

RANCHO SECO – PLANNING WHILE DISMANTLING

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ABSTRACT

The Rancho Seco Nuclear Generating Station ceased operation in June of 1989 and entered an extended period of SAFSTOR to allow funds to accumulate for dismantlement. Incremental dismantlement of steam systems was begun in 1997 and based on the successful work to date, the SMUD board of directors approved full decommissioning in July 1999.

The Spent Fuel is scheduled to be moved to dry storage in an onsite ISFSI beginning in April, with completion scheduled for late 2001. A self-contained spent fuel cooling system was installed in 1999 to allow the isolation of the Spent Fuel Building until fuel is moved. A reverse-osmosis water-treatment system has been leased to process accumulated wastewater and the fuel pool water, allowing removal of evaporators and other installed liquid radwaste components.

A schedule has been developed for completion of decommissioning by 2008, allowing decommissioning funds to accumulate, as they are needed. System removal began in the Auxiliary Building in October of 1999 and in the Reactor Building in January of 2000.

The personnel resources on site are currently assigned to support both the dry fuel project and the dismantlement of the facility. Once fuel movement is complete more resources will be provided for dismantlement. Of paramount importance is a safety culture that encourages watching out for one another and accountability for infractions.

While actual dismantlement work is going on, planning and scheduling is being done to move the completed detailed schedule from one that supports the current work to one that details the entire eight years. Characterization of major components to support planning for their removal is in progress and various cut-up and shipping options are being evaluated. The relatively slow pace of the work allows careful evaluation of cost-effective options as they become available in the industry.

INTRODUCTION

Rancho Seco is a 913-megawatt B&W designed nuclear power plant owned by the Sacramento Municipal Utility District that began commercial operation in 1975. It was shut down in June of 1989 as the result of a voter referendum. Due to a minimal decommissioning fund balance, the decision was made to enter an extended period of SAFSTOR to allow the activity to decay and the fund to build to a level that would allow dismantlement, projected to begin in 2008.

In 1991, the decision was made to place the spent fuel into dry storage, allowing the plant to enter a "hardened" SAFSTOR condition and cutting the required staff significantly. An ISFSI has been built and contracts for casks and fuel storage liners are in place, but numerous delays

have continued to postpone fuel transfer. The current schedule calls for fuel transfer to be complete by late 2001.

With the staff waiting for fuel movement and the possibility for significant cost savings by using the Envirocare disposal site, a three-year incremental decommissioning project was proposed to dismantle the Turbine Building systems and a portion of the Tank Farm systems (1). The project was approved for 1997, with annual renewals based on performance. This work has been successfully completed leading to approval of full dismantlement in July of 1999.

The plant staff is being reorganized to support a focus on decommissioning rather than the maintenance and operation of the station. The personnel resources on site are currently assigned to support both the dry fuel project and the decommissioning of the facility. With significant physical work going on for the first time in ten years, of paramount importance is a safety culture that encourages watching out for one another and accountability for infractions.

The plant systems are being reconfigured to facilitate dismantlement. Current issues involve backing out of operating systems to allow their removal and characterization of major components to support planning for their removal. A self-contained spent fuel cooling system has been installed to allow the isolation of the Spent Fuel Building until fuel is moved (Estimated late 2001). A reverse-osmosis water-treatment system was leased to process the accumulated wastewater, allowing removal of evaporators and other installed liquid radwaste components.

Longer term planning includes possible large component size reduction to allow disposal at Envirocare.

DRY FUEL PROJECT

The decision to move the fuel to dry storage was originally made to allow the plant to go to a hardened SAFSTOR condition that would allow the utility to minimize the staff and therefore the cost. SMUD decided that a transportable dry cask system was needed to allow the fuel to be transported to the DOE without replacing it in a fuel pool for repackaging. No such system existed at the time that would accommodate Rancho Seco's fuel. SMUD decided to develop and purchase a "first ever" large-scale canister based transportable spent fuel storage system.

