SMUD®

April 16, 2018

DPG 18-074

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Docket 72-11
Rancho Seco Independent Spent Fuel Storage Installation
License No. SNM-2510

RANCHO SECO RESPONSE TO NRC REQUEST FOR ADDITIONAL INFORMATION REGARDING SACRAMENTO MUNICIPAL UTILITY DISTRICT'S DECOMMISSIONING FUNDING PLAN UPDATE FOR RANCHO SECO INDEPENDENT SPENT FUEL STORAGE INSTALLATION.

Attention: Pamela Longmire,

The Sacramento Municipal Utility District (SMUD) is hereby submitting its response to the NRC Request for Additional Information, dated April 3, 2018, related to its review of the Decommissioning Funding Plan Update dated April 7, 2016 (Accession No. ML 1606A109).

The Decommissioning Funding Plan requirements in 10 CFR 72.30(c) include addressing four specific events potentially impacting the funding required to complete decommissioning. A summary of SMUD's response to the evaluation of these four events included in the revised Decommissioning Funding Plan Update (Rev. 2) is included as enclosure 2.

SMUD makes no new or revised regulatory commitment (as defined by NEI 99-04) in this letter.

SMUD is submitting our response to the NRC RAIs under oath or affirmation. Accordingly, pursuant to 10 CFR 72.16(b), I declare under penalty of perjury that the information contained in SMUD letter DPG 18-074, dated April 16, 2018, transmitting our RAI response, are true and correct to the best of my knowledge.

NMSS26

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If you, or members of your staff, have questions requiring additional information or clarification, please contact me directly at (916) 732-4893.

Sincerely,

Dan Tallman,

Manager, Rancho Seco Assets

Encl: (3)

(1) 2015 Decommissioning Funding Plan, Rev.2
(2) 10CFR72.30(c) evaluation summary

CC: NRC, Region IV

CALIFORNIA ALL-PURPOSE ACKNOWLEDGMENT **CIVIL CODE § 1189**

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State of California)
County of Sacramento)

On April 16, 2018 before me, Laurie Leigh Johnson, Notary Republic
Date *Here Insert Name and Title of the Officer*

personally appeared Dan Tallman
Name(s) of Signer(s)

,

who 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.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

LAURIE LEIGH JOHNSON
Notary Public – California
Sacramento County
Commission # 2188409
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Signature of Notary Public

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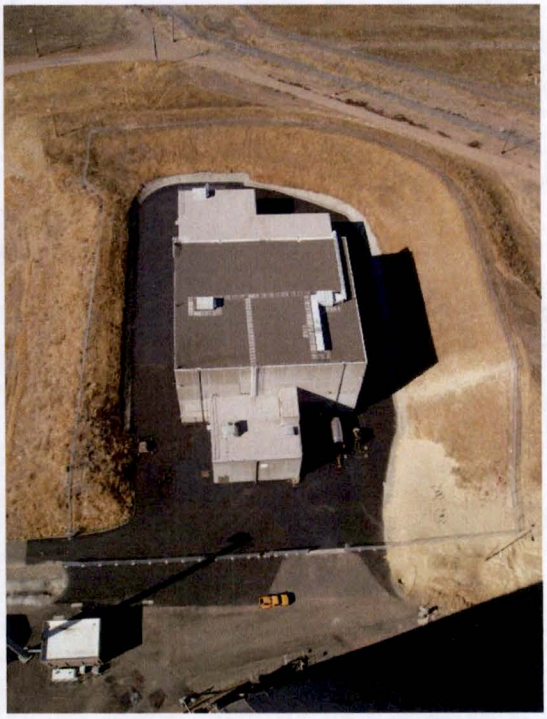
2015 DECOMMISSIONING COST ESTIMATE

Revision 2 April 2018

RANCHO SECO DECOMMISSIONING



APPROVALS

Prepared by:

Dan A. Tallman

Approved by:
Manager, Rancho Seco Assets

Dan A. Tallman

On the cover: IOSB – regulated by Part 50 license
ISFSI – regulated by Part 72 License

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REVISION LOG

Revision 0: 12/22/15 (DPG 15-297)
Revision 1: 3/17/16, correct the heading Page 1 to reflect 2015
Revision 2: 4/16/18, addition of 10CFR72.30(c) evaluation in response to NRC RAIs

2015 DECOMMISSIONING COST ESTIMATE

SUMMARY

The remaining cost projected to complete the decommissioning of The Rancho Seco Nuclear Generating Station (Rancho Seco) is $6.9 million. This includes all projected costs to terminate both the Part 50 and Part 72 licenses.

In 2009, Phase I license termination activities were completed and modification of the Part 50 license was approved by the Nuclear Regulatory Commission (NRC). Phase I costs (completed in 2009) totaled $487.1 million. As of 2015, Phase II expenditures already withdrawn from the Decommissioning Trust Fund totaled $23.0 million, and expenditures not yet withdrawn total $1.3 million making the total 2015 Decommissioning Cost Estimate $518.3 million. Remaining activities include: the transfer of the used nuclear fuel and Greater Than Class "C" (GTCC) Radioactive Waste to the Department of Energy (DOE) in 2021[1]; license termination activities for the area licensed under Part 50 begun in 2015 and scheduled to complete in 2016; and, license termination activities for the Part 72 licensed facility following removal of the material from the ISFSI. The previously expended costs include nuclear fuel storage costs only through 2008. Beginning in 2009, fuel costs are considered a normal operation and maintenance (O&M) expense and are not included in the Decommissioning Cost Estimate.

Cost changes in this estimate reflect updated radiological information for the Part 50 licensed facility following disposal of the Class B and Class C LLRW, and estimated costs for license termination activities that include the decommissioning of the ISFSI. The costs for the decommissioning line items for Phase II by category and as a schedule of expenditures are provided in Table 1. Actual costs for funds expended in Phase I are reported in detail in previous Cost Estimates.

