Work Copy

ACT/007/011

SURFACE HYDROLOGY AND CULVERT ADEQUACY OF THE HIAWATHA AND MOHRLAND, UTAH AREAS

Prepared for

UNITED STATES FUEL COMPANY

By

VAUGHN HANSEN ASSOCIATES

August 1978

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

Surface Hydrology and Culvert Adequacy of the Hiawatha and Mohrland, Utah Areas

INTRODUCTION

In an effort to better define surface runoff characteristics and problems near Hiawatha, Utah, United States Fuel Company requested that Vaughn Hansen Associates complete a hydrologic study composed of two phases:

1. Analyze drainage areas above and including surface mine-related facilities for runoff potential related to specific projected storms, as required by federal surface mining reclamation requirements. Specify runoff volumes and structure sizes necessary to contain this runoff.

2. Determine the capacity and adequacy of existing drainage structures. Recommend changes or additions where necessary.

This report presents the results of this study.

METHODS

Six surface facilities and their respective watersheds and drainage structures were studied for runoff potential (see Figure 1). Four of these (the Hiawatha yard and slurry ponds, the upper coal storage yard, the middle fork yard, and the lower Mohrland yard) are actively in use. The remaining two facilities (the south fork yard and the upper Mohrland yard) receive only limited use at the present time.

Surface runoff potential was assessed using curve number technology, as derived by the Soil Conservation Service (1972). According to this method, runoff volume is calculated by the equation

$$Q = \frac{(P - 0.2S)^2}{P + 0.8S} \qquad (1)$$

where Q = runoff volume, in inches; P = precipitation depth, in inches; and S is a watershed storage factor, in inches, defined as the maximum possible difference between P and Q. The value of S is derived according to the expression

$$CN = \frac{1000}{10 + S} \qquad (2)$$

or

$$S = \frac{1000}{CN} - 10 \qquad (3)$$

where CN is the curve number, or the hydrologic soil-complex number. Curve number values were chosen using information

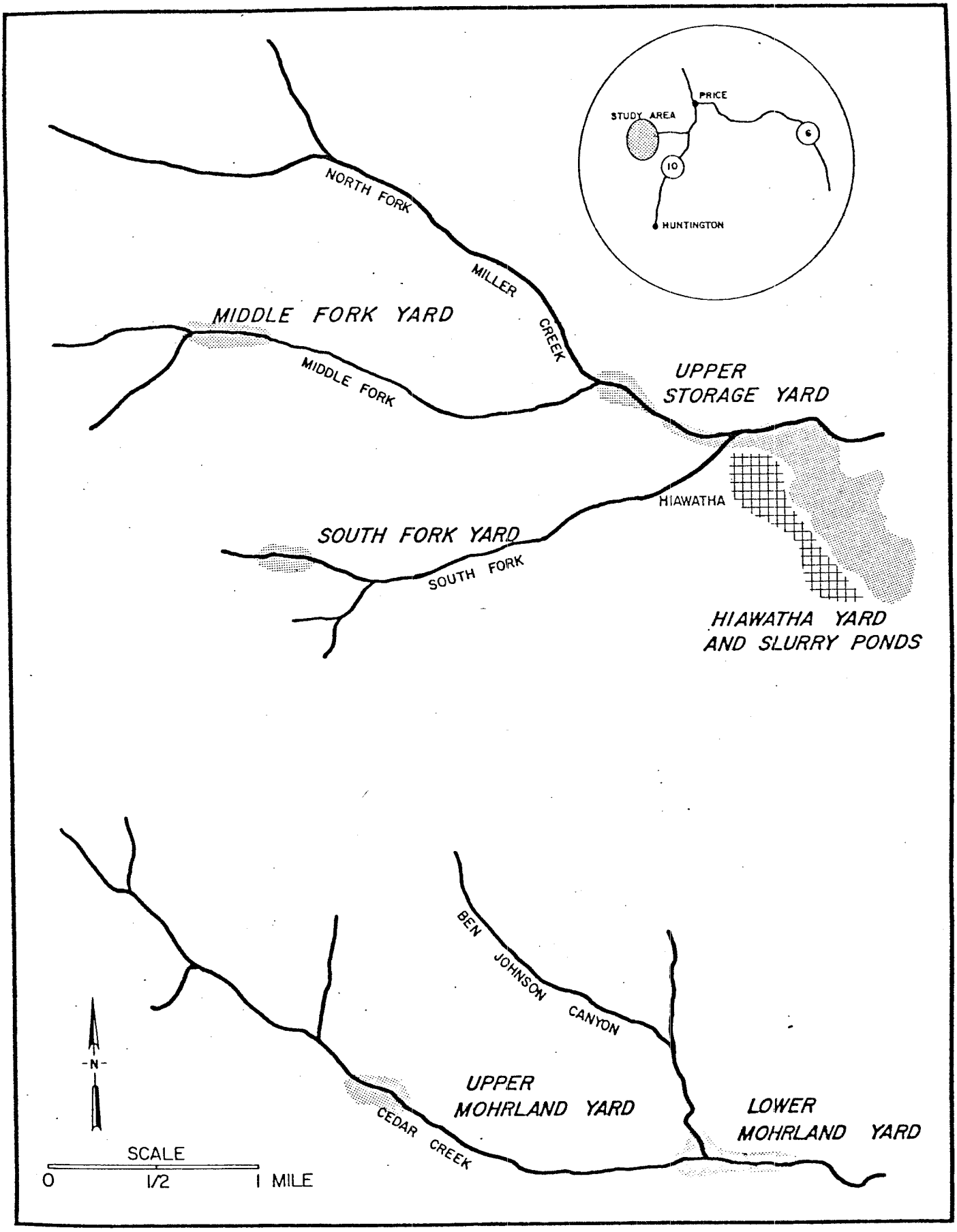


Figure 1. U.S. Fuel Company facilities studied.

supplied by the Soil Conservation Service (1972), Hawkins (1973), Burton et al. (1976), and personal hydrologic judgement following field observations. Values for P were obtained for various durations and return periods (the average number of years separating events of equal magnitude) from Richardson (1971, see Table 1). These were assumed to be representative for the entire area studied.

Table 1. Estimated precipitation depths for various return periods and durations at Hiawatha, Utah (from Richardson (1971).

RETURN PERIOD (years)	DURATION									
	5 Min	10 Min	15 Min	30 Min	1 Hr	2 Hr	3 Hr	6 Hr	12 Hr	24 Hr
1	.03	.04	.05	.07	.09	.24	.39	.76	1.09	1.43
2	.07	.10	.13	.18	.23	.40	.55	.95	1.30	1.67
5	.13	.20	.25	.35	.44	.62	.79	1.22	1.60	2.00
10	.16	.25	.31	.43	.55	.75	.93	1.40	1.82	2.25
25	.23	.35	.44	.62	.78	.99	1.19	1.69	2.14	2.60
50	.26	.40	.50	.70	.88	1.11	1.33	1.89	2.38	2.90
100	.31	.48	.60	.84	1.06	1.30	1.54	2.12	2.64	3.18

Estimates of the peak discharge to be expected from various precipitation events were made by a method also developed by the Soil Conservation Service, as reported by Kent (1973). According to this method

$$q = \frac{484\ A\ Q}{T_p} \tag{4}$$

where q is the peak discharge, in cubic feet per second; A is the drainage area, in square miles; Q is the runoff volume, in inches (as determined by equation 1); T_p is the time elapsed from the beginning of runoff to the hydrograph peak, in hours; and 484 is a factor which converts square mile-inches to cubic feet and hours to seconds. T_p is assumed to be a function of the watershed lag, as expressed by the equation

$$T_p = 1.17L \tag{5}$$

where

$$L = \frac{(\ell^{0.8})\ (S + 1)^{0.7}}{1900\ Y^{0.5}} \tag{6}$$

where L is the watershed lag, in hours; ℓ is the hydraulic length, or the length of the mainstream to the farthest divide, in feet; S is as previously defined; and Y is the average watershed slope, in percent. In some cases, peak discharges were adjusted in consideration of upstream discharge values. Because equation 4 tends to overpredict, no factor of safety should be necessary to adjust the peak flow values presented herein.

Existing culvert capacities were determined using the Manning formula, which states that

$$V = \frac{1.486}{n} R^{0.67} S^{0.5} \qquad (7)$$

where V is the velocity, in feet per second; n is the coefficient of roughness; R is the hydraulic radius, in feet; and S is the hydraulic slope, in feet per foot. Discharge capacities, in cubic feet per second, were obtained by multiplying the velocity obtained from equation 7 by the area of the culvert opening, in square feet. Values for the roughness coefficient were obtained from standard tables. Entrance losses to culverts were also considered in determining capacities.

Precipitation depths for each return period considered for durations of two hours and three hours were used to calculate runoff volumes and peaks of the same return period for drainage areas less than or greater than 1000 acres, respectively. Thus, the 10-year runoff peak and volume from a watershed with an area of 596 acres were determined from the 10-year, 2-hour precipitation depth (0.75 inch) while the 10-year runoff characteristics from a 1200 acre watershed were determined from the 10-year, 3-hour precipitation event (0.93 inch).

SURFACE RUNOFF FROM DISTURBED AREAS

Federal regulations (specifically the surface mining reclamation and enforcement provisions administered by the Office of Surface Mining Reclamation and Enforcement) require that all surface drainage leaving a permit area pass through a sedimentation pond or series of ponds. Ponds are to be constructed to provide active storage for the 10-year, 24-hour precipitation event plus an additional dead (sediment) storage space equal to 0.2 acre-foot for each acre of disturbed land upstream. Ponds should provide at least a 24-hour detention time and have a surface area equal to one square foot for each 50 gallons per day of inflow. Spillway systems are also to be provided on each pond which will safely pass the peak runoff resulting from a precipitation event with a 25-year recurrence interval. The 25-year, 2-hour precipitation event was assumed to provide the peak flow from a 25-year event for this study. Special design criteria have been given if the sedimentation pond has an embankment that is more than 20 feet in height or has a storage volume greater than or equal to 20 acre-feet. These include a spillway or series of spillways which will safely pass the peak discharge resulting from the 100-year, 6-hour precipitation event.

All ponds are to be cleaned of sediment when 80 percent of the sediment storage has filled. In addition, various effluent

restrictions have been placed on water which is discharged from the ponds and/or the permit area.

In the interest of brevity, all hydrologic data pertaining to proposed U.S. Fuel Company sedimentation ponds are contained in Appendix A. Information dealing with volume, surface area, and spillway requirements for the ponds is located in Table 4 found in the summary section of this report.

Hiawatha Yard and Slurry Ponds

Surface drainage patterns associated with the Hiawatha yard and slurry ponds can be found on Figure 2 (back of report). In general, water on the railroad tracks below the upper coal storage yard and the majority of the town drains into the yard. This flow continues along the tracks, through culverts No. 9, 10, and 11 and into the channel carrying the water tank overflow. Some water from the upper yard currently enters the water tank overflow channel above culvert No. 4. Water originating in the refuse pile also enters the water tank overflow channel, in this case between culverts No. 3 and 4. Water from the lower part of town flows into the channel east of the water tank overflow, above culvert No. 2, and into slurry pond No. 5.

Water originating in the lower yard flows either towards the railroad tracks or slurry pond No. 5. Because the tracks are

in the low part of the yard, water tends to stand in that area. What does continue down the tracks flows towards slurry pond No. 5. Runoff generated within the slurry ponds remains in the pond, with the exception of pond No. 2. A break in the embankment of this pond causes water originating here to flow into slurry pond No. 3 and remain.

Because runoff originating below culverts No. 9 and 10 eventually flows towards and remains in either slurry pond No. 5 or the railroad tracks, no sedimentation ponds will be necessary to control this water. However, much can be done to limit the amount of sediment which originates in the upper yard and the western portion of town and reaches the water tank overflow channel, which currently receives most of the water-borne sediment from the yard. Four spots in particular will require some attention. First, a leaky tap soutwest of the preparation plant intermittently delivers water to the channel between culverts No. 4 and 5. A small gully has been cut through the coal refuse, contributing coal and other sediment to the water tank overflow channel. This tap should be fixed and the gully plugged and filled with soil. A small embankment should also be built up along both sides of the overflow channel between culverts No. 4 and 7 to hold and/or divert the small amount of water reaching this section. This embankment should be built with soil instead of coal refuse to provide greater stability. An alternative to the embankment would be to place a small

retaining wall along each side of the channel composed of railroad ties, straw bales, rocks or a combination of these. This would have the advantage of protecting the channel from minor mechanical disturbances which also occur along the section as well as protecting the channel from inflow. In either case, coal refuse should be cleaned from the channel banks between culverts No. 4 and 7 to protect channel flow from picking up excess sediment.

As a second concern, slurry discharging from the preparation plant occasionally clogs the pipe which carries this discharge to slurry pond No. 4. When this happens, the slurry mixture overflows through a hole in the cement retaining wall surrounding the pipe opening and flows into the water tank overflow channel immediately above culvert No. 4. Two possibilities exist for correcting this situation. One option would be to install an overflow pipe from some point in the retaining wall below the current hole to the slurry pond pipe downstream from the section which clogs. The second option would be to insure that the water which does overflow is dumped into the system which will carry runoff from the upper yard to the sedimentation pond for the yard. This would require a metal or cement chute to direct the water out of the channel which currently carries the excess slurry towards the water tank overflow channel.

The third area of concern is along the south side of the rail-

road spur, east of the preparation plant and west of culvert No. 4 where water from the yard has gullied down the bank to the water tank overflow channel, entering immediately above culvert No. 4. This break should be plugged and the entire embankment built up with soil. Using soil instead of coal refuse will allow a more stable bank to be built. This will direct the flow down the tracks to be collected in a sedimentation pond further down the system. If possible, the small channel which has been cut from the preparation plant to the water tank overflow channel should also be filled with soil and revegetated. This vegetation would help to trap sediment carried by water which does escape and flow into the water tank overflow channel above culvert No. 4.

As an alternative to the first three problem areas discussed, the entire overflow channel section between culverts No. 4 and 7 could be enclosed in a culvert. Any water reaching this section would then pond on top of the culvert and be controlled.

The fourth problem area in the yard is found along the open channel between culverts No. 3 and 4. Runoff currently enters this stretch from the refuse pile as well as the upper yard (through culvert No. 11). The stretch also receives material which is pushed in from the adjacent road as a result of grading and travel. Because this section of channel receives most of the sediment from the yard, three courses of action are suggested.

First, it is suggested that the entire section be enclosed in a 48-inch culvert (the same size as culverts No. 3 and 4). This would alleviate the problems associated with dumping and grading material into the channel, which appears to contribute a major portion of the sediment leaving the permit area.

The second suggested course of action is to plug the gully in the embankment separating the water tank overflow channel from the refuse pile. This would create a sedimentation pond to control water originating in the refuse pile.

Finally, it is suggested that runoff from the upper yard which reaches the overflow channel through culvert No. 11 be contained in a sedimentation pond in the area above culvert No. 11 and/or overlying the culvert which will extend from culvert No. 3 to culvert No. 4. The use of both sites for ponds may be necessary to meet the requirements for pond surface area and volume (see Table 4 in the summary section of this report).

In order to insure that water from the yard flows where it should, ditches and culverts along the flow path should be periodically inspected for damage and cleaned of sediment. The removal of sediment is especially necessary because of the relatively flat slopes along most of the flow path which increase sediment deposition.

The edges of each existing slurry pond were studied to determine their impact on the local aquatic environment. The middle and lower banks of slurry pond No. 1, along Miller Creek, are covered with thick vegetative growth which appears to retain any sediment which is generated on the slope. In view of the fact that little (if any) sediment is contributed to Miller Creek by the embankment and that this pond is currently being reclaimed, with plans for the immediate future including leveling the steep embankment, covering the area with soil, and revegetating the pond site, no action is considered necessary to control runoff from the embankment of slurry pond No. 1. However, a small, old coal refuse pile exists on the north side of Miller Creek, about halfway between culvert No. 15 and the confluence with the south fork of Miller Creek, which is contributing sediment to the creek. If possible, it is suggested that this refuse pile be removed. An alternative measure would be to place several small rock and earth check dams upstream from the refuse pile, thus forcing the water out of the channel and onto the land. However, removal of the pile is suggested, if possible.

Runoff from the northeastern edge and most of the old pond area of slurry pond No. 2 enters directly into slurry pond No. 3 and is contained there, requiring no additional control. Water which runs off of the northwestern edge of slurry pond No. 2

enters a ditch which carries the water towards slurry pond No. 3. This ditch is in need of some minor repair where the bank has broken, allowing water to flow into the water tank overflow channel. Also, an old road has been bulldozed across the lower end of this ditch, blocking the flow of water into slurry pond No. 3. The ditch should be reopened at this lower end. Again, periodic checks should be made of the ditch to see if repairs or sediment removal are necessary.

The northern edge of slurry pond No. 3 has a good cover of pinyon, juniper, brush, and grasses. This vegetative cover is fairly effective in controlling sediment yields from the pond embankment, which slopes down to the water tank overflow channel. There is one location in particular, however, where a band about 20 feet wide slopes down to the overflow channel with no vegetative protection, thus providing no area for the deposition of sediment travelling along the bank. Because the bank is steep and composed of loose material, the use of heavy equipment to provide ditches or other structural measures along the embankment for sediment control are not possible. An examination of the channel bottom of the water tank overflow channel indicated that most of the sediment in the channel originates in and above the yard at the locations previously discussed (between culverts No. 3 and 5). The vegetative cover along the embankments of ponds 1 and 3 has shown that the key to sediment control on steep, friable slopes is breaking the length of the flow path, thus causing the flowing water to lose its energy and

drop its sediment load. It is, therefore, recommended that runoff flowing through this section be controlled by placing an obstruction (logs, straw bales, rock piles, etc) perpendicular to the flow path approximately every 25 or 30 feet. If possible, a layer of soil should also be placed in the section and a vegetative cover established through planting. This would not only stabilize the bank but would also reduce runoff rates, thus reducing sediment yields (see Burton et al., 1976).

Runoff from the east edge of both slurry pond No. 3 and No. 4 currently enters a gully and flows to the east across the land. Water flowing from the northeast corner of slurry pond No. 3 flows through a gully down to the water tank overflow channel. It is recommended that a sedimentation pond be built east of slurry pond No. 3 to control all of this runoff (see Figure 2). The area below the northeastern corner of pond No. 3, which currently contributes to the gully leading to the overflow channel, will need to be filled to create a slope towards the proposed sedimentation pond. Two ditches, one from the north and one from the south, will be required to carry the runoff to the sedimentation pond. These ditches and the pond should be placed in such a manner to control all runoff coming from the disturbed area.

