatt if you have any questions).

C. **Subsidence Monitoring Report:**

1. **Brief description of monitoring system (monuments or aerial surveys, how monitoring is done, how frequently monitoring is done);**
2. **List of all monitoring points (if any) and their locations and amount of displacement of each;**
3. **Map showing either monitoring points (if any) or a representation of subsidence which has occurred; and**
4. **Any owners and/or occupants of surface property and structures above the underground workings who were or will be mailed notification six months prior to mining (R645-301-525.300).**

D. **Vegetation Data (test plots) or Revegetation Success Monitoring (includes interim and final):**

1. **Test plot monitoring data or implementation;**
2. **Quantitative results from interim or final seeding efforts;**
3. **If quantitative monitoring was not required, then at minimum, a qualitative description of the interim or final vegetation; and**
4. **Describe any seeding done on site during the current year.**

E. **Annual Impoundment Certification, (R645-301-514.312) which includes the following information:**

1. **Any appearances of instability;**
2. **Structural weakness or other hazardous conditions;**
3. **Depth and elevation of any impounded waters;**
4. **Existing storage capacity;**
5. **Any existing or required monitoring procedures and instrumentation; and**
6. **Any other aspects of the structure affecting stability.**

Suggested form enclosed

F. **Annual Overburden, Spoil, Refuse, Roof, Floor, and Mid-Seam Data. For Consistency and completeness, please submit data for this reporting requirement in the following manner:**

1. **Location of sample site, sample interval, and sample matrix (if roof or floor, then include lithologic unit and if coal, then thickness of seam at sample site);**
2. **Sampling technique employed in the field (i.e., grab sample, composite, depth segregated or specific procedure outlined in the permit by chapter and page) and preparation prior to analysis (i.e., sieved sample, ground sample, air dried, oven dried, etc.);**
3. **Laboratory analysis report sheet which includes:**
   - **I. Sample time and date;**
   - **II. Date and time of lab analysis; and**
   - **III. Analytical method(s) employed and references. Include the soil/spoil: water ratio.**
4. **Summary of findings based on monitoring.**

G. **A current copy of the annual report of officers submitted to the Department of Commerce and any changes in the ownership and control information required under R645-301-110.**

H. **Any Other Information Required to be Submitted as Specified in your Permit Application Package and Permit.**

A. Summarized Water Monitoring Data:

1. Table 3 lists the surface water sampling schedule for samples in the vicinity of the SUFCo Mine. Table 6.4.1-4 lists the ground water sampling schedule. Table 4.7.2-1 lists the ground water sampling schedule for the Waste Rock Disposal Site. Tables 4, 6.4.1-2,and 4.7.2-2 list the parameters to be monitored at the respective sites.

2. A copy of the authorization to discharge under the UPDES is included. The three discharge points are listed by latitude and longitude.

3. The water monitoring data is includes as database files.

TABLE 4. WATER QUALITY PARAMETER LIST FOR ROUTINE WATER QUALITY MONITORING IN THE VICINITY OF THE SUFCo NO. 1 MINE NEAR SALINA, UTAH (Revised August, 1981) (1, 2)

PARAMETERS - FIELD

Flow

Temperature

Specific Conductance

Turbidity (estimated)

PARAMETERS - LABORATORY

Specific Conductance

Turbidity

pH

Total Hardness ($CaCO_3$)

Total Dissolved Solids (Calculated)

Calcium

Magnesium

Sodium

Total Alkalinity

Total Acidity

Bicarbonate

Carbonate

Hydroxide

Sulfate

Chloride

Phosphate (PO_4-P)

Nitrate + Nitrite (N)

Iron - total, dissolved

Manganese - total, dissolved

Boron (total)

Barium (total)

(1) Routine water quality sampling since 1978 indicates that continued monitoring of several parameters, particularly trace metals, was unwarranted since concentrations have been very low (often less than laboratory detection limits for trace metals).

(2) Includes surface and groundwater stations but excludes Waste Rock Disposal and Quitchupah Lease site.

REPLACES		TEXT		
Table 4	Page 20	Table 4	Page 20	Date 01/08/90

TABLE 3. WATER QUALITY SAMPLING IN THE VICINITY OF THE SUFCo NO. 1 MINE

SURFACE WATERS SAMPLING SCHEDULE(2)

Site(3) No.	Description	Baseline Period	Operational Period	Post-Mining Period	Flow Measurement Method
006	South Fork Quitchupah Creek	3x/yr	3x/yr	3x/yr	Pygmy Meter where feasible or Cross section/velocity estimate
007	North Fork Quitchupah Creek	3x/yr	3x/yr	3x/yr	Pygmy Meter where feasible or Cross section/velocity estimate
041	Quitchupah Creek above North Fork	3x/yr	3x/yr	3x/yr	Pygmy Meter where feasible or Cross section/velocity estimate
046	Convulsion Canyon above pumphouse	3x/yr	3x/yr	3x/yr	Pygmy Meter where feasible or Cross section/velocity estimate
047A	East Spring Canyon above Convulsion Canyon	3x/yr	3x/yr	3x/yr	Pygmy Meter where feasible or Cross section/velocity estimate
030(4)	East Spring Canyon just above mine(3)	3x/yr	3x/yr	3x/yr	Crest Gage
022(4)	Mud Spring Canyon just above mine(3)	3x/yr	3x/yr	3x/yr	Crest Gage

(Table 3, continued on page 19)

TABLE 3. WATER QUALITY SAMPLING IN THE VICINITY OF THE SUFCO NO. 1 MINE (Continued)

GROUNDWATER SAMPLING SCHEDULE(2)

Site No.(3)	Description	Baseline Period	Operational Period	Post-Mining Period	Flow Measurement Method
001	East Spring	3x/yr	3x/yr	3x/yr	Time/Volume
062	#6 Entry - North Main	3x/yr	3x/yr	3x/yr	Time/Volume
021	Mine Effluent(1)	3x/yr	3x/yr	3x/yr	Time/Volume
047	Pumphouse Effluent	3x/yr	3x/yr	3x/yr	Time/Volume

(1) Does not include sampling to meet NPDES permit requirements.

