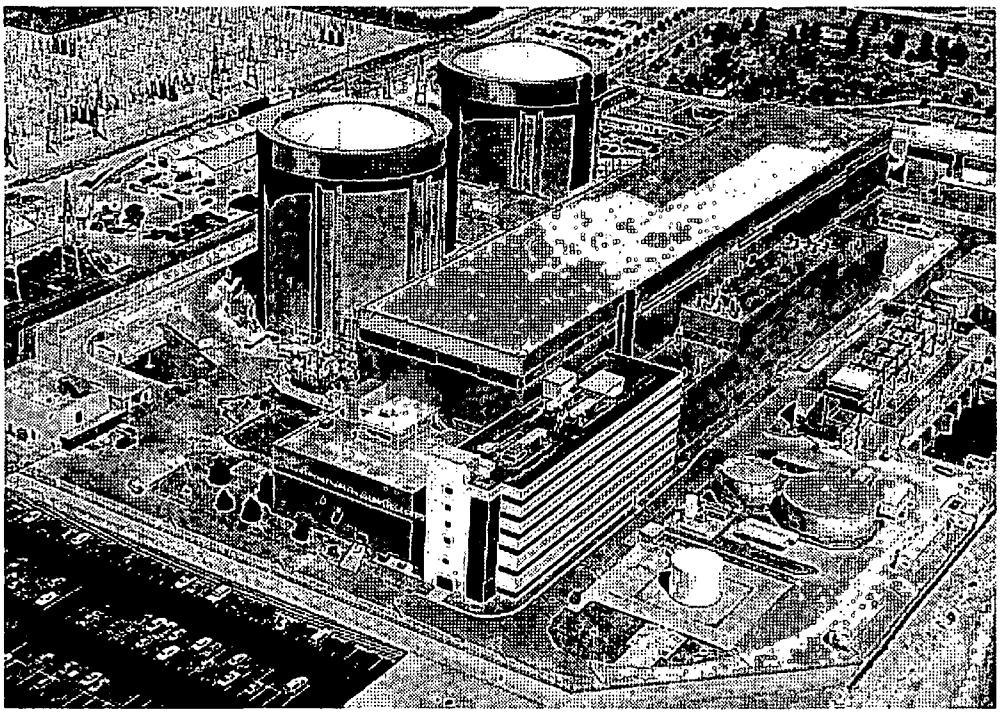
DECOMMISSIONING COST ANALYSIS

for the

ZION NUCLEAR POWER STATION



prepared for

EXELON Generation Company

prepared by

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February 2007

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TABLE OF CONTENTS

TABLE OF CONTENTS
(continued)

SECTION **PAGE**

TABLES

TABLE OF CONTENTS
(continued)

SECTION **PAGE**

FIGURES

APPENDICES

REVISION LOG

No.	CRA No.	Date	Item Revised	Reason for Revision
0		02-16-07		Original Issue

EXECUTIVE SUMMARY

This report presents estimates of the cost to decommission the Zion Nuclear Power Station (Zion) for the identified decommissioning scenarios following the February 13th, 1998 cessation of plant operations. The analysis relies upon site-specific, technical information, developed in an evaluation for Exelon Generation Company (Exelon) in 2003-04[1] and updated to reflect current assumptions pertaining to the disposition of the nuclear units and relevant industry experience in undertaking such projects. The updated estimates are designed to provide Exelon sufficient information to assess its financial obligations, as they pertain to the eventual decommissioning of the nuclear station.

The primary goal of the decommissioning is the removal and disposal of the contaminated systems and structures so that the plant's operating licenses can be terminated. The analysis recognizes that spent fuel will be stored at the site in the fuel handling building's storage pool until such time that it can be transferred to a U.S. Department of Energy (DOE) facility. Consequently, all three scenarios evaluated include the costs for maintaining the spent fuel storage pool and ultimately, the decontamination and dismantling of the fuel handling building.

The estimates are based on numerous fundamental assumptions, including regulatory requirements, project contingencies, low-level radioactive waste disposal practices, high-level radioactive waste management options, and site restoration requirements. Historical costs (i.e., incurred since the shutdown of Zion), are identified in the report. However, they are not included in the estimates for decommissioning, which are limited to future expenditures.

Alternatives and Regulations

The Nuclear Regulatory Commission (NRC or Commission) provided initial decommissioning requirements in its rule adopted on June 27, 1988[2]. In this rule, the NRC set forth financial criteria for decommissioning licensed nuclear power facilities. The regulations addressed planning needs, timing, funding methods, and environmental review requirements for decommissioning. The rule also defined three decommissioning alternatives as being acceptable to the NRC: DECON, SAFSTOR, and ENTOMB.

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1 "Decommissioning Cost Analysis for the Zion Nuclear Power Station," Document No. E16-1455-008, TLG Services, Inc., September 2004.

2 U.S. Code of Federal Regulations, Title 10, Parts 30, 40, 50, 51, 70 and 72 "General Requirements for Decommissioning Nuclear Facilities," Nuclear Regulatory Commission, Federal Register Volume 53, Number 123 (p 24018 et seq.), June 27, 1988.

DECON is defined as "the alternative in which the equipment, structures, and portions of a facility and site containing radioactive contaminants are removed or decontaminated to a level that permits the property to be released for unrestricted use shortly after cessation of operations."[3]

SAFSTOR is defined as "the alternative in which the nuclear facility is placed and maintained in a condition that allows the nuclear facility to be safely stored and subsequently decontaminated (deferred decontamination) to levels that permit release for unrestricted use."[4] Decommissioning is to be completed within 60 years, although longer time periods will be considered when necessary to protect public health and safety.

ENTOMB is defined as "the alternative in which radioactive contaminants are encased in a structurally long-lived material, such as concrete; the entombed structure is appropriately maintained and continued surveillance is carried out until the radioactive material decays to a level permitting unrestricted release of the property."[5] As with the SAFSTOR alternative, decommissioning is currently required to be completed within 60 years.

The 60-year restriction has limited the practicality for the ENTOMB alternative at commercial reactors that generate significant amounts of long-lived radioactive material. In 1997, the Commission directed its staff to re-evaluate this alternative and identify the technical requirements and regulatory actions that would be necessary for entombment to become a viable option. The resulting evaluation provided several recommendations, however, rulemaking has been deferred pending the completion of additional research studies, e.g., on engineered barriers.

In 1996, the NRC amended its decommissioning regulations to clarify ambiguities and codify procedures and terminology as a means of enhancing efficiency and uniformity in the decommissioning process [6]. The amendments allow for greater public participation and better define the transition process from operations to decommissioning. Regulatory Guide 1.184, issued in July 2000, further described the methods and procedures acceptable to the NRC staff for implementing the requirements of the 1996 amendments relating to the initial activities and major phases of the decommissioning process. The costs and schedules presented in this

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3 Ibid. Page FR24022, Column 3.
4 Ibid.
5 Ibid. Page FR24023, Column 2.
6 U.S. Code of Federal Regulations, Title 10, Parts 2, 50, and 51, "Decommissioning of Nuclear Power Reactors," Nuclear Regulatory Commission, Federal Register Volume 61, (p 39278 et seq.), July 29, 1996.

analysis follow the general guidance and processes described in the amended regulations.

Decommissioning Scenarios

The following scenarios were evaluated and are representative of alternatives available to the owner:

1. DECON: This scenario is intended to complete the decontamination of the power block structures, with the exception of the fuel handling building, as soon as reasonably achievable. The decommissioning workforce is mobilized at the site in 2013. Decontamination activities, including the removal of contaminated components and structures, are sequenced and integrated for the two units so as to minimize the overall duration. Fuel storage operations continue throughout and beyond the decommissioning of the adjacent facilities until the transfer of the fuel to the DOE can be completed (assumed for purposes of this study to be at the end of the year 2028). Once the pool is emptied, the fuel handling building is decommissioned, the operating licenses for the two units terminated, and the power block structures dismantled.

2. Delayed DECON: In the second scenario, the units remain in their current caretaking mode until the transfer of the spent fuel is complete. Decommissioning operations commence once the storage pool is emptied and proceed as a coordinated and integrated process. License termination is followed by building demolition and site restoration.

3. SAFSTOR: Similar to the Delayed DECON scenario, the units remain in an extended period of caretaking. However, in this scenario, decommissioning is deferred beyond the fuel storage period to the maximum extent possible, i.e., completion within the regulatory required 60-year time period. As with the first two scenarios, decommissioning activities at the two units are sequenced and integrated so as to minimize the total duration of the physical dismantling processes.

Methodology

The methodology used to develop the estimate described within this document follows the basic approach originally presented in the cost estimating guidelines [7] developed by the Atomic Industrial Forum (now Nuclear Energy Institute). This reference describes a unit factor method for determining decommissioning activity

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[7] T.S. LaGuardia et al., "Guidelines for Producing Commercial Nuclear Power Plant Decommissioning Cost Estimates," AIF/NESP-036, May 1986.

costs. The unit factors used in this analysis incorporate site-specific costs and the latest available information on worker productivity in decommissioning.

An activity duration critical path is used to determine the total decommissioning program schedule. The schedule is relied upon in calculating the carrying costs, which include program management, administration, field engineering, equipment rental, and support services such as quality control and security. This systematic approach for assembling decommissioning estimates ensures a high degree of confidence in the reliability of the resulting cost estimate.

Contingency

Consistent with cost estimating practice, contingencies are applied to the decontamination and dismantling costs developed as "specific provision for unforeseeable elements of cost within the defined project scope, particularly important where previous experience relating estimates and actual costs has shown that unforeseeable events which will increase costs are likely to occur."[8] The cost elements in the estimates are based on ideal conditions; therefore, the types of unforeseeable events that are almost certain to occur in decommissioning, based on industry experience, are addressed through a percentage contingency applied on a line-item basis. This contingency factor is a nearly universal element in all large-scale construction and demolition projects. It should be noted that contingency, as used in this analysis, does not account for price escalation and inflation in the cost of decommissioning over the remaining operating life of the station.

The use and role of contingency within decommissioning estimates is not a safety factor issue. Safety factors provide additional security and address situations that may never occur. Contingency funds, by contrast, are expected to be fully expended throughout the program. Inclusion of contingency is necessary to provide assurance that sufficient funding will be available to accomplish the intended tasks.

Low-Level Radioactive Waste Disposal

The contaminated and activated material generated in the decontamination and dismantling of a commercial nuclear reactor is classified as low-level (radioactive) waste, although not all of the material is suitable for "shallow-land" disposal. With the passage of the "Low-Level Radioactive Waste Policy Act" in 1980[9], and its Amendments of 1985[10], the states became ultimately responsible for the disposition of low-level radioactive waste generated within their own borders.

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8 Project and Cost Engineers' Handbook, Second Edition, American Association of Cost Engineers, Marcel Dekker, Inc., New York, New York, p. 239.

9 "Low-Level Radioactive Waste Policy Act of 1980," Public Law 96-573, 1980.

10 "Low-Level Radioactive Waste Policy Amendments Act of 1985," Public Law 99-240, 1986.

Zion is currently able to access the disposal facility in Barnwell, South Carolina. However, in June 2000, South Carolina formally joined with Connecticut and New Jersey to form the Atlantic Compact. The legislation allows South Carolina to gradually limit access to the Barnwell facility, with only Atlantic Compact members having access to the facility after mid-year 2008. It is reasonable to assume that additional disposal capacity will be available to support reactor decommissioning, particularly for the isolation of the more highly radioactive material that is not suitable for disposal elsewhere. For estimating purposes, and as a proxy for future disposal facilities, waste disposal costs are generated using available pricing schedules for the currently operating facilities, i.e., at Barnwell and the Envirocare facility in Utah.

High-Level Radioactive Waste Management

Congress passed the "Nuclear Waste Policy Act [11]" (NWPA) in 1982, assigning the responsibility for disposal of the spent nuclear fuel created by the commercial nuclear generating plants to the DOE. Two permanent disposal facilities were envisioned, as well as an interim storage facility. To recover the cost, the legislation created a Nuclear Waste Fund through which money is collected from the sale of electricity generated by the power plants. The NWPA, along with the individual disposal contracts with the utilities, specified that the DOE was to begin accepting spent fuel by January 31, 1998.

Since the original legislation, the DOE has announced several delays in the program schedule. By January 1998, the DOE had failed to initiate the disposal of spent nuclear fuel and high level waste, as required by the NWPA and the utility contracts. As a result, utilities have initiated legal action against the DOE. While legal actions continue, the DOE has no plans to receive spent fuel prior to completing the construction of its geologic repository.

Operation of DOE's yet-to-be constructed repository is contingent upon the review and approval of the facility's license application by the NRC, the successful resolution of pending litigation, and the development of a national transportation system. For comparison, the Private Fuel Storage consortium submitted an application for an interim storage facility in 1997. The Nuclear Regulatory Commission granted an operating license for the facility in September 2005, after eight years of review. With a more technically complex and politically sensitive application for permanent disposal, it is not unreasonable to expect that the NRC's approval to construct the repository at Yucca Mountain would require at least as long a review period. The DOE has no plans for receiving spent fuel from

[11] "Nuclear Waste Policy Act of 1982 and Amendments," U.S. Department of Energy's Office of Civilian Radioactive Management, 1982.

commercial nuclear plant sites prior to this date and startup operations may be phased in, creating additional delays. For estimating purposes, Exelon Generation has assumed that the high-level waste repository, or some interim storage facility, will be fully operational by 2018.

The NRC requires that licensees establish a program to manage and provide funding for the caretaking of all irradiated fuel at the reactor site until title of the fuel is transferred to the DOE [12]. The fuel will be stored in the storage pools located on the Zion site until the DOE has completed the transfer.

In all decommissioning mode, the storage pools remain operational and used for the interim storage of the fuel until the final shipment of fuel to the DOE has occurred.

The DOE's generator allocation/receipt schedules are based upon the oldest fuel receiving the highest priority. Given this scenario and an anticipated rate of transfer, spent fuel is projected to remain at the site until the end of 2028. Consequently, costs are included within the estimates for the long-term caretaking of the spent fuel at the site until that time.

Site Restoration

The efficient removal of the contaminated materials at the site will result in damage to many of the site structures. Blasting, coring, drilling, and the other decontamination activities will substantially damage power block structures, potentially weakening the footings and structural supports. Prompt demolition once the license is terminated is clearly the most appropriate and cost-effective option. It is unreasonable to anticipate that these structures would be repaired and preserved after the radiological contamination is removed. The cost to dismantle site structures with a work force already mobilized is more efficient and less costly than if the process were deferred. Experience at shutdown generating stations has shown that plant facilities quickly degrade without maintenance, adding additional expense and creating potential hazards to the public and the demolition work force. Consequently, this analysis assumes that non-essential site structures within the restricted access area are removed to a nominal depth of three feet below the local grade level wherever possible. The site is then graded and stabilized.

Summary

The costs to decommission Zion were evaluated for several decommissioning scenarios, incorporating the attributes of both the DECON and SAFSTOR

[12] "Domestic Licensing of Production and Utilization Facilities," U.S. Code of Federal Regulations, Title 10, Part 50.54 (bb).

decommissioning alternatives. Regardless of the timing of the decommissioning activities, the estimates assume the eventual removal of all the contaminated and activated plant components and structural materials, such that the facility operator may then have unrestricted use of the site with no further requirement for an operating license. Delayed decommissioning is initiated after the spent fuel has been removed from the site and is accomplished within the 60-year period required by current NRC regulations. In the interim, the spent fuel remains in storage at the site until such time that the transfer to a DOE facility can be completed. Once the transfer is complete, the storage facilities are also decommissioned.

The scenarios analyzed for the purpose of generating the estimates are described in Section 2. The assumptions are presented in Section 3, along with schedules of annual expenditures. The major cost contributors are identified in Section 6, with detailed activity costs, waste volumes, and associated manpower requirements delineated in Appendices C, D, and E. Cost summaries for the various scenarios are provided at the end of this section for the major cost components.

SUMMARY OF DECOMMISSIONING COST ELEMENTS
DECON
(thousands of 2006 dollars)

Activity	Unit 1	Unit 2	Total
Decontamination	4,426	6,543	10,970
Removal	91,015	105,407	196,422
Packaging	8,942	8,804	17,746
Transportation	6,942	7,089	14,031
Waste Disposal	69,135	59,310	128,445
Off-site Waste Processing	16,940	19,205	36,145
Program Management [1]	202,646	208,276	410,921
Spent Fuel Management	18,348	17,886	36,234
Insurance and Regulatory Fees	7,926	7,549	15,475
Energy	7,613	7,406	15,018
Characterization and Licensing Surveys	12,005	11,736	23,741
Property Taxes	10,523	10,039	20,562
Miscellaneous Equipment	6,305	6,537	12,842
Site O&M	2,750	2,624	5,374
Dormancy Costs	46,557	52,192	98,749
Total [2]	512,072	530,602	1,042,675
NRC License Termination	342,894	353,040	695,934
Spent Fuel Management	122,031	122,832	244,863
Site Restoration	47,147	54,730	101,877

[1] Includes engineering and security
[2] Columns may not add due to rounding

SUMMARY OF DECOMMISSIONING COST ELEMENTS
DELAYED DECON
(thousands of 2006 dollars)

Activity	Unit 1	Unit 2	Total
Decontamination	4,335	7,338	11,674
Removal	88,631	103,208	191,839
Packaging	8,156	8,088	16,244
Transportation	6,367	6,526	12,893
Waste Disposal	66,731	57,067	123,798
Off-site Waste Processing	16,940	19,205	36,145
Program Management [1]	145,674	142,401	288,075
Spent Fuel Management	10,062	10,062	20,125
Insurance and Regulatory Fees	2,788	2,596	5,383
Energy	4,596	4,593	9,189
Characterization and Licensing Surveys	12,005	11,736	23,741
Property Taxes	4,149	3,790	7,939
Miscellaneous Equipment	6,209	6,207	12,416
Site O&M	1,084	991	2,075
Dormancy Costs	147,465	151,681	299,146
Total [2]	525,192	535,489	1,060,681
NRC License Termination	320,531	318,847	639,379
Spent Fuel Management	157,528	161,743	319,271
Site Restoration	47,133	54,898	102,031

[1] Includes engineering and security
[2] Columns may not add due to rounding

SUMMARY OF DECOMMISSIONING COST ELEMENTS
SAFSTOR
(thousands of 2006 dollars)

Activity	Unit 1	Unit 2	Total
Decontamination	4,281	6,172	10,453
Removal	90,286	103,734	194,020
Packaging	8,207	8,013	16,220
Transportation	6,331	6,203	12,534
Waste Disposal	66,711	56,831	123,542
Off-site Waste Processing	17,056	19,324	36,379
Program Management [1]	196,697	156,454	353,151
Spent Fuel Management	10,062	10,062	20,125
Insurance and Regulatory Fees	11,282	11,328	22,610
Energy	7,274	7,360	14,634
Characterization and Licensing Surveys	12,005	11,736	23,741
Property Taxes	17,160	17,160	34,321
Miscellaneous Equipment	10,167	10,380	20,547
Site O&M	4,485	4,485	8,970
Dormancy Costs	147,465	147,465	294,931
Total [2]	609,471	576,708	1,186,179
NRC License Termination	404,865	364,519	769,383
Spent Fuel Management	157,528	157,528	315,056
Site Restoration	47,078	54,661	101,740

[1] Includes engineering and security
[2] Columns may not add due to rounding

1. INTRODUCTION

This report presents estimates of the cost to decommission the Zion Nuclear Power Station (Zion), for the scenarios described in Section 2. The analysis is designed to provide the Exelon Generation Company (Exelon) with sufficient information to assess its financial obligations, as they pertain to the eventual decommissioning of the nuclear station. It is not a detailed engineering document, but a financial analysis prepared in advance of the detailed engineering that will be required to carry out the decommissioning.

1.1 OBJECTIVES OF STUDY

The objectives of this study are to prepare comprehensive estimates of the cost to decommission Zion, to provide a sequence or schedule for the associated activities, and to develop waste stream projections from the decontamination and dismantling activities. Operating licenses were issued on April 6 and November 14, 1973, for Units 1 and 2, respectively, with corresponding expiration dates forty years later in 2013.

Unit 2 was shutdown on September 19, 1996, with Unit 1 following five months later on February 21, 1997. On February 13, 1998, Commonwealth Edison, a predecessor organization to Exelon, decided not to restart the two units. The reactors were permanently defueled and the units subsequently placed into protective storage, waiting decommissioning.

1.2 SITE DESCRIPTION

Zion is located in northeast Illinois on the west shore of Lake Michigan. The site is approximately 40 miles north of Chicago, Illinois, and 42 miles south of Milwaukee, Wisconsin.

The station is comprised of two essentially identical pressurized water reactors with supporting facilities. The nuclear steam supply systems (NSSS) were designed by the Westinghouse Corporation. The reactor coolant system (RCS) is comprised of the reactor vessel and four heat transfer loops. Each loop contains a reactor coolant pump, steam generator, and associated piping and valves. In addition, the system includes a pressurizer, a pressurizer relief tank, interconnecting piping, and the instrumentation necessary for operational control. Components of the reactor coolant system are located in the containment building. The design reactor thermal power level was 3,250 Megawatts thermal (MWth). The corresponding electrical output is approximately 1,085 Megawatts electric (MWe).

The containment structure is cylindrical, with a shallow dome roof and a flat foundation slab. The cylindrical portion is prestressed by a post-tensioning system consisting of horizontal and vertical tendons. The entire structure is internally lined with steel plate, which acts as a leak-tight membrane. The containment completely enclosed the entire primary coolant system, including the reactor coolant loops, and portions of the auxiliary and engineered safety features systems.

Heat produced in the reactor was converted to electrical energy by the power conversion system. A turbine-generator system converted the thermal energy of steam produced in the reactor into mechanical shaft power and then into electrical energy. The main turbine is a four casing, tandem-compound, six-flow exhaust unit consisting of one double-flow, high-pressure turbine and three double-flow low-pressure turbines. The generator was driven at 1,800 rpm and rated at 1,220 MVA. The exhaust steam from the turbine was condensed and deaerated in the main condenser. The heat rejected to the main condenser was removed by the circulating water system.

