

10CRF50.75

August 31, 2012

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

**Subject: Docket Nos. 50-206
Response to Request for Additional Information – Unit 1
Decommissioning Funding
San Onofre Nuclear Generating Station, Unit 1**

References: (1) Letter from J. C. Shepherd (NRC) to R. J. St. Onge (SCE), Subject:
"Request for Additional Information - Unit 1 Decommissioning Funding",
dated July 19, 2012

(2) Letter R. J. St. Onge (SCE) to Document Control Desk (NRC), Subject:
"Docket No. 50-206 10 CFR 50.75(f) Decommissioning Funding
Report, San Onofre Nuclear Generating Station Unit 1", dated March
29, 2012

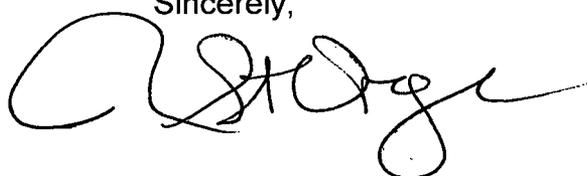
Dear Sir or Madam:

By letter dated July 19, 2012 the Nuclear Regulatory Commission (NRC) issued a Request for Additional Information (Reference 1) regarding SONGS Unit 1 Decommissioning Funding. The enclosure provides Southern California Edison's (SCE's) response.

The letter requested a response within 30 days of receipt of the letter. NRC staff agreed to an extension of this date by e-mail on August 15 and by phone on August 24.

There are no new regulatory commitments contained in this letter. If you have any questions or require additional information, please contact Ms. Linda T. Conklin at (949) 368-9443.

Sincerely,



Enclosures: 1. Response to Request for Additional Information – Unit 1
Decommissioning Funding
2. SONGS 1 Cost Study for Remaining Decommissioning Work

cc: E. E. Collins, Regional Administrator, NRC Region IV
J. E. Whitten, NRC Region IV, San Onofre Unit 1
J. C. Shepherd, NRC Project Manager, San Onofre Unit 1
G. G. Warnick, NRC Senior Resident Inspector, San Onofre Units 2 and 3

Enclosure 1

**Response to Request for Additional Information – Unit 1
Decommissioning Funding**

REQUEST FOR ADDITIONAL INFORMATION
BY THE OFFICE OF REGULATORY REGULATION
2012 DECOMMISSIONING FUNDING STATUS REPORT
FOR SAN ONOFRE NUCLEAR GENERATING STATION UNIT 1

RAI #1

Citation for Site-Specific Study

Provide the site specific cost estimate for SONGS 1, unless it was previously submitted to NRC. If the cost estimate was previously submitted to NRC, then provide a reference to its submittal. The site specific cost estimate should include a summary schedule of annual expenses, projected earnings, and end-of year fund balances, expressed in current dollars.

On March 29, 2012, SCE referenced a site-specific cost estimate for the amount of decommissioning funds estimated to be required.

Per 10CFR 50.75(f)(1)(i) and (ii),

the licensee must specifically describe the safe store period in order to take credit for projected future earnings when it uses a site-specific estimate as the basis for using the prepayment or external sinking fund methods of financial assurance.

Response to RAI #1

A site specific Decommissioning Cost Estimate for San Onofre Nuclear Generating Station (SONGS) Unit 1 was submitted to the NRC on May 5, 1999 (Accession Number 9905060222). That site specific estimate included the entire scope of the SONGS Unit 1 decommissioning project, as of December 1998. The California Public Utilities Commission (CPUC) approved that site specific estimate on June 3, 1999. That estimate included a summary schedule of annual expenses, which were expressed in 1998 dollars, but did not include projected earnings or end-of-year fund balances.

The site-specific cost estimate referenced in the March 29, 2012 letter is an updated estimate for the portion of the SONGS Unit 1 decommissioning work that was not yet completed as of January 1, 2009. This cost estimate was submitted to the CPUC on April 3, 2009, and was approved by the CPUC on July 29, 2010. A copy is attached as Enclosure 2. As discussed in a phone conversation on August 24, 2012, this cost estimate includes a summary schedule of remaining annual expenses, which is expressed in 2008 dollars.

Enclosure 2

**SONGS 1 Cost Study for Remaining
Decommissioning Work**

San Onofre Nuclear Generating Station – Unit 1
Decommissioning Cost Study

**San Onofre Nuclear Generating Station Unit 1
(SONGS 1)**

**Cost Study
For
Remaining Decommissioning Work**

March 2009

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EXECUTIVE SUMMARY

Southern California Edison Company (SCE) developed an updated cost estimate for the remaining San Onofre Nuclear Generating Station Unit 1 (SONGS 1) decommissioning scope of work. The updated estimated cost is \$184.4 million (2008 dollars).

This updated estimate includes the cost of some activities that began prior to January 1, 2009 for which funds have been expended but no liability has been eliminated. The decommissioning liability is considered to have been eliminated only when the entire activity is completed and all associated material is permanently removed from the site.

This updated cost estimate includes the removal of all remaining foundations, the burial of approximately 211,000 cubic feet of Low Level Radioactive Waste (LLRW), and the removal of approximately 2,496,000 cubic feet of clean material. Also included in this estimate are the costs for the long-term monitoring of the Independent Spent Fuel Storage Installation (ISFSI), removal of the ISFSI after spent fuel has been removed by the U. S. Department of Energy (DOE), site restoration in accordance with the site easement and lease agreements, and SCE staff termination costs that will occur at the end of the project consistent with California Public Utilities Code Section 8330.

The Phase I decommissioning activities, including decontamination and dismantling of all above grade structures and some foundations to Elevation 8'-6" (approximately 12 feet below grade), and installation and loading of the ISFSI, were completed in 2008. The Phase II activities, which include spent fuel dry storage monitoring, offshore conduits disposition, reactor pressure vessel (RPV) disposition, and the costs to transfer the fuel canisters to the DOE transportation casks, will continue through 2036. Phase III activities include spent fuel dry storage dismantling and site restoration. Final site restoration will be conducted concurrent with the SONGS 2&3 site restoration during the 2052-2053 timeframe.

