

**DOCKET**

**09-IEP-1L**

DATE JUL 14 2009

RECD JUL 16 2009

DPG 09-210

July 14, 2009

California Energy Commission  
Docket Office  
Attention: Docket **09-IEP-1L**  
1516 Ninth Street, MS-4  
Sacramento, CA 95814-5512

Subject: **RESPONSE TO CALIFORNIA ENERGY COMMISSION REQUEST  
FOR INFORMATION REGARDING NUCLEAR POWER PLANT DATA  
FOR RANCHO SECO**

Attention: Docket Office

Attached is the information requested by the California Energy Commission (CEC) regarding nuclear power plant data for Rancho Seco. The attached information includes a hardcopy of the submittal plus a CD with the information stored electronically.

If you have any questions requiring additional information or clarification, please call me at (916) 732-4817.

Sincerely,

Einar T. Ronningen  
Superintendent, Rancho Seco Assets

# California Energy Commission

## Nuclear Power Plant Data for Rancho Seco

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### A. Environmental Impacts

Not applicable

### B. Spent Fuel Generation

Not applicable

### C. Spent Nuclear Fuel Storage

1 – 7. Not applicable

8. Should an offsite storage or disposal facility become available, would the spent fuel stored onsite require repackaging before being transported offsite?

*All of the Rancho Seco spent nuclear fuel is stored in a NUHOMS transportable storage system licensed under 10 CFR Part 71 for transportation and 10 CFR Part 72 for storage. Accordingly, there would be no need to repackage the fuel prior to being transported offsite.*

How and where might spent fuel stored in dry casks at the reactor be repackaged, if needed, for transfer offsite to a storage or disposal facility?

*With the completion of decommissioning, Rancho Seco no longer has the capability to repackage the spent fuel onsite. If repackaging were required, the fuel would need to be transported to an offsite facility with the capability to perform repackaging.*

Please update information on the facilities that are available onsite to repackage, load, and/or transport the spent fuel offsite by truck, rail, and/or barge.

*All of Rancho Seco spent fuel is stored in a NUHOMS transportable storage system. With the completion of decommissioning, Rancho Seco no longer has the capability to repackage the spent fuel onsite. SMUD maintains control of the MP187 transportation cask which could be used to transport the spent fuel offsite via a rail spur that is adjacent to the dry storage facility.*

9 – 17. Not applicable

# California Energy Commission

## Nuclear Power Plant Data for Rancho Seco

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### **D. Spent Nuclear Fuel Transport and Disposal**

Not applicable

### **E. Interim Spent Fuel Storage Installations**

Not applicable

### **F. Seismic and Tsunami Issues**

Not applicable

### **G. Steam Generator Replacements**

Not applicable

### **H. Decommissioning**

1. Describe the status of plant decommissioning and provide updates on the estimated total plant decommissioning costs.

*The Rancho Seco facility operates under two separate NRC Licenses: the former nuclear power plant facility is licensed under 10 CFR Part 50, and the dry fuel storage facility is licensed under 10 CFR Part 72. The decommissioning of the fuel storage facility followed by termination of the Part 72 license will occur after movement of fuel and Greater-Than-Class-C waste offsite, and is expected to consist only of radiological monitoring of the facility: no decontamination is expected to be required.*

*The former nuclear power plant facility is undergoing decommissioning in two phases. Phase 1 involved the entire facility outside of a 1-acre area that contains a building currently storing low-level radioactive waste. All Phase 1 activities are complete, and consisted of removal of all components from the power plant, including all large components (e.g., reactor vessel, steam generators, pressurizer, etc.), followed by decontamination and radiological monitoring of the facility to demonstrate compliance with NRC release criteria. Currently the NRC is reviewing the data submitted for Phase 1. Following NRC approval of the submitted data (anticipated by the end of 2009), the Part 50 license will be redefined to include only the 1-acre area containing the low-level waste storage building.*

*The material that is stored under the Part 50 license is Class B and Class C low-level radioactive waste. There are no disposal facilities currently*

# California Energy Commission

## Nuclear Power Plant Data for Rancho Seco

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*available that can or will accept this material. After a suitable disposal facility becomes available, the low-level waste will be transported for disposal and Phase II of the decommissioning will be completed. This will entail any necessary decontamination (expected to be minimal) of the storage building and radiological monitoring of the facility. Following successful completion of those activities, the Part 50 license will then be terminated.*

*The latest decommissioning cost study (performed in 2008) estimated total plant decommissioning costs to be \$498 M.*

2. Provide updated estimates of the amounts of low-level waste to be generated and ultimately disposed of during plant operation and decommissioning and the cost of this disposal based on current and projected prices for transport and disposal.

*Phase I of the Part 50 radiological decommissioning at Rancho Seco is completed. No additional low-level waste is expected to be generated during Phase II or during the decommissioning of the Part 72 facility. 2,160 ft<sup>3</sup> of low-level radioactive waste is in storage under the Part 50 license. The 2008 cost study estimated disposal cost for this low-level waste to be \$6.98 M based on disposal fees at Barnwell, SC. Shipping costs estimated at \$900,000 for shipping from Rancho Seco to the Barnwell, SC facility. During the 2009 Cost Estimate Update, the basis for waste disposal costs will be reviewed and updated based upon industry standards.*

*Historical data: Total weight of radioactive waste generated during decommissioning and sent offsite for processing and disposal was 64,129,266 pounds. Total cost for the processing/disposal of the waste was \$41,908,000.*

3. Provide a copy of the application and associated work papers submitted to a state regulatory commission in the most recent decommissioning-related proceeding.

*All decommissioning proceedings have been directed by the NRC, and copies of submissions to the NRC were supplied to state agencies. Rancho Seco has not submitted any unique application or associated work papers to a state regulatory commission regarding any decommissioning-related proceedings.*

4. Provide a copy of submittals to the NRC over the period 2006 – 2009 related to decommissioning plans for the nuclear power plant.

*There have been no submittals to the NRC regarding decommissioning plans since 2006.*

# California Energy Commission

## Nuclear Power Plant Data for Rancho Seco

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5. Provide a copy of substantive filings submitted to a state regulatory commission or the NRC over the period 2006 – 2009 concerning the status of decommissioning, including the status and adequacy of decommissioning trust funds.

*Attachment 1 provides copies of the Rancho Seco license amendment request associated with the License Termination Plan (LTP) and the request for a phased release of portions of the Rancho Seco site. Attachment 2 provides copies of submittals to the NRC regarding decommissioning funding status.*

*Copies of the LTP and Final Status Survey (FSS) submittals are contained on the enclosed CD.*

6. What are the plans and status of efforts to store, transport, and dispose of large plant components?

*Phase I of the Part 50 radiological decommissioning at Rancho Seco is completed. All of the large components (e.g., pressurizer, steam generators, reactor vessel) have been removed and shipped for disposal. Some Class B and C radioactive waste, including irradiated reactor vessel internals, is stored in an interim onsite storage facility.*

### **I. Performance**

Not applicable

### **J. Nuclear Fuel**

Not applicable

### **K. Nuclear Insurance**

1. Provide the current information on the insurance policies concerning nuclear liability claims for Rancho Seco.

*SMUD Nuclear Liability Policies – American Nuclear Insurers (ANI)*

- *Policy NF0212 Facility Form -- \$100 million limit (nuclear 3<sup>rd</sup> party liability plant)*

# California Energy Commission

## Nuclear Power Plant Data for Rancho Seco

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- *Policy NS447 Suppliers and Transporters -- \$200 million limit (nuclear 3<sup>rd</sup> party liability away from plant)*
- *Policy NW591 Master Worker -- \$300 million/\$300 million industry aggregate limit (nuclear workers comp)*

2. What is the current maximum liability for secondary financial protection for any licensed commercial reactor in the US that experiences a nuclear liability loss?

*The maximum liability is \$100.59 million per reactor secondary financial protection provided by the Price-Anderson Act which was renewed by the Energy Policy Act of 2005, signed into law August 8, 2005.*

3. Does the plant have nuclear property, decontamination, and debris removal insurance? What is the maximum coverage?

*SMUD has a Nuclear Property/Decontamination Policy through Nuclear Electric Insurance Limited (NEIL). Policy P06-077 has a \$100,000,000 limit and a deductible of \$1,000,000. Debris removal is covered under this policy.*

4. Does SMUD have any form of coverage for outage expenses and replacement power costs? What is the deductible and what is the maximum coverage?

*Not applicable. Rancho Seco has completed decommissioning and is not a functioning power plant. Outage expenses and replacement power costs are not an issue.*

5. Does SMUD have nuclear liability and property tax insurance for non-certified acts for terrorism related losses including replacement power costs? What is the deductible and what is the maximum coverage?

*Non-certified acts of terrorism are covered under the nuclear liability and property policies up to limits shown subject to industry aggregate limits of \$300 million for liability policies and \$3.24 billion aggregate for property/decon policies.*

# California Energy Commission

## Nuclear Power Plant Data for Rancho Seco

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**L. Relicensing or Plant Retirement**

Not applicable

**M. Other Issues**

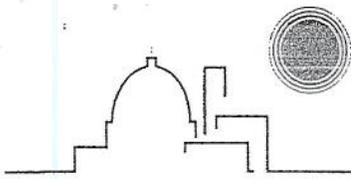
Not applicable

**California Energy Commission**  
**Nuclear Power Plant Data for Rancho Seco**

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**Attachment 1**

**License Amendment Request and Request for a Phased  
Release of Portions of the Rancho Seco Site**



**SMUD**

SACRAMENTO MUNICIPAL UTILITY DISTRICT  
The Power To Do More.®

P.O. Box 15830, Sacramento, CA 95852-1830; 1-888-742-SMUD (7683)

MPC&D 06-035

April 12, 2006

U.S. Nuclear Regulatory Commission  
Attn.: Document Control Desk  
Washington, DC 20555

Docket No. 50-312  
Rancho Seco Nuclear Generating Station  
License No. DPR-54

**RANCHO SECO LICENSE AMENDMENT REQUEST AND LICENSE  
TERMINATION PLAN, REVISION 0**

Attention: John Hickman

In accordance with 10 CFR 50.82(a)(9) and 10 CFR 50.90, we are submitting Proposed Amendment No. 199 (PA-199) to the Rancho Seco Operating License (DPR-54) and the License Termination Plan (LTP) for Rancho Seco Nuclear Generating Station. The LTP demonstrates that the remaining decommissioning activities will be performed in accordance with the regulations in 10 CFR Part 50, will not be inimical to the common defense and security or to the health and safety of the public, and will not have a significant adverse effect on the quality of the environment.

Upon NRC approval of the LTP, the amendment to the operating license adds a license condition that establishes the criteria for determining when changes to the LTP require prior NRC approval.

As discussed in Attachment 2, we have concluded that the proposed amendment presents no significant hazards consideration under the standards set forth in 10 CFR 50.92(c). Accordingly, a finding of "no significant hazards consideration" is justified.

Attachment 1 provides the insertion/removal instructions for the affected pages. Attachment 2 provides a description of the proposed change, the No Significant Hazards Consideration, and an environmental impact consideration determination. Attachment 3

provides a copy of the revised affected pages to the operating license. Included after the proposed license amendment is the Rancho Seco License Termination Plan.

In accordance with 10 CFR 50.91(b)(1), we have informed the Radiological Health Branch of the California State Department of Health Services of the proposed amendment by sending them a copy of this submittal package.

You or members of your staff with questions requiring additional information or clarification may contact Robert Jones at (916) 732-4843.

Sincerely,



Michael J. Bua

Manager, Plant Closure and Decommissioning (Acting)<sup>1</sup>

Attachments (4)

Cc w/ attachments: B. S. Mallett, NRC, Region IV  
Director, Radiological Health Branch, California State Department  
of Health Services

*Please see  
attached*



*NOTARY PUBLIC*

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<sup>1</sup> In accordance with the process outlined in SMUD procedure SDP 3.3, Michael J. Bua is authorized to sign for Steve Redeker in his absence (See SMUD Letter MPC&D 06-002).

# ALL-PURPOSE ACKNOWLEDGMENT

State of CALIFORNIA }  
County of AMADOR }

On 12 APRIL 2006, before me, Stormy D Kirk <sup>Notary Public</sup> (name, title of officer),  
personally appeared MICHAEL J. BLA

personally known to me – OR –  proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.



WITNESS my hand and official seal.

Stormy D. Kirk  
Signature

**Attachment 1**

***Removal and Insertion Instructions for***

***Proposed License Amendment No. 199 to the Rancho Seco Operating License***

Remove Operating License

Page 4

Insert Operating License

Pages 4 and 5

## Attachment 2

### ***Description of the Proposed Change, No Significant Hazards Consideration, and Environmental Impact Considerations***

#### **Background**

The Sacramento Municipal Utility District (SMUD) shut down Rancho Seco Nuclear Generating Station permanently on June 7, 1989, after approximately 15 years of operation. On August 29, 1989, SMUD formally informed the NRC that the plant was shut down permanently. On May 20, 1991, SMUD submitted the Rancho Seco decommissioning plan and on March 20, 1995, the NRC issued an Order approving the decommissioning plan and authorizing the decommissioning of Rancho Seco.

SMUD began actively decommissioning Rancho Seco in February 1997, and completed the transfer of all of the spent nuclear fuel to the 10 CFR Part 72 licensed Independent Spent Fuel Storage Installation (ISFSI) on August 21, 2002. Accordingly, the only quality-related structures, systems, or components (SSCs) at the Rancho Seco 10 CFR Part 50 licensed site are the radioactive sources used to calibrate the instrumentation used to measure radioactivity in gaseous and liquid effluents.

Plant dismantlement is substantially complete and most of the SSCs that *were* safety-related or important-to-safety have been removed from the plant and shipped for disposal. The pressurizer was shipped to EnergySolutions<sup>1</sup> for disposal in April 2004, one steam generator was shipped to EnergySolutions in December 2004, and the second steam generator was shipped to EnergySolutions in April 2005. Reactor vessel internals segmentation is in progress and activities in preparation for the reactor vessel segmentation are underway. Mobilization of the reactor vessel segmentation contractor is scheduled to begin in mid-2006.

#### ***Reason for the Proposed Change***

NRC Regulation 10 CFR 50.82(a)(9) requires that a licensee submit an application for the termination of the 10 CFR Part 50 license. The application for termination of the license must be accompanied or preceded by a License Termination Plan (LTP) to be submitted for NRC

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<sup>1</sup> EnergySolutions was formerly Envirocare of Utah

approval. The LTP is a supplement to the Rancho Seco Defueled Safety Analysis Report (DSAR).

We are submitting Proposed Amendment No. 199 (PA-199) to satisfy the requirements of 10 CFR 50.82(a)(10) for approval of the License Termination Plan by License amendment. SMUD is not submitting its application for termination of the Rancho Seco license at this time.

### **Description of the Proposed License Change**

As discussed in LTP Section 1.6, SMUD may make changes to the LTP, without prior NRC approval, under the provisions in 10 CFR 50.59, 10 CFR 50.82(a)(6), and 10 CFR 50.82(a)(7). PA-199 amends the Rancho Seco operating license to include the criteria for when changes to the LTP require prior NRC approval.

PA-199 adds new License Condition 2.C(4), as follows:

(4) *License Termination Plan (LTP)*

*NRC License Amendment No. 133 approves the License Termination Plan.*

*In addition to the criteria specified in 10 CFR 50.59 and 10 CFR 50.82(a)(6), a change to the LTP requires prior NRC approval if the change:*

- (a) *Increases the probability of making a Type I decision error above the level stated in the LTP*
- (b) *Increases the radionuclide-specific derived concentration guideline levels (DCGL) and related minimum detectable concentrations*
- (c) *Increases the radioactivity level, relative to the applicable DCGL, at which investigation occurs*
- (d) *Changes the statistical test applied other than the Sign Test or Wilcoxon Rank Sum Test.*

*Re-classification of survey areas from a less to a more restrictive classification (e.g., from a Class 3 to a Class 2 area) may be done without prior NRC notification; however, re-classification to a less restrictive*

*classification (e.g., Class 1 to Class 2 area) will require NRC notification at least 14 days prior to implementation.*

### **No Significant Hazards Consideration**

SMUD has reviewed the proposed license amendment against each of the criteria in 10 CFR 50.92 and has concluded that the amendment request involves no significant hazards consideration. The following provides SMUD's analysis of the issue of no significant hazards consideration:

**1. Does the proposed license amendment involve a significant increase in the probability or consequences of an accident previously evaluated?**

No. The proposed change is administrative. The change allows for the approval of the LTP and provides the criteria for when changes to the LTP require prior NRC approval. This change does not affect possible initiating events for accidents previously evaluated or alter the configuration or operation of the facility. Safety limits, limiting safety system settings, and limiting control systems are no longer applicable to Rancho Seco in the permanently defueled mode, and are therefore not relevant.

The proposed change does not affect the boundaries used to evaluate compliance with liquid or gaseous effluent limits, and has no impact on plant operations. Therefore, the proposed license amendment does not involve a significant increase in the probability or consequences of an accident previously evaluated.

**2. Does the proposed license amendment create the possibility of a new or different kind of accident from any accident previously evaluated?**

No. As described above, the proposed change is administrative and provides the criteria for when changes to the LTP require prior NRC approval. The safety analysis for the facility remains complete and accurate. There are no physical changes to the facility as a result of the proposed amendment and the plant conditions for which the design basis accidents have been evaluated are still valid.

The operating procedures and emergency procedures are not affected. The proposed changes do not affect the emergency planning zone, the boundaries used to evaluate compliance with liquid or gaseous effluent limits, and have no impact on plant operations. Consequently, no new failure modes are introduced as the result of the

proposed changes. Therefore, the proposed changes will not create the possibility of a new or different kind of accident from any accident previously evaluated.

**3. Does the proposed license amendment involve a significant reduction in a margin of safety?**

No. As described above, the proposed changes are administrative. There are no changes to the design or operation of the facility. The proposed changes do not affect the emergency planning zone, the boundaries used to evaluate compliance with liquid or gaseous effluent limits, and have no impact on plant operations. Accordingly, neither the design basis nor the accident assumptions in the Defueled Safety Analysis Report (DSAR), nor the Technical Specification Bases are affected. Therefore, the proposed changes do not involve a significant reduction in a margin of safety.

## **Environmental Impact Consideration**

This amendment request satisfies the criteria specified in 10 CFR 51.22(c)(9) for a categorical exclusion from the requirements to perform an environmental assessment or to prepare an environmental impact statement. The criteria of 10 CFR 51.22(c)(9) are addressed as follows:

**(i) The amendment involves no significant hazards consideration.**

As discussed in the No Significant Hazards Consideration section above, the proposed license amendment does not involve a significant hazards consideration.

**(ii) There is no significant change in the types or significant increase in the amounts of effluents that may be released offsite.**

The proposed license amendment is consistent with the plant activities described in the Rancho Seco Post Shutdown Decommissioning Activities Report (PSDAR). The environmental impacts associated with radiation dose to members of the public related to decommissioning activities and site release for unrestricted use were considered in NUREG-0586 "Final Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities," NUREG-0586 Supplement 1, and NUREG-1496 "Generic Environmental Impact Statement in Support of the Rulemaking on Radiological Criteria for License Termination."

In conjunction with the submittal of the original Rancho Seco Decommissioning Plan, the District submitted "Supplement to Rancho Seco Environmental Report - Post Operating License Stage." This environmental report compared Rancho Seco decommissioning attributes to those identified in NUREG-0586.

NUREG-0586 provides a generic environmental assessment of decommissioning a reference nuclear facility. When the NRC issued the Decommissioning Rule in 1988, and based on the findings in NUREG-0586, it concluded a generic finding of "no significant (environmental) impact." The NRC further concluded that no additional Environmental Impact Statement (EIS) would need to be prepared in connection with decommissioning a particular nuclear site unless the impacts of a particular plant have site-specific considerations significantly different from those studied generically.

The "Supplement to Rancho Seco Environmental Report - Post Operating License Stage" concluded that all effluents, both radiological and non-radiological, will remain within regulatory limits as specified in applicable control documents and approvals throughout the decommissioning process. LTP Chapter 8 provides an updated assessment of the environmental effects of decommissioning Rancho Seco. The updated assessment also

determined that the environmental effects from decommissioning Rancho Seco are minimal and there are no adverse effects outside the bounds of NUREG-0586 or the associated Supplement 1. The conclusions contained in the "Supplement to Rancho Seco Environmental Report - Post Operating License Stage" are still valid.

Based on the above, there will not be a significant change in the types or increase in the amounts of effluents released offsite for the remaining decommissioning activities.

**(iii) There is no significant increase in individual or cumulative occupational exposure.**

As stated above, the District submitted "Supplement to Rancho Seco Environmental Report - Post Operating License Stage" in conjunction with the submittal of the original Rancho Seco Decommissioning Plan. This environmental report compared Rancho Seco decommissioning attributes to those identified in NUREG-0586.

The "Supplement to Rancho Seco Environmental Report - Post Operating License Stage" contained the following conclusions:

- The District will maintain annual occupational radiation exposure to individuals as low as reasonably achievable (ALARA). These exposures will be below historical levels for the operating phase of the plant.
- The District expects to maintain exposure to onsite workers and the offsite public as a result of waste transportation well below the levels projected by NUREG-0586.

LTP Chapter 8 provides an updated assessment of the environmental effects of decommissioning Rancho Seco. The updated assessment also determined that the environmental effects from decommissioning Rancho Seco are minimal and there are no adverse effects outside the bounds of NUREG-0586 or the associated Supplement 1. Additionally, the conclusions contained in the "Supplement to Rancho Seco Environmental Report - Post Operating License Stage" are still valid.

Based on the above, there is no significant increase in individual or cumulative occupational exposure due to decommissioning Rancho Seco.

**Attachment 3**

***Revised Facility Operating License***

(3) Confirmatory Order

The movement of nuclear fuel into the Reactor Building is prohibited without prior NRC approval.

(Amendment 132 - 09/27/05)

(4) License Termination Plan (LTP)

NRC License Amendment No. 133 approves the License Termination Plan.

In addition to the criteria specified in 10 CFR 50.59 and 10 CFR 50.82(a)(6), a change to the LTP requires prior NRC approval if the change:

- (a) Increases the probability of making a Type I decision error above the level stated in the LTP
- (b) Increases the radionuclide-specific derived concentration guideline levels (DCGL) and related minimum detectable concentrations
- (c) Increases the radioactivity level, relative to the applicable DCGL, at which investigation occurs
- (d) Changes the statistical test applied other than the Sign Test or Wilcoxon Rank Sum Test.

