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# MONTANA DEPARTMENT OF NATURAL RESOURCES AND CONSERVATION

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HELENA, MONTANA 59601

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MAR 19 1975
ENVIRONMENTAL QUALITY COUNCIL

March 19, 1975

Attached is the Agency Impact Determination (negative declaration) concerning proposed repairs to the Cooney Dam. This action is planned by the Water Resources Division, Department of Natural Resources and Conservation, to insure the safe operation of the structure.

The repair effort is not a major action and will not significantly affect the quality of the human environment. Consequently, it was determined that an Environmental Impact Statement was unnecessary. The attached evaluation is intended to inform interested agencies and public groups of the nature of the action and the probable impacts.

Sincerely,

Gerhard M. Knudsen

Gerhard M. Knudsen
Environmental Coordinator

GMK/mm/bjt
Attachment

siphon?

# AGENCY IMPACT DETERMINATION

## PROPOSED REPAIRS
## TO THE
## COONEY DAM

MONTANA DEPARTMENT OF NATURAL RESOURCES AND CONSERVATION
WATER RESOURCES DIVISION
ENGINEERING BUREAU

32 South Ewing
Helena, Montana 59601

Submitted Pursuant to

Montana Environmental Policy Act

March 1975

## I. INTRODUCTION

Cooney Dam and Reservoir are located on Red Lodge Creek in Carbon County, approximately eight miles west of the town of Boyd (Figure 1). The dam was financed with a loan and grant from the Public Works Administration and funds from the State Water Conservation Board, predecessor of the Department of Natural Resources and Conservation (hereafter called "Department"). The project was constructed in 1937 to provide a reliable source of irrigation water for downstream users. In addition, Cooney Reservoir receives heavy recreational use; the Montana Department of Fish and Game maintains the recreational facilities.

The Rock Creek Water Users' Association operates Cooney Dam and Glacier Lake, another reservoir located at the headwaters of Rock Creek (Figure 1). Operation and maintenance of state-owned projects are normally carried out by local water users' associations with the technical guidance of the Department. The associations are required to finance all maintenance activity, with the operational policies carried out with the approval and under the direction of the Department.

Currently 265 water purchase contracts are held by 192 users on both reservoirs. The 17,250 acre-feet[1/] sold annually under contract from these dams is distributed through private diversions and canals from the creeks. This amount is approximately the firm annual yield of the projects through current operation practices.

The dam consists of 1,362,000 cubic yards of earth fill with a 200 foot wide spillway capable of passing up to 12,000 cubic feet per second (cfs)[2/]. The structure, 2,260 feet long and 97 feet high, has a storage capacity of 24,195 acre-feet. The reservoir pool floods a maximum area of 800 acres, and this land as well as 1,082 acres surrounding the impoundment are deeded to the state.

