RANCHO SECO – DECOMMISSIONING UPDATE

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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 was begun in 1997 of steam systems and based on the successful completion of work, the Sacramento Municipal Utility District (SMUD) board of directors approved full decommissioning in July 1999.

A schedule has been developed for completion of decommissioning by 2008, allowing decommissioning funds to accumulate until they are needed. Systems removal began in the Auxiliary Building in October of 1999 and in the Reactor Building in January of 2000. Systems dismantlement within the Auxiliary Building is nearing completion as removal of the final liquid waste tank was completed in January. Removal of support systems and structural steel within the Reactor Building is also nearing completion with only the large components remaining.

The spent fuel has been moved to dry storage in an onsite ISFSI, with completion on August 21, 2002. The spent fuel racks were removed from the pool, packaged and shipped for direct disposal. The stainless steel pool liner is in the process of being removed and shipped for disposal.

Work is progressing to ship the Rancho Seco Pressurizer, a 45' (13.7m) long, 150-ton (136 metric ton) component, for disposal at Envirocare of Utah. Radiological surveys and characterization of the Reactor Pressure Vessel internals has been completed and SMUD has received proposals for segmentation of the vessel internals. Also in the last year the reactor head was segmented into five sections and sent for disposal.

Preparation work on the Steam Generators continues as flanges and covers have been torqued or welded over vessel nozzles and penetrations. An exemption request has been submitted to the Department of Transportation to permit transport of the Steam Generators as unpackaged radioactive material. The generators will be cut in half by diamond-wire saw to facilitate easy removal from the Reactor Building and rail shipment.

All wastewater has been processed and holding tanks have been segmented and shipped for disposal. Current wastewater generation is being collected in a temporary tank and evaporated in drum dryers. If the dryers can't keep up with the generation rate then the water will be processed through a filter and demineralizers and subsequently discharged.

The HSA (Historical Site Assessment) is complete and characterization surveys and samples have been obtained to determine DCGLs (Derived Concentration Guideline Levels). Work has begun on the LTP (License Termination Plan). Work will soon begin on surface decontamination and embedded pipe decontamination and surveys.

In the year ahead the remaining structural steel in the Reactor Building will be removed, packaged and sent for disposal. Work will continue on embedded and underground piping.

INTRODUCTION

Rancho Seco is a 913-megawatt Babcock and Wilcox (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 was built and contracts for casks and fuel storage liners were put in place, but numerous delays continued to postpone fuel transfer. Fuel transfer was finally completed in August of 2002 as 21 canisters have been filled and placed in the ISFSI.

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 a 1997 start, with annual renewals based on performance. This work was successfully completed leading to approval of full dismantlement in July of 1999.

The plant staff has been reorganized to support the focus on decommissioning rather than the maintenance and operation of the station. The personnel resources on site were assigned to support both the dry fuel project and the decommissioning of the facility until the fuel movement was complete in August of 2002. After fuel movement was completed the staff was reorganized to focus on completion of dismantlement. With fuel in storage and off the reactor site many licensing requirements have been removed and many surveillances and procedures are being eliminated.

Over the last year significant progress has been made on removal of systems in the Auxiliary Building, the Reactor Building and the Spent Fuel Building. Eleven spent fuel storage racks were decontaminated, packaged and shipped to Envirocare of Utah for disposal. Following completion of this task in March, the pool water was drained, processed and released from site. Since that time site personnel have been removing the stainless liner plate from the walls and floor.

Except for the large components, all highly radioactive components in the buildings have been removed. The final underground radwaste tank within the Auxiliary Building was removed in January of 2004. Three outside holding tanks have also been segmented.

Work on large components has finally begun with the cut-up and disposal of the reactor head. Preparations are underway for an April removal of the pressurizer with vessel internals work to begin by June. Table I lists the current long-term schedule.

Table I Major item schedule

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

Work was also begun in October of 2003 on a new power plant on the Rancho Seco site. Phase one will be 500 MW of combined cycle natural gas turbine to be operational by summer of 2005. A second 500 MW phase may be built.