Re-classification of survey areas from a less to a more restrictive classification (e.g., from a Class 3 to a Class 2 area) may be done without prior NRC notification; however, re-classification to a less restrictive classification (e.g., Class 1 to Class 2 area) will require NRC notification at least 14 days prior to implementation.

- D. This license is subject to the following additional condition for the protection of the environment:

If harmful effects or evidence of irreversible damage are detected by the monitoring programs included in the Rancho Seco Quality Manual, the Applicant will provide an analysis of the problem and a proposed course of action to alleviate the problem.

- E. This license is effective as of the date of issuance and shall expire at midnight, October 11, 2008.

FOR THE ATOMIC ENERGY COMMISSION

**/s/ ROGER BOYD for**

A. Giambusso, Deputy Director  
for Reactor Projects  
Directorate of Licensing

Date of Issuance:  
August 16, 1974

Attachment:  
Appendix A - Technical Specifications

**(Amendment 120 - 10/13/92)**

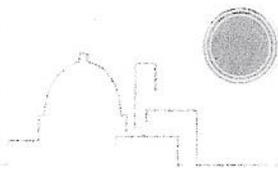
**Orders for Modification of License**

Deleted

**(Amendment 132 - 09/27/05)**

**Attachment 4**

***License Termination Plan***



**SMUD**

SACRAMENTO MUNICIPAL UTILITY DISTRICT

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P.O. Box 15830, Sacramento, CA 95852-1830; 1-888-742-SMUD (7683)

DPG 09-006

June 8, 2009

U.S. Nuclear Regulatory Commission  
Attn.: Document Control Desk  
Washington, DC 20555

Docket No. 50-312  
Rancho Seco Nuclear Generating Station  
License No. DPR-54

**PHASED RELEASE OF THE RANCHO SECO SITE**

Attention: John Hickman

The purpose of this letter is to request that the Nuclear Regulatory Commission (NRC) release a portion of the Rancho Seco site from 10 CFR Part 50 License Number DPR-54. The area to be released encompasses the majority of the Rancho Seco site. The only area remaining under the 10 CFR Part 50 license will be the Interim Onsite Storage Building (IOSB) which provides interim storage for radioactive waste. The IOSB is surrounded by a fence that defines the boundary of the remaining 10 CFR Part 50 site. The spent nuclear fuel remains stored at the Rancho Seco Independent Spent Fuel Storage Installation (ISFSI) licensed under 10 CFR Part 72.

The NRC approved the Rancho Seco License Termination Plan (LTP) on November 27, 2007. LTP Section 1.4.2 discusses SMUD's intent to release the Rancho Seco site for unrestricted use in two phases. We have now completed the first phase of Rancho Seco decommissioning and are requesting that the NRC release a major portion of the Rancho Seco site for unrestricted use.

SMUD has reviewed the survey area results to ensure that the proposed action will have no adverse impact on the ability of the site, in aggregate, to meet 10 CFR Part 20, Subpart E criteria for unrestricted use.

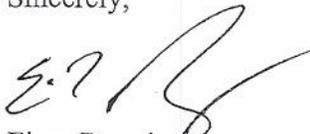
Attachment 1.0 provides a summary of the assessment performed. Attachment 1.0 does not contain the Final Status Survey (FSS) reports for all of the subject survey areas because those reports were submitted to the NRC previously.

Attachment 2.0 contains the post FSS particle survey results performed at Rancho Seco.

Attachments 3.0 and 4.0 presents an evaluation of the Co-60 and Cs-137 nuclide fraction in FSS soil samples and structure surfaces, respectively. These evaluations were also requested by your staff.

Members of your staff with questions requiring additional information or clarification may contact me at (916) 732-4817.

Sincerely,



Einar Ronningen  
Superintendent, Rancho Seco Assets

Attachment

Cc: Elmo Collins, NRC, Region IV

## Attachment 1

### Release of Rancho Seco Land from the 10 CFR Part 50 License

#### 1.0 Introduction

Rancho Seco Nuclear Generating Station was a 913-MWe PWR designed by Babcock and Wilcox Company. SMUD shut down Rancho Seco permanently on June 7, 1989, after approximately 15 years of operation. On August 29, 1989, SMUD formally informed the NRC that the plant was shut down permanently.

On May 20, 1991, SMUD submitted the Rancho Seco decommissioning plan and on March 20, 1995, the NRC issued an Order approving the decommissioning plan and authorizing the decommissioning of Rancho Seco. In March 1997, SMUD submitted its Post Shutdown Decommissioning Activities Report (PSDAR), in accordance with 10 CFR 50.82. The PSDAR superseded the original Decommissioning Plan and provided the information required by 10 CFR 50.82(a)(4).

SMUD began actively decommissioning Rancho Seco in February 1997, and the NRC approved the License Termination Plan (LTP) on November 27, 2007.

SMUD completed transferring all of the spent nuclear fuel to the Rancho Seco Independent Spent Fuel Storage Installation (ISFSI), under the site-specific 10 CFR Part 72 license, on August 21, 2002,

#### 2.0 Evaluation

##### 2.1 Areas to be Released and FSS Results

The area that we are requesting to release consists of the following general survey areas noted below. These survey areas encompass the majority of the site leaving only the IOSB fence-line within the 10 CFR Part 50 licensed site. The specific survey units to be released are presented in Table 1.0. Table 1.0 includes the Survey Unit identification code, name, survey class, survey type, submittal number, and area in m<sup>2</sup>.

Area ID #: 100000

Survey Area: Plant Effluent Water Course

Operating History: This area comprising 42,315 m<sup>2</sup> located at the south west corner of the site was the release point for liquid effluents generated by the plant. It includes the land on both sides of the creek. Portions of the area (approximately 21,483 m<sup>2</sup>) were impacted by both planned and unplanned liquid releases as well as the planned dispersion of dredged stream sediment. Operating records and the HSA document the release of radioactivity in this survey area. The HSA recorded multiple unplanned release events. (The Annual Environmental Report submitted to the NRC in 2002 contained the results of soil/sediment samples collected from this area.)

## Attachment 1

### Release of Rancho Seco Land from the 10 CFR Part 50 License

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Effluent activity and dose to the public were monitored and reported under the operating RETS/REMP program. Because the creek itself is beyond the site release point, it is outside the scope of FSS.

Area ID #: 200000

Survey Area: South Plant Outfall

Operating History: The area extended from the south Industrial Area fence to the South Non-Impacted Area and covered 226,567 m<sup>2</sup>. It bordered the Plant Effluent Water Course area to the west. Operating records and the HSA document several unplanned release events from the RHUT with the potential to contaminate the area.

Area ID #: 300000

Survey Area: South Non-Impacted Area

Operating History: This area bordered the Plant Effluent Water Course to the west. The area extended from the South Plant Outfall Area to the southern boundary of the site and contained approximately 306,000 m<sup>2</sup>. Operating records and the HSA document no release of radioactivity in this survey area. The HSA recorded no unplanned release events.

Area ID #: 400000

Survey Area: South East Non-Impacted Area

Operating History: This area comprised the entire south-east corner of the site. It bordered the Industrial Area, Area 200000, and Area 300000 to the east. The area extended south from the site access road and contained approximately 667,000 m<sup>2</sup>. Operating records and the HSA document no release of radioactivity in this survey area.

Area ID #: 500000

Survey Area: North East Non-Impacted Area

Operating History: The area extended from the Industrial Area fence to the plant access road (exclusive of the parking lots, roadway and warehouse in this area) making up the north-east quadrant of the site. It contained approximately 549,000 m<sup>2</sup>. Portions of the Upper/Outer Yard, Receiving Warehouse, Extended Parking Areas and Site Access Roadway (96,280 m<sup>2</sup>) were used to stage, transport and receive radioactive material. Operating records and the HSA document no release of radioactivity in this survey area. The HSA recorded no unplanned release events.

## Attachment 1

### Release of Rancho Seco Land from the 10 CFR Part 50 License

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Area ID #: 600000

Survey Area: North Non-Impacted Area

Operating History: The area extended from the Industrial Area fence north to state highway 104 (exclusive of the rail line in this area) and west to the site boundary. It contained approximately 233,000 m<sup>2</sup>. Operating records and the HSA document no release of radioactivity in this survey area. The HSA recorded no unplanned release events.

Area ID #: 700000

Survey Area: West Non-Impacted Area

Operating History: The area extended from the Industrial Area fence west to the site boundary (exclusive of the ISFSI and rail line in this area). It covered approximately 229,000 m<sup>2</sup>. Operating records and the HSA document no release of radioactivity in this survey area however this area does border the effluent discharge area. The HSA recorded no unplanned release events.

Area ID #: 800000

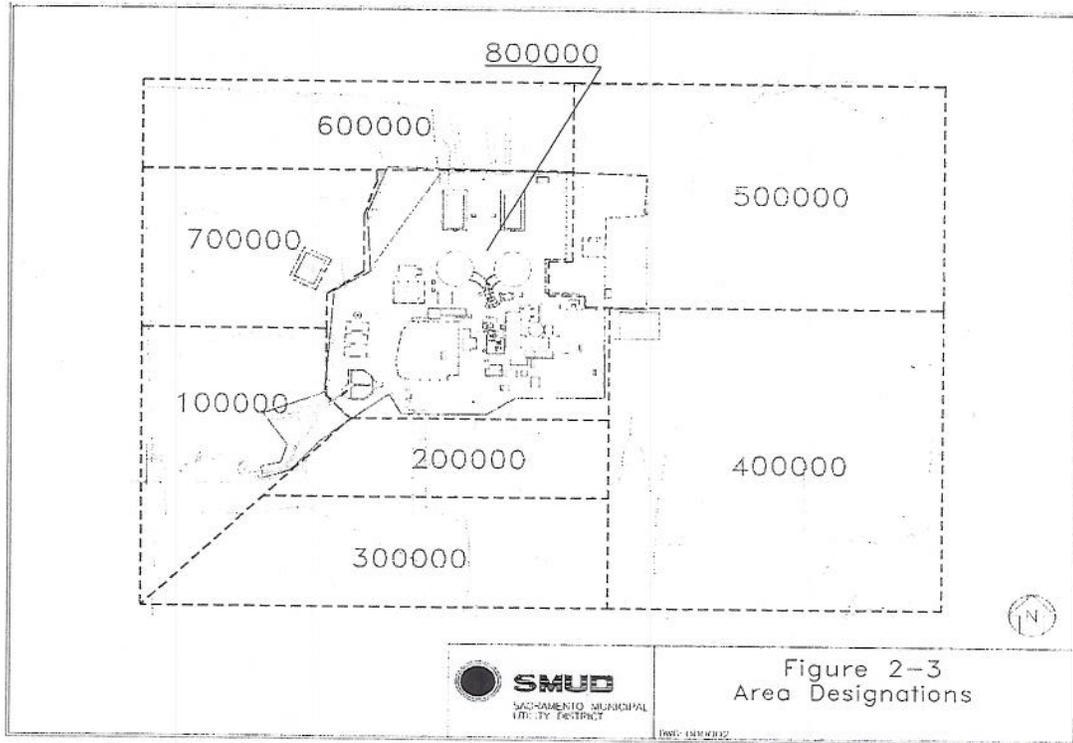
Survey Area: Industrial Area Soils

Operating History: The area covers the Industrial Area land (both bare soil and paved areas) exclusive of the building footprints and rail line in this area. The survey units for the region comprise approximately 357,268 m<sup>2</sup>. Operating records and the HSA document no specific release of radioactivity in these survey areas however this area does border known contaminated areas. Specific locations in this area that contained radioactive waste or effluent include the Barrel Farm and Retention Basins. The HSA recorded no specific unplanned release events.

The area identifications listed above (100000-800000) were illustrated in Chapter 2 of the License Termination Plan as Figure 2-3. A copy of this map is provided below.

Attachment 1

Release of Rancho Seco Land from the 10 CFR Part 50 License



Attachment 1

Release of Rancho Seco Land from the 10 CFR Part 50 License

Table 1.0

SUID#	SU Name	Survey Class	Survey Type	Submittal Number	Survey Unit Size m <sup>2</sup>
<b>Area 100000 Effluent Corridor</b>					
F1000001	Effluent Corridor	2	Soil	3	8339
F1000002	Effluent Corridor	2	Soil	3	7744
F1000003	Effluent Corridor	2	Soil	3	5202
F1000004	Effluent Corridor	1	Soil	3	198
<b>Area 200000 South Outfall</b>					
F2000001	South Outfall	3	Soil	3	226567
<b>Area 500000 North East of Industrial Area</b>					
F5010011	Receiving Warehouse Ext	3	Structure	1	1177
F5010012	Receiving Warehouse Int	3	Structure	1	1531
F5010031	Upper/Outer Yard	3	Soil	3	2665
F5010032	Hazardous Waste Bid Pad	3	Structure	3	268
F5010041	Extended Parking Area	3	Soil	3	42735
F5010042	Extended Parking Area	3	Soil	3	38692
F5010051	Site Access Roadway	3	Soil	5	9210
<b>Area 800000 Miscellaneous Site Soils</b>					
F8000011	Helo Pad	3	Soil	4	17284
F8000041	Central Transit Yard	3	Soil	3	6634
F8000071	West Industrial Area	3	Soil	3	88190
F8000072	Industrial Area West (West of Barrel Farm)	3	Soil	5	696
F8000073	Industrial Area West (North End)	3	Soil	5	255

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Table 1.0

SUID#	SU Name	Survey Class	Survey Type	Submittal Number	Survey Unit Size m <sup>2</sup>
F8000091	South East Industrial Area	3	Soil	5	55736
F8000101	Industrial Area Central Yard, North and East of Maintenance Building	3	Soil	5	1587
F8000102	Industrial Area Central Yard, North and West of Maintenance Building	3	Soil	5	1800
F8000103	Aux Bid/NSEB Alley	3	Soil	4	443
F8000104	Pump Alley Access Corridor	1	Soil	5	248
F8000105	Industrial Area, North-South Roadway East of BWB	2	Soil	5	1696
F8000106	Central Industrial Area Roadway	2	Soil	5	3680
F8000111	Industrial Area Corridor, North of "A" Warehouse and Fab Shop	2	Soil	5	1086
F8000121	Industrial Area Yard Buffer	3	Soil	3	6114
F8000141	North Industrial Area	3	Soil	3	55761
F8000142	North Industrial Area	3	Soil	5	29138
F8080031	Cooling Tower Buffer South	2	Soil	5	7500
F8080032	Cooling Tower Buffer West	2	Soil	5	5547
F8080033	Cooling Tower Buffer East	2	Soil	5	6481
F8090011	Sewer Plant Pavement	3	Soil	2	262
F8390001	Transformer Yard	3	Soil	3	3385
F8430011	Barrel Farm	1	Soil	3	1313
F8430021	Barrel Farm Surface Soil	2	Soil	3	5000
F8480011	N Retention Basin	1	Soil	3	1432
F8480012	S Retention Basin	1	Soil	3	1388
F8480017	Retention Basin Surf Soil	3	Soil	3	3590
F8480018	Retention Basin Concrete Structure	2	Soil	3	1059
F8480021	Retention Basin Buffer	3	Soil	3	10845

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Release of Rancho Seco Land from the 10 CFR Part 50 License

Table 1.0

SUD#	SU Name	Survey Class	Survey Type	Submittal Number	Survey Unit Size m <sup>2</sup>
F8510001	Switch Yard Soil	3	Soil	3	16700
F8510002	Switch Yard Pavement	3	Soil	3	14505
F8510005	Switch Yard South (plus Retention Basin Buffer)	3	Soil	5	7913
<b>Area 800000 Miscellaneous Site Structures</b>					
F8040011	PAP Bld Exterior	3	Structure	1	1177
F8040012	PAP Bld Interior	3	Structure	1	836
F8050011	Admin Bld Interior	3	Structure	1	910
F8050012	Admin Bld Exterior	3	Structure	1	1705
F8080011	E, W Cooling Tower Basins	3	Structure	2	47415
F8140002	T&R Bld Exterior	3	Structure	1	4303
F8140003	Training and Records Building Breezeway	3	Structure	5	431.4
F8140010	T&R Bld Interior	3	Structure	1	22160
F8150011	NSEB Interior	3	Structure	1	1197
F8150021	NSEB Exterior	3	Structure	1	1609
F8170011	Diesel Gen Bld Interior	3	Structure	1	3267
F8170021	Diesel Gen Bld Exterior	3	Structure	1	3484
F8210001	Water Treat Bld Interior	3	Structure	1	416
F8210002	Water Treat Bld Exterior	3	Structure	1	392
F8220011	Chlorine Bld Interior	3	Structure	1	597
F8220021	Chlorine Bld Exterior	3	Structure	1	457
F8230001	Intake Structure	3	Structure	3	402
F8240001	Primary Cooling Water Structure	2	Structure	2	252
F8310001	Microwave Bld Interior	3	Structure	1	274

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Table 1.0

SUID#	SU Name	Survey Class	Survey Type	Submittal Number	Survey Unit Size m <sup>2</sup>
F8310002	Microwave Bld Exterior	2	Structure	1	146
F8320001	Diesel Fuel Oil Tank Pad	3	Soil	3	1560
F8330001	Warehouse B Interior	3	Structure	1	3182
F8330002	Warehouse B Exterior	2	Structure	1	2574
F8400001	Warehouse A Interior	3	Structure	1	4548
F8400002	Warehouse A Exterior	3	Structure	1	1972
F8480013	Discharge Boxes/Manholes	1	Structure	2	124.3
F8480014	Discharge Boxes/Manholes	1	Structure	2	145.2
F8480015	Discharge Boxes/Manholes	1	Structure	2	26.8
F8480016	Discharge Boxes/Manholes	1	Structure	2	137
F8480019	Misc Small Buildings Retention Basin Area	3	Structure	4	242
F8510003	Switch Yd Bld Exterior	3	Structure	1	543
F8510004	Switch Yd Bld Interior	3	Structure	1	1374
F8520001	Machine Shop Interior	3	Structure	1	1482
F8520002	Machine Shop Exterior	3	Structure	1	952
F8540001	Misc Small Blds POL	3	Structure	4	260
F8540002	Misc Small Blds Lawn	3	Structure	4	130
F8560001	SAS Bld Exterior	3	Structure	1	179
F8560002	SAS Bld Interior	3	Structure	1	164
F8570001	Sub-Surface Vaults	3	Structure	3	2153
<b>Area 800000 Tank Farm &amp; RHUT</b>					
F8100011	Tank Farm Southwest and Steam Sump (surface)	1	Soil	5	672
F8100012	Tank Farm Southwest and Steam Sump (subsurface)	1	Soil	5	672

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Release of Rancho Seco Land from the 10 CFR Part 50 License

Table 1.0

SUID#	SU Name	Survey Class	Survey Type	Submittal Number	Survey Unit Size m <sup>2</sup>
F8100021	Tank Farm NW Quadrant (surface)	1	Soil	5	1618
F8100022	Tank Farm NW Quadrant (subsurface)	1	Soil	5	1618
F8100031	Tank Farm NE Quadrant (surface)	1	Soil	5	1942
F8100032	Tank Farm NE Quadrant (subsurface)	1	Soil	5	1942
F8100041	Tank Farm CST and #2 & #3 Pads	1	Structure	5	195.1
F8100042	Tank Farm DRCST Pad	2	Structure	5	177.4
F8100043	Tank Farm BWSST Pad	1	Structure	5	187
F8100044	Tank Farm Tritium Evaporator Pad	2	Structure	5	148
F8100051	Tank Farm Trench 1	1	Soil	5	750
F8100052	Tank Farm Trench 1 (surface)	1	Soil	5	660
F8100053	Tank Farm Trench 1 (subsurface)	1	Soil	5	660
F8370001	RHUT and Aux. Boiler Pad (surface)	1	Soil	5	1819
F8370002	Tank Farm/ RHUT (subsurface)	1	Soil	5	1819
<b>Area 800000 Reactor Building</b>					
F8110111	Rx Building FSS Ring (+75' to +115')	1	Structure	5	1966
F8110112	Rx Building FSS Ring (+25' to +75')	1	Structure	5	1966
F8110113	Rx Building FSS Ring (-27' to +25')	1	Structure	5	1762
F8110114	Rx Building Floor -27'	1	Structure	5	1125.4
F8111571	Reactor Bld Dome	1	Structure	1	1941
F8111591	Rx Building Tendon Gallery	3	Structure	5	1817
F8113000	Rx Building Exterior Dome	3	Structure	5	575
F8113001	Rx Building Exterior	3	Structure	5	5516

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Table 1.0

SUID#	SU Name	Survey Class	Survey Type	Submittal Number	Survey Unit Size m <sup>2</sup>
<b>Area 800000 Spent Fuel Building</b>					
F8120001	Spent Fuel Pool West Wall	1	Structure	5	185.9
F8120002	Spent Fuel Pool South Wall	1	Structure	5	137.7
F8120003	Spent Fuel Pool East Wall	1	Structure	5	206.6
F8120004	Spent Fuel Pool North Wall	1	Structure	5	267
F8120005	Spent Fuel Pool Floor	1	Structure	5	175.2
F8120111	Cask Catcher Pad	1	Structure	4	103
F8120121	Spent Fuel Building Exterior	1	Structure	5	122.5
F8120131	Fuel Bld Exterior	2	Structure	4	322
F8120141	Spent Fuel Building Exterior	3	Structure	5	854
F8120151	Fuel Bld Exterior	2	Structure	4	332
F8120161	Fuel Bld Exterior	1	Structure	4	123
F8120171	Spent Fuel Building Styrofoam Gap	2	Structure	5	314
F8120181	Spent Fuel Building Styrofoam Gap	1	Structure	5	50
F8121001	Spent Fuel Building Floor 40' El.	1	Structure	5	272
F8121002	Spent Fuel Building 40' El. Lower Walls, North	1	Structure	5	245
F8121003	Spent Fuel Building 40' El. Lower Walls, South	1	Structure	5	115.8
F8121004	Spent Fuel Building 40' El. Upper Walls, South	2	Structure	5	839.9
F8121005	Spent Fuel Building Control Rod Pit	3	Structure	5	33.4
F8121006	Spent Fuel Building 40' El. Upper Walls, North	2	Structure	5	446.1
<b>Area 800000 Auxiliary Building and Solidification Pad</b>					
F8130011	Aux Bld Rm 1 Lower	1	Structure	2	189
F8130021	Aux Bld Rm 1 Upper	1	Structure	2	306