The circulating water system provided the heat sink required for removal of waste heat in the power plant's thermal cycle. The system had the principal function of removing heat by absorbing this energy in the main condenser. Water was withdrawn from Lake Michigan via the intake pipes by the circulating water pumps. After passing through the plant condensers, the discharge was routed back to the lake.

1.3 REGULATORY GUIDANCE

The Nuclear Regulatory Commission (NRC or Commission) provided initial decommissioning requirements in its rule "General Requirements for Decommissioning Nuclear Facilities," issued in June 1988.[1]* This rule set forth financial criteria for decommissioning licensed nuclear power facilities. The regulation addressed decommissioning planning needs, timing, funding methods, and environmental review requirements. The intent of the rule was to ensure that decommissioning would be accomplished in a safe and timely manner and that adequate funds would be available for this purpose. Subsequent to the rule, the NRC issued Regulatory Guide 1.159, "Assuring the Availability of Funds for Decommissioning Nuclear Reactors,"[2] which provided additional guidance to the licensees of nuclear facilities on the financial methods acceptable to the NRC staff for complying with the requirements of the rule. The regulatory guide addressed the funding

* Annotated references for citations in Sections 1-6 are provided in Section 7.

requirements and provided guidance on the content and form of the financial assurance mechanisms indicated in the rule.

The rule defined three decommissioning alternatives as being acceptable to the NRC: DECON, SAFSTOR, and ENTOMB. The DECON alternative assumes that any contaminated or activated portion of the plant's systems, structures, and facilities are removed or decontaminated to levels that permit the site to be released for unrestricted use shortly after the cessation of plant operations. The rule also placed limits on the time allowed to complete the decommissioning process. For SAFSTOR, the process is restricted in overall duration to 60 years, unless it can be shown that a longer duration is necessary to protect public health and safety. The guidelines for ENTOMB are similar, providing the NRC with both sufficient leverage and flexibility to ensure that these deferred options are only used in situations where it is reasonable and consistent with the definition of decommissioning. At the conclusion of a 60-year dormancy period (or longer for ENTOMB if the NRC approves such a case), the site would still require significant remediation to meet the unrestricted release limits for license termination.

The ENTOMB alternative has not been viewed as a viable option for power reactors due to the significant time required to isolate the long-lived radionuclides for decay to permissible levels. However, with recent rulemaking permitting the controlled release of a site, the NRC has re-evaluated this alternative.[3] The resulting feasibility study, based upon an assessment by Pacific Northwest National Laboratory, concluded that the method did have conditional merit for some, if not most, reactors. However, the staff also found that additional rulemaking would be needed before this option could be treated as a generic alternative. The NRC had considered rulemaking to alter the 60-year time for completing decommissioning and to clarify the use of engineered barriers for reactor entombments.[4] However, the NRC's staff has recommended that rulemaking be deferred, based upon several factors (e.g., no licensee has committed to pursuing the entombment option, the unresolved issues associated with the disposition of greater-than-Class C material (GTCC), and the NRC's current priorities, at least until after the additional research studies are complete). The Commission concurred with the staff's recommendation.

The NRC published amendments to its decommissioning regulations in 1996.[5] When the regulations were originally adopted in 1988, it was assumed that the majority of licensees would decommission at the end of the facility's operating licensed life. Since that time, several licensees permanently and prematurely ceased operations. Exemptions from certain operating requirements were required once the reactor was defueled to

facilitate the decommissioning. Each case was handled individually, without clearly defined generic requirements. The NRC amended the decommissioning regulations in 1996 to clarify ambiguities and codify procedures and terminology as a means of enhancing efficiency and uniformity in the decommissioning process. The new amendments allow for greater public participation and better define the transition process from operations to decommissioning.

Under the revised regulations, licensees will submit written certification to the NRC within 30 days after the decision to cease operations. Certification will also be required once the fuel is permanently removed from the reactor vessel. Submittal of these notices will entitle the licensee to a fee reduction and eliminate the obligation to follow certain requirements needed only during operation of the reactor. Within two years of submitting notice of permanent cessation of operations, the licensee is required to submit a Post-Shutdown Decommissioning Activities Report (PSDAR) to the NRC. The PSDAR describes the planned decommissioning activities, the associated sequence and schedule, and an estimate of expected costs. Prior to completing decommissioning, the licensee is required to submit applications to the NRC to terminate the licenses, which will include a License Termination Plan (LTP).

1.3.1 Nuclear Waste Policy Act

Congress passed the Nuclear Waste Policy Act[6] (NWPA) in 1982, assigning the responsibility for disposal of the spent nuclear fuel created by the commercial nuclear generating plants to the U.S. Department of Energy (DOE). Two permanent disposal facilities and an interim storage facility were envisioned. To recover the cost, the legislation created a Nuclear Waste Fund through which money is collected from the sale of electricity generated by the power plants. The NWPA, along with the individual disposal contracts with the utilities, specified that the DOE was to begin accepting spent fuel by January 31, 1998.

After pursuing a national site selection process, the NWPA was amended in 1987 to designate Yucca Mountain, Nevada, as the only site to be evaluated for geologic disposal of high-level waste. Also in 1987, the DOE announced a five-year delay (1998 to 2003) in the opening date for the repository. Two years later, in 1989, an additional seven-year delay was announced, primarily due to problems in obtaining the permits necessary from the state of Nevada to perform the required characterization of the site.

Generators have responded to this impasse by initiating legal action against the DOE and constructing supplemental storage as a means of maintaining necessary fuel storage operating margins. In an August 2000 ruling,[7] the U.S. Court of Appeals for the Federal Circuit reaffirmed the utility position that DOE had breached its contractual obligation. The DOE continues to maintain that its delayed performance is unavoidable because it does not have an operational repository and does not have authority to provide storage in the interim. Consequently the DOE has no plans to receive spent fuel from the commercial reactors until the repository is operational.

The NRC requires that licensees establish a program to manage and provide funding for the management of all irradiated fuel at the reactor until title of the fuel is transferred to the Secretary of Energy, pursuant to Title 10 of the Code of Federal Regulations (10 CFR), §50.54 (bb).[8] This funding requirement is fulfilled through inclusion of certain high-level waste cost elements in the decommissioning estimates, as identified in Section 3.

Zion is currently in protective storage, with the spent fuel isolated in the fuel handling building's storage pool. It is expected that the fuel will remain in the pool until DOE can complete the transfer to a federal repository.

For estimating purposes, the DOE is assumed to initiate spent fuel receipt from the commercial generators in the year 2018. Given this scenario and an anticipated rate of transfer, spent fuel is projected to remain at the Zion site until the year 2028. Consequently, costs are included within the analysis for the continued operation of the storage pool until then.

1.3.2 Low-Level Radioactive Waste Acts

The contaminated and activated material generated in the decontamination and dismantling of a commercial nuclear reactor is classified as low-level (radioactive) waste, although not all of the material is suitable for "shallow-land" disposal. Congress passed the "Low-Level Radioactive Waste Policy Act" in 1980,[9] declaring the states as being ultimately responsible for the disposition of low-level radioactive waste generated within their own borders. The federal law encouraged the formation of regional groups or compacts to implement this objective safely, efficiently, and economically, and set a target date of 1986 for implementation. After little progress, the "Low-Level

Radioactive Waste Policy Amendments Act of 1985,"[10] extended the implementation schedule, with specific milestones and stiff sanctions for non-compliance. However, to date, no new compact facilities have been successfully sited, licensed, and constructed.

Zion is currently able to access the disposal facility in Barnwell, South Carolina. However, in June 2000, South Carolina formally joined with Connecticut and New Jersey to form the Atlantic Compact. The legislation allows South Carolina to gradually limit access to the Barnwell facility, with only Atlantic Compact members having access to the facility after mid-year 2008. It is reasonable to assume that additional disposal capacity will be available to support reactor decommissioning, particularly for the isolation of the more highly radioactive material that is not suitable for disposal elsewhere. For estimating purposes, and as a proxy for future disposal facilities, waste disposal costs are generated using available pricing schedules for the currently operating facilities (i.e., at Barnwell and at Envirocare's facility in Utah).

1.3.3 Radiological Criteria for License Termination

In 1997, the NRC published Subpart E, "Radiological Criteria for License Termination,"[11] amending 10 CFR §20. This subpart provides radiological criteria for releasing a facility for unrestricted use. The regulation states that the site can be released for unrestricted use if radioactivity levels are such that the average member of a critical group would not receive a Total Effective Dose Equivalent (TEDE) in excess of 25 millirem per year, and provided that residual radioactivity has been reduced to levels that are As Low As Reasonably Achievable (ALARA). The decommissioning estimates for Zion assume that the site will be remediated to a residual level consistent with the NRC-prescribed level.

It should be noted that the NRC and the Environmental Protection Agency (EPA) differ on the amount of residual radioactivity considered acceptable in site remediation. The EPA has two limits that apply to radioactive materials. An EPA limit of 15 millirem per year is derived from criteria established by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA or Superfund).[12] An additional limit of 4 millirem per year, as defined in 40 CFR §141.16, is applied to drinking water.[13]

On October 9, 2002, the NRC signed an agreement with the EPA on the radiological decommissioning and decontamination of NRC-licensed sites. The Memorandum of Understanding (MOU)[14] provides that EPA will defer exercise of authority under CERCLA for the majority of facilities decommissioned under NRC authority. The MOU also includes provisions for NRC and EPA consultation for certain sites when, at the time of license termination, (1) groundwater contamination exceeds EPA-permitted levels; (2) NRC contemplates restricted release of the site; and/or (3) residual radioactive soil concentrations exceed levels defined in the MOU.

The MOU does not impose any new requirements on NRC licensees and should reduce the involvement of the EPA with NRC licensees who are decommissioning. Most sites are expected to meet the NRC criteria for unrestricted use, and the NRC believes that only a few sites will have groundwater or soil contamination in excess of the levels specified in the MOU that trigger consultation with the EPA. However, if there are other hazardous materials on the site, the EPA may be involved in the cleanup. As such, the possibility of dual regulation remains for certain licensees. The present study does not include any costs for this occurrence.

2. DECOMMISSIONING ALTERNATIVES

Detailed cost estimates were developed to decommission Zion for three variations of the approved decommissioning alternatives: DECON and SAFSTOR. Although the scenarios differ with respect to technique, process, cost, and schedule, they attain the same result: the ultimate release of the site for unrestricted use.

Since Zion is currently in protective storage, all three scenarios are variations of a deferred decommissioning alternative. However, to distinguish between the scenarios and the timing of the physical decontamination and dismantling activities, the standard nomenclature has been modified and redefined for this study. DECON, as used in this study, refers to the earliest decommissioning scenario (i.e., scheduled to commence in 2013, the original license expiration date for Unit 1). Delayed DECON refers to the scenario in which decommissioning is deferred until the spent fuel is removed from the site (at the end of the year 2028). Decommissioning is further delayed in the SAFSTOR scenario, to the maximum extent possible, as allowed by the NRC. In all scenarios, decommissioning is completed within the required 60 year period. For purposes of this study, the decision to permanently cease operations in 1998 is used as the start of the 60-years.

Three decommissioning scenarios were evaluated for the nuclear units. The scenarios selected are representative of alternatives available to the owner and are defined as follows:

1. DECON: This scenario is intended to complete the decontamination of the power block structures, with the exception of the fuel handling building, as soon as reasonably achievable. The decommissioning workforce is mobilized at the site in 2013. Decontamination activities, including the removal of contaminated components and structures, are sequenced and integrated for the two units so as to minimize the overall duration. Fuel storage operations continue throughout and beyond the decommissioning of the adjacent facilities until the transfer of the fuel to the DOE can be completed (assumed for purposes of this study to be at the end of the year 2028). Once the pool is emptied, the fuel handling building is decommissioned, the operating licenses for the two units are terminated, and the power block structures are dismantled.

2. Delayed DECON: In the second scenario, the units remain in their current caretaking mode until the transfer of the spent fuel is complete. Decommissioning operations commence once the storage pool is emptied and

proceed as a coordinated and integrated process. License termination is followed by building demolition and site restoration.

3. SAFSTOR: Similar to the Delayed DECON scenario, the units remain in an extended period of caretaking. However, in this scenario, decommissioning is deferred beyond the fuel storage period to the maximum extent possible, i.e., completion within the regulatory required 60-year time period. Dormancy continues following the removal of spent fuel from the site, timed to allow final decommissioning and license termination to be completed within 60 years of final shutdown. As with the first two scenarios, decommissioning activities at the two units are sequenced and integrated so as to minimize the total duration of the physical dismantling processes.

Common to all three decommissioning scenarios are the following assumptions and cost bases:

1. Commonwealth Edison (a predecessor organization to Exelon) permanently shut down Zion on February 13, 1998. The two units were then placed, and are being maintained, in protective storage.

2. Fuel discharged from the two reactors over their operating lives is being stored in the fuel handling building's spent fuel storage pool and will remain in the pool until such time that it can be transferred to a DOE facility (i.e., there are no plans for relocating the fuel to dry storage).

3. The original expiration date for the Unit 1 operating license (i.e., April 2013), is used as the earliest commencement date for site decommissioning activities.

4. Site caretaking costs are included until such time that decommissioning activities commence.

5. Decommissioning expenditures prior to 2006 (historical expenditures) are not included in the estimates to complete.

The following sections describe the basic activities associated with each alternative. Although detailed procedures for each activity identified are not provided, and the actual sequence of work may vary, the activity descriptions provide a basis not only for estimating but also for the expected scope of work, i.e., engineering and planning at the time of decommissioning.

The conceptual approach that the NRC has described in its regulations divides decommissioning into three phases. The initial phase commences with the effective date of permanent cessation of operations and involves the transition of both plant

and licensee from reactor operations (i.e., power production) to facilitate de-activation and closure. During the first phase, notification is to be provided to the NRC certifying the permanent cessation of operations and the removal of fuel from the reactor vessel. The licensee would then be prohibited from reactor operation.

The second phase encompasses activities during the storage period or during major decommissioning activities, or a combination of the two. The third phase pertains to the activities involved in license termination. The decommissioning estimates developed for Zion are also divided into phases or periods; however, demarcation of the phases is based upon major milestones within the project or significant changes in the projected expenditures.

2.1 DECON

The DECON alternative, as defined by the NRC, is "the alternative in which the equipment, structures, and portions of a facility and site containing radioactive contaminants are removed or decontaminated to a level that permits the property to be released for unrestricted use shortly after cessation of operations." Exelon has indicated that it would not initiate decommissioning operations prior to 2013. Consequently, the scenario to initiate decommissioning activities at the site in 2013 is herein referred to as DECON.

This study does not address the cost to dispose of the spent fuel residing at the site; such costs are funded through a surcharge on electrical generation. However, the study does estimate the costs incurred with the interim on-site storage of the fuel pending shipment by the DOE to an off-site disposal facility.

2.1.1 Period 1 - Safe Storage Preparations

Preparations for long-term storage were initiated shortly after the decision to permanently cease operations at the site in 1998. Costs for the activities involved in placing the two units into protective storage are included in Table 3.1 (expenditures to date).

2.1.2 Period 2 - Dormancy

The second phase identified by the NRC in its rule addresses licensed activities during a storage period and is applicable to the dormancy phases of any deferred decommissioning alternative. The site is currently in a dormant state and is expected to remain in this mode until 2013, at the earliest. Dormancy activities during this period

include a 24-hour security force, preventive and corrective maintenance on security systems, area lighting, general building maintenance, heating and ventilation of buildings, routine radiological inspections of contaminated structures, maintenance of structural integrity, and a site environmental and radiation monitoring program. Resident maintenance personnel perform equipment maintenance, inspection activities, routine services to maintain safe conditions, adequate lighting, heating, and ventilation, and periodic preventive maintenance on essential site services.

The main electrical generator at Zion Unit 1 is currently being used as a synchronous condenser to stabilize and condition the electrical power distribution network in northern Illinois. No cost for this program is included within the estimates.

An environmental surveillance program is carried out during the dormancy period to ensure that releases of radioactive material to the environment are prevented and/or detected and controlled. Appropriate emergency procedures are established and initiated for potential releases that exceed prescribed limits. The environmental surveillance program constitutes an abbreviated version of the program in effect during normal plant operations.

Security during the dormancy period is conducted primarily to prevent unauthorized entry and to protect the public from the consequences of its own actions. The security fence, sensors, alarms, and other surveillance equipment provide security. Fire and radiation alarms are also monitored and maintained. While remote surveillance is an option, it does not offer the immediate response time of a physical presence.

Spent fuel will continue to be stored in the existing spent fuel storage pool throughout the dormancy period.

Dormancy is scheduled to conclude in April 2013. The NRC requires that the licensee submit an application to terminate the license, along with an LTP (described in Section 1.3), thereby initiating the third phase.

2.1.3 Period 3 – Dismantling Preparations

In anticipation of the onset of decommissioning operations, detailed preparations are undertaken to provide a smooth transition from

SAFSTOR dormancy to site decommissioning. Through implementation of a staffing transition plan, the organization required to manage the intended decommissioning activities is assembled from available plant staff and outside resources. Preparations include the planning for revision of technical specifications applicable to the operating conditions and requirements, a characterization of the facility and major components, and the development of a revised PSDAR.

Engineering and Planning

The PSDAR, required within two years of the notice to cease operations, provides a description of the licensee's planned decommissioning activities, a timetable, and the associated financial requirements of the intended decommissioning program. Upon receipt of the PSDAR, the NRC will make the document available to the public for comment in a local meeting to be held in the vicinity of the reactor site. Ninety days following submittal and NRC receipt of the PSDAR, the licensee may begin to perform major decommissioning activities under a modified 10 CFR §50.59 procedure (i.e., without specific NRC approval). Major activities are defined as any activity that results in permanent removal of major radioactive components, permanently modifies the structure of the containment, or results in dismantling components (for shipment) containing GTCC, as defined by 10 CFR §61. Major components are further defined as comprising the reactor vessel and internals, large bore reactor recirculation system piping, and other large components that are radioactive. The NRC includes the following additional criteria for use of the §50.59 process in decommissioning. The proposed activity must not:

- foreclose release of the site for possible unrestricted use,
- significantly increase decommissioning costs,
- cause any significant environmental impact, or
- violate the terms of the licensee's existing license.

Existing technical specifications are reviewed and modified to reflect plant conditions and the safety concerns associated with decommissioning the station. The environmental impact associated with the planned decommissioning activities is also considered. Typically, a licensee will not be allowed to proceed if the consequences of a particular decommissioning activity are greater than that bounded by previously evaluated environmental assessments or impact statements. In this instance, the licensee would have to submit a

license amendment for the specific activity and update the environmental report.

The decommissioning program outlined in the PSDAR will be designed to accomplish the required tasks within the ALARA guidelines (as defined in 10 CFR §20) for protection of personnel from exposure to radiation hazards. It will also address the continued protection of the health and safety of the public and the environment during the dismantling activity. Consequently, with the development of the PSDAR, activity specifications, cost-benefit and safety analyses, and work packages and procedures, would be assembled to support the proposed decontamination and dismantling activities.

Site Preparations

Following dormancy, and in preparation for actual decommissioning activities, the following activities are initiated:

- Characterization of the site and surrounding environs. This includes radiation surveys of work areas, major components (including the reactor vessel and its internals), internal piping, and primary shield cores.
- Isolation of the spent fuel storage pool and fuel handling systems was accomplished prior to entering dormancy; no further efforts are expected to be performed to protect the spent fuel from decommissioning activities.
- Specification of transport and disposal requirements for activated materials and/or hazardous materials, including shielding and waste stabilization.

Development of procedures for occupational exposure control, control and release of liquid and gaseous effluent, processing of radwaste (including dry-active waste, resins, filter media, metallic and non-metallic components generated in decommissioning), site security and emergency programs, and industrial safety

2.1.4 Period 4 - Decommissioning Operations

This period includes the physical decommissioning activities associated with the removal and disposal of contaminated and activated components and structures, including the successful termination of the

10 CFR §50 operating licenses. Significant decommissioning activities in this phase include:

- Construction of temporary facilities and/or modification of existing facilities to support dismantling activities. This may include a centralized processing area to facilitate equipment removal and component preparations for off-site disposal.
- Reconfiguration and modification of site structures and facilities as needed to support decommissioning operations. This may include the upgrading of roads (on- and off-site) to facilitate hauling and transport. Modifications may be required to the containment structure to facilitate access of large/heavy equipment. Modifications may also be required to the refueling area of the reactor buildings to support the segmentation of the reactor vessel internals and component extraction.
- Design and fabrication of temporary and permanent shielding to support removal and transportation activities, construction of contamination control envelopes, and the procurement of specialty tooling.
- Procurement (lease or purchase) of shipping canisters, cask liners, and industrial packages.
- Decontamination of components and piping systems as required to control (minimize) worker exposure.
- Removal of piping and components no longer essential to support decommissioning operations.
- Removal of control rod drive housings and the head service structure from reactor vessel head. Segmentation of the vessel closure head.
- Removal and segmentation of the upper internals assemblies. Segmentation will maximize the loading of the shielded transport casks (i.e., by weight and activity). The operations are conducted under water using remotely operated tooling and contamination controls
- Disassembly and segmentation of the remaining reactor internals, including the core former and lower core support assembly. Some of the material is expected to exceed Class C disposal requirements. As such, those segments are packaged in a modified fuel storage canister for geologic disposal.

- Segmentation of the reactor vessel. A shielded platform is installed for segmentation as cutting operations are performed in-air using remotely operated equipment within a contamination control envelope. The water level is maintained just below the cut to minimize the working area dose rates. Segments are transferred in-air to containers that are stored under water, for example, in an isolated area of the refueling canal.
- Removal of the activated portions of the concrete biological shield and accessible contaminated concrete surfaces. If dictated by the steam generator and pressurizer removal scenarios, those portions of the associated steam generator cubicles necessary for access and component extraction are removed.
- Removal of the steam generators and pressurizer for material recovery and controlled disposal. These components can serve as their own burial containers provided that all penetrations are properly sealed and the internal contaminants are stabilized, e.g., with grout. Steel shielding will be added, as necessary, to those external areas of the package to meet transportation limits and regulations.
- Spent fuel storage operations continue throughout the active decommissioning period. Fuel transfer is expected to begin in 2026 and to be completed by the end of the year 2028.

