SAFE DAMS PROGRAM
TENNESSEE DEPT. OF ENVIRONMENT AND CONSERVATION

The Tennessee Safe Dams Program (SDP) started when the Safe Dams Act of 1973 was passed. This occurred in the wake of failures in 1972 of a coal tailings dam on Buffalo Creek in West Virginia, which killed 125 people, and Canyon Lake Dam in Rapid City, South Dakota, which contributed significantly to the 236 deaths during heavy flooding there. Renewed interest occurred after the failures of Teton Dam (Idaho-1976), Laurel Run Dam (Pennsylvania-1977), and Toccoa Falls Dam (Georgia-1977), all of which killed people. Since 1983, when the SDP was moved to the Health Dept., over 150 dams have undergone major repairs to achieve current safety standards. Over 300 more have had minor repairs performed to achieve compliance.
The Safe Dams Act can be found on the web at
http://198.187.128.12/tennessee/lpext.dll?f=templates&fn=fs-main.htm&2.0

WHAT IS THE GOAL OF THE SAFE DAMS PROGRAM?

The primary goal of the Safe Dams program is to protect the public from dam failures.

WHAT DOES THE SAFE DAMS PROGRAM DO?

We inspect dams for safety and require that they meet stability and spillway standards in order to get an operating permit. Dams are inspected every 1, 2, or 3 years depending on whether they are high hazard, significant hazard, or low hazard, respectively. When dams are found to be unsafe, we review plans for repairing them and issue alteration permits for such repairs.
We also review plans for new dams and require that they meet strict standards in order to get a construction permit.
Unregulated dams are reviewed every five years for changes in ownership and hazard category.
The requirements for obtaining permits, safety standards, etc., are contained in our regulations, which can be found at http://www.state.tn.us/sos/rules/1200/1200-05/1200-05.htm

WHAT IS A DAM?

Any structure that can impound at least 30 acre-feet of water or is least 20 feet high. An acre-foot is an acre of water one foot deep, a 1/2 acre two feet deep, etc., or 43,560 ft^3. Height is the difference between the elevation of the downstream toe and the elevation of the low point of the dam crest.

EXEMPTIONS

1. Any dam owned or operated by the federal government, such as TVA and the Corps of Engineers.
2. Any dam licensed by the Federal Energy Regulatory Commission (FERC).
3. "Diversion weirs", "roadbeds", "water tanks", and "wastewater impoundment barriers" as defined in the Act.
4. "Farm Pond": any dam that is used for conservation, recreation, or agriculture only by the owner and which is closed to the general public. "Farm Pond" status is based on use of the lake. Farm Ponds can be any size or hazard category.

WHAT KINDS OF DAMS ARE THERE?

There are more than 1100 dams in Tennessee, more than 600 of which are regulated. Over 500 are exempt from regulation.
Most dams in the state are earth dams, 50 feet or less in height.
About 30 dams are concrete, the tallest being 50' high.
There are eight dams larger than 100', the tallest being a coal tailings dam in Marion County which is 315' high.
Currently, 98% of high hazard dams and 96% of all dams in Tennessee are in compliance.

CLASSIFICATION OF DAMS

Dams are classified by size and Hazard Potential Category (HPC).

The size classification is based on dam height or storage volume, whichever is greater, as shown in the following table.

Category	Storage (Ac-ft)	Height(ft)
Small	**30 to 999**	**20 to 40**
Intermediate	**1,000 to 50,000**	**41 to 100**
Large	**greater than 50,000**	**greater than 100**

The HPC is determined by the downstream damage that could result if a dam failed, based on the following definitions.

High hazard (HPC-1) dams would probably cause loss of life in the event of failure.
Significant hazard (HPC-2) dams would cause property damage or temporary loss of roads or utilities with a remote chance of loss of life.
Low hazard (HPC-3) dams would have little or no effect downstream if they failed.

The size of a dam is fixed by its physical dimensions and can change only if physical changes are made to the structure or its impoundment. On the other hand, **the hazard category can and does change** when new houses or businesses are built or old ones are torn down in the flood plain.

NOTE: The Safe Dams Act was amended in 2001 regarding construction of new homes or businesses downstream of dams. In cases where such construction might raise the hazard category of a dam located upstream of the new construction, the owner of the new structure is required to submit a dam failure analysis to the Safe Dams program. The analysis must be performed by a professional engineer licensed in Tennessee and show the flood elevations that would occur downstream if the dam failed under certain scenarios. Furthermore, city and county offices that issue building permits are required to advise the applicants for such permits of the above obligation. To help builders, local governments, and others comply with this law, the Safe

Dams program created a web site showing the locations of all significant (HPC-2) and low hazard (HPC-3) dams in Tennessee at http://gwidc.gwi.memphis.edu/website/dws/. High hazard dams are not shown for security reasons and because they already are classified in the highest hazard category.

HAVE DAM FAILURES EVER HAPPENED IN TENNESSEE?

55 known dam failures that caused release of water have occurred in Tennessee this century. An additional 21 dams have had partial failures which could have resulted in release of flood waters had remedial action not been taken.