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Table 1.0

SUID#	SU Name	Survey Class	Survey Type	Submittal Number	Survey Unit Size m <sup>2</sup>
F8130022	Aux. Building -47' El. Room 1, Ceiling	1	Structure	5	95
F8130031	Aux Bld Rm 2 Lower	1	Structure	2	165.3
F8130041	Aux. Building -47' El. Room 2, Upper Walls	1	Structure	5	239.5
F8130042	Aux Bld Rm 2 Upper	1	Structure	2	105
F8130051	Aux Bld Rm 3 Lower	1	Structure	3	141
F8130061	Aux Bld Rm 3 Upper	1	Structure	3	302
F8130071	Aux Bld 02 stairs	3	Structure	4	208
F8130081	Aux Bld 01 stairs	1	Structure	4	217
F8130091	Aux Bld Rms 56,127,138	3	Structure	4	178.1
F8130101	Aux Bld Rm 10 Lower	1	Structure	4	57.4
F8130102	Aux Bld Rm 10 Upper	2	Structure	4	239.4
F8130111	Aux Bld Rm 11 Lower	1	Structure	2	21
F8130112	Aux Bld Rm 11 Upper	2	Structure	2	105
F8130121	Aux Bld Rm 12 Lower	1	Structure	2	39.5
F8130122	Aux Bld Rm 12 Upper	1	Structure	2	63
F8130131	Aux Bld Rm 13	1	Structure	3	68.2
F8130141	Aux Bld Rm 14	1	Structure	3	61.6
F8130151	Aux Bld Rm 15, columns N-R	1	Structure	4	238
F8130161	Aux Bld Rm 15, columns R-T	1	Structure	4	310.1
F8130171	Aux Bld Rm 15, column T and East	1	Structure	4	309.9
F8130181	Aux Bld Rm 16	1	Structure	3	114
F8130191	Aux Bld Rm 17	1	Structure	3	167
F8130201	Aux Bld Rm 18 Lower	1	Structure	1	169

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Table 1.0

SUID#	SU Name	Survey Class	Survey Type	Submittal Number	Survey Unit Size m <sup>2</sup>
F8130211	Aux Bld Rm 18 Upper	2	Structure	1	204
F8130221	Aux Bld Rm 19 Lower	1	Structure	2	109
F8130222	Aux Bld Rm 19 Upper	2	Structure	2	175
F8130231	Aux Bld Rm 59 Lower	1	Structure	1	43
F8130232	Aux Bld Rm 59 Upper	2	Structure	1	63
F8130241	Aux Bld Rm 20 Lower	1	Structure	2	122
F8130251	Aux Bld Rm 20 Upper	1	Structure	2	213
F8130261	Aux Bld Rm 21 Lower	1	Structure	1	133
F8130271	Aux Bld Rm 21 Upper	2	Structure	1	184
F8130281	Aux Bld Rm 22 Lower	1	Structure	1	213
F8130291	Aux Bld Rm 22 Upper	2	Structure	1	222
F8130301	Aux Bld Rm 23 Lower	1	Structure	2	153
F8130311	Aux Bld Rm 23 Upper	2	Structure	2	198
F8130321	Aux Bld Rm 24	1	Structure	3	153
F8130331	Aux Bld Rm 25 Lower	1	Structure	2	132
F8130341	Aux Bld Rm 25 Upper	1	Structure	2	185
F8130351	Aux Bld Rm 26	1	Structure	3	182
F8130361	Aux Bld Rm 27	3	Structure	3	283.9
F8130401	Aux Bld Rms 28-31	1	Structure	1	306
F8130411	Aux Bld Rms 32-35	1	Structure	1	302
F8130421	Aux Bld Rm 36, floor and soil walls	1	Soil	4	144.1
F8130431	Aux Bld Rm 36, N. of column 9.7, walls (above one meter) and ceiling	1	Structure	4	301.1
F8130441	Aux Bld Rm 36, North and East Walls below -25'9"	1	Structure	4	164.6

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Table 1.0

SUID#	SU Name	Survey Class	Survey Type	Submittal Number	Survey Unit Size m <sup>2</sup>
F8130451	Aux Bld Rm 36, Column 9.7 – 11.7, Walls above one meter – ceilings	1	Structure	4	247.3
F8130461	Aux Bld Rm 36, South and West concrete walls below 25'9"	1	Structure	4	159.6
F8130471	Aux Bld Rm 36, column 11.7 - south above -25'7"	1	Structure	4	280.9
F8130481	Aux Bld Rm 37 Lower	1	Structure	2	236
F8130491	Aux Bld Rm 37 Upper	1	Structure	2	316.5
F8130501	Aux Bld Rm 38 Lower	1	Structure	2	243
F8130511	Aux Bld Rm 38 Upper	1	Structure	2	308.5
F8130521	Aux Bld Rm 39 Lower	1	Structure	2	236
F8130531	Aux Bld Rm 39 Upper	1	Structure	2	315
F8130541	Aux Bld Rm 40 Lower	1	Structure	2	245
F8130551	Aux Bld Rm 40 Upper	1	Structure	2	316.5
F8130561	Aux Bld Rm 41 Lower	1	Structure	2	236
F8130571	Aux Bld Rm 41 Upper	1	Structure	2	316.5
F8130581	Aux Bld Rm 42 Lower	1	Structure	2	225
F8130591	Aux Bld Rm 42 Upper	1	Structure	2	316
F8130601	Aux Bld Rm 43 Lower	1	Structure	1	162
F8130611	Aux Bld Rm 43 Upper	2	Structure	1	167
F8130621	Aux Bld Rm 44	1	Structure	1	278
F8130631	Aux Bld Rm 45	1	Structure	1	263
F8130641	Aux Bld Rm 46	1	Structure	1	265
F8130651	Aux Bld Rm 47	1	Structure	1	97.5
F8130661	Aux Bld Rm 48	1	Structure	1	60
F8130671	Aux Bld Rm 49	1	Structure	1	25

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Table 1.0

SUID#	SU Name	Survey Class	Survey Type	Submittal Number	Survey Unit Size m <sup>2</sup>
F8130681	Aux Bld Rm 50 Lower	1	Structure	1	66
F8130682	Aux Bld Rm 50 Upper	2	Structure	1	107
F8130691	Aux Bld Rm 51, Columns 10.3 to 9.7, Lower	1	Structure	4	125
F8130701	Aux Bld Rm 51, Columns 10.3 to 9.7, Upper	1	Structure	4	202
F8130711	Aux Bld Rm 51, Columns 9.2 to 9.7, Lower	1	Structure	4	140
F8130721	Aux Bld Rm 51, Columns 9.2 to 9.7, Upper	1	Structure	4	220
F8130731	Aux. Bd Rm 51, North of Column 9.1	1	Structure	5	142
F8130732	Aux Bld Rm 51 and 52 Excavation	1	Structure	4	93
F8130741	Aux Bld Rm 52, West of Column N Upper	1	Structure	4	288
F8130751	Aux Bld Rm 52, West of Column N Lower	1	Structure	4	177
F8130761	Aux Bld Rm 52, East of Column N Lower	1	Structure	4	150
F8130771	Aux Bld Rm 52, East of Column N Upper	1	Structure	4	214
F8130781	Aux Bld Rm 53 Lower	1	Structure	1	84
F8130782	Aux Bld Rm 53 Upper	2	Structure	1	141
F8130811	Aux Bld Rms 54,55	3	Structure	2	588
F8130861	Aux Bld Rms 102,103	2	Structure	4	246
F8130862	Aux Bld Rm 106	1	Structure	4	296.5
F8130881	Aux Bld Rm2 104-135	3	Structure	3	4926
F8130931	Aux Bld Rm 107	2	Structure	4	146
F8130941	Aux Bld Rms 109, 110	2	Structure	4	898.3
F8130942	Aux. Building Room 109	1	Structure	5	12
F8130991	Aux Bld Rm 112	1	Structure	3	243
F8131001	Aux Bld Rm 111	2	Structure	3	83

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Table 1.0

SUID#	SU Name	Survey Class	Survey Type	Submittal Number	Survey Unit Size m <sup>2</sup>
F8131011	Aux Bld Rm 113	2	Structure	3	155
F8131021	Aux Bld Rm 114	2	Structure	3	242.5
F8131031	Aux Bld Rm 115	2	Structure	3	199
F8131041	Aux Bld Rm 117 West	2	Structure	4	716
F8131051	Aux Bld Rm 117 East	2	Structure	4	566.5
F8131191	Aux Bld Rm 130	2	Structure	2	865
F8131201	Aux Bld Rms 131,222,345	3	Structure	2	436
F8131211	Aux. Bld Rm 132, Class 2	2	Structure	5	995
F8131212	Aux Bld Rm 132, Class 1	1	Structure	5	12
F8131221	Aux Bld Rm 133, Lower	1	Structure	4	271.1
F8131222	Aux Bld Rm 133, Upper	2	Structure	4	270.9
F8131231	Aux Bld Rm 134	1	Structure	4	260
F8131311	Aux Bld Rm Aux Bld Mezzanine Roof	3	Structure	3	482
F8131341	Aux Bld Rms 202,204	3	Structure	2	766
F8131351	Aux Bld Rm 206	3	Structure	3	294
F8131361	Aux Bld Rm 207	3	Structure	3	842
F8131371	Aux. Building Rooms 208, 211, Lower Walls	1	Structure	5	240
F8131372	Aux. Building Rooms 208, 211, Upper Walls	2	Structure	5	811
F8131381	Aux Bld Rm 209 Upper	1	Structure	4	184
F8131382	Aux Bld Rm 209 Lower	1	Structure	4	312
F8131402	Aux Bld Rm 210 Upper	2	Structure	4	205
F8131403	Aux Bld Rm 210 Lower	1	Structure	4	83
F8131411	Aux Bld Rms 212-226,ped	3	Structure	4	4546

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Table 1.0

SUID#	SU Name	Survey Class	Survey Type	Submittal Number	Survey Unit Size m <sup>2</sup>
F8131561	Aux Bld Roof	3	Structure	4	1434
F8131601	Aux Bld Non-Cont Rms	3	Structure	2	6314
F8131691	Aux. Building Rooms 309-317, and 350, Lower Walls	2	Structure	5	716
F8131692	Aux Building Rooms 309-317 and 350, Upper Walls	3	Structure	5	589
F8131781	Aux Bld Rm 319 Lower	1	Structure	4	85
F8131782	Aux Bld Rm 319 Upper	2	Structure	4	132
F8131791	Aux Bld Rms 320 Lower	2	Structure	4	59
F8131792	Aux Bld Rm 320 (all), 321 Upper	3	Structure	4	273
F8131811	Aux Bld Rms 322-324,351	3	Structure	4	853
F8131812	Aux Bld Rms 322-324,351	3	Structure	4	283
F8132051	Aux Bld Rms 346,elev	3	Structure	4	195.6
F8132131	Aux Bld Exterior	2	Structure	4	310.7
F8132132	Aux. Building Exterior 20' El. Steam Support Structure	2	Structure	5	276.5
F8132133	Aux. Building Exterior 0' El. Steam Support Structure	1	Structure	5	4
F8132134	Aux. Building Exterior 20' El. Steam Support Structure	1	Structure	5	2.25
F8132141	Aux Bld Exterior	3	Structure	4	698.6
F8132142	Aux Bld Ext South Wall	3	Structure	4	426.6
F8132143	Aux. Building Exterior Walls, East	3	Structure	5	410
F8132144	Aux. Building Exterior Walls, North	3	Structure	5	376.8
F8500011	Solidification Pad, NE Lower	1	Structure	2	236
F8500012	Solidification Pad, S Lower	1	Structure	2	211
F8500013	Solidification Pad Beneath NE Section	1	Structure	2	43
F8500014	Solidification Pad, NW Lower	1	Structure	2	118

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Table 1.0

SUID#	SU Name	Survey Class	Survey Type	Submittal Number	Survey Unit Size m <sup>2</sup>
<b>Area 826000 Turbine Building</b>					
F8260001	Turbine Building, Condenser Pit	1	Structure	2	35.8
F8260002	Turbine Building, Polisher Sump	1	Structure	2	22
F8260004	Turbine Building, Condenser Pump Pit, Central	1	Structure	5	286
F8260006	Turbine Building, Condenser Pump Pit, South	1	Structure	5	310
F8260008	Turbine Building, High Pressure Turbine Pit	2	Structure	5	346
F8260010	Turbine Building, Condenser Pump Pit, North	1	Structure	5	319
F8260011	Turbine Building, Lube Oil Pit	1	Structure	5	160.4
F8260031	Turbine Sumps Piping	1	Structure	5	2
F8260032	Turbine Building, Main Feed Pump Area	2	Structure	5	186.2
F8260131	Turbine Building, Grade Level, North	2	Structure	5	618.3
F8260141	Turbine Building, Grade Level, South	2	Structure	5	980.5
F8260151	Turbine Building, Grade Level, South	1	Structure	5	16
F8260161	Turbine Building Floor, North	1	Structure	5	11.6
F8260171	Turbine Building, Grade Level, North	1	Structure	5	16.6
F8260201	Turbine Building, Mezzanine, Interior Walls	3	Structure	5	1776
F8260202	Turbine Building, Structural Steel	3	Structure	5	9134.2
F8260251	Turbine Building, North Laydown Area	3	Structure	5	679
F8260261	Turbine Building, South Laydown Area and Sump	3	Structure	5	573.7
F8260302	Turbine Building, Exterior	3	Structure	5	1596
F8260303	Turbine Building Deck	2	Structure	4	815
F8260304	Turbine Building Deck	2	Structure	4	953
F8260305	Turbine Building Deck	2	Structure	4	847

Attachment I

Release of Rancho Seco Land from the 10 CFR Part 50 License

Table 1.0

SUID#	SU Name	Survey Class	Survey Type	Submittal Number	Survey Unit Size m <sup>2</sup>
F8261001	S Turbine Pedestal	3	Structure	2	633.7
F8261002	LP Turbine Pedestal	3	Structure	3	996
F8261003	Turbine Building, Pedestal 1	1	Structure	5	309.8
F8261004	Turbine Building, Pedestal 2	1	Structure	5	262.2
F8261005	Turbine Building, Pedestal 3	2	Structure	5	236.5
<b>Area 600000, 700000, 800000: Railway</b>					
F8340011	Industrial Area Railway	1	Soil	5	100
F8340012	Industrial Area Railway	2	Soil	5	4735
F8340021	Railway External to the Industrial Area	3	Soil	5	5990
<b>Area 899000 Embedded Piping</b>					
F8990021	Aux Feedwater Pipe	3	Piping	2	43.2
F8990071	Turbine Bld Drains East Grade Level	1	Piping	3	11.1
F8990072	Turbine Bld Drains +40 Elevation	1	Piping	3	22.8
F8990073	Turbine Bld Drains Grade Level	1	Piping	3	180
F8990074	High Pressure Turbine Pedestal Drain	1	Piping	5	8
F8990111	Decay Heat Removal System Piping	1	Piping	5	49
F8990401	Reactor Building Drains	1	Piping	5	12.3
F8990421	Radwaste System Piping	1	Piping	4	89
F8990422	East Radwaste System Piping	1	Piping	4	30.4
F8990423	West Radwaste System Piping	1	Piping	4	10.7
F8990441	Spent Fuel Pool Piping	1	Piping	5	38
F8990521	Acid Waste Pipe	1	Piping	3	29.6

Attachment 1

Release of Rancho Seco Land from the 10 CFR Part 50 License

Table 1.0

SUID#	SU Name	Survey Class	Survey Type	Submittal Number	Survey Unit Size m <sup>2</sup>
<b>Area 800000 Buried and Excavated Piping</b>					
F8990054	CDS-Clean Drain Pipe	3	Piping	3	4644
F8990060	Comp Cool Water Pipe	3	Piping	2	37.6
F8990091	CDS-Storm Drains	3	Piping	2	2733.5
F8990098	CDS Cross-Tie	2	Soil	5	91.5
F8990281	Main Condensate Pipe	3	Piping	2	135.7
F8990291	Circulating Water Pipe	3	Piping	3	4515
F8990321	Nitrogen Pipe	2	Piping	3	24.7
F8990351	Nuclear Service Water Pipe	3	Piping	3	35.4
F8990431	Service Air Pipe	3	Piping	2	207
F8990471	Service Water Pipe	3	Piping	3	250.3
F8990501	Waste Gas Pipe	3	Piping	2	24.1
F8990511	Carbon Dioxide Pipe	2	Piping	3	2.5
F8991071	CDS-Oily Water Separator	3	Piping	2	115.2
F8991072	CDS-Oily Water Separator, Storm Drains	3	Piping	2	764.9
F8991073	CDS-Oily Water Separator, Transformer Yard Drain Line Trench	3	Soil	3	55
F8991091	RHUT Trench	2	Soil	3	1544
F8991092	CDS-RHUT Pipe	1	Piping	2	187
F8991093	RHUT 8" Drain Lines	2	Soil	5	110

## Attachment 1

### Release of Rancho Seco Land from the 10 CFR Part 50 License

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The soil survey units associated with Survey Areas 100000 through 800000 have been previously noted. Survey units associated with Survey Area 800000 as subdivided in Table 1.0 are described below. The descriptions, HSA history, characterization data and FSS survey results for each individual survey unit noted in Table 1.0 may be found in the submitted FSS Summary Report.

Area ID #: 800000

Survey Area: Miscellaneous Site Structures

The Survey Area covers the miscellaneous structures in the Industrial Area. Principle structures include the Administration, Training and Records, NESB, PAP, Diesel Generator, Warehouses, Machine Shop Buildings and the East and West Cooling Tower Basins. The survey units for the region comprise approximately 113,179 m<sup>2</sup>. Operating records and the HSA history for the individual survey units is provided in the FSS Summary Reports.

Area ID #: 800000

Survey Area: Tank Farm (810000) and RHUT (837000) Soil and Structures

The Survey Area consists primarily of the surface and subsurface soils associated with the Tank Farm, RHUT and Auxiliary Boiler Pad. The structures sited are the remaining concrete pads for the Auxiliary Boiler, Tritium Evaporator, BWST, DRCST and CST. The survey units for the region comprise approximately 14,880 m<sup>2</sup> which includes the subsurface soil survey units. Operating records and the HSA history for the individual survey units is provided in the FSS Summary Reports.

Area ID #: 800000

Survey Area: Reactor Building (811000)

The Survey Area consists of the interior and exterior of the Reactor Building. The survey units for the structure comprise approximately 16,668 m<sup>2</sup> which includes the Tendon Gallery survey unit. Operating records and the HSA history for the individual survey units is provided in the FSS Summary Reports.

Area ID #: 800000

Survey Area: Spent Fuel Building (812000)

The Survey Area consists of the interior and exterior of the Spent Fuel Building. The survey units for the structure comprise approximately 5,145 m<sup>2</sup> which includes the gap region between the Spent Fuel Building and The North Diesel Generator Room. Operating records and the HSA history for the individual survey units is provided in the FSS Summary Reports.

## Attachment 1

### Release of Rancho Seco Land from the 10 CFR Part 50 License

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Area ID #: 800000

Survey Area: Auxiliary Building (813000) and Solidification Pad (850000)

The Survey Area consists of the interior and exterior of the Auxiliary Building and the Solidification Pad. The survey units for the structures comprise approximately 51,000 m<sup>2</sup> which includes the interior floors, walls and ceiling as well as the exterior walls and roof surfaces. Operating records and the HSA history for the individual survey units is provided in the FSS Summary Reports.

Area ID #: 800000

Survey Area: Turbine Building (826000)

The Survey Area consists of the interior and exterior of the Turbine Building, the Mezzanine and the Structural Support Steel. The survey units for the structures comprise approximately 22,123 m<sup>2</sup> which includes the interior floors, walls and ceiling as well as the exterior walls. Operating records and the HSA history for the individual survey units is provided in the FSS Summary Reports.

Area ID #: 600000, 700000, 800000

Survey Area: Railway (834000)

The Survey Area consist of the Railway survey units in Survey Area 800000 ending at the Industrial Area fence line and the survey unit from the Industrial Area fence line that transverses through Survey Areas 600000 and 700000 terminating at the SMUD property line. These survey units include approximately 10,825 m<sup>2</sup> and include the rail region and roadbed on either side of the rails. Operating records and the HSA history for the individual survey units is provided in the FSS Summary Reports.

Area ID #: 800000

Survey Area: Embedded Piping (899000)

The Survey Area consist of the embedded piping survey units associated with Turbine, Auxiliary, Fuel and Reactor Buildings. The associated survey units consist of approximately 524 m<sup>2</sup>. Operating records and the HSA history for the individual survey units is provided in the FSS Summary Reports.

Area ID #: 800000

Survey Area: Buried and Excavated Piping (899000)

The Survey Area consists of the buried and excavated piping survey units in the Industrial Area. The associated survey units include approximately 15,477 m<sup>2</sup>. Operating records and the HSA history for the individual survey units is provided in the FSS Summary Reports.

## Attachment 1

### Release of Rancho Seco Land from the 10 CFR Part 50 License

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The NRC has reviewed four previous FSS report submittals<sup>1</sup> for the areas to be released and determined that the FSS reports are acceptable. The NRC documented their review and acceptance of the FSS reports in letters dated April 4, 2008, July 29, 2008, September 23, 2008 and April 23, 2009. A fifth and final FSS report submittal is currently being reviewed by the NRC.

Survey areas for the remaining portion of the licensed site (i.e., the fenced-in area surrounding the IOSB) will be addressed when the IOSB is decommissioning and will remain under the 10 CFR Part 50 license until FSS reports for those areas are completed and the NRC terminates the Rancho Seco Part 50 license.

#### 2.2 Remaining Decommissioning Activities

SMUD has completed all decommissioning and dismantlement activities for the first phase of Rancho Seco decommissioning. Accordingly, no further dismantlement activities are required in the survey areas to be released from the license. The FSS Reports for each of the survey areas to be released have been submitted to the NRC previously, as listed in Table 1 of the transmittal letter.