1 INTRODUCTION

SCE staff personnel developed this site-specific cost estimate. The estimate includes the estimated cost necessary to complete the remaining SONGS 1 decommissioning work scope, including decommissioning project demobilization and document closeout work that began prior to January 1, 2009 but for which the decommissioning liability has not yet been eliminated.

1.1 OBJECTIVE

This study provides a comprehensive cost estimate of the remaining work associated with the decommissioning of SONGS 1.

1.2 SITE DESCRIPTION

SONGS 1 is located on the coast of southern California in San Diego County, approximately 62 miles southeast of Los Angeles and 51 miles northwest of San Diego. The site is located entirely within the boundaries of the United States Marine Corps Base, Camp Pendleton, under lease contracts and easement agreements granted by the United States Government and the California State Lands Commission. SCE is the majority owner and holds the NRC license in conjunction with San Diego Gas & Electric (SDG&E), the other SONGS 1 owner.

The SONGS facility was comprised of three nuclear generating units and support facilities. Unit 1 occupied the northern portion of the SONGS plant site. Units 2&3 are located south and immediately adjacent to the SONGS 1 site. SONGS 2&3 are not included in the scope of this study.

Designed by Bechtel, SONGS 1 contained a Westinghouse Nuclear Steam Supply System (NSSS) and a Westinghouse turbine-generator set rated at 450 Megawatts electric. The NSSS for SONGS 1 consisted of a pressurized water reactor and a three-loop Reactor Coolant System (RCS). The reactor core power output was 1347 Megawatts thermal. Beginning in 1982, SONGS 1 was operated at 92% of full power to extend the life of the steam generators, producing 410 Megawatts of electricity.

The RCS included the reactor vessel and three heat transfer loops, each contained a steam generator and a reactor coolant pump. In addition, the system included an electrically heated pressurizer, a pressurizer relief tank, and interconnected piping. The system was housed within a "containment sphere," a seismic Category 1 steel sphere enclosure with a concrete basemat. Enclosing the sphere is a concrete biological shield, the Sphere Enclosure Building (SEB).

Heat produced in the reactor was converted to electrical energy by the turbine-generator system. The turbine-generator system converted the thermal energy of the steam produced in the steam generators first into mechanical shaft power and then into electrical energy. The SONGS 1 turbine-generator was a three-cycle

tandem compound, quadruple exhaust, condensed unit operating at 1800 revolutions per minute. The high-pressure turbine and the two low-pressure turbines were coupled in tandem to drive the generator. The turbines were operated in a closed feedwater cycle that condensed the steam to feedwater and then returned it to the steam generators. The Circulating Water System removed heat rejected from the main condensers.

The Circulating Water System provided the heat sink required for removal of waste heat from the power plant's thermal cycle. The system had the principal function of removing heat by absorbing this energy in the main condenser. The circulating water pumps drew seawater through intake structures and pumped it into the main condensers where it absorbed waste heat. This seawater was then returned from the main condenser to the ocean. Reinforced concrete conduits placed below the ocean floor provided for seawater intake and discharge.

1.3 DECOMMISSIONING STATUS

After an evaluation in 1997 of whether or not to continue to delay or to proceed with decommissioning SONGS 1, a decision was made in the fall of 1997 to proceed with active decommissioning. In December of 1997, SCE and SDG&E advised the California Public Utility Commission (CPUC) and the U. S. Nuclear Regulatory Commission (NRC) of their intent to commence decommissioning SONGS 1. SCE submitted an updated Post Shutdown Decommissioning Activities Report (PSDAR) to the NRC on December 15, 1998. Subsequently, in Decision D.99-06-007, the CPUC approved SCE's request to the CPUC to commence SONGS 1 decommissioning.

Phase I of the SONGS 1 decommissioning project began in July 1999 with modifications to physically separate SONGS 1 from SONGS 2&3, preparations for demolition of the Diesel Generator Building, and the restoration of the SONGS 1 Turbine Gantry Crane.

Some of the major milestones achieved during 2000 included:

- Establishment of the new Radiologically Controlled Area (RCA) entry point,
- Demolition and removal of the Diesel Generator Building,
- Disassembly of the Turbine-Generator,
- Relocation of the Control Room,
- Achievement of Cold and Dark. This is a condition in which the existing SONGS 1 electrical systems were de-energized and a clearly defined temporary electrical distribution system was installed. This activity is a major safety consideration for personnel working on decommissioning activities.

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Some of the major milestones achieved during 2001 included:

- Demolition and removal of the Control Administration Building,
- Demolition and removal of the east feedwater heater deck of the Turbine Building,
- Relocation of the Security Boundary to permit less restrictive personnel and vehicular access to SONGS 1 while maintaining the Protected Area boundary for SONGS 2&3. The economic benefits of this achievement were altered after the September 11, 2001 terrorist attacks.
- Construction of a prototype canister for fuel storage in the ISFSI and acquisition of the fuel canister ASME "N" stamp certification.
- Segmentation of the reactor vessel internals and large component removal projects began.

Some of the major milestones achieved during 2002 included:

- Completed the ISFSI Pad and associated Security System(s).
- C.A. Huff & Associates completed the Machine Loading and Product Flow Analysis for the Dry Fuel Storage Container Facility.
- Completed the Reactor Vessel Internals (RVI) Segmentation Project.
- Sphere Enclosure Building (SEB) Roof Removed.

Some of the major milestones achieved during 2003 included:

- Completed fabrication of the first five of eighteen Dry Fuel Storage Containers.
- Moved Unit 1 Spent Fuel from Unit 3 to the ISFSI.
- Removed all major Turbine Building Systems.
- Removed remaining major radioactive components from Containment (e.g., Reactor Coolant Pumps, Residual Heat Exchangers, Pressurizer Relief Tank, etc).

Some of the major milestones achieved during 2004 included:

- Completed 10 additional, of eighteen, Dry Fuel Storage Containers.
- Moved Unit 1 Spent Fuel and GTCC waste from Unit 1 to ISFSI.