With Phase I of radiological decommissioning complete including the disposal of the previously-stored Class B and Class C LLRW, the remaining cost is comprised of the license termination activities necessary to demonstrate compliance with the facility release standards in 10 CFR 20.

[1] Based on the DOE's "Strategy for the Management and Disposal of Used Nuclear Fuel and High-Level Radioactive Waste", January 2013.

BACKGROUND

Rancho Seco is located approximately 25 miles southeast of Sacramento, California. The industrial facility is 87 acres and sits within a 2,480-acre plot of land that is owned by the Sacramento Municipal Utility District (SMUD). The station was comprised of a single B&W-designed generation unit with support facilities.

Rancho Seco commenced reactor operations September 16, 1974, and began commercial operation April 18, 1975. SMUD permanently terminated operations at Rancho Seco on June 7, 1989 following passage of a public referendum June 6, 1989. The reactor was completely defueled on December 8, 1989 and a Possession Only License, along with Permanently Defueled Technical Specifications, became effective April 28, 1992.

On May 20, 1991, SMUD submitted a proposed Decommissioning Plan to the NRC that outlined the decommissioning option of Hardened SAFSTOR. This alternative put the fuel in dry storage and placed the plant in a safe, dormant condition with a small site maintenance staff until 2008 when a Decommissioning Operations Contractor would be brought in to complete decommissioning. This allowed for the Decommissioning Trust Fund to be fully funded before dismantlement began. The NRC issued a decommissioning order and approved the Rancho Seco decommissioning funding plan on March 20, 1995.

Beginning in 1995, TLG Services, Inc. (TLG) provided SMUD with alternative cost estimates that included options for the decommissioning of the facility. Delays in the Fuel Dry Storage project caused increases in projected costs, and the alternatives were provided to take advantage of the available opportunities, including: availability of SMUD Staff on site to support dismantlement due to delays in the Fuel Dry Storage project, and; availability of Envirocare's Clive, Utah disposal facility (Envirocare is now EnergySolutions) as an appealing option for low level radioactive waste (LLRW) disposal.

In January of 1997, SMUD Board of Directors (the Board) approved the Incremental Decommissioning Project, and physical dismantlement of the facility began later that year. In 1999, the Board approved expansion of the Incremental project to include all activities necessary for license termination. In April of 2006, SMUD submitted the License Termination Plan (LTP) to the NRC, outlining the activities necessary for the NRC to allow license termination. The LTP was approved by the NRC in November 2007. In September 2009 the NRC approved SMUD's request for modification of the Part 50 license. Currently, only the Interim Onsite Storage Building (IOSB) and the land enclosed by the exterior fence (approximately 1 acre) remains licensed under Part 50.

In the interim, the NRC issued SMUD a specific license for fuel storage in the Independent Spent Fuel Storage Installation (ISFSI) under Part 72 in June of 2000. Transfer of all nuclear fuel to dry storage in the ISFSI was completed August 22, 2002.

With the closure of the Barnwell, S.C. waste disposal facility, there were no options for disposition of Class B and Class C LLRW available to SMUD beginning in 2008. The Class B and Class C LLRW was stored in the IOSB until the Waste Control Specialists, Inc. (WCS) facility in Andrews, Texas was deemed by SMUD as a a suitable facility for disposal of the material. Shipping of the stored waste was completed in November, 2014.

The estimated date for DOE acceptance of the used nuclear fuel and GTCC waste is 2021 based on the DOE's "Strategy for the Management and Disposal of Used Nuclear Fuel and High-Level Radioactive Waste". That report, and the 2012 report by the Blue Ribbon Commission on America's Nuclear Future provides the best available information on the potential for DOE to take possession of the material stored at the ISFSI. Considering that the Decommissioning Trust Fund is fully funded, and SMUD is not relying on increases in Trust Fund value through investment growth to ensure available funds for decommissioning, the uncertainty in the schedule for used fuel removal does not impact SMUD's ability to fund all decommissioning activities.

INTRODUCTION

This decommissioning cost estimate is prepared to satisfy the requirements of Title 10 of the Code of Federal Regulations, Part 50.75. In 2013, the cost basis for decommissioning the ISFSI was developed and reported in accordance with Part 72.30, and was updated in 2014. The cost basis for decommissioning the ISFSI will be updated again by 2017.

The origin of this current cost estimate is the area-based decommissioning cost estimate prepared in 1999 and later updated in the year 2000 by TLG (previous estimates were system-based). Subsequently, SMUD staff updated the estimate in the years 2001 through 2005. Each of these updates prepared by SMUD staff was reviewed by TLG. Since 2006, updates are performed by SMUD staff without outside agency review. SMUD staff has determined that outside review is not necessary because all activities involving significant cost and/or schedule risk have been completed. This Estimate also includes ISFSI decommissioning costs. These costs are not significant in comparison to the cost of decommissioning the reactor facility as no evidence exists that any remediation of ISFSI facilities or land areas would be required following removal of the used nuclear fuel and GTCC material. This cost estimate updates the 2014 estimate. The current cost estimate for decommissioning Rancho Seco is $518.3 million.

The technical portion of the TLG cost estimate was based on system and component removal and facility decontamination. With all system and component removal complete and no remaining facility decontamination anticipated, there is little technical basis to the remaining costs. In addition, the decommissioning costs to date have all been well within the estimated costs, and the small scope of work remaining poses little risk of changing the historical trend. With a firm basis for estimating the remaining costs, staff has determined that outside review would not provide additional confidence in the cost basis.

