Table 7-1

Results of Spring Inventory Conducted On and Adjacent To Hiawatha's Permit In October, 1983

LOCATION NUMBER	FLOW (gpm)	SPECIFIC CONDUCTANCE (umhos/cm @ 25° C)	GEOLOGIC CONDITIONS	SIGNS OF USAGE	COMMENTS
15-7-11-1	1	260	Steep slopes (base of Castlegate Sandstone)	Deer tracks	Chem date in WRI 81-539
11-2	Seep		At sandstone - Shale interface (base of Castlegate ss)	None	Dry
11-3	Seep		At sandstone - Shale interface (in Blackhawk Formation)	None	
11-4	Seep		In limestone (North Horn FM.)	None	
15-7-12-1	<1	260	Base of limestone (North Horn FM.)	Deer tracks	Chem data in BDR 31
15-7-13-1	1	320	Fractured sandstone within limestone (North Horn FM)	Developed with trough	
13-2	Seep		In limestone (North Horn FM.)	None	
13-3	4	320	Fractured sandstone within limestone (North Horn FM)	Wildlife	
13-4	Seep		In limestone (North Horn FM.)	Developed as pond. Cattle\deer tracks	
13-5	Seep		In limestone (North Horn FM.)	Deer & cattle tracks	
13-6			In limestone (North Horn FM.)	Developed as pond. Cattle & deer tracks	
14-7-14-1			In limestone (North Horn FM.)	Deer & cattle tracks	
15-7-14-2	Seep		In limestone (North Horn FM.)	Developed as pond. Cattle & deer tracks	No outflow
14-3	7	380	In limestone (North Horn FM.)	Deer & cattle tracks	Chem. data in WRI 81-539
14-4	Seep		In limestone (North Horn FM.)	Deer & cattle tracks	
14-5	Seep		In limestone (North Horn FM.)	Deer tracks	
14-6	8	320	At base of resistance unit (North Horn FM.)	Fenced, developed	U.S.Fuel monitor- ing station SP-3
15-7-15-1	2	400	In limestone (North Horn FM.)	Fenced, developed	Chem. data in BRD 31 & WRI 81-539
15-2	Seep		In limestone (North Horn FM.)	Deer & cattle tracks	
15-3	Seep		In limestone (North Horn FM.)	Deer tracks	
15-4	Seep		In limestone (North Horn FM.)	Deer tracks	
15-5	2	540	Base of limestone (North Horn FM.)		Chem. data in
15-6	4	480	From fractured sandstone (Price River Fm)	Deer & cattle tracks	WRI 81-539
15-7	2	370	At base of limestone (North Horn FM.)	Deer tracks	Chem. data in WRI 81-539

Table 7-1 (Continued)

Results of Spring Inventory Conducted On and Adjacent To Hiawatha's Permit In October, 1983

LOCATION NUMBER	FLOW (gpm)	SPECIFIC CONDUCTANCE (umhos/cm @ 25° C)	GEOLOGIC CONDITIONS	SIGNS OF USAGE	COMMENTS
15-7-22-1	1	430	At sandstone-shale interface (Price River Fm.)	None	Chem. data in WRI 81-539
22-2	10	430	Near base of sandstone (Price River Formation)	Deer & cattle tracks	
22-3	12	390	Near base of sandstone (Price River Formation)	Deer & cattle tracks	
22-4	Seep		Fractured Sandstone (Castlegate sandstone)	Deer & cattle tracks	
15-7-23-1	Seep		At sandstone - Shale interface (in Price River Fm.)	Deer & cattle tracks	Possible past development
23-2	Seep		Near base of limestone (in North Horn Fm.)	None	
23-3	5		Base of fractured sandstone (in Price River Fm.)	Deer & cattle tracks	Not sampled
23-4	Seep		Near base of limestone (North Horn Formation)	Deer tracks	
15-7-24-1	Seep		Fractured sandstone within limestone (North Horn Fm.)	Wildlife	Diffuse seepage
24-2	8	340	At base of steep slope (in North Horn Fm.)	Deer & cattle tracks	
24-3	5	360	In fractured limestone (North Horn FM.)	Deer & cattle tracks	
24-4	Seep		Limestone slope (North Horn Fm.)	Deer tracks	Diffuse seepage
15-7-25-1	Seep		Base of limestone (North Horn Fm.)	Deer tracks	
25-2	8	540	Near base of limestone (North Horn Fm.)	Deer & cattle tracks	Chem data in WRI 81-539
25-3	2		Near base of limestone (North Horn Fm.)	Deer tracks	Not sample
25-4	Seep		Base of limestone (North Horn Fm.)	Deer tracks	
15-7-26-1	Seep		Near base of limestone (North Horn Fm.)	None	
26-2	2	480	Near base of limestone (North Horn Fm.)	Deer & cattle tracks	Chem data in WRI 81-539
26-3	5	500	Near base of limestone (North Horn Fm.)	Deer tracks	Field data in WRI 81-539
26-4	15	460	Near base of limestone (North Horn Fm.)	Deer & cattle tracks	Field data in WRI 81-539
15-7-27-1	29	440	Base of limestone (North Horn Fm.)	Deer tracks	Chem data in WRI 81-539
27-2	11	310	Base of limestone (North Horn Fm.)	Deer tracks	Field data in WRI 81-539
15-7-34-1	Seep		At sandstone-shale interface (Price River Fm.)	None	Diffuse seepage
34-2	Seep		At sandstone-shale interface (Price River Fm.)	None	

