DECOMMISSIONING AND REPOWERING OF FORT ST. VRAIN

Michael E. Niehoff, Michael H. Holmes, Samuel W. Chesnutt
Utility Engineering, U.S.A.

ABSTRACT

Fort St. Vrain was a 330 MWe high temperature gas-cooled reactor, with helium coolant and graphite moderator, that was owned and operated by Public Service Company of Colorado. The plant was permanently shut down in August 1989, because of failures in several primary system components. PSCo decided to dismantle the reactor and clean-up the site as necessary to release the facility for unrestricted use, but not to restore the site to its original green fields condition.

Before decommissioning dismantlement activities could begin, all spent fuel had to be removed from the reactor. There is no high level waste storage facility in the United States and the governor of the State of Idaho denied PSCo access to the graphite fuel storage facility located in that state, for political reasons. Since it had no other reasonable options, PSCo built a passively cooled Independent Spent Fuel Storage Installation (ISFSI) at an on-site location about one quarter mile from the Reactor Building. By June 1992, all Fort St. Vrain spent fuel had been transferred into this ISFSI.

For remaining decommissioning activities, PSCo retained a decommissioning contractor team consisting of Westinghouse, Morrison-Knudsen, and the Scientific Ecology Group, using a fixed price contract. Dismantlement of the reactor and removal of all radioactive material required a period of 40 months. Activities were centered in the prestressed concrete reactor vessel (PCRV), since the PCRV contained over 95 percent of all radioactive material in the facility. After filling the PCRV internal cavity with water for shielding and protection of workers, activated PCRV concrete and all in-core components were removed using diamond wire saws, long handled tools, underwater plasma arc cutting torches, and other common demolition equipment. No sophisticated robotic tools or other unproven methodologies were used. These dismantlement actions resulted in the removal of 289,600 cubic feet of radioactive material and a collective occupational exposure of 380 person-Rem. A final radiation survey was performed in parallel with dismantlement activities as much as possible, and involved a period of 22 months and the collection of over 400,000 survey measurements, at a cost of $15 - 20 million. The U.S. Nuclear Regulatory Commission reviewed the final survey documentation and terminated the Fort St. Vrain nuclear facility license in August 1997, almost eight years after final plant shutdown. Total cost of decommissioning, excluding spent fuel disposition, was $189 million (U.S.).

When the Fort St. Vrain reactor was permanently shut down, PSCo determined that much of its non-nuclear equipment still had considerable remaining service life, the turbine generator was in good condition, the location was an established generating location, the switchyard served as a connection point for five major transmission lines and was valuable for supplying reliable electric power to the metropolitan Denver area, and the growing service territory needed additional generating capacity. Based on these considerations, PSCo decided to re-power the facility with natural gas-fired equipment. The re-powering

project includes combustion turbines and heat recovery steam generators and is being undertaken in phases. The first phase included a 130 MWe combustion turbine, which was constructed in parallel with Fort St. Vrain decommissioning activities and has been operational since May 1996. A 102 MWe heat recovery steam generator is being installed and is expected to be operational by summer 1998. A second and possibly a third combustion turbine/heat recovery steam generator unit are planned for later phases of the repowering project.

PSCo considers the Fort St. Vrain decommissioning and repowering project to be a success. The site was successfully cleaned up to meet the criteria for unrestricted release and the facility's nuclear license was successfully terminated, within PSCo's established schedule and budget. Also, repowering the facility with natural gas-fired equipment is making appropriate use of the plant site and remaining equipment, and is allowing Fort St. Vrain to continue as a valued contributor to PSCo's generating capacity.