This document is based upon the latest information available including actual costs to date, projections for the work remaining, and projections of SMUD overhead costs. Updated information was used to make this cost estimate as accurate as possible, and revisions to costs were made in the following areas:

- updated IOSB radiological surveys following removal of the stored LLRW

History of Rancho Seco Decommissioning and Cost Estimates

After the cessation of plant operations on June 7, 1989, the initial decommissioning alternative chosen was a modified SAFSTOR option identified as Hardened SAFSTOR. The facility was to be placed into a safe, stable condition including transferring of the used nuclear fuel from wet to dry storage. Because of the premature shutdown, the Decommissioning Trust Fund had not collected adequate funds for decommissioning. SMUD proposed a plan, which the NRC approved, to continue annual contributions to the Decommissioning Trust Fund over the time period of the original operating license, extending through 2008, at which time the Trust would be fully funded. This allowed

collection of funds while minimizing the overall financial impact to SMUD operations. Dismantlement activities were to commence once the funding was complete.

This original plan was the basis for the 1991 cost estimate, and was the baseline used for comparison when TLG prepared the 1995 cost estimate that included several decommissioning options. The two critical bases for these cost estimates were the use of a Decommissioning Operations Contractor to perform decommissioning, and the use of the then-proposed Ward Valley Low Level Waste Disposal Site (Ward Valley) as the cost basis for radioactive waste disposal.

Difficulties in the Fuel Dry Storage project caused delays over several years. The delays resulted in increases in overall decommissioning costs. The increases were reflected in the cost estimate updates and required increasing annual contributions to the Trust Fund, impacting SMUD's annual operating budget. Because of the financial impact, options were sought to mitigate the consequences of the increased costs. TLG was tasked with estimating the cost of several decommissioning options when preparing the 1995 update, and several options were evaluated.

Shortly after the 1995 decommissioning cost estimate update was prepared, EnergySolutions (then Envirocare) began accepting LLRW from nuclear utilities. EnergySolutions did not (and currently does not) accept the full spectrum of waste that is categorized as LLRW, but the waste they do accept represents the vast majority of waste generated during a power reactor decommissioning project. The Ward Valley cost basis was over \$400 per ft^3 of LLRW, while the EnergySolutions cost was under \$100 per ft^3. With over 200,000 ft^3 of material estimated to be generated during Rancho Seco decommissioning that would be acceptable for disposal at EnergySolutions, the opportunity to favorably impact the overall cost of decommissioning became possible.

In the original basis for the cost estimate, after entering Hardened SAFSTOR staffing would be reduced to correspond with the reduction in required plant systems and facilities maintenance. Delays in the fuel project resulted in maintaining site staff at a higher level longer than originally planned. While this caused increases to the annual contributions to the Trust Fund, it also maintained a large talent pool on site with considerable process knowledge of operating history and radiological conditions within the facility.

The availability of EnergySolutions combined with the presence of a large talent pool within the available staff presented an opportunity to begin the dismantlement process early. In 1996, a plan was developed to take advantage of both circumstances and perform dismantlement of the majority of the secondary systems in the Turbine Building. This was proposed to the Board as the Incremental Decommissioning Project, which they subsequently approved as a 3-year project in January 1997.

The Incremental Decommissioning Project was successful in helping to mitigate the impacts of the delay in the fuel project, and the work was completed ahead of schedule

and below projected costs. The Incremental project was so successful that the scope was expanded to include systems in the Tank Farm and other outside areas.

During the time period of Incremental Decommissioning, additional circumstances outside of SMUD's control resulted in further delays in the fuel project and additional impacts to the cost estimate and the annual Trust Fund contribution. Based upon the success of the Incremental project and the need to mitigate additional increases to the annual Trust Fund contribution, the decommissioning staff proposed a plan for continuing decommissioning through license termination with completion targeted at the end of 2008. The Board approved this plan in July 1999, and SMUD shifted from Incremental Decommissioning to Decommissioning.

Early cost estimates throughout the industry were based upon inventories of plant components and commodities by system. Based upon the experiences gained at Rancho Seco and at other decommissioning nuclear utilities, TLG shifted the performance of cost estimating from a system-based approach to an area-based approach. To facilitate shifting the Rancho Seco cost estimate to the area-based approach, staff performed an area-by-area inventory of the plant systems and components in the Auxiliary and Reactor Buildings. The cost estimate prepared by TLG in 1999 represented both the shift to the area-based approach and the schedule change of completing decommissioning in 2008. (An additional cost estimate representing an update to the 1995 system-based estimate was also performed by TLG in 1999 for comparison purposes. 1999 was the last year the system-based estimate was updated.)

With the commencement of active Decommissioning came the requirement to perform annual updates to the cost estimate. In 2000, TLG prepared an update to the 1999 area-based cost estimate. By this time, relatively long-term contracts were in place to provide labor, technical staff, transportation, radwaste packaging materials, radwaste processing, and radwaste disposal to support the decommissioning process. TLG used this actual information when preparing the 2000 cost estimate.

The date of January 1, 2000 is defined as the dividing line between Incremental Decommissioning and Decommissioning. The demarcation between the two projects may be defined as that point where the planned Turbine Building work was completed, and work in the Auxiliary Building was begun. In actuality, there was some overlap between the projects, with work occurring simultaneously on both projects for 1-2 months before and after 1/1/2000. Defining 1/1/2000 as both the end of Incremental Decommissioning (completion of work defined as within Incremental Decommissioning scope) and the beginning of Decommissioning (no work yet begun defined as within Decommissioning scope) has negligible impact on cost. However, it would be difficult to carry forward a demarcation point other than the beginning of the calendar year because Trust Fund calculations, the budget process, and the scheduling of costs over the duration of the project are all based upon calendar year.

