Internal erosion of soil particles forms within a dam by water that seeps through the dam (called piping by dam engineers) is one of the most common causes of failure of earth dams. Internal erosion is especially dangerous because there may be no external evidence, or only subtle evidence, that it is taking place. A dam may breach within a few hours after evidence of the internal erosion becomes obvious.

Internal erosion may develop the first time water is impounded behind a dam, or it may develop over many years. You cannot assume that your dam is safe against internal erosion just because it has performed satisfactorily for many years.

Internal erosion failures are often associated with "penetrations" of dams, such as outlet pipes buried in the embankment and concrete spillways that cross the embankment. An experienced dam engineer may be able to detect the subtle signs of internal erosion during routine periodic inspections, but you should be aware of what signs to look for between inspections. If you do observe signs of internal erosion, you should get help from an experienced dam engineer.

The Federal Emergency Management Agency has provided financial support for the publications of this brochure. Mr. A. Peter Barranco, Dam Safety Engineer of the state of Vermont, provided valuable input and many of the photos in this brochure.

This document is dedicated to the memory of Ronald C. Hirschfield.

The Association of State Dam Safety Officials (ASDSO) or your state dam safety office.

- Responsibility and Liability
- Procuring the Services of a Professional Engineer

Cover Photos
Top: Shallow subsidence on the downstream slope of the dam. Middle: A cavity in the dam, revealed when the embankment was excavated with a backhoe in the vicinity of the subsidence after the reservoir was lowered. Bottom: Close-up of the cavity, 6 feet wide and extending 85 feet into the embankment from the downstream toe of the dam.

ASSOCIATION OF STATE DAM SAFETY OFFICIALS
239 South Limestone
Lexington, Kentucky 40508
1-859-550-2788
www.damsafety.org
SIGNS OF IMMINENT DANGER
• Muddy water discharging from the downstream side of a
dam or from a drain or low-level outlet pipe, which may
indicate that the dam is failing.
• Sinkholes or subsidence anywhere on the embankment
or an abutment. Water flowing into a sinkhole below
the reservoir surface on the upstream slope of a dam is
especially dangerous.

SIGNS OF POTENTIAL DANGER
• Water discharging on the downstream slope of an earth
dam or with a few hundred feet downstream from the dam.
Look for any accumulation of sediment downstream from
the discharge.
• Water flowing along the outside of a pipe, concrete spillway,
or other structure that penetrates the embankment.
• Trees that are uprooted on the embankment or abutments
or in the valley bottom immediately downstream from
the dam.
• Dead trees (the rotting roots of which may become
avenues of internal erosion) on the embankment or
abutments or in the valley bottom immediately down-
stream from the embankment.
• Animal burrows on the embankment.

WHAT TO LOOK FOR

WHAT TO DO
Immediately, call 911, call the emergency number of your
state dam safety office, and implement your emergency
action plan if you see:
• Muddy water or large flow of clear water discharging
(1) from soil anywhere on the downstream side of the
dam, (2) next to a spillway, pipe or other structure that
perforates the embankment or abutments, or (3) from
drain pipes in the embankment.
• A large new sinkhole (more than 8 inches in diameter) or
new subsidence anywhere on the embankment or abutments.

IF YOU SEE SIGNS OF
POTENTIAL DANGER
As soon as possible, contact your state dam safety engineer
or other qualified profession dam engineer to inspect the
dam if you see:
• Springs that discharge a small quantity of clear water on the
downstream slope of the embankment or in the valley bottom
within a few hundred feet downstream from the dam.
• A small quantity of clear water flowing next to a pipe, spillway,
or other structure that penetrates the embankment.
• Water discharging near the roots of a living or dead tree.
• Corrosion or deterioration of the visible portion of a
low-level outlet pipe or other structure that penetrates
the embankment.
• A tree uprooted on the embankment or in the valley bottom
within a few hundred feet downstream from the dam.
• A small new sinkhole (less than 8 inches in diameter) or
animal burrow or an old sinkhole or subsidence anywhere
on the embankment or abutments.