LARGE COMPONENTS

During 2003 significant planning on the major components was completed. A Request for Proposal to segment the Reactor Vessel Internals was issued in September with bid openings on 1/21/04. An exemption request was submitted in November to the Department of Transportation to ship the Steam Generators to disposal during 2005. The Reactor Head and service structure have been segmented and disposed of. The Pressurizer has been prepared for a May 2004 shipment date.

Reactor Vessel and Internals

SMUD has received proposals back from vendors detailing proposed plans and pricing for disposition of the Reactor Vessel Internals and contract award is expected by March 1st. The current plan is to segment the Greater-than-Class C (GTCC) baffles and formers from the vessel interior to be followed by removal of the Class C core barrel and the Class C sections of the lower grid assembly.

The decision to segment the vessel followed careful consideration of the facts surrounding logistical challenges, and political and financial risk to Rancho Seco in shipping an intact vessel to disposal. Difficulties in shipping the entire vessel via rail included physical size, weight and public perception. The vessel possibly could be transported via barge, however the Rancho Seco site is landlocked with the nearest navigable water over 30 miles away. In addition, the barge would be required to travel through the Panama Canal or around Cape Horn at the southern end of South America.

The final activation analysis and radiological characterization of the vessel and internals was completed in June of 2003. After the GTCC is removed from the vessel, only 21,000 curies (7.78 E8 MBq) remain with 13,000 (4.81 E8 MBq) curies attributable to Co60.

The GTCC waste weighs 24,000 pounds (10,886 kg) and will be packaged into a single canister and stored within the onsite ISFSI alongside the spent fuel. The Class C waste will be segmented and packaged and stored in the Rancho Seco Interim Radwaste Storage Building.

Rancho Seco is currently working on options for vessel and Class A/B internals disposition. Section 3.3 of the 1995 NRC Branch Technical Position on Concentration Averaging and Encapsulation defines rules for mixing activated metal components and this guidance will be used when determining the final configuration of the reactor vessel with remaining internals. It is anticipated that the vessel will be segmented longitudinally into four sections, each similar in total size, weight and activity. Prior to segmentation, grout will be introduced into the vessel void in order to secure the internals in place and facilitate cutting.

Upon removal from the cavity, each section will be packaged into a canister for transportation to Envirocare of Utah. The mode of transportation to the disposal site will be via rail. The proposed canisters containing the segments of the vessel will clear rail route dimension and weight limits to Utah.

Reactor Head Disposition

A major work activity during 2003 involved the disposition of the Reactor Head. This B&W design consisted of sixty-nine Control Rod Drive Mechanisms (CRDMs), each weighing approximately 1000 pounds (454 kg); a Service Structure weighing 35,000 (15,876 kg) pounds and the Reactor Head itself, weighing 160,000 pounds (72,575 kg).

This work began with removal of the Service Structure, which was removed from the Reactor Head after abating and flame cutting the lower shroud from the Head. The Structure was removed from the Refueling Cavity and taken to an adjacent work area where it was segmented. These sections were packaged into a 20' Seavan that was subsequently sent to a processor for decontamination, free release or further volume reduction.

The next step was to remove the CRDMs from the Reactor Head. The CRDMs were grouped by their applicable function during plant operation and consisted of safeties, control and power shaping rods. There was very little radiological data associated with the CRDMs and lead-screws, which connected to the control rods, resulting in the dismantlement crew proceeding very carefully during removal of the CRDMs. Packaging criteria for the CRDMs was established based on the amount of activation and associated dose rates and burial site waste acceptance criteria.

The first CRDM removed was from the "safety" group and surveys indicated low dose rates. The survey along the length of the lead screw indicated 50 to 60 mrem/h (0.5 to 0.6 mSv) gamma while the tip of the lead screw was 40 mrem/hr (0.4 mSv) gamma. There was little fluctuation in dose rates as the different CRDM groups were removed and surveyed. All were packaged within a metal strong tight container (STC) and sent for direct disposal after segmentation.