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- Removed remaining major components from the Turbine Building (i.e., Gantry Crane, Condensate Tank, Transformers).
- Completed demolition of the SEB Wall with the exception of the western portion.

Some of the major milestones achieved during 2005 included:

- Completed remaining three Dry Fuel Storage Containers.
- Moved Unit 1 fuel from Unit 2 to the ISFSI.
- Drained spent fuel pool and removed systems from Fuel Storage Building.
- Achieved Cold and Dark in Radwaste Building, and removed systems from Valve Alley and Doghouse.

Some of the major milestones achieved during 2006 included:

- Removed remaining systems from Fuel Storage and Radwaste Buildings.
- Completed Phases 2 and 3 of Bluff Stabilization work scope.
- Completed system removal in Auxiliary Cooler Area.

Some of the major milestones achieved during 2007 included:

- Removed Ventilation Building systems, Ventilation Stack, and Ventilation Building.
- Completed Switchyard abandonment and turning power removal.
- Demolished A40/41 and A42 Buildings.
- Completed Containment Sphere and Fuel Storage Building demolition, foundation removal, and backfill and compaction.

Some of the major milestones achieved during 2008 included:

- Removed miscellaneous foundations and storm drain systems.
- Demolished A51/A52 Building.
- Completed backfill, compaction, and asphalt paving of most of SONGS 1 Industrial Area.
- Completed Phase I of the SONGS 1 decommissioning work scope.

Phase II of the SONGS 1 decommissioning project will primarily consist of maintaining and monitoring the SONGS 1 used fuel stored at the SONGS site until it is removed by the U.S. Department of Energy (DOE). SCE currently projects that the DOE will remove the last SONGS 1 fuel from the site in 2036. Other Phase II activities will include the final disposition of the SONGS 1 offshore conduits, and the segmentation and disposal of the SONGS 1 Reactor Pressure Vessel (RPV).

Phase III of SONGS 1 decommissioning will include the removal of remaining residual radioactivity as required to terminate the NRC License for the SONGS 1 site, and removal of remaining site structures and improvements as required for final site restoration and termination of the easement-leases from the U.S. Department of the Navy (Navy). Phase III of SONGS 1 decommissioning will be completed concurrently with Phase III of SONGS 2&3 decommissioning. This is not expected to occur until the two years after the DOE removes the last SONGS 2&3 used fuel from the SONGS site, which is currently projected to occur in 2051.¹

1.4 ASSUMPTIONS

1.4.1 General

- All "improvements" placed at SONGS 1 will be removed consistent with site easement and lease agreements.
- SCE will manage the performance of the decommissioning project.
- Controlled charges (explosives) will not be used in the SONGS 1 decommissioning project.
- Estimated costs are provided in 2008 dollars. Costs are not inflated or escalated over the period of performance.
- The current SCE cost of labor at the site is used as an estimating basis.

¹ See Exhibit SCE-2, page 4.

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- The schedule assumes a single shift, five day, eight hours per day workweek, with some expected exceptions.
- Supplemental craft labor required for SONGS 1 decommissioning activities will be acquired through the regional building trades at rates consistent with current labor agreements.
- A dewatering plan will be developed to support removal of all SONGS 1 foundations below the water table concurrent with the dewatering of the entire site currently expected during the site restoration period in 2052-2053.

1.4.2 Independent Spent Fuel Storage Installation (ISFSI)

- The ISFSI contains 17 stainless steel dry storage canisters containing SONGS 1 fuel and 1 stainless steel dry storage canister containing Greater Than Class C (GTCC) waste from SONGS 1, positioned horizontally and installed into reinforced concrete Advanced Horizontal Storage Modules (AHSMs).
- SONGS 1 fuel transfer to the DOE is assumed to be complete in 2036.
- The DOE contract provides for "free on board carrier" shipping arrangement. The costs to move fuel from the ISFSI to the DOE transportation vehicle are included in the decommissioning cost estimate. The DOE Nuclear Waste Fund is assumed to pay all costs (shipping and storage) after the canisters are placed on the DOE transportation vehicle.
- Repackaging of fuel, if needed, is assumed to be performed by the DOE at a DOE facility.

1.4.3 Low Level Radioactive Waste (LLRW)

- All known or potentially radioactive solid waste materials will be buried at a NRC licensed LLRW disposal facility.

1.4.4 Greater Than Class C Waste (GTCC)

- A licensed disposal facility is assumed to be available for GTCC disposal by the time the DOE removes the last SONGS 1 spent fuel canister.
- The disposal cost for GTCC waste is included in this estimate. All remaining SONGS 1 GTCC waste stored onsite is either stored in the ISFSI or encapsulated in the Reactor Pressure Vessel Packaging and Transportation System (RPVPTS).

1.5 DECOMMISSIONING APPROACH

SCE, with its current workforce, will perform Phase II work activities, such as monitoring and maintenance of the SONGS 1 used fuel, until SONGS 2&3 are permanently retired, currently projected to occur in 2022 after the current NRC operating licenses expire. At that time, SCE will assemble a staff dedicated to SONGS 2&3 decommissioning to manage that project, and to monitor and maintain the SONGS 1 spent fuel until it is removed by the DOE. In the interim, SCE will conduct the Phase II activities in a manner that ensures there is no impact or disruption to the ongoing operation of SONGS 2&3.

Phase III work associated with SONGS 1, including NRC license termination and final site restoration activities, will be performed by SCE's SONGS 2&3 decommissioning workforce, supplemented as needed by specialty contractors with decommissioning knowledge and experience.

2 ESTIMATE OF REMAINING DECOMMISSIONING ACTIVITIES (2009 to end of Phase III)

This section describes the scope of the estimate and the methodology used in developing the cost estimate. The cost estimate is summarized in Table 1, the projected cash flow is provided in Table 2, and the schedule of activities is provided in Table 3.

2.1 SCOPE OF ESTIMATE

The scope of this estimate addresses the remaining SONGS 1 decommissioning activities from January 1, 2009 through NRC license termination and final site restoration.