The Class B and C radioactive waste remains stored in the IOSB. SMUD will complete the final phase of decommissioning when a suitable disposal facility becomes available. The remaining activities for the final phase of decommissioning include shipment of all remaining radioactive waste followed by an expectedly minimal decontamination of the structure surfaces in the storage area. The spent nuclear fuel and Greater than Class C (GTCC) waste will remain stored at the ISFSI under 10 CFR Part 72.

#### 2.3 Controls to Prevent Recontamination

The Class B and C radioactive waste remains stored in the IOSB. The IOSB is a passive storage facility since no additional radioactive waste will be generated during the storage period.

The contamination controls to be implemented in the IOSB during the second phase of decommissioning are similar to those implemented during the first phase of decommissioning. Examples of controls to be implemented to ensure no recontamination may include:

- Personnel training
- Installation of barriers to control access to surveyed areas

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<sup>1</sup> See SMUD letters MPD&C 07-089 dated November 19, 2007, MPC&D 08-008 dated January 24, 2008, MPC&D 08-032 dated May 14, 2008, and MPC&D 08-064 dated July 31, 2008.

## Attachment 1

### Release of Rancho Seco Land from the 10 CFR Part 50 License

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- Installation of postings requiring individuals to perform contamination monitoring prior to accessing surveyed areas
- Locked entrances to surveyed areas of the facility
- Periodic routine Radiation Protection surveys to ensure no re-contamination occurs. If recontamination is identified, an investigation will be initiated in accordance with the site corrective action program.

All of the spent nuclear fuel and Greater than Class C (GTCC) radioactive waste are stored at the Rancho Seco ISFSI, in a NUHOMS horizontal storage system, which is licensed under 10 CFR Part 72. The NUHOMS canisters have double closure seal welds to form a pressure retaining confinement boundary and to maintain a helium (i.e., non-oxidizing) atmosphere. Consequently, there is no release of radioactive material during normal conditions of storage.

Chapter 8 of the Rancho Seco ISFSI Final Safety Analysis Report (FSAR) provides engineering analysis for normal, off-normal, and accident conditions. The analysis in Chapter 8 shows that there is no credible event that would lead to a breach of a canister. Consequently, there are no normal, off-normal, or accident conditions that would result in the release of radioactive material to areas that have been released for unrestricted use.

#### 2.4 Impact of Proposed Site Release on Programs and Documents

##### 2.4.1 Defueled Safety Analysis Report (DSAR)

The proposed release will require changes to the DSAR to describe the site area resulting from the removal of the subject survey areas from the 10 CFR Part 50 license. DSAR Figure 2-2 will be revised to identify the new site boundary.

##### 2.4.2 Technical Specifications

The Rancho Seco Technical Specifications do not include a description of the site. Accordingly, the Technical Specifications are not affected by the release of the of the subject survey areas.

The 10 CFR Part 72 ISFSI Technical Specifications are also not affected.

##### 2.4.3 Radiological Environmental Monitoring Program (REMP)

Solid, liquid, and gaseous radioactive waste systems that supported plant operations have been removed and disposed of. The first phase of decommissioning has been completed and liquid and gaseous discharges

## Attachment 1

### Release of Rancho Seco Land from the 10 CFR Part 50 License

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are no longer made from the reactor building, auxiliary building, or spent fuel building.

Some radioactive waste will continue to be stored in the IOSB until a suitable disposal facility becomes available. Accordingly, the REMP has been revised to reflect direct radiation monitoring for the IOSB and the ISFSI.

#### 2.4.4 Offsite Dose Calculation Manual (ODCM)

Solid, liquid, and gaseous radioactive waste systems that supported plant operations have been removed and disposed of. The first phase of decommissioning has been completed and liquid and gaseous discharges are no longer made from the reactor building, auxiliary building, or spent fuel building. Miscellaneous gaseous discharges may continue through the IOSB stack. Accordingly, the ODCM was revised to reflect that Rancho Seco no longer performs liquid effluent discharges.

#### 2.4.5 Emergency Plan

The emergency plan has been revised to reflect that Rancho Seco no longer performs liquid effluent discharges. The emergency plan addresses the IOSB and ISFSI. The emergency plan is not affected by the release of the of the subject survey areas.

#### 2.4.6 Security Plan

The security plan applies to the 10 CFR Part 72 licensed ISFSI only and is not affected by the release of the proposed areas.

#### 2.4.7 License Termination Plan (LTP)

The requested release is consistent with the LTP. The proposed release does not impact the LTP.

#### 2.4.8 Groundwater

Due to the depth of the water table there is no groundwater monitoring program at Rancho Seco.

#### 2.4.9 10 CFR Part 100 Siting Criteria

10 CFR Part 100 addresses design and environmental aspects to be considered when siting a power reactor. Decommissioning the power

## Attachment 1

### Release of Rancho Seco Land from the 10 CFR Part 50 License

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reactor portion of the site has been completed. Only the ISFSI and IOSB will remain after the requested release. Therefore, the criteria in 10 CFR Part 100 no longer applies to this site and do not need to be addressed.

#### 2.4.10 Decommissioning Environmental Report

Rancho Seco staff evaluated the environmental impacts of decommissioning Rancho Seco, as documented in the Rancho Seco Environmental Report - Post Operating License Stage. This report compared Rancho Seco decommissioning attributes to those identified in NUREG-0586 "Final Generic Environmental Impact Statement on decommissioning of nuclear facilities" (GEIS). The assessment determined that the environmental effects for decommissioning of Rancho Seco are minimal, and there are no adverse effects outside the bounds of NUREG-0586.

The phased release of the Rancho Seco site is discussed in the LTP and the requested release is consistent with the process in the LTP. Therefore, the Rancho Seco Environmental Report - Post Operating License Stage and the conclusions in LTP Chapter 8 are not impacted by the requested release.

#### 2.5 NRC Inspections and Confirmatory Surveys

NRC contractors from the Oak Ridge Institute for Science and Education (ORISE) performed multiple confirmatory radiation surveys and sample analysis to independently assess the radiological conditions at the site. Samples were tested by gamma spectroscopy for Co-60, Cs-137, and other gamma emitting radionuclides associated with the Rancho Seco site. Reports of ORISE and NRC surveys and sample analysis are public records and verify the Final Status Survey program implemented at Rancho Seco.

### 3.0 Conclusions

The NRC's review of the Rancho Seco LTP determined that the proposed DCGLs would ensure that the 10 CFR 20, Subpart E release criteria would be met. The final status survey (FSS) reports are consistent with, and demonstrate compliance with, the LTP. The FSS results demonstrate that the survey areas to be released meet the radiological criteria for unrestricted release.

NRC inspections and confirmatory measurements verified that the decommissioning and FSS programs adequately addressed the radiological conditions at the Rancho Seco site. Accordingly, the NRC should approve the request to release the subject survey areas from the Rancho Seco 10 CFR Part 50 license.

## Attachment 2

### Post FSS Particle Surveys at Rancho Seco

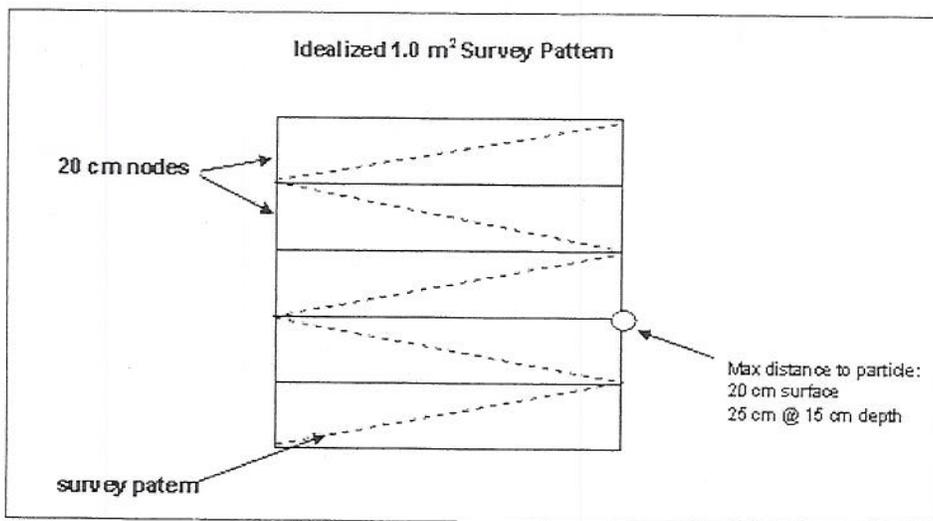
#### Background

During ORISE confirmatory surveys in December 2007, two instances of small (particle-like) sources of activity were discovered, one inside the Auxiliary Building, one in the Class 1 RHUT Land Area. Based on these discoveries, SMUD instituted a series of preventative actions, including increased monitoring of border areas between Survey Units that had completed FSS adjacent to Survey Units still “in service”. Increased contamination controls were also imposed specifically inside of the buildings. In addition, SMUD developed a “particle scan” protocol based on the ability to detect a 1 uCi Co-60 particle. These actions and the new survey basis were found acceptable by the NRC.

#### Particle Scan Basis

SMUD’s approved LTP implements the approved survey guidance found in MARSSIM. This uses an approach that combines statistical analysis of samples along with scans of survey units in order to determine the dose consequence of the residual radioactivity remaining in the survey unit. MARSSIM assumes that the residual radioactivity has some spatial distribution, i.e., that the residual radioactivity is distributed over a region and is not contained in a relatively small location like a particle. After the ORISE discoveries in December 2007, the survey protocols were revised to allow detection of particles as well as satisfy the MARSSIM survey protocols. The particle surveys consist of surveying using a 2 X 2 NaI detector in the same MARSSIM fashion (i.e., “z”-pattern over a designated area) but using a scan speed 50% slower than the scan speed for MARSSIM surveys. Note that the “z”-pattern also is based upon a “region” of detection and does not cause the detector to reside directly over every square inch of the survey unit. However, with the reduced scan speed, the technical bases (and all subsequent surveys) demonstrate SMUD’s ability to detect a 1.0 uCi Co-60 particle. As illustrated below, the 100 cm length of the idealized 1.0 m<sup>2</sup> survey area is divided into five 20 cm wide nodes. The detector is moved diagonally from the bottom left corner of one node to the top right corner of the next node and then to the top left corner of the next node until the region length is completed. The detector is moved at a fixed speed, for discrete particles the speed used was 0.25 m/s which is one-half the speed recommended by MARSSIM. The maximum node to particle surface location is 20 cm. If the particle is 15 cm deep the distance is 25 cm.

**Attachment 2**  
**Post FSS Particle Surveys at Rancho Seco**



**Consequence of a 1 uCi Co-60 Particle**

In the absence of general guidance for determining the dose consequence of a particle, SMUD used NRC-recommended protocols and implemented one of two different methods for determining the dose consequence of particles based upon its location on a structural surface (i.e., inside a building) or in soils. For soils, the dose consequence can be determined by examining the total particulate activity as if it were distributed over a 1.0 m<sup>2</sup> area, 15 cm deep and comparing this result to the DCGL. For building surfaces, it was suggested that the “George Xu” published paper be used as the basis. The consequences of each are shown in the Tables below and show that in no case is the 10 CFR 20 criteria for license termination exceeded, demonstrating that a detection limit of 1.0 uCi Co-60 provides reasonable assurance that an undetected particle less than 1.0 uCi will not result in exceeding the release criteria.

**Table 1.0**  
**Distributed Source Concentration**

Distributed Source Area (1.0 m <sup>2</sup> ) <sup>a</sup>	
Activity	pCi/g
1.0	4.17

<sup>a</sup>Volume Assumed: 1.0 m<sup>2</sup> 0.15 cm deep ~1.50E+05 cm<sup>3</sup> and ρ = 1.6 g/cm<sup>3</sup> V \* ρ = 2.40E+05 g

**Table 2.0**  
**Discrete Particle Skin Dose (EDE)**

1.0 uCi Co-60 Discrete Particle	
EDE urem/h/uCi	48.631 <sup>b</sup>
EDE urem (8.0 hrs) <sup>a</sup>	389.0
EDE urem/y	389.0

<sup>a</sup>8.0 hours is the time assumed that a particle is in contact before discovery and removal or, when the particle is removed from the skin during showering actions at the end of a work day.  
<sup>b</sup>X.G. Xu, Health Physics 89 (1):53-70; 2005

## Attachment 2 Post FSS Particle Surveys at Rancho Seco

### Post-FSS non-MARSSIM Survey Protocol

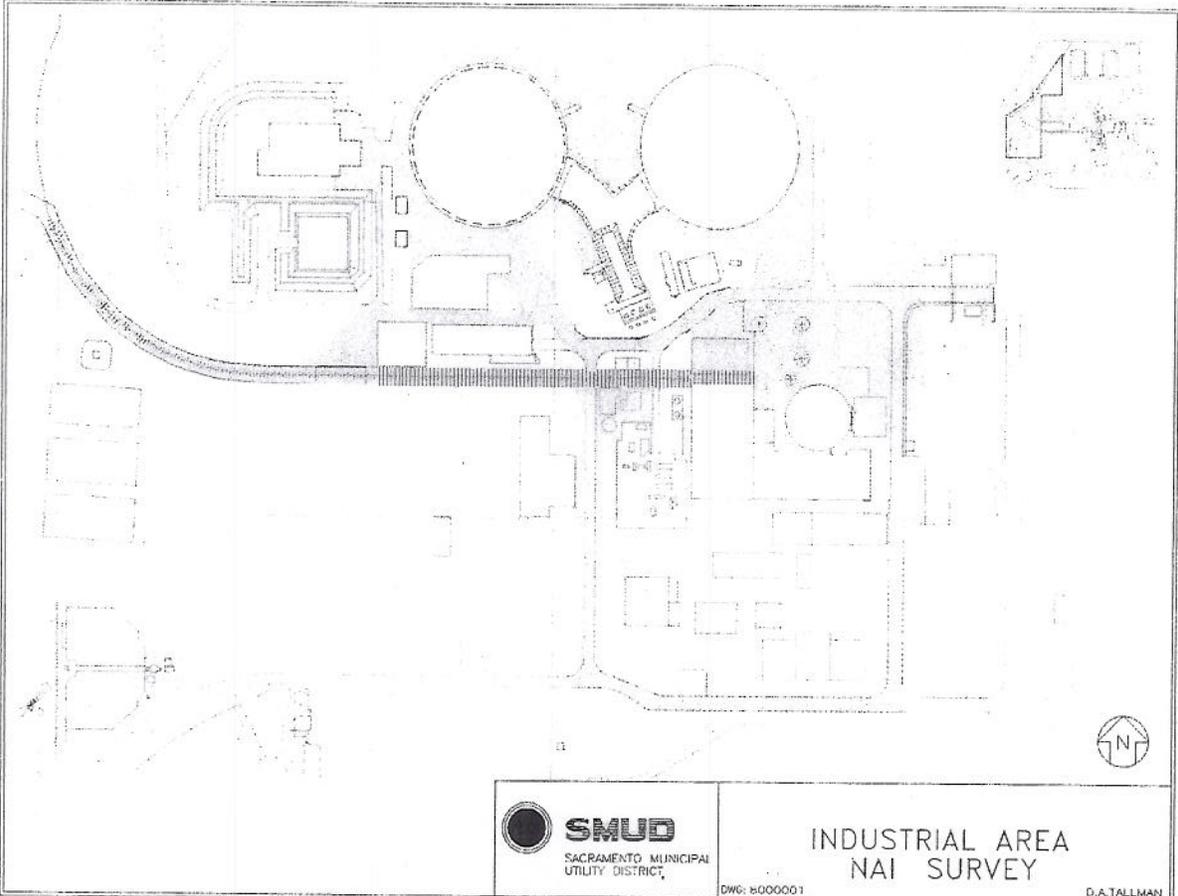
During ORISE confirmatory surveys in December 2008, a particle was discovered in the Reactor Building emergency sump. The particle was collected into a vacuum and was not able to be analyzed to determine the exact quantity of radioactivity in the particle, but based upon similar particles and the survey results a reasonable estimate was made with the result being well below 1.0 uCi Co-60. During ORISE confirmatory surveys in March 2009, three additional “particles” were discovered (some were rocks several grams in mass). In no case were the particles above the 1.0 uCi threshold. However, even though the residual radioactivity discovered was well below any “limit”, SMUD agreed to perform additional surveys of the Class 1 land areas adjacent to the power block as well as the routes used for transporting radioactive waste during the decommissioning process. A protocol was instituted to emulate the ORISE surveys, where the focus was not on a regimented MARSSIM-type survey pattern designed to detect regions of contamination that are large in relation to the detector size, but was instead based upon finding and detecting areas of contamination very small in relation to the size of the detector. These surveys were conducted under “ideal” conditions with essentially zero site activity occurring during the surveys: no passing vehicles, no motorized equipment being used anywhere near the surveys, no work being conducted in the vicinity, etc. The focus was on finding and locating any activity above background, not the MARSSIM technical basis of detecting a small fraction of a DCGL. The map in Figure 1.0 below presents the areas surveyed using this protocol.

### Post-MARSSIM Survey Results

Many instances of particle-like activity were detected, as summarized in Table 3.0 below. These ranged in physical size from true sand-grain or smaller “particles” to rocks and/or concrete aggregate with a mass of several grams. In each case the particles were retrieved and analyzed in the lab using HPGe equipment to identify and quantify the radioactivity. No particles approaching or exceeding 1.0 uCi were detected.

Attachment 2  
Post FSS Particle Surveys at Rancho Seco

Figure 1.0



**Attachment 2**  
**Post FSS Particle Surveys at Rancho Seco**

**Table 3.0**  
**Survey Results Inventory**

Item	Location	Size Description	Discrete Particle?	44-10 cpm <sup>1</sup>	HPGe Analysis Results				1.0 m <sup>3</sup> Distributed Activity in pCi/g <sup>2</sup>			
					Co-60	Cs-137	Eu-152	Eu-154	Co-60	Cs-137	Eu-152	Eu-154
1	Tank Farm 8100031	concrete ~6 g	No	42,521	4.66E+03	-	7.20E+03	4.67E+02	1.92E-02	-	3.00E-02	1.95E-03
2	Tank Farm 8100031	"speck"	Yes	60,621	1.78E+05	-	-	-	7.42E-01	-	-	-
3	Tank Farm 8100021	concrete chip	No	7,753	-	3.90E+04	-	-	-	1.63E-01	-	-
4	Tank Farm 8100011	rock aggregate	No	19,000	-	3.26E+04	-	-	-	1.36E-01	-	-
5	Tank Farm 8100011	rock aggregate	No	55,000	-	1.74E+05	-	-	-	7.23E-01	-	-
6	Tank Farm 8100021	rock aggregate	No	24,000	-	5.74E+04	-	-	-	2.39E-01	-	-
7	Tank Farm 8100021	rock aggregate	No	28,000	-	9.46E+04	-	-	-	3.94E-01	-	-
8	Tank Farm 8100021	rock aggregate	No	41,000	-	1.27E+05	-	-	-	5.28E-01	-	-
9	Tank Farm 8100021	sand grain	Yes	20,000	-	4.36E+04	-	-	-	1.82E-01	-	-
10	Tank Farm 8100021	sand grain	Yes	68,000	1.25E+05	-	-	-	5.21E-01	-	-	-
11	Tank Farm 8100021	rock chip	No	18,600	-	4.15E+04	-	-	-	1.73E-01	-	-
12	Tank Farm 8100021	rock aggregate	No	8,000	-	2.83E+04	-	-	-	1.18E-01	-	-
13	Tank Farm 8100021	rock aggregate	No	134,000	2.07E+02	4.38E+05	-	-	8.63E-04	1.83E+00	-	-
14	Tank Farm 8100021	metal shaving	No	60,000	1.10E+05	-	-	-	4.57E-01	-	-	-
15	Tank Farm 8100021	rock aggregate	No	36,000	-	1.08E+05	-	-	-	4.49E-01	-	-
16	Tank Farm 8100021	rock aggregate	No	10,000	-	1.97E+04	-	-	-	8.19E-02	-	-
17	Tank Farm 8100021	rock chip	Yes	15,000	-	2.91E+04	-	-	-	1.21E-01	-	-
18	Tank Farm 8100021	rock aggregate	No	18,000	-	6.06E+04	-	-	-	2.53E-01	-	-
19	Tank Farm 8100021	rock aggregate	No	15,000	-	3.61E+04	-	-	-	1.50E-01	-	-
20	Tank Farm 8100031	sand grain	Yes	71,000	1.19E+05	-	-	-	4.97E-01	-	-	-
21	Tank Farm 8100031	rock aggregate	No	60,000	8.04E+04	-	-	-	3.35E-01	-	-	-
22	Tank Farm 8100031	sand grain	Yes	87,000	1.37E+05	-	-	-	5.69E-01	-	-	-
23	Tank Farm 8100031	rock aggregate	No	21,000	4.73E+03	-	2.05E+04	1.58E+03	1.97E-02	-	8.53E-02	6.58E-03
24	Trench 1 E. 8100052	rock aggregate	No	38,000	1.20E+02	1.12E+05	-	-	5.00E-04	4.67E-01	-	-
25	Trench 1 E. 8100052	rock aggregate <sup>3</sup>	No	16,000	1.15E+04	-	-	-	4.79E-02	-	-	-
26	S.E.I.A. 8000091	particle	Yes	202,000	3.49E+05	-	-	-	1.45E+00	-	-	-
27	Ctrl I.A. 8000106	particle	Yes	45,000	8.07E+04	-	-	-	3.36E-01	-	-	-
28	Ctrl I.A. 8000106	rock aggregate	No	46,000	4.94E+01	1.40E+05	-	-	2.06E-04	0.585	-	-
29	Ctrl I.A. 8000106	particle	Yes	33,000	4.38E+04	-	-	-	1.83E-01	-	-	-
30	C. Twr. But 8080031	particle	Yes	42,000	6.62E+04	-	-	-	2.76E-01	-	-	-
31	C. Twr. But 8080031	particle	Yes	83,000	1.47E+05	-	-	-	6.11E-01	-	-	-
32	C. Twr. But 8080033	metal sliver	Yes	288,000	7.61E+05	-	-	-	3.17E+00	-	-	-

<sup>1</sup> With the exception of items 1-3 the 44-10 detector measurements represent the count rate of the item after removal from the soil.