Table 7-1 (Continued)

Results of Spring Inventory Conducted On and Adjacent To Hiawatha's Permit In October, 1983

LOCATION NUMBER	FLOW (gpm)	SPECIFIC CONDUCTANCE (umhos/cm @ 25° C)	GEOLOGIC CONDITIONS	SIGNS OF USAGE	COMMENTS
15-7-34-3	Seep		At sandstone-shale interface (Blackhawk Fm.)	Deer tracks	Diffuse seepage
34-4	1	500	At sandstone-shale interface (Blackhawk Fm.)	Deer & cattle tracks	
34-5	Seep		At sandstone-shale interface (Blackhawk Fm.)	None	In road cut
34-6	Seep		At sandstone-shale interface (Blackhawk Fm.)	None	In road cut
15-7-35-1	5	410	Fracture sandstone (Castlegate sandstone)	Cattle tracks	Chem data in WRI 81-539
35-2	Un-known	580	Fractured sandstone (Blackhawk Fm.)	Developed, manhole & valve	Chem data in WRI 81-539
36-3	Seep		At sandstone-shale interface (Blackhawk Fm.)	Deer tracks	
15-7-36-1	1	340	At sandstone lense in limestone (North Horn Fm.)	Deer tracks	
36-2	5	410	At sandstone lense in limestone(North Horn Fm.)	Deer & cattle tracks	
36-3	5	320	In limestone (North Horn Fm.)	Cattle tracks	
15-8-7-1	Seep		Near Base of limestone (North Horn Fm.)	Deer & cattle tracks	
7-2	Seep		Near Base of limestone (North Horn Fm.)	Deer tracks	
15-8-7-3	5	350	At base of limestone (North Horn Fm.)	Deer tracks	U.S.Fuel monitor ing station SP-14
7-4	2	330	In limestone (North Horn Fm.)	Deer & cattle tracks	
7-5	Seep		At sandstone-shale interface	None	
15-8-17-1	Seep		At base of limestone (North Horn Fm.)	None	
17-2	1	320	Near base of limestone (North Horn Fm.)	Deer tracks	
15-8-18-1	2	300	At base of limestone (North Horn fm.)	Deer & cattle tracks	U.S.Fuel monitor ing station SP-1
18-2	Seep		At sandstone-shale interface (Price River Fm.)	Deer tracks	
18-3	Seep		At sandstone-shale interface (Price River Fm.)	Deer tracks	
18-4	2	350	At base of limestone (North Horn Fm.)	Deer & cattle tracks	U.S.Fuel monitor ing station SP-2
18-5	5		Base of sandstone ledge (Castlegate sandstone)	None	Diffuse seepage
15-8-19-1	Seep		At sandstone-shale interface (Price River Fm.)	None	
19-2	4	480	Fractured sandstone (Castlegate sandstone)	Some deer tracks	U.S.Fuel monitor ing station SP-11
15-8-19-3	Seep		At base of limestone (North horn Fm.)	None (inaccessible)	Not sampled

Table 7-1 (continued)

Results of Spring Inventory Conducted On and Adjacent To Hiawatha's Permit In October, 1983