(2) Sampling dates are May/June, August/September and October/November.

(3) Monitoring stations 060, 061 and 062 #1 Entry -2N have been discontinued since they are now inaccessible.

(4) Ephemeral stream stations 022 and 030 will have flow measurement by crest gages. Water quality monitoring, if flow occurs, will be collected during the scheduled sampling intervals either by mine personnel or by an automatic sampler. Water samples collected automatically will have the parameter list (Table 4) reduced to exclude those constituents requiring special treatment.

REPLACES		TEXT		
Table 3	Page 19	Table 3	Page 19	Date 01/08/90

TABLE 6.4.1-2
SURFACE WATER BASELINE, OPERATIONAL AND
POSTMINING WATER QUALITY PARAMETER LIST
(Includes Stations GW-13, GW-21, SUFCo-089, SUFCo-090)

Field Measurements:

* - Water Level (Station SUFCo-089) or Flow
* - pH
* - Specific Conductivity (umhos/cm)
* - Temperature (Co)

Laboratory Measurements: (mg/l) (Major, minor ions and trace element analyzed in dissolved form only.)

* - Total Dissolved Solids
* - Total Hardness (as $CaCO_3$)
- Aluminum (Al)
- Arsenic (As)
- Barium (Ba)
- Boron (B)
* - Carbonate (CO_3 -2)
* - Bicarbonate (HCO_3 -)
- Cadmium (Cd)
* - Calcium (Ca)
* - Chloride (CL-)
- Chromium (Cr)
- Copper (Cu)
- Fluoride (F-)
* - Iron (Fe)
- Lead (Pb)
* - Magnesium (Mg)
* - Manganese (Mn)
- Mercury (Hg)
- Molybdenum (Mo)
- Nickel (Ni)
- Nitrogen: Ammonia (NH_3)
- Nitrite (NO_2)
- Nitrate (NO_3 -)
* - Potassium (K)
- Phosphate (PO_4 -3)
- Selenium (Se)
* - Sodium (Na)
* - Sulfate (SO_4 -2)
- Zinc (Zn)

Sampling Period:

-Baseline
*Operational, Postmining - Beginning 1992

Sampling Frequency:

Spring (May - June)
Summer (Aug)
Fall (Oct - Nov)

This page revised as of October 25, 1989.

TABLE 6.4.1-4
GROUND WATER SAMPLING

	Baseline Monitoring	Operational Monitoring	Postmining Monitoring
Type of Sampling Site	Observation Wells	Observation Wells	Observation Wells
Field Measurements	Yes	Yes	Yes
Sampling Frequency Each Site	At least two samples - summer and fall.	Three samples per annum - spring (May - June) summer (Aug - Sept) fall (Oct - Nov)	One sample per annum summer (Aug - Sept).
Sampling Duration	1989	Every year until two years after surface reclamation activities have ceased.	Every year until termination of bonding.
Type of Data Collected & Reported	Water levels.	Water levels.	Water levels.

Monitoring data will be submitted to the division within 90 days of the end of each quarter.

Three wells that will be drilled during 1989 (89-18-1, 89-20-2, and 89-16-1) will be included in the ground water monitoring program.

This page revised as of October 5, 1989.

TABLE 4.7.2-2
GROUND WATER BASELINE, OPERATIONAL AND
POSTMINING WATER QUALITY PARAMETER LIST
Waste Rock Disposal Site

Field Measurements:

* - Water Levels or Flow
* - pH
* - Specific Conductivity (umhos/cm)
* - Temperature (Co)

Laboratory Measurements: (mg/l) (Major, minor ions and trace elements are to be analyzed in dissolved form only.)

* - Total Dissolved Solids
* - Total Hardness (as $CaCO_3$)
- Aluminum (Al)
- Arsenic (As)
- Barium (Ba)
- Boron (B)
* - Carbonate (CO_3 -2)
* - Bicarbonate (HCO_3 -)
- Cadmium (Cd)
* - Calcium (Ca)
* - Chloride (CL-)
- Chromium (Cr)
- Copper (Cu)
- Fluoride (F-)
* - Iron (Fe)
- Lead (Pb)
* - Magnesium (Mg)
* - Manganese (Mn)
- Mercury (Hg)
- Molybdenum (Mo)
- Nickel (Ni)
- Nitrogen: Ammonia (NH_3)
- Nitrite (NO_2)
- Nitrate (NO_3 -)
* - Potassium (K)
- Phosphate (PO_4 -3)
- Selenium (Se)
* - Sodium (Na)
* - Sulfate (SO_4 -2)
- Sulfide (S-)
- Zinc (Zn)

Sampling Period:

-Baseline
*Operational, Postmining - Beginning Feb. 1990

Revised 9/88

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TABLE 4.7.2-1
GROUND WATER SAMPLING

	Baseline Monitoring	Operational Monitoring	Postmining Monitoring
Type of Sampling Site	Observation Wells	Observation Wells	Observation Wells
Field Measurements	Yes	Yes	Yes
Sampling Frequency Each Site	At least four samples per annum, at fixed monthly intervals.	Four samples per annum at fixed monthly intervals.	One sample per annum
Sampling Duration	Two years (six months of data before approval of PAP).	Every year until two years after surface reclamation activities have ceased.	Every year until termination of bonding.
Type of Data Collected and Reported	Water levels and water quality.	Water levels and water quality per operational parameters.	Water levels and water quality per operational parameters.
Comments		During the year preceding repermitting. One sample per baseline parameter.	

Monitoring data will be submitted to the division within 90 days of the end of each quarter.