Because the banks of both slurry pond No. 2 and No. 3 are so close to the water tank overflow channel, controlling runoff

therefrom will remain difficult regardless of the action taken. Therefore, in addition to the measures already discussed, it is suggested that both slurry ponds be reclaimed as soon as it is feasible. This will provide a wider buffer zone between disturbed areas and the overflow channel. Properly revegetating this buffer zone will provide an efficient filter system for any sediment which is carried towards the stream channel.

Runoff from all edges of slurry pond No. 5 tends to flow generally towards the east, although no well defined gullies were noticed in the field. Two small sedimentation ponds will be required to control this diffuse runoff, since a small ridge runs eastward from the pond just north of the southeast corner. Water will be delivered to both ponds by ditches. One ditch currently exists below the north edge of the pond. This should be extended around the east side of the slurry pond where the water will flow southward to the sedimentation pond. Water in the other ditch will flow northward to the sedimentation pond. This northern sedimentation pond should probably be located in the sagebrush rather than the pinyon-juniper stand, due to its easier construction and access.

An additional sedimentation pond will also be required below the southeast corner of slurry pond No. 5 to contain the sediment originating along the southern and southwestern edges of

the pond. Ditches would again direct the flow toward the pond.

Ditches for both the north and south pond should be built below the downslope edge of the small dirt road which follows along the bottom of slurry pond No. 5. This will allow runoff generated on the road to also be controlled.

Although slurry pond No. 5 does not appear to pose a serious pollution problem to the surrounding aquatic environment, it does contribute a substantial amount of dust to the air during wind storms (Burton, 1976). Reclaiming this pond, when feasible, should lessen air quality problems in the area.

Upper Coal Storage Yard

Runoff from a small area above the upper coal storage yard and northeast of the main haul road drains into the storage yard (see Figure 3, back of report). This water, plus that which is generated within the yard, then generally follows the railroad tracks. Water which reaches the area between the tracks in the middle of the yard tends to stand, as is the case in the Hiawatha yard, because of its lower elevation. Water flowing along the south side of the southern track flows either outside of the track or cuts beneath the track between ties to the central section. That which remains on the outside of the track flows through culvert No. 23 and down towards Miller

Creek. The runoff which flows inside of the northern-most track currently flows over the culvert and down into the Hiawatha yard.

Several steps can be taken to control the runoff crossing the upper coal storage yard. First, a ditch should be dug along the south side of the yard to force the water towards culvert No. 23. This would alleviate any problems created by water undercutting the tracks and insure that water is delivered to a point where it can be controlled.

Second, in order to control the flow which currently flows over culvert No. 23 towards the Hiawatha yard, a grate or similar structure should be placed in the top of the culvert to catch the water flowing between the tracks. The device should be installed in such a manner that water flowing down the tracks is adequately directed into the culvert.

The final step involved in controlling runoff from the yard will be to build a sedimentation pond of suitable size (see Table 4 in the summary section). Two possible locations were noted in the field, both of which can be found on Figure 3. Culvert No. 23 will need to be either extended or a ditch will need to be dug to direct the water towards the desired pond location.

The northeast bank of the storage yard is covered with thick vegetative growth. An examination of Miller Creek along this section indicated that the vegetation is very effective in controlling sediment yields. Therefore, no additional control measures appear to be necessary along this section.

Water which flows through the culverts shown along the haul road in Figure 3 drains areas above the haul roads and does not affect the upper coal storage yard. These culverts will be discussed in another section of this report dealing with culvert adequacy.

Middle Fork Yard

The middle fork yard currently receives runoff from the hillslope to the south as well as the drainage basins to the west (see Figure 4, back of report). Water which currently enters culvert No. 24 flows across about 150 feet of yard area before entering culvert No. 25. Water originating in the southwest drainage basin must flow across approximately 200 feet of yard area before entering culvert No. 25. Both channels above and below the confluence are filled with debris and other material, forcing the water onto the yard. This water combines with additional runoff originating in the upper yard and on the southern hillslope and flows eastward towards the tipple. The water then seeps into the coal pile and surrounding riprap and was not observed to surface anywhere in the area.

Runoff originating in the lower half of the yard and adjacent hillslope to the south flows across the yard and enters the middle fork of Miller Creek below the exit of culvert No. 25. Runoff from a section of the southern hillslope also flows across an old coal refuse pile below the exit of culvert No. 25 and into the middle fork.

Although water flowing across the upper portion of the middle fork yard is adequately controlled through seepage around the tipple area, that which flows across the yard prior to reaching culvert No. 25 will pick up undesirable sediment and debris which must be controlled by a sedimentation pond unless other measures are taken. The channel which carries the water bound for culvert No. 25 has been blocked by earth-moving activities forcing the water to overflow its bank before it reaches the culvert (note the branch in the channel shown in Figure 4). Culvert No. 25 should, therefore, be extended along the hillslope to the original channel. Culvert No. 24 should also be extended and joined directly into culvert No. 25. This will not only protect the water from picking up unnecessary amounts of sediment and debris, but will also protect the yard from excessive erosion and mud.

It appears that the best solution to the runoff problem from the lower yard will be to extend culvert No. 25 to the beginning

of the old stone and cement channel section of the middle fork and build the sedimentation pond on top of the extended culvert. This will allow not only the runoff from the lower yard to be controlled but also that which flows across the refuse piles on the hillslope to the south. Runoff from the hillslope below the beginning of the stone and cement channel appears to be adequately controlled by the stone embankment.

Runoff which passes through culverts No. 32 and 33 originates on the hillslopes to the north and does not affect the middle fork yard. These culverts have been installed to protect the haul road and will be discussed in another section of this report.

South Fork Yard

Runoff affecting the south fork yard originates primarily on the hillslope to the north (see Figure 5, back of report). Upon reaching the yard, water flows either directly down an additional slope to the main road or in a westerly direction, following the road around the front of the bath house. Some water presently enters the south fork of Miller Creek above the entrance of culvert No. 26, an additional portion flows towards the old mine portal and then either down the portal or through a grate and into a pipe which leads to culvert No. 26, and the remainder flows either into the south fork below culvert No. 26 or down the main road.

The effectiveness of runoff control measures at the south fork yard will depend upon whether or not the flow can be properly diverted to a single location. It is suggested that a ditch be cut along the north side of the old dirt road east of the shop shown in Figure 5 and above the main road to intercept runoff from the upper hillslope. Placing a small embankment on the south side of this road will control any runoff originating on the road. Both measures will direct the runoff towards the main yard. A ditch and adjacent embankment should also be placed along the south side of the main road from the area near the bath house to the spot where the water will be diverted towards the sedimentation pond. Special attention should be paid to those areas where water currently escapes and flows either down towards the mine portal or into the south fork above and below culvert No. 26. Once the ditch is below the disturbed areas and has caught all of the necessary runoff, the flow should be directed towards the pond, either through a channel or a culvert. Should a channel be used, riprap should be placed along the channel leading from the main road to the sedimentation pond to prevent excessive erosion.

In addition to the above mentioned steps to control runoff, consideration was given to the possibility of diverting the flow originating in the canyon above the bins and the shop through a culvert to the south fork, thus bypassing the yard (a 24-inch corrugated steel culvert should be sufficient). This would reduce the volume of the sedimentation pond required in Table 4

by 2.7 acre-feet and reduce the spillway requirements by 50 percent.

Lower Mohrland Yard

Flow in the lower Mohrland yard originates either in the yard or on the hillslope to the north of the yard and east of Ben Johnson Canyon (see Figure 6, back of report). Water on the yard north of the railroad tracks generally flows eastward towards culvert No. 20. That which flows past culvert No. 20 or originates between the railroad tracks flows into culvert No. 21 and down the hillslope towards Cedar Creek. Water from the hillslope north of the northern-most track remains on the north side of the track and generally ponds. Runoff from the main yard area south of the tracks flows down the sideslope towards Cedar Creek in several places.

Water from the hillslope north of the yard and west of Ben Johnson Canyon currently flows into a ditch which directs the water towards the creek. Although this water does not come into contact with the yard, it does flow across a small yard refuse area before entering the creek. To alleviate this problem, it is suggested that the refuse either be completely removed and the area revegetated, if necessary, or partially removed and the ditch more deeply dug to better control the direction of flow. A small amount of riprap may need to be placed in the ditch if erosion becomes excessive.

To control the runoff flowing across the yard south of the tracks (away from either culvert No. 20 or 21), it is recommended that an embankment be placed along the south side of the yard to a point on the southeast corner of the yard where the water can flow down the sideslope towards the sedimentation pond. This embankment should be composed of soil rather than coal refuse to provide greater stability and give a better appearance. The embankment should extend a short distance down the road around the entrance and exit of culvert No. 17. A small depression between the road and Cedar Creek below culvert No. 17 acts as a catch basin for the water which presently flows from the yard down the road. This depression appeared to be adequate for use as a catchment in the future, alleviating the need for a special sedimentation basin.

Water which currently flows through culvert No. 20 flows naturally towards the pond site and will require no additional diversion. It is suggested that water flowing through culvert No. 21 be diverted to flow down the old dirt road south of the railroad tracks which leads to the pond area. A ditch or open culvert should be placed along the road to control the diverted flow. An embankment should be placed on the southern edge of the old road to keep the runoff from flowing down the sideslope.

Riprap should be placed in each ditch which flows down a steep incline to reduce erosion. The slope below culvert No. 20 is in

special need of this. Because the flow passing through culvert No. 21 will be diverted to a different location, no riprap will be necessary below the culvert to control future erosion. However, patching the existing gully with soil or riprap would create a better appearance.

Upper Mohrland Yard

Two areas of disturbance exist in connection with the upper Mohrland yard: the main yard area and an old tailings pile southeast of the yard (see Figure 7, back of report). Water flowing across the main yard currently originates on the slopes to the northeast. The water flows southeast across the yard, exiting towards Cedar Creek via either an old road below the ruins, diffusely down the sideslope, or through culvert No. 19, which also carries the overflow from a spring originating in an adjacent abandoned mine. Water which passes these points flows down the road.

The road leading up the canyon to the yard crosses the middle of the old refuse pile. The pile slopes downhill directly into Cedar Creek. Water flowing across the pile originates on the slopes above and on the road. Once it crosses the pile, the water flows either down the road or across the road and down the pile to the creek.

Because runoff across more than one area will need to be controlled, three options are presented. The first option is to divert the runoff from the yard to a sedimentation pond on the old road below the ruins and remove or revegetate the refuse pile below the yard. Controlling runoff across the yard will involve a ditch and embankment along the western edge of the yard and down the southwestern edge of the old road below the ruins. The ditch should be lined with small riprap along the old road. This ditch will also collect the runoff flowing through culvert No. 19 and carry the flow to the sedimentation pond (labeled Upper Mohrland Yard - Upper in Table 4). Water from the lower part of the yard should be diverted to the sedimentation pond through a ditch or culvert.

Because culvert No. 19 will carry water towards the sedimentation pond, an additional pipe should be installed to carry the spring overflow to Cedar Creek. This would alleviate the necessity for this overflow water to flow continually through the pond. The reddish color of the rocks below the overflow box indicates that the iron content of the spring overflow water is high. This should be examined to determine the source and magnitude of the problem and the necessity of altering it before the new pipe is installed to carry the water to Cedar Creek.

Because of the steep, loose slopes, it is doubtful that the refuse pile can be feasibly removed. However, Burton et al.

(1976) have shown that revegetating coal tailing piles can reduce runoff and erosion. Obstructions such as old logs, rocks, straw bales, etc. should if necessary be placed perpendicular to the flow path down the refuse pile both above and below the main road, to detain runoff and soil. Soil should then be placed on the slope and planted with a species with roots capable of providing stability.

The second option is to treat the main yard as outlined but provide a second sedimentation pond (Upper Mohrland Yard - Lower; see Table 4) southeast of the tailings pile. This pond would contain runoff not only from the refuse pile but also from the mountain and road between the pile and the yard. A culvert would need to be installed below the pile to divert the water from the road to the pond (a 36-inch culvert would suffice).

The third option is to divert all water from the yard down the road and build one large sedimentation pond below the tailings pile (Upper Mohrland Yard - Combined; see Table 4). This option would require that a portion of the yard be filled in which currently yields water to the old road below the ruins. A ditch and embankment would run the entire length of the road to the culvert below the refuse pile which would divert the water to the pond.

Because of the steep, loose nature of the refuse pile, no mechanical work is possible to divert water from the portion of the pile below the road to the lower pond site. Thus, both the second and third option will require that that portion of the pile be either removed or revegetated. An alternative would be to install a large culvert in the stream or retaining wall at the stream's edge to protect the creek from the sediment yielded by the tailings. Revegetation is suggested as a more permanent alternative, if feasible.

CULVERT ADEQUACY

Table 2 summarizes the capacities of the culverts examined. In assessing the adequacy of the culverts, one must consider the consequences of the possible failure. The table assumes that all culverts are in good condition and free from deposited sediment. If that is not the case, steps should be taken to upgrade the culvert, as will be indicated in subsequent discussions. Hydrologic data and assumptions utilized in developing Table 2 can be found in Appendix B. The return period referred to is defined as the average time separating events of equal magnitude. Thus, a culvert capable of handling the 25-year peak flow can be expected to have its capacity exceeded once every 25 years, on the average. As mentioned previously, equation 4, used in determining peak flows, tends to overpredict. Thus, it can be considered that a factor of safety has been included in the culvert capacity determinations.

Table 3 lists various current and potential problems associated with the culverts. Culverts with sediment problems generally lie on flat slopes or have some type of obstruction either within or downstream from the culvert. Those culverts will require frequent inspection and cleaning of the culvert and channel to insure that they are open. Areas upstream from culverts with debris problems should be cleaned to avoid possible blockage and subsequent overtopping of the culvert. Various other problems are also mentioned in Table 3, including necessary repair, structural modifications, etc.

Table 2. Return periods of flows which can safely be passed by U.S. Fuel Company culverts.

Culvert Description			Return Period, in years					
Number	Diameter or Dimension	Type	2	5	10	25	50	100
1	24"	Corrugated steel	X	X				
2	36"	Corrugated steel	X	X	X	X	X	
3	48"	Steel, corrugated and lined	X	X	X	X	X	X
4	48"	Steel, lined and corrugated	X	X	X	X	X	X
5	24"	Corrugated steel	X	X	X	X	X	
6	21"	Corrugated steel	X	X	X	X	X	
7	24"	Corrugated steel	X	X	X	X	X	
8	13½"	Smooth steel	X	X	X	X		
9	24"	Smooth iron	X	X	X			
10	24"	Corrugated steel, 2 pieces	X	X	X			
11	17"	Smooth iron	X	X				
12	36"	Corrugated steel	X	X	X	X	X	X
13	108"	Corrugated steel and masonry	X	X	X	X	X	X
14	44"	Corrugated steel	X	X	X			
15	14'x16'	Arched masonry	X	X	X	X	X	X
16	6'x4'	Rectangular and arched masonry	X	X	X	X	X	X
17	54"	Corrugated steel	X	X	X	X		
18	14'x13½'	Masonry	X	X	X	X	X	X
19	24"	Corrugated steel	X	X	X	X	X	
20	18"	Corrugated steel	X	X	X	X	X	
21	12"	Smooth iron	X	X	X	X	X	X
22	11½'x12'	Arched masonry	X	X	X	X	X	X
23	29"	Smooth iron	X	X	X	X	X	X
24	24"	Corrugated steel	X	X	X	X	X	X
25	36"	Corrugated steel	X	X	X	X	X	X
26	96"	Corrugated steel	X	X	X	X	X	X
27	36"	Corrugated steel	X	X	X	X	X	X
28	36"	Corrugated steel	X	X	X	X	X	X
29	60"	Corrugated steel	X	X	X	X	X	
30	24"	Corrugated steel	X	X	X	X	X	X
31	24"	Corrugated steel	X	X	X	X	X	X
32	24"	Corrugated steel	X	X	X	X	X	X
33	36"	Corrugated steel	X	X	X	X	X	X
34	48"	Corrugated steel	X	X	X	X	X	X
35	36"	Corrugated steel	X					

Table 3. Current and potential problems associated with U.S. Fuel Company culverts with suggested improvements.

Culvert Number	Problem Requiring Attention			Remarks
	Sediment in Culvert	Upstream Debris	Other	
1	X		X	Straighten entrance
2	X	X	X	Exit covered with tailings. Needs to be extended or protected by retainer
3		X	X	Extend lower end to protect from refuse. Upper end to be connected with culvert No. 4
4		X		Remove tires and other debris
5	X	X	X	Clear brush from outlet
6		X		Remove tires and other debris
7	X		X	Straighten entrance
8		X		Remove debris
9	X		X	Straighten entrance and exit
10	X		X	Straighten entrance of upper culvert. Protect exit of lower culvert with retainer
11		X	X	Place riprap below exit
12	X	X		Protect entrance from debris
13	X	X	X	Clean debris from exit and protect from tailings with retainer. Clear brush and rocks from entrance
14	X	X	X	Crushed. Probably easier to replace than fix
15				In good condition
16		X		Remove rocks and debris if possible
17				In good condition
18	X		X	Log jam in culvert. Stone wall at exit is beginning to crumble. May need attention
19	X		X	Remove cement slab at exit. Improve channel. Divert spring water through another pipe
20		X	X	Straighten entrance. Install cement retaining wall at inlet. Place riprap below outlet
21			X	Extend outlet to old dirt road below track
22				In good condition
23		X	X	Install retaining wall on slope next to inlet. Place grate in culvert between tracks to catch runoff. Place riprap below outlet
24		X	X	Remove natural debris. Extend outlet to culvert No. 25. Cover properly
25			X	Extend entrance to original channel. Extend exit to stone retaining wall. Clean channel below exit. Repair holes in culvert
26			X	Clean channel below outlet
27		X		Remove debris
28			X	Place riprap below outlet
29				In good condition
30			X	Place riprap below outlet
31			X	Place riprap below outlet
32		X	X	Place riprap below outlet. Remove wood blocking inlet
33		X	X	Place riprap below outlet. Install retainer on slope next to inlet
34		X	X	Remove tailings from exit and protect
35	X			Clean out sediment

Culvert locations can be found on Figures 2 through 7, found in the back of the report. The following sections briefly discuss some of the findings outlined in Tables 2 and 3 which may need some clarification.

Hiawatha Yard and Slurry Ponds

Culverts No. 1 through 15 as well as 34 and 35 are associated with the main Hiawatha yard. The exit for culvert No. 2 was never found but the sewage which flows into the entrance of the culvert was seen to seep out immediately upstream from culvert No. 35. Although the sewage could have deteriorated the culvert and seeped out randomly, it was assumed that the sewage was flowing through the culvert and the exit was merely covered at that point by coal tailings. If this is the case, the exit should be extended or protected by a retaining box and wall which will prevent the coal dumpings from plugging the culvert. This retainer could be built of wood or some other cost effective material.