Beginning in December, 2013, financial assurance for ISFSI decommissioning is required. This cost estimate carries forward the information necessary to allow compliance with the regulations in 10 CFR 72.30 which will be updated in 2017 in accordance with those regulations.

Phased Decommissioning

By 2001, after Decommissioning had begun, SMUD decided not to send any LLRW to the Barnwell, SC disposal facility, having never sent any material there for disposal. This decision precluded the ability to complete Decommissioning and termination of the Part 50 license. At that time, the plan to decommission in phases was implemented. During Phase I, the majority of the identified license termination activities would be completed, including large component removal and decontamination of the facility to meet NRC release criteria. Class B & C LLRW resulting from these activities would be stored in the IOSB. With Phase I complete, the Part 50 license would be modified to include only the IOSB and land surrounding it (approximately 1-acre). Phase II included oversight of the stored waste, shipping of the waste for disposal, followed by completion of all license termination activities at the IOSB resulting in termination of the Part 50 license. Decommissioning of the ISFSI will occur following removal of the material stored at the ISFSI by the DOE.

All physical system removal and building decontamination was complete by the end of 2008, with Final Status Surveys completed in June 2009. In September 2009, the NRC approved SMUD's request to modify the Part 50 license, releasing all of the facility from the license except for the 1-acre area encompassing the IOSB. This completed Phase I of Decommissioning. In 2014, the stored LLRW was shipped for disposal and license termination activities were begun for the IOSB.

Financial Assurance for ISFSI Decommissioning

As discussed previously, SMUD fully funded the Part 50 Decommissioning Trust Fund by making the last contribution in 2008. However, because of the level of uncertainty inherent in power reactor decommissioning, the amount of funding provided was conservative. When Phase I of decommissioning was completed in 2009, an estimated $18 - $20 Million in excess funds were available in the Decommissioning Trust Fund. Much of the former excess was utilized for LLRW disposal and sufficient funds remain to assure available funding for ISFSI decommissioning. Therefore, no additional contributions to the Trust Fund are currently planned.

10 CFR 72.30 contains specific requirements for documenting the financial assurance for ISFSI decommissioning. These specifics are addressed here.

72.30(b)(1) requires documentation of how funds will be provided: The Trust Fund initially established for Part 50 Decommissioning was over-funded. The activities to decommission Rancho Seco include the activities necessary for terminating both NRC

licenses. This cost estimate demonstrates that sufficient funds are available in the Trust Fund to provide financial assurance for ISFSI decommissioning.

72.30(b)(2) requires a detailed cost estimate for decommissioning the ISFSI: This document provides the information required.

72.30(b)(2)(i) requires that the cost estimate include the cost of in independent contractor to perform decommissioning activities. This cost estimate assumes all activities are conducted by an independent contractor in compliance with this requirement, in addition to including the cost of a SMUD Project Manager.

72.30(b)(2)(ii) requires an adequate contingency factor: A factor of 15% is used. This is sufficient to account for project uncertainties and demonstrates compliance with this requirement. Contingency is provided to account for uncertainties in the decommissioning process. Given that detailed information exists documenting the radiological conditions of the facility, and the robust nature of the sealed fuel storage systems, there is little radiological uncertainty regarding the condition of the facility and 15% provides a sufficient margin.

72.30(b)(2)(iii) requires inclusion of the cost of meeting the radiological criteria for license termination contained in 10 CFR 20: Those activities are specifically included in this cost estimate demonstrating compliance with this requirement.

72.30(b)(3) requires identification and justification of the key assumptions used in the cost estimate: That information is specifically included later in this document, demonstrating compliance with this requirement.

72.30(b)(4) requires a description of assuring funds for decommissioning and a means for adjusting the cost estimate periodically over the life of the facility: The funds for decommissioning are already contained in a Decommissioning Trust Fund set aside for Part 50 license termination. 72.30(c) requires that the decommissioning funding plan be resubmitted at intervals not to exceed 3 years. In 2014, an updated plan was submitted reflecting the updated schedule for Part 50 decommissioning. Currently, all license termination activities for the Part 50 license are expected to be completed before the next Part 72 decommissioning funding plan must be resubmitted. Therefore it is expected that when the Part 72 decommissioning funding plan is updated, only Part 72 decommissioning costs will remain and the financial instrument used to demonstrate assurance with 72.30(e) will reflect that information. Until then, the existing Trust Fund is justified for providing financial assurance. The Rancho Seco ISFSI License expires in 2020, so per 72.30(c), the decommissioning funding plan will be resubmitted with the renewal application. The license renewal process will incorporate a mechanism for future funding plan updates.

72.30(b)(5) requires information regarding the subsurface residual radioactivity that will require remediation to meet the radiological criteria for license termination: No removal

of subsurface materials will be required to meet the radiological release criteria. The radiological condition of the land area of the ISFISI was evaluated prior to construction and no residual radioactivity was evident. Given that the material in storage at the facility resides in robust, sealed containers and there is no reasonable accident that can occur to cause failure of the containers, there is no reasonable likelihood that the stored radioactive materials will enter the environment. Detailed radiological surveys conducted during the process of moving the fuel from wet to dry storage document that no contamination of the area occurred during operations. With no reasonable method of introducing radioactive materials into the land within the ISFSI facility, there is no reasonable expectation that subsurface materials will require remediation. This documents compliance with this requirement.

72.30(b)(6) requires certification that financial assurance for decommissioning be provided: Compliance with this requirement was satisfied by a separate letter dated March 31, 2014.

10 CFR 72.30(c) At the time of license renewal and at intervals not to exceed 3 years, the decommissioning funding plan must be resubmitted with adjustments as necessary to account for changes in costs and the extent of contamination. If the amount of financial assurance will be adjusted downward, this cannot be done until the updated decommissioning funding plan is approved. The decommissioning funding plan must update the information submitted with the original or prior approved plan and must specifically consider the effect of the following events on decommissioning costs:

72.30(c)(1) spills of radioactive material producing additional residual radioactivity in onsite subsurface material: Section 9.6 of the Rancho Seco ISFSI FSAR states "Due to the zero-leakage design of the NUHOMS DSCs, SMUD expects no residual contamination on the ISFSI concrete base pad." Therefore, neither liquid spills of substances containing radioactive material, nor those that may come in contact with radioactive material are considered credible at this stage of decommissioning, since the remaining radioactive material is in solid form and not dispersible. This lack of credibility extends to the potential for contamination of the soil in contact with the ISFSI concrete pad.

72.30(c) (2) facility modifications: As reported to the NRC in SMUD letter "RANCHO SECO BIENNIAL REPORT" dated July 14, 2016 (ADAMS Accession No. ML 16208A109), SMUD installed a 400 square foot Fuel Transfer Equipment Storage Building (ESB) within the Part 72 licensed boundary. This structure, external to the ISFSI pad, provides environmentally sheltered storage for fuel handling equipment contaminated with licensed radioactive material. This contamination is either fixed (as in the case of the MP-187 Transfer Cask) or containerized to preclude its spread while in storage. Currently, as described in the assumptions section of the Decommissioning Cost Estimate, SMUD anticipates a maximum of 25 final status survey units to demonstrate satisfaction of the release criteria contained in 10 CFR 20. As contamination of the structure is not anticipated, an additional Class 3 survey unit for the ESB interior and

exterior would be added. As the survey design criteria for Class 3 survey units is minimal, the impact of adding these two additional survey unit on the overall cost of decommissioning the ISFSI would be insignificant.

72.30(c) (3) changes in authorized possession limits: SMUD completed the transfer of all SNF and GTCC waste to the ISFSI in 2006. There have been no changes to the authorized possession limits since the approval of the ISFSI Decommissioning Funding Plan.

72.30(c) (4) actual remediation costs that exceed the previous cost estimate: SMUD will not begin to decommission the Rancho Seco ISFSI until after the U.S. Department of Energy takes possession of the spent fuel and GTCC waste. Currently, this is estimated to begin in 2024. Therefore, there have been no actual remediation costs that exceed previous cost estimates.

As discussed previously, SMUD fully funded the Part 50 Decommissioning Trust Fund by making the last contribution in 2008. However, because of the level of uncertainty inherent in power reactor decommissioning, the amount of funding provided was conservative. When Phase I of decommissioning was completed in 2009, excess funds were available in the Decommissioning Trust Fund. This excess provided sufficient funds to assure available funding for future ISFSI decommissioning. Therefore, no additional contributions to the Trust Fund are currently planned.

METHODOLOGY AND APPROACH

This cost estimate reflects the actual costs of Phase I (defined as all costs of the dismantlement effort including some license termination activities that resulted in the modification of the part 50 license), and provides actual and estimated costs for Phase II (defined as costs beginning in 2009 with the oversight of stored waste through termination of the Part 50 license). Part 72 license termination activities are included separately. The technical basis for previous estimates included detailed calculations for: system and component removal; extensive building and outside area decontamination, and; determination of radioactive waste volumes and packaging requirements. With the completion of Phase I of decommissioning, all nuclear systems and components have been removed and remaining decommissioning costs are associated with Final Status Surveys of the IOSB, the ISFSI, and the licensed land areas around both facilities.

Details on the methods used by TLG in preparing the historical cost estimates are contained in the respective cost estimate documents. The methods used unique to this latest update are included in the discussion below.

Update Methodology

Previous updates to the cost estimate utilized actual cost bases to update ongoing activities. In 2009, the future costs were reevaluated and a new baseline was established

based on the limited scope of the remaining work and reflecting the need to re-establish a decommissioning organization when physical work resumes. This update reflects actual costs for LLRW disposal and costs for future license termination activities. The major cost categories are: "Shipping and Burial for Waste Disposal, Contract Staff and Miscellaneous".

Because the scope of remaining Part 50 decommissioning is limited, this update reflects only a shift in schedule not a change in total cost. The majority of the remaining Part 50 decommissioning activities are now planned in 2016 after all support contracts were put in place in 2015.

Overview of Decommissioning Cost Estimate Components

The cost estimate provides an overall cost for the duration of the project. This includes all costs incurred after transitioning from O&M-financed expenses after plant shutdown through 10 CFR 50 and 72 license terminations, plus an amount to cover SMUD costs anticipated for disposal of the GTCC material.

Phase I costs are identified as a single line item of costs previously expended and withdrawn from the Decommissioning Trust Fund. Some Phase II costs have also been withdrawn from the Trust.

As the purpose of the DCE is to provide a basis for assuring sufficient funds for decommissioning, appropriate costs are identified as "withdrawn" meaning that these actual expenses have been removed from the Decommissioning Trust Fund. Historically, SMUD would make annual withdrawals from the Trust based on expenditures. In the interim, the actual expenses were small enough that withdrawals were not taken which was reflected in the cost estimate. Following the disposal of the LLRW, another withdrawal was taken, but the withdrawal also considered ensuring sufficient funding for remaining decommissioning activities.

Staff costs include the cost for contract staff to perform the remaining license termination activities including any needed decontamination of the IOSB and performance of subsequent Final Status Surveys at the ISOB and ISFSI.

Miscellaneous costs have been included to document the support costs that are specifically identified for the duration of the decommissioning project. These costs also include materials costs for decommissioning.