At least two years prior to the anticipated date of license termination, an LTP is required. Submitted as a supplement to the Final Safety Analysis Report (FSAR) or its equivalent, the plan must include: a site characterization, description of the remaining dismantling activities, plans for site remediation, procedures for the final radiation survey, designation of the end use of the site, an updated cost estimate to complete the decommissioning, and any associated environmental concerns. The NRC will notice the receipt of the plan, make the plan available for public comment, and schedule a local meeting. LTP approval will be subject to any conditions and limitations as deemed appropriate by the Commission. The licensee may then commence with the final remediation of site facilities and services, including:

- Removal of remaining plant systems and associated components as they become nonessential to the decommissioning program or worker health and safety (e.g., waste collection and treatment systems, electrical power and ventilation systems).

- Removal of the steel liners from the refueling canal, disposing of the activated and contaminated sections as radioactive waste. Removal of any activated/ contaminated concrete.
- Surveys of the decontaminated areas of the containment structure.
- Removal of the contaminated equipment and material from the auxiliary and fuel building, and any other contaminated facility. Use radiation and contamination control techniques until radiation surveys indicate that the structures can be released for unrestricted access and conventional demolition. This activity may necessitate the dismantling and disposition of most of the systems and components (both clean and contaminated) located within these buildings. This activity will facilitate surface decontamination and subsequent verification surveys required prior to obtaining release for demolition.
- Removal of the remaining components, equipment, and plant services in support of the area release survey(s).
- Routing of material removed in the decontamination and dismantling to a central processing area. Material certified to be free of contamination is released for unrestricted disposition (e.g., as scrap, recycle, or general disposal). Contaminated material is characterized and segregated for additional off-site processing (disassembly, chemical cleaning, volume reduction, and waste treatment), and/or packaged for controlled disposal at a low-level radioactive waste disposal facility.

Incorporated into the LTP is the Final Survey Plan. This plan identifies the radiological surveys to be performed once the decontamination activities are completed and is developed using the guidance provided in the "Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM)."[15] This document incorporates the statistical approaches to survey design and data interpretation used by the EPA. It also identifies state-of-the-art, commercially available instrumentation and procedures for conducting radiological surveys. Use of this guidance ensures that the surveys are conducted in a manner that provides a high degree of confidence that applicable NRC criteria are satisfied. Once the survey is complete, the results are provided to the NRC in a format that can be verified. The NRC then reviews and evaluates the information, performs an independent confirmation of radiological site conditions, and makes a determination on final termination of the licenses.

The NRC will terminate the operating licenses if it determines that site remediation has been performed in accordance with the LTP, and that the terminal radiation survey and associated documentation demonstrate that the facility is suitable for release.

2.1.5 Period 5 - Site Restoration

Following completion of decommissioning operations, site restoration activities will begin. Efficient removal of the contaminated materials and verification that residual radionuclide concentrations are below the NRC limits will result in substantial damage to many of the structures. Although performed in a controlled, safe manner, blasting, coring, drilling, scarification (surface removal), and the other decontamination activities will substantially degrade power block structures including the reactor and auxiliary buildings. Under certain circumstances, verifying that subsurface radionuclide concentrations meet NRC site release requirements will require removal of grade slabs and lower floors, potentially weakening footings and structural supports. This removal activity will be necessary for those facilities and plant areas where historical records, when available, indicate the potential for radionuclides having been present in the soil, where system failures have been recorded, or where it is required to confirm that subsurface process and drain lines were not breached over the operating life of the station.

Prompt dismantling of site structures is clearly the most appropriate and cost-effective option. It is unreasonable to anticipate that these structures would be repaired and preserved after the radiological contamination is removed. The cost to dismantle site structures with a work force already mobilized on site is more efficient than if the process were deferred. Site facilities quickly degrade without maintenance, adding additional expense and creating potential hazards to the public as well as to future workers. Abandonment creates a breeding ground for vermin infestation as well as other biological hazards.

This cost study presumes that non-essential structures and site facilities are dismantled as a continuation of the decommissioning activity. Foundations and exterior walls are removed to a nominal depth of three feet below grade. The three-foot depth allows for the placement of gravel for drainage, as well as topsoil, so that vegetation can be established for erosion control. Site areas affected by the dismantling activities are restored and the plant area graded as

required to prevent ponding and inhibit the refloating of subsurface materials.

Concrete rubble produced by demolition activities is processed to remove rebar and miscellaneous embedments. The processed material is then used on site to backfill voids. Excess materials are trucked to an off-site area for disposal as construction debris.

2.2 DELAYED DECON

The Delayed DECON scenario differs from DECON in that the fuel is removed from the site prior to the initiation of decontamination and dismantling operations. While the dormancy period is longer, the physical dismantling phase is simplified without the constraint in the availability of the fuel building for decommissioning.

Variations in the length of the dormancy period are expected to have little effect upon the quantities of radioactive wastes generated from system and structure removal operations. Given the levels of radioactivity and spectrum of radionuclides expected from approximately twenty-four years of plant operation, no plant process system identified as being contaminated upon final shutdown will become releasable due to the decay period alone, i.e., there is no significant reduction in the waste generated from the decommissioning activities. Given the number of years since the final shutdown of the Zion units, the rate of radioactive decay is low, and any lower activity levels are not expected to change the percentage of material designated for off-site processing and recovery.

2.3 SAFSTOR

The SAFSTOR scenario differs from Delayed DECON only in its schedule. Decommissioning is deferred to the maximum extent possible and scheduled such that termination of the operating licenses occurs 60 years from the date of the decision to permanently cease operations, i.e. February 2058. Unlike Delayed DECON, there is a period during dormancy where the fuel has been removed from the site. During this phase, the site operating expenses are reduced as is the site maintenance and caretaking organization.

3. COST ESTIMATES

The cost estimates prepared for decommissioning Zion consider the unique features of the site, including the NSSS, power generation systems, support services, site buildings, and ancillary facilities. The basis of the estimates, including the sources of information relied upon, the estimating methodology employed, site-specific considerations, and other pertinent assumptions, is described in this section.

3.1 BASIS OF ESTIMATES

The physical plant inventory forms the basis for the estimates to decontaminate and dismantle Zion. Labor hours, material and equipment, field management, oversight, ancillary support services, and performance schedules are all determined from inventory-specific considerations.

The site-specific, technical information assembled for the previous evaluation in 2003-04[16] was re-evaluated for use in the current analysis. This involved the walk-down of all accessible plant areas by the estimating team. Each accessible area was visually inspected and characterized for specific decommissioning characteristics. Considerations included material accessibility and egress, radiological conditions, and physical limitations for staging work crews. The inventory and the attributes of each area were documented and reconciled with the previously established data base. High radiation areas or other areas not accessible for ALARA or safety reasons were inventoried from drawings, photos and/or other information available at the site or through interviews with remaining site personnel.

The unit factors, used in developing equipment and component removal costs, were then adjusted for the working conditions determined for each working area. Adaptation of the unit factors was accomplished by the manipulation of the duration adjustment variables or "Work Difficulty Factors" (WDF).

3.2 METHODOLOGY

The methodology used to develop the estimates follows the basic approach originally presented in the AIF/NESP-036 study report, "Guidelines for Producing Commercial Nuclear Power Plant Decommissioning Cost Estimates,"[17] and the DOE "Decommissioning Handbook."[18] These documents present a unit factor method for estimating decommissioning activity costs, which simplifies the estimating calculations. Unit factors for concrete removal ($/cubic yard), steel removal ($/ton), and cutting costs ($/inch) were developed using local labor rates. The activity-dependent costs

were estimated with the item quantities (cubic yards and tons), developed from plant drawings and inventory documents. Removal rates and material costs for the conventional disposition of components and structures relied upon information available in the industry publication, "Building Construction Cost Data," published by R.S. Means.[19]

This analysis reflects lessons learned from TLG's involvement in the Shippingport Station Decommissioning Project, completed in 1989, as well as the decommissioning of the Cintichem reactor, hot cells, and associated facilities, completed in 1997. In addition, the planning and engineering for the Pathfinder, Shoreham, Rancho Seco, Trojan, Yankee Rowe, Big Rock Point, Maine Yankee, Humboldt Bay-3, Oyster Creek, Connecticut Yankee, and San Onofre-1 nuclear units have provided additional insight into the process, the regulatory aspects, and the technical challenges of decommissioning commercial nuclear units.

The unit factor method provides a demonstrable basis for establishing reliable cost estimates. The detail provided in the unit factors, including activity duration, labor costs (by craft), and equipment and consumable costs, ensures that essential elements have not been omitted. Appendix A presents the detailed development of a typical unit factor. Appendix B provides the values contained within one set of factors developed for this analysis.

Work Difficulty Factors

TLG has historically applied work difficulty adjustment factors (WDFs) to account for the inefficiencies in working in a power plant environment. WDFs were assigned to each unique set of unit factors, commensurate with the inefficiencies associated with working in confined, hazardous environments. The ranges used for the WDFs are as follows:

◦ Access Factor	0% to 40%
◦ Respiratory Protection Factor	0% to 25%
◦ Radiation/ALARA Factor	0% to 40%
◦ Protective Clothing Factor	0% to 30%
◦ Work Break Factor	8.33%

These factors and their associated range of values were developed in conjunction with the Atomic Industrial Forum's Guideline Study. The factors (and their suggested application) are discussed in more detail in Appendix F.

Scheduling Program Durations

The unit factors, adjusted by the WDFs as described above, are applied against the inventory of materials to be removed in the radiologically controlled areas. The resulting man-hours, or crew-hours, are used in the development of the decommissioning program schedule, using resource loading and event sequencing considerations. The scheduling of conventional removal and dismantling activities are based upon productivity information available from the "Building Construction Cost Data" publication.[19]

An area-by-area activity duration critical path was used to develop the total decommissioning program schedule. The unit cost factors, adjusted for WDF's as described above, were applied against the inventory of materials to be removed in each defined work area. Each work area was assessed for the most efficient number of workers/crews for the decommissioning activities. These adjusted unit cost factors were applied against the available manpower so that an overall duration for removal of components and piping from each work area could be calculated. Work area identification was established by TLG with consultation with Exelon's radiological services group at Zion. An index of the work areas is provided in Appendix G.

The program schedule is used to determine the period-dependent costs for program management, administration, field engineering, equipment rental, contracted services, etc. The study relies upon regional or site-specific salary and wage rates for the personnel associated with the intended program.

3.3 FINANCIAL COMPONENTS OF THE COST MODEL

TLG's proprietary decommissioning cost model, DECCER, produces a number of distinct cost elements. These direct expenditures, however, do not comprise the total cost to accomplish the project goal, i.e., license termination and site restoration.

Inherent in any cost estimate that does not rely on historical data is the inability to specify the precise source of costs imposed by factors such as tool breakage, accidents, illnesses, weather delays, and labor stoppages. In the DECCER cost model, contingency fulfills this role. Contingency is added to each line item to account for costs that are difficult or impossible to develop analytically. Such costs are historically inevitable over the duration of a job of this magnitude; therefore, this cost analysis includes funds to cover these types of expenses.

3.3.1 Contingency

The activity- and period-dependent costs are combined to develop the total decommissioning cost. A contingency is then applied on a line-item basis, using one or more of the contingency types listed in the AIF/NESP-036 study. "Contingencies" are defined in the American Association of Cost Engineers "Project and Cost Engineers' Handbook[20] as "specific provision for unforeseeable elements of cost within the defined project scope; particularly important where previous experience relating estimates and actual costs has shown that unforeseeable events which will increase costs are likely to occur." The cost elements in this analysis are based upon ideal conditions and maximum efficiency; therefore, consistent with industry practice, a contingency factor has been applied. In the AIF/NESP-036 study, the types of unforeseeable events that are likely to occur in decommissioning are discussed and guidelines are provided for percentage contingency in each category. It should be noted that contingency, as used in this analysis, does not account for price escalation and inflation in the cost of decommissioning over the remaining operating life of the station.

The use and role of contingency within decommissioning estimates is not a "safety factor issue." Safety factors provide additional security and address situations that may never occur. Contingency funds are expected to be fully expended throughout the program. They also provide assurance that sufficient funding is available to accomplish the intended tasks. An estimate without contingency, or from which contingency has been removed, can disrupt the orderly progression of events and jeopardize a successful conclusion to the decommissioning process.

For example, the most technologically challenging task in decommissioning a commercial nuclear station is the disposition of the reactor vessel and internal components, now highly radioactive after a lifetime of exposure to core activity. The disposition of these components forms the basis of the critical path (schedule) for decommissioning operations. Cost and schedule are interdependent, and any deviation in schedule has a significant impact on cost for performing a specific activity.

Disposition of the reactor vessel internals involves the underwater cutting of complex components that are highly radioactive. Costs are based upon optimum segmentation, handling, and packaging

scenarios. The schedule is primarily dependent upon the turnaround time for the heavily shielded shipping casks, including preparation, loading, and decontamination of the containers for transport. The number of casks required is a function of the pieces generated in the segmentation activity, a value calculated on optimum performance of the tooling employed in cutting the various subassemblies. The expected optimization, however, may not be achieved, resulting in delays and additional program costs. For this reason, contingency must be included to mitigate the consequences of the expected inefficiencies inherent in this complex activity, along with related concerns associated with the operation of highly specialized tooling, field conditions, and water clarity.

Contingency funds are an integral part of the total cost to complete the decommissioning process. Exclusion of this component puts at risk a successful completion of the intended tasks and, potentially, subsequent related activities. For this study, TLG examined the major activity-related problems (decontamination, segmentation, equipment handling, packaging, transport, and waste disposal) that necessitate a contingency. Individual activity contingencies ranged from 10% to 75%, depending on the degree of difficulty judged to be appropriate from TLG's actual decommissioning experience. The contingency values used in this study are as follows:

Decontamination	50%
Contaminated Component Removal	25%
Contaminated Component Packaging	10%
Contaminated Component Transport	15%
Low-Level Radioactive Waste Disposal	25%
Reactor Segmentation	75%
NSSS Component Removal	25%
Reactor Waste Packaging	25%
Reactor Waste Transport	25%
Reactor Vessel Component Disposal	50%
GTCC Disposal	15%
Non-Radioactive Component Removal	15%
Heavy Equipment and Tooling	15%
Supplies	25%
Engineering	15%
Energy	15%

Characterization and Termination Surveys	30%
Construction	15%
Taxes and Fees	10%
Insurance	10%
Staffing	15%

The contingency values are applied to the appropriate components of the estimates on a line item basis. A composite value is then reported at the end of each estimate. For example, the composite contingency value reported for the DECON alternative is 17.0%. Values for the other alternatives are delineated within the detailed cost tables in Appendices D and E.

3.3.2 Financial Risk

In addition to the routine uncertainties addressed by contingency, another cost element that is sometimes necessary to consider when bounding decommissioning costs relates to uncertainty, or risk. Examples can include changes in work scope, pricing, job performance, and other variations that could conceivably, but not necessarily, occur. Consideration is sometimes necessary to generate a level of confidence in the estimate, within a range of probabilities. TLG considers these types of costs under the broad term "financial risk." Included within the category of financial risk are:

- Transition activities and costs: ancillary expenses associated with eliminating 50% to 80% of the site labor force shortly after the cessation of plant operations, added cost for worker separation packages throughout the decommissioning program, national or company-mandated retraining, and retention incentives for key personnel.
- Delays in approval of the decommissioning plan due to intervention, public participation in local community meetings, legal challenges, and national and local hearings.
- Changes in the project work scope from the baseline estimate, involving the discovery of unexpected levels of contaminants, contamination in places not previously expected, contaminated soil previously undiscovered (either radioactive or hazardous material contamination), variations in plant inventory or configuration not indicated by the as-built drawings.
- Regulatory changes, e.g., affecting worker health and safety, site release criteria, waste transportation, and disposal.

- Policy decisions altering national commitments (e.g., in the ability to accommodate certain waste forms for disposition) or in the timetable for such (e.g., the start and rate of acceptance of spent fuel by the DOE).
- Pricing changes for basic inputs, such as labor, energy, materials, and burial.

It has been TLG's experience that the results of a risk analysis, when compared with the base case estimate for decommissioning, indicate that the chances of the base decommissioning estimate's being too high is a low probability, and the chances that the estimate is too low is a higher probability. This is mostly due to the pricing uncertainty for low-level radioactive waste burial, and to a lesser extent due to schedule increases from changes in plant conditions and to pricing variations in the cost of labor (both craft and staff). This cost study, however, does not add any additional cost to the estimate for financial risk since there is insufficient historical data from which to project future liabilities. Consequently, the areas of uncertainty or risk are revisited periodically and addressed through repeated revisions or updates of the base estimate.

3.4 SITE-SPECIFIC CONSIDERATIONS

There are a number of site-specific considerations that affect the method for dismantling and removal of equipment from the site and the degree of restoration required. The cost impact of the considerations identified below is included in this cost study.

3.4.1 Spent Fuel Management

The cost to dispose of spent fuel generated from plant operations is not reflected within the estimates to decommission the Zion site. Ultimate disposition of the spent fuel is within the province of the DOE's Waste Management System, as defined by the NWPA. As such, the disposal cost is financed by a 1 mill/kWhr surcharge paid into the DOE's waste fund during operations. However, the NRC requires licensees to establish a program to manage and provide funding for the management of all irradiated fuel at the reactors until title of the fuel is transferred to the Secretary of Energy. This funding requirement is fulfilled through inclusion of certain high-level waste cost elements within the estimate, as described below.

The total inventory of assemblies that will require handling during decommissioning is based upon several assumptions. The pickup of commercial fuel is assumed to begin in the year 2018. The maximum rate at which the fuel is removed from the commercial sites is based upon an annual capacity at the geologic repository of 3,000 metric tons of uranium (MTU). Any delay in the startup of the repository or decrease in the rate of acceptance will correspondingly prolong the transfer process and result in the fuel remaining at the site longer.
In all three scenarios, the spent fuel pool in the fuel handling building will continue to operate until such time that the transfer of spent fuel to the DOE can be completed. Assuming that the DOE commences repository operation in 2018, fuel is projected to be removed from the Zion site by the year 2028.

Operation and maintenance costs for the spent fuel pool are included within the estimates and address the cost for staffing the facilities, as well as security, insurance, and licensing fees. The estimates include the costs to load and transfer the fuel storage canisters. Costs are also provided for the final disposition of the facilities once the transfer is complete.

Repository Startup

Operation of the DOE's yet-to-be constructed geologic repository is contingent upon the review and approval of the facility's license application by the NRC, the successful resolution of pending litigation, and the development of a national transportation system. By comparison, the NRC's review of the application for an interim storage facility submitted by the Private Fuel Storage consortium began in 1997. The Nuclear Regulatory Commission granted an operating license for the facility in September 2005, after eight years of review. With a more technically complex and politically sensitive application for permanent disposal, it is not unreasonable to expect that NRC approval to construct the repository at Yucca Mountain will require at least as long a review period. Therefore, the spent fuel management plan described in this section is predicated upon the DOE initiating the pickup of commercial fuel in the year 2018.

Spent Fuel Management Model

The Exelon nuclear fleet consists of 21 units at 11 sites in Illinois, Pennsylvania, and New Jersey, including the inactive units at Dresden, Peach Bottom, and Zion. The ability to complete the

decommissioning of these units, particularly for the DECON and Delayed DECON alternatives, is highly dependent upon when the DOE is assumed to remove spent fuel from the sites.

The DOE's repository program assumes that spent fuel will be accepted for disposal from the nation's commercial nuclear plants in the order (the "queue") in which it was removed from service ("oldest fuel first").[21] A computer model developed by Exelon Nuclear was used to determine when the DOE would provide allocations in the queue for removal of spent fuel from the individual sites. Repository operations were based upon annual industry-wide acceptance rates of 400 MTU/year for year 1, 600 MTU/ year for year 2, 1200 MTU/year for year 3, 2000 MTU/year for year 4, and 3000 MTU/year for year 5 and beyond.[22]

Independent Spent Fuel Storage Installations (ISFSIs) are constructed as necessary to maintain full-core discharge capability at the individual sites. Once the DOE begins repository operations, queue allocations are used to ship spent fuel from Exelon's operating sites. Spent fuel shipments are then made from decommissioning sites in the order of retirement.

Canister Loading and Transfer

An average cost of $250,000 is used for the labor to load/transport the spent fuel from the pools for shipment to the DOE, based upon Exelon experience. Loading costs are based upon a 32 fuel assembly, multi-purpose canister.

Operations and Maintenance

An annual cost (excluding labor) of approximately $724,528 is used for operation and maintenance of the spent fuel pool.

3.4.2 Reactor Vessel and Internal Components

The reactor pressure vessel and internal components are segmented for disposal in shielded, reusable transportation casks. Segmentation is performed in the refueling canal, where a turntable and remote cutter are installed. The vessel is segmented in place, using a mast-mounted cutter supported off the lower head and directed from a shielded work platform installed overhead in the reactor cavity.

Transportation cask specifications and transportation regulations will dictate segmentation and packaging methodology.

The dismantling of the reactor internals will generate radioactive waste considered unsuitable for shallow land disposal (i.e., GTCC). Although the material is not classified as high-level waste, the DOE has indicated it will accept this waste for disposal at the future high-level waste repository.[23] However, the DOE has not been forthcoming with an acceptance criteria or disposition schedule for this material, and numerous questions remain as to the ultimate disposal cost and waste form requirements. As such, for purposes of this study, the GTCC has been packaged and disposed of as high-level waste, at a cost equivalent to that envisioned for the spent fuel. It is not anticipated that the DOE would accept this waste prior to completing the transfer of spent fuel. Therefore, until such time the DOE is ready to accept GTCC waste, it is reasonable to assume that this material would remain in storage at the Zion site.

Intact disposal of the reactor vessel and internal components can provide savings in cost and worker exposure by eliminating the complex segmentation requirements, isolation of the GTCC material, and transport/storage of the resulting waste packages. Portland General Electric (PGE) was able to dispose of the Trojan reactor as an intact package. However, its location on the Columbia River simplified the transportation analysis since:

- the reactor package could be secured to the transport vehicle for the entire journey, i.e., the package was not lifted during transport,
- there were no man-made or natural terrain features between the plant site and the disposal location that could produce a large drop, and
- transport speeds were very low, limited by the overland transport vehicle and the river barge.

As a member of the Northwest Compact, PGE had a site available for disposal of the package - the US Ecology facility in Washington State. The characteristics of this arid site proved favorable in demonstrating compliance with land disposal regulations.