LOCATION NUMBER	FLOW (gpm)	SPECIFIC CONDUCTANCE (umhos/cm @ 25° C)	GEOLOGIC CONDITIONS	SIGNS OF USAGE	COMMENTS
19-4	Seep		At sandstone-shale interface (Blackhawk Fm.)		
19-5	4	480	At sandstone-shale interface (Castlegate sandstone)	Deer tracks	
19-6	Seep		At sandstone-shale interface (Blackhawk Fm.)	None	
19-7	Seep		At sandstone-shale interface (Blackhawk Fm.)	None	
19-8	Seep		At sandstone-shale interface (Blackhawk Fm.)	Some deer tracks	
15-8-30-1	3	460	In limestone above resistant layer (North Horn Fm.)	Developed	sampled at spring box
30-2	2	490	Base of sandstone ledge (Castlegate sandstone)	Deer tracks	
30-3	1	520	Base of sandstone ledge (Castlegate sandstone)	Deer tracks	
30-4	8	530	At base of sandstone (Castlegate sandstone)	Deer tracks	U.S.Fuel monitor ing station SP-12
30-5	5	470	At base of sandstone, above claystone (Castlegate ss)	Deer tracks	
30-6	Seep		Sandstone-shale interface (Blackhawk Fm.)	None	
15-8-31-1	<1	350	In limestone below resistant layer (North Horn Fm.)	Developed with pond & trough	U.S.Fuel monitor ing station SP-4
321-2	Seep		In limestone (North Horn Fm.)	None	In roadway
31-3	<1	280	In limestone (North Horn Fm.)	None	In roadway
31-4	4	460	Base of fractured sandstone (Castlegate sandstone)	Deer tracks	U.S.Fuel monitor ing station SP-13
31-5	2	640	Base of fractured sandstone (Castlegate sandstone)	Developed	
15-8-32-1	<1	1030	At sandstone-shale interface (Blackhawk Fm.)	None	
32-2	10	580	From fractured sandstone (Star Point sandstone)	Deer tracks	
16-7-1-1	5	400	In limestone (North Horn Fm.)	Deer & cattle tracks	Chem data in WRI 81-539
1-2	5	380	In limestone (North Horn Fm.)	Flows into stock pond	U.S.Fuel monitor ing station SP-7
1-3	Seep		In limestone (North Horn Fm.)	Livestock	fenced
1-4	Seep		At base of resistant layer (North Horn Fm.)	Livestock	
1-5	3	400	At base of resistant layers (North Horn Fm.)	Deer tracks	Diffuse seepage
16-7-2-1	Seep		In limestone (North Horn Fm.)	Deer & Cattle tracks	

Table 7-1 (Continued)

Results Of Spring Inventory Conducted On And Adjacent To Hiawatha's Permit In October, 1983

LOCATION NUMBER	FLOW (gpm)	SPECIFIC CONDUCTANCE (umhos/cm @ 25° C)	GEOLOGIC CONDITIONS	SIGNS OF USAGE	COMMENTS
16-7-11-1	<1	500	At sandstone-shale interface (Price River Fm.)	Deer tracks	Diffuse seepage
16-7-11-2	5	390	From fractured sandstone in limestone (North Horn Fm.)	Deer tracks	Chem. data in WRI 81-539
11-3	3	390	From fractured sandstone in limestone (North Horn Fm.)	Deer & cattle tracks	
11-14	1	540	Near base of limestone (North Horn Fm.)	Deer tracks	Field data in WRI 81-539
16-7-12-1	Seep		From sandstone (North Horn Fm.)	None	
12-2	2	450	From fractured sandstone (North Horn Fm.)	Deer tracks	
12-3	1	420	Base of resistant layers (North Horn Fm.)	Deer tracks, trails	Near surface displacement
12-4	Seep		In limestone (North Horn fm.)	Deer tracks, trails	Diffuse seepage
12-5	5	520	In limestone (North Horn Fm.)	Deer tracks	Chem data in WARI 81-539
16-7-13-1	3	330	Base of fractured limestone (North Horn Fm.)	Deer & cattle tracks	U.S.Fuel monitor ing station SP-9
13-2	2		At sandstone-shale interface (Price River Fm.)	None	Not sampled
167-13-3	5	390	From fractured sandstone above shale (Price River Fm.)	None	
13-4	Seep		At sandstone-shale interface (Price River Fm.)	None	
16-7-13-5	Seep		At sandstone-shale interface (Price River Fm.)	None	Diffuse seepage
13-6	Seep		At sandstone-shale interface (Price River Fm.)	Deer tracks	Diffuse seepage
13-7	10	360	At sandstone-shale interface (Price River Fm.)	None	Sampled at bottom of main canyon
13-8	8	310	At sandstone-shale interface (Price River Fm.)	None	Sampled at bottom of main canyon
13-9	Seep		At sandstone-shale interface (Price River Fm.)	None	
13-10	Seep		At sandstone-shale interface (Price River Fm.)	None	
13-11	Seep		At sandstone-shale interface (Blackhawk Fm.)	None	
13-12	Seep		At sandstone-shale interface (Blackhawk Fm.)	None	
13-13	Seep		At sandstone-shale interface (Blackhawk Fm.)	None	
13-14	Seep		At sandstone-shale interface (Blackhawk Fm.)	None	
16-7-13-15	3	490	Base of limestone (North Horn Fm.)	Deer & cattle tracks	