Revised 9/88

STATE OF UTAH
DEPARTMENT OF HEALTH
BUREAU OF WATER POLLUTION CONTROL
P.O. BOX - 16690
SALT LAKE CITY, UTAH 84116-0690

AUTHORIZATION TO DISCHARGE UNDER THE

UTAH POLLUTANT DISCHARGE ELIMINATION SYSTEM

In compliance with provisions of the "Utah Water Pollution Control Act", Title 26, Chapter 11, Utah Code Annotated 1953, as amended, the "Act"

SOUTHERN UTAH FUEL COMPANY

is authorized to discharge from it's Convulsion Canyon mine located

approximately six and one half (6.5) miles north of Salina Canyon (Interstate Highway 70), up Convulsion Canyon, Sevier County, Utah, with the outfalls located at latitude 38° 54′ 54″ and longitude 111° 24′ 57″, latitude 38° 54′ 52″ and longitude 111° 24′ 58″, and 38° 57′ 26″ and longitude 111° 23′ 06″.

to

Quitchupah Creek and East Spring Canyon a tributary of Quitchupah Creek

in accordance with discharge point(s), effluent limitations, monitoring requirements and other conditions set forth herein.

This permit shall become effective on

May 1, 1991.

This permit and the authorization to discharge shall expire at midnight,

April 30, 1996.

Signed this 25th day of April 1991

Authorized Permitting Official
Executive Secretary
Water Pollution Control Committee

B. Climatological Data:

The climatological Data is included as a database file.

C. Subsidence Monitoring Report:

1. A brief description of the monitoring of subsidence above the SUFCo mine is given in the subsidence report.

2. The displacement over the mining areas is shown on Maps 1 and 2.

3. The control grid for the photogrammetric survey is shown on Map 1. Map 1 also shows the cumulative displacement observed. Map 2 shows the subsidence in reference to the underground workings.

1992 SUBSIDENCE REPORT

SOUTHERN UTAH FUEL COMPANY

MINE NO. 1

by

DALL DIMICK

CHIEF SURVEYOR

INTRODUCTION

Southern Utah Fuel Company's 1992 subsidence report is an update of annual subsidence data which has been accumulated since 1976. Prior to 1985, the data was derived from conventional survey methods. Since then, photogrammetric surveys have been employed to monitor the ground movement.

During 1985, the entire Southern Utah Fuel Company (SUFCO) property was flown to establish a set of baseline photography and a grid of surface elevations. Where possible, an elevation was photogrammetrically determined on an approximate 200 foot grid. These original x, y and z locations serve as a comparative base for determining ground movement in the succeeding years.

Once each year another set of aerial photography is obtained. A new elevation is then found at the same x and y coordinates as all the originals. The new, or current, elevations are compared to the originals and the difference between the two is used to generate a contour map. The result is the subsidence contour map included with each annual subsidence report.

Two maps accompany this report. Map 1 is the main subsidence map showing surface control monuments, overburden contours, subsidence contours and surface tension cracks. Map 2 is a current mine map with the subsidence map superimposed.

SUBSIDENCE HISTORY

SUFCO began operations which cause surface subsidence in June, 1976. Continuous miners were used to extract coal from pillars which were developed as part of a retreating panel. The panels were approximately 650 feet wide and varied in length up to 2,500 feet. The average mining height approached 11 feet and the extraction ratio averaged about 80%.

The resulting subsidence from these continuous miner panels averaged about 4 feet in the plateau areas where overburden was 900 feet thick. In areas where panel boundaries were outside the escarpment and beyond the Castlegate Sandstone, subsidence increased with decreasing overburden thickness. The maximum subsidence measured to date, 8.5 feet, occurred in one of these areas. The overburden was only 600 feet thick.

Retreat mining continued in this manner until October, 1985, when a retreating longwall system was added. Longwall panels have ranged from 550 feet to 740 feet wide and up to 6,000 feet in length. Mining heights have varied from 9.5 feet to 12 feet.

Subsidence above the longwall panels has averaged about 4 feet; but the overburden thickness has been as much as 1,800 feet. The Maximum measured subsidence caused by longwall mining is seven feet. This occurred in an area outside the escarpment very similar to the one mentioned above for the continuous miner panel.

1992 SUBSIDENCE

The 1992 subsidence map (Map 1) was updated using data from current photogrammetric monitoring. Each subsidence area is labeled as an independent block. A brief description of each follows:

AREA 1

This was SUFCO's first subsidence area. Undermining began in June, 1976, and continued into 1979. The area is composed of five continuous miner panels which averaged 650 feet in width. Mining height averaged 11 feet with about an 80% extraction ratio.

Maximum subsidence ranged from 4.5 feet to 8.5 feet. It was first detected in 1976 and continued until 1985. No surface movement was detected in this entire area from 1986 to 1989. Area 1 was not monitored for the 1990 subsidence report and will remain dormant unless a need arises. Photographic coverage, however, has been maintained so that the area can be monitored if necessary.

AREA 2

This is another continuous miner area. The panels here were irregular shaped and the extraction ratio was modest. Undermining ceased in 1984.

Maximum subsidence has been measured at 2 feet. The area has been stable since 1985 and has not been monitored since 1989. The same condition as mentioned in Area 1 applies here.

AREA 3

This area is another continuous miner section, but the extracted area is a portion of mains with protective barriers instead of a panel. Coal recovery was moderate with mined areas which were subcritical. Undermining ceased in 1983.

Maximum subsidence was measured at 2 feet. Because of the limited extraction and subcritical areas, the subsidence occurred slowly with small changes noticeable until 1987. The area appeared stable in 1988 and 1989. It has not been monitored since 1989.

AREA 4

This subsidence area is comprised of three continuous miner panels. The mining height averaged 11 feet with a good extraction ratio. Undermining ceased in 1985.

Maximum subsidence was 5 feet with no detectable change in 1989. This area has not been monitored since 1989.

AREA 5

The four continuous miner panels which make up this area were mined from September, 1978, to November, 1981. Mining height averaged 11 feet with an 80% extraction ratio.

Maximum subsidence was 5 feet with no detectable changes from 1985 through 1989. This area was not monitored for 1991 and will also remain dormant. As with Areas 1 through 4, photographic coverage has been maintained so that monitoring could be done if necessary.