A major source of the decommissioning liability arises from the fundamental requirement to remove radioactive materials from the site and dispose of them at an NRC-licensed LLRW disposal facility. With the exception of the Reactor Pressure Vessel (RPV), SCE removed most radioactive materials from the SONGS 1 site during Phase I. SCE will remove the remaining radioactive materials during Phases II and III and ship them to a licensed disposal facility. In addition, this estimate assumes that SCE will segment and dispose of the SONGS 1 RPV, which also contains radioactive materials, during Phase II.

In 2005, the CA State Lands Commission approved an amendment to the easement-lease contract for the SONGS 1 offshore intake and discharge conduits that replaced SCE's obligation to excavate and remove the conduits with an environmentally preferred alternative that would remove the vertical structures and install mammal barriers over the resulting openings and allow the horizontal structures to remain in place and backfill with seafloor material. SCE agreed to defer this work until at least 2010 to allow the Navy to study possible reuse of one

or both conduits. SCE intends to complete this work, and/or to complete a full or partial transfer of the conduits easement-lease to the Navy, during Phase II. The site easement-lease contract also requires the removal of all remaining improvements to the SONGS 1 site, including non-radioactive materials, except to the extent the Navy requests SCE to leave them in place. The Navy has informed SCE that it does not intend to specify any improvements that may be left in place or deep foundations that may be abandoned in place until SCE is prepared to perform the final site restoration and terminate the site easement-lease contract.

2.2 METHODOLOGY

SCE used planning studies to develop the cost estimate of remaining work for the SONGS 1 decommissioning project. Planning for near-term activities is more detailed than planning for activities scheduled more than 12 to 15 months in the future. The task sequence used to develop estimates for the decommissioning activity is summarized below:

- a) SCE defined the scope and boundary of the direct physical work activity. Appendix A identifies the scope of these activities.
- b) SCE Engineering identified major components and system materials (electrical/mechanical) included in the work scope along with their associated weights (in pounds). Additionally, SCE Engineering identified design changes that would be required to support the work scope. Concurrently, similar work scopes that have been completed were identified, along with their recorded costs and quantities to aid in validating the estimates.
- c) SCE Engineering, Health Physics, and Projects personnel then performed work activity walkdowns. The purpose of the walkdowns was to (1) visually inspect the work activity area, (2) become familiar with the actual work scope, (3) discuss and define the work sequence, and (4) identify any work complexity considerations that would be involved during performance of the work tasks. Work complexity considerations include such issues as radiological considerations, accessibility, underground work, proximity to other work and/or equipment, airborne contamination, and packaging/cutting material for shipment.
- d) SCE Health Physics prepared the radiological characterization of the work scope including estimates of decontamination requirements, radioactive waste generated, and radioactive waste disposal costs.
- e) Based on the above information, SCE Projects personnel then identified the tasks necessary to complete the work scope. The estimates were prepared by developing a labor crew size, craft mix, and duration for each identified task to derive the estimated direct construction craft man-hours associated with the specific work scope. These estimates were based on prior construction experience, to-date experience with SONGS 1

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Decommissioning, and projected activity costs from industry vendors when necessary and appropriate. The direct construction craft man-hour estimates reflect work complexity considerations that would be encountered during the actual performance of the work. SCE also identified construction materials and equipment necessary to support the work tasks.

- f) The data developed in the first five steps were provided to Project Controls for consolidation into integrated plans and development of the cost estimate. When applicable, SCE used actual contract prices for specific tasks based upon executed contracts with suppliers. Duration dependent costs and contingency factors were estimated and included in the activity estimates. Appendix B identifies the cost estimate for each activity.
- g) Each activity plan and estimate was then reviewed with the SONGS 1 Decommissioning project management and finalized.
- h) After each activity plan and estimate was approved and entered into the Primavera Project scheduling program. SCE consolidated the results into the detailed, executable project plan and schedule. Table 2 provides the Project Plan Cash Flow and Table 3 provides the Project Plan Schedule.

Appendix C identifies the Project Staffing requirements, which result from the estimates of remaining work. Appendix D identifies the work complexities reflected in the estimates.

2.3 SITE SPECIFIC CONSERATIONS / CHALLENGES

Under the NRC's License Termination criteria, the plant operator must remove or decontaminate all equipment and structures necessary to permit release of the property for unrestricted use. In addition to completing all requirements for NRC license termination, SCE must remove all improvements from the site as prescribed in the site easement-lease contracts with the Navy. (SCE is not required to restore the pre-existing bluffs.) SCE also has material removal requirements for portions of the intake and outfall conduits, located under the seafloor, as specified in the easement-lease with the California State Lands Commission.

Following Phase I of SONGS 1 decommissioning, the ISFSI will provide storage for SONGS 1 spent fuel. Some other structures, including the SONGS 1 seawall, north boundary, and some structure foundations will also remain in place. After the DOE has removed all the spent fuel, the ISFSI and the other remaining structures will be decommissioned concurrent with the decommissioning and site restoration of SONGS 2&3.

In September 2002, the Governor of California issued an Executive Order that prohibits Class III landfills in the state from accepting materials from nuclear facility decommissioning projects that contain any measurable radioactivity, even if the activity levels are below NRC or EPA thresholds. Consequently, the SONGS 1 Decommissioning Cost Study must include the cost to dispose of all such materials from SONGS 1 at a licensed LLRW disposal facility.

2.4. CONTINGENCY

The overall contingency factor for Phase II and Phase III decommissioning activities is 25%, consistent with contingency factors for other long lead-time decommissioning activities.