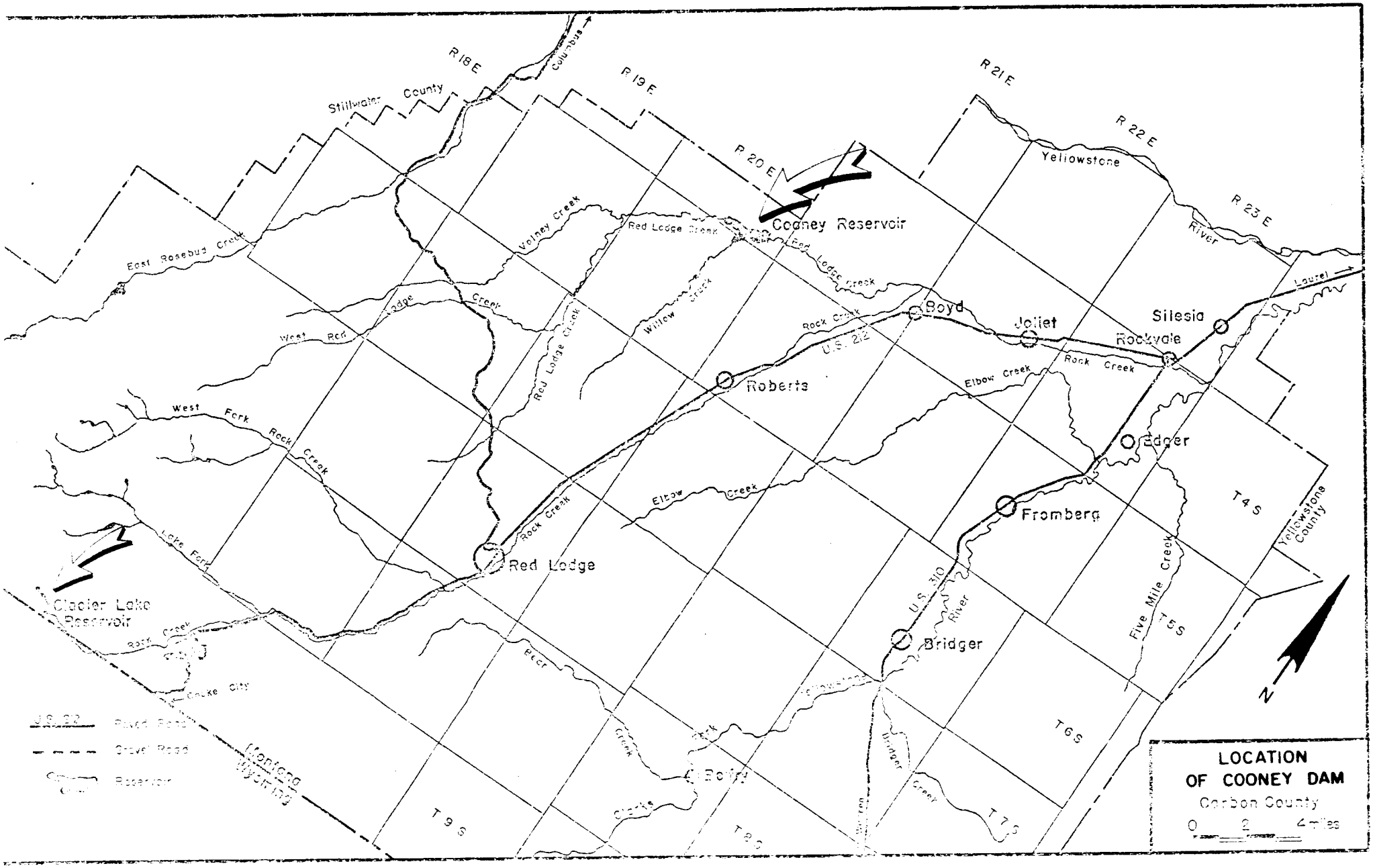
The normal path of the water, from the reservoir through the dam to the river channel, is shown in Figures 2 and 3. A six foot high, horseshoe shaped tunnel, 650 feet in length, allows the passage of water through the dam. The flow from the tunnel is regulated with an operating butterfly valve which is opened and closed by manual controls in the gatehouse at the top of the control tower. An emergency gate just upstream from the operating valve is used if repairs are required or if the operating valve is unusable for some reason.