FINANCIAL COMPONENTS OF THE COST MODEL

The decommissioning cost estimate in total is defined as the funding required to complete decommissioning through license termination. Historically, the estimate consisted of a large number of calculated costs based on cost factors, and the cost assigned to a given line item within the estimate was not as rigorously defended as the total. A basic assumption of the estimating process has been that when specific line items have been over-estimated, the unspent funds will be required to cover the costs associated with other line items that have been under-estimated. The historical costs captured in this estimate for Phase I of decommissioning reflect that the cost of the work completed was, in general, over-estimated.

The remaining future costs within this estimate were rigorously reviewed and/or refined. The format was changed in the 2009 update for ease of performing future updates. Previous estimates did include information for terminating the Part 72 license as a means to capture that date. With a regulatory requirement now in place to demonstrate financial assurance for Part 72 license termination, that information has been updated.

The 1999 area-based decommissioning cost estimate prepared by TLG was comprised of a detailed list of activities to which the unit cost factor methodology was applied. This provided a sound basis for determining overall costs, but contingencies were also added. The contingency provides additional funds to cover unforeseeable costs that are within the defined scope of the decommissioning project. It is important to note that contingency funds are an important part of the decommissioning cost estimate, and represent funds that are expected to be completely expended through the decommissioning process.

All of the activities which presented significant cost risk were completed in Phase I of Decommissioning, including dispositioning of the reactor vessel, reactor vessel internals, and all interior structures in the containment building. The reactor vessel and its internal components became radioactive as a result of activation during plant operation. Portions of the internals are highly radioactive and do not qualify as LLRW, but are classified as GTCC waste and are currently in storage at the ISFSI.

Examples of remaining contingencies include changes in the regulatory environment and cost or regulatory changes that would impact remaining license termination activities. The cost impacts of these uncertainties have been defined by TLG in previous estimates under the term "financial risk". To date, financial risk has not been specifically addressed within any Rancho Seco decommissioning cost estimate. Outside of the scope of the cost estimate itself, staff deals with these uncertainties on a project-by-project basis. An overall risk assessment taking into account any anticipated risk factor would typically be addressed through a probability analysis, perhaps utilizing a Monte Carlo-type probability simulation. Such a detailed risk analysis is considered to be outside of the scope of the decommissioning cost estimate. However, contingency is included as a component of the estimate.

ASSUMPTIONS

The following are the assumptions used in developing the Rancho Seco cost estimate. Some assumptions are generic in nature, and some are specific to the Rancho Seco site.

Used Fuel

1. The cost to remove and dispose of the used fuel from the site is not reflected within the estimate to decommission Rancho Seco. The Nuclear Waste Policy Act assigns responsibility to the DOE's Waste Management System.

2. The ISFSI will remain operational under the 10 CFR 72 license until the DOE takes possession of, or accepts responsibility for, the fuel. The cost for maintenance of the fuel is considered O&M and is not included in this cost estimate.

3. DOE acceptance of fuel in 2021. This will be reviewed for each subsequent estimate as there is currently great uncertainty with the acceptance date. Note that the actual date of fuel acceptance is currently not a factor in demonstrating financial assurance because the decommissioning costs are fully funded and do not rely on a return on investments over time.

ISFSI Decommissioning

1. No remediation will be required for any structures or land areas at the ISFSI. Evaluation of Reference 4 indicates that activation of materials at the ISFSI will not result in contamination that requires remediation. No loose contamination at the ISFSI was measured during the fuel movement activities in 2000 through 2002, and no indication of fuel canister leakage is evident.

Reactor Vessel Internal Components

1. The reactor vessel internal components classified as GTCC material is stored in the ISFSI until the DOE takes possession of the material. However, the DOE has not yet established an acceptance criteria or a disposition schedule for this material. Therefore, this cost estimate is based upon industry-accepted assumptions regarding DOE schedules. Industry assumptions for the acceptance criteria are modeled on the packaging for the used nuclear fuel: the GTCC is stored in a canister with the same outer geometry as the used fuel canisters.

2. The cost for maintenance, transfer and disposal of the GTCC material is not included in this cost estimate. Legal opinions and court decisions indicate that the GTCC disposal is the responsibility of the DOE.

Transportation Methods

1. Contaminated materials resulting from remaining decommissioning activities will qualify under Title 49 of the Code of Federal Regulations Part 173 as LSA –I, –II, or –III, or SCO–I or –II.

2. Transportation of Class A LLRW is by truck or rail to EnergySolutions in Clive, UT.

Low-Level Radioactive Waste Disposal

1. The majority of the LLRW generated during decommissioning has been disposed at EnergySolutions. Future disposal rates for Class A waste used in the estimate are based upon historical rates and potential future rate impacts based on over 10-years of historical trends. EnergySolutions considers contract disposal rates proprietary.

Estimating Basis

1. Future decommissioning costs are in general reported in the current year's currency regardless of the scheduled year of the expenditure; therefore, changes in schedule do not impact the cost estimate.

2. Remaining costs are based upon an estimate of the remaining activities including contract staff to perform the activities and other costs such as waste disposal.

Labor Costs

1. The craft labor required to complete decommissioning is obtained through standard SMUD contracting practices.

2. Future activities such as waste shipments and license termination activities will be performed by contracted staff.

3. Engineering services for such items as writing activity specifications, detailed procedures, and work procedures are assumed to be performed by contracted staff.

General

1. Only the 1-acre facility encompassing the IOSB remains under the Part 50 license.

2. The approximately 10-acre ISFSI remains under the Part 72 license. The used fuel will be completely transferred to the DOE by the end of 2021. Following transfer of the used fuel and GTCC material, a new decommissioning project will be undertaken to terminate this license.

3. Phase I of the LTP is complete. The disposal of previously-stored Class B & C LLRW has been completed under Phase II and license termination activities remain.