Table 1

**Cost Estimate Summary for
Remaining SONGS 1 Decommissioning Work**

San Onofre Nuclear Generating Station – Unit 1
Decommissioning Cost Study

Table 1

Cost Estimate Summary for Remaining SONGS 1 Decommissioning Work

Work Activity	Manhours	Waste (cubic feet)		Cost Estimate (2008\$ x 1000)
		Clean	LLRW	
Phase II Activities				
Post-Phase I Demobilization and Documentation Close-out	13,683	0	0	\$7,942
Used Nuclear Fuel Monitoring and Maintenance	0	0	0	\$2,063
Offshore Conduits Disposition	340	7,776	0	\$10,003
Reactor Pressure Vessel Segmentation	0	0	0	\$37,724
Reactor Pressure Vessel Maintenance, Shipping, and Disposal	0	0	0	\$52,032
Move SONGS 1 Used Fuel & GTCC from ISFSI to DOE Transporter	0	0	0	\$2,688
Phase II Subtotal	<u>14,023</u>	<u>7,776</u>	<u>0</u>	<u>\$112,452</u>
Phase III Activities				
ISFSI Demolition and Disposal (Allowance)				\$3,854
Miscellaneous Structure Removal and Disposal	1,469	0	40,473	\$11,050
Deep Foundation Removal, Disposal, Backfill, etc.	50,707	2,488,190	170,500	\$53,155
NRC License Termination, Final Site Restoration, and Easement Closeout (Allowance)				\$3,855
Phase III Subtotal	<u>52,176</u>	<u>2,488,190</u>	<u>210,973</u>	<u>\$71,914</u>
Total	66,199	2,495,966	210,973	\$184,366

Table 2

Cash Flow for
Remaining SONGS 1 Decommissioning Work

San Onofre Nuclear Generating Station – Unit 1
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Table 2

Cash Flow for Remaining SONGS 1 Decommissioning Work
(2008\$ x 1000)

Year	Activity Description	Phase II	Phase III	Total
2009	Demob & Doc Closeout, ISFSI M&M	\$8,113	\$0	\$8,113
2010	ISFSI M&M, Offshore Conduits	\$10,157	\$0	\$10,157
2011	ISFSI M&M	\$140	\$0	\$140
2012	ISFSI M&M	\$128	\$0	\$128
2013	ISFSI M&M	\$117	\$0	\$117
2014	ISFSI M&M	\$109	\$0	\$109
2015	ISFSI M&M	\$104	\$0	\$104
2016	ISFSI M&M	\$93	\$0	\$93
2017	ISFSI M&M	\$91	\$0	\$91
2018	ISFSI M&M	\$88	\$0	\$88
2019	ISFSI M&M	\$83	\$0	\$83
2020	ISFSI M&M	\$78	\$0	\$78
2021	ISFSI M&M	\$72	\$0	\$72
2022	ISFSI M&M	\$67	\$0	\$67
2023	ISFSI M&M	\$64	\$0	\$64
2024	ISFSI M&M	\$59	\$0	\$59
2025	ISFSI M&M, RPV Segmentation	\$37,773	\$0	\$37,773
2026	ISFSI M&M, RPV Ship & Bury	\$52,076	\$0	\$52,076
2027	ISFSI M&M	\$44	\$0	\$44
2028	ISFSI M&M	\$39	\$0	\$39
2029	ISFSI M&M	\$34	\$0	\$34
2030	ISFSI M&M	\$29	\$0	\$29
2031	ISFSI M&M	\$25	\$0	\$25
2032	ISFSI M&M	\$20	\$0	\$20
2033	ISFSI M&M	\$14	\$0	\$14
2034	ISFSI M&M	\$10	\$0	\$10
2035	ISFSI M&M, Move U1 Fuel & GTCC to DOE Transporter	\$1,435	\$0	\$1,435
2036	ISFSI M&M, Move U1 Fuel & GTCC to DOE Transporter	\$1,392	\$0	\$1,392
2037		\$0	\$0	\$0
2038		\$0	\$0	\$0
2039		\$0	\$0	\$0
2040		\$0	\$0	\$0
2041		\$0	\$0	\$0
2042		\$0	\$0	\$0
2043		\$0	\$0	\$0
2044		\$0	\$0	\$0
2045		\$0	\$0	\$0
2046		\$0	\$0	\$0
2047		\$0	\$0	\$0
2048		\$0	\$0	\$0
2049		\$0	\$0	\$0
2050		\$0	\$0	\$0
2051		\$0	\$0	\$0
2052	ISFSI, Misc, Dp Fdn D&D; Lic Term & Site Restoration	\$0	\$35,957	\$35,957
2053	ISFSI, Misc, Dp Fdn D&D; Lic Term & Site Restoration	\$0	\$35,957	\$35,957
Total		\$112,453	\$71,913	\$184,366

Table 3

**Schedule of
Remaining SONGS 1 Decommissioning
Work Activities**

San Onofre Nuclear Generating Station – Unit 1
Decommissioning Cost Study

Table 3

Schedule of Remaining SONGS 1 Decommissioning Work Activities

Activity ID	Description	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	
2.1.10	1PS000010	Demobilization & Document Closeout																					
2.1.2	1PS001790	Long Term ISFSI Maintenance																					
2.1.1	1PS001275	Offshore Conduit Disposition																					
2.1.6	1PS000030	RPV Segmentation																					
2.1.7	1PS001267F	RPV Ship and Bury																					
2.1.8	1PS001775	Move Fuel to DOE Transporter																					
2.1.9	1PS001780	ISFSI Decommissioning & Disposal																					
2.1.4	1PS000040	D & D Storm Drains																					
2.1.12	1PS001295F	Install/Operate Site Dewatering System																					
2.1.3	1PS001190B	Deep Containment Foundations Removal																					
2.1.5	1PS001260B	Demo Int Struct/Dls Civrts/Slurry Rmvl/Backfill																					
2.1.5	1PS001700B	Intake Foundation Removal																					
2.1.11	1PS000020	NRC License Termination & Final Site Restoration																					
Start Date		01MAY98	DEC2	Table 3																		Sorted By Start Date	
Finish Date		31DEC53	LT41	San Onofre Unit 1																			
Data Date		01MAR09		Decommissioning																			
Run Date		03MAR09 08:50		Level 1																			
				Summary Schedule																			
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Appendix A

Scope of Remaining Physical Work

Appendix A
Scope of Remaining Physical Work

Phase II Work

Post-Phase I Demobilization and Document Close-Out

Scope includes completion of activities required to leave Unit 1 Industrial Area in a safe and stable condition; demobilization of decommissioning-related temporary structures, equipment, and workforce; survey and decontamination of decommissioning tools and equipment; and close-out of decommissioning project documents and radiological survey records.