If the inflow to the reservoir is greater than the capacity of the tunnel, the reservoir fills, and water may subsequently flow over the emergency spillway. In poor condition, the spillway channel sloughs and erodes each time water is allowed to pass over it. The reservoir is now operated at a lower level as a means to minimize the possibility of damage from water passing over the spillway.

---

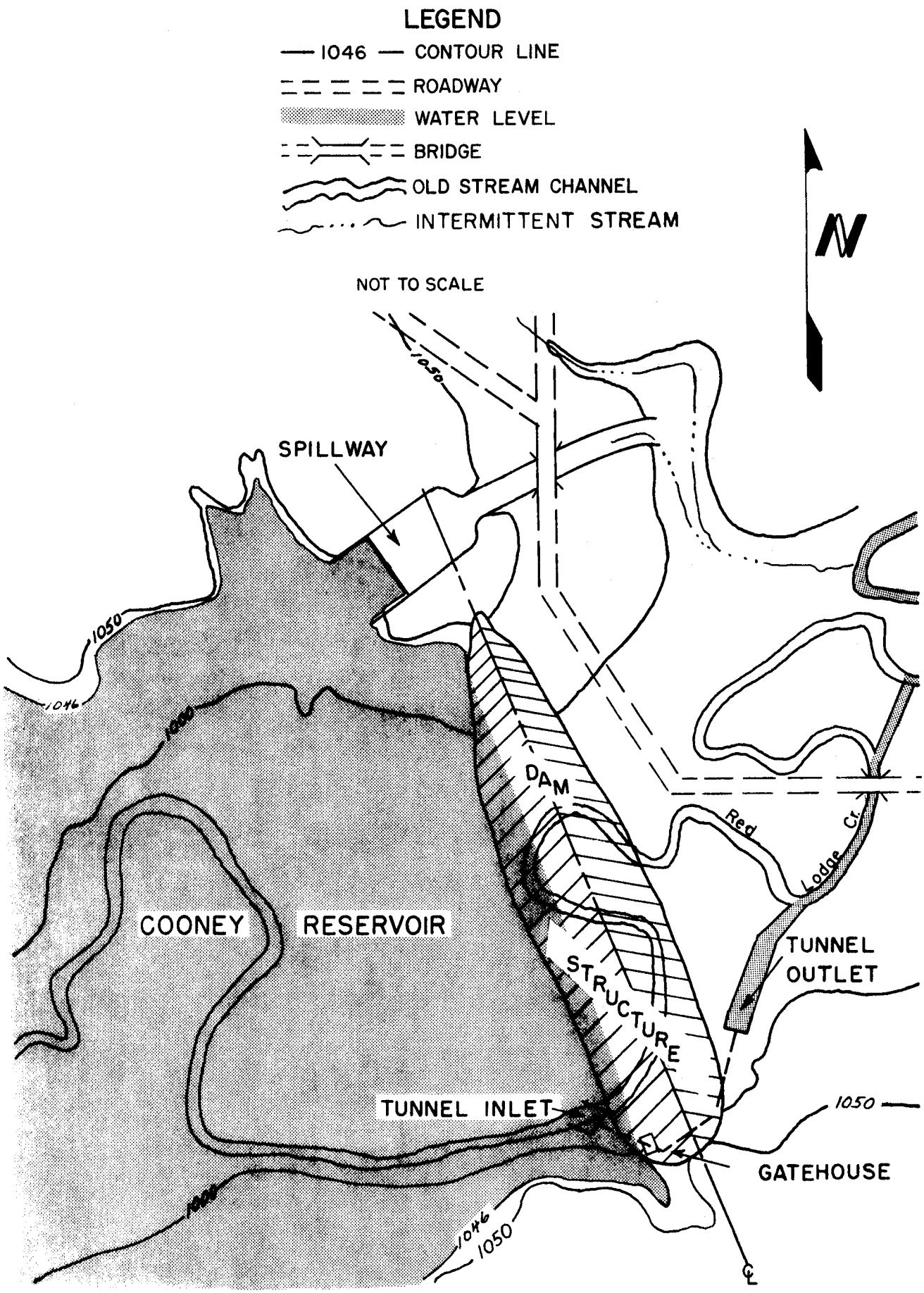
1/. An acre-foot of water is 325,900 gallons, enough to cover one acre of land to a depth of one foot. One acre-foot can supply the domestic water needs of a family of five for one year.