Because culverts No. 1 and 35 both presumably receive the flow from the relatively large drainage area contributing to culvert No. 2, they are capable of passing nothing larger than the 5-year peak flow. If it is considered unacceptable to have water and sediment flowing across the road towards slurry pond No. 5 at least once each two to five years, the culverts should be replaced with 36-or 48-inch culverts to pass the 25- or 50-year peak flows, respectively. In any case, the channel above and below the culverts

should be periodically cleaned of sediment, as should the culverts themselves to provide greater flow capacity. The channel bank across from the outlet of culvert No. 2 should also be built up with soil to handle greater flow depths.

The water tank overflow channel contains much debris which should be removed to prevent the culverts from clogging (culverts No. 3 through 6 and 8). The previous suggestion to connect culvert No. 3 with No. 4 will help to alleviate the problem. The entire section from culvert No. 3 to No. 8 should be frequently checked for debris because of its close proximity to the yard and town. Consideration should possibly be given to enclosing the entire stretch in a culvert, as was discussed in a previous section. A 36-inch culvert would be capable of passing the 100-year peak flow but might create problems in making the connection with culvert No. 4 (a 48-inch culvert).

Tailings from the reclamation of slurry pond No. 1 which are being dumped along the railroad tracks are falling into the channel below culvert No. 3. The exit of this culvert should, therefore, be either extended or protected with a retaining box and wall. An unused corrugated steel culvert section was found laying near the exit of the culvert which might be available for use as an extension.

Culverts No. 9 through 11 receive runoff from the upper yard and will carry water to the sedimentation pond. If the pond is

placed upstream from culvert No. 11, that culvert can probably be left as it is. Increasing the sizes of culverts No. 9 through 11 to a 36-inch diameter would allow the culverts to carry the 25-year peak flow while a 48-inch culvert could pass the 50-year peak flow, assuming that the culverts are kept free of sediment. It is important that the ditch below culvert No. 10 be periodically cleaned of sediment as well as the ditch above culvert No. 9 and the culverts themselves in order to provide a steeper flow slope, slower deposition rates, and greater capacities.

Culvert No. 10 should also be protected with a small retainer to keep road grading debris from clogging the channel. Riprap should be placed below culvert No. 11 to reduce erosion.

The lower half of culvert No. 13 is filling up with sediment, thus restricting the capacity of the structure. This can be remedied by removing the debris below the outlet which has built up (including the sediment in the channel bottom) and either extending the culvert outlet or building a retaining box and wall around the outlet. Because debris falls from the railroad tracks above, a small retaining wall may be necessary along the tracks.

Culvert No. 14 has been crushed to the point that only about half of its original capacity is now useful. If the road crossing the culvert is no longer in use, it is suggested that the

culvert and road be removed. If the road is still useful, a larger culvert could be installed to handle greater peak flow rates, if desired. A 84-inch culvert will handle the 50-year peak flow while a 108-inch culvert will handle the 100-year peak flow. If a new culvert is installed, the depth of fill over the culvert should be equal to at least half of the diameter of the culvert.

The exit for culvert No. 34 was also not found. Fresh debris had recently been dumped on the slope above the supposed outlet location. This debris should be removed and the outlet protected by a retaining box and wall to avoid future blockage.

Upper Coal Storage Yard

Both culverts associated with the upper coal storage yard (No. 22 and 23) appear to be capable of handling the expected 100-year peak flow. However, the inlet of culvert No. 23 should be protected by a retaining wall placed against the adjacent slope to keep rocks and other natural debris from blocking the culvert. Riprap should also be placed below the outlet to reduce erosion. As discussed previously, this culvert will also need to be modified with a grate or other structure to allow water flowing down the tracks to enter the culvert.

The remaining culverts shown on Figure 3 (No. 27 through 31) have been installed to protect the middle fork haul road. All

culverts except No. 29 are capable of safely passing the 100-year peak discharge. Culvert No. 29 was determined capable of handling the 50-year peak flow. Because this particular culvert has been adequately fortified with a cement abutment at the entrance and riprap at the exit, no additional structural reinforcement is considered necessary. If the culvert is overtopped, the flow will merely continue down the stream. Although it may create a temporary inconvenience, no major damage is expected.

Culverts No. 28, 30, and 31 all need riprap placed below the outlet to reduce erosion. A good source of riprap is often available immediately adjacent to the culvert.

Middle Fork Yard

Both culverts in the middle fork yard (No. 24 and 25) will require extensions, as previously discussed, to better protect the yard and reduce sediment yields. Both culverts are currently capable of safely handling the 100-year peak discharge and will, therefore, not need to be entirely replaced. The inlet of culvert No. 25 should be extended to the original channel, at the current tree line. This will make it possible to easily contain the runoff within the culvert. The culvert can be placed close to the bottom of the slope south of the fan, thus conserving valuable space. The new inlet should be provided with some type of headwall or mitered metal attachment to reduce entrance losses into the culvert.

Another alternative to extending the inlet of the culvert to the original channel would be to modify the original channel so that it extends down the slope southwest of the fan and then extend the culvert only to the bottom of the slope. Riprap would need to be placed along the new channel section down the slope. The disadvantage of this is that, regardless of the amount of riprap placed in the new section, erosion rates will be increased by the steep slope. Maintenance will also be higher to keep the new section in good shape. It is, therefore, suggested that the original recommendation be taken and the inlet be extended up the slope to the original channel.

The outlet of culvert No. 25 should also be extended to provide space for a storage pond and protect the middle fork channel from sediment yielded by the refuse piles on the adjacent slopes. This addition should extend to the beginning of the retaining wall lining the middle fork. The sediment and other debris should be cleaned from the channel below the outlet to reduce the amount of deposition which might otherwise clog the culvert.

Two holes were also noticed in culvert No. 25. Those should be repaired to keep large quantities of soil from entering the culvert.

The outlet of culvert No. 24 should be extended and joined with culvert No. 25. Because the extension will be placed beneath a

road within the yard, it should be covered by a depth of soil equal to at least one half of the culvert diameter (a soil depth of 12 inches).

Culverts No. 32 and 33, which protect the haul road, appear to be capable of handling the 100-year peak discharge. Riprap should be placed below the outlets to protect the road banks from erosion. The inlet to culvert No. 32 should be cleared and a retaining wall should be placed against the slope opposite the inlet of culvert No. 33 to hold back the debris from the dirt road above.

South Fork Yard

Culvert No. 26 is capable of safely passing the peak flow to be expected once each 100 years, on the average. The debris in the channel and on the banks below the outlet, however, could cause sediment deposition problems if the debris is trapped in the channel during a storm. It is also an eyesore. The refuse should, therefore, be removed.

Lower Mohrland Yard

Culvert No. 16 is a double culvert, the eastern half of which has been completely clogged with debris. The remaining open section, however, is capable of passing the expected 100-year peak flow, which does not necessitate that the plugged section be opened. However, some large rocks and debris are now resting

a few feet from the culvert inlet and should be removed, if possible, to avoid blockage in the future.

Although culvert No. 17 is likely to be overtopped approximately once each 25 years, the culvert size is considered adequate. Should the capacity of the culvert be exceeded, the flow will merely continue down Cedar Creek with only the road being temporarily affected. Occasionally patching the road will probably be easier than replacing the culvert. If this risk is not acceptable, however, a 72-inch culvert would be required to pass the 50-year peak flow and a 96-inch culvert would be necessary to safely handle the 100-year peak flow.

Culverts No. 20 and 21 have been discussed briefly in a preceeding section. Both are considered adequate for handling expected flows. However, the inlet to culvert No. 20 has been crushed by heavy equipment and should be straightened and protected by a clearly visible cement retaining box or wall. Riprap should also be placed below the outlet. As discussed previously, the outlet of culvert No. 21 should be extended to the old road leading towards the proposed sedimentation pond.

Upper Mohrland Yard

Culverts No. 18 and 19 are both adequate for runoff control purposes. Culvert No. 18, however, is beginning to crumble and should be inspected occasionally to see if repair is necessary.

Several logs have jammed sideways in the culvert, causing sediment to be deposited. This does not appear to be creating any problems at the present but should be periodically checked to insure that the culvert is not extensively clogged.

Debris should be removed from the outlet of culvert No. 19 and the sediment removed to create a more defined channel to the proposed sedimentation pond. Water from the spring overflow box should be diverted to the creek through another pipe to avoid the necessity of this water always passing through the sedimentation pond, as previously discussed.

The outlet of an unnumbered 24-inch corrugated steel culvert was found above the inlet to culvert No. 18, but the inlet was not found. This supposedly carries runoff from the canyon northwest of the yard and the road to Cedar Creek. This culvert should be cleaned of sediment and protected, if necessary, from future clogging with a grate or similar structure in front of the inlet. Care should be taken to insure that water from the small canyon and main road is adequately channeled into the culvert.

SUMMARY

Surface Runoff from Disturbed Areas

Table 4 presents the results of the analyses to determine the size of the sedimentation ponds necessary to contain the runoff expected from the previously discussed storms. As indicated previously, because equation 4 tends to overestimate the peak flow resulting from a given runoff volume, no additional factor of safety should be necessary in designing spillways, unless one is desired.

Four general comments should be made concerning surface runoff control as a summary to what has been presented in more detail in previous sections. First, an adequate surface runoff control program is based upon insuring that the runoff is properly channeled and carried to the sedimentation pond. What is now diffuse runoff must be collected and delivered to a specific location through ditches, embankments, etc.

The second point to be made is that the ditches carrying the water to the sedimentation ponds must be designed in such a manner to avoid excessive erosion. This may require nothing on gentle slopes but will necessitate the use of riprap, open culverts, or some other means on steep slopes.

The third suggestion is that the sedimentation ponds be designed for total containment, if possible, allowing the ponded water

Table 4. Hydrologic data pertinent to sedimentation pond design.

Site Description	Storage Information						Spillway Information	
	Inflow		Upstream Disturbed area (acres)	Sediment Storage (AF)	Total Storage (AF)	Pond Surface Area (acres)	25-yr, 2-hr Event (cfs)	100-yr, 6 hr Event (cfs)
	AF	gpd						
Hiawatha Main Yard	7.64	2,489,840	30	6.00	13.64	1.14	66	253
Slurry Ponds No. 3 and 4	0.91	295,220	8.3	1.66	2.57	0.14	25	94
Slurry Pond No. 5 - South	0.74	241,870	6.8	1.36	2.10	0.11	27	103
Slurry Pond No. 5 - North	1.32	430,390	12.1	2.42	3.74	0.20	24	91
Hiawatha Refuse Pile	0.48	156,500	4.4	0.88	1.36	0.07	17	66
Upper Coal Storage Yard	1.53	497,970	6.0	1.20	2.73	0.23	37	141
Middle Fork Yard	1.38	450,010	4.8	0.96	2.34	0.21	20	158
South Fork Yard	5.46	1,780,480	7.6	1.52	6.98	0.82	46	365
Lower Mohrland Yard	0.92	300,020	6.9	1.38	2.30	0.14	28	126
Upper Mohrland Yard-Upper	0.44	144,100	1.4	0.28	0.72	0.07	17	90
Upper Mohrland Yard-Lower	3.60	1,173,940	0.8	0.16	3.76	0.54	33	263
Upper Mohrland Yard-Combined	4.43	1,444,860	2.2	0.44	4.87	0.66	54	358

to evaporate or seep out. This will reduce operation and maintenance costs and should be feasible when dealing with ephemeral flows.

Finally, periodic inspections should be made of the control system. Immediate repair should be made of failures to insure adequate future control.

Culvert Adequacy

Culvert adequacy information has been presented in the form of flow capacity return periods and necessary improvements. The decision of acceptable risk of failure should be made by U.S. Fuel Company officials. Alternate culvert sizes have been suggested in some cases, where appropriate.

Three general categories of improvements have also been discussed for the culverts examined. Sediment deposition problems have resulted in some culverts, either because of gentle slopes or obstructions within or downstream from the culvert. The obstructions should be removed and the culverts cleaned to provide greater capacity.

Debris upstream from the culverts should be removed to prevent clogging. Other improvements, such as placing riprap below some culvert outlets, repairing some culvert entrances, etc. have also been indicated. Once again, periodic checks need to be made of the culverts to insure that they remain operative.

LITERATURE CITED

Burton, T.A. 1976. An Approach to the Classification of Utah Mine Spoils and Tailings Based on Surface Hydrology and Erosion. Thesis presented to Utah State University at Logan, Utah in partial fulfillment of the requirements for the degree of Master of Science in Watershed Science.

Burton, T.A., G.F. Gifford, and G.E. Hart. 1976. A classification of Surface Mine Spoils Hydrology, Surface Erosion, and Water Chemistry in Utah. Phase One Report prepared for the USDA Forest Service, Intermoutain Forest and Range Experiment Station. Logan, Utah.

Hawkins, R.H. 1973. Improved Prediction of Storm Runoff in Mountain Watersheds. ASCE Journal of the Irrigation and Drainage Division. 99 (IR4): 519-523.

Kent, K.M. 1973. A Method for Estimating Volume and Rate of Runoff in Small Watersheds. USDA Soil Conservation Service. SCS-TP-149.

Richardson, E.A. 1971. Estimated Return Periods for Short-Duration Precipitation in Utah. Department of Soils and Biometeorology Bulletin No. 1. Utah State University. Logan, Utah.

Soil Conservation Service. 1972. SCS National Engineering Handbook - Section 4: Hydrology. U.S. Government Printing Office. Washington, D.C.

APPENDIX A

Characteristics of Watersheds Contributing to Proposed Sedimentation Ponds

Table 5 gives the characteristics of the watersheds contributing to the proposed sedimentation ponds. In this table, A is drainage area, in acres; ℓ is the hydraulic length, in feet; Y is the average watershed slope, in percent; CN is the curve number; S is the watershed storage factor, in inches, as defined by equation 3; L is the watershed lag, in hours, as defined by equation 6; T_p is the time elapsed from the beginning of runoff to the hydrograph peak, in hours, as defined by equation 5; and T_c is the time of concentration, in hours, defined as 1.67 L.

Table 5. Drainage area and runoff characteristics of watersheds contributing to proposed sedimentation ponds in the Hiawatha and Mohrland, Utah areas.

Site Description	Drainage Area Characteristics			Runoff Characteristics				
	A	ℓ	Y	CN	S	L	T_p	T_c
Hiawatha Main Yard	70	4860	13.79	90	1.11	0.21	0.25	0.36
Slurry Ponds No. 3 and 4	8.3	1390	20.05	90	1.11	0.06	0.08	0.11
Slurry Pond No. 5 - South	6.8	1210	27.51	90	1.11	0.05	0.06	0.08
Slurry Pond No. 5 - North	12.1	1910	13.85	90	1.11	0.10	0.12	0.17
Hiawatha Refuse Pile	4.4	640	10.10	90	1.11	0.05	0.06	0.08
Upper Coal Storage Yard	14	1650	19.51	90	1.11	0.08	0.09	0.13
Middle Fork Yard	23	1400	44.72	80	2.50	0.06	0.07	0.10
South Fork Yard	91	3300	60.55	80	2.50	0.11	0.12	0.18
Lower Mohrland Yard	10	1360	35.45	87	1.49	0.06	0.06	0.09
Upper Mohrland Yard - Upper	5.4	1200	80.50	85	1.76	0.03	0.04	0.06
Upper Mohrland Yard - Lower	60	3000	67.34	80	2.50	0.09	0.11	0.16
Upper Mohrland Yard - Combined	65	3000	66.40	82	2.20	0.09	0.10	0.15

APPENDIX B

Watershed and Runoff Characteristics

Associated with Examined Culverts

Table 6 presents the drainage area and runoff characteristics of watersheds contributing to each of the culverts examined except culvert No. 3, which will presumably be connected with culvert No. 4 to make one continuous culvert. The column headings in this table have the same meanings as those of Table 5, as given in Appendix A.

Table 7 gives the expected runoff frequencies of peak flows reaching the examined culverts (except No. 3). In this table, P is the precipitation depth, in inches; Q is the runoff volume, in inches, as determined by equation 1; and q is the peak discharge, in cubic feet per second, as determined by equation 4.

Table 6. Drainage area and runoff characteristics of watersheds contributing to U.S. Fuel Company culverts.

Affected Culvert	Drainage Area Characteristics			Runoff Characteristics				
	A		Y	CN	S	L	T_p	T_c
1	153	5570	27.78	85	1.76	0.20	0.24	0.34
2	146	4870	29.11	85	1.76	0.18	0.21	0.30
3	TO BE DIRECTLY CONNECTED TO CULVERT 4							
4	246	7680	39.93	75	3.33	0.30	0.35	0.50
5	245	7530	40.09	75	3.33	0.29	0.34	0.49
6	244	7370	40.27	75	3.33	0.29	0.34	0.48
7	243	7230	40.36	75	3.33	0.28	0.33	0.47
8	53	3710	32.45	76	3.16	0.18	0.21	0.30
9	68	4260	13.49	90	1.11	0.19	0.23	0.32
10	69	4290	13.31	90	1.11	0.20	0.23	0.33
11	70	4860	13.79	90	1.11	0.21	0.25	0.36
12	112	4540	35.94	80	2.50	0.18	0.21	0.30
13	2106	18,330	54.65	75	3.33	0.51	0.60	0.85
14	2123	18,930	54.20	75	3.33	0.53	0.62	0.88
15	8808	30,240	50.90	75	3.33	0.79	0.93	1.32
16	1155	12,670	65.25	75	3.33	0.35	0.41	0.58
17	3587	23,510	42.05	75	3.33	0.71	0.83	1.19
18	2521	16,340	33.40	70	4.29	0.69	0.80	1.15
19	5.4	1200	80.50	85	1.76	0.03	0.04	0.06
20	6.4	1400	48.96	85	1.76	0.05	0.06	0.08
21	0.5	610	0.5	90	1.11	0.21	0.25	0.35
22	5845	25,800	51.75	75	3.33	0.69	0.81	1.15
23	14	1650	19.51	90	1.11	0.08	0.09	0.13
24	154	4480	57.60	70	4.29	0.19	0.22	0.31
25	342	4980	58.60	70	4.29	0.20	0.23	0.33
26	516	7570	43.95	70	4.29	0.32	0.38	0.54
27	49	3300	35.62	75	3.33	0.16	0.19	0.27
28	23	2100	46.38	75	3.33	0.10	0.11	0.16
29	1239	13,950	54.49	75	3.33	0.41	0.48	0.69
30	23	2100	75.89	75	3.33	0.08	0.09	0.13
31	32	2100	54.55	75	3.33	0.09	0.11	0.15
32	20	1600	65.45	75	3.33	0.07	0.08	0.11
33	100	3700	64.95	75	3.33	0.13	0.15	0.22
34	438	8770	35.70	75	3.33	0.35	0.41	0.59
35	152	5370	27.96	85	1.76	0.20	0.23	0.33

Table 7. Runoff frequencies of flows affecting U.S. Fuel Company culverts.