AREA 6

Area 6 is SUFCO's first longwall induced subsidence area. It is comprised of nine longwall panels varying from 540 feet to 700 feet in width and 1,700 feet to 3,900 feet in length. Also, there is a section of recovered mains between two of the longwall blocks. Undermining began in Area 6 during October, 1985, and continued through the mains recovery in March, 1990.

Maximum subsidence measured in areas bounded by the plateau is five feet. There is a location on the map which shows seven feet; but this area is outside the escarpment where the overburden is only 600 feet thick. The subsided escarpment is intentional and is part of a study agreed upon by SUFCO, the Division of Oil, Gas and Mining, the Bureau of Land Management and the U. S. Forest Service. This particular section of escarpment was removed from the "no subsidence zone" to study the effects of longwall mining on the escarpment.

Area 6 is still actively subsiding and will be monitored for several more years.

AREA 7

Area 7 was originally planned for no subsidence. Pillars were made to support the overburden but began to fail in the north end in 1984 when the underground workings were flooded. The failures progressed towards the south and by 1986, subsidence was detected over the area.

The map shows up to seven feet of subsidence. There has been no additional subsidence movement detected since 1988.

AREA 8

Undermining this area began in June, 1983, and has been sporadic up to the present. Continuous miners were used with extraction ratios over 80% and average mining heights of 10 feet. This is still an active area and will be for several more years. Maximum subsidence to date is five feet.

AREA 9

This area is a longwall mining area which is composed of four panels. The first began in June, 1989 and the block was finished in January 1992. The mining height averaged about 11 feet and the maximum subsidence shown to date is four feet.

AREA 10

Area ten is a new longwall mining block which began in January 1992. The entire surface area above this block was digitized for base-line elevations during 1991. The first panel was approximately three-fourths completed at the time of monitoring and shows a subsidence trough two feet deep in the center of the panel. This area will be active for several more years.

The experimental mining practice area discussed under "Area 6" was extended, with regulatory approval, to the east side of the canyon under the Southwest corner of "Area 10". An extensive premining survey of this location was conducted late in 1992. Detailed discussion of the survey findings and post-mining subsidence effects will be provided in the 1993 report subsequent to mining activity under this area.

DRAW ANGLE SURVEYS

Several draw angle surveys have been performed during the past years. Completed surveys have been over continuous miner areas and have been oriented both parallel and perpendicular to the long axis of the panel. The average of all measurements is 15°.

Individual measurements ranged from 10° to 21°.

Two additional lines of survey measurements for draw angle determination were installed above a longwall area (Area 6) in 1986. The area is beginning to stabilize now and the movements will be measured during 1993. The results of which will be included in the 1993 subsidence report.

SUBSIDENCE TENSION CRACKS

Tension cracks have occurred above most of the subsidence areas. Most have been located by survey and are plotted on Map 2. Their lengths vary from a few feet to nearly two hundred feet. Most are oriented either parallel to the natural jointing pattern or to the boundaries of the underground excavation. Vertical displacement along the cracks is uncommon and horizontal displacement varies from hairline to several inches in width.

The U. S. Forest Service completed a tension crack study in 1978. They monitored twenty-two different cracks (located in Area 1) with widths varying from 1/8 inch to six inches. Results show that most cracks self-heal, or close, from 13% to 100% of their original width.

No new tension crack data was obtained in 1992.

DD:jad

D. Vegetation Data or Revegetation Success Monitoring:

Vegetative monitoring was completed on the first lift at the waste rock disposal site. This monitoring is described in the copy of Endangered Plant Studies report.

The second lift at the waste rock disposal site was seeded on October 23, 1992 following the procedures approved in the M&RP. Approximately two acres was regraded and seeded. This brings the total regraded and reseeded area to about 3.5 acres at the waste rock disposal site.

Vegetation Monitoring of the Waste Rock Disposal Site and Vegetation Sampling of the Reference Area

Prepared for
Southern Utah Fuels Company
P.O. Box 719
Helper, Utah 84526

Attention: Mr Keith Welch

Prepared by
Stanley L. Welsh and Ronald J. Kass
Endangered Plant Studies, Inc.
129 North, 1000 East
Orem, Utah 84057

September 10, 1992

Introduction

This report describes the August 27, 1992 monitoring of the Southern Utah Fuels Company (SUFCO) waste rock disposal area and the September 2, 1992 vegetation sampling of the waste rock reference site. The sampling was conducted by Stanley L. Welsh and Ronald J. Kass of Endangered Plant Studies (EPS). Vegetation sampling was conducted at the waste rock site to obtain monitoring data for the 1992 monitoring program described in the SUFCO waste rock mining and reclamation plan (MRP) Table 4.6.3-1.

The waste rock reference site will be used as a vegetation standard during final reclamation of the waste rock site. The reference area was determined by Division of Oil, Gas and Mining (DOGM) reclamation specialist, Paul Baker and EPS.

Methods

Sampling was conducted according to DOGM vegetation guidelines (February 1992). Sampling procedures were discussed with Paul Baker prior to sampling. Percent cover was estimated by the ocular method for both the Waste Rock monitoring and reference site. Shrub density was estimated by the point-quarter method for the reference area.

Percent cover estimates

A 75 m tape was stretched across the longest axis of the Waste Rock monitoring site. Random numbers were generated and the corresponding numbers were used to locate the $1m^2$ quadrat along the 75 m transect. After sampling a minimum of 15 quadrats, the sample adequacy formula was computed and additional quadrats were sampled if necessary. Minimal sample size for the Waste Rock monitoring. site was N=11. A t-value of 1.645, and a d-value of 0.1 were used as coefficients to calculate sample adequacy. The same procedure was repeated for the Waste Rock reference area. The minimal sample size for the reference site was N=5.