2/. One cubic foot per second is a flow rate equal to 448 gallons per minute.




LOCATION MAP

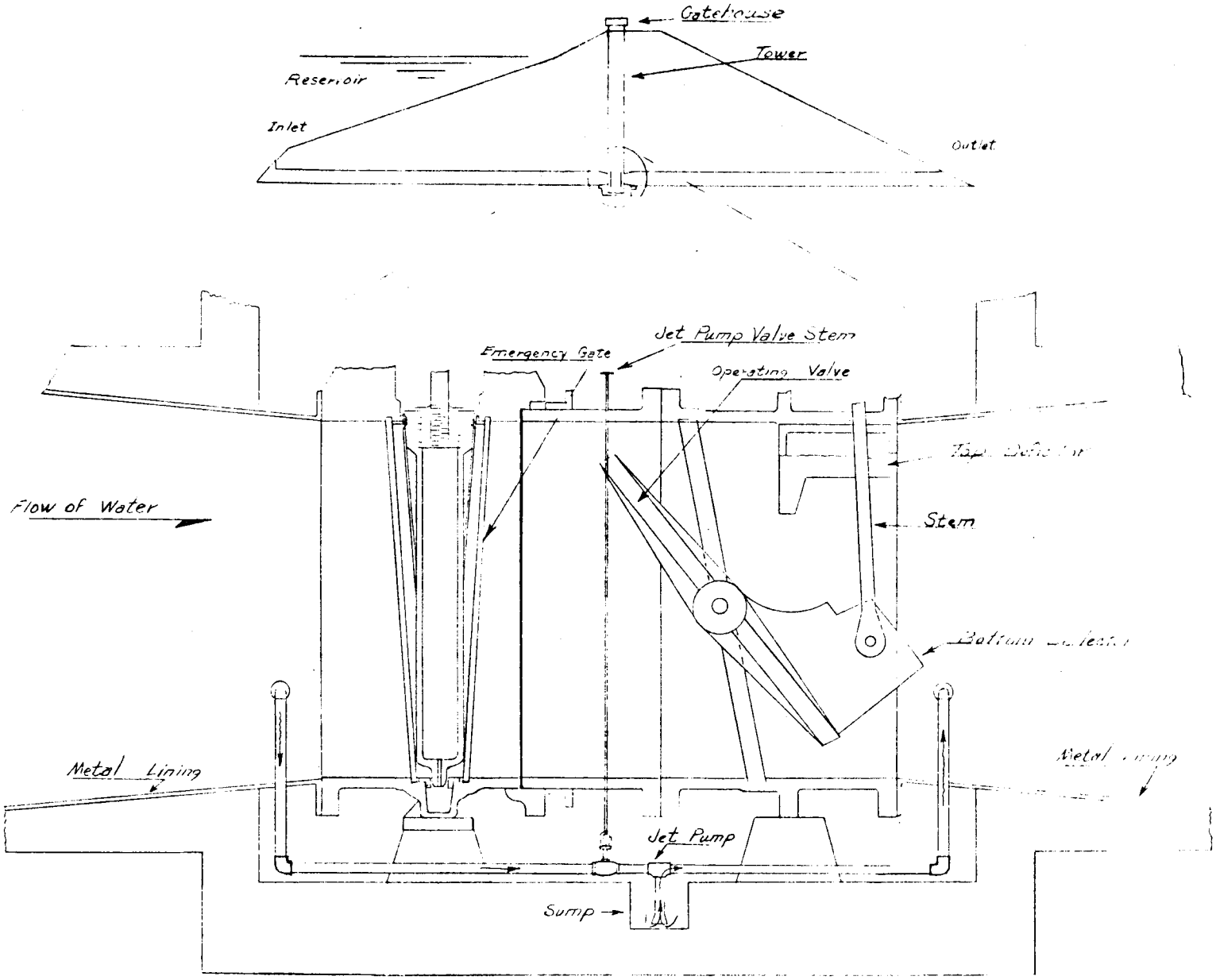
Figure 1




PLAN OF COONEY DAM

Figure 2

## CROSS SECTION OF DAM INDICATING TOWER & TUNNEL




## CROSS SECTION OF GATES & BOTTOM OF TOWER

FIGURE 3

## II. DESCRIPTION OF PROPOSED ACTION

### History

Major repairs to Cooney Dam have been few, with the latest being the riprapping of the dam face during the spring of 1974. There have been Department proposals calling for the replacement of the spillway, since remedial repairs are necessary whenever water goes over. However, its replacement is a major undertaking which is not presently feasible financially, as the Water Users' Association lacks the funds needed to complete the job.

### Present Condition

As noted, the reservoir is now operated with a lower water level in order to minimize the possibility of water going over the spillway. Snow survey data collected by the Soil Conservation Service are used in maintaining appropriate reservoir levels, and the Water Users' Association stores or releases water according to the water content of the snowpack.

Pitting on the metal around the operating gate was noticed during a dam safety inspection in August 1972. This pitting, left untouched for the past two years, is now deteriorating rapidly and is the most serious of the several problems observed during a September 30, 1974, dam inspection.

The pitting is a result of the forced water flowing through the small operating valve opening into the large outlet tunnel. A negative pressure is created by this flow, and vapor cavities, which are essentially small vacuum areas, are produced. These cavities ultimately collapse, and the resultant and extremely high, negative pressure pits the metal in the area just downstream from the operating valve. The photographs in Appendix A illustrate the location of the pitting, and, to some extent, the magnitude of the problem.

A jet pump (sometimes referred to as a sump pump) removes any water which accumulates at the bottom of the tower. The principle under which it works is related to a venturi tube which passes water under pressure through a pipe. Any water accumulated at the lowest point on the floor of the tower (sump) is sucked into the pipe and discharged into the outlet tunnel. A valve controls the flow of water through the jet pump apparatus. This valve is presumed to be worn because the flow of water through the valve cannot be completely stopped.

### Proposed Action

The Department has determined that the pitted metal must be repaired

and the top deflector of the operating gate replaced. In order to perform the repair operation, it will be necessary to close the emergency gate and dewater the tunnel, ceasing all downstream flows in Red Lodge Creek for some 5½ miles to the point where a tributary enters.

Timing and Duration of Proposed Operations

The Department intends to commence the repairs to the dam this winter, which will allow their completion before the dangerous spring runoff occurs. (High inflows to the reservoir could result in water flowing over the spillway.) Also, this timing would not interfere with the irrigation of the Water Users' crops.

The scheduled repairs should require a maximum of three weeks. This would allow time for casting a new iron deflector, repairing all pitted surfaces with a suitable epoxy steel, and possibly repairing the jet pump in the bottom of the tower.

## III. PROBABLE ENVIRONMENTAL IMPACTS OF THE PROPOSED ACTION

On the basis of thirty-five years of record, the average flow of Red Lodge Creek has been determined to be 96.9 cfs (Appendix B). The streamflows below the dam are very low for extended periods. This low flow situation most often occurs during the winter months, while water is being stored in the reservoir.

Fishery Resource

Twenty (20) percent of the average flow (19 cfs) is the amount needed for fishery survival as recommended by the Montana Department of Fish and Game. Flows below this amount are not uncommon, particularly during most winters. Consequently, a good fishery does not exist in Red Lodge Creek below the dam. The Fish and Game Department, knowing the present flow conditions and fisheries resource, has stated there will be little or no impact if the flow of water were stopped in Red Lodge Creek for the period necessary to undertake the repairs (Appendix C).

Other Impacts

Other elements of the environment are not likely to suffer as a result of no flow or a low flow in Red Lodge Creek, providing the repairs are made during the winter months as planned. Repairs at any other time of the year could have varying effects upon agriculture, recreation, wildlife, and vegetation.

Agriculture

The effect on agriculture would depend on the amount of water available for irrigation and the timing and duration of the repair effort. If repairs are made as planned this winter, there will be no impact on agriculture. Repairs made during any other season are likely

to have an effect on the production of hay, sugar beets, peas, and grain because of the curtailment of irrigation.