Affected	Return Period = 2 years			Return Period = 5 years			Return Period = 10 years			Return Period = 25 years			Return Period = 50 years			Return Period = 100 years		
Culvert	P	Q	q	P	Q	q	P	Q	q	P	Q	q	P	Q	q	P	Q	q
1	0.40	0.001	0.6	0.62	0.035	18	0.75	0.073	38	0.99	0.169	89	1.11	0.227	120	1.30	0.331	170
2	0.40	0.001	0.6	0.62	0.035	18	0.75	0.073	38	0.99	0.169	89	1.11	0.227	120	1.30	0.331	170
3	TO BE DIRECTLY CONNECTED TO CULVERT 4																	
4	0.40	0	0	0.62	0	0	0.75	0.002	1.1	0.99	0.029	15	1.11	0.052	28	1.30	0.101	54
5	0.40	0	0	0.62	0	0	0.75	0.002	1.1	0.99	0.029	15	1.11	0.052	28	1.30	0.101	54
6	0.40	0	0	0.62	0	0	0.75	0.002	1.1	0.99	0.029	15	1.11	0.052	28	1.30	0.101	54
7	0.40	0	0	0.62	0	0	0.75	0.002	1.1	0.99	0.029	15	1.11	0.052	28	1.30	0.101	54
8	0.40	0	0	0.62	0	0	0.75	0.004	0.8	0.99	0.037	7.0	1.11	0.063	12	1.30	0.117	22
9	0.40	0.025	5.5	0.62	0.105	23	0.75	0.170	38	0.99	0.314	70	1.11	0.394	88	1.30	0.531	120
10	0.40	0.025	5.5	0.62	0.105	23	0.75	0.170	38	0.99	0.314	70	1.11	0.394	88	1.30	0.531	120
11	0.40	0.025	5.5	0.62	0.105	23	0.75	0.170	38	0.99	0.314	70	1.11	0.394	88	1.30	0.531	120
12	0.40	0	0	0.62	0.005	2.2	0.75	0.023	9.2	0.99	0.080	32	1.11	0.120	48	1.30	0.194	78
13	0.55	0	0	0.79	0.004	12	0.93	0.019	51	1.19	0.071	190	1.33	0.110	290	1.54	0.181	480
14	0.55	0	0	0.79	0.004	12	0.93	0.019	51	1.19	0.071	190	1.33	0.110	290	1.54	0.181	480
15	0.55	0	0	0.79	0.004	32	0.93	0.019	138	1.19	0.071	510	1.33	0.110	790	1.54	0.181	1300
16	0.55	0	0	0.79	0.004	9.4	0.93	0.019	41	1.19	0.071	150	1.33	0.110	230	1.54	0.181	390
17	0.55	0	0	0.79	0.004	14	0.93	0.019	63	1.19	0.071	230	1.33	0.110	360	1.54	0.181	590
18	0.55	0	0	0.79	0	0	0.93	0.001	2.9	1.19	0.024	57	1.33	0.047	110	1.54	0.094	220

Table 7. Continued

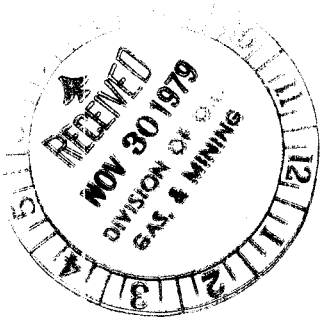
Affected Culvert	Return Period = 2 years			Return Period = 5 years			Return Period = 10 years			Return Period = 25 years			Return Period = 50 years			Return Period = 100 years		
	P	Q	q	P	Q	q	P	Q	q	P	Q	q	P	Q	q	P	Q	q
19	0.40	0.001	0.1	0.62	0.035	3.6	0.75	0.073	7.4	0.99	0.169	17	1.11	0.227	23	1.30	0.331	34
20	0.40	0.001	0.1	0.62	0.035	2.8	0.75	0.073	5.9	0.99	0.169	14	1.11	0.227	18	1.30	0.331	27
21	0.40	0.025	0.1	0.62	0.105	0.2	0.75	0.170	0.3	0.99	0.314	0.5	1.11	0.394	0.6	1.30	0.531	0.8
22	0.55	0	0	0.79	0.004	24	0.93	0.019	110	1.19	0.071	390	1.33	0.110	600	1.54	0.181	990
23	0.40	0.025	2.9	0.62	0.105	12	0.75	0.170	20	0.99	0.314	37	1.11	0.394	46	1.30	0.531	62
24	0.40	0	0	0.62	0	0	0.75	0	0	0.99	0.004	2.1	1.11	0.014	7.5	1.30	0.041	22
25	0.40	0	0	0.62	0	0	0.75	0	0	0.99	0.004	4.5	1.11	0.014	16	1.30	0.041	47
26	0.40	0	0	0.62	0	0	0.75	0	0	0.99	0.004	4.1	1.11	0.014	14	1.30	0.041	43
27	0.40	0	0	0.62	0	0	0.75	0.002	0.4	0.99	0.029	5.6	1.11	0.052	10	1.30	0.101	20
28	0.40	0	0	0.62	0	0	0.75	0.002	0.3	0.99	0.029	4.5	1.11	0.052	8.2	1.30	0.101	16
29	0.55	0	0	0.79	0.004	8.6	0.93	0.019	38	1.19	0.071	139	1.33	0.110	215	1.54	0.181	354
30	0.40	0	0	0.62	0	0	0.75	0.002	0.4	0.99	0.029	5.5	1.11	0.052	10	1.30	0.101	20
31	0.40	0	0	0.62	0	0	0.75	0.002	0.4	0.99	0.029	6.3	1.11	0.052	11	1.30	0.101	22
32	0.40	0	0	0.62	0	0	0.75	0.002	0.4	0.99	0.029	5.4	1.11	0.052	9.8	1.30	0.101	19
33	0.40	0	0	0.62	0	0	0.75	0.002	1.0	0.99	0.029	14	1.11	0.052	26	1.30	0.101	51
34	0.40	0	0	0.62	0	0	0.75	0.002	1.6	0.99	0.029	23	1.11	0.052	42	1.30	0.101	82
35	0.40	0.001	0.6	0.62	0.035	18	0.75	0.073	38	0.99	0.169	89	1.11	0.227	120	1.30	0.331	170

Full Copy
US Fuel
Rt. to Tom
File

United States Department of the Interior
OFFICE OF SURFACE MINING
Reclamation and Enforcement
[redacted] Brooks Towers
1020-15th Street
DENVER, COLORADO 80202

OFFICE OF THE REGIONAL DIRECTOR

23 NOV 1979



Mr. Ron Daniels
Coordinator of Mined Land Development
Utah Department of Natural Resources
Division of Oil, Gas and Mining
1588 West North Temple
Salt Lake City, Utah 84116

Dear Mr. ~~Daniels~~:

My staff has reviewed the submitted plans for U.S. Fuel Company, Hiawatha Mine sediment control for the Middle Fork Yard, Upper Coal Storage Yard, and South Fork Yard. Based on this review we have the following comments.

The Vaughn Hansen report prepared for U.S. Fuel Company has precipitation depths for each return period considered for durations of two or three hours, depending upon the drainage area. We have determined that this method is inadequate when used in combination with the runoff curve number technique, as defined by the U.S. Soil Conservation Service (SCS National Engineering Handbook-Section 4, 1972). [According to the curve number methodology, there is an algebraic and hydrologic relationship between infiltration, surface storage, and an estimated rainfall excess (or the equivalent runoff volume). The curve number indicates the runoff intensity.] The problem with using a 2-hour duration as compared to a 24-hour duration is that the estimated precipitation depths for the same return period are much larger for the 24-hour duration. The Vaughn Hansen report uses the 2-hour duration to determine if the culverts presently being used at the Hiawatha Mine can safely convey the runoff resulting from certain precipitation events. This shows that 20 of the present 35 culverts can safely convey the 100-year precipitation event. However, this is based on the 2-hour duration. We have calculated that runoff volume resulting from the 24-hour duration would be more than an order of magnitude higher than the runoff volume resulting from the 2-hour duration. [The time of concentration is constant for any given watershed.] Therefore, when using the curve number methodology without plotting a synthetic hydrograph the peak discharge is directly propotional to the runoff volume.

Correct procedures for determining the peak discharge should incorporate the use of a synthetic hydrograph, plotting the resulting peak flow associated with small durations. The precipitation intensity associated with the small durations should be obtained from the 24-hour (SCS-TP-149, Attachment B, 1973) or the 6-hour design rainfall distribution (SCS, National Engineering Handbook-Section 4, 1972).

U.S. Fuel Company must resubmit information to demonstrate that the present and proposed culverts will safely convey runoff resulting from the 10-year, 24-hour precipitation event. Because the life of the mine is 21 years, U.S. Fuels must demonstrate what effects the runoff resulting from the 50-year, 6-hour precipitation event will have on the stability of the present and proposed culverts. A 50-year, 6-hour precipitation event was chosen because the 50-year return interval has a probability of 0.35 of having an event equal to or greater than in 21 years. We consider this probability of occurrence acceptable.

None of the plans show whether or not trash racks will be used. Trash racks should be used at all locations where debris may clog the culvert which may cause the water to erode both the channel as well as the culvert head wall. U.S. Fuels must submit plans and diagrams showing the location and typical cross sections for the needed non-clogging trash racks.

The detailed diagrams for the Middle Fork Yard show a proposed 33-inch corrugated metal pipe that is designed to convey the natural stream flow under the proposed sedimentation pond. From the data presented, we cannot determine what the flood events would be for the natural stream flow. Since the Hiawatha Mine plans on mining Seam A until year 2001 or approximately 21 years, the corrugated metal pipe under the sedimentation pond should safely convey the runoff resulting from the 50-year, 6-hour precipitation event. We consider this necessary in order to insure the sedimentation pond will not be washed out. Before we can approve the sedimentation pond for the Middle Fork Yard, U.S. Fuel Company must show that the corrugated metal pipe will safely convey runoff resulting from 50-year, 6-hour precipitation event under the sedimentation pond.

Slopes for the sedimentation pond associated with the Upper Coal Storage area are located within 70 feet of Miller Creek and the pond is only 25 feet above the stream bed which is slightly incised. Before this sedimentation pond can be approved, U.S. Fuel Company must show that the pond and side slopes will be stable when Miller Creek is flowing at a discharge equal to or less than the runoff resulting from the 25-year, 6-hour precipitation event.

The plan for the South Fork Yard sediment control facilities shows a corrugated metal pipe conveying the natural stream flow under the proposed sedimentation pond. Also, the plan does not show how the surface drainage from the disturbed lands will be passed through the sedimentation pond. Drainage maps included

in the February 21, 1979, submittal show some of the diversions draining into the channel that is proposed to go under the sedimentation pond. Before this sediment control plan can be approved, U.S. Fuel Company must show that the corrugated metal pipe will safely convey the runoff resulting from the 50-year, 6-hour precipitation event under the sedimentation pond as well as diagrams showing how the surface drainage will be diverted into the sedimentation pond.

A copy of this letter is enclosed for transmittal to the applicant by your office. If you have any questions with regard to this review, please contact John Nadolski of my staff (303-837-3773).

Sincerely,

DONALD A. CRANE

STATE OF UTAH
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF OIL, GAS, AND MINING
1588 West North Temple
Salt Lake City, Utah 84116
(801) 533-5771

August 28, 1979

Mr. John Hardaway
Office of Surface Mining
Denver Regional Office
Room 270, Post Office Bldg.
1823 Stout Street
Denver, CO 80202

Re: Sedimentation Pond Design
U.S. Fuel Company
King Mines
ACT/007/011

Dear John:

Enclosed are seven (7) copies of U.S. Fuel Company's Sedimentation Pond designs for the South Fork yard.

The Division is looking at a 30-day review period, ending September 24, 1979. We would appreciate your comments.

If you have any questions, please contact the Division.

Sincerely,

Thomas J. Suchoski

THOMAS J. SUCHOSKI
RECLAMATION HYDROLOGIST

TJS/sp
enc: Sedimentation Pond designs

STATE OF UTAH
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF OIL, GAS, AND MINING
1588 West North Temple
Salt Lake City, Utah 84116
(801) 533-5771

August 28, 1979

Mr. Steve McNeal
Department of State Health
Division of Social Services
150 West North Temple
Salt Lake City, Utah 84103

Re: U.S. Fuel Company
Sedimentation Pond Design

Dear Steve:

Enclosed is one (1) copy of U.S. Fuel Company's Sedimentation Pond designs for the South Fork yard.

The Division is looking for a 30-day review period ending September 24, 1979.

If you have any questions please contact me.

Sincerely,

Thomas J. Suchoski

THOMAS J. SUCHOSKI
RECLAMATION HYDROLOGIST

TJS/sp
enc: Sedimentation Pond Design

STATE OF UTAH
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF OIL, GAS, AND MINING
1588 West North Temple
Salt Lake City, Utah 84116
(801) 533-5771

August 28, 1979

Mr. Robert Morgan
Dam Safety Engineer
Division of Water Resources
231 East 400 South
Salt Lake City, Utah 84111

Re: U.S. Fuel Company
Sedimentation Pond Design

Dear Bob:

Enclosed is one (1) copy of U.S. Fuel Company's Sedimentation Pond designs for the South Fork Yard.

The Division is looking for a 30-day review period ending September 24, 1979.

If you have any questions please contact me.

Sincerely,

Thomas J. Suchoski

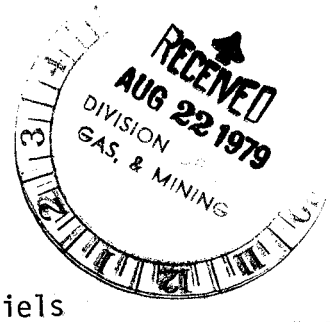
THOMAS J. SUCHOSKI
RECLAMATION HYDROLOGIST

TJS/sp
enc: Sedimentation Pond Design

File

UNITED STATES FUEL COMPANY

HIAWATHA, UTAH 84527



August 20, 1979

Ron Daniels
Utah Department of Natural Resources
Division of Oil, Gas, and Mining
1588 West North Temple
Salt Lake City, Utah 84116

RE: Compliance with 30 CFR710(d)
Initial Program Regulations

Dear Mr. Daniels:

Please find enclosed eleven (11) sets of plans and specifications relating to sediment pond location and construction in the vicinity of South Fork yard, Hiawatha, Utah.

Please refer to our letter of May 4, 1979 (copy attached) for additional information.

Yours truly,

Abdalla M. Elias,
Mining Engineer

AME/jl

Attachments:

UNITED STATES FUEL COMPANY

HIAWATHA, UTAH 84527

May 4, 1979

Cleon B. Feight
Utah Department of Natural Resources
Division of Oil, Gas, and Mining
1588 WEst North Temple
Salt Lake City, Utah 84116

RE: Compliance with 30 CFR710(d)
initial program regulations

Dear Mr. Feight:

Please find under separate cover, eleven (11) sets of plans and specifications relating to sediment pond construction in the vicinity of Hiawatha, Utah. Also under separate cover please find eleven (11) copies of Supplemental Hydrologic Information for the Sedimentation Ponds at Hiawatha and Mohrland, Utah. This data is submitted in connection with 30 CFR 710.11 (d) (Compliance of pre-existing, non-conforming structures). Please refer to the report Surface Hydrology and Culvert Adequacy of the Hiawatha and Mohrland, Utah Areas for details relating to pond locations.

We presently have contracted earth moving equipment at our property and for this reason would like to begin sedimentation pond construction as soon as possible while equipment is available. If there is any part of the pond construction that we can undertake prior to final approval of plans please advise us.

Plans for a sedimentation pond in connection with slurry impoundment No.1 have not yet been completed but will be submitted shortly. Also, plans for the sedimentation pond at our South Fork mine yard have not been completed due to snow cover restricting access for mapping.

No sedimentation ponds are proposed for the Mohrland area at this time since all coal mining related sites in that area are either leased to other operators or have not been used in connection with mining since before 1975.

Yours truly,

Robert Eccli

Robert Eccli,
Mine Engineer

RE/jl

UNITED STATES FUEL COMPANY

HIAWATHA, UTAH 84527

August 13, 1979

Mr. Thomas J. Suchoski
State of Utah
Dept. of Natural Resources
Division of Oil, Gas and Mining
1588 West North Temple
Salt Lake City, Utah 84116

Dear Sir:

In response to your letter of June 31, 1979 concerning the hydrologic monitoring plan proposed by U. S. Fuel Co., we sumbit the following comments:

Item 1:
U. S. Fuel Company will provide a map showing the location of monitoring stations in relation to stream diversions, sediment ponds, slurry ponds, and other surface facilities.

Item 2:
Present discharge points are covered by a PNDES discharge permit. All future points of discharge will also be covered.

Item 3:
We will include in our sampling an analysis of acidity, total manganese, dissolved iron, oil and grease.

Item 4:
We agree with all the sampling frequencies you've suggested, except that of stream stations. Of the six stream stations we are presently monitoring, three of these are a considerable distance from current mining operations and mining surface facilities. These stations would not be directly affected by mining in this area. Many of the changes occurring in the water analysis of these areas (flow rate, solids, etc.) can be attributed to natural causes such as, runoff. These changes are natural and expected. We feel that our present monitoring frequency of stream stations is sufficient to evaluate effeciently these areas.

Item 5:
Exploratory drill holes which encounter water will be considered for conversion to water monitoring wells.

Item 6:

Due to the considerable distance of the majority of our monitoring stations from current mining operations and surface facilities, we feel that annual reporting of analysis results would be sufficient. We will submit annual reports during the first quarter of the year with the results of the analysis and explanation of these results.

Sincerely,

Duane Wise FOR R. Eccli

Robert Eccli,
Chief Engineer

RE/dl

cc: E. M. Gardiner

File U.S. Fuel
ACT/007/011

STATE OF UTAH

DEPARTMENT OF NATURAL RESOURCES

DIVISION OF WATER RIGHTS

DEE C. HANSEN
STATE ENGINEER

EARL M. STAKER
DEPUTY

200 EMPIRE BUILDING
231 EAST 400 SOUTH
SALT LAKE CITY, UTAH 84111
(801) 533-6071

DIRECTING ENGINEERS
HAROLD D. DONALDSON
DONALD C. NORSETH
STANLEY GREEN
ROBERT L. MORGAN

July 18, 1979

Division of Oil, Gas, and Mining
1588 West North Temple
Salt Lake City, Utah 84116
Attn: Thomas J. Suchoski

Dear Tom:

I have completed the review of the sediment ponds for the U.S. Fuel Company complex at Hiawatha. These structures are very small and would not offer a significant hazard to life or property, therefore, it is not necessary for us to be involved in a review of the proposed construction plans. The plans and location maps serve as notice to this office of U.S. Fuel's intent.