Used Nuclear Fuel Monitoring and Maintenance

Scope includes the SONGS 1 pro rata share of maintenance and security for the ISFSI until the SONGS 1 used fuel and GTCC are removed and transported to a permanent disposal site by the DOE, currently projected by 2036.

Offshore Conduits Disposition

The work scope includes disposition of the Intake and Outfall Conduits west of the sea wall. The original easement-lease with the California State Lands Commission has been revised and now only requires removal of the vertical structures of the conduits in lieu of complete removal, and installation of "mammal barriers" that will allow the conduits to fill with seafloor materials. The primary input used for this cost estimate is a vendor contract awarded in 2005. The estimated costs for permitting fees and staff support necessary to obtain the necessary permits (including attorney fees) have also been included in this estimate.

Reactor Pressure Vessel Segmentation and Disposal

The work scope includes segmentation of the RPV concurrent with the disposition of the SONGS 2&3 RPVs. Segmentation may be required to reduce the shipping package sizes and weights to allow transportation on the U.S. rail system to the disposal site for LLRW Class C waste, which is assumed to be available within 1500 miles of the SONGS site, consistent with the assumption for such a facility in the SONGS 2&3 Decommissioning Cost Estimate. Segmentation is believed to be the bounding cost option.

Move SONGS 1 Used Fuel & GTCC from ISFSI to DOE Transporter

Scope includes the removal of SONGS 1 spent fuel canisters and GTCC canister from the ISFSI, placement of said canisters into DOE shipping casks and placement of casks onto a DOE transporter vehicle.

Phase III Work

SONGS 1 ISFSI Demolition and Disposal

Scope includes removal of the ISFSI structure, removal of remaining foundations subject to NRC and landlord requirements, decontamination of the site, as required, and restoration of the SONGS 1 site to an approved configuration.

Miscellaneous Structures Removal and Disposal

This scope of work includes the removal, packaging, shipping, and disposal of all remaining storm drains within the SONGS 1 Industrial Area. These storm drains are assumed to be radioactively contaminated. In addition, this scope includes the removal, disposal, and radiological surveys for the southeast quadrant of the SONGS 1 Industrial Area, the Utility Trench. Prior to backfill and compaction, Health Physics will survey and release all excavation areas.

Deep Foundation Removal, Disposal, Backfill, and Compaction

Containment Foundations

The scope of work includes removal of the remainder of containment foundation below Elevation 8' 6". This includes the three-foot thick concrete saddle that the Containment sphere rested upon, the low density grout that was placed in the saddle up to Elevation 7', and the 18-inch concrete cap that was placed between Elevation 7' and Elevation 8' 6". Before this work begins, the site must be de-watered. Any remaining underground utilities in the vicinity of the excavation for foundation removal will be included in this work scope. All excavated areas will be surveyed and released by Health Physics, and then backfilled to grade and compacted.

Intake Structure Foundations

During Phase I, the voids within the intake structure culverts and foundations below Elevation 8' 6" were filled with low density grout. This scope of work is to remove and dispose of all remaining intake structure foundations below Elevation 8' 6" associated with the circulating water system intake and outfall within the Industrial Area as far west as the sea wall. The structures west of the sea wall will be abandoned in place consistent with amended CA State Lands Commission easement-lease agreement. All excavated areas will be surveyed and released by Health Physics, and then backfilled to grade and compacted.

NRC License Termination and Final Site Restoration

Scope includes final status survey of the SONGS 1 site, removal of any remaining radioactive materials as required to terminate NRC license, and removal of remaining site improvements and other tasks required to meet specifications of the U.S. Department of the Navy in order to terminate the site easement-lease agreements.

Appendix B

**Detailed Cost Estimate
of
Remaining Decommissioning Work**

San Onofre Nuclear Generating Station – Unit 1
Decommissioning Cost Study

Appendix B

Detailed Cost Estimate for Remaining SONGS 1 Decommissioning Work
(2008\$ x 1000, includes all Site Overheads and Corporate A&G)

Est. #	Building/ Activity	Remaining Work						Type of Waste (cubic feet)		
		Removal	Packing & Shipping	Burial	Maintain & Monitor	Other Work	Total	Clean	LLRW	Manhours
Phase II Work										
Demobilization and Document Closeout										
2.1.10	Compl Post-Ph I Demob. & Document Closeout	\$0	\$0	\$0	\$0	\$7,942	\$7,942	0	0	13,683
ISFSI										
2.1.2	Monitoring & Maintenance	\$0	\$0	\$0	\$2,063	\$0	\$2,063	0	0	0
Offshore Conduits										
2.1.1	Offshore Conduits - Prep for Aband'mt	\$0	\$0	\$0	\$0	\$6,112	\$6,112	0	0	0
2.1.1	Offshore Conduits - Rmv Conc MH Risers	\$26	\$0	\$0	\$0	\$0	\$26	7,776	0	340
2.1.1	Offshore Conduits - Add'l Work Allow. Intake Structure Demo (Included w/ Deep Foundations)	\$0	\$0	\$0	\$0	\$3,865	\$3,865	0	0	0
Reactor Pressure Vessel Dispositioning										
2.1.6	Reactor Pressure Vessel Segmentation		\$0	\$0	\$0	\$37,724	\$37,724	0	0	0
2.1.7	RPV M&M; Shipping and Burial	\$0	\$16,307	\$29,591	\$2,451	\$3,681	\$52,032	0	0	0
ISFSI										
2.1.8	Move U1 Fuel & GTCC to DOE Transporter	\$0	\$0	\$0	\$0	\$2,688	\$2,688	0	0	0
Subtotal Phase II Work		\$26	\$16,307	\$29,591	\$4,515	\$62,011	\$112,451	7,776	0	14,023
Phase III Work										
ISFSI										
2.1.9	ISFSI D&D	\$0	\$0	\$0	\$0	\$3,854	\$3,854	0	0	0
Other Misc										
2.1.4	Storm Drains	\$183	\$2,015	\$8,410	\$0	\$0	\$10,609	0	40,473	1,469
2.1.11	Complete MARSSIM in SE corner	\$0	\$0	\$0	\$0	\$441	\$441	0	0	0
Deep Foundations										
2.1.3	CNMT Deep Foundations	\$3,690	\$0	\$0	\$0	\$0	\$3,690	953,694	0	20,562
2.1.5	Misc. Deep Fdns Incl. Dewatering	\$8,144	\$7,573	\$30,040	\$0	\$3,707	\$49,465	1,534,496	170,500	30,145
NRC Lic. Term & Site Restoration										
2.1.9	NRC Lic. Term & Site Restoration	\$0	\$0	\$0	\$0	\$3,855	\$3,855	0	0	0
Subtotal Phase III Work		\$12,017	\$9,589	\$38,450	\$0	\$11,858	\$71,915	2,488,190	210,973	52,176
		\$12,044	\$25,896	\$68,042	\$4,515	\$73,870	\$184,366	2,495,966	210,973	66,199

