0050

→ file ACT/015/018 #2
ACT/015/017 #2
ACT/015/019 #2

cc. T. Munson

utah power
& LIGHT COMPANY
MINING DIVISION
Field Office
P. O. Box 1005
Huntington, UT 84528

(801) 653-2312
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May 31, 1988

Mr. Tom Munson
Utah State Division of Oil, Gas & Mining
355 West North Temple
3 Triad Center, Suite 350
Salt Lake City, UT 84180-1203

Dear Tom:

Per your request of February 9, 1988 we have compiled a summary of our hydrologic monitoring plan and yearly monitoring schedules. The summary, a copy of which is enclosed for your review, includes a listing of the locations in which hydrologic parameters are monitored and the parameters tested (i.e., flow, quality). It will be included as an appendix in our 1987 Hydrologic Monitoring Report which will be completed in June. According to your recommendations we began monitoring according to the plan in January 1988.

We plan to include the plan in the mid-term review for the Deer Creek and Des-Bee-Dove mines and to add it to our Wilberg/Cottonwood permit as an amendment.

If you have any comments or suggestions regarding the summary, please contact me.

Sincerely,

Charles A. Semborski

Charles A. Semborski
Senior Geologist/Hydrologist

CAS/sh/1102
Enclosures

cc: D. Smaldone, w/enclosures
V. Payne "
R. Fry "

RECEIVED
JUN 29 1988
DIVISION OF
OIL, GAS & MINING

UTAH POWER & LIGHT COMPANY
MINING DIVISION - TECHNICAL SERVICES
HYDROLOGIC MONITORING PROGRAM
DEER CREEK, WILBERG/COTTONWOOD, and DES-BEE-DOVE MINES

I. Monitoring Locations

A. Surface Water Hydrology (see attached Map #1 for locations listed below)

1. Cottonwood Creek Drainage System
   a. Cottonwood Canyon Creek - USGS Flume: 700 feet North, 200 feet East of the Southwest corner of Section 31, Township 17 South, Range 7 East.
   b. Grimes Wash
      (1) Right Fork: (Approximately 1500 feet upstream from the inlet culvert for the disturbed area.) 550 feet North, 1500 feet West of the Southwest corner of Section 22, Township 17 South, Range 7 East.
      (2) Left Fork: (Approximately 50 feet upstream from the inlet culvert for the disturbed area.) 200 feet South, 2350 feet East of the Northwest corner of Section 27, Township 17 South, Range 7 East.
      (3) Below the mine: (Approximately 500 feet downstream from the outlet culvert below the disturbed area.) 1770 feet South, 1820 feet West of the Northeast corner of Section 27, Township 17 South, Range 7 East.

2. Huntington Creek Drainage System
   a. Huntington Creek: UP&L's Environmental Department monitors the following four sites along Huntington Creek:
      (1) Below Electric Lake*
      (2) Above the Forks*
      (3) Above the power plant diversion
      (4) Below the power plant

      * Not listed on map due to scale.

   b. Deer Creek
      (1) Above the mine: (Approximately 600 feet upstream from the mine facility.) 200 feet North, 800 feet West of the Southeast corner of Section 10, Township 17 South, Range 7 East.

(2) At Permit: (Approximately 5,000 feet downstream from the mine facility.) 480 feet North, 3360 feet East of the Northwest corner of Section 1, Township 17 South, Range 7 East.

(3) Below the Mine: (Approximately 12,000 feet downstream from the mine facility.) 480 feet South, 3360 feet East of the Northwest corner of Section 1, Township 17 South, Range 7 East.

c. Meetinghouse Canyon - South Fork: (Approximately 200 feet upstream from the north and south convergence.) 800 feet North, 1500 feet East of the Southwest corner of Section 35, Township 16 South, Range 7 East.

B. Groundwater Hydrology

1. East Mountain Springs (see attached Map #2 for spring locations)

Burnt Tree *
Elk Spring *
Sheba Springs *
Ted's Tub
79-2
79-10 *
79-15
79-23 *
79-24
79-26 *
79-29 *
79-34
79-35 *
80-41
80-43
80-44 *
80-46 *
80-47
82-51
82-52 *
84-56 *

* Recession Study Springs

2. Piezometric Data

a. Surface

(1) Rilda Canyon (see attached Map #1 for locations)

P1
P2
P3

P4
P5
EM-47

(2) Cottonwood Canyon Creek
EM-31

b. Underground (Deer Creek): Program was terminated due to access and mine construction projects. New locations will be added when prospective sites meet long-term monitoring criteria.