Sincerely,

Robert L. Morgan (SW)

Robert L. Morgan
Dam Safety Engineer

RLM:sn

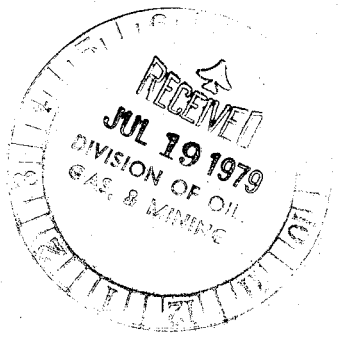
MDW
ACT/007/011

UNITED STATES FUEL COMPANY

HIAWATHA, UTAH 84527

July 13, 1979

United States Dept. of the Interior
Office of Surface Mining
Reclamation and Enforcement
Post Office Bldg. Rm. 270
1823 Stout St.
Denver, Colorado 80202



Dear Sir:

This report is submitted in accordance with regulations pertaining to reclamation activities, Section 211.62 of Title 30 in the Code of Federal Regulations applying to the mining of Federal Coal leases.

U.S. Fuel Company has conducted in 1978, core drilling exploration activities on the southern portion of Gentry Mountain in the Manti-LaSal Range. These exploration sites, designated F-77-5, F-77-11A and F-77-3B, are all located within Federal lease S.L. 069985 with each measuring approximately ¼ acre in area. The location of these sites are shown on the enclosed maps.

With the completion of this exploration, reclamation procedures were initiated in June of 1978. These procedures included:

1. The backfilling of mud pits.
2. Replacement of removed top soil.
3. A final grading of the distrubed areas to original contours, conforming with the pre-exploration landscape.
4. The planting of grass suitable to the area and adaptable to the environment. The varieties of grass used and their concentration included:

Smooth Brome	3 lbs./acre
Timothy	3 lbs./acre
Orchard Grass	2 lbs./acre
Intermediate Wheat Grass	2 lbs./acre
Kentucky Blue Grass	1 lbs./acre
Ranger Alfalfa	1 lbs./acre
Meadow Fox Tail	1 lbs./acre

With the reclamation activities, no particular irrigation or fertilization techniques were incorporated.

UNITED STATES FUEL COMPANY

HIAWATHA, UTAH 84527

However, the top soil removed during exploration was segregated to prevent possible contamination and then replaced during reclamation final grading. This ensures the replacement of the natural nutrients to the affected areas. As of this date, these reclamation procedures appear successful.

Sincerely,

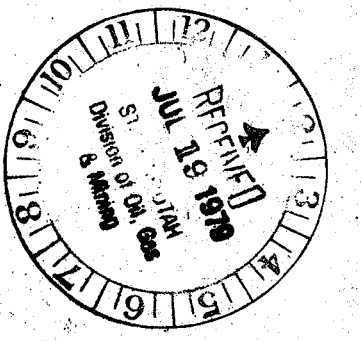
Frank Colosimo
Engineering Department

Enclosure:

cc: E. Gardiner
J. Pennington
Cleon B. Freight

MR FORM 3
Page 1 of 2

STATE OF UTAH
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF OIL, GAS, AND MINING
1588 West North Temple
Salt Lake City, Utah 84116



19 78 OPERATIONS AND PROGRESS REPORT

(To be filed for each Mining Operation at the end of each calander year)

OPERATOR: U.S. FUEL Co.

Address: BOX A
HIAWATHA Ut
84527

Sec. 18 T. 16S R. 8E. B&M S.L.

No. of approved Notice of INTENTION :

DATE OF APPROVAL :

(1) The gross amount of materials moved during the year for this mining operation was: 2200 cu. yds total FOR ALL three exploration sites.

(2) STATUS OF RECLAMATION WORK

Month	WORK PERFORMED	RESULTS
January		
February		
March		
April		
May		
June	backfilled mud pits, final grading	
July		
August		
September		

STATUS OF RECLAMATION WORK (Continued)

Month	WORK PERFORMED	RESULTS
October		
November	planted grass on sites	growth has started
December		

* The monthly status of reclamation work may be outlined on a separate sheet if desired.

(3) INCLUDE WITH THIS REPORT, AN UP-DATED MAP AND PLAN, PREPARED IN ACCORDANCE WITH RULE M-3, (1).

STATE OF UTAH
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF OIL, GAS, AND MINING
1588 West North Temple
Salt Lake City, Utah 84116
(801) 533-5771

June 22, 1979

Mr. Robert Eccli
Mine Engineer
U.S. Fuel Company
Hiawatha, Utah 84527

Re: Sediment pond design
Review
U.S. Fuel Company
King Mines
ACT/007/011

Dear Bob:

The Division is reviewing the plans for the King Mines at U.S. Fuel Company's Hiawatha Operation.

Using the maps provided in the Vaughn Hansen Associates report and some of Vaughn Hansen Associates field maps, estimates of the areas draining into the sediment ponds were made. These estimates of areas did not match those presented in the Vaughn Hansen report. The Division feels that these differences cause too great a variation in the total storage volume of the sediment pond. The major reason for the differences in the areas is that the diversion ditches, roads, and actual locations of the sediment ponds are not represented together on one map so that the sediment pond drainage areas can be determined.

Maps showing the local topography, roads, diversions, and ditches, with the drainage area boundaries for each respective sediment pond are required for completion of the review. The Division would require eleven (11) copies for review and distribution to O.S.M. and the State agencies.

If you have any questions, please contact the Division.

Sincerely,

Thomas J. Suchoski

THOMAS J. SUCHOSKI
RECLAMATION HYDROLOGIST

TJS/sp
cc: O.S.M., Region V, John Hardaway

STATE OF UTAH
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF OIL, GAS, AND MINING
1588 West North Temple
Salt Lake City, Utah 84116
(801) 533-5771

June 15, 1979

Mr. Robert Eccli
Mine Engineer
U.S. Fuel Company
Hiawatha, Utah 84527

Re: U.S. Fuel Company
Hiawatha Complex
ACT/007/011
Hydrologic Monitoring
Proposal

Dear Mr. Eccli:

The Division has reviewed the Hydrologic Monitoring plan, proposed by U.S. Fuel which was forwarded to the Division on February 28, 1979. The following comments would be offered:

1. The map showing the monitoring stations does not show the surface facilities. The Division would require that U.S. Fuel provide a map showing the location of the monitoring stations in relation to the stream diversions, the sediment ponds, slurry ponds, and other surface facilities.

2. All impoundment structures which have a point source discharge are required to be covered by an NPDES discharge permit.

3. The Division would like U.S. Fuel to add the parameters of Acidity, Total Manganese, Dissolved Iron, and Oil and grease (Surface and Mine water discharge only) to the analytical sampling schedule.

4. The sampling frequency of the Monitoring program should be upgraded as follows:

Stream stations	once per month
Spring stations	once in the fall and once in the spring
Mine water and other discharges	Whenever discharge occurs.

5. Exploratory drilling holes which encounter water should be considered for conversion to water monitoring wells.

6. Reports containing results of the analyses should be sent to the Division quarterly. Annual reports dealing with the results of the analyses and an explanation of the results should be submitted during the first quarter of the year.

If you have any questions, please contact the Division.

Sincerely,

Thomas J. Suchoski

THOMAS J. SUCHOSKI
RECLAMATION HYDROLOGIST

TJS/sp
cc: O.S.M., Denver
John Hardaway

File

STATE OF UTAH
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF OIL, GAS, AND MINING
1588 West North Temple
Salt Lake City, Utah 84116
(801) 533-5771

June 15, 1979

Mr. Robert Eccli
Mining Engineer
U.S. Fuel Company
Hiawatha, Utah 84527

Re: Plans for Sediment ponds
U.S. Fuel, Company
Hiawatha Complex
ACT/007/011
Carbon County, Utah

Dear Mr. Eccli:

After a cursory review of the plans submitted by U.S. Fuel for design and construction of the proposed sediment ponds for the King Mines, the Division finds that there is insufficient detail to complete the review.

The maps or plans do not show in sufficient detail, the location of the sediment ponds and the drainage of corresponding areas. The locations of diversions and drainage paths are not shown.

Review of the Sediment pond plans cannot be completed until these details are received.

I am sorry that it took so long to find this information was missing. The Division realizes there is only a short construction period during the year. We will try to expedite the review once this information requested is received.

Sincerely,

Thomas J. Suchoski

THOMAS J. SUCHOSKI
RECLAMATION HYDROLOGIST

TJS/sp
cc: John Hardaway, O.S.M., Denver
Steve McNeil, State Health
Bob Morgan, Water Rights

FILE

STATE OF UTAH
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF OIL, GAS, AND MINING
1588 West North Temple
Salt Lake City, Utah 84116
(801) 533-5771

May 16, 1979

Mr. Robert Morgan
Division of Water Rights
231 East 400 South
Salt Lake City, Utah 84111

Re: Sediment pond plans for
U.S. Fuel, Hiawatha Complex
ACT/007/011

Dear Mr. Morgan:

Enclosed are plans and design specifications for the sediment ponds for U.S. Fuel's Hiawatha Complex.

U.S. Fuel is very interested in starting construction on the ponds, as they have equipment available.

The Division would be interested in your comments on the structure of the sediment ponds which U.S. Fuel is proposing.

Sincerely,

Thomas J. Suchoski

THOMAS J. SUCHOSKI
RECLAMATION HYDROLOGIST

TJS/sp
enc: "Supplemental Hydrologic information
for the sedimentation ponds at
Hiawatha and Mohrland, Utah"

"Sedimentation pond plans - 1/10-7/10,
10/10"

SCOTT M. MATHESON
Governor

GORDON E. HARMSTON
Executive Director,
NATURAL RESOURCES

CLEON B. FEIGHT
Director

STATE OF UTAH
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF OIL, GAS, AND MINING
1588 West North Temple
Salt Lake City, Utah 84116
(801) 533-5771

OIL, GAS, AND MINING BOARD

CHARLES R. HENDERSON
Chairman

JOHN L. BELL
C. RAY JUVELIN
THADIS W. BOX
CONSTANCE K. LUNDBERG
EDWARD T. BECK
E. STEELE McINTYRE

May 16, 1979

Mr. Don Crane
Regional Director
Office of Surface Mining
Room 270, Post Office Bldg.
1823 Stout Street
Denver, Colorado 80202

RE: Review of U.S. Fuels Plans for
Sediment Pond Design.
ACT/007/011

Dear Don:

The Division staff is starting review of the design and plans for U.S. Fuels sedimentation ponds. Seven (7) copies of these plans where forwarded to your office in early May by Ron Daniels. The Division would like to set a target date of July 6, 1979, for approval of construction.

Hope this is acceptable to you. If you have any questions, please contact the Division.

Sincerely,

Thomas J. Suchoski

THOMAS J. SUCHOSKI
RECLAMATION HYDROLOGIST

cc: Robert Eccli, U.S. Fuels

STATE OF UTAH
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF OIL, GAS, AND MINING
1588 West North Temple
Salt Lake City, Utah 84116
(801) 533-5771

May 14, 1979

CERTIFIED-RETURN RECEIPT REQUESTED

Mr. Duane Wise
U.S. Fuel Company
Hiawatha, Utah 84527

Re: King #6 Portal
~~EXP/015/005~~ ACT/007/011

Dear Mr. Wise:

Your letter to the Division of May 8, 1979 informing us of your expectation to begin portal excavation at the King #6 Mine needs further clarification.

The Division has no record of the King #6 Mine in its original proposal from U.S. Fuel Company.

Either the King #6 Mine is a previously known mine which has been re-named or your plans somehow have not reached the Division yet.

In either case, please be advised that the Division, and possibly the Office of Surface Mining rules in regard to coal mine reclamation and development would apply to new construction as proposed in your letter.

Sincerely,

Ronald W. Daniels

RONALD W. DANIELS
COORDINATOR OF MINED
LAND DEVELOPMENT

RWD/sp
cc: Murray Smith, O.S.M., Denver

UNITED STATES POSTAL SERVICE
OFFICIAL BUSINESS

SENDER INSTRUCTIONS

Print your name, address, and ZIP CODE in the space below.
- Complete items 1, 2, and 3 on the reverse.
- Moisten gummed ends and attach to front of article if space permits. Otherwise affix to back of article.
- Endorse article "Return Receipt Requested" adjacent to number.

RETURN TO

STATE OF UTAH (Name of Sender)
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF OIL, GAS, AND MINING
1588 WEST NORTH TEMPLE (Street and No. or P.O. Box)
SALT LAKE CITY, UTAH 84116
(City, State, and ZIP Code)

PENALTY FOR PRIVATE USE TO AVOID PAYMENT OF POSTAGE, $300

HIAWATHA UT MAY 1979 AM

U.S.MAIL

NDER: Complete items 1, 2, and 3. Add your address in the "RETURN TO" space on reverse.

1. The following service is requested (check one).
- [X] Show to whom and date delivered ..... ¢
- [ ] Show to whom, date, and address of delivery ..... ¢
- [ ] RESTRICTED DELIVERY
  Show to whom and date delivered ..... ¢
- [ ] RESTRICTED DELIVERY
  Show to whom, date, and address of delivery ..... $
  (CONSULT POSTMASTER FOR FEES)

2. ARTICLE ADDRESSED TO:
Mr. Duane Wise
U.S. Fuel Co.
Hiawatha, Utah 84527

3. ARTICLE DESCRIPTION:
REGISTERED NO. | CERTIFIED NO. 538693 | INSURED NO.

(Always obtain signature of addressee or agent)
I have received the article described above.
SIGNATURE [ ] Addressee [ ] Authorized agent
Maren Reuse

4. DATE OF DELIVERY MAY 16 1979

5. ADDRESS (Complete only if requested)

6. UNABLE TO DELIVER BECAUSE:

POSTMARK HIAWATHA UTAH MAY 16 '79

CLERK'S INITIALS

PS Form 3811, Apr. 1977 RETURN RECEIPT, REGISTERED, INSURED AND CERTIFIED MAIL

☆GPO: 1977 O—249-595

STICK POSTAGE STAMPS TO ARTICLE TO COVER FIRST CLASS POSTAGE, CERTIFIED MAIL FEE, AND CHARGES FOR ANY SELECTED OPTIONAL SERVICES. (see front)

1. If you want this receipt postmarked, stick the gummed stub on the left portion of the address side of the article, **leaving the receipt attached,** and present the article at a post office service window or hand it to your rural carrier. (no extra charge)
2. If you do not want this receipt postmarked, stick the gummed stub on the left portion of the address side of the article, date, detach and retain the receipt, and mail the article.
3. If you want a return receipt, write the certified-mail number and your name and address on a return receipt card, Form 3811, and attach it to the front of the article by means of the gummed ends if space permits. Otherwise, affix to back of article. Endorse front of article **RETURN RECEIPT REQUESTED** adjacent to the number.
4. If you want delivery restricted to the addressee, or to an authorized agent of the addressee, endorse RESTRICTED DELIVERY on the front of the article.
5. Enter fees for the services requested in the appropriate spaces on the front of this receipt. If return receipt is requested, check the applicable blocks in Item 1 of Form 3811.
6. Save this receipt and present it if you make inquiry.

No. 538693

RECEIPT FOR CERTIFIED MAIL

NO INSURANCE COVERAGE PROVIDED—NOT FOR INTERNATIONAL MAIL
(See Reverse)

SENT TO: Mr. Duane Wise
STREET AND NO.: U.S. Fuel Company
P.O., STATE AND ZIP CODE: Hiawatha, Ut 84527

POSTAGE	$
CERTIFIED FEE	¢
SPECIAL DELIVERY	¢
RESTRICTED DELIVERY	¢
OPTIONAL SERVICES	
RETURN RECEIPT SERVICE: SHOW TO WHOM AND DATE DELIVERED	¢
SHOW TO WHOM, DATE, AND ADDRESS OF DELIVERY	¢
SHOW TO WHOM AND DATE DELIVERED WITH RESTRICTED DELIVERY	¢
SHOW TO WHOM, DATE AND ADDRESS OF DELIVERY WITH RESTRICTED DELIVERY	¢
CONSULT POSTMASTER FOR FEES	
TOTAL POSTAGE AND FEES	$
POSTMARK OR DATE	MAY 15 1979

PS Form 3800, Apr. 1976

FILE COPY

UNITED STATES FUEL COMPANY

HIAWATHA, UTAH 84527

May 8, 1979

State of Utah
Department of Natural Resources
Division of Oil, Gas and Mining
1588 West North Temple
Salt Lake City, Utah 84116

RE: Mined Land Reclamation Act 1975
Proposed King 6 Mine
U.S. Fuel Company
Hiawatha, Utah

Dear Sirs:

Please be advised that we expect to begin portal excavation for our new King 6 Mine on or about July 16, 1979.

Respectfully submitted,

Duane Wise

Duane Wise,
Engineering Dept.

DW/jl

cc: E. Gardiner
file

KING COAL

UNITED STATES FUEL COMPANY

HIAWATHA, UTAH 84527

Date MAY 4, 1979

UTAH DEPT. OF NATURAL RESOURCES
DIVISION OF OIL, GAS AND MINING
1588 WEST NORTH TEMPLE
SALT LAKE CITY, UTAH 84116

Attention: CLEON B. FEIGHT

Subject: _____

Gentlemen:

We attach for your attention the following:

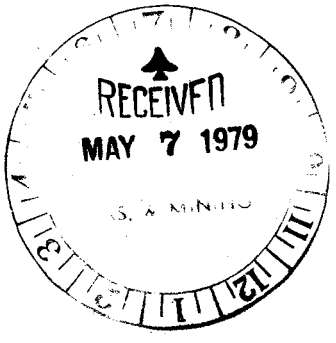
ELEVEN COPIES OF SUPPLEMENTAL HYDROLOGIC INFORMATION FOR SEDIMENTATION PONDS AT HIAWATHA AND MOHRLAND, UTAH.

A LETTER OF EXPLANATION IS BEING SENT UNDER SEPARATE COVER

Very truly yours,

U. S. FUEL COMPANY

By Robert Ecki



UNITED STATES FUEL COMPANY

HIAWATHA, UTAH 84527

Date MAY 4, 1979

UTAH DEPT. OF NATURAL RESOURCES
DIVISION OF OIL, GAS AND MINING
1588 WEST NORTH TEMPLE
SALT LAKE CITY, UTAH 84116

Attention: CLEON FEIGHT

Subject:

Gentlemen:

We attach for your attention the following:

ELEVEN SETS OF PLANS AND SPECIFICATIONS FOR SEDIMENTATION POND CONSTRUCTION NEAR HIAWATHA, UTAH.

A LETTER OF EXPLANATION IS BEING SENT UNDER SEPARATE COVER.