Table 7-1 (continued)

Results of Spring Inventory Conducted On and Adjacent To Hiawatha's Permit In October, 1983

LOCATION NUMBER	FLOW (gpm)	SPECIFIC CONDUCTANCE (umhos/cm @ 25° C)	GEOLOGIC CONDITIONS	SIGNS OF USAGE	COMMENTS
16-7-23-1	Seep		At sandstone-shale interface (Blackhawk Fm.)	None	
16-7-24-1	Seep		At sandstone-shale interface (Blackhawk Fm.)	None	
24-2	Seep		At sandstone-shale interface (Blackhawk Fm.)	None	
24-3	Seep		At sandstone-shale interface (Blackhawk Fm.)	None	Diffuse seepage
16-7-25-1	Seep		From fractured sandstone (Star point sandstone)	None	
25-2	Seep		From fractured sandstone (Star point sandstone)	None	
25-3	<1	5470	From bottom of channel (Mancos shale)	Deer tracks	Shale outcrops in channel downstream
16-7-26-1	>100	470	From fractured sandstone (Star point sandstone)	Developed City water supply	Bear Canyon spring Data in WRI 81-539
26-2	Seep		At sandstone-shale interface (Blackhawk Fm.)	None	
26-3	Seep		At sandstone-shale interface (Blackhawk Fm.)	None	
26-4	8	730	From fractured sandstone (Star point sandstone)	Deer tracks	Birch spring Data in WRI 81-539
16-7-26-5	>50	750	From fractured sandstone (Star point sandstone)	Deer tracks	Chem. data in WRI 81-539
16-8-5-1	3	450	In limestone (North Horn Fm.)	Developed, with trough	U.S.Fuel monitor ing station SP-5
16-8-6-1	3	450	Base of fractured sandstone (North Horn Fm.)	Deer & cattle tracks	U.S.Fuel monitor ing station SP-6
6-2	Seep		Base of resistant layer (North Horn Fm.)	None	
6-3	Seep		From road cut (north Horn Fm.)	None	
6-4	Seep		From road cut (north Horn Fm.)	None	
6-5	Seep		From road cut (north Horn Fm.)	None	
16-8-7-1	Seep		From road cut (Price River Fm.)	None	
7-2	10	440	From fractured sandstone (North Horn Fm.)	Deer & cattle tracks	
16-8-8-1	5	560	Fractured sandstone (Castlegate sandstone)	Deer tracks	
8-2	7	640	Fractured sandstone (Castlegate sandstone)	Deer tracks	Diffuse seepage in road cut
8-3	Seep		At sandstone-shale interface (Blackhawk Fm.)	None	In road cut
16-8-8-4	Seep		At sandstone-shale interface (Blackhawk Fm.)	None	In road cut

Table 7-1 (continued)

Results of Spring Inventory Conducted on and Adjacent To Hiawatha's Permit In October, 1983