Shrub density

To estimate shrub density of the Waste Rock reference site, a 75 m tape was stretched across the longest axis of the site. Random numbers were generated and the corresponding numbers were used to locate the point-quarter sample point along the 75 m transect. The sample point was divided into four sections and mean shrub distance was calculated for all shrubs species. Sample adequacy was calculated and N=27 sample points were required. A t-value=1.645, and d-value=0.1 were used as coefficients to calculate sample adequacy.

Results

Waste Rock Monitoring

This area was reseeded with the recommended seed mixture in Table 4.6 1-1 of the MRP. Total mean plant cover was x= 56.3 % (S=11.7) and approximately 80 % of the species percent composition was reseeded grasses (Table 1). We do suggest that sampling be accomplished in late June or early July when grasses and forbs are flowering, and when vegetative biomass is at or near maximum production. We suspect vegetative cover will be 10-20% higher and species richness will be higher if sampled during the above mentioned times.

Table 1. Percent cover and species composition of Waste Rock monitoring site.

	% cover	% composition
Bare ground	35.4	
Litter	8.3	
Grasses		
Bromus marginatus	5.4	9.6
Elymus cinereus	4.4	7.8
Elymus spicatus	25.5	45.3
Elymus lanceolatus	9.7	17.2
Poa pratensis	0.06	0.1
Forbs		
Achillea millefolium	0.06	0.1
Atriplex rosea	0.2	0.3
Eriogonum racemosum	0.06	0.1
Heliomeris multiflora	0.2	0.3
Kochia scoparia	0.2	0.3
Melilotus officinalis	6.9	12.3
Penstemon strictus	0.2	0.3
Pologonum aviculare	0.06	0.1
Sasola kali	3.4	6.1
Totals	56.3	100.0

Our samples did not detect any shrub cover nor did we observe any shrubs growing on the Waste Rock site. As DOGM suggests (R645-301-341.210, permit deficiency review), shrubs may be difficult to establish because of the large herds of wintering deer favoring newly established shrubs. It is recommended that the area be fenced after reseeding, or wire cages be used to protect newly established shrubs from deer browsing and subsequent shrub mortality. If seeding efforts fail to establish shrubs, then the use of containerized shrubs and wire caged may be appropiate. Season of planting containerized stock and density will be discussed with DOGM personnel.

Waste Rock Reference

Total mean plant cover for the Waste Rock reference site was x= 67.2 % (S= 9.1) (Table 2). Shrubs composed 54.7 % and grasses 45.0 % of the percent species composition. Mean distance per shrub was 0.51, yielding a value of 7,935 shrubs/acre. We estimated by ocular reconnaissance that approximately 70 % of the total shrubs/acre (5,555) are little rabbitbrush and approximately 30 % (2380) are sagebrush. We also recommend that this area be sampled in late June or early July to approach a more accurate estimate of mean cover and species composition.

Table 2. Percent cover and species composition of Waste Rock monitoring site.

	% cover	% composition
Bare ground	8.8	
Litter	24.0	
Grasses		
Agropyron cristatum	12.5	18.7
Elymus smithii	16.0	23.9
Elymus spicatus	1.1	1.6
Poa pratensis	0.5	0.8
Forbs		
Eriogonum racemosum	0.2	0.3
Shrubs		
Artemisia tridentata	21.8	32.4
Chrysothamnus vicidiflorus	15.0	22.3
Totals	67.2	100.0

E. Annual Impoundment Certification:

The annual impoundment certifications for the mine site and waste rock disposal site sedimentation ponds are include. No sign of instability, structural weakness or other hazardous condition were observed.

ANNUAL MINESITE SEDIMENTATION POND CERTIFICATION -- 1992

An inspection of Southern Utah Fuel Company's Minesite Sediment Pond was conducted by Wesley K. Sorensen, P.E. on December 23, 1992.

No signs of structural weakness of the dam or surrounding slopes were observed.

The fill slope above the pond has minor erosion gullies in several locations. No signs of instability of the fill slope were noted.

The primary spillway was raised to an elevation of 7418.15 to gain additional capacity in accordance with the M&RP. The sediment level is at 7410.03 ft. 15 feet directly west of the primary spillway.

The water level in the pond during the inspection was 7413.11 ft. which is 5.04 feet below the standpipe spillway elevation. An additional 0.979 acre-ft of storage volume was available in the pond above the current water level. The sediment level in the pond was at 7410.03 feet which correspondes to a sediment volume of 0.514 acre-ft based on a level sediment surface and the pond volume in the M&RP. This is 92.6% of the maximum sediment volume. The sediment pond will require cleaning during 1993, when weather conditions permit.

A copy of the field notes are attached.

I certify that the above description accurately represents the condition of the Minesite Sediment Pond as observed during my inspection on December 23, 1992.

Wesley K. Sorensen, P.E.
Registration No. 5369
State of Utah

WKS:jad

MLD 2/27/92

SOUTHERN UTAH FUEL COMPANY

Minesite Sediment Pond [redacted] Annual Inspection Report

Inspector Wesley K Sorensen Date 12/23/92

1. Dam Structural Weakness

A. Cracks or scarps on crest ___ Yes ✓ No

B. Cracks or scarps on slope ___ Yes ✓ No

C. Sloughing or bulging on slope ___ Yes ✓ No

2. Major Erosion Problems ___ Yes ✓ No

Fill slope north of pond has minor erosion gullys.

3. Surface Movements of Surrounding Slopes ___ Yes ✓ No

4. Visible Sumps or Sinkholes in Slurry Surface ___ Yes ✓ No

Water in pond ICE LEVEL = 7413.11

SED LEVEL = 7410.03.

5. Clogging

A. Spillway channels and pipes ___ Yes ✓ No

Small delta at inlet.