Recreation

Red Lodge Creek does not receive as much recreational use as Cooney Reservoir, and the recreational impact downstream from the dam is difficult to assess. During the repair period, the reservoir would begin to take on water, and the discharge from the dam would be far less than normal. With the creek low, the only major recreational activity, fishing, would be hampered.

Despite the rising water, recreational activities at the reservoir could continue normally.

Wildlife

The repair operation should have little impact on the many species of wildlife that exist in Red Lodge Creek Basin. Sufficient pools of water would remain if the flow ceased for a short while. Low flows resulting from seepage through the dam and from ground-water recharge would provide an adequate supply of water for wildlife.

Vegetation

Vegetation is not likely to suffer as a result of the proposed repair action. A small amount of seepage from the dam will preclude complete drying of the river bed. Ground water, which probably comprises an adequate supply for vegetation, will not suffer any unusual drawdown because of the repair project. If repairs are made during the winter period of dormancy, the chances of significant adverse impacts are greatly reduced.

## IV. ALTERNATIVES

As a result of the rapid degeneration of the metal inside the outlet tunnel, the no action alternative has been eliminated. These repairs are needed to restore the tunnel and operating gate to an acceptable and safe level.

Since the repairs have been scheduled for early this year, the alternatives which are available to the Department are broken down into the time of the action.

Alternative 1 - Make the proposed repairs in the spring.

Advantages:

1. Tributary flows would be highest. Therefore, some flow would exist downstream from the dam while the gates are closed.

2. Ground-water recharge of the river would be greater.

Disadvantages:

1. High runoff can occur during the spring. As run-off increases and the reservoir approaches the spillway elevation, the only option if the gate were closed would be to allow the water to flow over the spillway crest. Use of the spillway, as previously noted, always creates repair problems and additional expense and should therefore be avoided.

2. Access to the dam in springtime is difficult due to poor road conditions.

Alternative 2 - Make the proposed repairs in the summer.

Advantages:

1. Better working conditions would be encountered.

2. Access to the dam would be improved.

Disadvantages:

1. Irrigation of crops would be interrupted.

2. Conditions in the tunnel would worsen.

3. Recreation on the creek would be disrupted.

4. Summer storms could quickly raise the reservoir to the spillway level.

Alternative 3 - Make the proposed repairs in the fall.

Advantages:

1. Inflow into the reservoir would be fairly stable and low, reducing the risk of water flowing over the spillway.

2. Good working conditions would be encountered.

3. Access to the dam would be good.

Disadvantages:

1. The tunnel would deteriorate further due to additional use, necessitating more time and expense for repairs.

## V. RELATIONSHIP BETWEEN SHORT-TERM USE OF THE ENVIRONMENT AND LONG-TERM PRODUCTIVITY

Repair of the pitted metal in the outlet tunnel and replacement of the deflector for the operating gate stem will require closing the gates and dewatering the tunnel. The time allotted for this repair has been estimated at three weeks.

The closure of the gates will have a number of short-term effects. A low flow or no-flow situation can be expected to alter the limited aquatic resource. The extent to which the fisheries resource will suffer depends upon the season during which the repairs are done and the availability of supplemental ground water and surface flows. Nonetheless, the fishery in Red Lodge Creek, as previously mentioned, is not particularly significant, and there is no possibility of ruining an important fisheries resource.

The primary use of the water from the reservoir is irrigation. A sizable amount of land along the creek produces hay, sugar beets, peas, and grain. Therefore, low or no-flows would affect the citizens during the irrigation season. Hopefully it will not be necessary to make the repairs during that time.

The long-term benefit of the proposed repair would be the continued safe operation of the dam. The Rock Creek Water Users would again have the use of the controlled creek flow for irrigation.

If no repair action were pursued, the consequences would be drastic and long-term. The dam structure would become critically unsafe, the reservoir would ultimately be drained, and the dam would be breached. Should this occur, there would be significant erosion and sedimentation problems. The river would return to its natural flow, and irrigated agriculture would be reduced. Those lands whose productivity has been improved by the availability of stored water would, of necessity, revert to a lesser use.

## VI. IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

The epoxy, once committed to the repair, will be rendered both irreversible and irretrievable. However, the quantity of epoxy to be used to fill the pitted areas of the tunnel is not significant. The cast iron used in the building of a new deflector is neither an irreversible nor an irretrievable commitment since it is capable of being removed and recast. The fossil fuels necessary to drive an electric generator, which in turn will be used to run lights, blower, and wrench, will comprise a further irreversible resource commitment.

Despite any losses that may occur in the creek, the stream itself is a biological entity, capable of regeneration. This ability to renew indicates there is generally no irreversible commitment of the resource.