SMUD signed the contract in 1992 for the design, licensing and fabrication of a transportable storage system. In 1995 the ISFSI was constructed and fabrication of the cask and associated equipment began. However, in 1996, quality issues throughout the dry storage industry and vendor bankruptcy forced work to be stopped. In 1997, a new supplier resumed the design and license work. Work is now expected to be complete to allow an April 2001 start to fuel movement with possible completion by late 2001.

The transportable storage system consists of a transportation cask, twenty-one dry storage canisters, twenty-two horizontal storage modules and a multi-axle trailer. The cask serves for on-site transfer and off-site transportation overpack for the canisters. The canisters hold the spent fuel in a structural array and are seal welded at both ends. The horizontal storage modules are thick reinforced concrete storage bunkers used to store the canisters. The twenty-second

module is expected to provide storage for greater-than-class-C waste from reactor vessel internals.

The cask and first canister is onsite and preparations are underway to begin fuel movement. An independent review team (IRT) has developed a list of items to be addressed prior to fuel movement and a NRC team will also provide a review before the process can start. A schedule for canister delivery is still in doubt due to fabrication delays. Once the process starts and a delivery schedule is completed, the completion date can be predicted with some confidence. The continual slipping of the completion date for this activity has a major effect on other aspects of decommissioning.

PAST WORK

Beginning in 1997 a small team was formed to begin selective dismantlement. This work was successful and grew into the current decommissioning project. From 1997 through 1999, most all of the potentially contaminated components in the turbine building and outside areas were removed. Most all of the asbestos, lead and other hazardous material remediation has also been completed. Work began in the auxiliary building in September 1999.

2000 WORK

Tank Cleaning – Tank cleaning is a high exposure, but necessary, activity that allows the removal of radwaste tanks. Some tanks have a thin layer of activated oxide material, some have significant sludge from sumps and others have a gravel-like activated material. Each presents its own set of problems for removal and waste handling. Early work on low-activity tanks was done by washing the material to a sump, but this only allows the problem to be revisited when the sump is cleaned.

The next tank to be cleaned was the Misc. Waste Tank, which received sump waste and had a significant quantity of sludge. The sludge was washed to a bag filter system by high-pressure water lance. Bag handling caused more dose than anticipated and left many filters to process. This would not be acceptable on higher activity tanks.

A method was developed for the next tanks to flush the sludge to a high integrity container (HIC) that contained previously discharged resin. This allowed for low exposure handling and activity averaging over the resin waste with no increase in waste volume.

Tank Cutup – Tank removal was a significant obstacle. Small tanks and vessels were removed whole if possible. Larger ones had to be sized for removal from rooms and cubicles. Tanks were either stainless steel or carbon steel with paint and an interior coating. For coated tanks the paint and coating was manually removed along lines to be cut and the tank was cut by torch. For stainless tanks a variety of methods were used, including saws, machining and plasma torch. Plasma torch was the most efficient, but created smoke that plugged filters and required tenting the local area to control fumes. Each tank was evaluated to determine the best method.

Hot Spot Removal – A program of removal of hot spots in the auxiliary building has been performed. Mostly valves, these hot spots caused many rooms to be radiation or high radiation areas. Prior to major work in these rooms the valves were removed making work much simpler and at significantly lower exposure. A similar program is planned for the reactor building in 2001.

Waste – Most waste from Rancho Seco goes to two different facilities. High-density waste is packaged for disposal at Envirocare of Utah. In 2000 approximately 17,000 cubic feet of boxed and drummed waste was shipped there. Most low-density waste is shipped to GTS Duratek for processing based on weight. Approximately 20,000 cubic feet was shipped for processing in 2000. Some high-activity waste (<100 cubic feet) was generated and is stored pending a disposal solution (Envirocare B & C License?).

Planning – Until the recent year, job planning was barely ahead of ongoing work. Once the entire decommissioning project was approved it became a priority to develop the planning process to support a detailed schedule for the entire project. A high-level schedule was developed for an eight-year duration to provide a framework. Then, the detailed schedule was slowly extended to include the next two years. The biggest unknown affecting this schedule is the completion of fuel movement, which continues to produce many challenges.

Allowing the planning to develop over an extended period of time permits the evaluation of many alternative methods for dismantlement and the incorporation of lessons learned from other projects that are further along.