Completion of Phase II of the LTP will result in complete termination of the Part 50 license.

4. Completion of license termination activities for the Part 72 license will be completed after the DOE removes the stored material from the ISFSI.

5. NRC oversight of the decommissioning process is estimated based on previous license termination activities. The amount of oversight effort is proportioned based on the number of Survey Units for license termination as a reasonable basis for the estimate.

6. Equipment costs for use during decommissioning are included as Miscellaneous Costs.

7. Demonstration of compliance with the radiological criteria for license termination will require documentation for a maximum of 48 Survey Units. While radioactive materials have been handled in both locations, no contaminated systems or material processing occurred in these facilities, limiting the probability of contamination. The "staging cell" in the IOSB is completely contained, and is known to have fixed contamination, but other areas have no history of loose or fixed contamination. The ISFSI will contain 27 Survey Units, and the IOSB will contain at most 22 Survey Units as follows:

List of Possible Survey Units

# Units	Description	Location	Classification
22	HSMs	ISFSI	Class 1
1	Concrete Pad	ISFSI	Class 2
1	Concrete Apron	ISFSI	Class 3
1	Land Area	ISFSI	Class 3
1	ESB (exterior)	ISFSI	Class 3
1	ESB (interior)	ISFSI	Class 3
15	Storage Cells	IOSB	Class 3
1	Staging Cell	IOSB	Class 1
1	Misc Structures	IOSB	Class 3
1	Warehouse Area	IOSB	Class 3

1	Truck Bay	IOSB	Class 2
1	Sump/piping	IOSB	Class 3
1	Office Areas	IOSB	Class 3
1	Land Areas	IOSB	Class 3
1	Paved Areas	IOSB	Class 3

8. Equipment such as administrative equipment (desks, chairs, etc.), forklifts, trucks, other mobile equipment and items of personal property owned by SMUD will be easily removed without the use of special equipment at no cost or credit to the project.

9. The decommissioning activities are performed in accordance with applicable regulations.

10. The principles of ALARA used in determining work duration adjustment factors are minimal for the remaining work scope, but remain an element in the cost estimate.

11. SMUD provides the electrical power required for the decommissioning project at no cost to the project.

10 CFR 50.75(C) DETERMINATIONS

In order to comply with 10 CFR 50.75(c), a determination must be made comparing this site-specific DCE with the NRC's generic DCE calculated in accordance with 50.75(c).

1986 Baseline Decommissioning Cost

Per 10 CFR 50.75(c)(1)(i), the 1986 Baseline Decommissioning Cost for a Pressurized Water Reactor (PWR) rated below 3,440 MWt is calculated as follows (millions of dollars):

$(75 + 0.0088P)

Where: P = power level in mega-watts thermal (MWt)

For Rancho Seco, rated at 2,773 MWt, the 1986 baseline cost is:

$(75 + 0.0088 x 2773) = $ 99.402 Million

Current 10 CFR 50.75(c) Decommissioning Cost Determination

To determine the current value of the Baseline Decommissioning Cost Estimate, the 1986 value is adjusted by the factor specified in 10 CFR 50.75(c)(2), which is:

0.65 L + 0.13 E + 0.22 B

Where: L = escalation factor for Labor, from US Department of Labor
E = escalation factor for Energy, from US Department of Labor
B = escalation factor for LLRW burial, from NUREG-1307

Determination of Labor Escalation

The US Department of Labor last adjusted labor in 2005 establishing a new baseline value for L:

$L_{2005} = 2.06$

Utilizing the most recent Employment Cost Index information available from the Bureau of Labor Statistics (Q3 2015), the value of L is calculated as follows:

L = 2.06 x 124.6 ÷ 100 = 2.57

Determination of Energy Escalation

The energy escalation is calculated based on two factors, industrial electric power (P) and light fuel oil (F) based on the following equation for a PWR (from NUREG-1307, Rev. 15):

$$E = 0.58 \times P + 0.42 \times F$$

Both of the factors P and F are determined by a ratio of current Producer Price Index information (November 2015) to the January 1986 value. The current values are calculated as follows:

$$P = 212.3 \div 114.2 = 1.86$$
$$F = 160.4 \div 82.0 = 1.96$$

The resulting energy escalation factor is:

$$E = (0.58) \times (1.86) + (0.42) \times (1.96) = 1.90$$

Determination of Burial Escalation

This value is taken directly from NUREG-1307, Rev. 15 Table 2.1 for "Combination of Compact-Affiliated and Non-Compact Facility" for the Atlantic Compact per footnote (e) with B = 13.885

Current 10 CFR 50.75(c) Decommissioning Cost Calculation

The resulting 10 CFR 50.75(c) Decommission Cost is as follows (millions of dollars):

$$\$99.402 \times [(0.65) \times (2.57) + (0.13) \times (1.90) + (0.22) \times (13.885)] = \$494.037$$

Comparison to Rancho Seco Decommissioning Cost Estimate

The current total cost estimate for Rancho Seco decommissioning is $518.339 million, which exceeds the 10 CFR 50.75(c) required minimum of $494.037 million.