LOCATION NUMBER	FLOW (gpm)	SPECIFIC CONDUCTANCE (umhos/cm @ 25° C)	GEOLOGIC CONDITIONS	SIGNS OF USAGE	COMMENTS
8-5	6	730	Colluvium overlying sandstone (Blackhawk Fm.)	Developed	U.S.Fuel monitor ing station SP-8
16-8-8-6	Seep		At sandstone-shale interface (Blackhawk Fm.)	None	In road cut
16-8-9-1	Seep		Sandstone in road cut (Star Point Fm.)	None	
16-8-17-1	5	500	Near base of limestone (North Horn Fm.)	Deer & Cattle tracks	
17-2	5	490	Near base of limestone (North Horn Fm.)	Deer & Cattle tracks	
16-8-18-1	3		Fractured limestone (North Horn Fm.)	Deer & Cattle tracks	Not sampled
18-2	3	600	Fractured limestone (North Horn Fm.)	Deer & Cattle tracks	Field data in WRI 81-539
18-3	9	520	In limestone (North Horn Fm.)	Deer & Cattle tracks	Chem. data in WRI 81-539
16-8-19-1	<1	570	Base of fractured sandstone (Castlegate sandstone)	Deer tracks	Chem. data in WRI 81-539
16-8-20-1	3	700	Base of limestone (North Horn Fm.)	Cattle tracks	U.S.Fuel monitor ing station SP-10
20-2	Seep		Near base of limestone (North Horn Fm.)	Deer tracks	
16-8-21-1	<1	2820	At sandstone-shale interface (Blackhawk Fm.)	None	
21-2	4	2630	Fractured sandstone (Star Point sandstone)	Deer tracks	Field data in WRI 81-539
16-8-28-1	9	2230	Base of sandstone (Star Point sandstone)	Developed, with trough	

north of this point. Flow from the old Mohrland portal (EPA Mine Water Discharge Point D001) represents the total of all water intercepted by U. S. Fuel's mining operations.

It has been noted in the PHC ~~response to R645-301-724.600~~ that ~~the degree of~~ hydraulic interconnection along the Bear Canyon Fault between the Blackhawk Formation and the S tar Point Sandstone is thought to be nonexistent ~~uncertain. Whether dewatering of the mines will impact downgradient springs issuing from the Star Point Sandstone is, therefore, unknown. However, and~~ An examination of discharge rates of springs issuing from the Star Point Sandstone in and near the mouth of Bear Canyon (Danielson et al., 1981: ~~David~~ Darrel Leemaster, Castle Valley Special Services District, personal communication 1984) indicates no general decline in flow during the period of record (1978-1983). Additional monitoring of the flows in Big Bear Spring has shown no decline in flow through 1987. Since mining near the fault by U.S. Fuel occurred in the late 1950's and then again from January of 1973 to June of 1977 and no drop in flows was noticed for 10 years after mining in the area had ceased ~~As a result,~~ dewatering of the mine workings is not expected to impact discharge rates of springs issuing from the Bear Canyon Fault in the Star Point Sandstone. Thus, no alternate water supply should be required for these springs. Because of drought conditions in the period between 1988 to 2001 a decline was observed in Big Bear Spring hitting a low approximately 50% of pre 1988 in 1993 and then recovering to approximately 70% of pre 1988 flows by 2001. Once the drought conditions end and the palmer drought index returns to pre 1988 levels the flows in Big Bear Spring should return to pre 1988 levels.

R645-301-728 Probable Hydrologic Consequences Determination

Underground mining operations could affect surface and groundwater sources. Depending on coal extraction methods used, subsidence could more or less result in fractures through the strata above the Star Point sandstone formation. Fractures resulting from subsidence, as well as natural fractures encountered in mining could contribute to changes in existing water patterns. Springs, seeps, and stream flows could possibly be affected, and changes in drainage patterns could result. Since no mining is proposed to be done below the Hiawatha coal seam which lies immediately on top of the Star Point sandstone, strata below that elevation should not be affected. In order to prevent any anticipated affects, barriers can be left around the permit boundary or under a spring or a seep preventing any subsidence from occurring in those areas.

The effects of past mining on water sources is not known, except that significant flows have resulted from contact with major fractures such as the Bear Canyon fault. Large areas of the King 1 and King 2 mines were mined out from 45~~15~~ to 11080 years ago by room and pillar methods, yet numerous springs and seeps overlying these mines are still flowing. Whether or not they have diminished as a result of mining is not known. (See Plates 5-1 and 5-2)

Since the general dip of the strata in the mine plan area is toward the south west and since all existing mine workings are more or less interconnected, all water encountered in mining tends to flow to the most southerly mine opening which at this time is the old Mohrland Portal (King 2 portal) in Cedar Creek Canyon.

No fracture-controlled seeps or springs were found issuing from the coal-bearing Blackhawk Formation. Instead, seeps and springs within this formation were found issuing from the base of sandstone units overlying shale layers. Hence, fracturing of the Blackhawk Formation does not appear to convey groundwater to the surface.

