

OPERATION AND MAINTENANCE PLAN

LAKE 17 DAM BLAINE COUNTY, MONTANA February, 2013

General

Operation and maintenance of Lake 17 dam is an asset to the success of the Fort Belknap, Little Suction Creek Diversion and Lake 17 Dam Project. Since the dam stores 4111 acre feet of water at the crest of the principal spillway and 5773 acre feet of water at the crest of the auxiliary spillway it is important to perform routine operation and maintenance. Lake 17 Dam has an estimated design life of 50 years, which will be assured and/or increased by developing and carrying out a good operation and maintenance program. The dam includes the following components:

- a. Dam
- b. Principal Spillway, Riser and Pipe
- c. Outlet Plunge Pool
- d. Auxiliary Spillway

Periodic inspections must be made to assure that the system is in good condition and operating correctly. As a minimum the following are required.

- a. A formal inspection of the entire system at least once annually. It is recommended that this be done in the fall.
- b. Periodic inspections should be made during the summer season while the system is operating. This would generally be a part of the weekly management and operation of the system.

Operation of Lake 17 Dam

The project consists of removal and disposal of the existing principal spillway pipe, headgate, and concrete inlet structure. The existing outlet works was replaced with a new reinforced concrete principal spillway riser, steel trash rack, and twin 42-inch diameter bell and spigot concrete pipes. When the pool level exceeds the elevation of the top of the riser, or 3020.9, water drops into the two chamber riser and flows out through the 42 inch pipes. The combined capacity of the pipes when the pool is at the crest of the auxiliary spillway is 413 cfs. There is no drawdown pipe, gates, or adjustments needed to control flow.

The concrete pipes are supported with concrete bedding and is outlet into a rock riprap lined plunge pool. A reinforced concrete cantilever pipe support and support footing allows the pipe to span over the rock lined plunge pool. The riser is equipped with a steel trash rack, sized to provide acceptable intake velocities, and two steel plate anti-vortex walls which are required to maintain system capacity. It is necessary to keep the trash rack clean and free of debris to maintain capacity.

After the riser and pipe were installed, the area excavated for the principal spillway was rebuilt. The reconstruction includes a sand filter diaphragm and filter drain that provides seepage protection around the conduits.

In order to protect the dam from waves that are driven by wind blowing across the lake, the upstream face is protected with rock riprap from station 1+00 to 5+00. Rock is also placed around the riser to provide additional protection against scouring flow.

A two hundred foot wide auxiliary spillway is constructed to allow excess flow to pass back to Duck Creek without impact to the dam. The main road also crosses through the spillway. Approximately 16,758 cubic yards of material was excavated for the spillway.

Maintenance of the Dam.

1. The dam has a sand filter diaphragm that is capable of collecting water that may seep through the embankment in the vicinity of the pipes. Once collected, the water can outlet along the 42 inch concrete pipes in a filter drain consisting of sand. The outlet is protected with rock riprap that lines the plunge pool. Periodic inspection for damage or any sloughing at the outlet is required.
2. Rock riprap is placed on the face of the dam from station 1+00 to 5+00. This includes rock around the riser. Periodic inspections of the rock are required. The rock section is 20 inches thick. Any section that becomes thinner due to wear and tear needs to have rock added back to the original thickness.
3. Periodic inspections and repair of local erosion on the slopes or damage to vegetation are required.
4. Eradicate or otherwise remove all rodents and burrowing animals. Immediately repair any damage caused by their activity.
5. The seeded areas must be protected from grazing
6. Careful observations need to be made to assure there are no areas on the downstream side of the embankment with uncontrolled seepage. If any are observed, determine the cause and make plans for repairs.
7. Prevent the growth of any woody vegetation, especially trees that can grow large enough that when they fall the slope is damaged when roots pull out soil and riprap.

Maintenance of the Principal Spillway Riser and Pipe.

1. The riser is equipped with a steel trash rack, sized to provide acceptable intake velocities, and two steel plate anti-vortex walls. It is necessary to keep the trash rack clean and free of debris so that flow is not obstructed. The trash rack is coated with Coal Tar Epoxy and may periodically need to be re-painted.
2. Damage to the concrete riser, pipe, or trash rack by vandalism need to be repaired. Spalls in the concrete need to be grouted back to the original surface. Periodic inspection of the inside of the pipes is required to assure the pipe has not settled or damage has occurred. Each joint gap should be inspected, measured, and recorded for future comparison.
3. Damage to the trash rack may be caused by vandalism or ice. If the damage is noticeable or threatens the function of the structure it will need to be repaired.

Maintenance of the Outlet Plunge Pool.

1. The outlet plunge pool is lined with rock riprap. Periodic inspection is required to assure that the rock has not been dislodged. The rock thickness is 3.75 feet. Sections of rock that become thinner need to have rock added back to the original thickness.
2. Erosion or sloughing of the dikes around the plunge pool need to be inspected and repaired if necessary.
3. Periodic inspection and repair of local erosion on the slopes or damage to vegetation is required.
4. Clean the area below the plunge pool or repair any local erosion as needed.
5. Protect seeded areas from grazing.

Maintenance of the Auxiliary Spillway.

1. Periodic inspection and repair of local erosion or sloughing within the spillway, on the slopes, or damage to vegetation is required. Inspection should occur at least once per year and after any large storm events.
2. Protect seeded areas from grazing.

Fort Belknap Approval:
