

0005



State of Utah

DEPARTMENT OF NATURAL RESOURCES
DIVISION OF OIL, GAS AND MINING

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October 28, 1988

TO: File *[Handwritten signature]*
FROM: Rick F. Summers, Reclamation Hydrologist
RE: Report on Water Pollution of Eccles Creek, Utah Fuel Company, Skyline Mine, ACT/007/005, Folder # , Carbon County, Utah

SUMMARY:

This report summarizes the information known to date regarding the investigation of the water quality and resultant impacts to Eccles Creek as a result of discharges from the Skyline Mine in Carbon County, Utah. The mine is owned and operated by Utah Fuel Co. and is operating under permit ACT/007/005 issued by DOGM. This report describes the site, observed water discharges on September 28 and October 4, 1988, procedures used to date to investigate the problem, incorporates findings of the Department of Wildlife Resources (DWR) on habitat health and fish populations, and references regulations of the Utah Coal Mining and Reclamation Regulatory Program: Chapter I - Rules Pertaining to Underground Coal Mining Activities that the operator has violated.

STUDY AREA:

Eccles Creek is a tributary of Mud Creek in the Price River drainage basin. The stream is located in Sec.17, T. 13 S., R. 7 E. (Figure 1). The watershed of Eccles Creek encompasses 5.5 sq. miles at an elevation of 8000' - 9000 feet. The stream is classified as a Class 3A stream which is protected for cold water species of game fish and their necessary organisms in their food chain (Dept. of State Health, Wastewater Regulations, revised 1988). That same reference also classifies this segment as an Antidegradation Segment (section 3.2 and 12.13, Dept. of State Health, 1988). An Antidegradation Segment is defined as follows:

Waters of high quality which have been determined by the committee (section 12.13) to be of exceptional recreational or ecological significance or have been determined to be a State or National resource requiring protection, shall be maintained at existing high quality through designation, by the committee after public hearing, as antidegradation segments.

Scofield Reservoir is located downstream and is considered to provide good habitat for Rainbow trout stocking and naturally reproducing Cuthroat trout populations. Eccles Creek is considered to be an important spawning and rearing area for the native Cutthroat trout population (Larry Dalton, DWR, pers. comm.). Trout populations in the area have fluctuated since the development of the area in 1980-81. A notable decline of population and standing crop estimates in 1982 and 1983 was observed possibly due to mine area and road development in the area (Wyatt, 1983). UDWR indicates that the population and standing crop estimates had rebounded from this decline in 1986, but were still lower than predevelopment estimates. The population and standing crop estimates were 78% and 88% of the pre-impact situation following 1986 estimates (letter to Dr. Dianne Nielson from Bill Greer, January 26, 1987).

SITE OBSERVATIONS

On July 7, 1987, a joint inspection was conducted with DWR and DOGM personnel to investigate private citizen reports from late June that stream water in Eccles and Mud Creeks was being stained. Subsequent inspection reports chronicled this problem (7/31/87, 8/4/87). It was determined in this period that the problem originated at the Skyline Mine's main mine facilities sedimentation pond. A black, slimy algae or mold was observed coating the stream substrate below the mine with no similar observations above the property in two undisturbed forks of Eccles Creek. It was determined by DWR personnel that macro-invertebrate populations were decreased 30 - 40 percent. Fish inventories conducted at the South Fork of Eccles Creek confluence indicated that fish populations were 270 fish per mile. That memo also indicates that fish populations would not suffer from lack of macro-invertebrates in their diet for a period of several weeks.

During travel to assigned tasks at another project in the area periodically between June and September, 1988, I observed a persistence of the substrate coating and an increase in visible foam in the stream. On September 1, 1988, a continuous foam line was visible in the stream past the confluence with Mud Creek to a location in the vicinity of Valley Camp of Utah's Utah #2 project.

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On September 28, 1988 while enroute from the Blazon reclamation project, I observed an unusually heavy occurrence of foam in the stream. It is noted that this is the second occurrence of a stream water quality problem that was observed and reported by persons other than the mine operating personnel. I drove to the outfall of the Skyline mine 72 inch bypass culvert for Eccles Creek. I observed (approximately 3:00 p.m.) a significant amount of foaming (nearly bank to bank) at this discharge point with the foaming continuing downstream in this continuous (bank to bank) fashion to the vicinity of the South Fork of Eccles Creek confluence. At this point, the foaming was diminished, but still significant visually. Samples of the discharge at the outfall of the bypass culvert were collected and placed on ice. Photographs of the discharge were taken. Keith Zobell was contacted at the site and he accompanied me while I took samples of the middle, north, and south branches of Eccles Creek above the mine disturbance. All samples were delivered by myself to Dave Janusz at Mountain States Analytical Laboratories in Salt Lake City the following day (Thursday, September 29, 1988). Mountain States Laboratory is a certified laboratory by the E.P.A. (# UT - 054) and the Utah State Department of Health, Environmental Pollution (# E - 87).