Major fracturing in the area trends primarily north-south, paralleling the Bear Canyon Fault. A geologic map prepared by Waddell et al. (1981) indicates that the Bear Canyon fault is near the eastern edge of the Pleasant Valley Fault Zone, which a fault zone that extends from the southern half of T.17 S., R.7 E. northward through Pleasant Valley to Scofield Reservoir. Hence, all fracturing noted in relation to the springs is assumed to be part of the Bear Canyon Fault Zone or one of the companion fault zones.

A survey was conducted by U. S. Fuel in the King 4 mine to determine the extent of inflow to the mine along the Bear Canyon Fault and other sources. Surveys could not be conducted in older mine workings since they are permanently sealed. The King 5 Mine is essentially dry (containing only a few low-yield roof drippers) and, hence, was not surveyed. In addition, roof stability problems in the King 6 mine makes access hazardous. Thus, the in-mine seepage survey was confined to the King 4 mine. (See Plates 5-1 and 5-2)

Five points of inflow greater than 1 gpm were found in the mine. Three of these originated from the floor of the mine through fractures or the Bear Canyon Fault, one originates from the roof through a fracture near the northern-most portion of the mine and one originates

Effects of Mining on Streamflow

Data obtained from mines in the region, as outlined on page 7-79 ~~in section 724.600~~, suggest that subsidence will affect streamflow quantity only in those areas where surface cracks develop. In areas experiencing trough subsidence, no streamflow impacts have been documented to date. As a result, those areas on the ridge of Gentry Mountain and within Gentry Hollow that are subjected to subsidence should not experience any changes in streamflow attributable to mining. As noted previously, well-defined streamflow does not exist along Gentry Mountain. Stream channels that cross the upper west-facing slopes of Gentry Hollow are ephemeral. That stream flow that is generated in these areas originates within and flows in the area of potential subsidence only across outcrops of the North Horn Formation (presumably subject only to trough subsidence). Hence, without the development of subsidence fractures, no impacts are expected to occur to streamflow crossing the ridges of Gentry Mountain and the upper slopes of Gentry Hollow.

Potential impacts to streamflow resulting from subsidence should be limited to the Miller Creek watershed where streams cross formations that are stratigraphically lower than the North Horn Formation. The results of the spring inventory conducted in the permit and adjacent areas in October 1983 indicate that base-flow within the zone of potential subsidence in the Miller Creek watershed is about 7 gallons per minute in the north branch of North Fork of Miller Creek, 12 gpm in the south branch of North Fork, 16 gpm in Middle Fork, and 6 gpm in South Fork. This base-flow all originates as springs issuing from the North Horn Formation and the Castlegate Sandstone (compare Exhibits 7-2 and 7-7). Only minor seepage issues from the Price River Formation within the potential subsidence zone of the Miller Creek watershed. Snowmelt and

North Horn springs proper are expected (see previous discussions). Impacts downstream from the point of issue have been discussed in a previous section. Hence, potential impacts to springs due to subsidence are assumed to be limited to those springs that issue from the Price River Formation or the Castle-gate Sandstone.

Assuming that all springs issuing below the North Horn Formation dry up as a result of subsidence, the maximum depletion in spring flow will be 28 gpm. It is emphasized that the subsidence fracture would have to directly intercept the spring or its immediate recharge area to cause a depletion in flow. If the cracks pass downstream from the spring, water would still be available at the source for livestock and wildlife use.

~~Some concern has been raised by OSM regarding an apparent decrease in flow rates measured at spring monitoring station SP-3 since 1980. The flow data collected from this station are given in Tables 1 and 4 of Appendix 7-12. According to this table, flows at SP-3 normally vary from about 4.5 to 6.0 gpm. The data is insufficient to determine long-term trends.~~

Stream monitoring, ongoing since 1978, at monitoring points downstream from disturbed areas, serve to identify contaminating materials. Current stream monitoring data ~~are given in Appendix 7-14.~~ for all current monitoring sites is included in the water database maintained by the Division of Oil Gas and Mining and can be accessed on the internet at www.dogm.nr.state.ut.us

301-527 and R645-301-732. Interim Reclamation is given in R645-301-331 and in Appendix 5-7. Topsoil storage and protection is covered in R645-301-231.