B. Decant System ___ Yes ✓ No

C. Diversion ditches [redacted] ___ Yes ✓ No

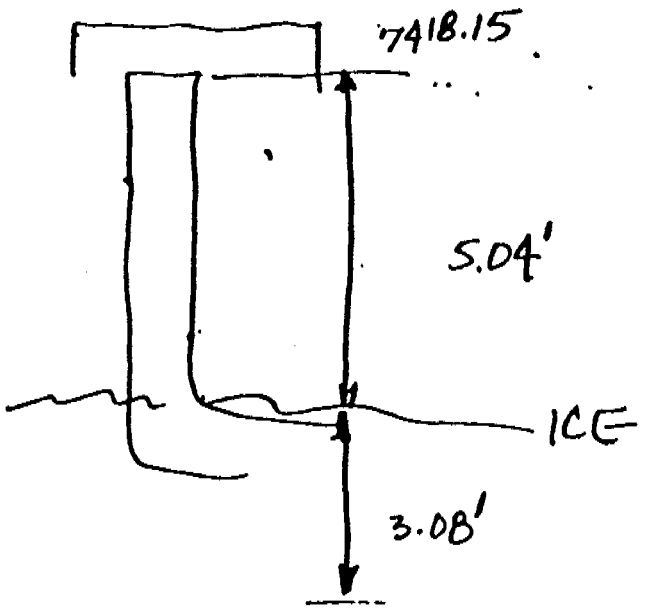
6. Seepage (Specify Location, Color and Approx. Volume) ___ Yes ✓ No

7. Any appearance of instability, structural weakness, or other hazardous conditions ___ Yes ✓ No

None observed

8. Other Comments

South & East slope free of most snow
Road & westside & north slope dam 2-6" snow
clear ≈ 30°F 11:30 - 12:30



ANNUAL WASTE ROCK SEDIMENTATION POND CERTIFICATION -- 1992

An inspection of Southern Utah Fuel Company's Waste Rock Sediment Pond and associated Decant Impoundment was made on December 22, 1992 by Wesley K. Sorensen, P.E.

No signs of structural weakness of the sediment pond dam or decant impoundment dam were observed.

The diversion ditches, spillways and decant device are in as-constructed condition and are functional.

The sediment level in the center of the sediment pond is at 7884.14 ft. At the time of the inspection there was snow in the pond. The total storage volume between 7884.14 and 7889.50 (spillway) is 0.72 acre ft. No sediment or water was observed in the decant impoundment.

A copy of the field notes of the inspection are attached.

I certify that the above description accurately represents the condition of the Waste Rock Sedimentation Pond and Decant Impoundment observed during the inspection.

Wesley K. Sorensen, P.E.
Registration No. 5369
State of Utah

WKS:jad

Attachment

MLD 2/27/92

SOUTHERN UTAH FUEL COMPANY

Rock Waste Sediment Pond [redacted] Annual Inspection Report

Inspector Wesley K. Sorensen Date 12/22/92

1. Dam Structural Weakness

   A. Cracks or scarps on crest ___ Yes ✓ No

   B. Cracks or scarps on slope ___ Yes ✓ No

   C. Sloughing or bulging on slope ___ Yes ✓ No

2. Major Erosion Problems ___ Yes ✓ No

3. Surface Movements of Surrounding Slopes ___ Yes ✓ No

4. Visible Sumps or Sinkholes in Slurry Surface ___ Yes ✓ No

5. Clogging

   A. Spillway channels and pipes ___ Yes ✓ No

   B. Decant System ___ Yes ✓ No

C. Diversion ditches [redacted] ___ Yes ✓ No

6. Seepage (Specify Location, Color and Approx. Volume) ___ Yes ✓ No

7. Any appearance of instability, structural weakness, or other hazardous conditions ___ Yes ✓ No

8. Other Comments

92.58
8.44
84.14

101 1/4 from top of catwalk to sediment in pond center

No water in pond.
13" of snow in most areas
Clear & Sunny, slight wind.
Deer & elk in area

Decant Impoundment

No cracks
No bulging
No sloughing
No water
Spillway in as built condition

F. Annual Overburden, Spoil, Refuse, Roof, Floor, and Mid-Seam Data.

1. Southern Utah Fuel Company's waste rock disposal site is located 6.4 road miles from the minesite in the NW 1/4 of NE 1/4 of Section 18, Township 22 South, Range 4 East, SLB&M. Because Southern Utah Fuel Company is an underground coal mine that does not wash its product, refuse material is only produced when rehabilitating old work areas and when installing overcasts for ventilation. The refuse produced thus consists predominantly of coal with a small amount of rock from the first foot of floor rock and the first four feet of roof rock. Systematic sampling of roof and floor rock is not done because of the small amount and infrequency in which these materials are encountered.

2. Representative grab samples are taken of all refuse material as it is hauled out of the mine. The samples are composited on a quarterly basis making for a 50-100 pound sample that is analyzed. Sample preparation includes crushing to 4 mesh and riffling to a representative 5-10 pound size for analysis.

3. Laboratory analysis sheets are included.

4. A summary table of analytical results from the quarterly samples is included.

Inter-Mountain Laboratories, Inc.
1633 Terra Avenue
Sheridan, Wyoming 82801
Tel. (307) 672-8945

SOUTHERN UTAH FUEL COMPANY
SALINA, UTAH

April 28, 1992

Lab No.	Location	Depths	pH	EC mmhos/cm @ 25°C	Saturation %	Calcium meq/l	Magnesium meq/l	Sodium meq/l	SAR
72926	WRDS 1 QTR 92	0.0-0.0	6.7	9.05	40.8	33.6	28.6	40.4	7.24

Miscellaneous Abbreviations: SAR= Sodium Adsorption Ratio, CEC= Cation Exchange Capacity, ESP= Exchangeable Sodium Percentage, Exch= Exchangeable, Avail= Available

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SOUTHERN UTAH FUEL COMPANY
SALINA, UTAH

April 28, 1992

Lab No.	Location	Depths	Total Sulfur %	T.S. AB t/1000t	Neut. Pot. t/1000t	T.S. ABP t/1000t	H2O Sol Boron ppm	H2O Sol Selenium ppm	Alkalinity PE meq/l
72926	WRDS 1 QTR 92	0.0-0.0	0.61	19.1	159.	140.	4.81	<0.02	2.64