The confluence of South Fork and Eccles Creeks was observed. It was observed that the black substrate coating of the previous year had persisted. Additionally, a green, filamentateous algae species and small, pearl-shape orange nodules were present that were not observed last year. Samples of three rocks were collected placed in a plastic bag with native water and placed on ice. The samples were delivered to Nelson Laboratories in Salt Lake City, a laboratory experienced in micro-biological analysis, on September 29, 1988.

On Monday, October 3, 1988, I met with Larry Dalton of the Price Office of DWR and Bill Shriver and Keith Zobell of Skyline Mine to further investigate the problem. The stream conditions of Eccles Creek and Mud Creek were observed from the bypass outfall to a location just below Valley Camp of Utah's Utah #2 facility. Foaming was still observed at the outfall and downstream to the Mud Creek Confluence. The blackish substrate coating was observed at all observation points throughout the entire system to the Utah #2 site. It was the opinion of those present that the substrate coating had persisted since last June, had increased in distribution (i.e. extended into Mud Creek to Utah #2), and had begun to colonize the underside of the stream substrate.

Undisturbed tributary (South Fork, Whiskey Creek, and Mud Creek) stream conditions were observed. The substrate coating was not observed in any tributary. It was noted that the green, filamentaceous algae had increased since the September 28, 1988 observation. Larry Dalton also indicated that he has observed a sedge-type community develop at the water edge during this season that was not observed in previous years. Observations (not strict samples) indicated that the macro-invertebrate populations were decreased in terms of numbers and diversity.

The mine maintenance shop facilities were toured. Mine personnel indicated that the waste water from this facility was collected in shop drains and a sump and routed to the sedimentation pond without treatment. A detergent dispensing tank used to clean machinery (suspected as a possible source for the stream problem) was tagged as "Do not use".

The interior of the 72 " bypass culvert for Eccles Creek was inspected by myself and Keith Zobell in mid-afternoon. The culvert system was inspected from a location near the outlet to the confluence of the middle fork and south branches of Eccles Creek. The inspection noted the following of interest:

1. A leak in the system (on the order of 4 gpm, estimated) at a joint just upstream from the outlet. The leak was occurring in a culvert joint and indicates possible piping of water around the bypass culvert.
2. An unidentified 32 inch culvert which discharges into the bypass from the north located below the primary spillway. Mine personnel could not identify the source of this culvert.
3. The pond spillway (32 inch) was discharging. The discharge was visibly foaming. A sample was taken of the discharge. The black substance found in Eccles Creek was observed at the lip of this outlet and in the bypass culvert from this point downstream. The 72 inch bypass culvert was noticeably slicker down from this area.

4. At the confluence of the north branch culvert bypass, an unidentified 4 inch PVC line discharges into the manhole drop. The line was dripping slightly. Mine personnel could not identify this line.
5. An unidentified 28 inch culvert discharging into the bypass upculvert from the north branch confluence was observed. Heavy rust colored sludge was observed in the culvert and at the outfall (1/2 inch in depth on vertical, 3 inches in 28 inch pipe). The pipe had evidence of a recent discharge (i.e. wet culvert walls approximately 4-5 inches deep) and was discharging slightly. A sample was taken of the discharge. Mine personnel could not identify the source of this culvert.
6. An unidentified drain pipe (appx. 4" diameter) located in the middle fork and north branch manhole. The pipe is located near the top of the manhole. This manhole was dripping and wet indicating possible system leaks near the manhole, natural springs piping around the pipe system, or similar problems.
7. Slight foaming was noticed in the back eddy of the middle fork branch culvert at the confluence with the south branch. Mine personnel could not identify any discharge lines located in this branch of the culvert nor acknowledge that no lines existed. A sample of the middle fork drainage was collected. The sample results (attached) indicate the MBAS levels at this point were slightly elevated (0.1 mg/l) verses undisturbed upstream levels (0.3 mg/l).

The existing MRP and the recently submitted MRP were reviewed in the Division offices to determine the function and locations of the observed discharge lines into the bypass. The information was not found in the existing or proposed MRP as required by UMC 784.23 (b)(6). The operator is in violation of that regulation, UMC 771.23 (a), (b) and UCA 40-10-9, 1953 et. seq.