<sup>2</sup> Items 1-3 Model 44-10 detector values are one minute static counts over the suspect location prior to removal from the soil.

<sup>3</sup> Assumes 100 cm x 100 cm x 15 cm depth and density of 1.6 g/cm<sup>3</sup> = 2.40E+05 g

<sup>4</sup> Nb-94 identified by HPGe analysis 2.241E+02 pCi ~9.34E-04 pCi/g; normally associated with in-vessel components composed of Inconel

**Attachment 2**  
**Post FSS Particle Surveys at Rancho Seco**

**Dose Consequences of Discoveries**

As can be seen, the individual dose consequences of these particles are insignificant. In fact, if all of the activity of these discoveries is distributed in a single area of 1.0 m<sup>2</sup> by 15 cm deep, the DCGL is not exceeded. Summing all of the particulate activity results in the following soil values: 9.24 pCi/g, Co-60; 6.59 pCi/g, Cs-137; 0.12 pCi/g, Eu-152 and 8.52E-03 pCi/g, Eu-154. Examining the mixture concentrations using the unity rule where the single nuclide DCGL for Co-60 is 12.6 and the Cs-137 surrogate DCGL for hard-to-detect nuclides is 52.6 pCi/g, the screening levels from NUREG 1757 Volume 2 Revision 1 Table H-2 are used for Eu-152 (8.7 pCi/g) and Eu-154 (8.0 pCi/g), then,

$$\frac{9.24}{12.6 \text{ } ^{60}\text{Co}} + \frac{6.59}{52.6 \text{ } ^{137}\text{sur Cs}} + \frac{0.12}{8.7 \text{ } ^{152}\text{Eu}} + \frac{8.52E-03}{8.0 \text{ } ^{154}\text{Eu}} = 0.87 < 1.0 \text{ (unity)}$$

**Conclusions:**

1. No activity discovered by ORISE or SMUD results in exceeding the 10 CFR 20 license termination criteria.
2. SMUD has clearly demonstrated that the facility not only meets the 25 mrem/y limit for unrestricted release of the site, but in fact the residual radioactivity has been reduced to a very small fraction of the limit.
3. No discoveries by ORISE or SMUD resulted in detection of activity above agreed-upon limits.
4. The dose consequences of the discoveries do not result in exceeding the 10 CFR 20 limit for license termination.
5. Surveys based on MARSSIM protocols are sufficient to demonstrate compliance with the 10 CFR 20 release criteria.
6. The results of the SMUD surveys (both during and after FSS) indicate our ability to detect levels of particles well below any values that would result in approaching the 10 CFR 20 limit on license termination.
7. While SMUD retrieved (i.e., remediated) the particles discovered during the Post-FSS surveys, it was not ALARA to do so: SMUD has demonstrated in the approved LTP that remediation below the 25-mrem/y limit is not necessary.

### Attachment 3

## Evaluation of Co-60 and Cs-137 Nuclide Fractions in FSS Soil Samples

### General

Final Status Surveys of the Rancho Seco Nuclear Generating Station (RSNGS) comprised 324 survey units. Sixty (60) of these survey units represented the associated land areas. Table 1.0 presents the survey classes for these land areas.

**Table 1.0**  
**Land Survey Units by Class**

Survey Class	Survey Units
1	15
2	17
3	28
Total	60

This evaluation is intended to examine the soil sample analysis results to determine the impact on radionuclide identities, nuclide fractions and any subsequent changes to the DCGL. The original soil characterization for hard-to-detect (HTD) nuclides and DCGL determination was based on analysis of the highest activity samples available. Examination of the highest activity samples provides for the highest success in identifying HTD radionuclides that may be associated with the sample locations. During the course of decommissioning areas that could potentially contain high concentrations of HTD nuclides are remediated and the associated activities reduced in concentration for all nuclides that are present. The residual radioactivity associated with the observed and HTD nuclides following remediation are conservative relative to the original DCGL.

### Evaluation

The evaluation of the site soil survey units consisted of examining the reported positive results for Co-60 and Cs-137 for each survey unit in several steps and the results are provided in Table 2.0 of this evaluation..

In the first step the positive sample results for Co-60 and Cs-137 in each survey unit were individually summed. The Co-60 and Cs-137 results are then added together to determine the total activity for all the positive samples in the survey unit. The summed Cs-137 results are divided by the total activity to determine the nuclide fraction for Cs-137 for the positive results and the same operation is performed for Co-60. This resulted in a biased Cs-137 and Co-60 nuclide fraction for the survey unit because of the domineering presents of positive Cs-137 in all the samples. However, the method resulted in a beneficial evaluation feature. The total activity for all the samples is provided and can be compared to the DCGL as a means of evaluating the significance of the residual radioactivity in the survey unit and of the nuclide mixture.

The second step of the process examines the worst case sample nuclide fraction for Cs-137 and Co-60. This step provides a worst case indicator of the nuclide fraction (but is based on a single sample). Additional information could be acquired by averaging only the Cs-137 and Co-60 samples in the survey unit however in 7 of the 9 survey units

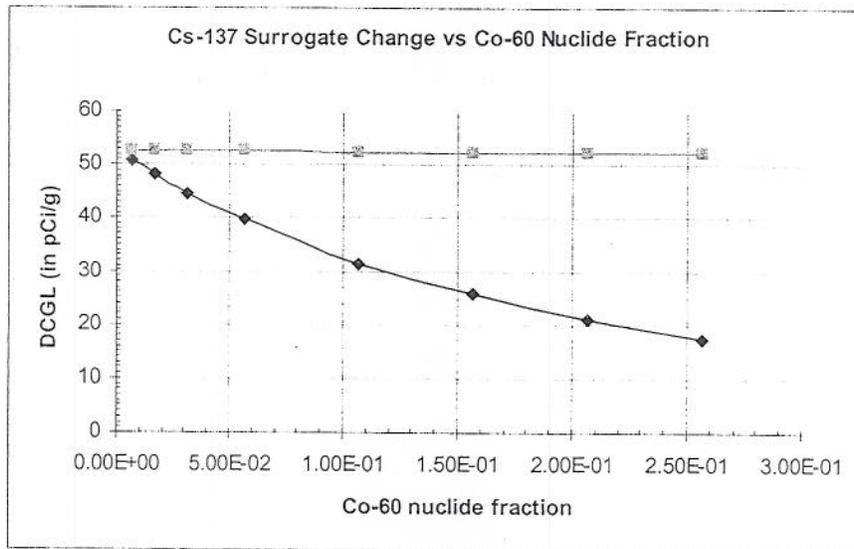
### Attachment 3

#### Evaluation of Co-60 and Cs-137 Nuclide Fractions in FSS Soil Samples

exhibiting both Co-60 and Cs-137 only one to four samples resulted for each survey unit contained positive values for both nuclides. In examining the worst case samples several findings were noted and are discussed under the bulleted items below.

- Variations were noted for several samples where the Co-60 nuclide fraction was significantly above the averaged nuclide fraction presented in the DTBD. To investigate this condition the Cs-137 surrogate DCGL was adjusted by varying the nuclide fraction of Cs-137 and Co-60 in the original mix and plotting the change in the Cs-137 surrogate DCGL as the Co-60 fraction increased. While increasing the Co-60 nuclide fraction the Cs-137 nuclide fraction was decreased proportionately. The graph representing the change is provided in Figure 1.0 below. For example, a 10.0 percent increase in the Co-60 nuclide fraction (and subsequent 10 percent decrease in the Cs-137 nuclide fraction) result in a change in the Cs-137 surrogate DCGL from about 51.0 pCi/g to ~33.0 pCi/g. Note that the Cs-137 surrogate DCGL when Co-60 is removed from the mixture does not significantly change over the graph range (52.5-52.35 pCi/g). Also, when the mixture is evaluated using the single nuclide DCGL's for Co-60 (12.6 pCi/g) and the Cs-137 surrogate without Co-60. The mixture is then evaluated using the unity rule.

**Figure 1.0**  
**Cs-137 surrogate DCGL Change vs. Co-60 Nuclide Fraction**



- As per the above information the first sample to exhibit a significant increase in the Co-60 nuclide fraction (0.09) was SU F8100011 where of 20 samples a single positive result was reported. Examining Table 2.0 data the total activity for all the samples resulted in a total activity of 8.89 pCi/g which is significantly lower than the reduced Cs-137 surrogate value of ~33.0 pCi/g. Evaluating the results using the single nuclide DCGL for Co-60 and the Cs-137 surrogate value (~52.35 pCi/g) on a unity basis will readily result in the SU unit passing.

### Attachment 3

#### Evaluation of Co-60 and Cs-137 Nuclide Fractions in FSS Soil Samples

- From Table 2.0 SU F8100051 indicates a worst case single sample with Cs-137 and Co-60 nuclide fraction results of 0.23 and 0.77, respectively. However the total sample activity is 0.579 pCi/g. The total positive activity associated with 67 samples is only 1.95 pCi/g and is insignificant.
- SU F8480011 shows a worst case sample where the Co-60 nuclide fraction is 0.083. The Cs-137 surrogate DCGL value associated with this fraction of Co-60 is ~35 pCi/g and evaluating the individual sample shows that the Cs-137 residual radioactivity associated with this sample is 9.29 pCi/g Cs-137 and 0.178 pCi/g Co-60. Evaluating the sample using the unity rule would result in a unity value of ~0.19.
- SU F8480012 shows a worst case sample with a nuclide fraction of 0.137 for Co-60. This would result in a change to the Cs-137 surrogate DCGL value to ~27 pCi/g. The individual sample shows that the Cs-137 residual radioactivity associated with this sample is 20.8 pCi/g and is 0.77 of the surrogate DCGL. Using the unity rule and both Cs-137 and Co-60 the individual sample result is 0.398.
- SU F8480018 indicated a worst case sample with the nuclide fraction for Co-60 of 0.71. The total activity associated with this sample for both Cs-137 and Co-60 is 7.17E-01 pCi/g. The positive value associated with 14 samples is 4.75 pCi/g and insignificant.

#### Conclusion

The nuclide fractions and bases for the surrogate DCGL's developed using pre-remediation analysis data remain valid and applicable for use in all post-remediation surveys. Based on the contents of Table 2.0 the following observations were made:

- A total of 25 Survey Unit analysis results were  $\leq$ MDA.
- A total of 24 Survey Unit analysis positive results identified only Cs-137.
- One Survey Unit was evaluated using the gross beta DCGL.
- Ten Survey Units (16.7%) displayed analysis results for both Co-60 and Cs-137.
- Of 1,169 samples for all survey units only 31 samples contained Co-60 (2.7%)
- Based on the evaluations performed for the survey units containing both Co-60 and Cs-137 any change in the nuclide fraction did not affect the FSS evaluation.

### Attachment 3

#### Evaluation of Co-60 and Cs-137 Nuclide Fractions in FSS Soil Samples

- Survey Units containing positive results for both Cs-137 and Co-60 were evaluated using the Cs-137 surrogate value of 52.6 and the single nuclide DCGL 12.6

#### Explanation of Table 2.0 Columns

##### Column 1 - Item

The item number as the next sequential entry.

##### Column 2 - Area

The physical description or name of a survey unit

##### Column 3 - SUID

The Survey Unit Identification Number (the F for final is omitted)

##### Column 4 -- Class

Notes the Survey Unit Class (1, 2 or 3)

##### Column 5 – Submittal

The NRC report (submittal) grouping in which the Survey Unit was submitted (1-5)

##### Column 6 – Cs-137 (activity in $\mu\text{Ci/g}$ )

The activity for the positive Cs-137 results

##### Column 7 – Co-60 (activity in $\mu\text{Ci/g}$ )

The activity for the positive Co-60 results

##### Column 8 – Total activity (activity in $\mu\text{Ci/g}$ )

The sum of columns 5, 6 and 7

##### Column 9 – Cs-137 nf

Cs-137 nuclide fraction, Column 6 divided by Column 8.

##### Column 10 – Co-60 nf

Co-60 nuclide fraction, Column 7 divided by Column 8

##### Column 11 – Cs-137 nf (worst case sample)

The Cs-137 nuclide fraction for the worst case sample

##### Column 12 – Co-60 nf (worst case sample)

The Co-60 nuclide fraction for the worst case sample

### Attachment 3

#### Evaluation of Co-60 and Cs-137 Nuclide Fractions in FSS Soil Samples

**Column 13 - Remarks**

Notes if the data is based on gross beta activity or  $\leq$ MDA where the gamma spectroscopy results are all MDA. If the cell is blank it indicates positive gamma spectroscopy results for Co-60, Cs-137 or both.

**Column 14 – Co-60 (Positive Results)**

Notes the number of Co-60 positive gamma spectroscopy results.

**Column 15 – Cs-137 (Positive Results)**

Notes the number of Cs-137 positive gamma spectroscopy results.

**Column 16 – Sample Total**

Notes the total number of gamma spectroscopy samples acquired for the survey unit.

Attachment 3

Evaluation of Co-60 and Cs-137 Nuclide Fraction in FSS Soil Samples

Table 2.0  
Summary of Nuclide Fractions for All Land Survey Units

Item	Area	SUID	Class	Submittal	Activity in $\mu\text{Ci/g}$			Total Activity	Averaged Samples			Worst Case Sample		Positive Results		Sample Total
					Cs-137	Co-60	Co-60		Cs-137 nf	Co-60 nf	Cs-137 nf	Co-60 nf	Co-60	Cs-137		
1	Effluent Corridor	1000001	2	3	4.13E-05	3.59E-07	4.17E-05	9.91E-01	8.62E-03	9.89E-01	9.89E-01	1.13E-02		2	15	19
2	Effluent Corridor	1000002	2	3	1.13E-05		1.13E-05	1.00E+00	0.00E+00					0	6	17
3	Effluent Corridor	1000003	2	3	2.88E-05	1.92E-07	2.90E-05	9.93E-01	6.62E-03	9.83E-01	9.83E-01	8.46E-03		1	21	21
4	Effluent Corridor	1000004	1	3	1.14E-04	6.57E-07	1.15E-04	9.94E-01	5.73E-03	9.89E-01	9.89E-01	1.10E-02		4	15	15
5	South Outfall	2000001	3	3	3.62E-06		3.62E-06	1.00E+00	0.00E+00					0	11	14
6	Upper/Outer Yard Pavement	5010031	3	3										0	0	14
7	Hazardous Waste Building Pad	5010032	3	3										0	0	14
8	Extended Parking Area Soil	5010041	3	3	5.83E-07		5.83E-07	1.00E+00	0.00E+00					0	4	14
9	Extended Parking Area Pavement	5010042	3	3										0	0	14
10	Access Road	5010051	3	5										0	0	14
11	Helio Pad Area	8000011	3	4	8.58E-06		8.58E-06	1.00E+00	0.00E+00					0	2	14
12	Central Transit Area	8000041	3	3										0	0	14
13	West Industrial Area	8000071	3	3	1.21E-07		1.21E-07	1.00E+00	0.00E+00					0	2	14
14	Industrial Area West (W. of Barrel Farm)	8000072	3	5										0	0	14
15	Industrial Area West (North end)	8000073	3	5										0	0	14
16	South East Industrial Area Lands	8000091	3	5	4.16E-07		4.16E-07	1.00E+00	0.00E+00					0	4	28
17	Industrial Area Central Yard S/P	8000101	3	5	5.05E-07		5.05E-07	1.00E+00	0.00E+00					0	1	15
18	Industrial Area Central Yard S/P	8000102	3	5	2.53E-08		2.53E-08	1.00E+00	0.00E+00					0	1	14
19	Aux Building-NESB (Pigeon) Alley	8000103	3	4										0	0	14
20	Pump Alley Access Corridor	8000104	1	5										0	0	14
21	Industrial Area Roadway	8000105	2	5										0	0	14
22	Central 1A Roadway	8000106	2	5										0	0	15
23	Industrial Corridor & N A Whse/Fab	8000111	2	5										0	0	14
24	Industrial Area Buffer Zone	8000121	3	3	6.16E-08		6.16E-08	1.00E+00	0.00E+00					0	1	15
25	North Industrial Area	8000141	3	3	2.01E-07		2.01E-07	1.00E+00	0.00E+00					0	1	14
26	North Industrial Area	8000142	3	5										0	0	14

**Attachment 3**  
**Evaluation of Co-60 and Cs-137 Nuclide Fractions in FSS Soil Samples**

**Table 2.0**  
**Summary of Nuclide Fractions for All Land Survey Units**

Item	Area	SUID	Class	Submittal	Activity in $\mu\text{Ci/g}$		Total Activity	Averaged Samples		Worst Case Sample		Positive Results		Sample Total	
					Cs-137	Co-60		Cs-137 nf	Co-60 nf	Cs-137 nf	Co-60 nf	Co-60	Cs-137		Remarks
27	Cooling Tower Buffer South	8080031	2	5									0	0	20
28	Cooling Tower Buffer West	8080032	2	5									0	0	14
29	Cooling Tower Buffer East	8080033	2	5									0	0	16
30	Sewer Plant Asphalt	8090011	3	2									0	0	14
31	Tank Farm SW & Steam Sump	8100011	1	5	8.74E-06	1.51E-07	8.89E-06	9.83E-01	1.70E-02	9.10E-01	9.04E-02		1	18	20
32	Tank Farm SW & Steam Sump	8100012	1	5	4.22E-06		4.22E-06	1.00E+00	0.00E+00				0	12	40
33	Tank Farm NW Quadrant	8100021	1	5	5.00E-06		5.00E-06	1.00E+00	0.00E+00				0	14	17
34	Tank Farm NW Quadrant	8100022	1	5	3.83E-05	3.65E-07	3.87E-05	9.91E-01	9.44E-03	9.90E-01	9.98E-03		1	7	34
35	Tank Farm Quadrant (surface)	8100031	1	5	7.73E-06		7.73E-06	1.00E+00	0.00E+00				0	18	22
36	Tank Farm NE Quadrant (subsurface)	8100032	1	5	6.26E-08		6.26E-08	1.00E+00	0.00E+00				0	1	43
37	Tank Farm Trench 1	8100051	3	5	6.18E-07	1.33E-06	1.95E-06	3.17E-01	6.83E-01	2.30E-01	7.70E-01		3	2	67
38	Tank Farm Trench 1 surface	8100052	1	5	6.40E-06		6.40E-06	1.00E+00	0.00E+00				0	17	38
39	Tank Farm Trench 1 Subsurface	8100053	2	5	7.45E-08		7.45E-08	1.00E+00	0.00E+00				0	1	28
40	Diesel Fuel Oil Tank Pad Area	8320001	3	3	3.84E-08		3.84E-08	1.00E+00	0.00E+00				0	1	14
41	Industrial Area Railway	8340011	1	5								$\leq$ MDA	0	0	16
42	Industrial Area Railway	8340012	2	5								$\leq$ MDA	0	0	23
43	Railway External to the Industrial Area	8340021	3	5								$\leq$ MDA	0	0	16
44	RHUT & Aux Boiler Pad	8370001	1	5								$\leq$ MDA	0	0	18
45	Tank Farm/RHUT Subsurface soil	8370002	1	5								$\leq$ MDA	0	0	30
46	Transformer Yard	8390001	3	3	3.58E-07		3.58E-07	1.00E+00	0.00E+00				0	0	14
47	Barrel Farm Soil	8430011	1	3	1.39E-07		1.39E-07	1.00E+00	0.00E+00				0	1	16
48	Barrel Farm Berm	8430021	2	3	9.90E-08		9.90E-08	1.00E+00	0.00E+00				0	2	15
49	North Retention Basin	8480011	1	3	5.36E-05	1.34E-06	5.49E-05	9.76E-01	2.44E-02	9.17E-01	8.30E-02		8	29	29
50	South Retention Basin	8480012	1	3	5.12E-05	2.11E-06	5.33E-05	9.60E-01	3.96E-02	8.63E-01	1.37E-01		8	21	21
51	Retention Basin Surface Soil	8480017	3	3	1.68E-07		1.68E-07	1.00E+00	0.00E+00				0	3	14
52	Retention Basin Concrete Storage Area	8480018	2	3	4.07E-06	6.76E-07	4.75E-06	8.58E-01	1.42E-01	2.90E-01	7.10E-01		2	14	14
53	Retention Basin Buffer Zone	8480021	3	3	1.78E-07		1.78E-07	1.00E+00	0.00E+00				0	2	14

**Attachment 3**  
**Evaluation of Co-60 and Cs-137 Nuclide Fractions in FSS Soil Samples**

**Table 2.0**  
**Summary of Nuclide Fractions for All Land Survey Units**

Item	Area	SUID	Class	Submittal	Activity in $\mu\text{Ci/g}$		Total Activity	Averaged Samples		Worst Case Sample		Positive Results		Sample Total
					Cs-137	Co-60		Cs-137 $\text{nf}$	Co-60 $\text{nf}$	Cs-137 $\text{nf}$	Co-60 $\text{nf}$	Co-60	Cs-137	
54	Switch Yard Soil	8510001	3	3	4.42E-07	Co-60	4.42E-07	1.00E+00	0.00E+00			0	7	14
55	Switch Yard Pavement Switch Yard South (+Retention Basin Buffer)	8510002	2	3								0	0	14
56		8510005	3	5	2.44E-07		2.44E-07	1.00E+00	0.00E+00			0	2	14
57	CDS Cross-Tie	8990098	2	5								0	0	14
58	CDS Oily Water Separator	8991073	3	3								0	0	15
59	RHUT Pipe Trench	8991091	2	3	3.96E-06	4.49E-07	4.41E-06	8.98E-01	1.02E-01			1	33	53
60	RHUT 8' Piping	8991093	2	5								0	0	16

## Attachment 4

### Evaluation of Co-60 and Cs-137 Nuclide Fractions in FSS Surface Samples

Final Status Surveys of the Rancho Seco Nuclear Generating station (RSNGS) comprised 324 survey units. Two hundred sixty-four (264) of these survey units represented the associated structure surfaces. Table 1.0 presents the survey classes for these surface areas.

