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The Alaska Dam Safety Program and dams at mines in Alaska

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The recent failure of the tailings storage facility dam at the Mount Polley Mine in British Columbia has raised awareness of the subject of dam safety in Alaska. The following information presents a brief review of the Alaska Dam Safety Program, dams at mines in Alaska, and one perspective of the state's interest in and response to the Mount Polley incident.

The mission of the Alaska Dam Safety Program is to protect life and property in Alaska through the effective collection, evaluation, understanding and sharing of the information necessary to identify, estimate and mitigate the risks created by dams. The Dam Safety and Construction Unit within the Water Resources Section of the Division of Mining, Land and Water, in the Alaska Department of Natural Resources (ADNR Dam Safety) administers the Alaska Dam Safety Program under the authority of AS 46.17 to "supervise the safety" of dams currently identified under state regulatory jurisdiction. This includes a variety of dams, from small concrete dams for the water supply of villages to the large rockfill embankment dams used for tailings storage at hard rock mines in Alaska. The Alaska Dam Inventory is represented in Figure 1. Federally owned and operated dams and dams regulated by the Federal Energy Regulatory Commission (i.e., most hydroelectric dams in Alaska) are exempt by statute from state dam safety regulations.

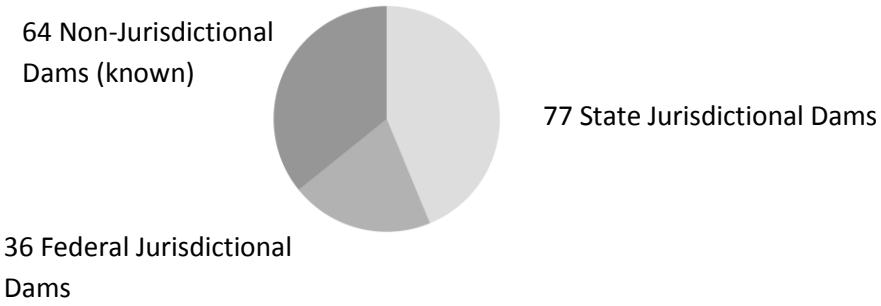

Figure 1. Alaska Dam Inventory
(177 dams total)

Several dams at mines that meet the statutory definition of a dam are subject to regulation by the Alaska Dam Safety Program, whether the dams contain tailings or only water. Both the Red Dog Mine and the Fort Knox Mine utilize large, rockfill embankment dams to store tailings from mill processing. A relatively small, rockfill dam impounds mill tailings at the Kensington Mine. A small embankment dam for tailings storage at the Nixon Fork Mine is in temporary closure. Both the Greens Creek Mine and the Pogo Mine (underground mines) utilize a dry stack for the

portion of tailings disposed above ground. Water retention dams are used for management of storm and contact water at these mines, and water retention dams are utilized at Fort Knox and Red Dog for freshwater storage. A small diversion dam at the Red Dog Mine is also regulated, and the heap leach pad at the Fort Knox Mine is regulated as a dam, even though there is not an open water pond behind the rockfill embankment that stabilizes the structure. All of the dams at the active hard rock mines in Alaska have current periodic safety inspection reports, appear to be in satisfactory condition, and are in general compliance with the Alaska dam safety regulations.

Alaska demonstrated leadership in dam safety with passage of the Alaska Water Use Act of 1966 (AS 46.15). The first National Dam Safety Act of 1972 set the nation on the path to safer dams, and in the early-1980's, the Alaska Dam Safety Program was organized by the ADNR under Chapter 93 of Title 11 of the Alaska Administrative Code (11 AAC 93). The subsequent Alaska Dam Safety Act of 1987 improved and formalized the legislative authority for regulating dams. The current dam safety regulations were promulgated in 1989 and revised in 2004. The Alaska Dam Safety Program was based on a model dam safety program developed in multi-agency committees including members of the Association of State Dam Safety Officials (ASDSO) and the Federal Emergency Management Agency (FEMA), the administrator of the National Dam Safety Program. While FEMA's role is primarily to develop and promote consistent standards, as well as to support and strengthen state programs, the state programs have the regulatory authority for assuring the safety of 80 percent of the nation's 84,000 dams. Alaska remains at the forefront of dam safety on a national level, with ADNR's State Dam Safety Engineer currently serving on the board of directors of ASDSO and several committees, including the ASDSO Design Review Committee. ADNR is an organizational member of the United States Society on Dams (USSD). These affiliations help the Alaska Dam Safety Program stay current with technology and engineering practice, and viable as a credible and important regulatory program.

ADNR Dam Safety serves to protect the downstream communities and resources that may be affected by the operation or failure of a dam. To achieve the mutual goal of safe dams, effective communication and cooperative relationships are required between the various persons, businesses, agencies, and other interests that are involved in the permitting, design, construction, and operation of dams. The Alaska Dam Safety Program receives geotechnical investigation reports, design drawings, engineering evaluations, detailed design reports, construction specifications, quality assurance plans, emergency action plans, periodic safety inspection reports and more. The level of detail in this information is highly dependent on the size of the project and the hazard potential classification and risk of the dam. (A detailed discussion of these concepts is beyond the scope of this article.) Much of the work represents multi-million dollar construction projects and requires highly specialized engineers for the technical design and analyses. Independent inspections and engineering evaluations are conducted by ADNR Dam Safety as necessary to confirm and monitor the condition and safety of the dam. After detailed technical reviews are completed on engineering submittals from dam owners and operators, ADNR Dam Safety issues a *Certificate of Approval to Construct, Repair, Modify, Operate, Remove, or Abandon a Dam* to indicate compliance with program objectives. The "Guidelines

for Cooperation with the Alaska Dam Safety Program" (currently being updated) provide a detailed overview of the program (available for download from the ADNR web site listed below).

ADNR Dam Safety expects high quality engineering submittals in applications for dam repairs, modifications, new dam construction or other work. Application fees are primarily used to fund the project-specific technical reviews and application process, which may include professional assistance from qualified consulting engineers retained under the authority of AS 46.17.020 to reinforce the program. Application fees are generally associated with construction activity and represent work beyond the scope of normal dam operations. No additional or separate fees are required for *Certificates of Approval to Operate a Dam;* these certificates are issued recurrently for routine operation and maintenance of existing dams in regular compliance with program requirements. The greater portion of recent application fees relates to work at mine projects. Refurbishing and rehabilitation of other dam projects also contribute fees, but to a lesser degree. In general, applications for construction of new dams are rare.

Accurate understanding and effective communication of technical and operational requirements are paramount to ensuring that dams are safe. The recent events at the Mount Polley Mine have increased awareness of the importance of safe dams at an international level. ADNR Dam Safety is extremely interested in learning from the incident and the reports on the investigations currently in progress. In the meantime, all of the existing dams at hard rock mines in Alaska appear to be safe and the mining companies are actively engaged in dialogue with ADNR Dam Safety. With the help of the engineering community, dam owners and operators, state and federal agencies, and many others, as well as the appropriate resources for all involved to do the necessary work, ADNR Dam Safety will continue to bear the standard for safe dams in Alaska.

For more information on the Alaska Dam Safety Program, visit http://dnr.alaska.gov/mlw/water/dams or contact Charles F. Cobb, P. E., State Dam Safety Engineer, at (907) 269-8636. For more information on dams and dam safety, visit ASDSO at www.damsafety.org and USSD at www.ussdams.org.