## VII. INDIVIDUALS CONTRIBUTING TO PREPARATION OF IMPACT ASSESSMENT

CLARK, Robert, Supervisor of Design Section, Engineering Bureau, Water Resources Division, Department of Natural Resources and Conservation
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KNUDSEN, Gerhard, Special Staff, Department of Natural Resources and Conservation
B.S., Forest Management, 1966, University of Montana
M.S., Forest Ecology, 1968, University of Montana

MASSMAN, Carole, Special Staff, Department of Natural Resources and Conservation
B.A., English, 1966, University of Montana

PORRINI, Philip, Dam Safety Engineer, Engineering Bureau, Water Resources Division, Department of Natural Resources and Conservation
B.E., Civil Engineering, 1974, Villanova University

## VIII. AGENCIES, GROUPS, AND INDIVIDUALS RECEIVING THIS STATEMENT

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Roberts, MT 59070

County Commissioners
County Courthouse
Red Lodge, MT 59068

# APPENDIX A

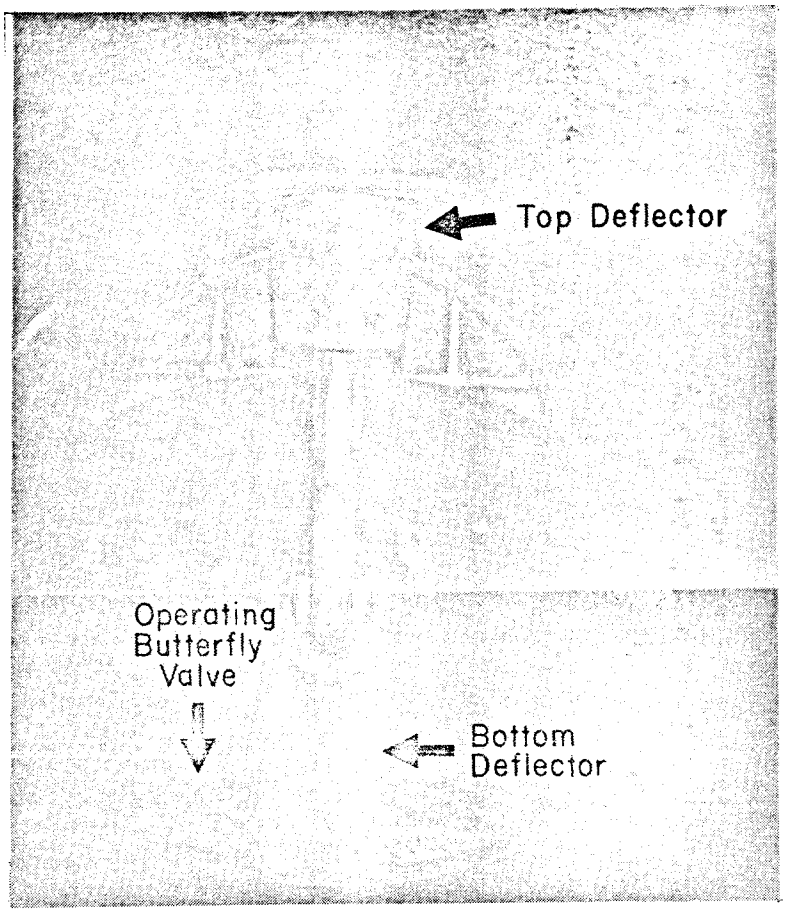


PHOTO 1

View of the operating butterfly valve, looking into the tunnel toward the reservoir side of the dam structure.

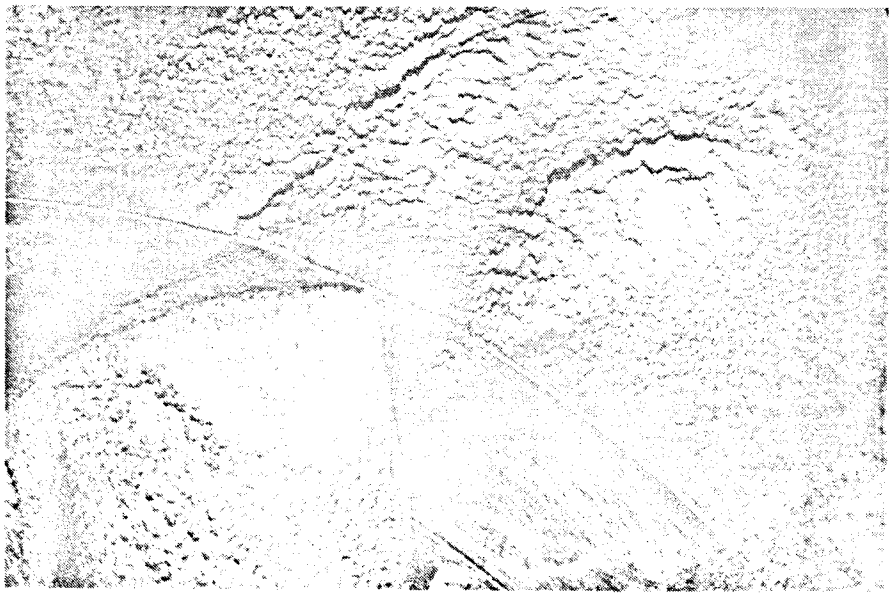

PHOTO 2

Ceiling immediately on the downstream side of the top deflector.