**Table 1.0**  
**Structure Survey Units by Class**

Survey Class	Survey Units
1	140
2	48
3	76
Total	264

This evaluation is intended to examine the surface sample results to determine the impact on radionuclide identities, nuclide fractions and any subsequent changes to the DCGL at the time of final survey. For structures and surfaces the associated DCGL is based on DTBD 05-015, Rancho Seco Nuclear Generating Station Surface Nuclide Fractions and DCGL. The gross beta DCGL: for surfaces was based on dose (25.0 mrem/y) and resulted in a gross beta DCGL of  $4.30E+04$  dpm/100 cm<sup>2</sup>. The evaluation of principle radionuclides for structures is based on ISOCS measurements that were acquired as FSS scan surveys. Evaluating the nuclide fraction based on scan data can bias the principle nuclides (Co-60 and Cs-137) fraction nuclide fraction because ISOCS measurements are typically performed using a "count to" value where the MDA values were selected based on a conservative criterion (usually 1000-2000 dpm/100 cm<sup>2</sup> for Co-60 and Cs-137, respectively).

Table 2.0 presents the 264 structure and surface survey units broken into Survey Class and categories of Gross Beta, <MDA and Other.

**Table 2.0**  
**Structure Survey Unit Groups**

Survey Class	Gross Beta	<MDA	Other
1	88	4	48
2	33	8	7
3	61	7	8
Total (264)	182	19	63

The Gross Beta category represents survey units where all FSS scan and direct measurement data were gross beta measurements.

The <MDA category represents survey units where scan or direct data measurements were acquired using gamma spectroscopy methods however, the results were below the minimum detectable activity. Data where the Co-60 and Cs-137 radionuclides are below the MDA value are biased and result in high nuclide fractions for Co-60. Items 205 and 208-210 which represent survey units F8260251 and F8260303-F8260305 illustrate this condition where the MDA nuclide fractions for these four survey units average 0.596 and 0.404 for Co-60 and Cs-137 respectively (See Table 4.0, Summary of Nuclide Fractions

#### Attachment 4

### Evaluation of Co-60 and Cs-137 Nuclide Fractions in FSS Surface Samples for Structure Survey Units).

The category designated “Other” represents survey units where gamma spectroscopy measurements were acquired for FSS scan measurements and in some instances direct measurements. Of the 63 survey units associated with this category, thirteen survey units contained positive results for both Co-60 and Cs-137. Table 3.0 presents the nuclide fractions associated with these survey units. Table 4.0 provides additional information regarding these survey units.

**Table 3.0**  
**Structure Nuclide Fraction**

Survey Unit ID	Nuclide Fraction	
	Co-60	Cs-137
F8120003	0.003	0.997
F8120004	0.070	0.930
F8120005	0.189	0.811
F8130042	0.225	0.775
F8130421	0.030	0.970
F8130451	0.061	0.939
F8130541	0.056	0.944
F8130631	0.093	0.907
F8130641	0.044	0.956
F8130731	0.047	0.953
F8130732	0.077	0.923
F8130761	0.085	0.915
F8260002	0.033	0.967
Average	0.078	0.922

Table 3.0 nuclide fractions result in averaged nuclide fractions for Co-60 and Cs-137 of 0.078 and 0.922, respectively. These fractions are very similar to the Co-60 and Cs-137 nuclide fraction average presented in DTBD 05-015 for all structure samples (0.108 and 0.892). The average Co -60 and Cs-137 nuclide fraction based on the seven samples submitted for vendor analysis for “Hard-to-Detect” nuclides was 0.0207 and 0.839.

Two survey units in Table 3.0 are indicative of higher nuclide fractions for Co-60. These Survey Units are F8120005 and F8130042. The data used to determine the nuclide fraction for Survey Unit F8120005 is based on a single Co-60 result of 7.32E+02 dpm/100cm<sup>2</sup> that was greater than the MDA value. The Cs-137 result is also low (3.15E+03 dpm/100cm<sup>2</sup>). Survey Unit F8130042 also exhibits a high Co-60 nuclide fraction which like the previous result is due to low activity. There were only two positive Co-60 and four positive Cs-137 results for 15 gamma spectroscopy locations.

To further evaluate the results of Table 3.0 the variation in the Co-60 nuclide fraction was examined on a dose basis using the same conditions as found in DTBD 05-015. The spreadsheet below is used to illustrate the basis.

## Attachment 4

### Evaluation of Co-60 and Cs-137 Nuclide Fractions in FSS Surface Samples

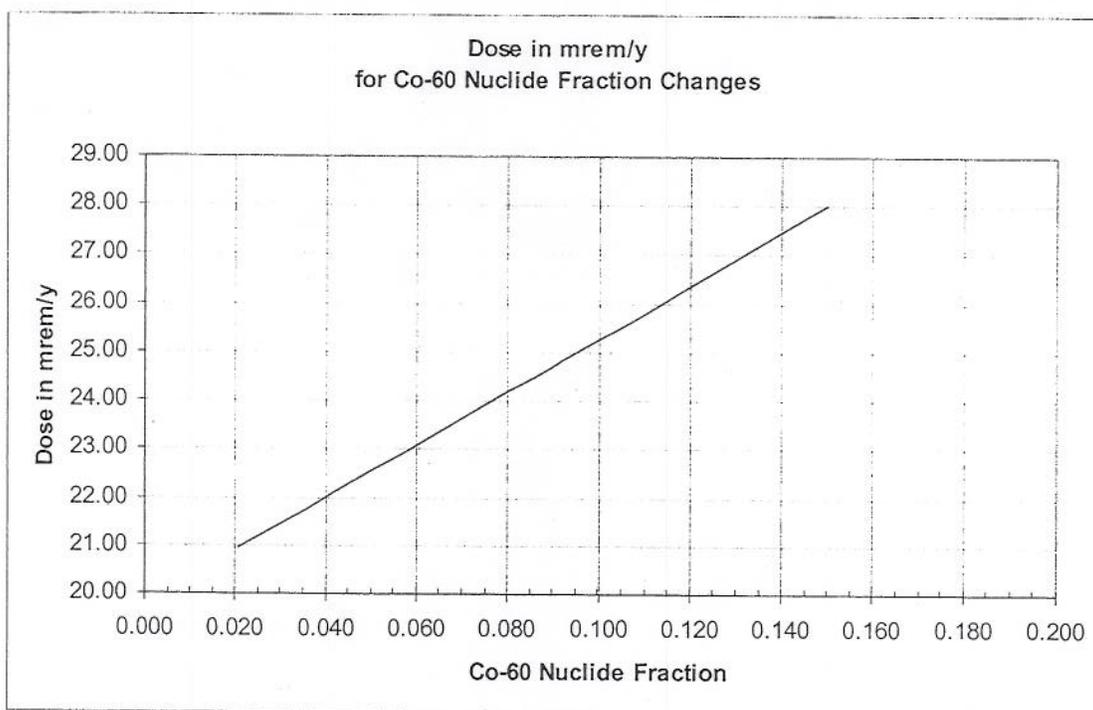
DTBD 05-015 mixture					
					mrem/y
					Dose For
					43000
Nuclide	mrem/y per		Normalized	1 dpm dose	dpm/100 cm <sup>2</sup>
	1.0 dpm/100 cm <sup>2</sup>	fraction	mean nf	Times nf	detectable
Co-60	1.645E-03	2.073E-02	2.073E-02	3.409E-05	1.553E+00
Sr-90	2.066E-04	8.348E-02	8.348E-02	1.725E-05	7.858E-01
Cs-134	1.142E-03	3.293E-04	3.293E-04	3.759E-07	1.713E-02
Cs-137	4.496E-04	8.392E-01	8.392E-01	3.773E-04	1.719E+01
Pu-238	7.310E-03		1.174E-03	8.579E-06	3.909E-01
Pu-239	8.197E-03		3.733E-04	3.060E-06	1.394E-01
Pu-240	8.197E-03		3.732E-04	3.059E-06	1.394E-01
Pu-241	1.374E-04		5.328E-02	7.319E-06	3.335E-01
Am-241c	8.361E-03		1.048E-03	8.761E-06	3.992E-01
sum			1.000E+00	total==>	2.095E+01
Avg. fraction		9.438E-01			

Co-60 nf 5.0% Cs-137 adjusted accordingly					
					mrem/y
					Dose For
					43000
Nuclide	mrem/y per		Normalized	1 dpm dose	dpm/100 cm <sup>2</sup>
	1.0 dpm/100 cm <sup>2</sup>	fraction	mean nf	Times nf	detectable
Co-60	1.645E-03	5.000E-02	5.000E-02	8.224E-05	3.747E+00
Sr-90	2.066E-04	8.348E-02	8.348E-02	1.725E-05	7.858E-01
Cs-134	1.142E-03	3.293E-04	3.293E-04	3.759E-07	1.713E-02
Cs-137	4.496E-04	8.102E-01	8.102E-01	3.643E-04	1.660E+01
Pu-238	7.310E-03		1.174E-03	8.579E-06	3.909E-01
Pu-239	8.197E-03		3.733E-04	3.060E-06	1.394E-01
Pu-240	8.197E-03		3.732E-04	3.059E-06	1.394E-01
Pu-241	1.374E-04		5.328E-02	7.319E-06	3.335E-01
Am-241c	8.361E-03		1.048E-03	8.761E-06	3.992E-01
sum			1.000E+00	total==>	2.255E+01
Avg. fraction		9.440E-01			

The spreadsheet titled DTBD 05-015 displays the average normalized nuclide fraction, the mrem/y per 1.0 dpm/100 cm<sup>2</sup> value and in the last column the mrem per year dose based on the 43,000 dpm/100 cm<sup>2</sup> DCGL for each nuclide. The total dose is also noted (20.95 mrem/y for Co-60 nuclide fraction of 0.0207). This is the same value provide in DTBD 05-015 where the standard error of the mean was 2.034. The second section of the spreadsheet is titled, "Co-60 nf 5.0% Cs-137 adjusted accordingly" and represents a change in the nuclide fraction for Co-60 and Cs-137. Where the Co-60 fraction is upwardly adjusted (in this case to 5.0%) the Cs-137 nuclide fraction is downwardly adjusted to maintain the mixture total fraction at 1.0. The Hard-to-Detect nuclide fractions were left unchanged. Note that the total dose for this spreadsheet is 22.55 mrem/y or an increase of about 7.6% from the original data. This extrapolation process was continued and is used to illustrate the total dose for different nuclide fractions of Co-60 (and subsequently Cs-137). The graph below illustrates the results.

## Attachment 4

### Evaluation of Co-60 and Cs-137 Nuclide Fractions in FSS Surface Samples



The DTBD results of 20.95 mrem/y are noted at the lower left side of the graph line and the value of 28.0 mrem/y for a Co-60 nuclide fraction of 0.15 (Cs-137 nuclide fraction of 0.71) is found at the upper right end of the graph line.

#### Conclusion

Based on the above graph the average nuclide fraction provide in Table 3.0 indicates a dose of about 24.0 mrem/y and is in good agreement with the original findings of DTBD 05-015. The nuclide fractions based on FSS are in reasonable agreement with the original data. Remediation actions typically reduce the nuclide concentrations for easy and hard to detect nuclides. The use of the original DTBD nuclide fractions for dose determination is conservative.

For all the structure survey units there was a total of 3,133 gamma spectroscopy locations of which there were 170 positive Co-60 results and 1,545 positive Cs-137 results. The positive results for Co-60 were 5.43 percent of the total and indicative that Cs-137 is the dominant nuclide in the residual radioactivity.

#### Explanation of Table 4.0 Columns

##### Column 1 – Item

The item number as the next sequential entry.

##### Column 2 – Area

The physical description or name of a survey unit

## Attachment 4

### Evaluation of Co-60 and Cs-137 Nuclide Fractions in FSS Surface Samples

**Column 3 - SUID**

The Survey Unit Identification Number (the F for final is omitted)

**Column 4 – Submittal**

The NRC report (submittal) grouping in which the Survey Unit was submitted (1-5)

**Column 5 – Cs-137 (activity in dpm/100 cm<sup>2</sup>)**

The averaged activity for the positive Cs-137 results

**Column 6 – Co-60 (activity in dpm/100 cm<sup>2</sup>)**

The averaged activity for the positive Co-60 results

**Column 7 – Other (activity in dpm/100 cm<sup>2</sup>)**

The averaged activity for the positive results of other nuclides

**Column 8 – Total activity (activity in dpm/100 cm<sup>2</sup>)**

The sum of columns 5, 6 and 7

**Column 9 – Cs-137 nf**

Cs-137 nuclide fraction, Column 5 divided by Column 8.

**Column 10 – Co-60 nf**

Co-60 nuclide fraction, Column 6 divided by Column 8

**Column 11 - Remarks**

Notes if the data is based on gross beta activity;  $\leq$ MDA where the gamma spectroscopy results are all MDA, or Other where some of the gamma spectroscopy results are positive values.

**Column 12 – Co-60**

Notes the number of Co-60 positive gamma spectroscopy results

**Column 13 – Cs-137**

Notes the number of Cs-137 positive gamma spectroscopy results

**Column 14 – Total # of Samples**

Notes the total number of gamma spectroscopy samples for the survey unit.

**Column 15 – Class**

Notes the Survey Unit Class (1, 2 or 3)

Attachment 4

Evaluation of Co-60 and Cs-137 Nuclide Fraction in FSS Surface Samples

Table 4.0  
Summary of Nuclide Fractions for Structure Survey Units

Item	Area	SUID	Submittal	All activity in dpm/100 cm <sup>2</sup>			Total		Averaged Sample nf			Remarks	Positive Results		Total # of Samples	class
				Cs-137	Co-60	Other	Activity	Cs-137	Co-60	Co-60	Cs-137		Co-60			
1	Receiving Warehouse Exterior	5010011	1									Gross β			3	
2	Receiving Warehouse Interior	5010012	1									Gross β			3	
3	PAP Building Exterior	8040011	1									Gross β			3	
4	PAP Building Interior	8040012	1									Gross β			3	
5	Administration Building Interior	8050011	1									Gross β			3	
6	Administration Building Exterior	8050012	1									Gross β			3	
7	East and West Cooling Towers	8080011	2									sMDA	0	0	190	3
8	Tank Farm CST, #2 & #3 pads	8100041	5	1.47E+03								Other	0	1	22	1
9	Tank Farm DRCST Pad	8100042	5									Gross β			2	
10	Tank Farm BWST Pad	8100043	5									Gross β			1	
11	Tank Farm H-3 Evaporator Pad	8100044	5									Gross β			2	
12	RX Building FSS Ring (+75 to 115')	8110111	5	2.99E+03								Other	0	146	180	1
13	RX Building FSS Ring (+25 to 75')	8110112	5	2.85E+03								Other	0	165	180	1
14	Rx Building FSS Ring (-27 to +25')	8110113	5	2.00E+03								Other	0	141	180	1
15	Rx Building Floor -27 Elevation	8110114	5	6.69E+02								Other	0	23	24	1
16	Rx Building Floor -27 Elevation (under vessel)	8110114	5	5.80E-01	1.05E+00	8.40E-01						Other	21	79	160	1
17	Reactor Building Dome Interior	8111571	1	1.24E+04	5.93E+03							Other	72		190	1
18	RX Building Tendon Gallery	8111591	5									Gross β				3
19	RX Building Exterior Dome	8113000	5									Gross β				3
20	RX Building (CTMT) Exterior	8113001	5									sMDA	0	0	40	3
21	Fuel Pool West Wall	8120001	5	1.48E+04								Other	0	40	40	1
22	Fuel Pool South Wall	8120002	5	1.14E+04								Other	0	25	27	1
23	Fuel Pool East Wall	8120003	5	6.80E+05	1.76E+03					6.82E+05	9.97E-01	Other	2	57	57	1
24	Fuel Pool North Wall	8120004	5	9.78E+05	7.36E+04					1.05E+06	9.30E-01	Other	16	89	89	1
25	Fuel Pool Floor	8120005	5	3.15E+03	7.34E+02					3.88E+03	8.11E-01	Other	1	54	68	1
26	Cask Catcher Pad	8120111	4									Gross β				1
27	Fuel Building Exterior	8120121	5	4.77E+03								Other	0	26	58	1
28	Fuel Building West Exterior Wall	8120131	4									sMDA	0	0	22	2

**Attachment 4**  
**Evaluation of Co-60 and Cs-137 Nuclide Fractions in FSS Surface Samples**

**Table 4.0**  
**Summary of Nuclide Fractions for Structure Survey Units**

Item	Area	SUID	Submittal	All activity in dpm/100 cm <sup>2</sup>		Total Other	Averaged Sample nf			Remarks	Positive Results		Total # of Samples	class
				Cs-137	Co-60		Activity	Cs-137	Co-60		Co-60	Cs-137		
29	Spent Fuel Building Exterior 3	8120141	5	1.95E+03						Other	0	15	24	3
30	Fuel Building East Exterior Wall	8120151	4	1.97E+03						Other	0	3	12	2
31	Fuel Building East Exterior Wall	8120161	4	3.88E+03						Other	1	14	16	1
32	Styrofoam Gap	8120171	5							Gross β				2
33	Styrofoam Gap	8120181	5							Gross β				1
34	Spent Fuel Building Floor El. 40'	8121001	5	2.79E+03						Other	0	33	42	1
35	Spent Fuel Building Lower Walls North	8121002	5	9.37E+02						Other	0	7	16	1
36	Spent Fuel Building Lower Walls South	8121003	5	1.03E+03						Other	0	2	9	1
37	Spent Fuel Building Upper Walls South	8121004	5	8.18E+02						Other	0	15	26	2
38	Spent Fuel Building Control Rod (CR) Pit	8121005	5							Gross β				3
39	Spent Fuel Building Upper Walls North	8121006	5	1.00E+03						Other	0	1	10	2
40	Aux Building Rm 1 Lower	8130011	2							Gross β				1
41	Aux Building Rm 1 Upper	8130021	2							Gross β				1
42	Aux Building Rm 1 -47' El. Ceiling	8130022	5	1.34E+03						Other	0	3	11	1
43	Aux Building Rm 2 Lower	8130031	2							Gross β				1
44	Aux Building Rm 2 -47' El. Upper Walls	8130041	5							Gross β				1
45	Aux Building Rm 2 Upper	8130042	2	5.01E+03	1.46E+03			6.47E+03	7.75E-01	2.25E-01	2	4	15	1
46	Aux Building Rm 3 Lower	8130051	3							Gross β				1
47	Aux Building Rm 3 Upper	8130061	3							Gross β				1
48	Aux Building Rm 2 Stairs	8130071	4							Gross β				1
49	Aux Building Rm 1 Stairs	8130081	4							Gross β				1
50	Aux Building Rms 56, 127, 138	8130091	4							Gross β				1
51	Aux Building Rm 10	8130101	4							Gross β				3
52	Aux Building Rm 10	8130102	4							Gross β				1
53	Aux Building Rm 11 Lower	8130111	2							MDA	0	0	4	2
54	Aux Building Rm 11 Upper	8130112	2							Gross β				1
55	Aux Building Rm 12 Lower	8130121	2							Gross β				2
56	Aux Building Rm 12 Upper	8130122	2							Gross β				1
57	Aux Building Rm 13	8130131	3							Gross β				1
58	Aux Building Rm 14	8130141	3							Gross β				1
59	Aux Building Rm 15	8130151	4	1.60E+03						Other	0	6	32	1

Attachment 4

Evaluation of Co-60 and Cs-137 Nuclide Fractions in FSS Surface Samples

Table 4.0  
Summary of Nuclide Fractions for Structure Survey Units

item	Area	SUID	Submittal	All activity in dpm/100 cm <sup>2</sup>		Total Other	Averaged Sample nf			Remarks	Positive Results		Total # of Samples	class
				Cs-137	Co-60		Activity	Cs-137	Co-60		Co-60	Cs-137		
60	Aux Building Rm 15	8130161	4	2.49E+03							0	13	28	1
61	Aux Building Rm 15	8130171	4	1.43E+03							0	8	33	1
62	Aux Building Rm 16	8130181	3											1
63	Aux Building Rm 17	8130191	3											1
64	Aux Building Rm 18 Lower	8130201	1											1
65	Aux Building Rm 18 Upper	8130211	1											1
66	Aux Building Rm 19 Lower	8130221	2											2
67	Aux Building Rm 19 Upper	8130222	2											1
68	Aux Building Rm 59 Lower	8130231	1											2
69	Aux Building Rm 59 Upper	8130232	1											1
70	Aux Building Rm 20 Lower	8130241	2											1
71	Aux Building Rm 20 Upper	8130251	2											1
72	Aux Building Rm 21 Lower	8130261	1											1
73	Aux Building Rm 21 Upper	8130271	1											2
74	Aux Building Rm 22 Lower	8130281	1											1
75	Aux Building Rm 22 Upper	8130291	1											2
76	Aux Building Rm 23 Lower	8130301	2											1
77	Aux Building Rm 23 Upper	8130311	2											2
78	Aux Building Rm 24	8130321	3											1
79	Aux Building Rm 25 Lower	8130331	2											1
80	Aux Building Rm 25 Upper	8130341	2											1
81	Aux Building Rm 26	8130351	3											1
82	Aux Building Rm 27	8130361	3											1
83	Aux Building Demin Cubicles 28,29,30, 31	8130401	1											1
84	Aux Building Demin Cubicles 32,33,34,35	8130411	1											1
85	Aux Building Rm 36	8130421	4	7.16E+00	2.22E-01			7.38E+00	9.70E-01	3.01E-02	10	21	21	1
86	Aux Building Rm 36	8130431	4	8.67E+03							0	35	37	1
87	Aux Building Rm 36	8130441	4											1
88	Aux Building Rm 36	8130451	4	2.57E+04	1.68E+03			2.74E+04	9.39E-01	6.14E-02	13	44	44	1
89	Aux Building Rm 36	8130461	4											1
90	Aux Building Rm 36	8130471	4	2.01E+04							4	48	49	1