The CRDMs, mounted to the Reactor Head, were removed by cutting the nozzles just below the mounting flange by use of a Tri-Tool clamshell cutting-tool, which was fitted around the nozzle. Once cut, each CRDM was lifted from the cavity, surveyed and placed in a processing area where it was segmented into box-sized lengths for disposition.

During the first part of 2003, a Request for Proposal was issued for transportation of the Reactor Head and Pressurizer to Envirocare of Utah in addition to negotiating a disposal rate for the intact Head and for five sections of the Head. The Reactor Head to be transported was described without the Service Structure and CRDMs. It became apparent that the most cost effective option for the disposition of the

Reactor Head would be segmentation. Pricing considerations for disposition of the Reactor Head included engineering cost and fabrication of a suitable container for the intact Head, disposal cost of the intact versus segmented Head, Rancho Seco's low source term and dose rates allowing easy handling and packaging of the segmented Head sections, and transportation costs to Envirocare of Utah. Rancho Seco's overall project costs for segmentation was less than one-half the estimated cost for intact disposal.

The Reactor Head was segmented with the use of a diamond-studded wire rope supplied by our segmentation vendor Bluegrass. The five segmented sections included three sections of the flange and two sections of the top portion of the Head, cut just off-center through a clear path around the remainder of the CRDM nozzles.

Contact dose rates underneath the Head were 200 mrem/h (2 mSv) and dropped off to 80 (0.8 mSv) mrem/h at the open plane of the bottom flange. Dose rates on the top of the Head ranged from 15 mrem/h to 30 mrem/h (0.15 to 0.3 mSv). The four flange keys had contact dose rates up to 800 mrem/h (8 mSv) so the keys were shielded as the segmented pieces were prepared for shipment. High levels of contamination were found on the underside of the Head and were affixed with use of a polymer-based latex paint.

Pressurizer

Planning for the Rancho Seco Pressurizer shipment is well underway with an anticipated ship date of May 2004. The Pressurizer is a 45' (13.7 m) long, 150-ton (136 metric tons) component, which will be disposed of at Envirocare of Utah. Radiological surveys and characterization have been completed and the Pressurizer will be shipped as a surface contaminated object within a soft-sided strong tight container. Contracts have been put into place for rigging and removal of the Pressurizer from the Reactor Building and for railroad transport to Envirocare of Utah.

Preparation for this project included removal of piping systems with subsequent plugging of the penetrations. Exterior dose rates are 0.2 mrem/h (2 □Sv) or less except for a hot spot at the Pressurizer bottom where the surge line exits the vessel where a contact reading of 200 mrem/h (2 mSv) was found. To ensure 49 CFR 173.441 radiation limits are met, a carbon steel shielding cover has been placed over the surge line and welded to the exterior of the vessel reducing the contact dose rate to well less than 200 mrem/h (2 mSv). To prepare the vessel for contamination control while handling onsite, a polymer-based latex paint has been applied to the exterior rendering loose contaminant levels to less than 1000 dpm (16.7 Bq)/100cm^2 beta-gamma.

Steam Generators

Rancho Seco has submitted an exemption request to the Department of Transportation seeking relief from 49 CFR 173.403 demonstration requirements for a surface contaminated object (SCO) and from 49 CFR 173.427 (b)(1) for packaging of SCO. The B&W designed once-through steam generators are over 73' (22.25 m) in length, 12.5' (3.81 m) in diameter and weigh 570 tons (517 metric tons) each.

Due to their overall length, it was ascertained that the steam generators would be unable to be shipped intact to a disposal site via rail. As a result of this, Rancho Seco has chosen to segment each generator in half, leaving four sections to then ship for disposal. A steel plate will be welded onto the segmented end of the each generator section. Other openings have been flanged and welded or torqued to original operating specification. Each section of generator will be transported as unpackaged radioactive material as the generator sections have been successfully evaluated against the criteria in 49 CFR 173.465(c) for a 1 foot free drop test. A blocking and bracing plan was developed in accordance with the American Association of Railroad Manual criteria for open top loading.