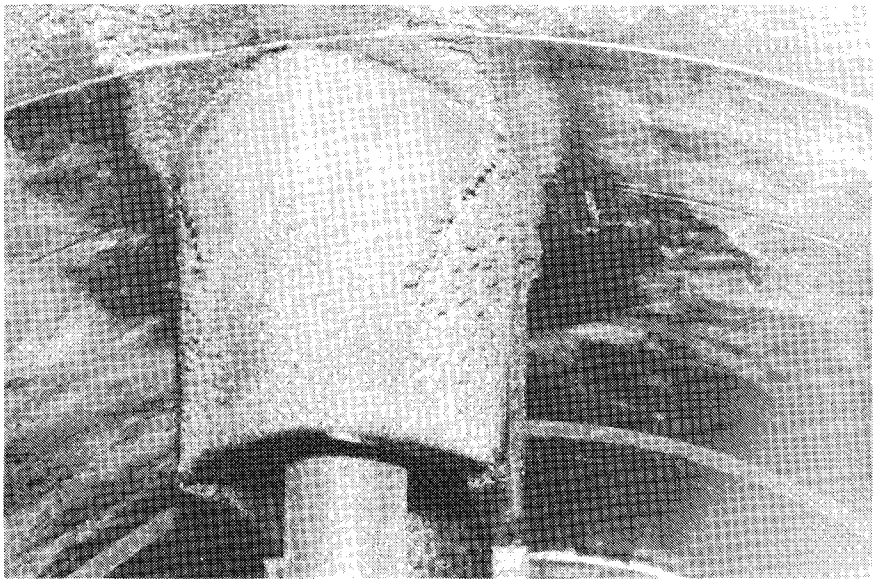

PHOTO 3

Top deflector as viewed from a downstream position.

PHOTO 4

Closeup of the top deflector.

Notice the severe pitting of a surface that is otherwise smooth.

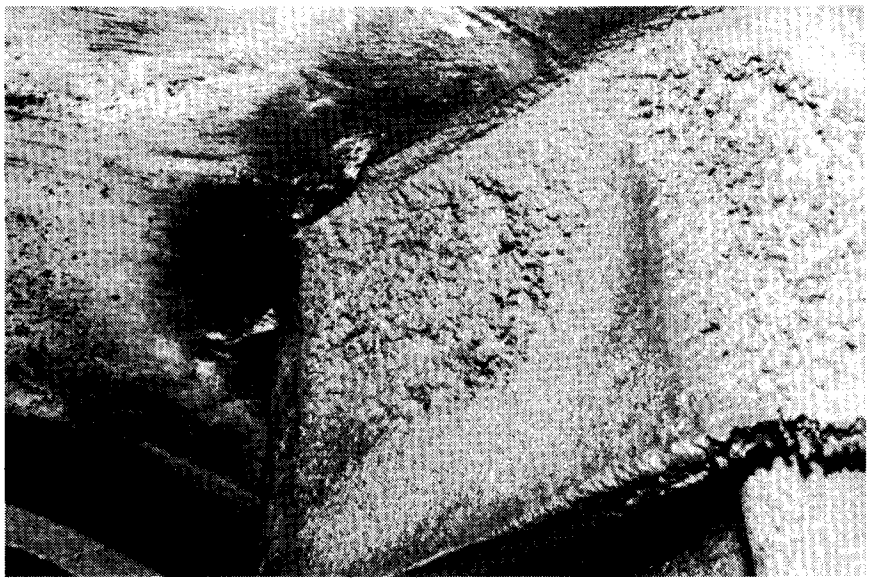

PHOTO 5

Top deflector showing severe pitting.