Very truly yours,

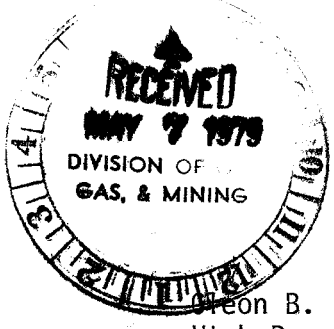
U. S. FUEL COMPANY

By Robert Eccli

UNITED STATES FUEL COMPANY

HIAWATHA, UTAH 84527

ACT/007/011
File



May 4, 1979

Cleon B. Feight
Utah Department of Natural Resources
Division of Oil, Gas, and Mining
1588 WEst North Temple
Salt Lake City, Utah 84116

RE: Compliance with 30 CFR710(d)
initial program regulations

Dear Mr. Feight:

Please find under separate cover, eleven (11) sets of plans and specifications relating to sediment pond construction in the vicinity of Hiawatha, Utah. Also under separate cover please find eleven (11) copies of Supplemental Hydrologic Information for the Sedimentation Ponds at Hiawatha and Mohrland, Utah. This data is submitted in connection with 30 CFR 710.11 (d) (Compliance of pre-existing, non-conforming structures). Please refer to the report Surface Hydrology and Culvert Adequacy of the Hiawatha and Mohrland, Utah Areas for details relating to pond locations.

We presently have contracted earth moving equipment at our property and for this reason would like to begin sedimentation pond construction as soon as possible while equipment is available. If there is any part of the pond construction that we can undertake prior to final approval of plans please advise us.

Plans for a sedimentation pond in connection with slurry impoundment No.1 have not yet been completed but will be submitted shortly. Also, plans for the sedimentation pond at our South Fork mine yard have not been completed due to snow cover restricting access for mapping.

No sedimentation ponds are proposed for the Mohrland area at this time since all coal mining related sites in that area are either leased to other operators or have not been used in connection with mining since before 1975.

Yours truly,

Robert Eccli

Robert Eccli,
Mine Engineer

RE/jl

-, ilo

November 14, 1978

Mr. Clyde W. Gillan
U.S. Fuel Company
19th Floor
University Club Building
136 East South Temple
Salt Lake City, Utah 84111

Re: Vaughn Hansen Associates' study of the hydrology and culvert adequacy of the Hiawatha and Mohrland areas. ACT/007/011

Dear Mr. Gillan:

I have reviewed the above mentioned study and have the following comments:

Surface runoff in area inches of depth was calculated by the curve number technique as developed by the Soil Conservation Service. This method of estimating area runoff is very acceptable. The curve numbers used, as listed in Tables 5, 6, and 7, appear to be rather accurate. Therefore, the Division concurs with the depths of runoff estemated by this study.

Peak flow was determined for culverted areas resulting from the ten year two hour storm event for areas less than 1,000 acres, and from the ten year three hour storm event for areas over 1,000 acres. Peak flow was estimated by the equation: q(peak) = (484AQ)/Tp. The design storms employed are acceptable and meet the intent of the regulations. The above mentioned formula for estimating peak flow, as used by Vaughn Hansen Associates, is somewhat erroneous. This formula is used for determining peak flow for increments of less than 1/5 of the storm period equal to the watershed's time of concentration. These increments are then summed to construct a synthetic storm runoff hydrograph for the watershed. However, this formula has been used by some hydrologists in the way Vaughn Hansen Associates did for a rough estimate of peak flow; however, it tends to over estimate peak flows. The Division will accept the estimated peak flow results for low risk structures such as culverts. High risk structures such as spillways should be re-evaluated.

Sedimentation pond design should also be re-evaluated when the permanent regulatory program is finalized and published, which should be in January, 1979. Design criteria will be somewhat different.

If you have any questions please feel free to call.

Sincerely,

K. MICHAEL THOMPSON
ENGINEERING GEOLOGIST

KMT/sp
cc: Mr. Bob Eccli
U.S. Fuel Company
Hiawatha, Utah 84527

O.S.M., Denver

UNITED STATES
DEPARTMENT OF THE INTERIOR

OFFICE OF SURFACE MINING RECLAMATION AND ENFORCEMENT
REGION V—RM. 270 POST OFFICE BLDG., 1823 STOUT STREET
DENVER, COLORADO 80202

23 Oct. 78

Dear Mike,

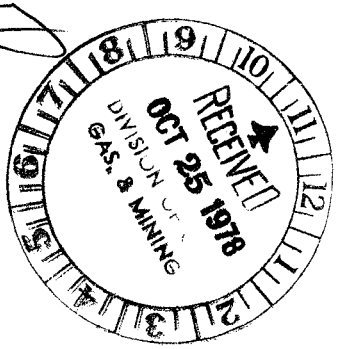
Here are the two shots of U.S. Fuel Co.'s outside slope of #1 slurry Pond which you said you would like copies of.

Look at them in good health.

ACT/007/011

Larry

Sandy,
Please file
US Fuel
Hiawatha



File U.S. Fuel
ACT/007/011
Folder 2A

United States Department of the Interior

OFFICE OF THE SOLICITOR

DENVER REGION
P.O. BOX 25007
DENVER FEDERAL CENTER
DENVER, COLORADO 80225

July 11, 1978

Mr. Ron Daniels
Utah Division of Oil, Gas, and Mining
1588 West North Temple
Salt Lake City, Utah 84116

Re: U.S. Fuels

Dear Mr. Daniels:

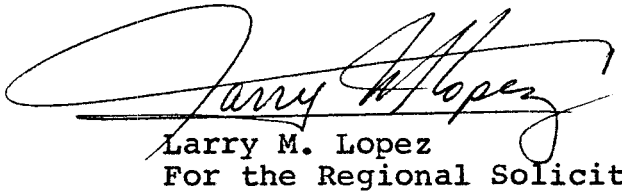
You have requested a legal opinion from this Office regarding the applicability of the Surface Control and Reclamation Act of 1977 (the Act) to the proposed construction of U.S. Fuels Corporation. The fact situation which you related to this Office is that U.S. Fuels wishes to expand their Office and Warehouse area below the town of Hiawatha, Utah. This area is approximately 3 to 4 miles distant from the mine site(s) which U.S. Fuels operates. You further explained that this area is used for the headquarters of the corporation and that at no time is the coal which is mined in the mine(s) operated by the U.S. Fuels brought to this location.

Your question was, Does the Act apply to this new construction? The answer to your question is, No.

Under Section 701(28) of the Act, the definition of "surface coal mining operations" which expresses the scope of the coverage of the Act, such a headquarters area which is not located adjacent to the mine operation(s) and at which incidental activities to the activities enumerated in Section 701(28)(A) are not conducted is not considered covered under the Act. Further, after reviewing Section 701(28)(B) which lists the types of activities contemplated by Congress as covered by the Act, nothing similar to your fact situation is covered.

We hope that this satisfies your request. Should you have any further legal questions, please feel free to contact us.

Sincerely,



Larry M. Lopez
For the Regional Solicitor

cc: Regional Director, OSM, Denver
Ass't. Solicitor, Government Relations, Washington
Acting Ass't. Director, State & Federal Programs, Washington

STATE OF UTAH
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF OIL, GAS, AND MINING
1588 West North Temple
Salt Lake City, Utah 84116
(801) 533-5771

February 6, 1978

Terence W. Danielson
Hydrologist
United States Geological Survey
Water Resources Division
8002 Federal Building
Salt Lake City, UT 84138

Dear Terry:

Enclosed with this letter please find a copy of the EIA for the U.S. Fuel, King No. 4 Mine. Also included for your information is their mining and reclamation plan as submitted to us. We have detailed mine maps and surface facility maps for your inspection if needed. You might also be interested in a new publication by the Utah Geological Survey entitled, "Coal Drilling at Trail Mountain, North Horn Mountain and Johns Peak Areas, Wasatch Plateau, Utah," Bulletin 112. It includes detailed drill hole$ logs and measured sections plus correlation diagrams and both structural and isopach maps of the Hiawatha Bed in the Trail Mountain and West East Mountain Areas.

Sincerely,

Brian

BRIAN W. BUCK
ENGINEERING GEOLOGIST

/jy

Enclosures

ACT/007/041

ENVIRONMENTAL IMPACT ANALYSIS

UNITED STATES FUEL COMPANY

KING NO. 4 UNDERGROUND MINE

U-026583/058261

CARBON COUNTY, UTAH

PREPARED BY

ROBERT W. CRACKNELL

NOVEMBER 1, 1977

OFFICE OF THE AREA MINING SUPERVISOR

CONSERVATION DIVISION

8426 FEDERAL BUILDING

125 SOUTH STATE STREET

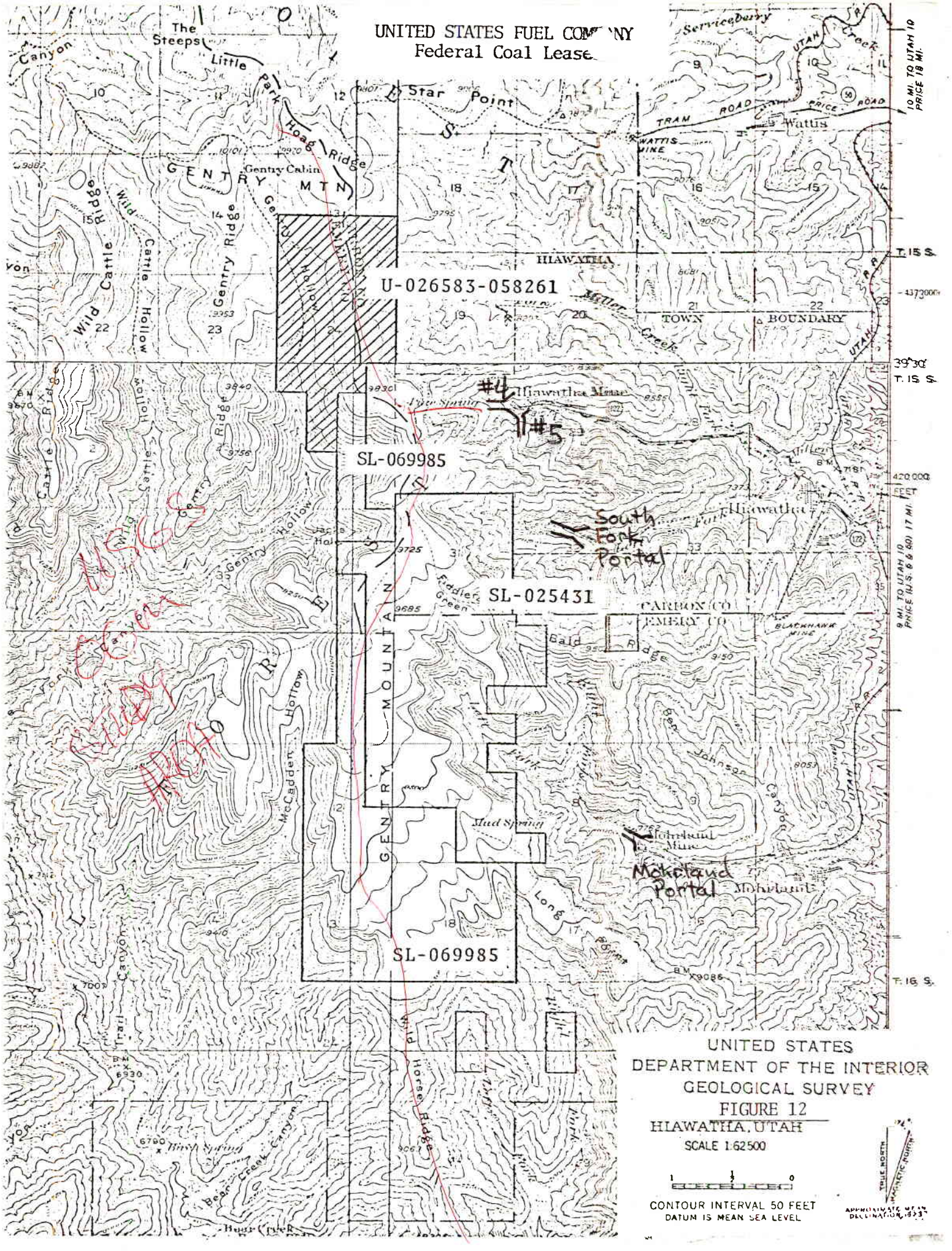
SALT LAKE CITY, UTAH 84138

Constant exhausting of mine air by fans will alter a localized portion of this airshed. Temperature of the exhausted air may differ from the free air in the vicinity. This may create a micro-climate in and around the fan that may differ from the natural airshed. The exhaust air may also have suspended particulates such as rock dust and coal dust, and may have abnormal concentrations of mine gases.

How all this will affect the physical environment is unknown. Personal observations at similar installations shows no noticeable impact although normal winter conditions such as snowpacks, and freezing and thawing is nonexistent where the mine air is exhausted. The possible impact will influence less than an acre of land immediately adjacent to the fan.

7. Hydrology of the Area

The water drainage patterns in the area surrounding the discussed land are shown in Figure 12 . Of the many drainage channels, most are normally dry or intermittent. Some such as Bear Creek Canyon, McCadden Hollow and Gentry Hollow have small springs or seeps at various points in their channels, but only Cedar and Miller Creeks flow continuously throughout the year from within the property area. Cedar Creek with its tributaries, the left and right forks, are part of the San Rafael River system. Its tributaries include North Fork, Middle Fork, and South Fork. Water volume measurements have been taken at Cedar Creek on a regular basis for many years. This data is shown in Figure 13. No recent measurements have been made on Miller Creek.


UNITED STATES FUEL COMPANY
Federal Coal Lease
U-026583-058261
SL-069985
SL-025431
SL-069985
#4
#5
Hiawatha Mine
South Fork Portal
Mohrland Portal
HIAWATHA
TOWN
BOUNDARY
GENTRY MTN
Gentry Cabin
Star Point
Wattis
Price
Utah
Carbon Co
Emery Co
T. 15 S.
T. 16 S.
UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
FIGURE 12
HIAWATHA, UTAH
SCALE 1:62500
CONTOUR INTERVAL 50 FEET
DATUM IS MEAN SEA LEVEL

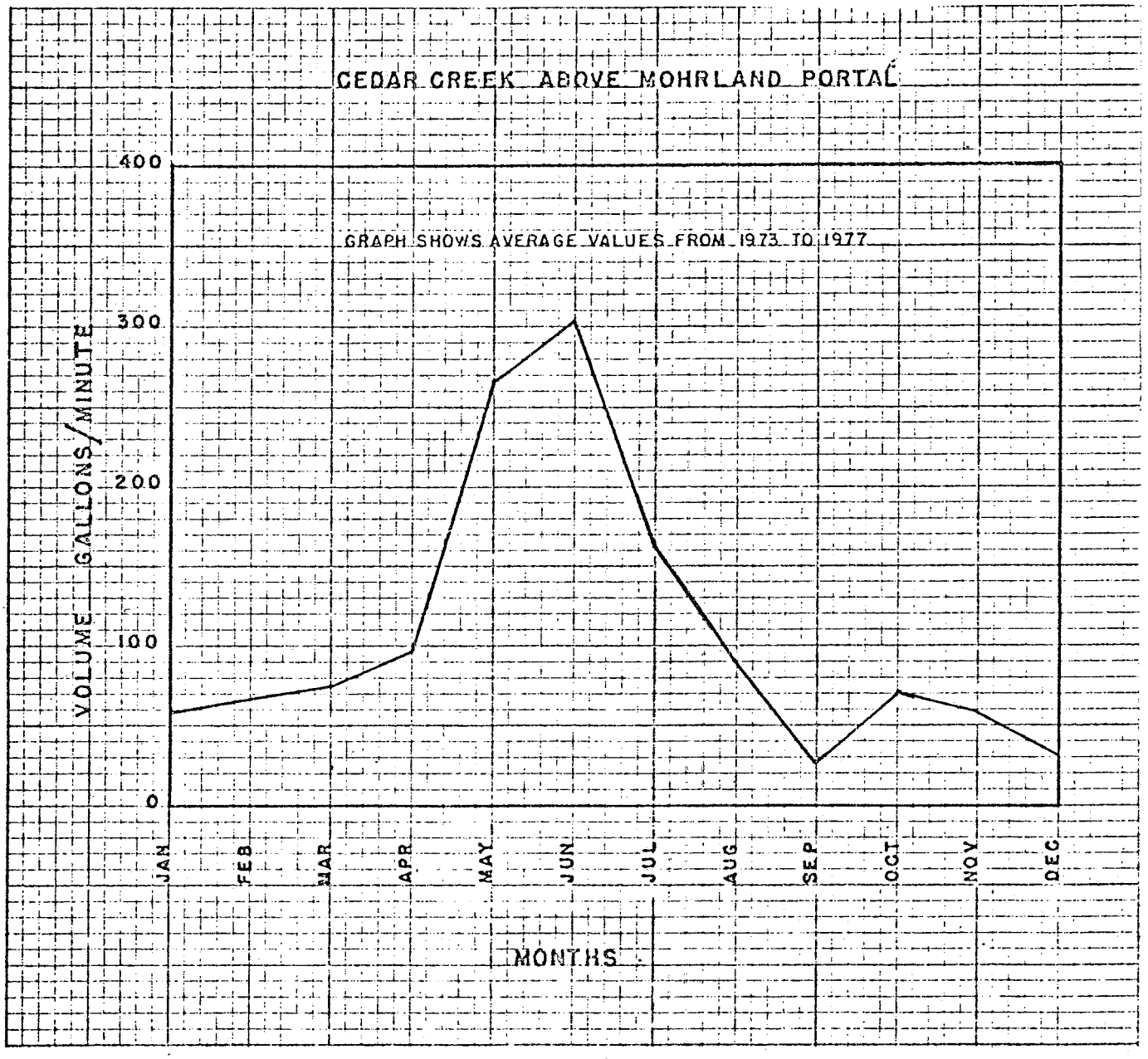

CEDAR CREEK ABOVE MOHRLAND PORTAL
GRAPH SHOWS AVERAGE VALUES FROM 1973 TO 1977
VOLUME - GALLONS/MINUTE
400
300
200
100
0
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
MONTHS

FIGURE 13

Water is encountered from time to time underground in the course of mining. Usually it occurs in the form of drippers or small steady trickles from the floor and roof. These generally tend to decrease and dry up as development advances. Large water flows have been encountered in the past mainly due to contact with the Bear Canyon fault which is apparently a major ground water channel. Old mine workings have contacted the fault at several points and this probably accounts for much of the mine water discharge that flows from the Mohrland portal. Since the dip of the beds in this area are toward the southwest, all water encountered in mining tends to flow to the most southwesterly opening, namely the Mohrland portal. Table 4 and Figure 14 gives quality and quantity data for the mine discharge water.

Water encountered underground indicates that aquifers are present; however, their extent and the extent of the water table is not known.

The probable impact of anticipated mining operations on the hydrology of the area should not be significant so long as contact with the Bear Canyon fault is avoided in future mining. Large water flows originating from the fault could, as mentioned above, flow to the most southwesterly opening causing changes in drainage patterns.

