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Ken Payne
General Manager



**Southern Utah
Fuel Company**

P.O. Box P
Salina, Utah 84654
(801) 529-7428
(801) 637-4880 (Mine)

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Energy Company

JIM

APR 02 1984

March 28, 1984

Mr. James W. Smith
Division of Oil, Gas and Mining
4241 State Office Building
Salt Lake City, Utah 84114

Dear Mr. Smith:

Enclosed with this letter, please find 14 copies of Southern Utah Fuel's interim subsidence report for 1983. It is our understanding that DOGM handles distribution of the appropriate number of copies to the required state and federal agencies.

If you have any questions concerning this report, please contact John R. Frederick.

Sincerely,
SOUTHERN UTAH FUEL COMPANY


Ken Payne
V. P. & General Manager

JRF:cfc

Enclosure

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DIVISION OF
OIL, GAS & MINING

1983 SUBSIDENCE REPORT
SOUTHERN UTAH FUEL COMPANY (SUFCO)
CONVULSION CANYON MINE

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DIVISION OF
OIL, GAS & MINING

Introduction

This report is presented as an addendum to SUFCO's Mining and Reclamation Plan and previously submitted subsidence reports. The included maps, figures, and tables have been updated with new data obtained during 1983. Only two new areas were subsided. These were the 1R1W panel and the 1 West mains.

New Subsidence Areas

As shown on Map 80-9B revised (attached), subsidence occurred over the 1R1W panel and the 1 West mains. The 1R1W panel have subsided a maximum of 2.2 feet. Additional subsidence is anticipated as the panel retreats further. The 1 West mains have subsided 1.4 feet. Additional subsidence over this area will probably be limited due to the relatively small contiguous area which was extracted.

Old Subsidence Area

Additional subsidence was detected over 1L2E, 2L2E, 3L2E, and 4L2E. In general, this resulted in a one foot subsidence increase. However, subsidence in the north portion of panel 4L2E is roughly one foot less than previously depicted. Incorrect data from past surveys was showing more subsidence in this area than actually realized.

Incorrect surveying data from past surveys also depicted the 5L1W, 2L2N, and 3L2N as subsiding roughly one foot more than they actually did. The revised map 80-9B reflects the correct data as well as the tables and figures included in this report.

New personnel were, and will be in the future, conducting the subsidence surveys in 1983. Problems which were present in previous surveys have been corrected and should not be repeated.

Limit Angle Surveys

Present data is not sufficient to completely verify the 12° limit angle. As discussed in the 1980 subsidence report, this angle was determined from a series of short spaced stations over the 4L1W panel. A similar test is planned over the 2R4E panel during 1984. In addition, Table 1 is included here. This shows subsidence stations positioned over unmined areas or barrier pillars adjacent to full extraction panels. As shown, stations with subsidence values indicate a limit angle greater than 5 and less than 23 degrees. The S-25 and S-30 points were not surveyed since their installation because the area directly beneath them has not been mined. For limit angle purposes, these points will be checked. Full extraction mining had not progressed near the remaining points on Table 1 which do not show a subsidence value.

TABLE 1

SUBSIDENCE LIMIT ANGLE SUMMARY

<u>Subsidence*</u> <u>Station</u>	<u>Total</u> <u>Subsidence</u>	<u>Overburden</u> <u>Depth (OD)</u>	<u>Hor. Dist To**</u> <u>Mined Area (HD)</u>	<u>HD</u> <u>OD</u>	<u>Limit Angle</u>	<u>Comments</u>
S-3	.86 (ft)	976 (ft)	90 (ft)	.092	5 ⁰	
S-15	.19	908	70	.077	4	
S-19	0	891	380	.426	23	
S-22	.78	1020	90	.088	5	
S-25	-	1250	90	.072	4	
S-30	-	1219	470	.386	21	
1R1W-1	.05	1058	90	.085	5	
2R1W-5	-	911	100	.110	6	
1L4E-4	-	257	100	.389	21	
1L4E-6	-	285	70	.246	14	

*Only those stations positioned over barrier pillars or undeveloped areas.

**Mined areas are full extraction areas only.

Subsidence/Overburden Depth

Current data indicates less subsidence, with overburden depths greater than 900 feet, than previously anticipated. Figure 1, included in SUFCO's Mining and Reclamation Plan as Figure 4, has been revised and included in this report. Assuming an average 10 feet mining height and 1,000 feet of overburden, current data would indicate an average subsidence of roughly 2.1 feet while previous data indicated nearly 3.0 feet. Insufficient data is available to indicate any modification of the original Figure 4 where overburden depths are less than 900 feet. Therefore, no change in this range was made on Figure 1.