Appendix C

Staffing Requirements
For
Remaining Decommissioning Work

San Onofre Nuclear Generating Station – Unit 1
Decommissioning Cost Study

Appendix C

Staffing Requirements for Remaining SONGS 1 Decommissioning Work
(Direct & Support FTE's)

	2009	2010	2011- 2024	2025	2026	2027- 2034	2035	2036	2037- 2051	2052	2053
DIRECT STAFFING											
Phase II											
Demob & Doc Closeout	22.50										
Used Fuel M&M	0.04	0.04	0.56	0.04	0.04	0.32	0.04	0.04	0.00	0.00	0.00
Offshore Conduits		Contract									
RPV Segment, Ship, Bury				Allowance							
Move Fuel to DOE Transporter							Allowance				
Phase III											
ISFSI D&D										Allowance	
Misc. Structures Removal										8.95	
Deep Foundations Rmvl										8.40	
Lic Term & Site Restore										6.20	6.20
SUPPORT STAFFING	1.00	1.00	14.00	1.00	1.00	8.00	1.00	1.00	14.00	7.50	7.50
Total Staffing Phases II & III	23.54	1.04	14.56	1.04	1.04	8.32	1.04	1.04	14.00	31.05	13.70

Notes:

The projected staffing levels for the contractor that will perform the Offshore Conduits disposition project are proprietary.

Detailed work plans for the RPV Segmentation and Shipping project, the Move SONGS 1 Used Fuel to the DOE Transporter project, and the ISFSI Decontamination and Demolition project have not yet been developed. Therefore, no staffing level projections have been made for these projects. Allowances have been provided for the associated project costs.

Appendix D

Work Complexity Considerations

Appendix D
Work Complexity Considerations

In preparation for estimating the cost of the remaining work, SCE Engineering, Health Physics, and Projects personnel then performed work activity walkdowns. The purpose of the walkdowns was to (1) visually inspect the work activity area, (2) become familiar with the actual work scope, (3) discuss and define the work sequence, and (4) identify any work complexity considerations that would be involved during performance of the work tasks. Additionally, the SCE personnel identified work complexities that would be involved in the performance of the work tasks.

The work complexity issues primarily impact the construction craft man-hours required to complete the activities. Based on a review of the activities, a crew size, crew mix, and duration were developed in order to derive the estimated direct construction craft man-hours to perform the work. Based on previous work experience with SONGS 1 decommissioning as well as work experiences throughout the SONGS site, these direct man-hour estimates reflect the work complexities involved in performing the work.

Work complexities and associated factors are defined below:

1. Work in Radiological Controlled Areas — This work would require many additional administrative tasks and preparatory activities that increase labor costs as well as the wearing of protective clothing and equipment that reduces productivity. Additional elements of work activity such as installation and removal of temporary shielding or physical access limitations also increase the labor man-hours required to complete the work scope. The work complexity factors reflected in the cost estimate are:
 - Work in Radiation/Contaminated areas requiring Health Physics tailboard.
5% increase to direct craft hour estimate.
 - Added rigging support on jobs requiring rigging from radiological controlled area: clean areas. *5% increase to direct craft hour estimate.*
 - Work in Radiation/Contaminated areas requiring modesty garments and protective clothing:
 - 1) Most work areas are contaminated. *5% increase to direct craft hour estimate.*
 - 2) Some work areas are considered High Contaminated or High Radiation areas. *10% increase to direct craft hour estimate.*
 - 3) Some work areas > 80 mRem/hour. *10% increase to direct craft hour estimate.*
 - 4) Some work areas > 1000 mRem/hour. *15% increase to direct craft hour estimate.*
2. Access — Labor productivity is affected when the task must be performed in an area that is difficult to access (such as an excavation site), when scaffolding is required, and when the area around the component is congested with other equipment, piping, or cabling. The work complexity factors reflected in the cost estimate are:

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- Scaffolding < 12' above floor required to access majority of components or area around components is congested requiring system removal to be performed with access ladders. *5% increase to direct craft hour estimate.*
 - Scaffolding required between 12-20' above floor to access majority of components or area around components extremely congested with difficult overhead system removal activities. *10% increase to direct craft hour estimate.*
 - Scaffolding required between 21-45' above floor to access majority of components or area around components extremely congested with difficult access to system/debris removal. *25% increase to direct craft hour estimate.*
3. Underground Work — Activities associated with the removal of underground structures and systems requires additional direct labor man-hours to account for unknown items that will be encountered as a result of not being able to physically inspect the area. Work complexity factors reflected in the cost estimate are:
- Based on actual experience with Security Boundary and Diesel Generator underground removal, a work complexity factor is required to account for the unknown/unforeseen. *20% increase to direct craft hour estimate.*
4. Work in Proximity to Other Work — The use of multiple work crews in a given area may require the construction of barriers. Work complexity factors reflected in the cost estimate are:
- Requires protection of other workers in the area by physical construction of barriers and coordination of equipment and space with resulting possibility of delays and/or additional craft hours. *5% increase to direct craft hour estimate.*
 - Requires protection of other workers in the more congested construction areas by physical construction of barriers and coordination of equipment and space with resulting possibility of delays and/or additional craft hours. *10% increase to direct craft hour estimate.*
5. Work in Proximity to Fuel Storage (Wet or Dry) — Work in the vicinity of the Spent Fuel Pool is affected by additional work precautions and protocols. Work complexity factors reflected in the cost estimate are:
- Added work precautions and inefficiencies for work in the vicinity of the Spent Fuel building. *5% increase to direct craft hour estimate.*
6. Airborne Contamination — Use of respiratory equipment to protect workers from air contamination will adversely affect productivity. Such equipment restricts vision and inhibits rapid coordinated motion in addition to requiring more time to don, doff, and maintain the respiratory equipment. Work complexity factors reflected in the cost estimate