3. In-Mine
   a. Deer Creek Mine (see attached Map #3 for locations)
      (a) 3rd South "B" xc-21
      (b) 3rd North xc-41
   b. Wilberg/Cottonwood Mines (see attached Map #4 for locations)
      (a) 2nd South xc-11
      (b) 4th East xc-24

II. Monitoring Schedule

A. Field Measurement: Listed below are the sites which will be monitored by UP&L Mining Division in accordance with the guidelines established by DOGM; i.e.,
   - Date and Time
   - Flow
   - pH
   - Temperature
   - Dissolved oxygen

1. Cottonwood Canyon Creek
   a. Cottonwood Canyon Creek - USGS Flume
   b. Grimes Wash
      (1) Right Fork
      (2) Left Fork
      (3) Below the mine

2. Huntington Canyon Drainage
   a. Deer Creek
      (1) Above the mine
      (2) At Permit Boundary
      (3) Below the mine
   b. Meetinghouse Canyon - South Fork

3. East Mountain Springs

4. In-Mine
   a. Deer Creek
   b. Wilberg/Cottonwood

All sites will be monitored monthly except for East Mountain Springs and in-mine locations. East Mountain Springs will be field tested during the months of July and October. In addition, the Recession

Study Springs (denoted by asterisks in the Monitoring Location section) will be field tested from July through October. In-Mine locations will be field tested quarterly.

B. Quality Sampling (Laboratory Measurements)

1. Surface Water Hydrology: Water samples will be collected and analyzed quarterly (one sample at low flow and high flow) during the first or second week of the quarter. Parameters analyzed are those listed in the DOGM Guidelines for Surface Water Quality (see Table #1). Quarterly sampling was initiated during March 1988 and will continue throughout the year; i.e., June, September, and December. Baseline analysis was performed in 1986 and will be repeated every five years thereafter.
   a. Cottonwood Creek Drainage, Grimes Wash
      (1) Right Fork
      (2) Left Fork
      (3) Below the mine
   b. Huntington Creek Drainage
      (1) Deer Creek
         (a) Above the mine
         (b) Below the mine
      (2) Meetinghouse Canyon - South Fork

2. Groundwater Hydrology
   a. East Mountain Springs: Water samples will be collected and analyzed during the months of July and October. Parameters analyzed are those listed in the DOGM Guidelines for Groundwater Water Quality (see Table #2). In addition, the Recession Study Springs (denoted by asterisks in the Monitoring Location section) will be sampled monthly for the following parameters:
      (1) Total Hardness
      (2) Carbonate
      (3) Total Manganese

      (See attached memo for clarification.)

   b. In-Mine: Two water samples will be collected and anlyzed per mine quarterly. Parameters analyzed are those listed in the DOGM Guidelines for Groundwater Water Quality (see Table #2).

TABLE 1

SURFACE WATER BASELINE, OPERATIONAL AND POSTMINING WATER QUALITY PARAMETER LIST

Field Measurements:

*	-	Water Levels or Flow
*	-	pH
*	-	Specific Conductivity (umhos/cm)
*	-	Temperature (C^o)
*	-	Dissolved Oxygen (ppm) (perennial streams only)

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

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

Sampling Period:

-Baseline

*Operational, Postmining

#Construction

TABLE 2

GROUND WATER BASELINE, OPERATIONAL AND
POSTMINING WATER QUALITY PARAMETER LIST

Field Measurements:

* - Water Levels or Flow
* - pH
* - Specific Conductivity (umhos/cm)
* - Temperature (C^o)

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

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

Sampling Period:

-Baseline
*Operational, Postmining

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RESUBMITTED: Corrections made May 13, 1988

April 30, 1987

Mr. Tom Munson
UTAH STATE DIVISION of
OIL, GAS & MINING
3 Triad Center
Salt Lake City, UT 84180-1204

Dear Tom:

As we discussed in our meeting on April 13, Utah Power & Light Company is desirous of revising its Hydrologic Monitoring Program. It is our contention that the data collected to date more than adequately define the flow characteristics and quality of the springs relative to baseline data; therefore, we propose to modify our Monitoring Program as follows:

I. Only the springs located within or immediately adjacent to areas overlying coal to be mined in the next five (5) years or areas overlying previously mined areas will be monitored [except that the twelve (12) discharge recession curve springs and Rilda Canyon wells (in lieu of North and South springs) will all be monitored regardless of location].

   A. Each Annual Hydrologic Monitoring Report will include a map which will show previously mined areas and areas to be mined in the upcoming five (5) years. The springs to be monitored in the upcoming year will be identified from the map.

   B. New springs will be added each year based on the new areas to be mined in the upcoming five (5) years.

   C. Springs will cease to be monitored when 1) it has been determined that mining induced subsidence has stabilized and that the spring monitoring indicates stable hydrologic conditions, and 2) it is mutually agreed by UP&L and the Division that monitoring should be terminated.