Abbreviations for extractants: PE= Saturated Paste Extract, H2OSol= water soluble,AB-DTPA= Ammonium Bicarbonate-DTPA, AAO= Acid Ammonium Oxalate
Abbreviations used in acid base accounting: T.S.= Total Sulfur, AB= Acid Base, ABP= Acid Base Potential, PyrS= Pyritic Sulfur, Pyr+Org= Pyritic Sulfur + Organic Sulfur, Neut. Pot.= Neutralization Potential

Inter-Mountain Laboratories, Inc.
1633 Terra Avenue
Sheridan, Wyoming 82801
Tel. (307) 672-2481

SOUTHERN UTAH FUEL COMPANY
SALINA, UTAH

July 28, 1992

Lab No.	Location	Depths	Total Sulfur %	T.S. AB t/1000t	Neut. Pot. t/1000t	T.S. ABP t/1000t	Boron ppm	Selenium ppm	Alkalinity PE meq/l
78023	WRDS 2ND QTR 92	0.0-0.0	0.50	15.7	120.	104.	4.42	0.07	1.86

Abbreviations for extractants: PE= Saturated Paste Extract, H2OSol= water soluble, AB-DTPA= Ammonium Bicarbonate-DTPA, AAO= Acid Ammonium Oxalate
Abbreviations used in acid base accounting: T.S.= Total Sulfur, AB= Acid Base, ABP= Acid Base Potential, PyrS= Pyritic Sulfur, Pyr+Org= Pyritic Sulfur + Organic Sulfur, Neut. Pot.= Neutralization Potential

Inter-Mountain Laboratories, Inc.
1633 Terra Avenue
Sheridan, Wyoming 82801
Tel. (307) 672-8945

SOUTHERN UTAH FUEL COMPANY
SALINA, UTAH

July 28, 1992

Lab No.	Location	Depths	pH	EC mmhos/cm @ 25°C	Calcium meq/l	Magnesium meq/l	Sodium meq/l	SAR
78023	WRDS 2ND QTR 92	0.0-0.0	7.3	4.26	23.9	13.9	10.2	2.33

Miscellaneous Abbreviations: SAR= Sodium Adsorption Ratio, CEC= Cation Exchange Capacity, ESP= Exchangeable Sodium Percentage, Exch= Exchangeable, Avail= Available

Inter-Mountain Laboratories, Inc.
1633 Terra Avenue
Sheridan, Wyoming 82801
Tel. (307) 672-8945

SOUTHERN UTAH FUEL COMPANY
SALINA, UTAH

November 9, 1992

Lab No.	Location	Depths	pH	EC mmhos/cm @ 25°C	Saturation %	Calcium meq/l	Magnesium meq/l	Sodium meq/l	SAR
83688	WRDS 3QTR 92		6.9	6.87	35.7	27.9	27.7	21.7	4.11

Miscellaneous Abbreviations: SAR= Sodium Adsorption Ratio, CEC= Cation Exchange Capacity, ESP= Exchangeable Sodium Percentage, Exch= Exchangeable, Avail=Available

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SOUTHERN UTAH FUEL COMPANY
SALINA, UTAH

November 9, 1992

Lab No.	Location	Depths	Total Sulfur %	T.S. AB t/1000t	Neut. Pot. t/1000t	T.S. ABP t/1000t	Boron ppm	Selenium ppm	Alkalinity PE meq/l
83688	WRDS 3QTR 92		0.49	15.3	185.	169.	5.54	0.04	3.68

Abbreviations for extractants: PE= Saturated Paste Extract, H2OSol= water soluble, AB-DTPA= Ammonium Bicarbonate-DTPA, AAO= Acid Ammonium Oxalate
Abbreviations used in acid base accounting: T.S.= Total Sulfur, AB= Acid Base, ABP= Acid Base Potential, PyrS= Pyritic Sulfur, Pyr+Org= Pyritic Sulfur + Organic Sulfur, Neut. Pot.= Neutralization Potential

Inter·Mountain Laboratories, Inc.
1633 Terra Avenue
Sheridan, Wyoming 82801
Tel. (307) 672-8945

SOUTHERN UTAH FUEL COMPANY
SALINA, UTAH

February 1, 1993

Lab No.	Location	Depths	Total Sulfur %	T.S. AB t/1000t	Neut. Pot. t/1000t	T.S. ABP t/1000t	Boron ppm	Selenium ppm	Alkalinity PE meq/l
86862	WDRS 4QTR 92		0.43	13.4	245.	231.	4.71	0.02	3.34

Abbreviations for extractants: PE= Saturated Paste Extract, H2OSol= water soluble,AB-DTPA= Ammonium Bicarbonate-DTPA, AAO= Acid Ammonium Oxalate
Abbreviations used in acid base accounting: T.S.= Total Sulfur, AB= Acid Base, ABP= Acid Base Potential, PyrS= Pyritic Sulfur, Pyr+Org= Pyritic Sulfur + Organic Sulfur, Neut. Pot.= Neutralization Potential

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SOUTHERN UTAH FUEL COMPANY
SALINA, UTAH

February 1, 1993

Lab No.	Location	Depths	pH	EC mmhos/cm @ 25°C	Saturation %	Calcium meq/l	Magnesium meq/l	Sodium meq/l	SAR
86862	WDRS 4QTR 92		7.1	16.0	42.1	35.9	20.6	107.	20.1

Miscellaneous Abbreviations: SAR= Sodium Adsorption Ratio, CEC= Cation Exchange Capacity, ESP= Exchangeable Sodium Percentage, Exch= Exchangeable, Avail= Available