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- Work will be performed in respirators or bubble hoods. *5% increase to craft hour estimate.*
7. Packaging / Cutting Materials for Shipment — Work activities for processing material shipping are affected by the materials to be processed and the means of shipping the materials off-site. Work complexity factors reflected in the cost estimate are:
- Packaging requirements for cut-up and packaging into inter-modal containers vs. shipping by truck or rail. *5% increase to craft hour estimate.*

The following table identifies the complexity factors that are reflected in the estimates. It identifies the initial unit cost (\$/lb) for system removal and demolition, the complexity factor(s) reflected the estimate, and the resulting unit cost (\$/lb) for system removal and demolition.

Appendix E

Allocations and Corporate Overheads

Appendix E Allocations & Corporate Overheads

SCE allocates some costs to the SONGS 1 decommissioning project on a monthly basis. These allocations are identified below:

Common Allocations

SCE allocates the appropriate amount of SONGS site "Common-O&M costs to SONGS 1 Decommissioning project on a monthly basis. SONGS "Common" O&M costs include activities that provide support to all SONGS work activities. For more information on the Common O&M allocation, refer to the 2009 General Rate Case Testimony, SCE-2, Vol. 2, Chapters IV and XIV.

Corporate A&G

SCE allocates corporate overhead costs to the SONGS 1 Decommissioning project. This allocation includes A&G and is based on the SAP procedures for allocating such costs to capital projects. The portion of corporate A&G chargeable to capital projects is a percentage approved by the CPUC. The A&G costs attributable to capital are distributed to all capital work orders, including SONGS 1 Decommissioning project, on a proportional basis. For more information on the Capitalized Corporate A&G, refer to the 2009 General Rate Case Testimony, SCE-7, Vol. 1, Chapter IX.

Appendix F
Cash Flow by Cost Category

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Appendix F

Cash Flow by Cost Category
(2008\$ x 1000)

Year	Activity Description	Labor	Other	Burial	Total
2009	Demob & Doc Closeout, ISFSI M&M	\$7,916	\$197	\$0	\$8,113
2010	ISFSI M&M, Offshore Conduits	\$26	\$10,131	\$0	\$10,157
2011	ISFSI M&M	\$0	\$140	\$0	\$140
2012	ISFSI M&M	\$0	\$128	\$0	\$128
2013	ISFSI M&M	\$0	\$117	\$0	\$117
2014	ISFSI M&M	\$0	\$109	\$0	\$109
2015	ISFSI M&M	\$0	\$104	\$0	\$104
2016	ISFSI M&M	\$0	\$93	\$0	\$93
2017	ISFSI M&M	\$0	\$91	\$0	\$91
2018	ISFSI M&M	\$0	\$88	\$0	\$88
2019	ISFSI M&M	\$0	\$83	\$0	\$83
2020	ISFSI M&M	\$0	\$78	\$0	\$78
2021	ISFSI M&M	\$0	\$72	\$0	\$72
2022	ISFSI M&M	\$0	\$67	\$0	\$67
2023	ISFSI M&M	\$0	\$64	\$0	\$64
2024	ISFSI M&M	\$0	\$59	\$0	\$59
2025	ISFSI M&M, RPV Segmentation	\$0	\$37,773	\$0	\$37,773
2026	ISFSI M&M, RPV Shlp & Bury	\$0	\$22,780	\$29,296	\$52,076
2027	ISFSI M&M	\$0	\$44	\$0	\$44
2028	ISFSI M&M	\$0	\$39	\$0	\$39
2029	ISFSI M&M	\$0	\$34	\$0	\$34
2030	ISFSI M&M	\$0	\$29	\$0	\$29
2031	ISFSI M&M	\$0	\$25	\$0	\$25
2032	ISFSI M&M	\$0	\$20	\$0	\$20
2033	ISFSI M&M	\$0	\$14	\$0	\$14
2034	ISFSI M&M	\$0	\$10	\$0	\$10
2035	ISFSI M&M, Move U1 Fuel & GTCC to DOE Transporter	\$0	\$1,435	\$0	\$1,435
2036	ISFSI M&M, Move U1 Fuel & GTCC to DOE	\$0	\$1,392	\$0	\$1,392
2037		\$0	\$0	\$0	\$0
2038		\$0	\$0	\$0	\$0
2039		\$0	\$0	\$0	\$0
2040		\$0	\$0	\$0	\$0
2041		\$0	\$0	\$0	\$0
2042		\$0	\$0	\$0	\$0
2043		\$0	\$0	\$0	\$0
2044		\$0	\$0	\$0	\$0
2045		\$0	\$0	\$0	\$0
2046		\$0	\$0	\$0	\$0
2047		\$0	\$0	\$0	\$0
2048		\$0	\$0	\$0	\$0
2049		\$0	\$0	\$0	\$0
2050		\$0	\$0	\$0	\$0
2051		\$0	\$0	\$0	\$0
2052	ISFSI, Misc, Dp Fdn D&D; Lic Term & Site Restoration	\$10,798	\$5,926	\$19,231	\$35,956
2053	ISFSI, Misc, Dp Fdn D&D; Lic Term & Site Restoration	\$10,798	\$5,926	\$19,231	\$35,956
Total		\$29,538	\$87,069	\$67,759	\$184,366