ENVIRONMENTAL
Fact Sheet

NEW HAMPSHIRE DEPARTMENT OF Environmental Services

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Typical Failure Modes for Gated Dam Outlets

The failure of a low-level dam outlet is not normally a sudden, unpredicted occurrence with the uncontrolled release of a large breach or flood flow downstream. Rather, failure may take on the form of inoperability, gate leakage, downstream channel/embankment erosion, conduit leakage, or uncontrolled discharges.

Inoperability
Many factors could lead to inoperability. These include, but are not limited to: bent or deformed members, corrosion of steel members, sediment/debris blockage, wood decay, vandalism, loss of access or loss of operating appurtenances such as hand cranks, portable motors, etc.

Gate Leakage
Leakage through a low-level outlet gate can have a detrimental effect in many ways. However, minor leakage is quite common and harmless. Leakage can result in: loss of reservoir storage or concentrated flow pressures – cavitation of gate structure surfaces.

Downstream Channel/Embankment Erosion
The channel downstream of the outlet conduit and the downstream toe of an earthen embankment immediately adjacent to the gated outlet conduit are susceptible to erosion from discharged waters. Undermining of the dam structure or saturating the earthen toe by backing water over it (channel blockage) could be the cause of structural integrity problems.

Conduit Leakage
Breaks, separation of joints, or loss of conduit materials within the dam structure could lead to leakage of pressurized water into the dam embankment. This action could cause the washing out of materials from within the dam thereby creating potential structural problems. To reduce the risk of seepage through the conduit, the gate control mechanism should be placed at the upstream side of the dam. This will eliminate the constant pressure exerted on the interior of the conduit walls and probably reduce seepage through these walls.

Uncontrolled Discharges
Uncontrolled discharges through the low level outlet conduit from a partial or complete failure of the gate would be the most serious case of failure for an outlet structure. This type of failure could result from either a “blow out” of an old and deteriorated wooden gate or from the inability to close a fully opened gate due to any one of many mechanical reasons. Whatever the cause, the result can be dangerous to the structure should this uncontrolled flow begin to affect the structural integrity of the entire dam structure.

For more information, relative to the design, construction, maintenance and operation of dams, please contact the NHDES Dam Bureau at (603) 271-3406 or email damsafety@des.nh.gov. General information is available at NHDES Dam Bureau Webpage. You may also visit our office at 29 Hazen Drive, Concord, NH.

This fact sheet is accurate as of December 2019. Statutory or regulatory changes or the availability of additional information after this date may render this information inaccurate or incomplete.