Bill Shriver accompanied and assisted me with sampling of the sedimentation pond. Samples were taken using a brass bailer which affords an isolated sample of the water column. Samples were taken from the pond spillway platform at depths of 3, 6, 9, and 10.5 feet. The pond depth was measured at 10.98 feet. Samples were labeled and iced for transportation.

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Temperature values for the site and surrounding area were taken between the hours of 2:30 and 5:30. The values were taken and recorded using a mercury bulb thermometer in a down drainage (i.e. from upstream undisturbed tributaries to Mud Creek) sequence.

On October 4 and 5, 1988, Utah Division of Wildlife (UDWR) personnel visited the site. Fish inventories, macro-invertebrate samples, and water quality analysis were conducted. DOGM personnel were not represented during this visit.

Division of State Health, Bureau of Water Pollution Control personnel Steve McNeil and Mike Herkimer were contacted regarding the investigation on 10/5/88 and 10/21/88. Division Memorandum of Understanding with Water Pollution Control regarding noncompliance with NPDES permits as discovered by DOGM personnel had not been finalized as of those dates.

REPORT FROM DWR personnel

DWR personnel conducted macro-invertebrate sampling and fish inventory sampling on October 4 and 5, 1988. Larry Dalton and Walt Donaldson reported preliminary findings of interest to myself during a conference telephone conversation on October 11, 1988 at 9:30 a.m. This information was subsequently finalized in reports to the Division on October 11, 1988 and October 18, 1988.

The reports conclude that 1986 fish population estimates at a sampling station most near the minesite indicate a population of approximately 601 fish/ mile. The October, 1988 survey indicates a significant reduction of numbers to 20 fish/mile. Trout biomass declined from 27 kg/ stream/ mile in 1986 to only 2.2 kg/ stream mile in October of 1988. These estimates correspond to a reduction in population of 97 percent and a biomass decrease of 92 percent (DWR report to DOGM, October 11, 1988. It is conjectured that this reduction is due to avoidance behavior (i.e. escape polluted waters) or mortality. It is conjectured that the avoidance behavior is due to the high nitrite concentrations (i.e. greater than 0.06 mg/l) in the stream. The DWR reports further confirm this hypothesis with data demonstrating that the population has increased in lower portions of the stream system.

The DWR report states that "the most critical impact of this pollutant, however, is the lack of trout reproduction throughout the stream system.....(data) indicates no natural reproduction during 1987 or 1988". The loss of this age class corresponds with the observation of the development and persistence of the substrate coating first observed last June (6/87). This growth can be traced and is generally agreed upon to originate at the Skyline Mine.

Maco-invertibrate samples indicate a nearly a complete loss of the population. Diversity numbers in the undisturbed sections above the mine were on the order of 6 - 7 families / square foot. Mud Creek had a diversity on the order of 8. Below the outfall of the bypass culvert for Eccles Creek, a single family was observed (roundworm). Caddis were observed (two genre) below the confluence of Whiskey Creek. The use of biological indicators for pollution is documented in the literature. The Stonefly and Mayfly families are generally considered to be the least resistant species to pollution and are usually the first to disappear in an impacted system. Caddisfly families are generally more resistant to pollution sources (thermal or constituent).

RESULTS:

This section describes preliminary results that have been obtained from the laboratory analysis and field data. The evidence of visible foams observed, photographed and sampled on September 28, 1988 is in violation of the NPDES permit #UT-0023540. Section A of that permit reads (in part): "There shall be no discharge of floating solids or visible foam in other than trace amounts". Slide photographic documentation of the conditions at the outlet of the 72 inch bypass culvert are available in Division files. Water quality analysis received show elevated levels of MBAS (detergent) in the outfall on September 28, 1988. These samples further demonstrate the presence of detergents/soaps in the discharge. The sample results are attached to this memo. The sample taken on 9/28/88 and October 3, 1988 of the Eccles Creek outfall of the 72 inch bypass culvert had MBAS levels of 0.28 mg/1 and 0.33 mg/1 respectively. MBAS levels in the undisturbed branches of the north, south, and middle fork drainage were undetectable (less than 0.03 mg/1). This represents a nine fold (9) increase in MBAS levels at the outfall and a 26 fold increase in MBAS levels from undisturbed levels to levels detected in the sedimentation pond.

Samples collected of the water column in the sedimentation pond at 3, 6, 9 and 10.5 foot depths all had elevated levels of MBAS (approximately 0.80 mg/l). This indicates the current pond water is entirely contaminated and that the discharge problems are not the result of a stratification of the pond with contaminants largely at the surface. As a result, the pond system will continue to discharge elevated levels of MBAS until the source is eliminated and the system is allowed to flush. The recommended limitation for reader reference for MBAS is 0.2 mg/l (Steve McNeil, State Health Dept., pers. communication, 10/5/88). Mr. McNeil also informed me the NPDES permit has a clause that prohibits discharge of wastes containing visible foaming agents or soaps. A copy of the NPDES permit is attached for reader reference.

Temperature data indicates that a temperature increase in Eccles Creek is experienced from the confluence of the three undisturbed branches of the north fork of Eccles Creek and the outfall location. The temperature increase from 43 to 54 degrees (F) represents a net temperature increase of 11 degrees (F) or 6.1 degrees (C). Table 2.14.2, numeric criteria for aquatic wildlife, Wastewater disposal regulations, Part II, State of Utah, Department of Health, 1988 gives a maximum allowable temperature change for Class 3A waters of 2 degrees (C).

It was also noted that the tributary streams (So. Fork and Whiskey Creek) had recorded stream temperatures that were relatively low (42 and 47.5 degrees (F) respectively).

Temperatures taken of the mine #3 and mine #1 inflow to the sediment pond were 54.5 and 50 degrees (F) respectively indicating the source for the increased temperatures. The potential negative effects of an increased stream temperature on the aquatic habitat are lowered dissolved oxygen values and increased primary production (i.e. algae blooms). Eccles Creek experiences a rapid entrainment of oxygen as the headwater stream tumbles down the steep, rocky gradient between the outfall and the confluence with South Fork of Eccles Creek, therefore it is anticipated that any reduction in dissolved oxygen values from increased stream temperatures will not be a limiting factor in the Eccles Creek ecosystem. The increased stream temperature may be a significant factor in the development of the unidentified substrate coating observed due to an increase in primary production.

Discharge at the outfall of the 72 inch bypass culvert had elevated levels of nitrites, ammonia, and organic nitrogen when compared with undisturbed levels. Although analysis is still in the preliminary stages, the elevated nitrite (0.64 mg/l) is of concern to the Eccles Creek ecosystem. Division of Wildlife Resource personnel (L. Dalton, W. Donaldson, 10/11/88) informed me the reference limitation for nitrites in aquatic systems is 0.06 mg/l. Ninety-six hour LC50 concentrations for nitrite nitrogen for rainbow trout (*Salmo gairdneri*) have been reported as 0.14 - 0.15 mg/l for a 12 gram trout (E.P.A., 1976).

Interpretations of the ammonia concentrations will require determination from the laboratory of the type of analysis performed. It is noted that an ammonia increase up and downstream of the mine was observed. Undisturbed levels were virtually undetectable (less than 0.05 mg/l) and the outfall values were 0.19 mg/l. Certain analysis results for ammonia are dependent on pH and temperature values so interpretation should proceed with caution at this time.

Phosphorus values at all samples taken at all sites (undisturbed and down gradient) were less than 0.05 mg/l as Total Phosphorus. However, mine personnel have reported levels of phosphates in the maintenance shop sump approaching 13 mg/l (Keith Zobell, pers. communication).

The samples of the stream substrate are undergoing an apparently successful course for analysis. This analysis is to date (10/28/88) not finalized. The identification of the substrate species should confirm accurate identification of the pollution source or indicate need for further investigation. Conversations with the laboratory indicate the analysis should be complete prior to November 4, 1988. Section R448-2-7 of the Wastewater Disposal Regulations, Part II, State of Utah, Department of Health, Division of Environmental Quality, 1988 defines the application of Water Quality Standards:

The numeric criteria listed in Section 2.14 shall apply to each of the classes assigned to waters of the State as specified in Section 2.6 of these regulations. It shall be unlawful and a violation of these regulations of any person to discharge or place any wastes or other substances in such a manner as may interfere with designated uses protected by assigned classes or to cause any of the applicable standards to be violated, except as provided for in R448-1-3.1.

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The applicable numeric criteria for aquatic wildlife (class 3A waters) in section 2.14 is presented in Table 1.

ENFORCEMENT

Cessation Order C88-15-1-1

This action was issued on 10/13/88 for failure to minimize disturbances and adverse impacts of mining operations on Fish, wildlife, and related environmental values. The action was coordinated and authored with assistance from Dr. Dianne Nielson, Lowell P. Braxton of the Division. The Order was terminated with a Division directive on 10/28/1988 with an effective date of 10/14/88.

Notice of Violation N88-15-3-2 (1 of 2)

This action was issued on 10/13/88 for conducting mining operations without a valid permit; failure to provide complete, current, and accurate information in the mining permit application. This applied to the unidentified bypass discharge pipes to the Eccles Creek 72 inch bypass culvert and related structures or operations. The NOV was subsequently vacated by Division Associate Director Ken May.