The considerable number of points to the left of the plot in the 900 to 1,000 foot overburden range would indicate further shallowing of the curve above 900 feet. However, the 1R1W and 2R1W points have not yet fully subsided and would therefore, for plotting purposes, not carry the weight of the other points. It is anticipated that additional subsidence will shift these points to the right and more in line with the projected curve.

In order to better screen pertinent data for subsidence/mining height versus overburden depth comparisons, Table 2 (Subsidence Data Summary) was generated and is presented here. Only those stations shown over areas of good recovery on Table 2 were used to compile Figure 1.

Environmental Effects of Subsidence

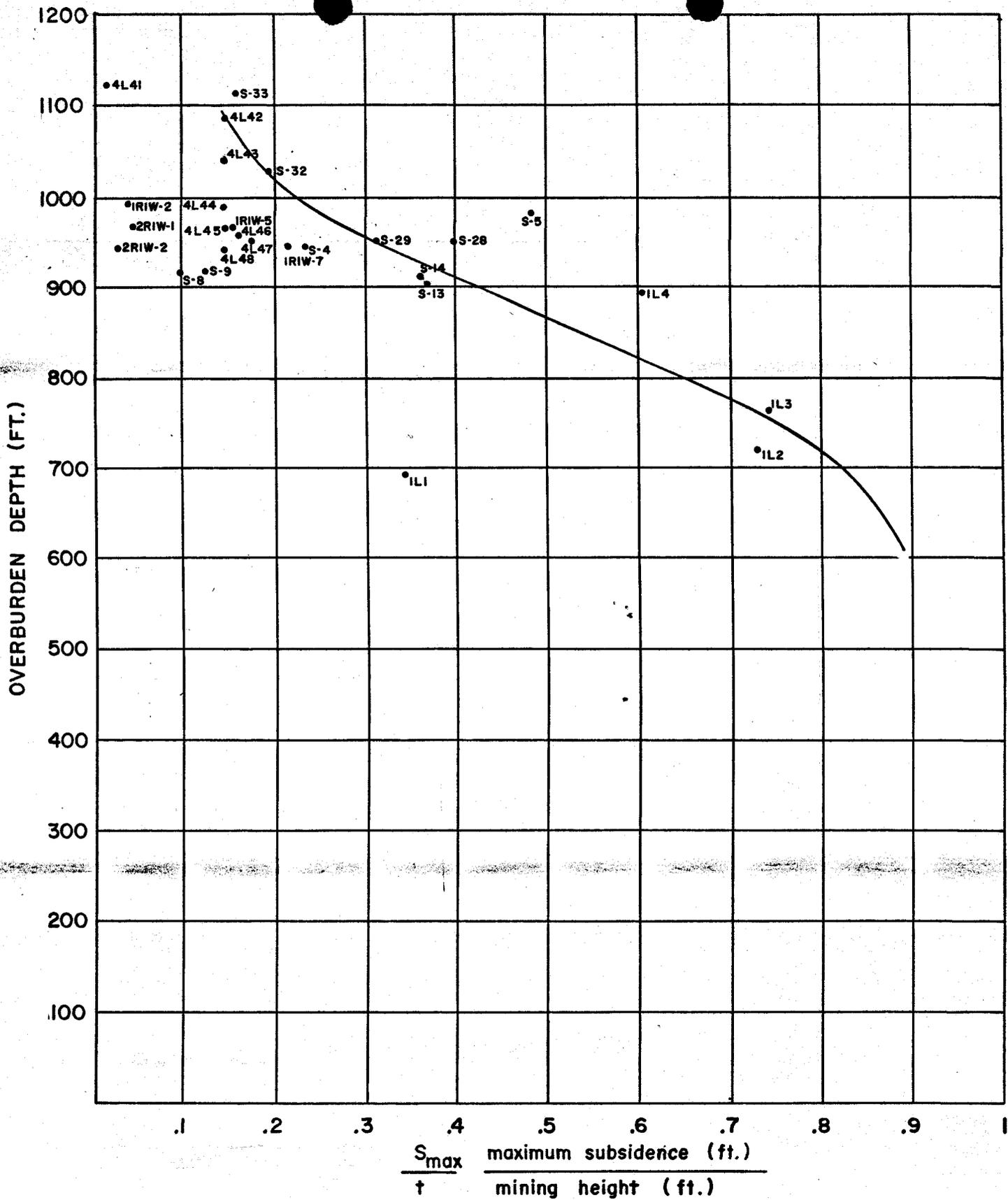
Visual observations of the subsidence areas detected no significant effect to the area's overall environment. Due to the mountainous terrain and speed of tension cracks healing, described in SUFCO's Mining and Reclamation Plan, subsidence effects are virtually indistinguishable. In addition, no change has been noted in the two natural springs occurring in the area. This is understandable since no subsidence was detected or anticipated during 1983 within the immediate area of the springs.