Attachment 4

Evaluation of Co-60 and Cs-137 Nuclide Fractions in FSS Surface Samples

Table 4.0

Summary of Nuclide Fractions for Structure Survey Units

Item	Area	SUID	Submittal	All activity in dpm/100 cm <sup>2</sup>			Total	Averaged Sample nf			Remarks	Positive Results		Total # of Samples	class
				Cs-137	Co-60	Other		Activity	Cs-137	Co-60		Co-60	Cs-137		
91	Aux Building Rm 37 Lower	8130481	2								Gross β			1	
92	Aux Building Rm 37 Upper	8130491	2	1.19E+03							Other	0	2	56	
93	Aux Building Rm 38 Lower	8130501	2	3.67E+03							Other	0	8	14	
94	Aux Building Rm 38 Upper	8130511	2	1.88E+03							Other	0	14	56	
95	Aux Building Rm 39 Lower	8130521	2	5.74E+03							Other	2	14	14	
96	Aux Building Rm 39 Upper	8130531	2	1.67E+03							Other	0	28	56	
97	Aux Building Rm 40 Lower	8130541	2	2.17E+04	1.29E+03			2.30E+04	9.44E-01	5.60E-02	Other	3	18	18	
98	Aux Building Rm 40 Upper	8130551	2	3.02E+03							Other	0	53	56	
99	Aux Building Rm 41 Lower	8130561	2								Gross β			1	
100	Aux Building Rm 41 Upper	8130571	2	2.06E+03							Other	0	7	42	
101	Aux Building Rm 42 Lower	8130581	2								Gross β			1	
102	Aux Building Rm 42 Upper	8130591	2	1.77E+03							Other	0	15	53	
103	Aux Building Rm 43 Lower	8130601	1								Gross β			1	
104	Aux Building Rm 43 Upper	8130611	1								Gross β			1	
105	Aux Building Rm 44	8130621	1								Gross β			1	
106	Aux Building Rm 45	8130631	1	3.63E+03	3.73E+02			4.01E+03	9.07E-01	9.31E-02	Other	1	10	10	
107	Aux Building Rm 46	8130641	1	3.36E+04	1.54E+03			3.51E+04	9.56E-01	4.38E-02	Other	5	20	20	
108	Aux Building Rm 47	8130651	1								Gross β			1	
109	Aux Building Rm 48	8130661	1	6.05E+03							Other	0	7	7	
110	Aux Building Rm 49	8130671	1	1.10E+04							Other	0	6	6	
111	Aux Building Rm 50 Lower	8130681	1								Gross β			1	
112	Aux Building Rm 50 Upper	8130682	1								Gross β			2	
113	Aux Building Rm 51	8130691	4								Gross β			1	
114	Aux Building Rm 51	8130701	4								Gross β			1	
115	Aux Building Rm 51	8130711	4								Gross β			1	
116	Aux Building Rm 51	8130721	4								εMDA	0	0	8	
117	Aux Building Rm 51e	8130731	5	1.12E+05	5.57E+03			1.18E+05	9.53E-01	4.74E-02	Other	2	44	44	
118	Aux Building Rm 51	8130732	4	7.82E+03	6.52E+02			8.47E+03	9.23E-01	7.70E-02	Other	8	19	19	
119	Aux Building Rm 52	8130741	4	1.33E+04							Other	0	21	21	
120	Aux Building Rm 52	8130751	4	1.07E+04							Other	0	14	15	
121	Aux Building Rm 52	8130761	4	5.68E+04	5.30E+03			6.21E+04	9.15E-01	8.53E-02	Other	1	8	8	

Attachment 4

Evaluation of Co-60 and Cs-137 Nuclide Fractions in FSS Surface Samples

Table 4.0  
Summary of Nuclide Fractions for Structure Survey Units

Item	Area	SUID	Submittal	All activity in dpm/100 cm <sup>2</sup>		Total	Averaged Sample nf			Positive Results		Total # of Samples	class
				Cs-137	Co-60		Activity	Cs-137	Co-60	Co-60	Cs-137		
122	Aux Building Rm 52	8130771	4	2.30E+04		Other				0	8	8	1
123	Aux Building Rm 53 Lower	8130781	1			Gross β							1
124	Aux Building Rm 53 Upper	8130782	1			Gross β							2
125	Aux Building Rms 54,55	8130811	2			Gross β							3
126	Aux Building Rms 102, 103	8130861	4			Gross β							2
127	Aux Building Rm 106	8130862	4			Gross β							1
128	Aux Building Rms 104-135	8130881	3			Gross β							3
129	Aux Building Rm 107	8130931	4			Gross β							2
130	Aux Building Rms 109, 110	8130941	4	3.84E+03		Gross β				0	8	19	2
131	Aux Building Rm 109	8130942	5			Other							2
132	Aux Building Rm 112	8130991	3			Gross β							1
133	Aux Building Rm 111	8131001	3			Gross β							1
134	Aux Building Rm 113	8131011	3			Gross β				0	0	5	2
135	Aux Building Rm 114, 136, 137	8131021	3			≤MDA							2
136	Aux Building Rm 115, 203, 315	8131031	3	2.21E+02		Gross β				0	5	6	2
137	Aux Building Rm 117W	8131041	4			Other							2
138	Aux Building Rm 117E	8131051	4			≤MDA				0	0	38	2
139	Aux Building Rm 130	8131191	2			≤MDA				0	0	41	2
140	Aux Building Rms 131.222.345	8131201	2			Gross β							2
141	Aux Building Rm 132	8131211	5			Gross β							3
142	Aux Building Rm 132	8131212	5			Gross β							2
143	Aux Building Rm 133	8131221	4			Gross β							1
144	Aux Building Rm 133	8131222	4			Gross β							1
145	Aux Building Rm 134	8131231	4			Gross β							2
146	Aux Building Mezzanine Roof	8131311	3			Gross β							1
147	Aux Building Rms 202,204	8131341	2			≤MDA				0	0	8	3
148	Aux Building Rm 206	8131351	3			Gross β							3
149	Aux Building Rm 207	8131361	3			Gross β							3
150	Aux Building Rm 208, 211 Lower	8131371	5			Gross β							3
151	Aux Building Rm 208, 211 Uppers	8131372	5			Gross β							1
152	Aux Building Rm 209	8131381	4			Gross β				1	1	5	2
						≤MDA							1

Attachment 4

Evaluation of Co-60 and Cs-137 Nuclide Fractions in FSS Surface Samples

Table 4.0  
Summary of Nuclide Fractions for Structure Survey Units

Item	Area	SUID	Submittal	All activity in dpm/100 cm <sup>2</sup>			Total Other	Averaged Sample nf			Remarks	Positive Results		Total # of Samples	class
				Cs-137	Co-60			Activity	Cs-137	Co-60		Co-60	Cs-137		
153	Aux Building Rm 209	8131382	4								≤MDA			1	
154	Aux Building Rm 210	8131402	4								Gross β			2	
155	Aux Building Rm 210	8131403	4								Gross β			1	
156	Aux Building Rms 212-226 fan pedestals	8131411	4								Gross β			3	
157	Aux Building Roof	8131561	4								≤MDA	0	0	42	
158	Aux Building Non-Controlled Rooms	8131601	2		2.14E+03						Gross β			3	
159	Aux Building Rms 309-317, 350 Lowers	8131691	5								Gross β			2	
160	Aux Building Rms 309-317, 350 Uppers	8131692	5								Gross β			2	
161	Aux Building Rm 319	8131781	4								Gross β			3	
162	Aux Building Rm 319	8131782	4								Gross β			1	
163	Aux Building Rm 320 Lower	8131791	4								Gross β			2	
164	Aux Building Rm 320 Upper, Rm 321	8131792	4								Gross β			2	
165	Aux Building Rms 322,-324, 351	8131811	4								Gross β			3	
166	Aux Building Rms 322,-324, 351	8131812	4								Gross β			3	
167	Aux Building Rm 346, Elevator	8132051	4								Gross β			3	
168	Aux Building Exterior	8132131	4								Gross β			3	
169	Aux Building Exterior 20' El. Steam Sup. St.	8132132	5								Gross β			2	
170	Aux Building Exterior 0' El. Steam Sup. St.	8132133	5								Gross β			2	
171	Aux Building Exterior 20' El. Steam Sup. St.	8132134	5								Gross β			1	
172	Aux Building Exterior	8132141	4		9.95E+02						Gross β			1	
173	Aux Building Exterior, South Wall	8132142	4		1.01E+03						Other	0	1	20	
174	Aux Building Exterior Walls East	8132143	5								Other	0	1	9	
175	Aux Building Exterior Walls North	8132144	5								≤MDA	0	0	14	
176	T&R Building Exterior	8140002	1								≤MDA	0	0	6	
177	T & R Breezeway	8140031	5								Gross β			3	
178	T & R Building Interior	8140010	1								Gross β			3	
179	Nuclear Service Electrical Building Interior	8150011	1								Gross β			3	
180	Nuclear Service Electrical Building Exterior	8150021	1								Gross β			3	
181	Diesel Generator Building Interior	8170011	1								Gross β			3	
182	Diesel Generator Building Exterior	8170021	1								Gross β			3	
183	Water Treatment Building Interior	8210001	1								Gross β			3	

Attachment 4

Evaluation of Co-60 and Cs-137 Nuclide Fractions in FSS Surface Samples

Table 4.0  
Summary of Nuclide Fractions for Structure Survey Units

Item	Area	SUID	Submittral	All activity in dpm/100 cm <sup>2</sup>			Total Other	Averaged Sample nf			Remarks	Positive Results		Total # of Samples	class
				Cs-137	Co-60	Other		Activity	Cs-137	Co-60		Co-60	Cs-137		
184	Water Treatment Building Exterior	8210002	1								Gross β			3	
185	Chlorine Building Interior	8220011	1								Gross β			3	
186	Chlorine Building Exterior	8220021	1								Gross β			3	
187	Intake Structure	8230001	3								Gross β			3	
188	Primary Cooling Water (PCW) Intake	8240001	2								Gross β			2	
189	Condenser Pit Sump Excavation	8260001	2	1.45E+03							Other	1	4	9	
190	Turbine Building Polisher Sump	8260002	2	4.76E+00	1.60E-01			4.92E+00	9.67E-01	3.25E-02	Other	4	10	12	
191	Turbine Building, Condensate Pump Pit Ctrl	8260004	5	8.30E+01	6.70E+01			1.50E+02	5.53E-01	4.47E-01	≤MDA	0	0	3	
192	Turbine Building, Condensate Pump Pit South	8260006	5								Gross β			1	
193	Turbine Building, West HP Pit	8260008	5								Gross β			1	
194	Turbine Building, Condensate Pump Pit North	8260010	5								Gross β			1	
195	Turbine Building Lube Oil Pit	8260011	5								Gross β			1	
196	Turbine Building, MFP Pit Sump	8260031	5								Gross β			1	
197	Turbine Building, Main Feed Pump Area	8260032	5								Gross β			2	
198	Turbine Building Grade Level North	8260131	5	2.34E+03							Other	0	33	59	
199	Turbine Building Grade Level South	8260141	5	1.94E+03							Other	0	14	47	
200	Turbine Building Grade Level South Class 1	8260151	5								Gross β			1	
201	Turbine Building Grade Level North	8260161	5								Gross β			1	
202	Turbine Building Grade Level North Class 1	8260171	5								Gross β			1	
203	Turbine Building Mezzanine Interior Walls	8260201	5	6.53E+02							Gross β			1	
204	Turbine Building Structural Steel	8260202	5								Other	0	3	18	
205	Turbine Building North Laydown Area	8260251	5	1.11E+03	7.12E+02			1.82E+03	6.09E-01	3.91E-01	Gross β			3	
206	Turbine Building South Laydown Area & Sump	8260261	5	8.11E+02							≤MDA	0	0	6	
207	Turbine Building Exterior	8260302	5	7.23E+02							Other	0	3	17	
208	Turbine Building Deck, North	8260303	4	9.19E+02	6.38E+02			1.56E+03	5.90E-01	4.10E-01	Other	0	6	68	
209	Turbine Building Deck, Center	8260304	4	8.65E+02	5.76E+02			1.44E+03	6.00E-01	4.00E-01	≤MDA	0	0	42	
210	Turbine Building Deck, South	8260305	4	8.88E+02	627			1.52E+03	5.86E-01	4.14E-01	≤MDA	0	0	57	
211	Turbine Building S. Turbine Pedestal	8261001	2	1.01E+03							Other	0	2	22	
212	Turbine Building LP Turbine Pedestal	8261002	3	1.28E+03							Other	0	2	25	
213	Turbine Building HP Turbine Pedestal 1	8261003	5	1.14E+03							Other	0	2	12	
214	Turbine Building HP Turbine Pedestal 2	8261004	5								Other	0	18	36	
											Gross β			1	

Attachment 4

Evaluation of Co-60 and Cs-137 Nuclide Fractions in FSS Surface Samples

Table 4.0  
Summary of Nuclide Fractions for Structure Survey Units

item	Area	SUID	Submittal	All activity in dpm/100 cm <sup>2</sup>		Total Other	Averaged Sample nf			Remarks	Positive Results		Total # of Samples	class
				Cs-137	Co-60		Activity	Cs-137	Co-60		Co-60	Cs-137		
215	Turbine Building HP Turbine Pedestal 3	8261005	5								Gross β		2	
216	Microwave Building Interior	8310001	1								Gross β		3	
217	Microwave Building Exterior	8310002	1								Gross β		2	
218	Warehouse B Interior	8330001	1								Gross β		3	
219	Warehouse B Exterior	8330002	1								Gross β		2	
220	Warehouse A Interior	8400001	1								Gross β		3	
221	Warehouse A Exterior	8400002	1								Gross β		3	
222	Discharge Boxes/ Manholes	8480013	2								Gross β		1	
223	Discharge Boxes/ Manholes	8480014	2								Gross β		1	
224	Discharge Boxes/ Manholes	8480015	2								Gross β		1	
225	Discharge Boxes/ Manholes	8480016	2								Gross β		1	
226	Solidification Pad	8500011	2								Gross β		1	
227	Solidification Pad	8500012	2								Gross β		1	
228	Solidification Pad	8500013	2								Gross β		1	
229	Solidification Pad	8500014	2								Gross β		1	
230	Switchyard Building Exterior	8510003	1								Gross β		3	
231	Switchyard Building Interior	8510004	1								Gross β		3	
232	Machine Shop Interior	8520001	1								Gross β		3	
233	Machine Shop Exterior	8520002	1								Gross β		3	
234	Misc Small Buildings (POL)	8540001	4								Gross β		3	
235	Misc Small Buildings (Lawn Maintenance)	8540002	4								Gross β		3	
236	Secondary Alarm Station Building Exterior	8560001	4								Gross β		3	
237	Secondary Alarm Station Building Interior	8560002	4								Gross β		3	
238	Subsurface Vaults	8570001	4								Gross β		3	
239	Aux Feedwater Piping	8990021	4								Gross β		3	
240	CDS Clean Drain Piping	8990054	3								Gross β		3	
241	Component Cooling Water Piping	8990060	2								Gross β		3	
242	CDS Turbine Building Drains	8990071	3								Gross β		1	
243	CDS Turbine Building Drains	8990072	3								Gross β		1	
244	CDS Turbine Building Drains	8990073	3								Gross β		1	
245	Turbine Building HP Turbine Pedestal Drains	8990074	5								Gross β		1	

Attachment 4

Evaluation of Co-60 and Cs-137 Nuclide Fractions in FSS Surface Samples

Table 4.0  
Summary of Nuclide Fractions for Structure Survey Units

Item	Area	SUID	Submittal	All activity in dpm/100 cm <sup>2</sup>			Total Other	Averaged Sample nf			Remarks	Positive Results		Total # of Samples	class
				Cs-137	Co-60	Other		Activity	Cs-137	Co-60		Co-60	Cs-137		
46	Clean Drains To Effluent	8990091	2								Gross β			3	
47	Decay Heat Piping	8990111	5								Gross β			1	
48	Main Condensate Piping	8990281	2								Gross β			3	
49	Main Circ Water Piping	8990291	3								Gross β			3	
50	Nitrogen Piping	8990321	3								Gross β			2	
51	Nuclear Service Water Piping	8990351	3								Gross β			3	
52	Rx Drains	8990401	5								Gross β			1	
53	Radwaste Piping	8990421	4								Gross β			1	
54	Radwaste Piping	8990422	4								Gross β			1	
55	Radwaste Piping	8990423	4								Gross β			1	
56	Service Air Piping	8990431	2								Gross β			3	
57	Spent Fuel Pool Piping	8990441	5								Gross β			1	
58	Service Water Piping	8990471	3								Gross β			3	
59	Waste Gas Piping	8990501	2								Gross β			3	
60	Carbon Dioxide Piping	8990511	3								Gross β			2	
61	Acid Waste Piping	8990521	3								Gross β			1	
62	CDS Oily Water Separator	8991071	2								Gross β			3	
63	CDS Oily Water Separator	8991072	2								Gross β			3	
64	CDS RHUT Piping	8991092	2								Gross β			1	

**California Energy Commission**  
**Nuclear Power Plant Data for Rancho Seco**

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**Attachment 2**

**Submittals to the NRC Regarding  
Decommissioning Funding Status**



**SMUD**

SACRAMENTO MUNICIPAL UTILITY DISTRICT □ 6201 S Street, P.O. Box 15830, Sacramento CA 95852-1830, (916) 452-3211  
AN ELECTRIC SYSTEM SERVING THE HEART OF CALIFORNIA

MPC&D 06-029

March 15, 2006

U.S. Nuclear Regulatory Commission  
ATTN: Document Control Desk  
Washington, DC 20555

Docket No. 50-312  
Rancho Seco Nuclear Generating Station  
License No. DPR-54

**RANCHO SECO REPORT ON DECOMMISSIONING FUNDING STATUS**

Attention: John Hickman

As required by 10 CFR 50.75(f)(1), we are submitting this report on the status of decommissioning funding for Rancho Seco.

**Background**

Rancho Seco began commercial power operation in April 1975, and shutdown permanently in June 1989. In 1991, SMUD submitted the proposed Decommissioning Plan for Rancho Seco, along with a Revised Financial Assurance Plan. The NRC approved the Decommissioning Plan in March 1995. Due to revisions to 10 CFR 50.82, SMUD submitted the Post Shutdown Decommissioning Activities Report for Rancho Seco in March 1997. Rancho Seco has been undergoing plant dismantlement since February 1997.

The current plan is to fully fund the decommissioning trust fund by 2008. However, based upon the lack of a radioactive waste disposal facility acceptable to the District, SMUD plans to store some Class B and C radioactive waste in our Interim Onsite Storage Building beyond 2008, awaiting disposal at a later date.

**Decommissioning Financial Assurance Method and Trust Fund Status**

SMUD had maintained an internal decommissioning fund since the early 1980s. In 1991, SMUD transferred \$90 million from the internal fund into an "External Sinking Decommissioning Trust Fund" currently maintained by Wells Fargo Bank. Table 1 shows the amount of the trust fund annual contribution and disbursements for the years 1991 through 2005. The total disbursements between 1994 and 2005 are \$365.3 million. At the end of 2005, the trust fund contained \$84.2 million.

**TABLE 1**

YEAR	ANNUAL CONTRIBUTION	ANNUAL DISBURSAL
1991	\$90 Million <sup>1</sup>	\$0
1992	\$12 Million	\$0
1993	\$12 Million	\$0
1994	\$12 Million	\$35,327,974
1995	\$15 Million	\$24,375,399
1996	\$15.5 Million	\$17,950,000
1997	\$16.5 Million	\$18,400,000
1998	\$17.5 Million	\$21,920,000
1999	\$18.5 Million	\$34,693,319
2000	\$18.5 Million	\$45,847,250
2001	\$24.5 Million	\$36,213,871
2002	\$27 Million	\$40,869,137
2003	\$27 Million	\$23,886,458
2004	\$27 Million	\$31,360,571
2005	\$27 Million	\$34,446,586

**Cost Estimate**

TLG Services, Inc. performed the initial cost estimate in 1991, and then performed biennial updates in 1993, 1995, and 1997. When SMUD began plant dismantlement in 1997, we also began performing annual updates to the decommissioning cost estimate.

SMUD staff performed the 1998 update. TLG performed the 1999 and 2000 annual updates. SMUD staff began performing the annual update beginning with the 2001 cost estimate update with TLG providing quality reviews. The total decommissioning costs are now estimated to be \$534.1 million. The portion of this total that is not NRC-defined decommissioning activities (e.g., non-radiological dismantlement, spent fuel storage, etc.) is \$131.5 million, most of which is related to dry fuel storage at our Independent Spent Fuel Storage Installation (ISFSI).

Table 2 shows the history of estimated decommissioning costs for license termination. The estimated costs include spent fuel storage through 2008, but do not include site restoration costs.

---

<sup>1</sup> Initial contribution

**TABLE 2**

<b>YEAR OF COST STUDY</b>	<b>ESTIMATED DECOMMISSIONING COST</b>
1991	\$281 Million
1993	\$365 Million
1995	\$441 Million
1997	\$452 Million
1998	\$459 Million (1997 dollars)
1999	\$458 Million
2000	\$495 Million
2001	\$504 Million
2002	\$519 Million
2003	\$524.3 Million
2004	\$529.7 Million
2005	\$534.1 Million

### **Accumulation of Funds**

SMUD plans to accumulate funds in the external trust fund, at the rate of \$27 million per year, through 2008. Based on the current decommissioning cost estimate and funding rate, collecting funds through 2008 will provide sufficient funds to complete decommissioning Rancho Seco and terminate the 10 CFR Part 50 license.

As stated above, SMUD expects to store some Class B and C radioactive waste in our Interim Onsite Storage Building beyond 2008. Long term storage and disposal costs of the Class B and C radioactive waste are included in the decommissioning costs.

Funding to store the spent nuclear fuel at the ISFSI beyond 2008 is not included in the decommissioning fund. SMUD will fund site restoration separately, after the completion of dismantlement activities.

### **Certification of Financial Assurance**

Certification is hereby made that financial assurance is being provided through an external sinking fund in the amount of \$168.8 million to complete decommissioning at Rancho Seco and terminate the 10 CFR Part 50 license.

### **Adjustments to Cost Estimate and Trust Fund**

With active decommissioning in progress, we now perform annual updates to the cost estimate. Historically, TLG performed the cost estimate updates as requested by SMUD. However, after several years of decommissioning experience, and with relatively long-term contracts in place, SMUD staff began performing the annual cost estimate update in 2001, with TLG providing an independent quality review. The current cost update increase is due to inflation.

### **Administration of the Decommissioning Fund**

The trust fund holdings were reviewed at the end of 2005, and the trust fund contained \$84.2 million. As indicated in Table 1, the annual contribution amount is reviewed and adjusted, as appropriate, to meet the needs of the total estimated decommissioning cost. SMUD will continue to monitor the adequacy of the annual contribution to assure that adequate funds will be available to complete decommissioning and terminate the 10 CFR Part 50 license.