Rx Building Work – Reactor Building work began with removal of asbestos and mirror insulation. Removal of cabling, ventilation systems and dome spray systems was next. Currently, a high-pressure wash-down of the entire building is in progress. With the planned hot spot removal program, the building should be far more accessible from a radiological standpoint.

Site Boundary Survey – A radiological survey of utility property beyond the security fence was performed to determine background levels and to bound the impacted area. The survey was intended to meet the intent of the planned rule making for partial site release as “not different from background” and may be used for that purpose. This survey also supported the planned addition of a gas-fired unit to the south on utility property.

Safety and ALARA – An active safety program has resulted in no contractor lost-time accidents in 2000 and only one OSHA recordable injury. On the utility side, one lost time accident and two recordable injuries were counted, significantly better than 1999. The annual dose recorded was approximately 22 manrem, higher than the annual estimate but the estimate did not include many of the higher exposure projects that were accomplished.

PLANNED WORK FOR 2001

Detailed planning for work in 2001 has been completed. Essentially all of the remaining Auxiliary Building piping systems except for those needed to support the Spent Fuel Cooling System and the liquid radwaste tanks and pumps should be removed during 2001. In the Reactor Building, remaining ventilation systems, cooling water systems, steam systems, wiring and the four reactor-coolant pump motors are planned to be removed. Table I lists the current long-term schedule.

Table I. Major Item Schedule

Activity Description	Start	Finish
Auxiliary Building System Removal	Sept. 1999	Dec. 2002
Reactor Building Preparation	Jan. 2000	Dec. 2000
Reactor Building System Removal (non-RCS)	Jan. 2001	Dec. 2005
Remove RCP Motors	Mar. 2001	June 2001
Move Spent Fuel to ISFSI	April 2001	Dec. 2001
Spent Fuel Pool Dismantlement	Jan. 2002	July 2003
Remove Reactor Coolant Piping	Jan. 2003	May 2003
Remove Reactor Coolant Pumps	May 2003	Dec. 2003
Remove Steam Generators and Pressurizer	Jan. 2004	July 2005
Remove Outside Tanks	Feb. 2002	Oct. 2002
Remove Underground Piping	Jan. 2002	Dec. 2002
License Termination Plan Preparation	Jan. 2001	Oct. 2003
Reactor Vessel Internals Removal	Jan. 2005	July 2006
Reactor Vessel Cut-up	July 2006	May 2007
Building Decontamination	July 2003	Feb. 2008
Perform Final Survey	Oct. 2006	Oct. 2008

PLANNED WORK FOR 2002

Work planned for 2002 in the Auxiliary Building includes processing water in the liquid radwaste tanks and removal of all but one tank and the removal of much of the ventilation ducting. Once the fuel is moved, much of the Spent Fuel Building is to be removed during 2002 and 2003. In the Reactor Building all remaining piping systems except major components will be removed. In-core detectors will be removed and work may begin on reactor coolant pumps and the pressurizer.

PLANNING FOR LARGE COMPONENTS

No significant planning on the major components has been done. Due to the time frame when these components are expected to be removed, 2003 to 2007, the ultimate destination is unknown. It may be possible to send all of the components to Envirocare, with some sizing for transportation. Barnwell may still be an option or other sites may be open (Richland or DOE sites). The possibility of wire-sawing the steam generators to allow easy removal and shipment to Envirocare is being investigated.

CONCLUSION

The slow ramp-up of decommissioning activities from an incremental project to a full decommissioning has allowed time for innovation and trial and error in the process. While the approval for full decommissioning required catching up in the planning process, much of that planning has been completed in the last year. The goal is to have three years of planning completed ahead of the ongoing work. A further goal is to determine the ultimate disposition of the major components to allow the detailed planning to begin.

REFERENCES

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3. SMUD, Rancho Seco Nuclear Power Plant, Post Shutdown Decommissioning Activities Report; Amendment 2, Docket 50-312, November 1999.
4. Rancho Seco Procedures Manual, "Control of Incremental Decommissioning Projects", RSAP-1900, Revision 4, September 1999.