It is not known whether this option will be available when Zion is decommissioned. Future viability of this option will depend upon the

ultimate location of the disposal site, as well as the disposal site licensee's ability to accept highly radioactive packages and effectively isolate them from the environment. Consequently, the study assumes the reactor vessel will require segmentation, as a bounding condition.

3.4.3 Primary System Components

The following discussion deals with the removal and disposition of the steam generators, but the techniques involved are also applicable to other large components, such as heat exchangers, component coolers, and the pressurizer. The steam generators' size and weight, as well as their location within the reactor building, will ultimately determine the removal strategy.

A trolley crane will be set up for the removal of the generators. It can also be used to move portions of the steam generator cubicle walls and floor slabs from the reactor building to a location where they can be decontaminated and transported to the material handling area. Interferences within the work area, such as grating, piping and other components, will be removed to create sufficient laydown space for processing these large components.

The generators are rigged for removal, disconnected from the surrounding piping and supports, and maneuvered into the open area where they are lowered onto a dolly. Each generator is rotated into the horizontal position for extraction from the containment and placed onto a multi-wheeled vehicle for transport to an on-site processing and storage area.

The generators are disassembled on-site with the outer shell and lightly contaminated subassemblies designated for off-site recycling. The more highly contaminated tube sheet and tube bundle are packaged for direct disposal. The interior volume is filled with low-density cellular concrete for stabilization of the internal contamination.

Disposal costs are based upon the displaced volume and weight of the units. Each component is then loaded onto a rail car for transport to the disposal facility.

Reactor coolant piping is cut from the reactor vessel once the water level in the vessel (used for personnel shielding during dismantling and cutting operations in and around the vessel) is dropped below the

nozzle zone. The piping is boxed and transported by shielded van. The reactor coolant pumps and motors are lifted out intact, packaged, and transported for disposal.

3.4.4 Main Turbine and Condenser

The main turbine will be dismantled using conventional maintenance procedures. The turbine rotors and shafts will be removed to a laydown area. The lower turbine casings will be removed from their anchors by controlled demolition. The main condensers will also be disassembled and moved to a laydown area. Material is then prepared for transportation to an off-site recycling facility where it will be surveyed and designated for either decontamination or volume reduction, conventional disposal, or controlled disposal. Components will be packaged and readied for transport in accordance with the intended disposition.

3.4.5 Transportation Methods

Contaminated piping, components, and structural material other than the highly activated reactor vessel and internal components will qualify as LSA-I, II or III or Surface Contaminated Object, SCO-I or II, as described in Title 49.[24] The contaminated material will be packaged in Industrial Packages (IP 1, IP-2, or IP-3, as defined in subpart 173.411) for transport unless demonstrated to qualify as their own shipping containers. The reactor vessel and internal components are expected to be transported in accordance with §71, as Type B. It is conceivable that the reactor, due to its limited specific activity, could qualify as LSA II or III. However, the high radiation levels on the outer surface would require that additional shielding be incorporated within the packaging so as to attenuate the dose to levels acceptable for transport.

Transport of the highly activated metal, produced in the segmentation of the reactor vessels and internal components, will be by shielded truck cask. Cask shipments may exceed 95,000 pounds, including vessel segment(s), supplementary shielding, cask tie-downs, and tractor-trailer. The maximum level of activity per shipment assumed permissible was based upon the license limits of the available shielded transport casks. The segmentation scheme for the vessel and internal segments is designed to meet these limits.

The transport of large intact components, e.g., large heat exchangers and other oversized components will be by a combination of truck, rail, and/or multi-wheeled transporter.

The low-level radioactive waste requiring controlled disposal will be sent to one of two currently available burial facilities. Transportation costs are based upon the mileage to either the Envirocare facility in Clive, Utah, or the Barnwell facility in South Carolina. Memphis, Tennessee, is used as the destination for off-site processing. Transportation costs are estimated using published tariffs from Tri-State Motor Transit.[25]

3.4.6 Low-Level Radioactive Waste Disposal

To the greatest extent practical, metallic material generated in the decontamination and dismantling processes is treated to reduce the total volume requiring controlled disposal. The treated material, meeting the regulatory and/or site release criterion, is released as scrap, requiring no further cost consideration. Conditioning and recovery of the waste stream is performed off site at a licensed processing center.

Material requiring controlled disposal is packaged and transported to one of two currently available burial facilities. Very low-level radioactive material (e.g., structural steel and contaminated concrete), is sent to Envirocare. More highly contaminated and activated material is sent to Barnwell. Disposal fees are based upon current charges for operating waste, with surcharges added for the highly activated components, e.g., generated in the segmentation of the reactor vessels.

3.4.7 Site Conditions Following Decommissioning

The NRC will terminate (or amend) the site licenses if it determines that site remediation has been performed in accordance with the license termination plan, and that the terminal radiation survey and associated documentation demonstrate that the facility is suitable for release. The NRC's involvement in the decommissioning process will end at this point. Building codes and environmental regulations will dictate the next step in the decommissioning process, as well as the owner's own future plans for the site.

Non-essential structures or buildings severely damaged in decontamination process are removed to a nominal depth of three feet below grade. Concrete rubble generated from demolition activities is processed and made available as clean fill. The excavations will be regraded such that the power block area will have a final contour consistent with adjacent surroundings.

The estimates include an allowance for the remediation of contaminated soil at the site.

3.5 ASSUMPTIONS

The following are the major assumptions made in the development of the estimates for decommissioning the site.

3.5.1 Estimating Basis

The study follows the principles of ALARA through the use of work duration adjustment factors. These factors address the impact of activities such as radiological protection instruction, mock-up training, and the use of respiratory protection and protective clothing. The factors lengthen a task's duration, increasing costs and lengthening the overall schedule. ALARA planning is considered in the costs for engineering and planning, and in the development of activity specifications and detailed procedures. Changes to worker exposure limits may impact the decommissioning cost and project schedule.

3.5.2 Labor Costs

The craft labor required to decontaminate and dismantle the nuclear units will be acquired through standard site contracting practices. The current cost of labor at the site is used as an estimating basis. Costs for site administration, operations, construction, and maintenance personnel are based upon average salary information provided by Exelon or from comparable industry information.

Exelon will hire a Decommissioning Operations Contractor (DOC) to manage the decommissioning. The owner will provide site security, radiological health and safety, quality assurance and overall site administration during the decommissioning and demolition phases. Contract personnel will provide engineering services (e.g., for preparing the activity specifications, work procedures, activation, and structural analyses), under the direction of Exelon.

3.5.3 Design Conditions

Any fuel cladding failure that occurred during the lifetime of the plant is assumed to have released fission products at sufficiently low levels that the buildup of quantities of long-lived isotopes (e.g., ^{137}Cs, ^{90}Sr, or transuranics) has been prevented from reaching levels exceeding those that permit the major NSSS components to be shipped under current transportation regulations and disposal requirements.

The curie contents of the vessel and internals at final shutdown are derived from those listed in NUREG/CR-3474.[26] Actual estimates are derived from the curie/gram values contained therein and adjusted for the different mass of the Zion components and different periods of decay. Additional short-lived isotopes were derived from CR-0130[27] and CR-0672,[28] and benchmarked to the long-lived values from CR-3474.

The control elements are disposed of along with the spent fuel (i.e., there is no additional cost provided for their disposal). There are no other legacy core components accounted for in the decommissioning waste stream in the cleanout of the pools.

Activation of the reactor building structures is confined to the biological shield. More extensive activation (at very low levels) of the interior structures within containment has been detected at several reactors and their owners have elected to dispose of the affected material at a controlled facility rather than reuse the material as fill on site or send it to a landfill. The ultimate disposition of the material removed from the reactor buildings will depend upon the site release criteria selected, as well as the designated end use for the site.

3.5.4 General

Transition Activities

Existing warehouses will be cleared of non-essential material and remain for use by Exelon and its subcontractors. The transition staff will perform the following activities at no additional cost or credit to the project:

- Drain and collect fuel oils, lubricating oils, and transformer oils for recycle and/or sale.

- Drain and collect acids, caustics, and other chemical stores for recycle and/or sale.
- Process operating waste inventories (i.e., the estimates do not address the disposition of any legacy wastes); the disposal of operating wastes during this initial period is not considered a decommissioning expense.

Scrap and Salvage

The existing plant equipment is considered obsolete and suitable for scrap as deadweight quantities only. Exelon will make economically reasonable efforts to salvage equipment following final plant shutdown. However, dismantling techniques assumed by TLG for equipment in this analysis are not consistent with removal techniques required for salvage (resale) of equipment. Experience has indicated that some buyers wanted equipment stripped down to very specific requirements before they would consider purchase. This required expensive rework after the equipment had been removed from its installed location. Since placing a salvage value on this machinery and equipment would be speculative, and the value would be small in comparison to the overall decommissioning expenses, this analysis does not attempt to quantify the possible salvage value that an owner may realize based upon those efforts.

It is assumed, for purposes of this analysis, that any value received from the sale of scrap generated in the dismantling process would be more than offset by the on-site processing costs. The dismantling techniques assumed in the decommissioning estimates do not include the additional cost for size reduction and preparation to meet "furnace ready" conditions. For example, the recovery of copper from electrical cabling may require the removal and disposition of any contaminated insulation, an added expense. With a volatile market, the potential profit margin in scrap recovery is highly speculative, regardless of the ability to free release this material. This assumption is an implicit recognition of scrap value in the disposal of clean metallic waste at no additional cost to the project.

Furniture, tools, mobile equipment such as forklifts, trucks, bulldozers, and other property owned by Exelon will be removed at no cost or credit to the decommissioning project. Disposition may include relocation to other facilities. Spare parts will also be made available for alternative use.

Energy

For estimating purposes, the plant is assumed to be de-energized, with the exception of those facilities associated with spent fuel storage. Replacement power costs are used for the cost of energy consumption during decommissioning for tooling, lighting, ventilation, and essential services.

Insurance

Costs for continuing coverage (nuclear liability and property insurance) during decommissioning are included and based upon current premiums. Reductions in premiums, throughout the decommissioning process, are based upon the guidance and the limits for coverage defined in the NRC's proposed rulemaking "Financial Protection Requirements for Permanently Shutdown Nuclear Power Reactors."[29] NRC's financial protection requirements are based on various reactor (and spent fuel) configurations.

Taxes

Property taxes are included for all decommissioning periods at a flat rate of $1 million per year.

Site Modifications

The perimeter fence and in-plant security barriers will be moved, as appropriate, to conform to the Site Security Plan in force during the various stages of the project.

3.6 COST ESTIMATE SUMMARY

A schedule of expenditures to date for the Zion decommissioning program is provided in Table 3.1; these cost dollars are provided in the year of expenditure. A schedule of expenditures for each scenario is provided in Tables 3.2 through 3.4. Decommissioning costs are reported in the year of projected expenditure; however, the values are provided in thousands of 2006 dollars. Costs are not inflated, escalated, or discounted over the period of expenditure. The annual expenditures are based upon the detailed activity costs reported in Appendices C through E, along with the schedules discussed in Section 4.

In the DECON alternative, the progression of decommissioning activities is initially offset so that certain major dismantling tasks are sequenced between the two units. This offset is eliminated once the structures are decontaminated so that license termination activities can be performed as a single, integrated activity for the site. As such, many of the expenditures in the years 2006 through 2012, and 2029 through 2032 have been combined and evenly divided between the two units, consistent with a consolidated operating site.

TABLE 3.1
HISTORICAL DECOMMISSIONING EXPENDITURES
(nominal dollars)

Year of Expenditure	Station Yearly Total
1998	$56,898,000
1999	$26,926,000
2000	$26,457,000
2001	$17,058,000
2002	$15,134,000
2003	$11,839,000
2004	$10,579,000
2005	$9,253,000
Total through 2005	$174,144,000

TABLE 3.2a
SCHEDULE OF ANNUAL EXPENDITURES
DECON, UNIT 1
(thousands, 2006 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2006	0	0	0	0	6,408	6,408
2007	0	0	0	0	6,408	6,408
2008	0	0	0	0	6,425	6,425
2009	0	0	0	0	6,408	6,408
2010	0	0	0	0	6,408	6,408
2011	0	0	0	0	6,408	6,408
2012	0	0	0	0	6,425	6,425
2013	24,992	911	850	30	2,926	29,709
2014	50,051	8,516	1,135	12,286	3,996	75,984
2015	54,472	14,351	1,091	32,848	8,119	110,881
2016	37,812	6,618	894	24,007	4,190	73,521
2017	20,790	2,998	574	12,324	2,704	39,390
2018	3,541	83	230	9	1,650	5,512
2019	3,541	83	230	9	1,650	5,512
2020	3,551	85	230	9	1,654	5,529
2021	3,541	83	230	9	1,650	5,512
2022	3,541	83	230	9	1,650	5,512
2023	3,541	83	230	9	1,650	5,512
2024	3,551	85	230	9	1,654	5,529
2025	3,541	83	230	9	1,650	5,512
2026	4,331	2,455	230	9	1,650	8,674
2027	4,403	2,670	230	9	1,650	8,962
2028	4,416	2,675	230	14	1,652	8,987
2029	14,261	1,371	230	527	1,195	17,584
2030	17,535	4,067	151	11	869	22,632
2031	13,418	4,887	115	0	750	19,169
2032	5,294	1,928	45	0	296	7,563
	280,120	54,113	7,613	82,133	88,093	512,072

TABLE 3.2b
SCHEDULE OF ANNUAL EXPENDITURES
DECON, UNIT 2
(thousands, 2006 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2006	0	0	0	0	6,408	6,408
2007	0	0	0	0	6,408	6,408
2008	0	0	0	0	6,425	6,425
2009	0	0	0	0	6,408	6,408
2010	0	0	0	0	6,408	6,408
2011	0	0	0	0	6,408	6,408
2012	0	0	0	0	6,425	6,425
2013	0	0	0	0	6,408	6,408
2014	20,618	1,058	988	33	2,359	25,055
2015	45,264	10,369	1,128	17,332	4,970	79,063
2016	55,041	14,725	1,093	34,302	8,335	113,496
2017	48,007	5,390	861	13,553	3,110	70,920
2018	22,302	2,322	496	5,723	2,266	33,109
2019	3,541	83	230	9	1,650	5,511
2020	3,551	85	230	9	1,654	5,529
2021	3,541	83	230	9	1,650	5,511
2022	3,541	83	230	9	1,650	5,511
2023	3,541	83	230	9	1,650	5,511
2024	3,551	85	230	9	1,654	5,529
2025	3,541	83	230	9	1,650	5,511
2026	4,331	2,455	230	9	1,650	8,674
2027	4,403	2,670	230	9	1,650	8,961
2028	4,552	2,695	230	44	1,659	9,180
2029	27,722	3,419	230	3,497	1,892	36,760
2030	18,486	5,054	151	11	869	24,571
2031	14,960	6,334	115	0	750	22,159
2032	5,902	2,499	45	0	296	8,742
	296,392	59,573	7,406	74,574	92,658	530,602

TABLE 3.3a
SCHEDULE OF ANNUAL EXPENDITURES
DELAYED DECON, UNIT 1
(thousands, 2006 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2006	0	0	0	0	6,408	6,408
2007	0	0	0	0	6,408	6,407
2008	0	0	0	0	6,425	6,426
2009	0	0	0	0	6,408	6,407
2010	0	0	0	0	6,408	6,407
2011	0	0	0	0	6,408	6,407
2012	0	0	0	0	6,425	6,426
2013	0	0	0	0	6,408	6,407
2014	0	0	0	0	6,408	6,407
2015	0	0	0	0	6,408	6,407
2016	0	0	0	0	6,425	6,426
2017	0	0	0	0	6,408	6,407
2018	0	0	0	0	6,408	6,407
2019	0	0	0	0	6,408	6,407
2020	0	0	0	0	6,425	6,426
2021	0	0	0	0	6,408	6,407
2022	0	0	0	0	6,408	6,407
2023	0	0	0	0	6,408	6,407
2024	0	0	0	0	6,425	6,426
2025	0	0	0	0	6,408	6,407
2026	791	2,372	0	0	6,408	9,570
2027	862	2,587	0	0	6,408	9,857
2028	951	2,591	3	0	6,411	9,956
2029	32,159	1,256	1,148	65	1,165	35,793
2030	55,264	13,248	1,120	23,637	5,584	98,853
2031	47,277	12,496	1,004	32,145	6,358	99,279
2032	33,797	5,500	864	22,733	3,076	65,971
2033	10,439	1,012	112	1,133	1,133	13,830
2034	19,484	3,679	168	16	926	24,272
2035	13,418	4,887	115	0	750	19,169
	221,721	52,279	4,596	79,729	166,867	525,192

TABLE 3.3b
SCHEDULE OF ANNUAL EXPENDITURES
DELAYED DECON, UNIT 2
(thousands, 2006 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2006	0	0	0	0	6,409	6,409
2007	0	0	0	0	6,409	6,409
2008	0	0	0	0	6,427	6,428
2009	0	0	0	0	6,409	6,409
2010	0	0	0	0	6,409	6,409
2011	0	0	0	0	6,409	6,409
2012	0	0	0	0	6,427	6,428
2013	0	0	0	0	6,409	6,409
2014	0	0	0	0	6,409	6,409
2015	0	0	0	0	6,409	6,409
2016	0	0	0	0	6,427	6,428
2017	0	0	0	0	6,409	6,409
2018	0	0	0	0	6,409	6,409
2019	0	0	0	0	6,409	6,409
2020	0	0	0	0	6,427	6,428
2021	0	0	0	0	6,409	6,409
2022	0	0	0	0	6,409	6,409
2023	0	0	0	0	6,409	6,409
2024	0	0	0	0	6,427	6,428
2025	0	0	0	0	6,409	6,409
2026	791	2,372	0	0	6,409	9,572
2027	862	2,587	0	0	6,409	9,859
2028	863	2,588	0	0	6,427	9,878
2029	7,875	431	403	13	4,568	13,291
2030	29,623	4,258	1,148	3,593	1,797	40,420
2031	54,705	16,006	1,100	34,823	7,693	114,326
2032	51,141	9,321	929	22,667	4,535	88,593
2033	41,893	5,023	669	11,220	2,399	61,204
2034	20,186	4,465	168	16	926	25,760
2035	15,016	6,364	115	0	750	22,246
2036	8,146	3,452	62	0	407	12,068
	231,101	56,869	4,593	72,331	170,595	535,489

TABLE 3.4a
SCHEDULE OF ANNUAL EXPENDITURES
SAFSTOR, UNIT 1
(thousands, 2006 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2006	0	0	0	0	6,408	6,408
2007	0	0	0	0	6,408	6,407
2008	0	0	0	0	6,425	6,426
2009	0	0	0	0	6,408	6,407
2010	0	0	0	0	6,408	6,407
2011	0	0	0	0	6,408	6,407
2012	0	0	0	0	6,425	6,426
2013	0	0	0	0	6,408	6,407
2014	0	0	0	0	6,408	6,407
2015	0	0	0	0	6,408	6,407
2016	0	0	0	0	6,425	6,426
2017	0	0	0	0	6,408	6,407
2018	0	0	0	0	6,408	6,407
2019	0	0	0	0	6,408	6,407
2020	0	0	0	0	6,425	6,426
2021	0	0	0	0	6,408	6,407
2022	0	0	0	0	6,408	6,407
2023	0	0	0	0	6,408	6,407
2024	0	0	0	0	6,425	6,426
2025	0	0	0	0	6,408	6,407
2026	791	2,372	0	0	6,408	9,570
2027	862	2,587	0	0	6,408	9,857
2028	869	2,588	0	0	6,411	9,868
2029	2,234	248	115	29	1,058	3,683
2030	2,234	248	115	29	1,058	3,683
2031	2,234	248	115	29	1,058	3,683
2032	2,240	249	115	29	1,061	3,693
2033	2,234	248	115	29	1,058	3,683
2034	2,234	248	115	29	1,058	3,683
2035	2,234	248	115	29	1,058	3,683
2036	2,240	249	115	29	1,061	3,693
2037	2,234	248	115	29	1,058	3,683
2038	2,234	248	115	29	1,058	3,683
2039	2,234	248	115	29	1,058	3,683
2040	2,240	249	115	29	1,061	3,693
2041	2,234	248	115	29	1,058	3,683

TABLE 3.4a (continued)
SCHEDULE OF ANNUAL EXPENDITURES
SAFSTOR, UNIT 1
(thousands, 2006 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2042	2,234	248	115	29	1,058	3,683
2043	2,234	248	115	29	1,058	3,683
2044	2,240	249	115	29	1,061	3,693
2045	2,234	248	115	29	1,058	3,683
2046	2,234	248	115	29	1,058	3,683
2047	2,234	248	115	29	1,058	3,683
2048	2,240	249	115	29	1,061	3,693
2049	2,234	248	115	29	1,058	3,683
2050	2,234	248	115	29	1,058	3,683
2051	2,234	248	115	29	1,058	3,683
2052	10,244	513	393	32	1,088	12,270
2053	38,153	3,498	1,148	2,506	1,593	46,898
2054	55,559	15,389	1,104	31,610	7,133	110,796
2055	40,985	9,298	936	28,026	4,824	84,070
2056	25,209	4,084	635	16,957	2,522	49,407
2057	17,555	1,493	149	25	1,080	20,301
2058	14,945	4,577	128	4	795	20,450
2059	13,393	4,887	115	0	750	19,144
2060	2,679	977	23	0	150	3,829
	272,650	57,971	7,274	79,826	191,750	609,471

TABLE 3.4b
SCHEDULE OF ANNUAL EXPENDITURES
SAFSTOR, UNIT 2
(thousands, 2006 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2006	0	0	0	0	6,408	6,408
2007	0	0	0	0	6,408	6,407
2008	0	0	0	0	6,425	6,426
2009	0	0	0	0	6,408	6,407
2010	0	0	0	0	6,408	6,407
2011	0	0	0	0	6,408	6,407
2012	0	0	0	0	6,425	6,426
2013	0	0	0	0	6,408	6,407
2014	0	0	0	0	6,408	6,407
2015	0	0	0	0	6,408	6,407
2016	0	0	0	0	6,425	6,426
2017	0	0	0	0	6,408	6,407
2018	0	0	0	0	6,408	6,407
2019	0	0	0	0	6,408	6,407
2020	0	0	0	0	6,425	6,426
2021	0	0	0	0	6,408	6,407
2022	0	0	0	0	6,408	6,407
2023	0	0	0	0	6,408	6,407
2024	0	0	0	0	6,425	6,426
2025	0	0	0	0	6,408	6,407
2026	791	2,372	0	0	6,408	9,570
2027	862	2,587	0	0	6,408	9,857
2028	864	2,588	0	0	6,411	9,864
2029	642	249	115	28	1,058	2,092
2030	642	249	115	28	1,058	2,092
2031	642	249	115	28	1,058	2,092
2032	643	249	115	29	1,061	2,098
2033	642	249	115	28	1,058	2,092
2034	642	249	115	28	1,058	2,092
2035	642	249	115	28	1,058	2,092
2036	643	249	115	29	1,061	2,098
2037	642	249	115	28	1,058	2,092
2038	642	249	115	28	1,058	2,092
2039	642	249	115	28	1,058	2,092
2040	643	249	115	29	1,061	2,098
2041	642	249	115	28	1,058	2,092

TABLE 3.4b (continued)
SCHEDULE OF ANNUAL EXPENDITURES
SAFSTOR, UNIT 2
(thousands, 2006 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2042	642	249	115	28	1,058	2,092
2043	642	249	115	28	1,058	2,092
2044	643	249	115	29	1,061	2,098
2045	642	249	115	28	1,058	2,092
2046	642	249	115	28	1,058	2,092
2047	642	249	115	28	1,058	2,092
2048	643	249	115	29	1,061	2,098
2049	642	249	115	28	1,058	2,092
2050	642	249	115	28	1,058	2,092
2051	642	249	115	28	1,058	2,092
2052	643	249	115	29	1,061	2,098
2053	15,204	906	806	34	1,126	18,077
2054	38,300	8,264	1,139	11,798	3,316	62,818
2055	55,500	16,578	1,074	38,206	8,181	119,539
2056	48,091	6,038	864	15,870	2,774	73,636
2057	33,903	3,575	453	5,616	1,709	45,256
2058	16,264	5,851	128	4	795	23,043
2059	14,935	6,334	115	0	750	22,134
2060	2,987	1,267	23	0	150	4,427
	243,110	62,336	7,360	72,213	191,689	576,708

4. SCHEDULE ESTIMATE

The schedules for the decommissioning scenarios considered in this study follow the sequence presented in the AIF/NESP-036 study, with minor changes to reflect recent experience and site-specific constraints. In addition, the scheduling has been revised to reflect the spent fuel management plan described in Section 3.4.1.