To ensure compliance of all effluent parameters within the UPDES permit, Hiawatha Coal ~~U.S. Fuel~~ will implement the following steps:

1. Monitor according to the UPDES Permit.
2. Report monitoring results according to the UPDES Permit.
3. When exceedances occur, report the exceedances according to the UPDES Permit.
4. Implement changes required when the Division of Water Quality approves changes to the UPDES Permit.

731.200 Water Monitoring

Ground-Water Monitoring Plan

~~United States Fuel~~ Hiawatha Coal Company currently monitors springs included in its monitoring program twice each year (normally in July and October, depending on accessibility). Data collected during each visit includes; flow, PH, water temperature, and specific conductance. ~~Prior to 1986, spring samples were analyzed according to Table 7-12. In order to bring the monitoring program into line with the Division's "Guidelines For Establishment of Surface and Ground-water Monitoring Programs" (January, 1986),~~ sSamples are ~~now~~ analyzed according to either Table 7-12~~13~~ or 7-15~~19~~ at the frequence show on Table 7-17. ~~The type of analyses to be done will depend on the year in which the samples are taken. Refer to the monitoring schedule given in Table 7-22.~~

Canyon. The King 6 mine is currently inactive and the water tank is not being used. ~~Mine water discharge sample analyses for past years is given in Appendix 7-13.~~

During the 2002 ~~1992~~ permit review the Division requested that persistent and measurable in-mine flows be monitored for quality quantity and seasonal variations. Currently all portals are sealed so no in-mine monitoring can be done. Once the seals are breached and mining is resumed Hiawatha will develop an underground water monitoring plan to monitor all flows that are greater than 5gpm and last for more than 30 days. The Division will be consulted during the development of this plan. ~~Towards this end U. S. Fuel will monitor the flow at point UG-1 (Exhibit 6-3). No mine workings are currently accessible south of this point and only a very limited area is accessible to the north and east. Due to the dip of the beds, monitoring the flow at this location will reflect the cumulative result of all sources originating in the King 4 mine north of the 10 West and 10 East sections. UG-1 will be monitored once in the spring (May or June) and once in the fall (Sept. or Oct.).~~ Monitoring parameters will be the same as those required by the EPA NPDES permit listed in Table 7-13 ~~14~~.

SURFACE WATER MONITORING PLAN

~~United States Fuel~~ Hiawatha Coal Company currently monitors streams described in this program on a monthly basis when accessible. The location of each monitoring point is shown on Exhibit 7-1 and described in Table 7-15. Sample analyses are done semi-annually. Table 7-17 shows the sampling frequency for each of the sites. ~~Table 7-16 presents the initial comprehensive parameter schedule used in September of 1979. Table 7-17 presents the routine analytical parameter schedule that has been followed from September 1979 to May 1986. From May 1986 to August 1988 Table 7-18 was used.~~ Samples collected ~~after~~

Table 7-17

Water Monitoring Matrix

STATION	JAN	FEB	MAR	ARP	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
ST-1				Operational	Field	Field	Field	Field	Operational	Field		
ST-2				Operational	Field	Field	Field	Field	Operational	Field		
ST-2B				Operational	Field	Field	Field	Field	Operational	Field		
ST-3				Operational	Field	Field	Field	Field	Operational	Field		
ST-3A				Operational	Field	Field	Field	Field	Operational	Field		
ST-3B				Operational	Field	Field	Field	Field	Operational	Field		
ST-4				Operational	Field	Field	Field	Field	Operational	Field		
ST-4A				Operational	Field	Field	Field	Field	Operational	Field		
ST-4B				Operational	Field	Field	Field	Field	Operational	Field		
ST-5				Operational	Field	Field	Field	Field	Operational	Field		
SP-2						Operational				Operational		
SP-4						Operational				Operational		
SP-5						Operational				Operational		
SP-11						Operational				Operational		
SP-12						Operational				Operational		
SP-13						Operational				Operational		
D001	Field	Operational	Field	Field	Operational	Field	Field	Operational	Field	Operational	Field	Field
D002*	Field	Operational	Field	Field	Operational	Field	Field	Operational	Field	Operational	Field	Field

*D002 Operational samples will be tested for the parameters in Table 7-13. All others will be tested according to Table 7-16.

Map(s) is kept with this application located in the Public Information Center of our Salt Lake City office.

PLATE 5-2A

PLATE 5-2B

PLATE 5-2C

PLATE 7-1

PLATE 7-2

PLATE 7-7