WASTE ROCK DISPOSAL SITE
ANALYSES OF MATERIAL

Qtr	Year	pH of P.E. (SU)	Alkalin. of P.E. (meq/L)	Elect. Cond. (mmhos/cm)	Water Satur. (wt.%)	Calcium (meq/L)	Magnesium (meq/L)	Sodium (meq/L)	Sodium Absorp. Ratio	Total Sulfur (wt.%)	Total Sulfur A.B. (T/1000T)	Neutral. Potent. (T/1000T)	Total Sulfur A.B.P. (T/1000T)	Water Boron (ppm)	Soluble Selenium (ppm)
1	1992	6.7	2.64	9.05	40.80	33.6	28.6	40.4	7.24	0.61	19.1	159.0	140.0	4.81	0.02
2	1992	7.3	1.86	4.26		23.9	13.9	10.2	2.33	0.50	15.7	120.0	104.0	4.42	0.07
3	1992	6.9	3.68	6.87	35.70	27.9	27.7	21.7	4.11	0.49	15.3	185.0	169.0	5.54	0.04
4	1992	7.1	3.34	16.00	42.10	35.9	20.6	107.0	20.10	0.43	13.4	245.0	231.0	4.71	0.02

Notes: 1. Absence of a value indicates that the parameter was not analyzeds.
2. The detection limit for selenium is 0.02 ppm. Analysis values equal to or less than 0.02 are entered as 0.02.

ANNUAL WASTE ROCK DISPOSAL SITE
CERTIFICATION -- 1992

An inspection of Southern Utah Fuel Company's Waste Rock Disposal Site was made by Wesley K. Sorensen, P.E. on December 22, 1992.

The second lift of the waste rock disposal site has been reclaimed using moguels to enhance vegetation growth. The resulting surface of about two acres was hydroseeded in accordance to the M&RP during October 1992. The third lift is just started with a maximum height of about 13 ft.

The active area pad of the third lift has approximate dimensions of 100 ft x 195 ft. Underground development waste is end dumped from 10 wheel dump trucks in piles about 3.5 ft high. These piles are leveled with a D-8 Cat dozer. The resulting lift thickness is 18-24 inches. The dozer and loaded trucks are routed over the pad to compact the lift.

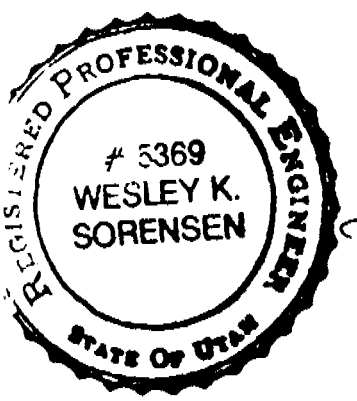
Final and intermediate construction slopes were less than the designed 1v:2h. Slopes are constructed such that water cannot pond against the toe.

No fires have occurred to date and none were observed during the inspection.

No significant erosion was observed.

A copy of the field notes are attached.

I certify that the above description accurately represents the conditions observed at the Waste Rock Disposal Site during my inspection on December 22, 1992.



Wesley K. Sorensen, P.E.
Registration No. 5369
State of Utah

WKS:jad

Attachment

2-27-92 MLD

SOUTHERN UTAH FUEL COMPANY

Coal Refuse Piles Annual [redacted] Inspection Report

Inspector Wesley K Sorensen Title Chief Eng P.E.

Date 12/22/92 Permit # Act/041/002

1. Foundation Preparation (vegetation, topsoil removal?) ✓Yes __No
2. Lift Thickness (inches) ≈ 18"-24"
3. Compaction (4 to 6 complete passes) ✓Yes __No
4. Burning (specify extent and location) __Yes ✓No
   None during year
5. Angle of Slope (degrees) _____
6. Seepage (specify location, color, & appr. volume) __Yes ✓No
7. Cracks or Scarps (location, size) __Yes ✓No
8. Major Erosion Problems (location and extent) __Yes ✓No
9. Water Impounding Against Toe __Yes ✓No
10. Any appearance of instability, structural weakness, or other hazardous conditions __Yes ✓No

1st lift veg doing well

Active PAD ~~E-W N-S~~ 100' X 195'

2nd lift reclaimed ≈ 2 acres

Moguels were put in to increase surface roughness.

3rd lift about 13ft high

	EAST	WEST
SOUTH	33%	43%
CENTER	42%	35%
NORTH	47%	62%
	Ave 1:2.46	1:2.14

doc#66

6"-20" of snow cover

Wesley K. Sorensen, P.E.
Registration No. 5369
State of Utah

G. A Current Copy of the Annual Report of Officers:

A copy of the current list of officers for Southern Utah Fuel Company, Coastal States Energy and Coastal Corporation is included.

The directors and officers of Southern Utah Fuel Company are:

Board of Directors: James R. Paul, James L. Van Lanen, David A. Arledge, Vernal J. Mortensen, Austin M. O'Toole

Officers:

James R. Paul	Chairman of the Board
James L. Van Lanen	President and Chief Executive Officer
David A. Arledge	Executive Vice President
Vernal J. Mortensen	Executive Vice President
Donald J. Appleman	Vice President
Jeffery A. Connelly	Vice President and Treasurer
Robert A. Feilner	Vice President
William S. Hudgins, Jr.	Vice President, General Counsel and Asst. Secretary
Kenneth M. Payne	Vice President
E.C. Simpson	Vice President
Edward P. Gleichauf	Controller
Austin M. O'Toole	Secretary
Pauletta P. Cohn	Assistant Secretary
Jay L. Gallia	Assistant Secretary
John S. Gennaro	Assistant Secretary
Robert A. Shaw, Jr.	Assistant Secretary
H.R. Natho	Assistant Controller

OFFICERS (continued)

Pauletta P. Cohn	Assistant Secretary
Jay L. Gallia	Assistant Secretary
John S. Gennaro	Assistant Secretary
Robert A. Shaw, Jr.	Assistant Secretary
Dale V. Shultz	Assistant Secretary
Kirk W. Weinert	Assistant Secretary
Fred D. Gray	Assistant Treasurer
Ronald D. Matthews	Assistant Treasurer
James M. Rauch	Assistant Treasurer
J. W. French	Assistant Controller
Fred H. Hallman	Assistant Controller
J. W. Knowles	Assistant Controller
H. R. Natho	Assistant Controller