   D. The springs will be monitored in July and as many as are accessible will be monitored in October.

   E. Each spring will be measured for the following parameters:

      1. Quantity of discharge
      2. pH (Field Measurement)

3. Temperature (Field Measurement)
4. Conductivity (Field Measurement)
5. Dissolved oxygen (Field Measurement)
6. Bicarbonate Alkalinity
7. Chloride
8. Conductivity
9. pH
10. Solids, Total Dissolved
11. Solids, Total Suspended
12. Sulfate
13. Total Cation
14. Total Anion
15. Calcium
16. Iron
17. Magnesium
18. Potassium
19. Sodium
20. Hardness
21. Carbonate
22. Manganese

F. In 1987 the following springs will be monitored under the program:

1. 79-2
2. 79-15
3. 79-24
4. 79-32
5. 79-34
6. 79-38
7. 79-40
8. 80-41
9. 80-43
10. 80-47
11. 82-51
12. Ted's Tub

II. The twelve (12) springs identified for discharge recession curve monitoring and Rilda Canyon wells will be monitored monthly, access permitting, each year between July and October.

A. The springs include:

1. 79-10
2. 79-23
3. 79-26
4. 79-29
5. 79-35
6. 80-44
7. 80-46
8. 82-52
9. 84-56

10. Burnt Tree
11. Elk
12. Sheba
13. Rilda Canyon Wells

B. The springs will be measured twice a year (July and October) in accordance with the parameters listed for spring monitoring under item I. E. (DOGM's Guidelines for Groundwater Water Quality) of this document.

C. Recession Study Springs will be measured monthly for the following parameters:

1. Discharge
2. Specific conductivity (Field Measurement)
3. Temperature (Field Measurement)
4. pH (Field Measurement)
5. Total Hardness
6. Carbonate
7. Total Manganese

III. All other portions of our Hydrologic Monitoring, both surface and underground, will remain unchanged and as listed in the approved Plan.

I am submitting this to you so that you may understand our intent. If you are in agreement with the changes, we will submit a formal modification to our Monitoring Plan. Please contact me if you have any questions and when you have determined that the changes listed are acceptable.

Sincerely,

Rodger C. Fry
Director of Exploration

RCF/sh/858
cc: C. Semborski

YEAR ======) 1988 & 1990

			LOCATION	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
SURFACE	HYDROLOGY	COTTONWOOD CREEK DRAINAGE SYSTEM	COTTONWOOD CANYON CREEK	field	field	field	field	field	field	field	field	field	field	field	field
			GRIMES WASH												
			RIGHT FORK	field	field	operational	field	field	operational	field	field	operational	field	field	operational
			LEFT FORK	field	field	operational	field	field	operational	field	field	operational	field	field	operational
			BELOW MINE	field	field	operational	field	field	operational	field	field	operational	field	field	operational
		HUNTINGTON CREEK DRAINAGE SYSTEM	DEER CREEK												
			ABOVE MINE	field	field	operational	field	field	operational	field	field	operational	field	field	operational
			@ PERMIT	field	field	field	field	field	field	field	field	field	field	field	field
			BELOW MINE	field	field	operational	field	field	operational	field	field	operational	field	field	operational
			MEETINGHOUSE CANYON	field	field	operational	field	field	operational	field	field	operational	field	field	operational
GROUNDWATER	HYDROLOGY		EAST MOUNTAIN SPRINGS							operational *			operational *		
			RECESSION STUDY SPRINGS							operational		operational			
			IN-MINE												
			DEER CREEK			operational			operational			operational			operational
			WILBERG/ COTTONWOOD			operational			operational			operational			operational

* includes recession study springs
** see attached memo
modified ** modified **

YEAR ======) 1989

(Baseline monitoring preceeding repermitting)

			LOCATION	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
SURFACE	HYDROLOGY	COTTONWOOD CREEK DRAINAGE SYSTEM	COTTONWOOD CANYON CREEK	field	field	field	field	field	field	field	field	field	field	field	field
			GRIMES WASH												
			RIGHT FORK	field	field	operational	field	field	baseline	field	field	operational	field	field	baseline
			LEFT FORK	field	field	operational	field	field	baseline	field	field	operational	field	field	baseline
			BELOW MINE	field	field	operational	field	field	baseline	field	field	operational	field	field	baseline
		HUNTINGTON CREEK DRAINAGE SYSTEM	DEER CREEK												
			ABOVE MINE	field	field	operational	field	field	baseline	field	field	operational	field	field	baseline
			@ PERMIT	field	field	field	field	field	field	field	field	field	field	field	field
			BELOW MINE	field	field	operational	field	field	baseline	field	field	operational	field	field	baseline
			MEETINGHOUSE CANYON	field	field	operational	field	field	baseline	field	field	operational	field	field	baseline
GROUNDWATER	HYDROLOGY		EAST MOUNTAIN SPRINGS							operational *			baseline *		
			RECESSION STUDY SPRINGS							* includes recession study springs ** see attached memo modified ** modified ** operational operational					
			IN-MINE												
			DEER CREEK			operational			baseline			operational			operational
			WILBERG/ COTTONWOOD			operational			baseline			operational			operational