Radiological characterization has been completed on each section of the generator. The sections are all classified as waste class A with A2 activity fractions ranging from 16.4 to 17.4; the differences attributed to small weight variances and interior and exterior dose rates. Interior dose rates were obtained from a clear lane (free of tubes) in the center of the tube bundle and from feedwater nozzles. The highest dose rate found was 2.5 rem/h (25 mSv) at the center of the tube bundle. Smears were obtained from base metal inside the tubes (primary side) and on the tube sheet and analyzed for 10 CFR 61 data. The generator activity was modeled within MicroShield V5.05 and results were subsequently verified through back calculations using the exterior dose rates. Exterior dose rates are very low with no more than 2 mrem/h (20 □Sv) found on surveys.

It is planned to ship the generator sections to disposal during the third quarter of 2005. Requests for Proposal that will be issued for this work will include 1) segmentation, 2) rigging and removal from the reactor building and 3) transportation to the disposal site.

ONGOING WORK

Radioactive Waste Breakdown

During 2003, radioactive waste from Rancho Seco went for either disposal at a burial site, or for processing at a vendor's facility.

Higher-density waste was packaged for disposal at Envirocare of Utah. In 2003, approximately 26,000 cubic feet (736 m^3) of waste was shipped there, consisting of metal boxes and Seavans, as well as compacted DAW in drums. Lower-density waste is shipped to a processor for volume reduction and disposal or for decontamination and free release. Approximately 8,500 cubic feet (241 m^3) was shipped for processing in 2003.

Plant components, that never came into direct contact with radioactive systems or which can be easily cleaned by grit blasting, are considered candidates for onsite free release. In 2003, approximately 100,000 pounds (45,359 kg) of metal was free released.

For the decommissioning project:

- 8,500,000 pounds (3,855,532 kg) of material has been surveyed and free released
- 9,000,000 pounds (4,082,328 kg) or 131,000 ft3 (3,707 m^3) of waste has been sent for direct disposal
- 1,500,000 pounds (680,388 kg) or 59,000 ft3 (1670 m^3) of waste sent to processors
- 311 waste shipments to disposal facility and processors
- Approximately 5,000,000 pounds (2,267,960 kg) remain (not including concrete and soil)

The remaining waste consists of

- 2,300,000 pounds (1,043,261 kg) for the Steam Generators
- 645,000 pounds (292,567 kg) for the Reactor Pressure Vessel
- 340,000 pounds (154,221 kg) of Vessel Internals
- 304,000 pounds (137,892 kg) for the Pressurizer
- 1,400,000 pounds (635,029 kg) of structural steel, grating and miscellaneous waste

Rancho Seco has begun to characterize the remaining concrete and soil. It is anticipated that by Spring 2004 this will be completed and Requests for Proposal will be issued for disposition options of these waste streams.

Rancho Seco was able to transfer its large calibration sources (including three plutonium/beryllium sources) to the original vendor this year. Fission chamber detectors were returned to their original vendor last year. There is now no longer any special nuclear material on the site inventory. Work is ongoing to transfer all remaining sources not needed for current calibrations.

Spent Fuel Building

The eleven spent fuel racks were removed from the pool during the first quarter of 2003 and shipped to Envirocare for direct disposal. The process for removal and disposal began with vacuuming the debris from each cell, followed by radiological survey, for hot spots, and further rack decontamination during removal from the pool. A Tri-Nuclear vacuuming unit coupled with high-loading filters was used to collect the loose debris from the racks. Two filters reading 25 rem/h (0.25 Sv) and 30 rem/h (0.30 Sv) were ultimately generated during the cleanup.

Upon removal each rack was placed on the cask wash-down platform, where a thorough decontamination and survey of each cell and outer surface was performed. The racks were then removed from the wash-down platform and staged for drying, followed with a coating of spray adhesive, and wrapped in 12-mil (0.3 mm) plastic. The 12-mil plastic served for contamination control during packaging, which occurred outside on the plant turbine deck.