Tension Cracks

No new subsidence tension cracks were surveyed during 1983. As described above, new subsidence areas were fairly limited. With a maximum of 2.2 feet of subsidence, tension cracks were difficult to identify. It was determined that a more accurate survey could be conducted when the new areas had subsided further. An attempt was made to survey the tension cracks late in the 1983 season; however, due to snow cover, they could not be located. The 1984 surveys should delineate these new tension cracks.

Conclusions

New subsidence during 1983 was limited to a maximum of 2.2 feet over 1R1W and 1.4 feet over the 1 West mains. Surface disturbance in these areas was minor and created no noticeable environmental effects. Tension cracks were too minor to warrant delineation at the time subsidence surveys were conducted. However, further subsidence and corresponding tension crack enlargement is expected and will be documented during 1984. Limit angle studies were inconclusive. Insufficient evidence was gained to verify or discredit the 12° value. The subsidence versus overburden studies did indicate a flattening of the curve above 900 feet of overburden. This indicates less subsidence when overburden exceeds 900 feet than previously anticipated.



NOTE: Only those subsidence stations positioned over good recovery areas in full extraction panels are used for this plot.

FIG. 1
SUBSIDENCE / MINING HEIGHT vs OVERBURDEN DEPTH
 (After fig. 4 in Mining and Reclamation Plan, Subsidence Section)

TABLE 2
SUBSIDENCE DATA SUMMARY

	<u>Subsidence Station</u>	<u>Surface Elevation</u>	<u>Mine Elevation</u>	<u>Overburden Depth</u>	<u>Total Subsidence (Smax)</u>	<u>Mining Height (t)</u>	<u>Smax t</u>	<u>Recovery</u>
1.	S-1	8545.31	7526	1019 (ft)	0 (ft)	11 (ft)		Over North Main Pillars
2.	S-2	8452.20	7505	947	.18	11	.02	Over North Main Pillars
3.	S-3	8487.93	7512	976	.86	11	.08	Over Barrier Pillar
4.	S-4	8466.82	7520	947	2.66	11	.24	Good
5.	S-5	8524.14	7540	984	5.26	11	.48	Good
6.	S-6	8503.78	7560	944	.44	11	.04	Over 2 East Main Pillars
7.	S-7	8329.80	7390	940	1.18	11	.11	Over First Mined Area
8.	S-8	8354.92	7435	920	1.12	11	.10	Good
9.	S-9	8358.17	7436	922	1.43	11	.13	Good
10.	S-10	8362.30	7443	919	.09	11	.01	Over 1 West Main Pillars
11.	S-11	8372.66	7450	923	.18	11	.02	Over 1 West Main Pillars
12.	S-12	8361.43	7477	884	1.88 (?)	11	.17	Moderate, Few Large Stumps
13.	S-13	8355.18	7450	905	4.12	11	.37	Good
14.	S-14	8337.65	7430	908	3.93	11	.36	Good
15.	S-15	8323.19	7415	908	.19	11	.02	Over Barrier Pillars
16.	S-16	8305.10	7429	876	.91	11	.08	Over First Mined Area
17.	S-17	8331.73	7442	890	.13	11	.01	Over First Mined Area

	<u>Subsidence Station</u>	<u>Surface Elevation</u>	<u>Mine Elevation</u>	<u>Overburden Depth</u>	<u>Total Subsidence (Smax)</u>	<u>Mining Height (t)</u>	<u>Smax</u> <u>t</u>	<u>Recovery</u>
18.	S-18	Vandalized						Over Barrier Pillars
19.	S-19	8381.25	7490	891 (ft)	0 (ft)	11 (ft)		Over Barrier Pillars
20.	S-20	8440.11	7408	1032	.55	11	.05	Over 1 West Main Pillars
21.	S-21	8504.55	7381	1124	0	11		Good, but Near Barrier Pillars
22.	S-22	8429.25	7409	1020	.78	11	.07	Over Barrier Pillar
23.	S-23	8417.17	7366	1051	1.37	11	.12	Good, but Near Chain Pillars
24.	S-24	8406.44	7377	1029	2.48	11		Over Chain Pillars
25.	S-25	8614.21			-			Over Barrier Pillars
26.	S-26	8557.43	7386	1171	0	11		Over Large Panel Pillars
27.	S-27	8567.50	7570	998	-			Over 2 East Main Pillars
28.	S-28	8497.13	7545	952	4.38	11	.40	Good
29.	S-29	8497.88	7540	958	3.47	11	.32	Good
30.	S-30	8737.27			-			No Mining This Area
31.	S-31	8379.02	7425	954	1.07	11	.10	Over First Mined Area
32.	S-32	8435.81	7409	1027	2.08	11	.19	Good
33.	S-33	8484.02	7377	1107	1.78	11	.16	Good
34.	S-34	8396.63	7412	985	1.04	11		Moderate, Large Stumps
35.	S-35	8479.15	7363	1116	-	11		Over Barrier Pillar