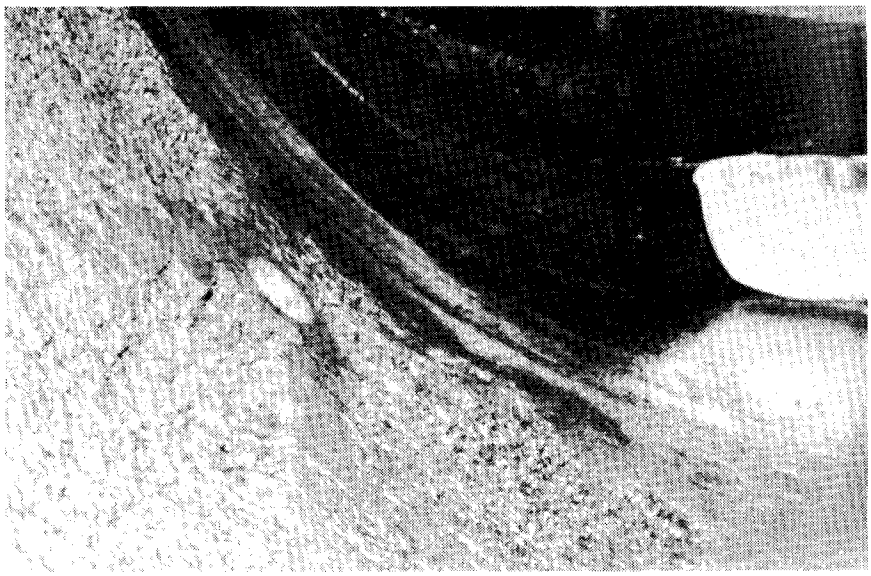

PHOTO 6

Floor of the tunnel around the jet pump outlet hole.

# APPENDIX B

## STREAMFLOW RECORDS

Station: Red Lodge Creek below Cooney Reservoir near Boyd, Montana

Period of Record: 1937 to 1973

Maximum Discharge on Record: 3,470 cfs - June 15, 1967

Minimum Discharge on Record: No Flow - October 6 and 7, 1948

Average Discharge Over 36 Years: 96.9 cfs

Low Flow Periods:

| | | | | |
|---|---|---|---|---|
| Mar. 13, 1973 | - | Apr. 1, 1973 | - | 22.0 cfs to 27.0 cfs |
| Apr. 13, 1972 | - | May 10, 1972 | - | 30.0 cfs |
| Nov. 1, 1970 | - | Feb. 10, 1971 | - | 4.4 cfs to 7.6 cfs |
| Dec. 21, 1969 | - | Apr. 11, 1970 | - | 6.5 cfs to 12.0 cfs |
| Feb. 10, 1969 | - | Apr. 8, 1969 | - | 7.2 cfs to 13.0 cfs |
| Dec. 4, 1967 | - | Dec. 11, 1967 | - | 18.0 cfs to 20.0 cfs |
| Dec. 29, 1966 | - | Jan. 29, 1967 | - | 14.0 cfs to 25.0 cfs |
| Nov. 30, 1964 | - | Feb. 3, 1965 | - | 6.0 cfs to 11.0 cfs |
| Nov. 28, 1963 | - | Apr. 15, 1964 | - | 1.5 cfs to 9.5 cfs |
| Mar. 27, 1963 | - | Apr. 23, 1963 | - | 11.0 cfs to 16.0 cfs |
| Oct. 1, 1961 | - | Nov. 9, 1961 | - | 1.8 cfs to 2.9 cfs |
| Oct. 15, 1960 | - | May 30, 1961 | - | 2.9 cfs to 9.0 cfs |

From 1937 to 1960, detailed data are not available, although monthly averages and yearly high and low flows are provided. The yearly high and low flows are on the basis of the average daily rate.

Yearly Low Flow Recorded (24-hour average)

| Water Year* | Flow (cfs) | Water Year* | Flow (cfs) | Water Year* | Flow (cfs) |
|---|---|---|---|---|---|
| 1973 | 22.0 | 1960 | 1.6 | | |
| 1972 | 35.0 | 1959 | 7.2 | 1948 | 5.9 |
| 1971 | 4.4 | 1958 | 3.3 | 1947 | 14.0 |
| 1970 | 6.5 | 1957 | 23.0 | 1946 | 15.0 |
| 1969 | 6.4 | 1956 | 6.5 | 1945 | 16.0 |
| 1968 | 12.0 | 1955 | 7.0 | 1944 | 2.7 |
| 1967 | 14.0 | 1954 | 3.0 | 1943 | 9.0 |
| 1966 | 3.8 | 1953 | 2.9 | 1942 | 10.0 |
| 1965 | 6.0 | 1952 | 20.0 | 1941 | 4.5 |
| 1964 | 1.5 | 1951 | 2.6 | 1940 | 6.6 |
| 1963 | 5.4 | 1950 | 4.0 | 1939 | 7.1 |
| 1962 | 1.7 | 1949 | .2 | 1938 | 1.8 |
| 1961 | 1.9 | | | | |

* A water year is the period from October 1 through September 30.

APPENDIX C

# STATE OF MONTANA

DEPARTMENT OF

FISH AND GAME

Helena, Montana 59601
December 20, 1974

RECEIVED
DEC 23 1974
MONT. DEPT. OF NATURAL RESOURCES & CONSERVATION

Mr. Gerry M. Knudsen, Environmental Coordinator
Department of Natural Resources and Conservation
Helena, Montana 59601

Dear Gerry:

After discussing your proposed repair plans on Cooney Dam, we concur with your decision that a negative declaration will sufficiently describe the problem and that an environmental impact statement is not needed to examine the impact of the proposed project on the fish or wildlife resource.

Sincerely,

James A. Posewitz, Administrator
Environment and Information Division

JAP/sd