The racks were then moved to a lay-down area outside the fuel building, down-ended, and placed in a watertight shipping bag. The final step involved re-rigging the rack for placement in a large metal strong-tight container. Each rack had less than an A2 quantity of radioactivity that allowed use of the strong-tight container. All radiological surveys were performed to ensure DOT radiation limits were met, labels and placards applied, and the package placed on the transport vehicle for disposal. Each transport package contained only one rack and was transported by highway for disposal at Envirocare of Utah.

Dose rates on the rack exteriors ranged from 2 mrem/h (20 □Sv) on the top, to 15 mrem/h (150 □Sv) in the middle, and to 50 to 80 mrem/h (0.5 to0.8 mSv) on the bottom. Hotspots within the cells ranged from 1 rem/h to 4 rem/h (10 to 40 mSv), all on the bottom. The hotspots were easily removed through decontamination using high-pressure washing except for the 4 rem/h (40 mSv) hotspot, which was found between the cells and was found to be mobile. After making several attempts to remove it, ready-mix grout was poured into the cell matrix, which fixed the hotspot in place. The introduction of grout lowered the measured dose rate to less than 80 mrem/h (0.8 mSv).

Prior to decontamination, loose surface contamination ranged from 300 K dpm (5,000 Bq) /100cm^2 to 500 K dpm (8,333 Bq) /100 cm^2 beta-gamma, but less than 20 dpm (0.33 Bq) /100 cm^2 alpha. Post-decontamination levels were found to be no more than 30K dpm (500 Bq) /100 cm^2 beta-gamma.

Following successful completion of the rack project, the remaining pool water was drained, and the walls and the floor pressure-washed. Loose contamination levels on the floor and walls after wash-down were only 1000 to 3000 dpm (16.7 to 50 Bq)/100cm^2 beta-gamma. The remaining water and wash-water was sent to a holding tank for processing. Decommissioning then embarked on removal of the pool liner plate which is constructed of ¼" (6.35 mm) thick stainless steel and was connected to the concrete wall with numerous embedded supports positioned at 6 foot centers in the horizontal and vertical direction. Methods for removal that were considered included; plasma cutting and machine cutting the plates. Plasma cutting would have involved a tremendous effort to set up an enclosed area to control smoke and

possible toxic fumes (chromium) generated by the flame cut. Although a slow process, machine cutting was selected as it generates little secondary waste, involves no industrial hygiene concerns and was proven to be capable of performing the cuts.

The machine cutting is performed with a carbide bit installed on a hydraulically operated milling track which can be positioned horizontally or vertically depending on the cut to be made. The carbide bit travels along the milling track machining the stainless steel as it goes. The milling track is affixed to the wall by use of fasteners welded to the liner with a stud gun.

The milled sections of the liner plate are then loaded into a top-loading 20' Seavan and shipped for direct disposal. Dose rates on a loaded Seavan are no greater than 0.2 mrem/h (2 □Sv).

Once the liner plate is removed, the underlying concrete structure and soil below will be sampled to ascertain if pool-water leakage (known to have occurred) will require their excavation and packaging for disposition.

Outside Tanks

Two large stainless-steel tanks and one lined carbon-steel outdoor tank were dismantled, packaged and shipped for direct disposal in 2003. The three tanks included the 1) Borated Waste Storage Tank (BWST), 2) Demineralized Reactor Coolant Storage Tank (DRCST) and 3) the Regenerant Hold-Up Tank (RHUT). The BWST and DRCST contained water for reactor coolant makeup and filling the reactor cavity during outages. The RHUT held water collected for discharge.

The process for tank removal was the same for all three – layout of cut locations, lead paint abatement of these locations (if required), plasma arc segmentation of the stainless-steel sections or cutting torch segmentation of the carbon steel sections and packaging the sections in open-top 20' Seavans. The original plan for the RHUT was to attempt free release, however residual activity prevented this. The BWST and DRCST presented minor contamination control challenges regarding radioactivity within the tank - up to 30,000 dpm (500Bq) /100 cm^2 beta-gamma was discovered on the surfaces of the inner walls and floors. A wash-down of the interior was conducted prior to segmentation and the wash water was sent to a holding tank for processing.