A schedule or sequence of activities is presented in Figure 4.1 for the DECON decommissioning alternative. The schedule is also representative of the work activities identified in the delayed dismantling scenarios, absent any spent fuel constraints. The scheduling sequence assumes that fuel is removed from the spent fuel pools within the first 5½ years after operations cease. The key activities listed in the schedule do not reflect a one-to-one correspondence with those activities in the cost tables, but reflect dividing some activities for clarity and combining others for convenience. The schedule was prepared using the "Microsoft Project 2003" computer software.[30]

4.1 SCHEDULE ESTIMATE ASSUMPTIONS

The schedule reflects the results of a precedence network developed for the site decommissioning activities, i.e., a PERT (Program Evaluation and Review Technique) Software Package. The work activity durations used in the precedence network reflect the actual man-hour estimates from the cost tables, adjusted by stretching certain activities over their slack range and shifting the start and end dates of others. The following assumptions were made in the development of the decommissioning schedule:

- The fuel handling building has been isolated from the balance of the nuclear island and will remain in this configuration until all spent fuel has been discharged from the spent fuel pool to the DOE.
- All work (except vessel and internals removal) is performed during an 8-hour workday, 5 days per week, with no overtime. There are eleven paid holidays per year.
- Reactor and internals removal activities are performed by using separate crews for different activities working on different shifts, with a corresponding backshift charge for the second shift.
- Multiple crews work parallel activities to the maximum extent possible, consistent with optimum efficiency, adequate access for cutting, removal and laydown space, and with the stringent safety measures necessary during demolition of heavy components and structures.

- For plant systems removal, the systems with the longest removal durations in areas on the critical path are considered to determine the duration of the activity.

4.2 PROJECT SCHEDULE

The period-dependent costs presented in the detailed cost tables are based upon the durations developed in the schedule for decommissioning Zion. Durations are established between several milestones in each project period; these durations are used to establish a critical path for the entire project. In turn, the critical path duration for each period is used as the basis for determining the period-dependent costs. A second critical path is also shown for the spent fuel cooling period, which determines the release of the fuel handling building for final decontamination.

Project timelines are provided in Figures 4.2 through 4.4. Milestones are based on the date of permanent cessation of operations (February 13, 1998) or the original license expiration date for Unit 1 (April 6, 2013). The start of decommissioning operations in the Delayed DECON scenario is concurrent with the end of the fuel transfer activity (i.e. to an off-site DOE facility, at the end of the year 2028).

FIGURE 4.1
ACTIVITY SCHEDULE

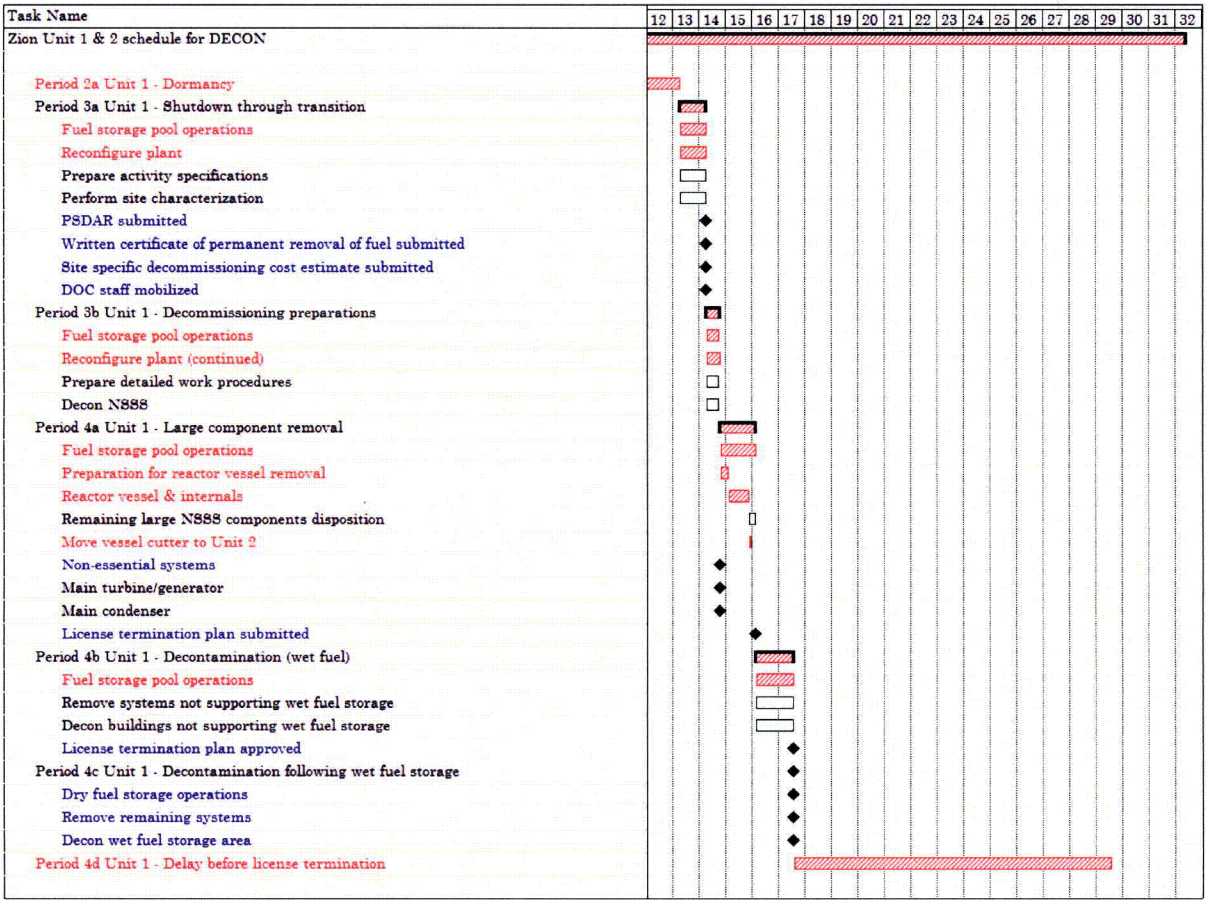


FIGURE 4.1 (continued)
ACTIVITY SCHEDULE

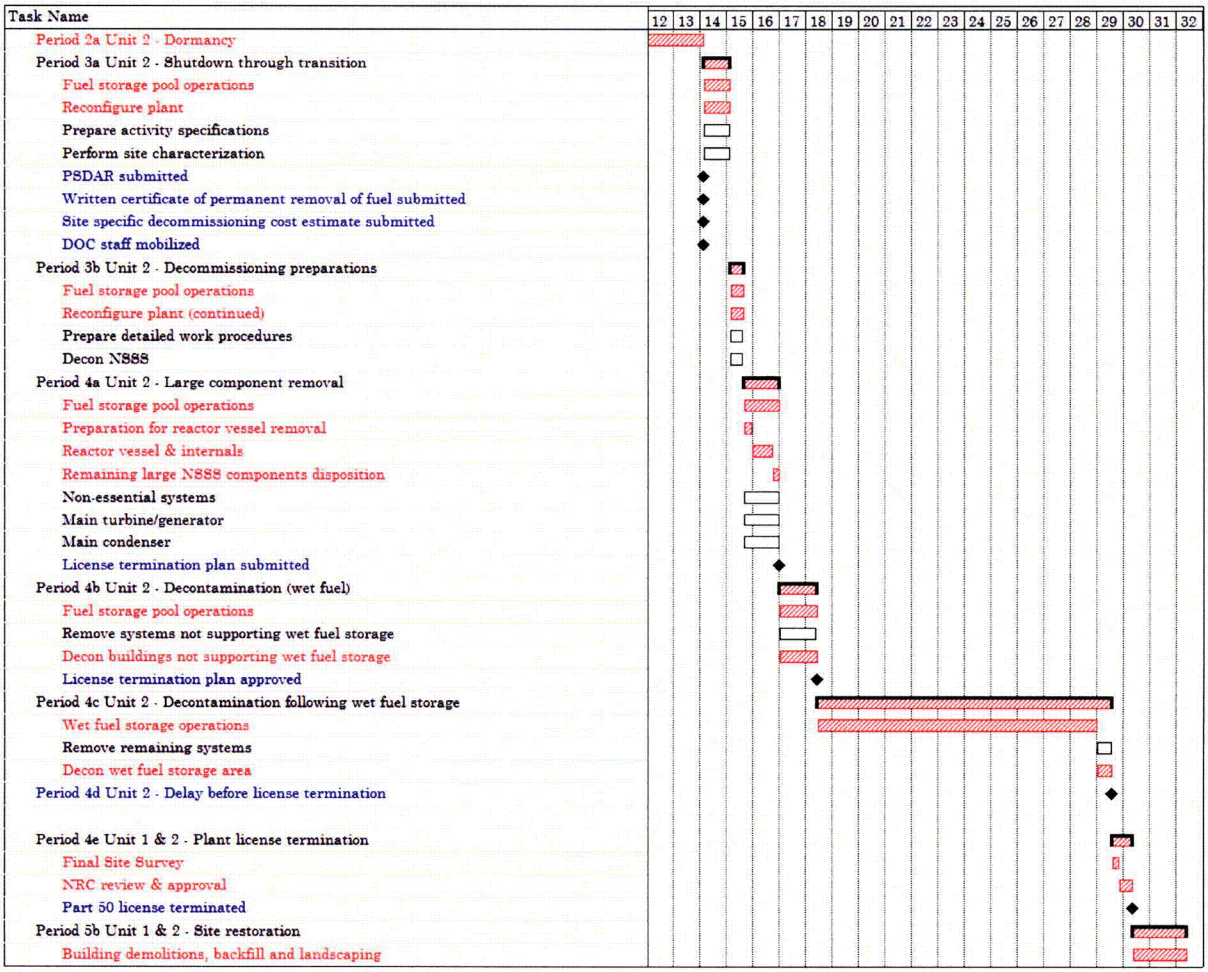
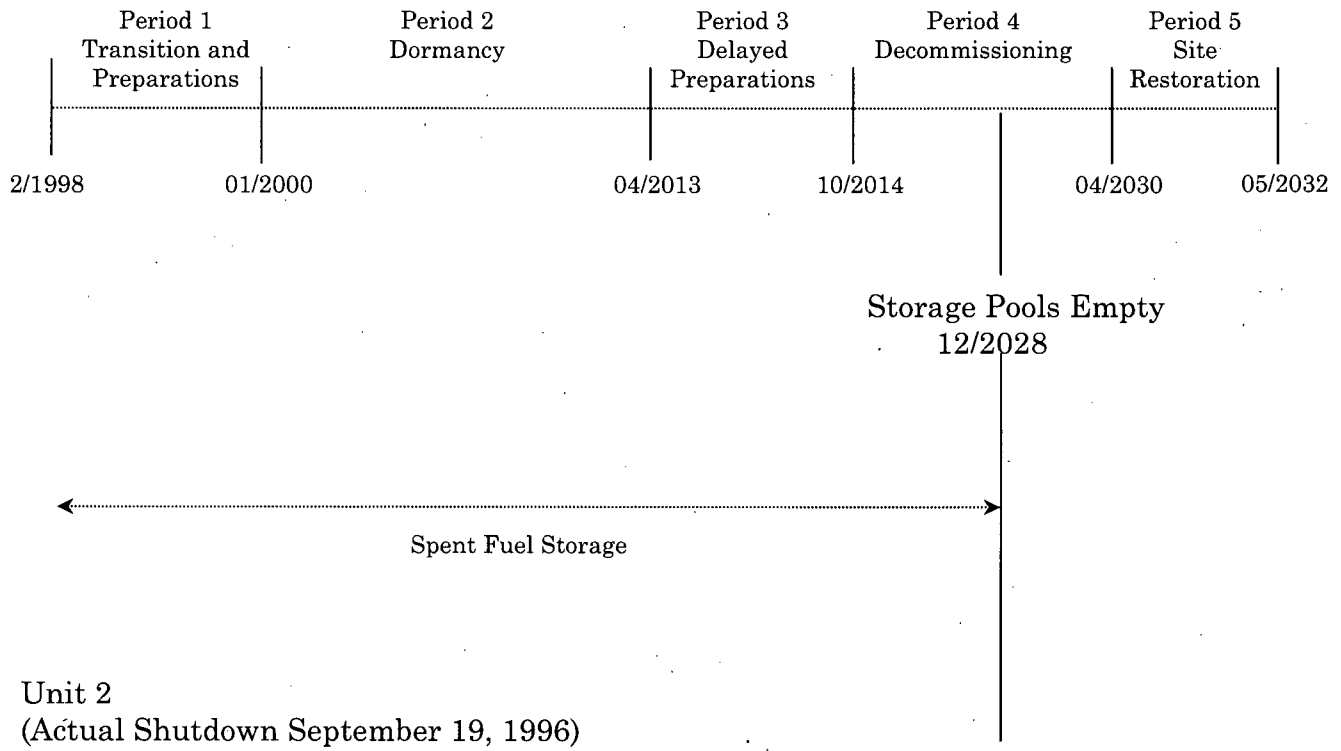


FIGURE 4.2
DECOMMISSIONING TIMELINE
DECON
(not to scale)

Unit 1
(Actual Shutdown February 21, 1997)



Unit 2
(Actual Shutdown September 19, 1996)

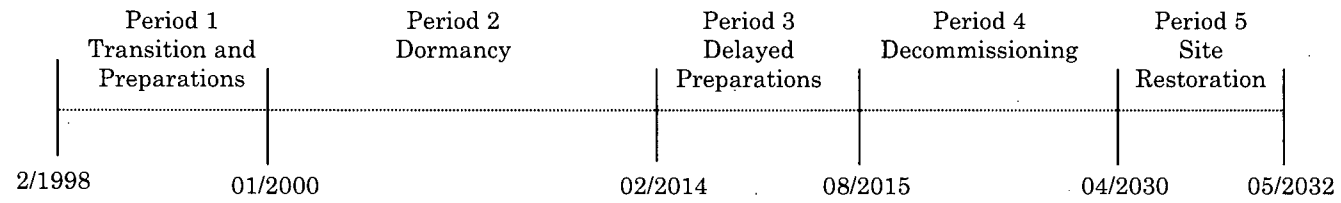
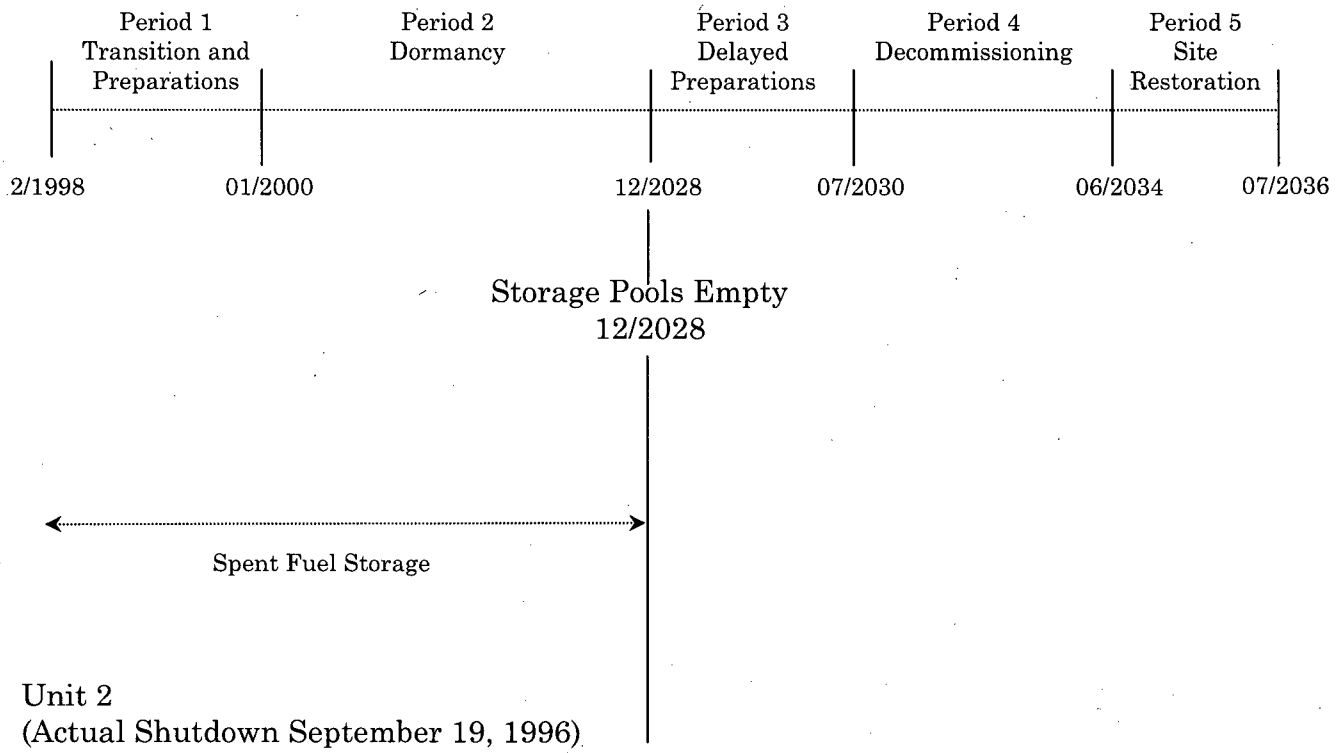


FIGURE 4.3
DECOMMISSIONING TIMELINE
DELAYED DECON
(not to scale)

Unit 1
(Actual Shutdown February 21, 1997)



Unit 2
(Actual Shutdown September 19, 1996)