The most disastrous failure in the state occurred in 1916 when the John Thompson dam failed and killed 24 people. The dam was located on the Barren Fork River in Claiborne County, and its failure caused the failures of five smaller dams downstream. The dam overtopped during a rainfall of 12-15 inches in five hours. (This is approximately a 1/2 Probable Maximum Precipitation (PMP), which small, high hazard dams and intermediate, significant hazard dams now have to pass without failing.)

Since 1973, 37 dams in Tennessee have failed, of which 33 were unregulated.

Most dams fail when excessive rain causes the lake to rise and overtop the dam, washing it out. A smaller number fail due to excessive seepage of water through the dam leading to the dam caving in and failing.

WHAT SHOULD I DO IN CASE OF A DAM EMERGENCY?

Any time a serious problem is detected and there is eminent danger of dam failure, the person identifying the problem should immediately contact the Tennessee Emergency Management Agency (TEMA) by dialing **1-800-262-3300**. TEMA will contact the local authorities and the Tennessee Safe Dams Section. Alternatively, the person may notify the local sheriff or police department, who should in turn notify TEMA.

Further measures that might be taken in emergencies are listed under "**POTENTIAL PROBLEMS AND IMMEDIATE RESPONSE ACTIONS"** and depend on the specific problem encountered. A dam owner may also choose to contact an engineer, a lawyer, or other parties whom he chooses.

If a dam is exhibiting problems but is not in danger of failure, notify the Tennessee Safe Dams Section. A professional engineer may also be called at the owner's discretion.

PROBLEM IDENTIFICATION

Detection of the following problems will require implementation of emergency procedures.

1. The dam is overtopping.

2. Internal erosion is occurring in the dam. This is usually indicated by water flowing out of a hole in the dam or by a sinkhole appearing somewhere on the dam.
3. A large slide occurs on either the upstream or downstream slope of the dam.
4. A crack or cracks appear in the dam.
5. Appurtenant structures such as spillways or risers fail.
6. A large area of the downstream slope becomes saturated (becomes soggy or muddy), particularly if the saturated area develops on the upper 2/3 of the slope.

REPORTING REQUIREMENTS

The person reporting the emergency situation to state or local officials should provide the following information to those agencies.

1. Name of person making the report and his telephone number.
2. The name and location of the dam.
3. A description of the problem (for example, excessive leakage, cracks, boils, slides, wet spots, etc.)
4. The location of the problem area on the dam relative to various parts of the dam. For example, "about 1/3 up from the toe and about 100' to the right of the spillway". The part of the dam which is actually affected, such as the toe, crest, upstream slope, downstream slope, etc.
5. A description of the extent of the problem area.
6. An estimate of the quantity of flow, if applicable.
7. An estimate of the lake level relative to the level of the principal spillway and whether the lake is rising or falling.
8. An indication of whether the situation is worsening and whether it can be contained.
9. Weather conditions and any other information that seems important.

POTENTIAL PROBLEMS AND IMMEDIATE RESPONSE ACTIONS

It is important to know what type of emergency repairs should be attempted. The following is a list of possible actions to take to avoid or delay a dam failure. **REMEMBER: NOTIFY THE PROPER AUTHORITIES IMMEDIATELY IF THE DAM HAS ANY OF THE PROBLEMS LISTED UNDER PROBLEM IDENTIFICATION.**

NOTE: Extreme caution should be exercised when working around a dam during emergency conditions. If the structural integrity of the dam is in doubt, or if attempting repairs to the dam would endanger the lives of those making the attempt, only authorized emergency personnel should be allowed on or below the dam.

OVERTOPPING BY FLOOD WATERS
. If available, open drawdown valve or use pumps or siphons to lower the lake level.
. Place sandbags along the crest to increase freeboard, if possible.
. An additional spillway or small breach may be cut into a short area of the dam or adjacent area only with approval of the Tennessee Safe Dams Section!

LOSS OF FREEBOARD DUE TO STORM WAVE EROSION OR PARTIAL EMBANKMENT FAILURE

. If available, open drawdown valve or use pumps or siphons to lower the lake level.
. Place sandbags or other suitable material in damaged areas to prevent further embankment erosion and/or to restore freeboard.

SLIDES ON THE UPSTREAM OR DOWNSTREAM SLOPE OF THE EMBANKMENT

. If available, open drawdown valve or use pumps or siphons to lower the lake level.

SINKHOLES, PIPING, OR BOILS APPEARING ON THE DAM

. If available, open drawdown valve or use pumps or siphons to lower the lake level.

FAILURE OF APPURTENANT STRUCTURES SUCH AS OUTLETS OR SPILLWAYS

. If available, open drawdown valve or use pumps or siphons to lower the lake level.
. Close off outlet or spillway if possible.

MOVEMENT OF THE DAM OR CRACKING IN THE DAM

. If available, open drawdown valve or use pumps or siphons to lower the lake level.
. Use sandbags or other suitable material to block flow of water through cracks.

EXCESSIVE SEEPAGE OR HIGH-LEVEL SATURATION OF THE EMBANKMENT

. If available, open the drawdown valve or use pumps or siphons to lower the lake level.