The inside of the RHUT was lined with a rubber barrier, which was removed and placed within a Seavan with segmented sections of the tank. The barrier was only slightly contaminated and the desire was that the inner tank wall would be free of detectable contamination and could thus, be free released. If free released, Rancho Seco would have employed a technology to crush the tank into a transportable size and send it to a local metal recycler. Small amounts of radioactive contamination were discovered in many areas inside the tank and the decision was made not to pursue free release.

The BWST and the DRCST each weighed 112,000 pounds (50,000 kg) while the RHUT weighed 38,000 pounds (17,236 kg). The segmented waste from these tanks was packaged into eight open-top 20' Seavans. Each Seavan contained approximately 300 cubic feet (8.5 m^3) of waste and was shipped for disposal at Envirocare of Utah.

Underground Tank Farm

2003 began with three of the original seven tanks remaining that comprised the liquid radioactive waste tank farm located twenty-three feet below grade level under an outside access road. By January all tanks had been segmented and the sections placed within B-25 boxes and sent for direct disposal at Envirocare of Utah.

During the year Rancho Seco was successful in processing and releasing all the water within the tanks to the environment. However, a system is still required to collect, sample and process the minor amount of water that is still produced. A 1000-gallon (3,875 L) poly tank was installed to collect any water that could not be immediately processed by the drum-dryers. Water in the tank is then processed in the drum-dryers, as capacity is available, or processed through filters and media for release if necessary. All other tritiated and borated water on-site has been processed and discharged.

The three remaining tanks required very little decontamination prior to segmentation. The residual water within the three tanks was sent to a drum-dryer evaporation system where the water was heated and evaporated over time. Residual contamination was pressure washed and sent to the drum-dryer. Dose rates on the drums when removed did not exceed 50 mrem/h (0.5 mSv).

The tanks were constructed of stainless steel and were cut by plasma torch into sections for packaging into the B-25 boxes. The use of plasma has been proven to the most efficient however, creates smoke that clogs filters and requires enclosing the local area to control possible toxic (chromium) fumes. The pre-filters used in filtering the smoke and fumes while torching the stainless tanks have quantifiable RCRA concerns with chromium thus creating a mixed waste. Rancho Seco is currently reviewing options for disposition of this waste stream.

Underground and Embedded Pipe

Work has begun planning for decontamination and survey or removal of underground and embedded pipe. There are approximately 5500 feet (1676 m) of embedded pipe to be decontaminated and surveyed. Most underground pipe known to be contaminated will be removed. Pipe removal is expected to begin in May of 2004.

License Termination Plan

The Historical Site Assessment (HAS) was completed and characterization work is in progress to support development of the LTP. Sampling has been completed for DCGL development – including surface soil, subsurface soil, scabbled concrete, concrete cores and pipe samples.

A meeting with the NRC is planned for spring 2004 to present the proposed LTP approach.

Safety and ALARA

An active safety program has resulted in no lost-time accidents in 2003 and only 2 OSHA recordable injuries under the decommissioning program. The annual dose the site recorded was approximately 17 man-rem (0.17 Sv), which was less than the annual estimate of approximately 22 man-rem (0.22 Sv). Since active decommissioning began in 1997 total site dose is approximately 105 man-rem (1.05 Sv).

CONCLUSION

Ongoing work continues to follow the long-term schedule to meet a completion date of the end of 2008 and remains within the planned budget. Innovative approaches have been possible due to the long lead times of the schedule, the short operating history and long decay prior to dismantlement. Large component work planned for the coming years will challenge that plan but we believe that innovative solutions should see us through.

REFERENCES

1 M. Snyder, J. Newey, E. Ronningen "Rancho Seco – Decommissioning Update", Presented at Waste Management 2003, Tucson, Arizona