Dam Failures

General Information
National statistics show that overtopping due to inadequate spillway design, debris blockage of spillways, or settlement of the dam crest account for 34% of all dam failures. Foundation defects, including settlement and slope instability, account for 30% of all failures. Piping and seepage cause 20% of national dam failures. This includes internal erosion caused by seepage, seepage and erosion along hydraulic structures, leakage through animal burrows, and cracks in the dam. The remaining 16% of failures are caused by other means.

On average, Washington state experiences a dam failure approximately once every two years. The majority of these failures are in whole or in part the result of a failure to perform adequate maintenance and monitoring of the facilities. Of the 998 dams in the state, 68 are federally owned and operated while 73 are non-federal hydropower dams licensed by the Federal Energy Regulatory Commission. The remaining 857 dams are solely maintained by the Wasghington State Department of Ecology.

Effects
Loss of life and damage to structures, roads, utilities and crops may result from a dam failure. Economic losses can also result from a lowered tax base and lack of utility profits. These effects would certainly accompany the failure of one of the major dams in Washington state.

Three of Washington state's major dams are described below and the effects its failure would have on surrounding communities. This information is based on studies that assume a complete dam failure that occurs quickly. In an actual emergency, however, other failures or partial failures could occur.

The South Fork Tolt River Dam is located in the Cascade Mountains, 30 miles due east of Seattle. The dam project consists of an earthfill dam, a storage reservoir, a pipeline from the reservoir to a regulating basin about five miles downstream, and another pipeline from the regulating basin to Lake Forest Reservoir. The Tolt River Dam produces electricity and drinking water for Seattle and the region. Failure of the Tolt River Dam will cause major inundation of the City of Carnation, and the Snoqualmie River Valley. The Tolt Reservoir can hold over 18 billion gallons of water and its regulating basin can hold over 280 million gallons. Inundation maps indicate that major flooding will occur as far east as Snoqualmie Falls, and as far west as Everett.

The Tapps Lake Dam is an earthfill dam located on the White River approximately 20 miles southeast of Tacoma. A diversion dam at the City of Buckley diverts water into an 8-mile long series of canals, settling basins, and pipelines to the Project Reservoir, Lake Tapps. This dam is owned by Puget Power and used for recreation and hydroelectric power in Pierce County. Lake Tapps is an off-channel lake fed by a diversion flume. The lake has a very low natural drainage area so it is unlikely that Lake Tapps dikes would be overtopped during heavy rainfall.

A dam failure at Lake Tapps would result in peak flows in the White River, Puyallup River and Green River; models show that flood conditions would exist on these rivers for several days.

Inundation of the Puyallup River would not affect King County. The Green River would inundate the communities of Auburn, Kent, Renton and surrounding areas. It would also inundate the Duwamish River near Renton and flow through the Duwamish Valley to Puget Sound. The White River would also inundate Auburn and the surrounding communities and then would turn back south to Pierce County.

Located in the Sultan River basin, the Jackson Project is owned by Snohomish County and has been managed for the City of Everett's water supply since the early 1900's. In the event of dam failure, the majority of flooding would be in Snohomish County. However, models show that approximately one hour and twenty minutes after dam failure, at Monroe, the Snoqualmie River would become inundated and there would be flooding along the Snoqualmie to Fall City, in King County. The communities of Duvall and Carnation would also be affected by Jackson Project dam failure.

Conclusion

In the late 1980's the Dam Safety program of the Department of Ecology was reorganized to better utilize its resources in order to minimize public safety problems. The Dam Safety Section has also recognized the key role of other government agencies in carrying out its public safety charge. For example, the approval process now requires that dams located above populated areas develop emergency action plans in conjunction with the local county emergency management agency.

With such an abundance of dams in the state of Washington it behooves residents to be aware of the facilities whose failure could put them, their loved ones and their property at risk and to make necessary precautions and preparations.