Notice of Violation N88-15-3-2 (2 of 2)

This action was issued on 10/13/88 for failure to minimize disturbance to the hydrologic balance in the permit and adjacent areas and failure to conduct operations to minimize water pollution, and where necessary, utilize treatment methods to control pollution of waters. This applied to the documented observance of visible foam in the Eccles Creek outfall on September 28, 1988. The NOV was subsequently vacated by the Division Associate Director, Ken May.

Regulations of the "State of Utah, Utah Coal Mining and Reclamation Regulatory Program, Chapter I, Rules Pertaining to Underground Coal Mining Activities" that are applicable to this situation are as follows:

UMC 817.97 Protection of Fish, Wildlife, And Related Environmental Values

(a) Any person conducting underground coal mining activities shall, to the extent possible using the best technology currently available, minimize disturbances and adverse impacts of the activities on fish, wildlife, and related environmental values, and achieve enhancement of such resources where practicable.

(d)(4) Each person who conducts underground mining activities shall, to extent possible using the best technology currently available—Restore, enhance where practicable or avoid disturbance to habitats of unusually high value for fish and wildlife

UMC 817.41 Hydrologic Balance: General Requirements

(a) Underground coal mining activities shall be planned and conducted to minimize changes to the prevailing hydrologic balance in both the permit area and adjacent areas, in order to prevent long term adverse changes in that balance that could result from those activities.

(c) In no case shall state and federal water quality statutes, regulations, standards, or effluent limitations be violated.

(d) Operations shall be conducted to minimize water pollution and where necessary, treatment methods shall be used to control water pollution.

(d)(3) If the practices listed at paragraph (d)(2) of this section are not adequate to meet the requirements of this part, the person who conducts underground coal mining activities shall operate and maintain the necessary water treatment facilities for as long as treatment is required under this part.

UMC 817.42 Hydrologic Balance: Water Quality Standards And Effluent Limitations

(b) Discharges of water from areas disturbed by underground mining activities shall be made in compliance with all applicable state and federal water quality laws and regulations and with the effluent limitations for coal mining promulgated by the U.S. Environmental Protection Agency set forth in 40 CFR Part 434.

(c) "Adequate facilities shall be installed, operated, and maintained to treat any water discharged from the disturbed are or discharged from the underground mine, so that it complies with all state and federal water quality laws and regulations and the limitations of this section....."

UMC 817.181 Support Facilities And Utility Installations

(a) Support facilities required for or used incidentally to, the operation of the underground mine, including, but not limited to, mine buildings,, sheds, . . . , shops, shall be designed, constructed, or reconstructed, and located to prevent or control erosion and siltation, water pollution, and damage to public or private property. Support facilities shall be designed, constructed or reconstructed, maintained, and used in manner which prevents, to the extent possible using the best technology currently available--

(1) Damage to fish, wildlife, and related environmental values,

UMC 784.23 Operation Plan: Maps And Plans

Each application shall contain maps, plans, and cross-sections of the proposed permit area and adjacent areas as follows:

(b)(6) Each water diversion, collection, conveyance, treatment, storage, and discharge facility to be used;

UMC 771.23 Permit Applications - General Requirements for Format
And Content

(a) "Applications for permits to conduct underground coal mining operations shall meet the application requirements of Section 40 - 10 -10 of the Act and shall be submitted to the Division on form UMC-1. The application shall be complete and include, at a minimum, all the applicable information required under UMC 782, 783, and 784,"

(b) Information set forth in the application shall be current, presented clearly and concisely, and supported by appropriate references to technical and other written material available to the Division.

UMC 843.11 Cessation Orders

(a)(1) The Division, the Director, or an authorized representative of either shall immediately order a cessation of underground coal mining activities or of the relevant portion thereof, if he finds, on the basis of any state inspection, any condition or practice, or any violation of the Act, this chapter, the state program, or any condition of an exploration approval or permit imposed under the program, the Act, or this chapter, which:

(ii) Is causing or can reasonable be expected to cause significant, imminent environmental harm to land, air, or water resources.

UMC 843.12 Notices of Violation

(a)(1) The Director, Division or their authorized representative shall issue a notice of violation if....which does not create an imminent danger or harm

(a)(2) "When, on the basis of any state inspection other than one described in paragraph (a)(1), the Director, Division or their authorized representative determines that there exists a violation of the Act, the state program, or any condition of a permit or an exploration approval required by the Act or the state program which does not create an imminent danger or harm for which a cessation order must be issued under UMC 843.11, the Director, Division or their authorized representative shall issue a notice of violation to the permittee....."