	<u>Subsidence Station</u>	<u>Surface Elevation</u>	<u>Mine Elevation</u>	<u>Overburden Depth</u>	<u>Total Subsidence (Smax)</u>	<u>Mining Height (t)</u>	<u>Smax t</u>	<u>Recovery</u>
36.	S-36	8452.77	7389	1064 (ft)	.79 (ft)	11 (ft)	.07	Over Panel Pillars
37.	S-37	8402.08	7408	994	.38	11	.03	Poor, Large Stumps & Pillars
38.	4L38	8552.91	7556	997	-	11		Good, but Close to Large Pillar
39.	4L39	8556.45	7564	992	-	11		Good
40.	4L40	8709.09	7558	1151	0	11		Good, but Close to Barrier.
41.	4L41	8674.32	7557	1117	.20	11	.02	Good
42.	4L42	8642.37	7560	1082	1.62	11	.15	Good
43.	4L43	8600.70	7560	1041	1.67	11	.15	Good
44.	4L44	8562.14	7567	995	1.70	11	.15	Good
45.	4L45	8540.47	7571	969	1.75	11	.16	Good
46.	4L46	8535.36	7572	963	1.92	11	.17	Good
47.	4L47	8527.83	7573	955	2.02	11	.18	Good
48.	4L48	8516.05	7579	937	1.61	11	.15	Good
49.	4L49	8503.90	7581	923	-	11		Good, but Close to Barriers
50.	4L50	8500.68	7582	919	-	11		Good, but Close to Barriers
51.	4L51	8564.45	7580	984	-	11		Good, but Close to Barriers
52.	1R1W-1	8472.59	7415	1058	.05	10		Over Barrier Pillar
53.	1R1W-3	8426.33	7427	999	.42	10	.04	Good
54.	1R1W-5	8400.93	7432	969	1.68	10	.17	Good
55.	1R1W-7	8383.04	7435	948	2.16	10	.22	Good
56.	2R1W-1	8413.19	7440	973	.54	10	.05	Good
57.	2R1W-2	8391.84	7444	948	.29	10	.03	Good
58.	2R1W-3	8373.93			-			

	<u>Subsidence Station</u>	<u>Surface Elevation</u>	<u>Mine Elevation</u>	<u>Overburden Depth</u>	<u>Total Subsidence (Smax)</u>	<u>Mining Height (t)</u>	<u>$\frac{Smax}{t}$</u>	<u>Recovery</u>
59.	2R1W-4	8362.35			-			
60.	2R1W-5	8391.04			-			
61.	3R1W-1	8390.84			-			
62.	3R1W-2	8387.15			-			
63.	3R1W-3	8372.00			-			
64.	3R1W-4	8393.38			-			
65.	3R1W-5	8421.94			-			
66.	1L2W2-1	8601.87			-			
67.	1L2W2-2	8538.53			-			
68.	1L2W2-3	8492.97			-			
69.	1L2W1-1	8898.19			-			
70.	1L2W1-2	8837.46			-			
71.	1L2W1-3	9180.06			-			
72.	1L2W1-4	8663.79			-			
73.	1L2W1-5	8611.82			-			
74.	1L4E-1	8339.76			-			
75.	1L4E-2	8338.92			-			
76.	1L4E-3	8030.28			-			
77.	1L4E-4	7652.03			-			
78.	1L4E-5	7853.28			-			
79.	1L4E-6	7663.47			-			
80.	2L4E-2	Proposed			-			
81.	2L4E-3	Proposed			-			
82.	2L4E-4	8367.90			-			
83.	2L4E-5	Proposed			-			
84.	2L4E-6	8371.72			-			
85.	1L1	8190.37	7495	695 (ft)	3.82	11 (ft)	.35	Over Panel Pillars

	<u>Subsidence Station</u>	<u>Surface Elevation</u>	<u>Mine Elevation</u>	<u>Overburden Depth</u>	<u>Total Subsidence (Smax)</u>	<u>Mining Height (t)</u>	<u>Smax t</u>	<u>Recovery</u>
86.	1L2	8214.80	7502	713 (ft)	8.09 (ft)	11 (ft)	.74	Good
87.	1L3	8272.40	7507	765	8.25	11	.75	Good
88.	1L4	8410.41	7512	898	6.76	11	.61	Good
89.	2L1	8380.44	7480	900	0	11		Over Barrier Pillar
90.	2L2	8383.72	7485	899	0.29	11		Over Panel Pillars
91.	2L3	8390.60	7490	901	2.21	11		Moderate, Few Scattered Pill
92.	2L4	8394.42	7495	899	4.28	11		Moderate, Few Scattered Pillars
93.	2L5	8392.12	7500	892	0.60	11		Over Barrier Pillar