The impacted surface area involves the upper reach of Miller Creek and several unnamed tributaries. This area receives approximately 25 inches of precipitation annually, mostly in the form of snow. Snowpacks in excess of four feet may be common during the winter. Additionally, frequent, brief duration summer thunderstorms may drop one inch or more of rain in localized areas.

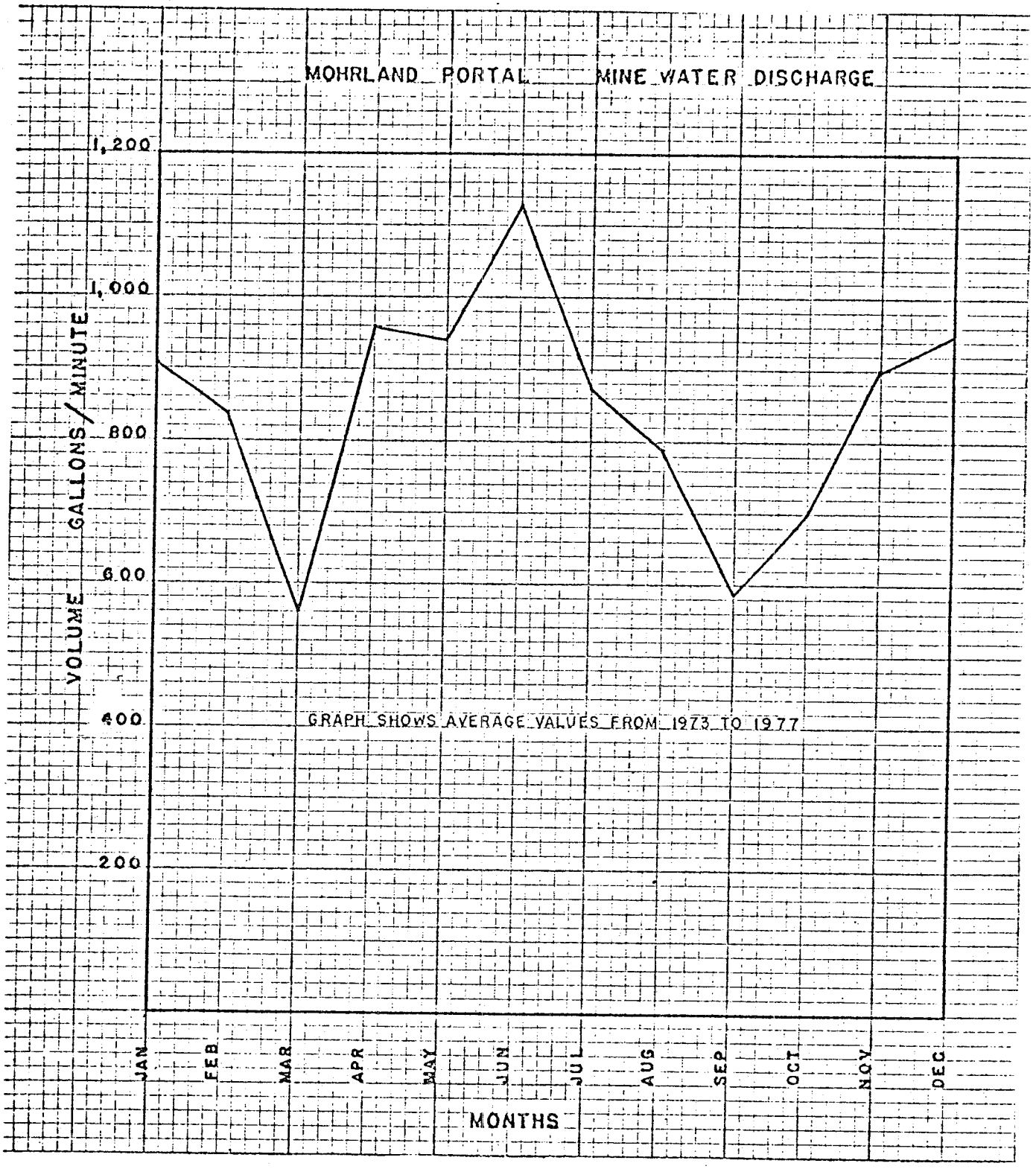

MOHRLAND PORTAL MINE WATER DISCHARGE
1,200
1,000
800
600
400
200
VOLUME GALLONS / MINUTE
GRAPH SHOWS AVERAGE VALUES FROM 1973 TO 1977
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
MONTHS

FIGURE 14

CHEMICAL ANALYSIS
OF
MOHRLAND PORTAL MINE WATER DISCHARGE

Alkalinity as CaCO3 mg/l	274.0
Bicarbonate as HCO3 mg/l	334.2
Calcium as Ca mg/l	94.4
Carbonate as CO3 mg/l	<0.01
Chloride as Cl mg/l	6.0
Conductivity umhos/cm	1.110
Fluoride as F mg/l	0.43
Hardness as CaCO3 mg/l	482.0
Hydroxide as OH mg/l	<0.01
Magnesium as Mg mg/l	59.04
pH	7.35
Potassium as K mg/l	4.15
Sodium as Na mg/l	11.9
Sulfate as SO4 mg/l	220.0
Total Dissolved Solids mg/l	725.0
Turbidity FTU	0.25
Nitrate as NO3-N mg/l	0.110
Total Phosphate as PO4-P mg/l	0.140
Ortho Phosphate as PO4-P mg/l	0.120
Aluminum as Al mg/l	0.012
Antimony as Sb mg/l	<0.001
Arsenic as As mg/l	<0.001
Barium as Ba mg/l	0.015
Beryllium as Be mg/l	<0.001
Boron as B mg/l	0.005
Cadmium as Cd mg/l	<0.001
Chromium as Cr mg/l	<0.001
Cobalt as Co mg/l	<0.001
Copper as Cu mg/l	0.003
Germanium as Ge mg/l	<0.001
Iron as Fe (Total) mg/l	0.340
Lead as Pb mg/l	0.003
Manganese as Mn mg/l	0.092
Mercury as Hg mg/l	<0.0001
Molybdenum as Mo mg/l	<0.001
Nickel as Ni mg/l	<0.001
Selenium as Se mg/l	<0.001
Silver as Ag mg/l	<0.001
Vanadium as V mg/l	<0.001
Zinc as Zn mg/l	0.009
Chemical Oxygen Demand mg/l	3.0
Total Organic Carbon mg/l	1.0
Silica as SiO2 mg/l	12.0
Oil and Grease mg/l	<1.0
Total Suspended Solids mg/l	<1.0
DISSOLVED OXYGEN mg/l	8.50

TABLE 4

The present hydrologic condition in the immediate mine site area of the proposal has been altered by the previous mining. The present proposal will not introduce any further significant degradation to this area.

8. Vegetation

Vegetation in this area ranges from cold, temperate, desert shrubs at the arid foothill and bench regions, to lush forests and grasslands on top of the plateau. The immediate mine site area is predominately Douglas fir, Aspen, and Engelmann spruce, with associated understory of mountain brome, alpine, aster, sweet anise, snowberry, and red alder.

Following is a description of typical species in the area:

Deseret Shrub

Vegetation of the desert shrub type are more predominant in the lower valley areas below Hiawatha; however, they extend in to this area and can be found interspersed with the more dominent pigmy conifers and mountain shrubs. Typical plants of this type include rabbitbrush, shadscale, greasewood, slatbrush, and prickly pear.

Pigmy Conifers

This is the dominant vegetation on the bench areas in this vicinity. It consists mainly of Utah juniper and pinyon pine. They extend in elevation from 5,000 feet in the low foothills to above 8,000 feet on some of the canyon slopes. Rocky Mountain juniper and one seed juniper are also present in the higher, cooler locations. Other plants common to this zone include Mormon-tea, Spanish bayonet, sagebrush, and cliff rose.

Mountain Shrubs

Mountain shrubs of the evergreen and deciduous types are common throughout most of this area. They generally overlap and eventually displace the pigmy conifers at higher elevations. They tend to dominate south canyon walls across from pigmy conifers at lower elevations and gradually move across and dominate the north walls opposite mountain conifers and aspens at higher elevations. Common mountain shrubs include sagebrush, serviceberry, snowberry, gamble oak, and mountain mohogani.

UNITED STATES FUEL COMPANY

HIAWATHA, UTAH 84527

September 26, 1977

State of Utah
Department of Natural Resources
Division of Oil, Gas and Mining
1588 West North Temple
Salt Lake City, Utah 84116

Re: Mined Land Reclamation Act 1975
Proposed King 5 Mine
U. S. Fuel Company
Hiawatha, Utah

Dear Sirs:

Please be advised that we expect to begin portal excavation for our new King 5 Mine on or about October 1, 1977.

Respectfully submitted,

Duane Wise

Duane Wise
Engineering Dept.

DW/mo

cc: E. Gardiner
File

CIRCULATE TO:

DIRECTOR ☒
PETROLEUM ENGINEER ☐
MINE COORDINATOR ☒
ADMINISTRATIVE ASSISTANT ☒ BeB
ALL ☐

RETURN TO Jane
FOR FILING

ACT/007/011

UNITED STATES FUEL COMPANY

NINETEENTH FLOOR UNIVERSITY CLUB BUILDING
136 EAST SOUTH TEMPLE
SALT LAKE CITY, UTAH 84111

May 31, 1977

Department of Natural Resources
Division of Oil, Gas and Mining
1588 West North Temple
Salt Lake City, Utah 84116

Re: Notice of Intention

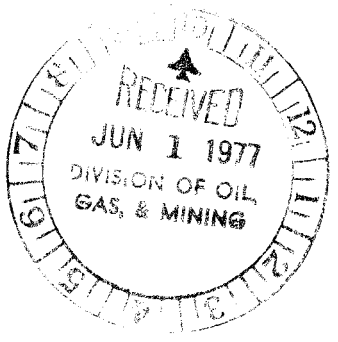
Gentlemen:

Pursuant to Section 40-8-23 of the Mined Reclamation Act of 1975, United States Fuel Company does hereby submit a Notice of Intention for active and proposed mining operations on lands situate in Carbon and Emery Counties, Utah.

Enclosed are MR Form-1 and MR Form-2 along with Surface and Underground Maps showing surface topography with existing facilities, property ownership, location of exploratory drill holes, the extent of underground mine workings and the methods of developing both active and proposed mining areas.

Sincerely,

J. R. Pennington, President
United States Fuel Company

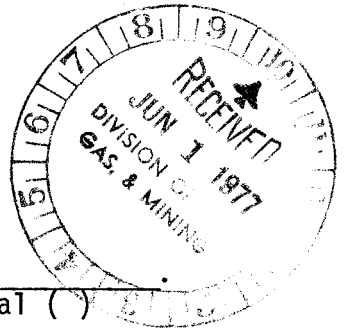


MR FORM 1

Mining Application No._____

Date_____

STATE OF UTAH
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF OIL, GAS AND MINING
1588 West North Temple
Salt Lake City, Utah 84116



NOTICE OF INTENTION TO COMMENCE MINING OPERATIONS
(See Rule M of General Rules and Regulations)

1. Name of Applicant or Company UNITED STATES FUEL COMPANY
Corporation(X) Partnership ( ) Individual ( )

2. Address 19th FLOOR UNIVERSITY CLUB BLDG., 136 EAST SOUTH TEMPLE, SALT LAKE CITY, UT.
Permanent

3. Name and title of person representing company JAMES R. PENNINGTON, PRESIDENT

4. Address SAME AS ABOVE Office Phone (801)355-8857

5. Location of Operation: CARBON AND EMERY COUNTIES

Sections 13,24,25,36	T15S, R7E
Sections 18,19,20,27,28,29,30,31,32,33,34	T15S, R8E
Sections 1,12,13	T16S, R7E
Sections 3,4,5,6,7,8,9,10,15,16,17,18,19,20,21,22	T16S, R8E

6. Name of Mine KING-4 MINE, KING-5 MINE, MOHRLAND MINE, SOUTH FORK MINE

7. Mineral to be mined:
(X) Coal

Mining Method:
CONTINUOUS MINER
ROOM AND PILLAR
DEVELOPMENT
LONGWALL PANELS (future)

8. Have you or any person, partnership or corporation associated with you received an approved Notice of Intention to Commence Mining Operations by the State of Utah for operations other than described herein?
( ) Yes (X) No

If yes, list all approval numbers now under surety:

_____ _____ _____ _____

_____ _____ _____ _____

_____ _____ _____ _____

9. Owner/owners of record of the surface area within the land to be affected:

U.S. FUEL COMPANY FEE Address 19th FLOOR UNIVERSITY CLUB BLDG. 136 EAST SOUTH TEMPLE, SALT LAKE CITY, UT.

GOVERNMENT LEASE Address FEDERAL BLDG. SALT LAKE CITY, UTAH

10. Owner/Owners of record of minerals to be mined:

UNITED STATES FUEL COMPANY Address SAME AS ABOVE

LEASE COAL Address PUBLIC LAND MANAGED BY BLM

11. Owner/Owners of record of all other minerals within any part of the land affected:

NONE Address

11a. Have the above owners been notified in writing?
( ) Yes (X) No

12. Source of Operator's legal right to enter and conduct operations on land to be covered by the Notice FEE OWNERSHIP, GOVERNMENT LEASE #025431-#026583-#058261-#069985

13. Approximate acreage to be disturbed: 10,824 acres

Mining Operation Area: 257 acres+
(*Include operations, storage, & disposal area)

Access Road or Haulageway: 25 acres+

Drainage System: N/A

Total Acres: 11,106 Acres

14. Give the names and post office addresses of every principal Executive, Officer, Partner, (or person performing a similar function) of Applicant:

Name	Title	Address
a. Martin Horwitz	Chmn. of Board	437 Madison Ave. New York, NY 10022
b. J.R. Pennington	President	19th Fl. Univ. Club Bldg., S.L.C. Ut. 84111
c. J.Geo. Gange	Vice President	437 Madison Ave. New York, NY 10022
d. E.M. Gardiner	V.P. & G.M.	Hiawatha, Utah 84527
e. W.H. Ames	Secretary	19th Fl. Univ. Club Bldg., S.L.C. Ut. 84111
f. Seymour Horwitz	Treasurer	437 Madison Ave. New York, NY 10022
g. Benton Boyd		5115 Holladay Blv. S.L.C. Ut. 84117
h. L. Stonestreet		19th Fl. Univ. Club Bldg. S.L.C. UT. 84111
i. Wm. R. Kastelic		19th Fl. Univ. Club Bldg. S.L.C. UT. 84111
j. Paul F. Weber		19th Fl. Univ. Club Bldg. S.L.C. UT. 84111

15. Has Applicant, any subsidiary or affiliate or any person, partnership, association, trust, or corporation controlled by or under common control with Applicant, or any person required to be identified by Item 14, ever had an approval of a Notice of Intention withdrawn or has surety relating thereto ever been forfeited? ( ) Yes (X) No

If yes, explain:

STATE OF UTAH

COUNTY OF SALT LAKE

I, J. R. Pennington, have been duly sworn depose and attest that all of the representations contained in the foregoing application are true to the best of my knowledge; that I am authorized to complete and file this application on behalf of the Applicant and this application has been executed as required by law.

Signed _____

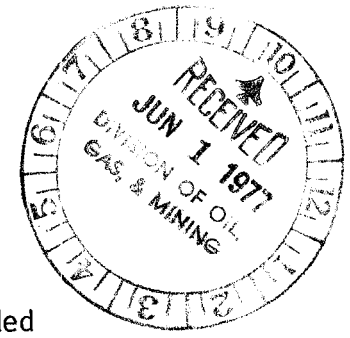
Taken, subscribed and sworn to before me the undersigned authority in my said county, this 31st day of May, 1977

Notary Public Florence G. Smith

My Commission Expires: April 15, 1978

MR-FORM 2

STATE OF UTAH
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF OIL, GAS AND MINING
1588 West North Temple
Salt Lake City, Utah 84116



MINING AND RECLAMATION PLAN
(Other forms may be used in lieu of MR 2, provided they contain the same information)

1. NAME OF APPLICANT OR COMPANY United States Fuel Company.

2. PROPOSED TYPE OF OPERATION Coal Mining (Underground).

3. (a) PRIOR LAND USE(S) Grazing and Mining.

   (b) CURRENT LAND USE(S) Same.

   (c) POSSIBLE OR PROSPECTIVE FUTURE LAND USE(S) Same.

4. WHAT VEGETATION EXISTS ON THE LAND PROPOSED TO BE AFFECTED Desert Shrubs, Pigmy Conifers, Mountain Shrubs, Mountain Deciduous Forests, Mountain Coniferous Forests, Grasses and Herbs.

   (a) TYPES AND ESTIMATED PERCENT COVER OR DENSITY: Shrubs, Grass & Herbs 50% Pigmy Conifers 30%, Mountain Conifers & Deciduous Trees 20%.

5. WHAT IS THE PH RANGE OF THE SOIL BEFORE MINING? 7.0 to 7.5 PH

   NAME OF PERSON OR AGENCY AND METHOD OF DETERMINING PH Robert Eccli (Mine Engineer) Model 101 Aquatronic Portable PH Meter

6. SITE ELEVATION ABOVE SEA LEVEL 8210 Ft. (Mine Portal)

7. IN CASE OF COAL, OIL SHALE, AND BITUMINOUS SANDSTONE:
   PRINCIPAL SEAM(S) AND THICKNESS(ES) A-Seam 4 to 6 ft., B-Seam 4 to 12 ft. Hiawatha Seam 5 to 16 ft. Upper Seam 4 to 6 ft.

8. ESTIMATED DURATION OF MINING OPERATIONS 20 Years.

9. HAS OVERBURDEN, WASTE OR REJECTED MATERIALS BEEN CLASSIFIED AS ACID OR ALKALI PRODUCING? ( ) Yes (X) No

   DOES THE ABOVE MATERIAL BEING MOVED HAVE ANY OTHER CHARACTERISTICS AFFECTING REVEGETATION? Refuse from Preparation Plant Retards Revegetation.

10. WILL ANY UNDERGROUND WORKINGS OR AQUIFERS BE ENCOUNTERED? (X) Yes ( ) No

DESCRIBE: Underground aquifers and water bearing structures have been encountered in past mining operations. The Bear Canyon Fault which marks the western boundary of present mine workings is an important ground water channel and probably is the source of most of the mine water being discharged.

IS THERE AN ACTIVE DISCHARGE OF WATER FROM ABANDONED DEEP MINES ON OR CROSSING THE LAND AFFECTED? (X) Yes ( ) No IF YES DESCRIBE THE QUALITY OF WATER BEING DISCHARGED.

The quality of the discharge water is of a culimary nature. Depending on demand, approximately 20% to 100% of this discharge is piped to the town of Hiawatha for domestic, culinary and industrial uses. The water is diverted in compliance with permits from the State Division of Water Rights.

