

## Dam Safety Issues

### 1. Risk of Failure

Although the majority of dams in the U.S. have responsible owners and are properly maintained, still many dams fail every year. In the past several years, hundreds of documented failures across the country have occurred. Dam failures are most likely to happen for several reasons, including:

- Overtopping from water spilling over the dam top
- Structural failure of materials used in construction
- Cracking caused by movements such as settling
- Inadequate maintenance and upkeep
- Piping — seepage through a dam causing movement of soil particles leading to the development of channels or sinkholes

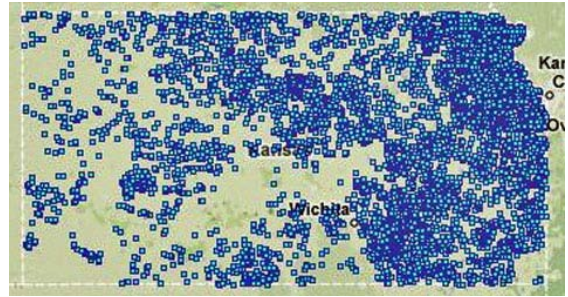
### 2. The Increasing Hazard

Dams are innately hazardous structures. Failure or mis-operation can result in the release of the reservoir contents — this includes water, mine wastes or agricultural refuse — causing negative impacts upstream or downstream or at locations remote from the dam.

Approximately 10,000 state-regulated U.S. dams are "high-hazard," a term used by a majority of state dam safety programs and federal agencies as part of a three-pronged classification system used to determine the impact a dam's failure might be to the downstream area.

Kansas has slightly more than 400 high hazard (c) and significant hazard (b) dams. These significant hazard dams require state-mandated inspections and are deemed a higher risk than the state's other classification: low hazard dams (a).

"High-hazard" reflects the dam's potential for doing damage downstream should it fail, not the condition of the dam. Ongoing debate is focused on the increasing number of these high-hazard structures — not because more high-hazard dams are being built, but that more development is occurring downstream. Dam safety regulators generally have no control over local zoning issues or developers' property rights.



*Jurisdictional dams in Kansas*

To help communities manage development below existing dams, the Kansas Department of Agriculture's Division of Water Resources prepared a model regulation for counties and municipalities. This model ideally will help minimize the risk of additional damage to life and property and avoid dam owner expense related to dam upgrading that can result when a higher hazard classification is assigned because of downstream development.

### 3. Lack of Financing for Maintenance and Repair

Dams must be maintained to keep them safe. Occasional upgrade or rehabilitation is necessary due to deterioration, changing technical standards, improved techniques, better understanding of the area's precipitation conditions, increases in downstream populations, and changing land use. Unfortunately, operation, maintenance, and rehabilitation costs range from the low thousands to millions. Owners — many who can't afford the cost — are responsible for these expenses (58% of dams in the U.S. are privately owned; in Kansas, about 55%).

Funding assistance, through government or private sources, is minimal at best. In 2009, the American Society of Civil Engineers graded dam safety as a "D" on a grading scale of A to F, partially due to the lack of funding available to support dam repair and upgrade.

### 4. Lack of Emergency Preparedness in Case of Failure

Most dam owners and local authorities are not prepared for a sudden dam failure and the ensuing downstream consequences, which is why high hazard and significant hazard dams are required to have Emergency Action

Plans, formal documents that identify potential emergency conditions at a dam and specify preplanned actions if dams should fail. In Kansas, 75% of high hazard dam owners required to file an EAP have done so.

#### **5. Lack of Public Awareness**

The ordinary citizen is unaware that the beautiful lakes on which he or she boats, skis or fishes are only there because of manmade dams. Developers build in dam break flood inundation areas not knowing about the potential devastation that an upstream dam could cause should it fail. In fact, some developers and zoning officials are completely unaware of dams within their community.

Even if citizens understand and are aware of dams, they still can be overly confident in the infallibility of these manmade structures. Also, many dam owners do not realize they are responsible and liable for impact of their dams on the downstream public and environment. They, too, don't always understand proper dam maintenance and its importance.

Today, every state but Alabama has a dam safety regulatory program. In Kansas, the Dam Safety Program in the DWR reviews plans and specifications for dam construction and major repair work, makes periodic inspections of construction work on new and existing dams, reviews and approves of emergency action plans, offers dam safety education, and does other activities to ensure dam safety.

This publication is adapted from *Top Issues Facing the Dam Community* published by the Association of State Dam Safety Officials. This organization partners with private and public entities, including the U.S. Society on Dams and the American Society of Civil Engineers; Federal Emergency Management Agency, Corps of Engineers, Department of the Interior, and Federal Energy Regulatory Commission to increase the safety of dams in the United States.