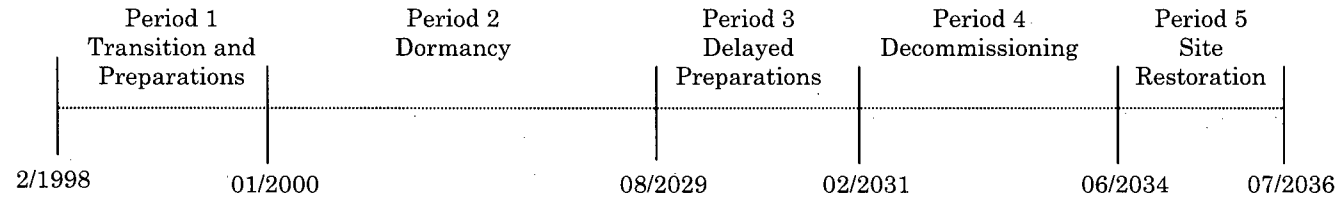
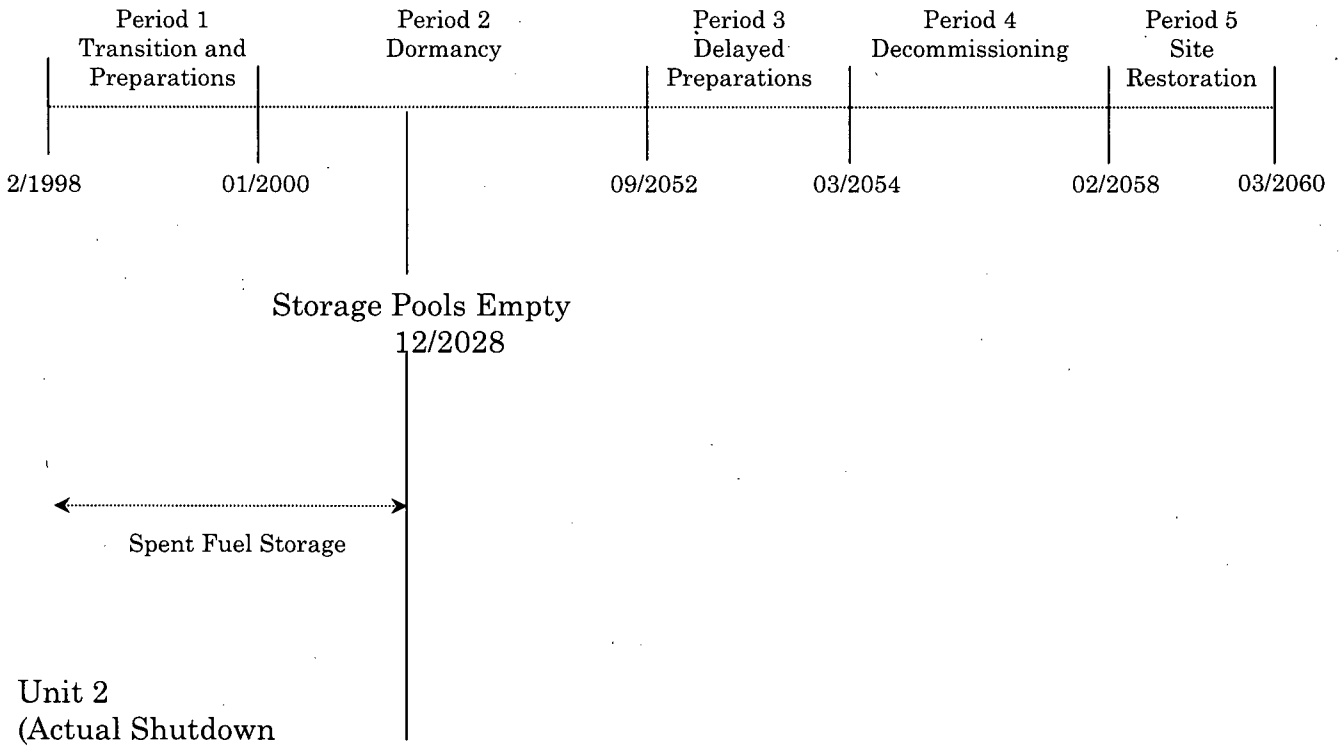
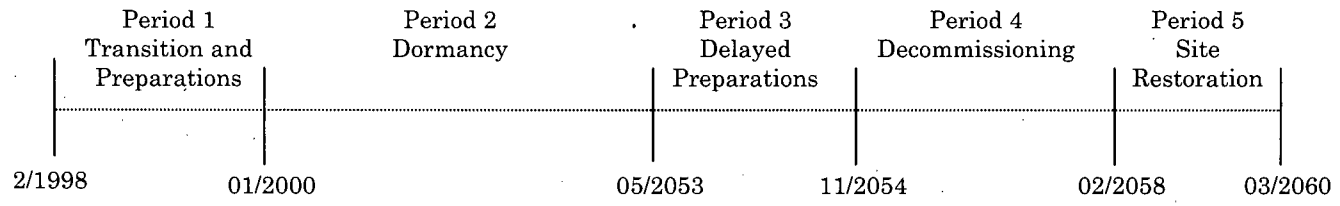


FIGURE 4.4
DECOMMISSIONING TIMELINE
SAFSTOR
(not to scale)

Unit 1
(Actual Shutdown February 21, 1997)



Unit 2
(Actual Shutdown
September 19, 1996)



5. RADIOACTIVE WASTES

The objectives of the decommissioning process are the removal of all radioactive material from the site that would restrict its future use and the termination of the NRC license(s). This currently requires the remediation of all radioactive material at the site in excess of applicable legal limits. Under the Atomic Energy Act,[31] the NRC is responsible for protecting the public from sources of ionizing radiation. Title 10 of the Code of Federal Regulations delineates the production, utilization, and disposal of radioactive materials and processes. In particular, §71 defines radioactive material as it pertains to packaging and transportation and §61 specifies its disposition.

Most of the materials being transported for controlled burial are categorized as Low Specific Activity (LSA) or Surface Contaminated Object (SCO) materials containing Type A quantities, as defined in 49 CFR §173-178. Shipping containers are required to be Industrial Packages (IP-1, IP-2 or IP-3, as defined in subpart 173.411). For this study, commercially available steel containers are presumed to be used for the disposal of piping, small components, and concrete. Larger components can serve as their own containers, with proper closure of all openings, access ways, and penetrations.

The volumes of radioactive waste generated during the various decommissioning activities at the site is shown on a line-item basis in Appendices C, D, and E and summarized in Tables 5.1 through 5.3. The quantified waste volume summaries shown in these tables are consistent with §61 classifications. The volumes are calculated based on the exterior dimensions for containerized material and on the displaced volume of components serving as their own waste containers.

The reactor vessel and internals are categorized as large quantity shipments and, accordingly, will be shipped in reusable, shielded truck casks with disposable liners. In calculating disposal costs, the burial fees are applied against the liner volume, as well as the special handling requirements of the payload. Packaging efficiencies are lower for the highly activated materials (greater than Type A quantity waste), where high concentrations of gamma-emitting radionuclides limit the capacity of the shipping canisters.

No process system containing/handling radioactive substances at shutdown is presumed to meet material release criteria by decay alone, i.e., systems radioactive at shutdown will still be radioactive over the time period during which the decommissioning is accomplished, due to the presence of long-lived radionuclides. While the dose rates decrease with time, radionuclides such as ^{137}Cs will still control the disposition requirements.

The waste material generated in the decontamination and dismantling of Zion is primarily generated during Period 4. Material that is considered potentially contaminated when removed from the radiologically controlled area is sent to processing facilities in Tennessee for conditioning and disposal. Heavily contaminated components and activated materials are routed for controlled disposal. The disposal volumes reported in the tables reflect the savings resulting from reprocessing and recycling.

For purposes of constructing the analysis, the rate schedule for the Barnwell facility was used as a proxy for the higher activity waste. This schedule was used to estimate the disposal fees for the reactor vessel and internals components disposal.

For plant components and neutron activated structural components, including all activated concrete unsuitable for processing or recovery, an average disposal rate of approximately $288 per cubic foot (based upon an average waste density of 85 pounds per cubic foot) was used. This waste was also assumed to be disposed of at the Barnwell facility.

The remaining volume of contaminated metallic and concrete debris is processed and conditioned at a Duratek facility. The contaminated metallic waste stream includes the lower activity components such as miscellaneous steel, metal siding, scaffolding, and structural steel. Metals are recycled at a unit rate of $1.05 per pound. Concrete, soil, asbestos and other bulk debris are disposed of at a rate of $1.00 per pound or approximately $100 per cubic foot. Dry active wastes, e.g., cloth, paper and plastics, are sent to the Envirocare facility for direct disposal from the site at $2.78 per pound or $55.60 per cubic foot, at an assumed density of 20 pounds per cubic foot.

TABLE 5.1
DECOMMISSIONING WASTE SUMMARY
DECON

	Waste Class[1]	Volume (cubic feet)	Weight (pounds)
Low-Level Radioactive Waste			
Barnwell, South Carolina (contaminated/activated metallic waste and concrete)			
	A	154,726	14,839,756
	B	5,509	713,962
	C	1,837	217,522
Envirocare, Utah (miscellaneous steel, contaminated/activated concrete)			
	A	299,743	9,181,010
Geologic Repository (Greater-than Class C)			
	>C	407	83,800
Total [2]		462,222	25,036,050
Processed Waste (off-site)			29,835,410
Scrap Metal			175,568,000

1 Waste is classified according to the requirements as delineated in Title 10 CFR, Part 61.55
2 Columns may not add due to rounding.

TABLE 5.2
DECOMMISSIONING WASTE SUMMARY
DELAYED DECON

	Waste Class[1]	Volume (cubic feet)	Weight (pounds)
Low-Level Radioactive Waste			
Barnwell, South Carolina (contaminated/activated metallic waste and concrete)			
	A	154,732	14,840,055
	B	6,911	726,252
	C	1,899	213,382
Envirocare, Utah (miscellaneous steel, contaminated/activated concrete)			
	A	295,266	9,091,293
Geologic Repository (Greater-than Class C)			
	>C	407	83,800
Total [2]		459,215	24,954,782
Processed Waste (off-site)			29,835,410
Scrap Metal			175,568,000

1 Waste is classified according to the requirements as delineated in Title 10 CFR, Part 61.55
2 Columns may not add due to rounding.

TABLE 5.3
DECOMMISSIONING WASTE SUMMARY
SAFSTOR

	Waste Class[1]	Volume (cubic feet)	Weight (pounds)
Low-Level Radioactive Waste			
Barnwell, South Carolina (contaminated/activated metallic waste and concrete)			
	A	152,272	14,567,551
	B	6,911	726,252
	C	1,899	213,382
Envirocare, Utah (miscellaneous steel, contaminated/activated concrete)			
	A	314,737	9,481,472
Geologic Repository (Greater-than Class C)			
	>C	407	83,800
Total [2]		476,225	25,081,457
Processed Waste (off-site)			30,029,410
Scrap Metal			175,568,000

1 Waste is classified according to the requirements as delineated in Title 10 CFR, Part 61.55
2 Columns may not add due to rounding

6. RESULTS

The analysis to estimate the costs to decommission Zion relied upon the site-specific, technical information developed for a previous analysis prepared in 2003-04. While not an engineering study, the estimate provides Exelon with sufficient information to assess its financial obligations, as they pertain to the eventual decommissioning of the nuclear station.

The estimates described in this report are based on numerous fundamental assumptions, including regulatory requirements, project contingencies, low-level radioactive waste disposal practices, high-level radioactive waste management options, and site restoration requirements. The decommissioning scenarios assume continued operation of the plant's spent fuel pool until the fuel can be transferred to a DOE facility.

The cost projected to promptly decommission (DECON) Zion is estimated to be $1,042.7 million. The majority of this cost (approximately 66.7%) is associated with the physical decontamination and dismantling of the nuclear units so that the licenses can be terminated. Another 23.5% is associated with the management, interim storage, and eventual transfer of the spent fuel. The remaining 9.8% is for the demolition of the designated structures and limited restoration of the site.

The primary cost contributors, identified in Tables 6.1 through 6.3, are either labor-related or associated with the management and disposition of the radioactive waste. Program management is the largest single contributor to the overall cost. The magnitude of the expense is a function of both the size of the organization required to manage the decommissioning, as well as the duration of the program. It is assumed, for purposes of this analysis, that Exelon will oversee the decommissioning program, using a DOC to manage the decommissioning labor force and the associated subcontractors. The size and composition of the management organization varies with the decommissioning phase and associated site activities. However, once the operating licenses are terminated, the staff is substantially reduced for the conventional demolition and restoration of the site.

As described in this report, the spent fuel pool will remain operational until the DOE removes the last of the spent fuel; this is expected to occur by the end of 2028. This will allow decommissioning operations to proceed in and around the pool area. The spent fuel will be packaged into transportable steel canisters for loading into a DOE-provided transport cask for final transfer to DOE.

The cost for waste disposal includes only those costs associated with the controlled disposition of the low-level radioactive waste generated from decontamination and

dismantling activities, including plant equipment and components, structural material, filters, resins and dry-active waste. As described in Section 5, disposal of the lower level material, including concrete and structural steel, is at the Envirocare facility. The more highly radioactive material is sent to the Barnwell facility, with the exception of selected reactor vessel components. Highly activated components, requiring additional isolation from the environment, are packaged for geologic disposal. Disposal of these components is based upon a cost equivalent for spent fuel.

A significant portion of the metallic waste is designated for additional processing and treatment at an off-site facility. Processing reduces the volume of material requiring controlled disposal through such techniques and processes as survey and sorting, decontamination, and volume reduction. The material that cannot be unconditionally released is packaged for controlled disposal at one of the currently operating facilities. The cost identified in the summary table for processing is all-inclusive, incorporating the ultimate disposition of the material.

Removal costs reflect the labor-intensive nature of the decommissioning process, as well as the management controls required to ensure a safe and successful program. Decontamination and packaging costs also have a large labor component that is based upon prevailing union wages. Non-radiological demolition is a natural extension of the decommissioning process. The methods employed in decontamination and dismantling are generally destructive and indiscriminate in inflicting collateral damage. With a work force mobilized to support decommissioning operations, non-radiological demolition can be an integrated activity and a logical expansion of the work being performed in the process of terminating the operating licenses. Prompt demolition reduces future liabilities and can be more cost effective than deferral, due to the deterioration of the facilities (and therefore the working conditions) with time.

The reported cost for transport includes the tariffs and surcharges associated with moving large components and/or overweight shielded casks overland, as well as the general expense, e.g., labor and fuel, of transporting material to the destinations identified in this report. For purposes of this analysis, material is primarily moved overland by truck.

Slightly contaminated material or material located within a contaminated area is sent to an off-site processing center, i.e., this analysis does not assume that contaminated plant components and equipment can be decontaminated for uncontrolled release *in-situ*. Centralized processing centers have proven to be a more economical means of handling the large volumes of material produced in the dismantling of a nuclear unit.

License termination survey costs are associated with the labor intensive and complex activity of verifying that contamination has been removed from the site to the levels specified by the regulating agency. This process involves a systematic survey of all remaining plant surface areas and surrounding environs, sampling, isotopic analysis, and documentation of the findings. The status of any plant components and materials not removed in the decommissioning process will also require confirmation and will add to the expense of surveying the facilities alone.

The remaining costs include allocations for heavy equipment and temporary services, as well as for other expenses such as regulatory fees and the premiums for nuclear insurance. While site operating costs are greatly reduced following the final cessation of plant operations, certain administrative functions do need to be maintained either at a basic functional or regulatory level.

TABLE 6.1
SUMMARY OF DECOMMISSIONING COST ELEMENTS
DECON
(thousands of 2006 dollars)

Work Category	Cost	%
Decontamination	10,970	1.1%
Removal	196,422	18.8%
Packaging	17,746	1.7%
Transportation	14,031	1.3%
Waste Disposal	128,445	12.3%
Off-site Waste Processing	36,145	3.5%
Program Management [1]	410,921	39.4%
Spent Fuel Management	36,234	3.5%
Insurance and Regulatory Fees	15,475	1.5%
Energy	15,018	1.4%
Characterization and Licensing Surveys	23,741	2.3%
Property Taxes	20,562	2.0%
Miscellaneous Equipment	12,842	1.2%
Site O&M	5,374	0.5%
Dormancy Costs	98,749	9.5%
Total [2]	1,042,675	100.0%
NRC License Termination	695,934	66.7%
Spent Fuel Management	244,863	23.5%
Site Restoration	101,877	9.8%

[1] Includes engineering and security
[2] Columns may not add due to rounding

TABLE 6.2
SUMMARY OF DECOMMISSIONING COST ELEMENTS
DELAYED DECON
(thousands of 2006 dollars)

Work Category	Cost	%
Decontamination	11,674	1.1%
Removal	191,839	18.1%
Packaging	16,244	1.5%
Transportation	12,893	1.2%
Waste Disposal	123,798	11.7%
Off-site Waste Processing	36,145	3.4%
Program Management [1]	288,075	27.2%
Spent Fuel Management	20,125	1.9%
Insurance and Regulatory Fees	5,383	0.5%
Energy	9,189	0.9%
Characterization and Licensing Surveys	23,741	2.2%
Property Taxes	7,939	0.7%
Miscellaneous Equipment	12,416	1.2%
Site O&M	2,075	0.2%
Dormancy Costs	299,146	28.2%
Total [2]	1,060,681	100.0%
NRC License Termination	639,379	60.3%
Spent Fuel Management	319,271	30.1%
Site Restoration	102,031	9.6%

[1] Includes engineering and security
[2] Columns may not add due to rounding

TABLE 6.3
SUMMARY OF DECOMMISSIONING COST ELEMENTS
SAFSTOR
(thousands of 2006 dollars)

Work Category	Cost	%
Decontamination	10,453	0.9%
Removal	194,020	16.4%
Packaging	16,220	1.4%
Transportation	12,534	1.1%
Waste Disposal	123,542	10.4%
Off-site Waste Processing	36,379	3.1%
Program Management [1]	353,151	29.8%
Spent Fuel Management	20,125	1.7%
Insurance and Regulatory Fees	22,610	1.9%
Energy	14,634	1.2%
Characterization and Licensing Surveys	23,741	2.0%
Property Taxes	34,321	2.9%
Miscellaneous Equipment	20,547	1.7%
Site O&M	8,970	0.8%
Dormancy Costs	294,931	24.9%
Total [2]	1,186,179	100.0%
NRC License Termination	769,383	64.9%
Spent Fuel Management	315,056	26.6%
Site Restoration	101,740	8.6%

[1] Includes engineering and security
[2] Columns may not add due to rounding

7. REFERENCES

1. U.S. Code of Federal Regulations, Title 10, Parts 30, 40, 50, 51, 70 and 72, "General Requirements for Decommissioning Nuclear Facilities," Nuclear Regulatory Commission, Federal Register Volume 53, Number 123 (p 24018 et seq.), June 27, 1988.

2. U.S. Nuclear Regulatory Commission, Regulatory Guide 1.159, "Assuring the Availability of Funds for Decommissioning Nuclear Reactors," October 2003.

3. U.S. Code of Federal Regulations, Title 10, Part 20, Subpart E, "Radiological Criteria for License Termination."

4. U.S. Code of Federal Regulations, Title 10, Parts 20 and 50, "Entombment Options for Power Reactors," Advanced Notice of Proposed Rulemaking, Federal Register Volume 66, Number 200, October 16, 2001.

5. U.S. Code of Federal Regulations, Title 10, Parts 2, 50 and 51, "Decommissioning of Nuclear Power Reactors," Nuclear Regulatory Commission, Federal Register Volume 61 (p 39278 et seq.), July 29, 1996.

6. "Nuclear Waste Policy Act of 1982 and Amendments," U.S. Department of Energy's Office of Civilian Radioactive Management, 1982.

7. Maine Yankee Atomic Power Company, Connecticut Yankee Atomic Power Company, and Yankee Atomic Power Company v. United States, U.S. Court of Appeals for the Federal Circuit decision, Docket No. 99-5138, -5139, -5140, August 31, 2000.

8. U.S. Code of Federal Regulations, Title 10, Part 50, "Domestic Licensing of Production and Utilization Facilities," Subpart 54 (bb), "Conditions of Licenses."

9. "Low-Level Radioactive Waste Policy," Public Law 96-573, 1980.

10. "Low-Level Radioactive Waste Policy Amendments Act of 1985," Public Law 99-240, January 15, 1986.

11. U.S. Code of Federal Regulations, Title 10, Part 20, Subpart E, "Radiological Criteria for License Termination," Federal Register, Volume 62, Number 139 (p 39058 et seq.), July 21, 1997.

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(continued)

12. "Establishment of Cleanup Levels for CERCLA Sites with Radioactive Contamination," EPA Memorandum OSWER No. 9200.4-18, August 22, 1997.

13. U.S. Code of Federal Regulations, Title 40, Part 141.16, "Maximum contaminant levels for beta particle and photon radioactivity from man-made radionuclides in community water systems."

14. "Memorandum of Understanding Between the Environmental Protection Agency and the Nuclear Regulatory Commission: Consultation and Finality on Decommissioning and Decontamination of Contaminated Sites," OSWER 9295.8-06a, October 9, 2002.

15. "Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM)," NUREG/CR-1575, Rev. 1, EPA 402-R-97-016, Rev. 1, August 2000.

16. "Decommissioning Cost Analysis for the Zion Nuclear Power Station," Document No. E16-1455-008, TLG Services, Inc., September 2004.

17. T.S. LaGuardia et al., "Guidelines for Producing Commercial Nuclear Power Plant Decommissioning Cost Estimates," AIF/NESP-036, May 1986.

18. W.J. Manion and T.S. LaGuardia, "Decommissioning Handbook," U.S. Department of Energy, DOE/EV/10128-1, November 1980.

19. "Building Construction Cost Data 2006," Robert Snow Means Company, Inc., Kingston, Massachusetts.

20. Project and Cost Engineers' Handbook, Second Edition, p. 239, American Association of Cost Engineers, Marcel Dekker, Inc., New York, New York, 1984.

21. "Acceptance Priority Ranking & Annual Capacity Report," DOE/RW-0567, July 2004.

22. "Civilian Radioactive Waste Management System Total System Description," Revision 02 (TDR-CRW-SE-000002), DOE/RW-0500, September 2001.

7. REFERENCES
(continued)

23. "Strategy for Management and Disposal of Greater-Than-Class C Low-Level Radioactive Waste," Federal Register Volume 60, Number 48 (p 13424 et seq.), March 1995.

24. U.S. Department of Transportation, Title 49 of the Code of Federal Regulations, "Transportation," Parts 173 through 178, 1996.

25. Tri-State Motor Transit Company, published tariffs, Interstate Commerce Commission (ICC), Docket No. MC-427719 Rules Tariff, March 2004, Radioactive Materials Tariff, January 2004.

26. J.C. Evans et al., "Long-Lived Activation Products in Reactor Materials" NUREG/CR-3474, Pacific Northwest Laboratory for the Nuclear Regulatory Commission. August 1984.

27. R.I. Smith, G.J. Konzek, W.E. Kennedy, Jr., "Technology, Safety and Costs of Decommissioning a Reference Pressurized Water Reactor Power Station," NUREG/CR-0130 and addenda, Pacific Northwest Laboratory for the Nuclear Regulatory Commission. June 1978.

28. H.D. Oak, et al., "Technology, Safety and Costs of Decommissioning a Reference Boiling Water Reactor Power Station," NUREG/CR-0672 and addenda, Pacific Northwest Laboratory for the Nuclear Regulatory Commission. June 1980.

29. "Financial Protection Requirements for Permanently Shutdown Nuclear Power Reactors," 10 CFR Parts 50 and 140, Federal Register Notice, Vol. 62, No. 210, October 30, 1997.

30. "Microsoft Project 2003," Microsoft Corporation, Redmond, WA, 2003.

31. "Atomic Energy Act of 1954," (68 Stat. 919).

APPENDIX A

UNIT COST FACTOR DEVELOPMENT

APPENDIX A
UNIT COST FACTOR DEVELOPMENT

Example: Unit Factor for Removal of Contaminated Heat Exchanger < 3,000 lbs.

1. SCOPE

Heat exchangers weighing < 3,000 lbs. will be removed in one piece using a crane or small hoist. They will be disconnected from the inlet and outlet piping. The heat exchanger will be sent to the waste processing area.