11. DESCRIBE SPECIFICALLY A DETAILED PROCEDURE FOR:

(a) THE MINING SEQUENCE

At the present time, it appears that along with our currently operating King 4 Mine, three additional mines can be developed within the property limits of this plan. Following is a description of existing and proposed operations. It is naturally assumed that unforeseen safety, economic, or geologic factors could substantially change these proposals.

1. King-4 Mine

B Seam

This is our currently operating King 4 mine. Production from this mine began in the summer of 1975 when new portals and surface facilities were completed in Middle Fork Canyon.

Presently, there are five operating sections, each utilizing the continuous miner, room and pillar type of mining method.

Mining consists of initially driving 6 entry main development headings from which panels are later extended. For the most part, all entries and crosscuts are driven on 100 foot centers. Panels are mined by developing 6 entries to the limit of the area then adding one to four additional entries on each side while retreating and pulling pillars. Figure 2 shows proposed development.

A Seam

The extraction of coal from the A Seam in the King 4 mine will most likely have to be delayed until the B Seam is mined out. The reason for this is that the rock interval between the two seams is only 20 to 40 feet thick throughout most of the area. Also, practically all of the A Seam reserves lie under B Seam reserves that have not yet been developed. Because of the necessity of mining beneath mined out workings and because of the low thickness of the A Seam, longwall methods with their inherent roof support capability are being evaluated for use.

Access to the A Seam will be by way of a rock tunnel slope developed from the existing B Seam workings. Figure 3 shows a proposal for A Seam development.

2. King-5 Mine

B Seam

This is a proposed new mine which will be operated partly in lease land. It will be located as shown in Figure 4 with surface facilities shared with the King 4 mine. It is scheduled to begin development during the fourth quarter of 1977.

Mining methods will be the same as for King 4 using low profile equipment. A main heading containing 6 entries will be driven due south to the limit of the reserves. Retreat mining will then be established by extracting panels on both sides of the main in a northerly direction. An opening for ventilation and drainage will be established in the South Fork area.

A Seam

The A Seam in the King-5 mine will be developed to extract the coal existing in the block between South Fork and Middle Fork of Miller Creek. Mining will be delayed pending completion of B Seam mining above. Access will be either by rock slope from the B Seam or by a separate portal in South Fork where surface facilities can be shared with a proposed Hiawatha Seam mine. Figure 5 shows a development proposal using the South Fork access.

3. Mohrland Mine

Hiawatha Seam

Construction of surface facilities for this mine are planned to begin during the second half of 1978. Surface facilities and initial development mining will be on fee land.

The mine yard and portals will be built on the south side of Cedar Creek Canyon across from the old abandoned King 2 mine portals. Surface structures will include a material yard, parking lot, change house administration building, shop, electrical sub-stations, fan building, water tank and conveyor system to carry coal to a train loading facility near the old Mohrland townsite.

Figure 6 shows a proposed mining layout. The main entry system will be developed with continuous miners and shuttle cars using conveyor haulage. Production will probably first be derived by room and pillar mining but later it is hopeful that longwall systems can be introduced if conditions are favorable.

Upper Seam

This seam is located approximately 330 feet above the Hiawatha Seam. Drill holes indicate that the part of the Upper Seam which reaches a mineable thickness (4 feet or more) is not very extensive. Also, it is situated in a somewhat inaccessable location. It is hopeful that access can be provided from the Hiawatha Seam if development in rock is not prohibitive. Another alternative would be to construct separate portals, either directly above the Hiawatha Seam portals or on up Cedar Creek Canyon where the existing road crosses the Upper Seam outcrop. In any case access will be difficult and for this reason, it is not certain whether this seam is economically mineable at this time. Figure 7 shows a preliminary mine layout proposal with access from the existing Cedar Creek road.

4. South Fork Mine

This mining unit will be developed in a remnant of the Hiawatha Seam in the South Fork area. Figure 8 shows a development proposal. The A Seam has been mined extensively above this unit and may therefore require longwall mining methods to provide adequate roof support. The rock interval between the two seams in this area averages about 40 feet.

Development will require driving two entries through previously mined but uncaved workings for belt haulage and supply facilities. Intake and return airways will them be picked up from existing workings and a 6 entry development heading will be driven to the western boundry of the coal block. Panels will then be driven north and south of the main heading in a retreat fashion.

Surface facilities will be located on fee land in the South Fork mine yard where an existing dry house, shop, fan building, and water tank can be reactivated.

(b) CONSTRUCTION AND MAINTENANCE OF ACCESS ROADS

Existing access roads serving the King 4 and 5 mines at Middle Fork and the Mohrland mine at Cedar Creek are shown on contour maps included with this plan. The Middle Fork and South Fork roads are paved and should not require additional construction. The Mohrland road will require considerable construction to upgrade it to adequate conditions.

Plans for upgrading the Mohrland road or construction of new roads have not yet been formulated; however, all construction and maintenance will be consistent with feasible known technology and sound engineering principles.

(c) SITE PREPARATION

Mining operations covered by this plan are of the underground type, using surface facilities which have been in existance for several years. For this reason, it is not anticipated that additional major site preparation will be required. Where it is required, it will be accomplished in the following manner: Brush and trees will be dozed from the site and disposed of in an approved manner. Where possible, top soil will be

stripped and stockpiled away from the disturbed area. Earth and rock will be excavated and re-deposited in such a way as to cause a minimum disturbance to existing land.

(d) METHOD OF REMOVING AND STOCKPILING TOPSOIL OR DISTURBED MATERIAL

Topsoil or other disturbed material will be removed by dozers or scrapers and segregated in a separate pile away from other soil. Measures will be taken to protect the soil from wind and water erosion.

(e) METHOD OF PLACEMENT OR CONTAINMENT OF DISTURBED MATERIAL

The method of placement and containment of disturbed material will be in accordance with sound engineering standards and practices and applicable Federal and State Laws. Disturbed material will be compacted where necessary to ensure stability. Acid-forming or other toxic materials will be graded and covered where necessary to prevent leaching. Slopes will be kept to a minimum to prevent erosion.

(f) FINAL STABILIZATION OF DISTURBED MATERIALS

Final stabilization will involve regrading the area back to as near original contour as possible using the original soil as a top covering. Where required, all holes, tranches and other excavations will be filled in, compacted, graded and revegetated in such a way as to restore the land as near as possible to its original condition. Refuse piles and slurry impoundments will be abandoned in compliance with State and Federal regulations.

GRADING AND REGRADING

SPECIFICALLY DESCRIBE:

(a) TYPICAL CROSS-SECTION OF REGRADING

Final regrading of refuse piles and other disturbed areas will be done in a manner that will compliment "the lay of the land." Natural drainage patterns will be observed. Steep side embankment slopes will be reduced. All hazardous conditions will be eliminated, and a reasonable effort will be made to bring the end product into harmony with the natural environment.

(b) METHOD OF SPREADING UPPER HORIZON MATERIAL

Topsoil or other suitable material will be spread by alternate layers using trucks and dozers equipped with blades to spread and compact the top layer of soil approximately 1 foot thick, or whatever thickness is deemed necessary to stabilize the pile and support revegetation.

(c) WHAT TYPE OF SOIL TREATMENT WILL BE UTILIZED?

If reclamation conditions indicate that special soil preparation or fertilizer application is required, they will be carried out according to recommendations of the Forest Service or Soil Conservation Service.

(d) METHOD OF DRAINAGE CONTROL

The following procedures will be used in drainage control:

(1) Gentle slopes will be utilized to retard erosion.
(2) Refuse piles will be graded in such a manner to compliment natural drainage patterns.
(3) Major natural drainage streams will be diverted around large refuse deposits.
(4) Unnatural impoundments will be eliminated.

(e) MAXIMUM GRADING SLOPE

The maximum grading slope will be 1-1/2 to 1.

The above guidelines affecting grading and regrading are tentative proposals only; however, we will comply with State and Federal laws in effect at the time.

TESTING

1. DESCRIBE METHOD FOR TESTING STABILITY OF RECLAMATION FILL MATERIAL.

If questionable stability occurs, a geotechnical consultant will be employed to determine stability of the covered area.

Final soils test will be done in accordance with procedures set forth forth by the appropriate government agency.

2. DESCRIBE ANY SOIL TREATMENT EMPLOYED AS AN AID TO REVEGETATION

See item (c) under Grading and Regrading.

3. DESCRIBE SURFACE PREPARATION OF AREAS INTENDED TO SUPPORT VEGETATION:

The following general procedures will be observed:

(a) Excessive debris (prohibitive to revegetation) will be removed.
(b) Final grading and leveling will be done to enhance growth.
(c) Tilling and/or discing will be done as required. Natural drainage will be utilized to supplement new growth areas.
(d) Soil preparation and fertilizer will be used if required.

REVEGETATION

1. REVEGETATION TO BE COMPLETED BY

(X) OPERATOR
( ) SOIL CONSERVATION DISTRICT
( ) PRIVATE CONTRACTOR
NAME_____
( ) OTHER_____

( ) HYDROSEEDING
( ) AERIAL SEEDING
(X) CONVENTIONAL OR RANGELAND DRILLING
( ) OTHER_____

2. WILL MULCH BE USED?

TYPE No RATE/ACRE N/A lbs.

3. REVEGETATION PLAN AND SCHEDULE

Species	Rate/Acre	Planting Location	Facing N-S-E-W	Season To Be Replanted
As required--				

4. WILL AFFECTED AREA BE SUBJECT TO LIVESTOCK OR WILDLIFE GRAZING? (X) Yes ( ) No. WILL VEGETATION PROTECTION BE NEEDED? No

5. WILL IRRIGATION BE USED? ( ) Yes (X) No Type_____

6. DESCRIBE MAINTENANCE PROCEDURES FOR REVEGETATION IF NEEDED, UNTIL SURETY RELEASE IS GRANTED. A periodic inspection of the replanted areas will be made and if needed, corrective measures will be taken to ensure the revegetated areas have been permanently established.

I, the undersigned Operator, hereby submit this to be my Reclamation and Mining Plan for the area shown on the attached map. I further understand that the operation will be conducted in accordance with the Mined Land Reclamation Act of 1975, and all rules and regulations currently in effect thereunder.

Signed _____ Operator Date May 31, 1977

Taken, subscribed and sworn to before me the undersigned authority in my said county, this 31st day of May 19 77.

Notary Public Florence B. Smith

My Commission Expires: April 15, 1978

Dr. be

UNITED STATES FUEL COMPANY

HIAWATHA, UTAH 84527

May 24, 1976

PLAN FOR EXTINGUISHING FIRES ON
REFUSE PILES & SLURRY IMPOUNDMENTS

1211-UT-9-0001
-0002
-0003
-0004
-0005
-0007

TO: Mr. John W. Barton, District Manager
M.E.S.A Coal Mine Health & Safety
P.O. Box 15037
Denver, Colorado 80215

FROM: Robert Eccli, Mine Engineer
King Mine, I.D. No. 42-00098
U. S. Fuel Company
Hiawatha, Utah 84527

Dear Mr. Barton:

This plan is submitted for your approval as required by Federal Regulation 77.216(c) and 77.215(j). We propose to extinguish fires by one or both of the following methods:

Excavation

Burning areas will be extinguished by excavating the burning refuse from the embankment with construction equipment such as dozers, front end loaders or drag lines. The refuse will be spread out at a safe distance from the embankment and allowed to burn itself out. The embankment will then be repaired by backfilling with soil.

Excavation will be started at the toe of the embankment and progress inward on firm ground so as to eliminate the possibility of burned-out areas collapsing under the weight of heavy equipment. One man will be assigned to watch the embankment for signs of cracking or sloughing and to warn equipment operators of dangerous slides.

Quinching with water

With this method the fire will be extinguished by building a dike around the burning area and directing a

stream of water into the diked pond. The size of the diked pond will be kept to a minimum and in no case will it be constructed with a storage volume greater than 20 acre-ft.

Only those persons authorized by the mine superintendent and who have an understanding of the procedures to be used will be involved in the extinguishing operations. Men who have had previous experience extinguishing fires will be used whenever possible.

Yours truly,

Robert Eccli

Robert Eccli
Mine Engineer

RE/mf

United States Department of the Interior

MINING ENFORCEMENT AND SAFETY ADMINISTRATION
COAL MINE HEALTH AND SAFETY
POST OFFICE BOX 15037
DENVER, COLORADO 80215

DISTRICT 9

June 30, 1976

In Reply Refer To:
EMS - H&S 3-1-8

Robert Eccli, Mine Engineer
United States Fuel Company
Box A
Hiawatha, Utah 84527

Re: King Mine
I.D. No. 42-00098
Refuse Piles and Slurry
Impoundments

Dear Mr. Eccli:

Your plan for extinguishing fires on refuse piles and slurry impoundments as required by Sections 77.216(e) and 77.215(j), 30 CFR 77, is approved.

Should a subsequent inspection by an authorized representative of the Secretary determine that the plan is inadequate or does not provide for the safety of workmen, appropriate action will be taken.

Sincerely yours,

Harold E. Dolan
for John W. Barton
District Manager

Enclosure

UNITED STATES FUEL COMPANY

HIAWATHA, UTAH 84527

1211-UT-9-0001
-0002
-0003
-0004
-0005

April 29, 1976

PROGRAM FOR INSPECTION AND CORRECTION OF
HAZARDOUS CONDITIONS ON SLURRY IMPOUNDMENTS

TO: Mr. John W. Barton, District Manager
M.E.S.A. Coal Mine Health and Safety
Post Office Box 15037
Denver, Colorado 80215

FROM: Robert Eccli, Mine Engineer
King Mine, I.D. No. 42-00098
U.S. Fuel Company
Hiawatha, Utah 84527

Dear Mr. Barton:

This plan is submitted for your approval as required by Federal Regulation 77.216-3(e).

All water, sediment, or slurry impoundments which have not been abandoned, will be examined for structural weakness and other hazardous conditions by a qualified person designated by the Mine Superintendent. The examination will be made weekly.

An inspection form as shown in Figure 1, will be used for each facility. All items on the form will be checked. Items which do not apply will be marked N/A.

No instrumentation is being used or planned. Should instrumentation be required, it will be monitored weekly according to an applicable outline.

Procedures for evaluating hazardous conditions are listed below:

Subsidence

A hazardous condition will be assumed to exist when embankment subsidence of serious magnitude is detected on any impoundment.

Sloughing and Sliding

Signs of sloughing and sliding as indicated by bulging, vertical displacement scarps and cracking will be assumed to present a hazardous condition when such signs are of sufficient magnitude to indicate that a serious failure surface is developing.

Piping

Evidence of piping, such as a large increase in seepage containing suspended solids and silt or large slumps or sinkholes in the slurry surface, will be considered to present a hazardous condition.

Procedures for eliminating hazardous conditions are listed below:

1/ Stop slurry discharge into the impoundment.

2/ Blockade roads and re-route traffic if potential embankment failure is in a location to threaten roads.

3/ Allow water to drain from the impoundment by natural seepage.

When a potentially hazardous condition exists, it will be immediately reported to the Mine Superintendent who will notify the District Manager by telephone.

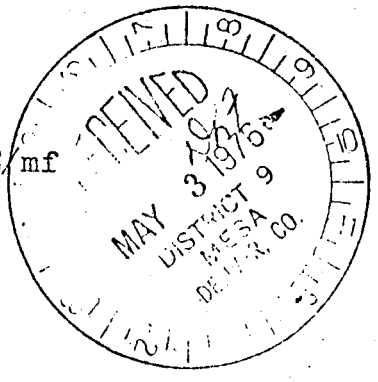
Procedures for evacuating coal miners from mine property which may be affected by hazardous conditions will consist of evacuating those miners whose work requires them to be in the vicinity of the impoundments. These men will be notified and evacuated by the person responsible for inspecting the impoundments.

Yours truly,

Robert Eccli

Robert Eccli
Mine Engineer

RE/mf



COAL OPERATORS WEEKLY INSPECTION FOR

COAL WASTE IMPOUNDMENTS

Name_____ Title_____

Date_____ Date Last Inspected_____

Site Name_____

Refusal Facility ID No._____

1.	Foundation preparation (removal of vegetation? topsoil?)	___Yes ___No
2.	Lift thickness (inches)	_____
3.	Compaction (4 to 6 complete passes)	___Yes ___No
4.	Burning* (specify extent & location)	___Yes ___No
5.	Angle of slope (degrees)	_____
6.	Seepage* (specify location, color & approximate volume)	
	From underdrain pipes	___Yes ___No
	At isolated points on embankment slopes	___Yes ___No
	At natural hillside	___Yes ___No
	Over widespread areas	___Yes ___No
	From downstream foundation area	___Yes ___No
	"Boils" beneath stream or ponded water	___Yes ___No
7.	Cracks or scarps on crest	___Yes ___No
8.	Cracks or scarps on slope	___Yes ___No
9.	Sloughing or bulging on slope	___Yes ___No
10.	Major erosion problems	___Yes ___No
11.	Surface movements in valley or on hillside*	___Yes ___No
12.	Erosion of toe*	___Yes ___No
13.	Water impounded against toe*	___Yes ___No
14.	_____ Increase _____ Decrease in water level (feet)	_____
15.	Embankment freeboard (feet)	_____
16.	Cracks, bulging, or erosion on upstream face*	___Yes ___No
17.	Visible sumps or sinkholes in slurry surface	___Yes ___No
18.	Clogging*	
	Spillway channels & pipes	___Yes ___No
	Decant system	___Yes ___No
	Diversion ditches	___Yes ___No
19.	Cracking or crushing of pipes*	
	Spillway pipes	___Yes ___No
	Decant system	___Yes ___No
20.	Trash racks clear & in place	___Yes ___No

Adverse conditions noted in items marked (*) should be described (extent, location, volume, etc.) in the space provided. Major adverse changes in these items could cause instability.

Inspection Category	Comments
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

United States Department of the Interior
MINING ENFORCEMENT AND SAFETY ADMINISTRATION
COAL MINE HEALTH AND SAFETY
POST OFFICE BOX 15037
DENVER, COLORADO 80215

DISTRICT 9

May 13, 1976

In Reply Refer To:
EMS - H&S 3-1-8

Robert Eccli, Mine Engineer
United States Fuel Company
Box A
Hiawatha, Utah 84527

Re: Impoundments:
I. D. Nos.: 1211-UT-9-0001
1211-UT-9-0002
1211-UT-9-0004
1211-UT-9-0005
King Mine, I. D. No. 42-00098
Inspection Program

Dear Mr. Eccli:

The inspection program, submitted on April 29, 1976, as required by Section 77.216-3, 30 CFR 77 for the subject impoundments, has been approved and placed on file at this office.

As required by the regulations the inspections must be promptly recorded by the qualified person making the inspection and signed by one of the officials listed in Section 77.216-3(d), 30 CFR 77. These records must be available at the mine for inspection by a qualified representative of the Secretary of the Interior.

Sincerely yours,

Harold E. Nelson
for John W. Barton
District Manager

Enclosure