GLOSSARY INCLUDING ACRONYMS AND ABBREVIATIONS

1. ALARA: As Low As Reasonably Achievable
2. Barnwell: The Barnwell, SC LLRW Disposal Facility
3. DOE: Department of Energy
4. Energy Solutions: EnergySolutions, Inc., formerly Envirocare of Utah, Inc. - headquartered in Salt Lake City that operates the LLRW disposal facility in Clive, UT and is a partner in "Sempra-Safe, LLC", a licensed resin processing technique in TN
5. GTCC: Greater Than Class "C" Waste - disposal of this waste is the responsibility of the DOE
6. IOSB: Interim Onsight Storage Building
7. ISFSI: Independent Spent Fuel Storage Installation
8. LLRW: Low Level Radioactive Waste
9. LTP: License Termination Plan
10. NRC: Nuclear Regulatory Commission
11. O & M: Operation and Maintenance
12. PWR: Pressurized Water Reactor
13. Part 50: Title 10 of the Code of Federal Regulations, Part 50 – regulations governing the former operating plant license now applicable to the IOSB
14. Rancho Seco: Used in reference to both facilities licensed by the NRC, Rancho Seco Nuclear Generating Station (Part 50) and Rancho Seco ISFSI (Part 72)
15. SMUD: Sacramento Municipal Utility District
16. TLG: TLG Services, Inc
17. Ward Valley: The proposed Ward Valley Low Level Waste Disposal Site in Needles, CA
18. WCS: Waste Control Specialist, Inc. - operates the LLRW disposal facility being constructed in Andrews, TX

REFERENCES

1. "2014 Decommissioning Cost Estimate for the Rancho Seco Nuclear Generating Station", March 11, 2015
2. Letter to NRC, "Rancho Seco Report on Decommissioning Funding Status", March 23, 2015
3. Rancho Seco Part 72 License Termination cost basis, TLG Services, Inc "Independent Spent Fuel Storage Installation Decommissioning" Cost Summary, 2003; ARO Response to Data Request and Assumptions, Attachment S11-1481-0302
4. SMUD Engineering Calculation #Z-XXX-N0057, Revision 1, October 4, 1993, "Neutron Activation of a Pacific Nuclear NUHOMS"
5. "Strategy for the Management and Disposal of Used Nuclear Fuel and High-Level Radioactive Waste", Department of Energy, January 2013

Table 1
Decommissioning Cost Estimate - Phase II
(Thousands of 2015
Dollars)

	COSTS BY ACTIVITY							COSTS BY YEAR			
	Waste Disposal					%					
DESC	SHIP	BURY	STAFF	Misc	CNTGCY	CNTGCY	TOTAL	2016	2027	2028	TOTAL
License Termination Actvities											
Part 50 license terminatior	2	28	1,724	100	256	12%	2,110	2,110			2,110
Part 72 license terminatior	2	32	2,808	1,296	621	15%	4,759			4,759	4,759
Total License Termination	5	60	4,532	1,396	876	15%	6,869				
TOTAL COST (CE 2015)	5	60	4,532	1,396	876	15%	6,869	2,110		4,759	6,869
Phase I Costs							487,139				
Phase II, Actual through 2014							22,990				
Total Actual Expenditures withdrawn from Trust Fund							510,129				
Total Actual Expenditures (2015) not yet withdrawn from Trust Fund							1,340				
Total Decommissioning Cost							**518,339**				

Notes
"TOTAL COST (CE 2015)" represents total expected future Decommissioning Trust Fund withdrawals
"Total Decommissioning Cost" represents all previously expended funds and estimated future costs

ENCLOSURE 2

10 CFR 72.30(c) Evaluation

10 CFR 72.30(c) At the time of license renewal and at intervals not to exceed 3 years, the decommissioning funding plan must be resubmitted with adjustments as necessary to account for changes in costs and the extent of contamination. If the amount of financial assurance will be adjusted downward, this cannot be done until the updated decommissioning funding plan is approved. The decommissioning funding plan must update the information submitted with the original or prior approved plan and must specifically consider the effect of the following events on decommissioning costs:

10 CFR 72.30(c)(1) spills of radioactive material producing additional residual radioactivity in onsite subsurface material.

Response: Section 9.6 of the Rancho Seco ISFSI FSAR states "Due to the zero-leakage design of the NUHOMS DSCs, SMUD expects no residual contamination on the ISFSI concrete base pad." Therefore, neither liquid spills of substances containing radioactive material, nor those that may come in contact with radioactive material are considered credible at this stage of decommissioning, since the remaining radioactive material is in solid form and not dispersible. This lack of credibility extends to the potential for contamination of the soil in contact with the ISFSI concrete pad.

10 CFR 72.30(c) (2) facility modifications

Response: As reported to the NRC in SMUD letter "RANCHO SECO BIENNIAL REPORT" dated July 14, 2016 (ADAMS Accession No. ML 16208A109), SMUD installed a 400 square foot Fuel Transfer Equipment Storage Building (ESB) within the Part 72 licensed boundary. This structure, external to the ISFSI pad, provides environmentally sheltered storage for fuel handling equipment contaminated with licensed radioactive material. This contamination is either fixed (as in the case of the MP-187 Transfer Cask) or containerized to preclude its spread while in storage. Currently, as described in the assumptions section of the Decommissioning Cost Estimate (attachment 1, DPG 16-065, page 14), SMUD anticipates a maximum of 25 final status survey units to demonstrate satisfaction of the release criteria contained in 10 CFR 20. As contamination of the structure is not anticipated, an additional Class 3 survey unit for the ESB interior and exterior would be added. As the survey design criteria for Class 3 survey units are minimal, the impact on the overall cost of decommissioning the ISFSI would be insignificant.

10 CFR 72.30(c) (3) changes in authorized possession limits

Response: SMUD completed the transfer of all SNF and GTCC waste to the ISFSI in 2006. There have been no changes to the authorized possession limits since the approval of the ISFSI Decommissioning Funding Plan.

10 CFR 72.30(c) (4) actual remediation costs that exceed the previous cost estimate.

Response: SMUD will not begin to decommission the Rancho Seco ISFSI until after the U.S. Department of Energy takes possession of the spent fuel and GTCC waste. Currently, this is estimated to begin in 2024. Therefore, there have been no actual remediation costs that exceed previous cost estimates.