2. CALCULATIONS

Act ID	Activity Description	Activity Duration (minutes)	Critical Duration (minutes)*
a	Remove insulation	60	(b)
b	Mount pipe cutters	60	60
c	Install contamination controls	20	(b)
d	Disconnect inlet and outlet lines	60	60
e	Cap openings	20	(d)
f	Rig for removal	30	30
g	Unbolt from mounts	30	30
h	Remove contamination controls	15	15
i	Remove, wrap, send to waste processing area	60	60
	Totals (Activity/Critical)	355	255

Duration adjustment(s):	
+ Respiratory protection adjustment (25% of critical duration)	64
+ Radiation/ALARA adjustment (20% of critical duration)	51
Adjusted work duration	370
+ Protective clothing adjustment (30% of adjusted duration)	111
Productive work duration	480
+ Work break adjustment (8.33 % of productive duration)	40
Total work duration (minutes)	521

***** Total duration = 8.683 hr *****

* Alpha designators indicate activities that can be performed in parallel

APPENDIX A
(Continued)

3. LABOR REQUIRED

Crew	Number	Duration (Hours)	Rate ($/hr)	Cost
Laborers	3.00	8.683	$46.60	$1,213.88
Craftsmen	2.00	8.683	$57.12	$991.95
Foreman	1.00	8.683	$59.39	$515.34
General Foreman	0.25	8.683	$61.34	$133.15
Fire Watch	0.05	8.683	$46.60	$20.23
Health Physics Technician	1.00	8.683	$46.01	$399.50
Total labor cost				$3,274.05

4. EQUIPMENT & CONSUMABLES COSTS

Equipment Costs	none
Consumables/Materials Costs	
-Blotting paper 50 @ $0.48 sq ft {2}	$24.00
-Plastic sheets/bags 50 @ $0.11/sq ft {3}	$5.50
-Gas torch consumables 1 @ $7.95/hr x 1 hr {1}	$7.95
Subtotal cost of equipment and materials	$34.45
Overhead & profit on equipment and materials @ 16.25 %	$6.09
Total costs, equipment & material:	$43.54

TOTAL COST:
Removal of contaminated heat exchanger <3000 pounds: $3,317.59

Total labor cost:	$3,274.05
Total equipment/material costs:	$43.54
Total craft labor man-hours required per unit:	63.39

5. NOTES AND REFERENCES

- Work difficulty factors were developed in conjunction with the Atomic Industrial Forum's (now NEI) program to standardize nuclear decommissioning cost estimates and are delineated in Volume 1, Chapter 5 of the "Guidelines for Producing Commercial Nuclear Power Plant Decommissioning Cost Estimates," AIF/NESP-036, May 1986.

- References for equipment & consumables costs:

    1. www.mcmaster.com online catalog - Spill Control (7193T88)
    2. R.S. Means (2006) Div 01540 Section 800-0200, page 17
    3. R.S. Means (2006) Div 01 54 33 Section 40-6360, page 510

- Material and consumable costs were adjusted using the regional indices for Chicago, Illinois.

APPENDIX B

UNIT COST FACTOR LISTING
(DECON: Power Block Structures Only)

APPENDIX B

UNIT COST FACTOR LISTING
(Power Block Structures Only)

Unit Cost Factor	Cost/Unit
Removal of clean instrument and sampling tubing, $/linear foot	0.90
Removal of clean pipe 0.25 to 2 inches diameter, $/linear foot	8.72
Removal of clean pipe >2 to 4 inches diameter, $/linear foot	11.22
Removal of clean pipe >4 to 8 inches diameter, $/linear foot	24.06
Removal of clean pipe >8 to 14 inches diameter, $/linear foot	44.36
Removal of clean pipe >14 to 20 inches diameter, $/linear foot	57.68
Removal of clean pipe >20 to 36 inches diameter, $/linear foot	84.61
Removal of clean pipe >36 inches diameter, $/linear foot	100.15
Removal of clean valve >2 to 4 inches	155.49
Removal of clean valve >4 to 8 inches	240.63
Removal of clean valve >8 to 14 inches	443.61
Removal of clean valve >14 to 20 inches	576.84
Removal of clean valve >20 to 36 inches	846.08
Removal of clean valve >36 inches	1,001.50
Removal of clean pipe hanger for small bore piping	55.14
Removal of clean pipe hanger for large bore piping	178.46
Removal of clean pump, <300 pound	416.87
Removal of clean pump, 300-1000 pound	1,095.69
Removal of clean pump, 1000-10,000 pound	3,895.42
Removal of clean pump, >10,000 pound	7,552.01
Removal of clean pump motor, 300-1000 pound	460.33
Removal of clean pump motor, 1000-10,000 pound	1,634.89
Removal of clean pump motor, >10,000 pound	3,684.10
Removal of clean heat exchanger <3000 pound	2,240.34
Removal of clean heat exchanger >3000 pound	5,611.12

APPENDIX B

UNIT COST FACTOR LISTING
(Power Block Structures Only)

Unit Cost Factor	Cost/Unit
Removal of clean feedwater heater/deaerator	14,842.20
Removal of clean moisture separator/reheater	30,027.62
Removal of clean tank, <300 gallons	527.84
Removal of clean tank, 300-3000 gallon	1,621.85
Removal of clean tank, >3000 gallons, $/square foot surface area	12.77
Removal of clean electrical equipment, <300 pound	233.67
Removal of clean electrical equipment, 300-1000 pound	751.12
Removal of clean electrical equipment, 1000-10,000 pound	1,507.19
Removal of clean electrical equipment, >10,000 pound	3,357.81
Removal of clean electrical transformer < 30 tons	2,428.20
Removal of clean electrical transformer > 30 tons	6,721.20
Removal of clean standby diesel generator, <100 kW	2,384.55
Removal of clean standby diesel generator, 100 kW to 1 MW	5,321.36
Removal of clean standby diesel generator, >1 MW	11,014.50
Removal of clean electrical cable tray, $/linear foot	20.37
Removal of clean electrical conduit, $/linear foot	9.12
Removal of clean mechanical equipment, <300 pound	233.67
Removal of clean mechanical equipment, 300-1000 pound	751.12
Removal of clean mechanical equipment, 1000-10,000 pound	1,507.19
Removal of clean mechanical equipment, >10,000 pound	3,357.81
Removal of clean HVAC equipment, <300 pound	233.67
Removal of clean HVAC equipment, 300-1000 pound	751.12
Removal of clean HVAC equipment, 1000-10,000 pound	1,507.19
Removal of clean HVAC equipment, >10,000 pound	3,357.81
Removal of clean HVAC ductwork, $/pound	0.98

APPENDIX B

UNIT COST FACTOR LISTING
(Power Block Structures Only)

Unit Cost Factor	Cost/Unit
Removal of contaminated instrument and sampling tubing, $/linear foot	1.19
Removal of contaminated pipe 0.25 to 2 inches diameter, $/linear foot	16.49
Removal of contaminated pipe >2 to 4 inches diameter, $/linear foot	28.15
Removal of contaminated pipe >4 to 8 inches diameter, $/linear foot	44.71
Removal of contaminated pipe >8 to 14 inches diameter, $/linear foot	88.89
Removal of contaminated pipe >14 to 20 inches diameter, $/linear foot	106.93
Removal of contaminated pipe >20 to 36 inches diameter, $/linear foot	148.95
Removal of contaminated pipe >36 inches diameter, $/linear foot	177.21
Removal of contaminated valve >2 to 4 inches	349.08
Removal of contaminated valve >4 to 8 inches	418.96
Removal of contaminated valve >8 to 14 inches	854.62
Removal of contaminated valve >14 to 20 inches	1,091.57
Removal of contaminated valve >20 to 36 inches	1,455.19
Removal of contaminated valve >36 inches	1,737.79
Removal of contaminated pipe hanger for small bore piping	94.96
Removal of contaminated pipe hanger for large bore piping	310.07
Removal of contaminated pump, <300 pound	718.56
Removal of contaminated pump, 300-1000 pound	1,672.27
Removal of contaminated pump, 1000-10,000 pound	5,670.79
Removal of contaminated pump, >10,000 pound	13,764.22
Removal of contaminated pump motor, 300-1000 pound	708.33
Removal of contaminated pump motor, 1000-10,000 pound	2,285.27
Removal of contaminated pump motor, >10,000 pound	5,162.32
Removal of contaminated heat exchanger <3000 pound	3,317.59
Removal of contaminated heat exchanger >3000 pound	9,606.38

APPENDIX B

UNIT COST FACTOR LISTING
(Power Block Structures Only)

Unit Cost Factor	Cost/Unit
Removal of contaminated tank, <300 gallons	1,198.22
Removal of contaminated tank, >300 gallons, $/square foot	24.20
Removal of contaminated electrical equipment, <300 pound	564.01
Removal of contaminated electrical equipment, 300-1000 pound	1,350.43
Removal of contaminated electrical equipment, 1000-10,000 pound	2,599.08
Removal of contaminated electrical equipment, >10,000 pound	5,204.83
Removal of contaminated electrical cable tray, $/linear foot	27.74
Removal of contaminated electrical conduit, $/linear foot	12.92
Removal of contaminated mechanical equipment, <300 pound	641.84
Removal of contaminated mechanical equipment, 300-1000 pound	1,534.51
Removal of contaminated mechanical equipment, 1000-10,000 pound	2,957.63
Removal of contaminated mechanical equipment, >10,000 pound	5,204.83
Removal of contaminated HVAC equipment, <300 pound	641.84
Removal of contaminated HVAC equipment, 300-1000 pound	1,534.51
Removal of contaminated HVAC equipment, 1000-10,000 pound	2,957.63
Removal of contaminated HVAC equipment, >10,000 pound	5,204.83
Removal of contaminated HVAC ductwork, $/pound	1.69
Removal/plasma arc cut of contaminated thin metal components, $/linear in.	3.07
Additional decontamination of surface by washing, $/square foot	6.44
Additional decontamination of surfaces by hydrolasing, $/square foot	27.37
Decontamination rig hook up and flush, $/ 250 foot length	5,428.92
Chemical flush of components/systems, $/gallon	12.93
Removal of clean standard reinforced concrete, $/cubic yard	192.85
Removal of grade slab concrete, $/cubic yard	256.48
Removal of clean concrete floors, $/cubic yard	448.96

APPENDIX B

UNIT COST FACTOR LISTING
(Power Block Structures Only)

Unit Cost Factor	Cost/Unit
Removal of sections of clean concrete floors, $/cubic yard	1,387.64
Removal of clean heavily rein concrete w/#9 rebar, $/cubic yard	294.29
Removal of contaminated heavily rein concrete w/#9 rebar, $/cubic yard	1,590.35
Removal of clean heavily rein concrete w/#18 rebar, $/cubic yard	372.51
Removal of contaminated heavily rein concrete w/#18 rebar, $/cubic yard	2,101.96
Removal heavily rein concrete w/#18 rebar & steel embedments, $/cubic yard	578.60
Removal of below-grade suspended floors, $/cubic yard	448.96
Removal of clean monolithic concrete structures, $/cubic yard	1,176.55
Removal of contaminated monolithic concrete structures, $/cubic yard	1,590.34
Removal of clean foundation concrete, $/cubic yard	953.56
Removal of contaminated foundation concrete, $/cubic yard	1,480.58
Explosive demolition of bulk concrete, $/cubic yard	40.28
Removal of clean hollow masonry block wall, $/cubic yard	168.79
Removal of contaminated hollow masonry block wall, $/cubic yard	233.19
Removal of clean solid masonry block wall, $/cubic yard	168.79
Removal of contaminated solid masonry block wall, $/cubic yard	233.19
Backfill of below-grade voids, $/cubic yard	19.64
Removal of subterranean tunnels/voids, $/linear foot	177.24
Placement of concrete for below-grade voids, $/cubic yard	125.21
Excavation of clean material, $/cubic yard	3.56
Excavation of contaminated material, $/cubic yard	28.25
Removal of clean concrete rubble (tipping fee included), $/cubic yard	30.50
Removal of contaminated concrete rubble, $/cubic yard	20.22
Removal of building by volume, $/cubic foot	0.40
Removal of clean building metal siding, $/square foot	2.22

APPENDIX B

UNIT COST FACTOR LISTING
(Power Block Structures Only)

Unit Cost Factor	Cost/Unit
Removal of contaminated building metal siding, $/square foot	3.06
Removal of standard asphalt roofing, $/square foot	3.77
Removal of transite panels, $/square foot	3.60
Scarifying contaminated concrete surfaces (drill & spall), $/square foot	10.46
Scabbling contaminated concrete floors, $/square foot	6.04
Scabbling contaminated concrete walls, $/square foot	16.06
Scabbling contaminated ceilings, $/square foot	54.74
Scabbling structural steel, $/square foot	5.20
Removal of clean overhead crane/monorail < 10 ton capacity	1,045.88
Removal of contaminated overhead crane/monorail < 10 ton capacity	1,420.46
Removal of clean overhead crane/monorail >10-50 ton capacity	2,498.82
Removal of contaminated overhead crane/monorail >10-50 ton capacity	3,402.34
Removal of polar crane > 50 ton capacity	9,272.45
Removal of gantry crane > 50 ton capacity	39,046.27
Removal of structural steel, $/pound	0.31
Removal of clean steel floor grating, $/square foot	7.15
Removal of contaminated steel floor grating, $/square foot	9.88
Removal of clean free standing steel liner, $/square foot	19.35
Removal of contaminated free standing steel liner, $/square foot	28.27
Removal of clean concrete-anchored steel liner, $/square foot	9.77
Removal of contaminated concrete-anchored steel liner, $/square foot	32.61
Placement of scaffolding in clean areas, $/square foot	18.77
Placement of scaffolding in contaminated areas, $/square foot	22.71
Landscaping with topsoil, $/acre	20,146.73
Cost of CPC B-88 LSA box & preparation for use	1,651.21

APPENDIX B

UNIT COST FACTOR LISTING
(Power Block Structures Only)

Unit Cost Factor	Cost/Unit
Cost of CPC B-25 LSA box & preparation for use	1,479.98
Cost of CPC B-12V 12 gauge LSA box & preparation for use	1,227.01
Cost of CPC B-144 LSA box & preparation for use	8,514.82
Cost of LSA drum & preparation for use	158.99
Cost of cask liner for CNSI 14 195 cask	285.59
Cost of cask liner for CNSI 8 120A cask (resins)	6,864.83
Cost of cask liner for CNSI 8 120A cask (filters)	1,893.27
Decontamination of surfaces with vacuuming, $/square foot	1.13

APPENDIX C

DETAILED COST ANALYSIS

DECON

Page

Table C-1
Zion Nuclear Power Station Unit 1
DECON Decommissioning Cost Estimate
(Thousands of 2006 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
	2006-2013 Decommissioning Expenditures	-	-	-	-	-	-	46,557	-	46,557	-	46,557	-	-	-	-	-	-	-	-	-
PERIOD 3a - Reactivate Site Following SAFSTOR Dormancy																					
Period 3a Direct Decommissioning Activities																					
3a.1.1	Prepare preliminary decommissioning cost	-	-	-	-	-	-	123	18	141	141	-	-	-	-	-	-	-	-	-	1,300
3a.1.2	Review plant dwgs & specs.	-	-	-	-	-	-	435	65	500	500	-	-	-	-	-	-	-	-	-	4,600
3a.1.3	Perform detailed rad survey									a											
3a.1.4	End product description	-	-	-	-	-	-	94	14	109	109	-	-	-	-	-	-	-	-	-	1,000
3a.1.5	Detailed by-product inventory	-	-	-	-	-	-	123	18	141	141	-	-	-	-	-	-	-	-	-	1,300
3a.1.6	Define major work sequence	-	-	-	-	-	-	708	106	815	815	-	-	-	-	-	-	-	-	-	7,500
3a.1.7	Perform SER and EA	-	-	-	-	-	-	293	44	337	337	-	-	-	-	-	-	-	-	-	3,100
3a.1.8	Perform Site-Specific Cost Study	-	-	-	-	-	-	472	71	543	543	-	-	-	-	-	-	-	-	-	5,000
3a.1.9	Prepare/submit License Termination Plan	-	-	-	-	-	-	387	58	445	445	-	-	-	-	-	-	-	-	-	4,096
3a.1.10	Receive NRC approval of termination plan									a											
Activity Specifications																					
3a.1.11.1	Re-activate plant & temporary facilities	-	-	-	-	-	-	696	104	801	721	-	80	-	-	-	-	-	-	-	7,370
3a.1.11.2	Plant systems	-	-	-	-	-	-	394	59	453	407	-	45	-	-	-	-	-	-	-	4,167
3a.1.11.3	Reactor internals	-	-	-	-	-	-	671	101	771	771	-	-	-	-	-	-	-	-	-	7,100
3a.1.11.4	Reactor vessel	-	-	-	-	-	-	614	92	706	706	-	-	-	-	-	-	-	-	-	6,500
3a.1.11.5	Biological shield	-	-	-	-	-	-	47	7	54	54	-	-	-	-	-	-	-	-	-	500
3a.1.11.6	Steam generators	-	-	-	-	-	-	295	44	339	339	-	-	-	-	-	-	-	-	-	3,120
3a.1.11.7	Reinforced concrete	-	-	-	-	-	-	151	23	174	87	-	87	-	-	-	-	-	-	-	1,600
3a.1.11.8	Main Turbine	-	-	-	-	-	-	38	6	43	-	-	43	-	-	-	-	-	-	-	400
3a.1.11.9	Main Condensers	-	-	-	-	-	-	38	6	43	-	-	43	-	-	-	-	-	-	-	400
3a.1.11.10	Plant structures & buildings	-	-	-	-	-	-	295	44	339	169	-	169	-	-	-	-	-	-	-	3,120
3a.1.11.11	Waste management	-	-	-	-	-	-	435	65	500	500	-	-	-	-	-	-	-	-	-	4,600
3a.1.11.12	Facility & site closeout	-	-	-	-	-	-	85	13	98	49	-	49	-	-	-	-	-	-	-	900
3a.1.11	Total	-	-	-	-	-	-	3,757	564	4,321	3,803	-	517	-	-	-	-	-	-	-	39,777
Planning & Site Preparations																					
3a.1.12	Prepare dismantling sequence	-	-	-	-	-	-	227	34	261	261	-	-	-	-	-	-	-	-	-	2,400
3a.1.13	Plant prep. & temp. svces	-	-	-	-	-	-	2,419	363	2,782	2,782	-	-	-	-	-	-	-	-	-	-
3a.1.14	Design water clean-up system	-	-	-	-	-	-	132	20	152	152	-	-	-	-	-	-	-	-	-	1,400
3a.1.15	Rigging/Cont. Cntrl Envlps/tooling/etc.	-	-	-	-	-	-	2,048	307	2,355	2,355	-	-	-	-	-	-	-	-	-	-
3a.1.16	Procure casks/liners & containers	-	-	-	-	-	-	116	17	134	134	-	-	-	-	-	-	-	-	-	1,230
3a.1	Subtotal Period 3a Activity Costs	-	-	-	-	-	-	11,334	1,700	13,035	12,517	-	517	-	-	-	-	-	-	-	72,703
Period 3a Collateral Costs																					
3a.3	Subtotal Period 3a Collateral Costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Period 3a Period-Dependent Costs																					
3a.4.1	Insurance	-	-	-	-	-	-	175	17	192	192	-	-	-	-	-	-	-	-	-	-
3a.4.2	Property taxes	-	-	-	-	-	-	501	50	551	551	-	-	-	-	-	-	-	-	-	-
3a.4.3	Health physics supplies	-	260	-	-	-	-	-	65	325	325	-	-	-	-	-	-	-	-	-	-
3a.4.4	Heavy equipment rental	-	335	-	-	-	-	-	50	385	385	-	-	-	-	-	-	-	-	-	-
3a.4.5	Disposal of DAW generated	-	-	11	5	-	33	-	10	59	59	-	-	-	592	-	-	-	11,866	145	-
3a.4.6	Plant energy budget	-	-	-	-	-	-	1,001	150	1,152	1,152	-	-	-	-	-	-	-	-	-	-
3a.4.7	NRC Fees	-	-	-	-	-	-	259	26	285	285	-	-	-	-	-	-	-	-	-	-
3a.4.8	Emergency Planning Fees	-	-	-	-	-	-	100	10	110	-	110	-	-	-	-	-	-	-	-	-
3a.4.9	Site O&M Cost	-	-	-	-	-	-	125	19	144	144	-	-	-	-	-	-	-	-	-	-
3a.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	363	54	417	-	417	-	-	-	-	-	-	-	-	-
3a.4.11	Security Staff Cost	-	-	-	-	-	-	1,125	169	1,293	1,293	-	-	-	-	-	-	-	-	-	31,371
3a.4.12	Utility Staff Cost	-	-	-	-	-	-	17,445	2,617	20,062	20,062	-	-	-	-	-	-	-	-	-	291,754
3a.4	Subtotal Period 3a Period-Dependent Costs	-	595	11	5	-	33	21,095	3,238	24,976	24,449	528	-	-	592	-	-	-	11,866	145	323,126
3a.0	TOTAL PERIOD 3a COST	-	595	11	5	-	33	32,429	4,938	38,011	36,966	528	517	-	592	-	-	-	11,866	145	395,828

