



# Dam Safety Fact Sheet

## *Internal Erosion of Earthen Dams*

STATE OF WISCONSIN • DEPARTMENT OF NATURAL RESOURCES • BUREAU OF WATERSHED MANAGEMENT

### **What is Internal Erosion?**

Internal erosion is one of the most common causes of earthen dam failures. It is the removal of soil particles from the embankment, foundation or abutments of a dam by water seeping through the dam. If the seepage that discharges at the downstream side of the dam carries particles of soil, an elongated cavity or "pipe" may be eroded backward toward the reservoir through the embankment, foundation or an abutment. When a backward-eroding pipe reaches the reservoir, a catastrophic breaching of the dam will almost certainly occur.

Internal erosion is exceptionally dangerous because it can occur with little or no external evidence that it is occurring. A dam may breach within a few hours after evidence the internal erosion becomes evident.

### **What can cause Internal Erosion?**

Internal erosion failures are often the result of physical structures which penetrate a dam such as outlet pipes buried in embankments or concrete spillways that cross the embankment. Other causes of internal erosion are tree roots and animal burrows. Decaying tree roots leave voids within the dam creating paths for water to enter and flow. Rodents such as beavers, groundhogs, and muskrats are naturally attracted to areas of ponded water such as dams and reservoirs. The tunnels these rodents construct can serve as pathways for seepage.



- Animal burrow

### **What are the signs of Internal Erosion?**

An experienced dam engineer should be able to detect the subtle signs of internal erosion during required inspections, but dam owners/operators should be aware of what signs to look for during more routine inspections. If signs of internal erosion are observed, contact an experienced dam engineer as well as the DNR Regional Water Management Engineer (WME) responsible for the county in which the dam is located. Contact information for DNR Regional WMEs can be found at: <http://dnr.wi.gov/topic/dams/regionalcontacts.html>.

### Signs of Imminent Danger (Call 911 and activate the Emergency Action Plan.)

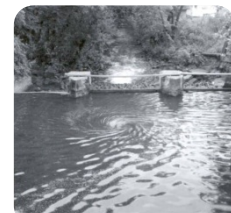
- Muddy water or a large flow of clear water discharging from the downstream side of a dam or next to a drain, low-level outlet pipe or spillway that penetrates the embankments or abutments.
- Large new sinkholes (more than 8 inches in diameter) or subsidence anywhere on the embankment or an abutment.
- Water flowing into a sinkhole below the reservoir surface on the upstream slope of the dam as evidenced by a whirlpool in the impoundment.



- Uncontrolled seepage/piping



- Slope failure



- Sinkhole in reservoir

Signs of Potential Danger (Contact an experienced dam engineer as well as the DNR WME responsible for the county in which the dam is located.)

- Water discharging on the downstream slope of an earth dam or within a few hundred feet downstream from the dam, possibly with the accumulation of sediment.
- Clear water flowing along the outside of a pipe, concrete spillway, or other structure that penetrates the embankment.
- Corrosion or deterioration of the visible portion of a low-level outlet pipe or other structure that penetrates the embankment.
- Uprooted trees on the embankment or abutments or within a few hundred feet downstream from the dam.
- Dead trees on the embankment or abutments or in the valley bottom immediately downstream from the embankment.
- New sinkhole (less than 8 inches in diameter), animal burrows or an old sinkhole or subsidence on the embankment or abutments.



- Uncontrolled seepage



- Corroded outlet



- Trees on embankment

### **Can Internal Erosion be prevented?**

Internal erosion on an earthen dam cannot be completely prevented. However, the damage caused by internal erosion can be limited by frequent, thorough inspections and prompt maintenance. Damage to earthen dams can also be limited by ensuring anyone involved in inspection of the dam knows the signs and causes of internal erosion.

For more information on dam safety either go to the [WDNR Dam Safety Program](http://dnr.wi.gov/topic/dams/) website: <http://dnr.wi.gov/topic/dams/> or write to:

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Dam Safety Program, WT/3  
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Madison, WI 53707-7921  
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