### **Assumptions Regarding Rates of Trust Fund Escalation and Earnings**

SMUD has made the following assumptions regarding trust fund escalation and earnings. Based on historical portfolio performance, SMUD has estimated the rate of return at 4.0%. The decommissioning cost escalation rate is currently estimated at 2.5%. This rate is within an established range and congruent with rates used for other business plans at SMUD. Therefore, SMUD's estimated real rate of return is 1.5%.

### **Contractual Obligations**

There are no contractual obligations associated with SMUD's financial assurance plan or the operation of the decommissioning trust fund.

### **Modifications to Financial Assurance Method**

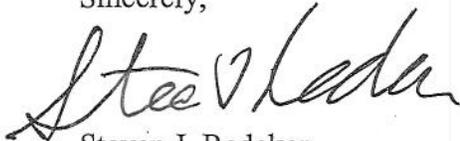
In 1991, SMUD submitted its Financial Assurance Plan to the NRC describing the use of an external sinking fund. There have been no significant modifications to SMUD's external sinking fund since our initial submittal.

### **Material Changes to the Trust Fund Agreement**

In July 2003, the trust fund moved from Bankers Trust, N.Y. to Wells Fargo Bank, N.A.

If you or members of your staff have questions requiring additional information or clarification, please contact Bob Jones at (916) 732-4843.

Sincerely,



Steven J. Redeker  
Manager, Plant Closure and Decommissioning

Cc: B.S. Mallett, NRC, Region IV, Arlington



**SMUD**

SACRAMENTO MUNICIPAL UTILITY DISTRICT □ P. O. Box 15830, Sacramento CA 95852-1830, (916) 452-3211  
AN ELECTRIC SYSTEM SERVING THE HEART OF CALIFORNIA

MPC&D 07-006

February 1, 2007

U.S. Nuclear Regulatory Commission  
ATTN: Document Control Desk  
Washington, DC 20555

Docket No. 50-312  
Rancho Seco Nuclear Generating Station  
License No. DPR-54

**RANCHO SECO REPORT ON DECOMMISSIONING FUNDING STATUS**

Attention: John Hickman

As required by 10 CFR 50.75(f)(1), we are submitting this report on the status of decommissioning funding for Rancho Seco.

**Background**

Rancho Seco began commercial power operation in April 1975, and shutdown permanently in June 1989. In 1991, SMUD submitted the proposed Decommissioning Plan for Rancho Seco, along with a Revised Financial Assurance Plan. The NRC approved the Decommissioning Plan in March 1995. Due to revisions to 10 CFR 50.82, SMUD submitted the Post Shutdown Decommissioning Activities Report for Rancho Seco in March 1997. Rancho Seco has been undergoing plant dismantlement since February 1997.

The current plan is to fully fund the decommissioning trust fund by 2008. However, based upon the lack of a radioactive waste disposal facility acceptable to the District, SMUD plan to store some Class B and C radioactive waste in our Interim Onsite Storage Building beyond 2008, awaiting disposal at a later date.

**Decommissioning Financial Assurance Method and Trust Fund Status**

SMUD had maintained an internal decommissioning fund since the early 1980s. In 1991, SMUD transferred \$90 million from the internal fund into an "External Sinking Decommissioning Trust Fund" currently maintained by Wells Fargo Bank. Table 1 shows the amount of the trust fund annual contribution and disbursements for the years 1991 through 2006. The total disbursements between 1994 and 2006 are \$397.2 million. At the end of 2006 the trust fund contained \$82.8 million.

**TABLE 1**

YEAR	ANNUAL CONTRIBUTION	ANNUAL DISBURSAL
1991	\$90 Million <sup>1</sup>	\$0
1992	\$12 Million	\$0
1993	\$12 Million	\$0
1994	\$12 Million	\$35,327,974
1995	\$15 Million	\$24,375,399
1996	\$15.5 Million	\$17,950,000
1997	\$16.5 Million	\$18,400,000
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2000	\$18.5 Million	\$45,847,250
2001	\$24.5 Million	\$36,213,871
2002	\$27 Million	\$40,869,137
2003	\$27 Million	\$23,886,458
2004	\$27 Million	\$31,360,571
2005	\$27 Million	\$34,446,586
2006	\$27 Million	\$31,901,184

**Cost Estimate**

TLG Services, Inc. performed the initial cost estimate in 1991, and then performed biennial updates in 1993, 1995, and 1997. When SMUD began plant dismantlement in 1997, we also began performing annual updates to the decommissioning cost estimate.

SMUD staff performed the 1998 update. TLG performed the 1999 and 2000 annual updates. SMUD staff began performing the annual update beginning with the 2001 cost estimate update through the 2005 cost estimate update with TLG providing quality reviews. The 2006 cost estimate is the first to be finalized without outside agency review. With approximately 2 years left for the project, major dismantlement projects are near completion and remaining project scope quantified, staff has determined that outside review would not provide additional confidence in the cost basis. The total decommissioning costs are now estimated to be \$538.1 million. The portion of this total that is not NRC-defined decommissioning activities (e.g., non-radiological dismantlement, spent fuel storage, etc.) is \$132.1 million, most of which is related to dry fuel storage at our Independent Spent Fuel Storage Installation (ISFSI).

Table 2 shows the history of estimated decommissioning costs for license termination. The estimated costs include spent fuel storage through 2008, but do not include site restoration costs.

---

<sup>1</sup> Initial contribution

**TABLE 2**

<b>YEAR OF COST STUDY</b>	<b>ESTIMATED DECOMMISSIONING COST</b>
1991	\$281 Million
1993	\$365 Million
1995	\$441 Million
1997	\$452 Million
1998	\$459 Million (1997 dollars)
1999	\$458 Million
2000	\$495 Million
2001	\$504 Million
2002	\$519 Million
2003	\$524.3 Million
2004	\$529.7 Million
2005	\$534.1 Million
2006	\$538.1 Million

### **Accumulation of Funds**

SMUD plans to accumulate funds in the external trust fund, at the rate of \$27 million per year, through 2008. Based on the current decommissioning cost estimate and funding rate, collecting funds through 2008 will provide sufficient funds to complete decommissioning Rancho Seco and terminate the 10 CFR Part 50 license.

As stated above, SMUD expects to store some Class B and C radioactive waste in our Interim Onsite Storage Building beyond 2008. Long term storage and disposal costs of the Class B and C radioactive waste are included in the decommissioning costs.

Funding to store the spent nuclear fuel at the ISFSI beyond 2008 is not included in the decommissioning fund. SMUD will fund site restoration separately, after the completion of dismantlement activities.

### **Certification of Financial Assurance**

Certification is hereby made that financial assurance is being provided through an external sinking fund in the amount of \$140.9 million to complete decommissioning at Rancho Seco and terminate the 10 CFR Part 50 license.

### **Adjustments to Cost Estimate and Trust Fund**

With active decommissioning in progress, we now perform annual updates to the cost estimate. Historically, TLG performed the cost estimate updates as requested by SMUD. However, after several years of decommissioning experience, and with relatively long-

term contracts in place, SMUD staff began performing the annual cost estimate update in 2001. The current cost update increase is due to inflation.

### **Administration of the Decommissioning Fund**

The trust fund holdings were reviewed at the end of 2006, and the trust fund contained \$82.8 million. As indicated in Table 1, the annual contribution amount is reviewed and adjusted as appropriate, to meet the needs of the total estimated decommissioning cost. SMUD will continue to monitor the adequacy of the annual contribution to assure that adequate funds will be available to complete decommissioning and terminate the 10 CFR Part 50 license.

### **Assumptions Regarding Rates of Trust Fund Escalation and Earnings**

SMUD has made the following assumptions regarding trust fund escalation and earnings. Based on historical portfolio performance, SMUD has estimated the rate of return at 5.0%. The decommissioning cost escalation rate is currently estimated at 2.5%. This rate is within an established range and congruent with rates used for other business plans at SMUD. Therefore, SMUD's estimated real rate of return is 2.5%.

### **Contractual Obligations**

There are no contractual obligations associated with SMUD's financial assurance plan or the operation of the decommissioning trust fund.

### **Modifications to Financial Assurance Method**

In 1991, SMUD submitted its Financial Assurance Plan to the NRC describing the use of an external sinking fund. There have been no significant modifications to SMUD's external sinking fund since our initial submittal.

### **Material Changes to the Trust Fund Agreement**

In July 2003, the trust fund moved from Bankers Trust, N.Y. to Wells Fargo Bank, N.A.

If you or members of your staff have questions requiring additional information or clarification, please contact Bob Jones at (916) 732-4843.

Sincerely,



Steven J. Redeker  
Manager, Plant Closure and Decommissioning

Cc: B.S. Mallett, NRC, Region IV, Arlington



**SMUD**

SACRAMENTO MUNICIPAL UTILITY DISTRICT  
The Power To Do More.<sup>SM</sup>

P.O. Box 15830, Sacramento, CA 95852-1830; 1-888-742-SMUD (7683)

MPC&D 08-006A

February 5, 2008

U.S. Nuclear Regulatory Commission  
ATTN: Document Control Desk  
Washington, DC 20555

Docket No. 50-312  
Rancho Seco Nuclear Generating Station  
License No. DPR-54

**RANCHO SECO REPORT ON DECOMMISSIONING FUNDING STATUS**

Attention: John Hickman

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**Background**

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The current plan is to fully fund the decommissioning trust fund by the end of 2008. However, based upon the lack of a radioactive waste disposal facility acceptable to the District, SMUD plans to store some Class B and C radioactive waste in our Interim Onsite Storage Building beyond 2008, awaiting disposal at a later date.

**Decommissioning Financial Assurance Method and Trust Fund Status**

SMUD had maintained an internal decommissioning fund since the early 1980s. In 1991, SMUD transferred \$90 million from the internal fund into an "External Sinking Decommissioning Trust Fund" currently maintained by Wells Fargo Bank. Table 1 shows the amount of the trust fund annual contribution and disbursements for the years 1991 through 2007. The total disbursements between 1994 and 2007 are \$441.8 million. At the end of 2007 the trust fund contained \$69.8 million.

**TABLE 1**

YEAR	ANNUAL CONTRIBUTION	ANNUAL DISBURSAL
1991	\$90 Million <sup>1</sup>	\$0
1992	\$12 Million	\$0
1993	\$12 Million	\$0
1994	\$12 Million	\$35,327,974
1995	\$15 Million	\$24,375,399
1996	\$15.5 Million	\$17,950,000
1997	\$16.5 Million	\$18,400,000
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2003	\$27 Million	\$23,886,458
2004	\$27 Million	\$31,360,571
2005	\$27 Million	\$34,446,586
2006	\$27 Million	\$31,901,184
2007	\$27 Million	\$44,614,663

**Cost Estimate**

TLG Services, Inc. performed the initial cost estimate in 1991, and then performed biennial updates in 1993, 1995, and 1997. When SMUD began decommissioning in 1997, we also began performing annual updates to the decommissioning cost estimate.

SMUD staff performed the 1998 update. TLG performed the 1999 and 2000 annual updates. SMUD staff began performing the annual update beginning with the 2001 cost estimate update through the 2005 cost estimate update with TLG providing quality reviews. The 2006 cost estimate was the first to be finalized without outside agency review. With approximately 1 year left for the project, major dismantlement projects are near completion and remaining project scope quantified, staff has determined that outside review would not provide additional confidence in the cost basis. The total decommissioning costs are now estimated to be \$522.9 million, including a reduction to future costs of \$17 million in project savings. The portion of this total that is not NRC-defined decommissioning activities (e.g., non-radiological dismantlement, spent fuel storage, etc.) is \$133.2 million, most of which is related to dry fuel storage at our Independent Spent Fuel Storage Installation (ISFSI).

Table 2 shows the history of estimated decommissioning costs for license termination. The estimated costs include spent fuel storage through 2008, but do not include site restoration costs.

---

<sup>1</sup> Initial contribution

**TABLE 2**

<b>YEAR OF COST STUDY</b>	<b>ESTIMATED DECOMMISSIONING COST</b>
1991	\$281 Million
1993	\$365 Million
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1997	\$452 Million
1998	\$459 Million
1999	\$458 Million
2000	\$495 Million
2001	\$504 Million
2002	\$519 Million
2003	\$524.3 Million
2004	\$529.7 Million
2005	\$534.1 Million
2006	\$538.1 Million
2007	\$522.9 Million

### **Accumulation of Funds**

SMUD has accumulated funds in the external trust fund as shown in Table 1. Based on the current decommissioning cost estimate and funding rate, there are sufficient funds to complete decommissioning Rancho Seco and terminate the 10 CFR Part 50 license.

As stated above, SMUD expects to store some Class B and C radioactive waste in our Interim Onsite Storage Building beyond 2008. Long term storage and disposal costs of the Class B and C radioactive waste are included in the decommissioning costs.

Funding to store the spent nuclear fuel at the ISFSI beyond 2008 is not included in the decommissioning fund. SMUD will fund site restoration separately.

### **Certification of Financial Assurance**

Certification is hereby made that financial assurance is being provided through an external sinking fund for \$81.1 million to complete decommissioning at Rancho Seco and terminate the 10 CFR Part 50 license.

### **Adjustments to Cost Estimate and Trust Fund**

With active decommissioning in progress, we now perform annual updates to the cost estimate. Historically, TLG performed the cost estimate updates as requested by SMUD. However, after several years of decommissioning experience, and with relatively long-term contracts in place, SMUD staff began performing the annual cost estimate update in 2001. The current cost update has an overall decrease due to project savings less inflation.

### **Administration of the Decommissioning Fund**

The trust fund holdings were reviewed at the end of 2007, and the trust fund contained \$69.8 million. The annual contribution amount is reviewed and adjusted as appropriate, to meet the needs of the total estimated decommissioning cost as indicated in Table 1. SMUD will continue to monitor the adequacy of the annual contribution to assure that adequate funds will be available to complete decommissioning and terminate the 10 CFR Part 50 license.

### **Assumptions Regarding Rates of Trust Fund Escalation and Earnings**

SMUD has made the following assumptions regarding trust fund escalation and earnings. Based on historical portfolio performance, SMUD has estimated the rate of return at 4.5%. The decommissioning cost escalation rate is currently estimated at 2.5%. This rate is within an established range and congruent with rates used for other business plans at SMUD. Therefore, SMUD's estimated real rate of return is 2.0%.

### **Contractual Obligations**

There are no contractual obligations associated with SMUD's financial assurance plan or the operation of the decommissioning trust fund.

### **Modifications to Financial Assurance Method**

In 1991, SMUD submitted its Financial Assurance Plan to the NRC describing the use of an external sinking fund. There have been no significant modifications to SMUD's external sinking fund since our initial submittal.

### **Material Changes to the Trust Fund Agreement**

In July 2003, the trust fund moved from Bankers Trust, N.Y. to Wells Fargo Bank, N.A.

If you or members of your staff have questions requiring additional information or clarification, please contact Bob Jones at (916) 732-4843.

Sincerely,



Steven J. Redeker  
Manager, Plant Closure and Decommissioning

Cc: B.S. Mallett, NRC, Region IV, Arlington



SACRAMENTO MUNICIPAL UTILITY DISTRICT □ P. O. Box 15830, Sacramento CA 95852-1830, (916) 452-3211  
AN ELECTRIC SYSTEM SERVING THE HEART OF CALIFORNIA

DPG-09-067

February 24, 2009

U.S. Nuclear Regulatory Commission  
ATTN: Document Control Desk  
Washington, DC 20555

Docket No. 50-312  
Rancho Seco Nuclear Generating Station  
License No. DPR-54

## **RANCHO SECO REPORT ON DECOMMISSIONING FUNDING STATUS**

Attention: John Hickman

As required by 10 CFR 50.75(f)(1), we are submitting this report on the status of decommissioning funding for Rancho Seco.

### **Background**

Rancho Seco began commercial power operation in April 1975, and shutdown permanently in June 1989. In 1991, SMUD submitted the proposed Decommissioning Plan for Rancho Seco, along with a Revised Financial Assurance Plan. The NRC approved the Decommissioning Plan in March 1995. Due to revisions to 10 CFR 50.82, SMUD submitted the Post Shutdown Decommissioning Activities Report for Rancho Seco in March 1997. Rancho Seco has been undergoing decommissioning since February 1997.

The decommissioning trust fund was fully funded at the end of 2008. However, based upon the lack of an acceptable radioactive waste disposal facility, SMUD plans to store some Class B and C radioactive waste in our Interim Onsite Storage Building beyond 2008, awaiting disposal at a later date.

### **Decommissioning Financial Assurance Method and Trust Fund Status**

SMUD had maintained an internal decommissioning fund since the early 1980s. In 1991, SMUD transferred \$90 million from the internal fund into an "External Sinking Decommissioning Trust Fund" currently maintained by Wells Fargo Bank. Table 1 shows the amount of the trust fund annual contribution and disbursements for the years 1991 through 2008. The total disbursements between 1994 and 2008 are \$478.4 million. At the end of 2008 the trust fund contained \$38.4 million.

**TABLE 1**

YEAR	ANNUAL CONTRIBUTION	ANNUAL DISBURSAL
1991	\$90 Million <sup>1</sup>	\$0
1992	\$12 Million	\$0
1993	\$12 Million	\$0
1994	\$12 Million	\$35,327,974
1995	\$15 Million	\$24,375,399
1996	\$15.5 Million	\$17,950,000
1997	\$16.5 Million	\$18,400,000
1998	\$17.5 Million	\$21,920,000
1999	\$18.5 Million	\$34,693,319
2000	\$18.5 Million	\$45,847,250
2001	\$24.5 Million	\$36,213,871
2002	\$27 Million	\$40,869,137
2003	\$27 Million	\$23,886,458
2004	\$27 Million	\$31,360,571
2005	\$27 Million	\$34,446,586
2006	\$27 Million	\$31,901,184
2007	\$27 Million	\$44,614,663
2008	\$2.25 Million	\$36,574,857

**Cost Estimate**

TLG Services, Inc. performed the initial cost estimate in 1991, and then performed biennial updates in 1993, 1995, and 1997. When SMUD began decommissioning in 1997, we also began performing annual updates to the decommissioning cost estimate.

SMUD staff performed the 1998 update. TLG performed the 1999 and 2000 annual updates. SMUD staff began performing the annual update beginning with the 2001 cost estimate update through the 2005 cost estimate update with TLG providing quality reviews. The 2006 cost estimate was the first to be finalized without outside agency review. Decommissioning is now essentially complete with the final submittal packet of Final Status Surveys near completion. The total decommissioning costs are now estimated to be \$498.2 million, including an additional reduction to future costs of \$22 million for a total of \$39 million in project savings. The portion of this total that is not NRC-defined decommissioning activities (e.g., non-radiological dismantlement, spent fuel storage, etc.) is \$132.5 million, most of which is related to dry fuel storage at our Independent Spent Fuel Storage Installation (ISFSI).

Table 2 shows the history of estimated decommissioning costs for license termination. The estimated costs include spent fuel storage through 2008, but do not include site restoration costs.

<sup>1</sup> Initial contribution

**TABLE 2**

<b>YEAR OF COST STUDY</b>	<b>ESTIMATED DECOMMISSIONING COST</b>
1991	\$281 Million
1993	\$365 Million
1995	\$441 Million
1997	\$452 Million
1998	\$459 Million
1999	\$458 Million
2000	\$495 Million
2001	\$504 Million
2002	\$519 Million
2003	\$524.3 Million
2004	\$529.7 Million
2005	\$534.1 Million
2006	\$538.1 Million
2007	\$522.9 Million
2008	\$498.2 Million

**Accumulation of Funds**

SMUD has accumulated funds in the external trust fund as shown in Table 1. Based on the current decommissioning cost estimate, there are sufficient funds to complete decommissioning Rancho Seco and terminate the 10 CFR Part 50 license.

As stated above, SMUD expects to store some Class B and C radioactive waste in our Interim Onsite Storage Building beyond 2008. Long term storage and disposal costs of the Class B and C radioactive waste are included in the decommissioning costs.

Funding to store the spent nuclear fuel at the ISFSI beyond 2008 is not included in the decommissioning fund. SMUD will fund site restoration separately.

**Certification of Financial Assurance**

Certification is hereby made that financial assurance is being provided through an external sinking fund for \$19.8 million to complete decommissioning at Rancho Seco and terminate the 10 CFR Part 50 license.

**Adjustments to Cost Estimate and Trust Fund**

With active decommissioning in progress, we now perform annual updates to the cost estimate. Historically, TLG performed the cost estimate updates as requested by SMUD. However, after several years of decommissioning experience, and with relatively long-term contracts in place, SMUD staff began performing the annual cost estimate update in 2001. The current cost update has an overall decrease due to project savings.

**Administration of the Decommissioning Fund**

The trust fund holdings were reviewed at the end of 2008, and the trust fund contained \$38.4 million. The annual contribution amount is reviewed and adjusted as appropriate, to meet the needs of the total estimated decommissioning cost as indicated in Table 1. SMUD will continue to monitor the adequacy trust fund balance to assure that adequate funds will be available to complete decommissioning and terminate the 10 CFR Part 50 license.

**Assumptions Regarding Rates of Trust Fund Escalation and Earnings**

SMUD has made the following assumptions regarding trust fund escalation and earnings. Based on historical portfolio performance, SMUD has estimated the rate of return at 4.5%. The decommissioning cost escalation rate is currently estimated at 2.5%. This rate is within an established range and congruent with rates used for other business plans at SMUD. Therefore, SMUD's estimated real rate of return is 2.0%.

**Contractual Obligations**

There are no contractual obligations associated with SMUD's financial assurance plan or the operation of the decommissioning trust fund.

**Modifications to Financial Assurance Method**

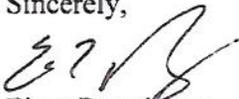
In 1991, SMUD submitted its Financial Assurance Plan to the NRC describing the use of an external sinking fund. There have been no significant modifications to SMUD's external sinking fund since our initial submittal.

**Material Changes to the Trust Fund Agreement**

In July 2003, the trust fund moved from Bankers Trust, N.Y. to Wells Fargo Bank, N.A.

If you or members of your staff have questions requiring additional information or clarification, please contact Leslie England at (916) 732-4860.

Sincerely,



Einar Ronningen  
Superintendent, Rancho Seco Assets

Cc: B.S. Mallett, NRC, Region IV, Arlington