Table C-1
Zion Nuclear Power Station Unit 1
DECON Decommissioning Cost Estimate
(Thousands of 2006 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes Class A Cu. Feet	Burial Volumes Class B Cu. Feet	Burial Volumes Class C Cu. Feet	Burial Volumes GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
PERIOD 3b - Decommissioning Preparations																					
Period 3b Direct Decommissioning Activities																					
Detailed Work Procedures																					
3b.1.1.1	Plant systems	-	-	-	-	-	-	447	67	514	463	-	51	-	-	-	-	-	-	-	4,733
3b.1.1.2	Reactor internals	-	-	-	-	-	-	236	35	272	272	-	-	-	-	-	-	-	-	-	2,500
3b.1.1.3	Remaining buildings	-	-	-	-	-	-	128	19	147	37	-	110	-	-	-	-	-	-	-	1,350
3b.1.1.4	CRD cooling assembly	-	-	-	-	-	-	94	14	109	109	-	-	-	-	-	-	-	-	-	1,000
3b.1.1.5	CRD housings & ICI tubes	-	-	-	-	-	-	94	14	109	109	-	-	-	-	-	-	-	-	-	1,000
3b.1.1.6	Incore instrumentation	-	-	-	-	-	-	94	14	109	109	-	-	-	-	-	-	-	-	-	1,000
3b.1.1.7	Reactor vessel	-	-	-	-	-	-	343	51	394	394	-	-	-	-	-	-	-	-	-	3,630
3b.1.1.8	Facility closeout	-	-	-	-	-	-	113	17	130	65	-	65	-	-	-	-	-	-	-	1,200
3b.1.1.9	Missile shields	-	-	-	-	-	-	43	6	49	49	-	-	-	-	-	-	-	-	-	450
3b.1.1.10	Biological shield	-	-	-	-	-	-	113	17	130	130	-	-	-	-	-	-	-	-	-	1,200
3b.1.1.11	Steam generators	-	-	-	-	-	-	435	65	500	500	-	-	-	-	-	-	-	-	-	4,600
3b.1.1.12	Reinforced concrete	-	-	-	-	-	-	94	14	109	54	-	54	-	-	-	-	-	-	-	1,000
3b.1.1.13	Main Turbine	-	-	-	-	-	-	147	22	169	-	-	169	-	-	-	-	-	-	-	1,560
3b.1.1.14	Main Condensers	-	-	-	-	-	-	147	22	169	-	-	169	-	-	-	-	-	-	-	1,560
3b.1.1.15	Auxiliary building	-	-	-	-	-	-	258	39	297	267	-	30	-	-	-	-	-	-	-	2,730
3b.1.1.16	Reactor building	-	-	-	-	-	-	258	39	297	267	-	30	-	-	-	-	-	-	-	2,730
3b.1.1	Total	-	-	-	-	-	-	3,046	457	3,503	2,823	-	679	-	-	-	-	-	-	-	32,243
3b.1	Subtotal Period 3b Activity Costs	-	-	-	-	-	-	3,046	457	3,503	2,823	-	679	-	-	-	-	-	-	-	32,243
Period 3b Additional Costs																					
3b.2.1	Site Characterization	-	-	-	-	-	-	496	74	570	570	-	-	-	-	-	-	-	-	-	-
3b.2.2	Clean Asbestos Remediation	-	3,762	30	464	-	2,527	-	1,645	8,428	8,428	-	-	-	65,280	-	-	-	909,067	55,578	-
3b.2.3	Contaminated Asbestos Remediation	-	3,334	15	232	-	1,154	-	1,158	5,893	5,893	-	-	-	31,936	-	-	-	415,168	46,357	-
3b.2	Subtotal Period 3b Additional Costs	-	7,095	45	696	-	3,681	496	2,878	14,892	14,892	-	-	-	97,216	-	-	-	1,324,235	101,935	-
Period 3b Collateral Costs																					
3b.3.1	Decon equipment	737	-	-	-	-	-	-	111	847	847	-	-	-	-	-	-	-	-	-	-
3b.3.2	DOC staff relocation expenses	-	-	-	-	-	-	829	124	953	953	-	-	-	-	-	-	-	-	-	-
3b.3.3	Small tool allowance	-	100	-	-	-	-	-	15	114	114	-	-	-	-	-	-	-	-	-	-
3b.3.4	Pipe cutting equipment	-	957	-	-	-	-	-	143	1,100	1,100	-	-	-	-	-	-	-	-	-	-
3b.3	Subtotal Period 3b Collateral Costs	737	1,056	-	-	-	-	829	393	3,015	3,015	-	-	-	-	-	-	-	-	-	-
Period 3b Period-Dependent Costs																					
3b.4.1	Decon supplies	23	-	-	-	-	-	-	6	28	28	-	-	-	-	-	-	-	-	-	-
3b.4.2	Insurance	-	-	-	-	-	-	88	9	97	97	-	-	-	-	-	-	-	-	-	-
3b.4.3	Property taxes	-	-	-	-	-	-	252	25	277	277	-	-	-	-	-	-	-	-	-	-
3b.4.4	Health physics supplies	-	492	-	-	-	-	-	123	615	615	-	-	-	-	-	-	-	-	-	-
3b.4.5	Heavy equipment rental	-	169	-	-	-	-	-	25	194	194	-	-	-	-	-	-	-	-	-	-
3b.4.6	Disposal of DAW generated	-	-	6	3	-	19	-	6	34	34	-	-	-	339	-	-	-	6,788	83	-
3b.4.7	Plant energy budget	-	-	-	-	-	-	503	76	579	579	-	-	-	-	-	-	-	-	-	-
3b.4.8	NRC Fees	-	-	-	-	-	-	130	13	143	143	-	-	-	-	-	-	-	-	-	-
3b.4.9	Emergency Planning Fees	-	-	-	-	-	-	50	5	55	-	55	-	-	-	-	-	-	-	-	-
3b.4.10	Site O&M Cost	-	-	-	-	-	-	63	9	72	72	-	-	-	-	-	-	-	-	-	-
3b.4.11	Spent Fuel Pool O&M	-	-	-	-	-	-	182	27	210	-	210	-	-	-	-	-	-	-	-	-
3b.4.12	Security Staff Cost	-	-	-	-	-	-	1,168	175	1,344	1,344	-	-	-	-	-	-	-	-	-	32,594
3b.4.13	DOC Staff Cost	-	-	-	-	-	-	4,390	659	5,049	5,049	-	-	-	-	-	-	-	-	-	64,137
3b.4.14	Utility Staff Cost	-	-	-	-	-	-	8,770	1,316	10,086	10,086	-	-	-	-	-	-	-	-	-	146,674
3b.4	Subtotal Period 3b Period-Dependent Costs	23	661	6	3	-	19	15,598	2,474	18,783	18,518	265	-	-	339	-	-	-	6,788	83	243,406
3b.0	TOTAL PERIOD 3b COST	760	8,812	52	699	-	3,700	19,969	6,201	40,192	39,248	265	679	-	97,555	-	-	-	1,331,023	102,018	275,649
PERIOD 3 TOTALS		760	9,407	63	704	-	3,733	52,398	11,139	78,203	76,214	793	1,197	-	98,147	-	-	-	1,342,888	102,164	671,477

Table C-1
Zion Nuclear Power Station Unit 1
DECON Decommissioning Cost Estimate
(Thousands of 2006 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
PERIOD 4a - Large Component Removal																					
Period 4a Direct Decommissioning Activities																					
Nuclear Steam Supply System Removal																					
4a.1.1.1	Reactor Coolant Piping	17	56	30	20	-	775	-	222	1,120	1,120	-	-	-	1,891	-	-	-	228,729	1,301	-
4a.1.1.2	Pressurizer Relief Tank	3	9	5	3	-	124	-	35	179	179	-	-	-	329	-	-	-	36,571	212	-
4a.1.1.3	Reactor Coolant Pumps & Motors	8	33	41	5	58	2,420	-	631	3,195	3,195	-	-	304	3,919	-	-	-	769,120	1,048	-
4a.1.1.4	Pressurizer	8	57	415	95	-	704	-	250	1,530	1,530	-	-	-	2,446	-	-	-	267,971	2,566	750
4a.1.1.5	Steam Generators	31	3,966	2,230	1,311	1,228	4,978	-	2,855	16,599	16,599	-	-	37,344	17,284	-	-	-	3,132,422	20,507	2,850
4a.1.1.6	CRDMs/ICIs/Service Structure Removal	7	71	170	20	-	176	-	85	529	529	-	-	-	3,052	-	-	-	51,800	1,493	-
4a.1.1.7	Reactor Vessel Internals	29	1,707	1,339	682	-	7,098	171	5,375	16,400	16,400	-	-	-	2,312	501	918	-	397,825	23,619	1,077
4a.1.1.8	Vessel & Internals GTCC Disposal	-	-	-	-	-	3,428	-	514	3,942	3,942	-	-	-	-	-	-	203	41,900	-	-
4a.1.1.9	Reactor Vessel	28	3,509	1,094	497	-	5,688	171	5,913	16,901	16,901	-	-	-	6,672	2,254	-	-	979,179	23,619	1,077
4a.1.1	Totals	130	9,408	5,325	2,633	1,286	25,390	342	15,881	60,395	60,395	-	-	37,648	37,905	2,754	918	203	5,905,518	74,365	5,754
Removal of Major Equipment																					
4a.1.2	Main Turbine/Generator	-	180	121	29	362	-	-	116	808	808	-	-	7,664	-	-	-	-	344,901	3,293	-
4a.1.3	Main Condensers	-	378	114	27	340	-	-	161	1,021	1,021	-	-	7,194	-	-	-	-	323,743	6,807	-
Cascading Costs from Clean Building Demolition																					
4a.1.4.1	Reactor Building	-	712	-	-	-	-	-	107	819	819	-	-	-	-	-	-	-	-	8,643	-
4a.1.4.2	Auxiliary Building	-	211	-	-	-	-	-	32	242	242	-	-	-	-	-	-	-	-	2,746	-
4a.1.4.3	Service Building & Addition	-	110	-	-	-	-	-	16	126	126	-	-	-	-	-	-	-	-	1,609	-
4a.1.4	Totals	-	1,033	-	-	-	-	-	155	1,188	1,188	-	-	-	-	-	-	-	-	12,998	-
Disposal of Plant Systems																					
4a.1.5.1	AUX-592-1_BRY	-	130	18	9	-	266	-	102	526	526	-	-	-	1,096	-	-	-	78,595	2,420	-
4a.1.5.2	AUX-592-1_PRO	-	768	10	24	296	-	-	241	1,339	1,339	-	-	6,947	-	-	-	-	282,113	14,546	-
4a.1.5.3	AUX-592-2_BRY	-	32	4	1	-	42	-	19	98	98	-	-	-	140	-	-	-	12,525	601	-
4a.1.5.4	AUX-592-2_PRO	-	50	2	4	48	-	-	20	123	123	-	-	1,123	-	-	-	-	45,613	894	-
4a.1.5.5	AUX-592-3_BRY	-	273	56	28	-	790	-	276	1,423	1,423	-	-	-	3,448	-	-	-	233,005	5,319	-
4a.1.5.6	AUX-592-3_PRO	-	118	3	6	77	-	-	42	246	246	-	-	1,805	-	-	-	-	73,290	2,235	-
4a.1.5.7	AUX-617-1_CLN	-	20	-	-	-	-	-	3	23	-	-	23	-	-	-	-	-	-	391	-
4a.1.5.8	AUX-617-2_CLN	-	239	-	-	-	-	-	36	275	-	-	275	-	-	-	-	-	-	4,727	-
4a.1.5.9	AUX-617-3_BRY	-	17	3	2	-	46	-	16	84	84	-	-	-	203	-	-	-	13,659	317	-
4a.1.5.10	AUX-617-3_PRO	-	583	7	17	214	-	-	181	1,002	1,002	-	-	5,012	-	-	-	-	203,536	10,995	-
4a.1.5.11	AUX-617-4_PRO	-	44	1	3	35	-	-	17	99	99	-	-	813	-	-	-	-	33,031	805	-
4a.1.5.12	AUX-617-5_BRY	-	3	1	1	-	16	-	5	25	25	-	-	-	52	-	-	-	4,673	59	-
4a.1.5.13	AUX-630-1_CLN	-	505	-	-	-	-	-	76	581	-	-	581	-	-	-	-	-	-	9,895	-
4a.1.5.14	AUX-642-1_CLN	-	413	-	-	-	-	-	62	475	-	-	475	-	-	-	-	-	-	8,094	-
4a.1.5.15	AUX-642-2_PRO	-	6	0	0	4	-	-	2	13	13	-	-	88	-	-	-	-	3,555	115	-
4a.1.5.16	AUX-654-1_PRO	-	151	2	5	62	-	-	48	268	268	-	-	1,446	-	-	-	-	58,719	2,925	-
4a.1.5.17	RX-592-2_BRY	-	326	25	16	-	460	-	201	1,029	1,029	-	-	-	1,513	-	-	-	135,756	5,985	-
4a.1.5.18	RX-592-2_PRO	-	253	5	11	141	-	-	87	498	498	-	-	3,318	-	-	-	-	134,751	4,656	-
4a.1.5.19	TB-560-1_CLN	-	532	-	-	-	-	-	80	612	-	-	612	-	-	-	-	-	-	10,577	-
4a.1.5.20	TB-560-1_PRO	-	981	50	118	1,462	-	-	487	3,098	3,098	-	-	34,292	-	-	-	-	1,392,636	18,581	-
4a.1.5.21	TB-592-1_CLN	-	491	-	-	-	-	-	74	565	-	-	565	-	-	-	-	-	-	9,843	-
4a.1.5.22	TB-592-1_PRO	-	1,102	34	81	1,002	-	-	441	2,661	2,661	-	-	23,507	-	-	-	-	954,629	20,684	-
4a.1.5.23	TB-592-2_CLN	-	573	-	-	-	-	-	86	659	-	-	659	-	-	-	-	-	-	11,370	-
4a.1.5.24	TB-592-2_PRO	-	185	4	8	104	-	-	63	364	364	-	-	2,443	-	-	-	-	99,218	3,336	-
4a.1.5.25	TB-592-3_CLN	-	538	-	-	-	-	-	81	619	-	-	619	-	-	-	-	-	-	10,710	-
4a.1.5.26	TB-592-3_PRO	-	348	11	25	311	-	-	138	832	832	-	-	7,284	-	-	-	-	295,813	6,478	-
4a.1.5.27	TB-617-1_CLN	-	530	-	-	-	-	-	80	610	-	-	610	-	-	-	-	-	-	10,626	-
4a.1.5.28	TB-617-1_PRO	-	1,185	55	129	1,607	-	-	562	3,538	3,538	-	-	37,687	-	-	-	-	1,530,477	22,452	-
4a.1.5.29	TB-617-2_CLN	-	187	-	-	-	-	-	28	215	-	-	215	-	-	-	-	-	-	3,737	-
4a.1.5.30	TB-617-2_PRO	-	350	17	41	506	-	-	171	1,085	1,085	-	-	11,858	-	-	-	-	481,578	6,598	-
4a.1.5.31	TB-617-3_CLN	-	753	-	-	-	-	-	113	866	-	-	866	-	-	-	-	-	-	15,047	-
4a.1.5.32	TB-617-3_PRO	-	683	16	38	478	-	-	250	1,466	1,466	-	-	11,219	-	-	-	-	455,590	12,336	-
4a.1.5.33	TB-642-1_CLN	-	243	-	-	-	-	-	36	280	-	-	280	-	-	-	-	-	-	4,815	-

Table C-1
Zion Nuclear Power Station Unit 1
DECON Decommissioning Cost Estimate
(Thousands of 2006 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Disposal of Plant Systems (continued)																					
4a.1.5.34	TB-642-1_PRO	-	674	57	134	1,668	-	-	444	2,977	2,977	-	-	39,122	-	-	-	-	1,588,772	12,783	-
4a.1.5.35	TB-642-2_CLN	-	45	-	-	-	-	-	7	51	-	-	51	-	-	-	-	-	-	878	-
4a.1.5	Totals	-	13,331	380	701	8,015	1,621	-	4,576	28,625	22,794	-	5,830	187,964	6,453	-	-	-	8,111,535	255,832	-
4a.1.6	Scaffolding in support of decommissioning	-	922	9	2	23	9	-	237	1,203	1,203	-	-	493	31	-	-	-	24,921	18,950	-
4a.1	Subtotal Period 4a Activity Costs	130	25,252	5,948	3,393	10,027	27,021	342	21,127	93,240	87,409	-	5,830	240,964	44,389	2,754	918	203	14,710,620	372,246	5,754
Period 4a Additional Costs																					
4a.2.1	Curie Surcharge (excluding RPV)	-	-	-	-	-	167	-	42	209	209	-	-	-	-	-	-	-	-	-	-
4a.2	Subtotal Period 4a Additional Costs	-	-	-	-	-	167	-	42	209	209	-	-	-	-	-	-	-	-	-	-
Period 4a Collateral Costs																					
4a.3.1	Process liquid waste	26	-	9	45	-	30	-	28	138	138	-	-	-	179	-	-	-	8,788	40	-
4a.3.2	Small tool allowance	-	310	-	-	-	-	-	46	356	321	-	36	-	-	-	-	-	-	-	-
4a.3	Subtotal Period 4a Collateral Costs	26	310	9	45	-	30	-	75	494	459	-	36	-	179	-	-	-	8,788	40	-
Period 4a Period-Dependent Costs																					
4a.4.1	Decon supplies	61	-	-	-	-	-	-	15	77	77	-	-	-	-	-	-	-	-	-	-
4a.4.2	Insurance	-	-	-	-	-	-	238	24	262	262	-	-	-	-	-	-	-	-	-	-
4a.4.3	Property taxes	-	-	-	-	-	-	682	68	750	675	-	75	-	-	-	-	-	-	-	-
4a.4.4	Health physics supplies	-	1,675	-	-	-	-	-	419	2,093	2,093	-	-	-	-	-	-	-	-	-	-
4a.4.5	Heavy equipment rental	-	2,250	-	-	-	-	-	338	2,588	2,588	-	-	-	-	-	-	-	-	-	-
4a.4.6	Disposal of DAW generated	-	-	93	44	-	282	-	86	505	505	-	-	-	5,072	-	-	-	101,632	1,245	-
4a.4.7	Plant energy budget	-	-	-	-	-	-	1,294	194	1,489	1,489	-	-	-	-	-	-	-	-	-	-
4a.4.8	NRC Fees	-	-	-	-	-	-	469	47	516	516	-	-	-	-	-	-	-	-	-	-
4a.4.9	Emergency Planning Fees	-	-	-	-	-	-	136	14	150	-	150	-	-	-	-	-	-	-	-	-
4a.4.10	Site O&M Cost	-	-	-	-	-	-	170	26	196	196	-	-	-	-	-	-	-	-	-	-
4a.4.11	Spent Fuel Pool O&M	-	-	-	-	-	-	494	74	568	-	568	-	-	-	-	-	-	-	-	-
4a.4.12	Radwaste Processing Equipment/Services	-	-	-	-	-	-	498	75	573	573	-	-	-	-	-	-	-	-	-	-
4a.4.13	Security Staff Cost	-	-	-	-	-	-	2,975	446	3,421	3,421	-	-	-	-	-	-	-	-	-	82,981
4a.4.14	DOC Staff Cost	-	-	-	-	-	-	14,733	2,210	16,943	16,943	-	-	-	-	-	-	-	-	-	215,478
4a.4.15	Utility Staff Cost	-	-	-	-	-	-	23,661	3,549	27,211	27,211	-	-	-	-	-	-	-	-	-	397,546
4a.4	Subtotal Period 4a Period-Dependent Costs	61	3,925	93	44	-	282	45,352	7,584	57,341	56,548	718	75	-	5,072	-	-	-	101,632	1,245	696,005
4a.0	TOTAL PERIOD 4a COST	218	29,487	6,051	3,481	10,027	27,500	45,694	28,828	151,284	144,625	718	5,941	240,964	49,639	2,754	918	203	14,821,040	373,531	701,758
PERIOD 4b - Site Decontamination																					
Period 4b Direct Decommissioning Activities																					
Disposal of Plant Systems																					
4b.1.1.1	AUX-542-1_BRY	-	127	11	6	-	168	-	76	387	387	-	-	-	552	-	-	-	49,471	2,294	-
4b.1.1.2	AUX-542-1_PRO	-	501	9	21	265	-	-	169	966	966	-	-	6,224	-	-	-	-	252,763	9,446	-
4b.1.1.3	AUX-542-2_BRY	-	141	36	23	-	662	-	208	1,069	1,069	-	-	-	2,176	-	-	-	195,234	2,723	-
4b.1.1.4	AUX-542-2_PRO	-	364	9	20	253	-	-	133	779	779	-	-	5,931	-	-	-	-	240,844	6,871	-
4b.1.1.5	AUX-542-3_BRY	-	128	24	12	-	346	-	123	633	633	-	-	-	1,493	-	-	-	101,952	2,439	-
4b.1.1.6	AUX-542-3_PRO	-	36	1	1	15	-	-	11	64	64	-	-	358	-	-	-	-	14,551	616	-
4b.1.1.7	AUX-560-1_BRY	-	14	1	1	-	17	-	8	40	40	-	-	-	56	-	-	-	5,002	235	-
4b.1.1.8	AUX-560-1_PRO	-	1,009	19	44	546	-	-	342	1,959	1,959	-	-	12,794	-	-	-	-	519,581	18,898	-
4b.1.1.9	AUX-560-2_BRY	-	70	12	7	-	203	-	71	363	363	-	-	-	668	-	-	-	59,933	1,304	-
4b.1.1.10	AUX-560-2_PRO	-	555	18	42	524	-	-	225	1,364	1,364	-	-	12,285	-	-	-	-	498,917	10,474	-
4b.1.1.11	AUX-579-1_BRY	-	61	6	3	-	94	-	40	203	203	-	-	-	310	-	-	-	27,770	1,112	-
4b.1.1.12	AUX-579-1_PRO	-	650	10	23	284	-	-	210	1,177	1,177	-	-	6,668	-	-	-	-	270,810	12,291	-
4b.1.1.13	AUX-579-2_BRY	-	89	9	6	-	158	-	64	325	325	-	-	-	520	-	-	-	46,627	1,624	-
4b.1.1.14	AUX-579-2_PRO	-	250	4	9	117	-	-	82	462	462	-	-	2,739	-	-	-	-	111,231	4,677	-
4b.1.1.15	AUX-579-3_BRY	-	33	8	4	-	108	-	37	189	189	-	-	-	464	-	-	-	31,754	656	-
4b.1.1.16	AUX-579-3_PRO	-	104	2	6	72	-	-	38	223	223	-	-	1,697	-	-	-	-	68,920	1,984	-
4b.1.1.17	AUX.BLDG-VPC_BRY	-	66	6	4	-	102	-	43	220	220	-	-	-	335	-	-	-	30,014	1,186	-

Table C-1
Zion Nuclear Power Station Unit 1
DECON Decommissioning Cost Estimate
(Thousands of 2006 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
Disposal of Plant Systems (continued)																					
4b.1.1.18	AUX.BLDG-VPC_PRO	-	466	7	18	221	-	-	153	865	865	-	-	5,178	-	-	-	-	210,270	8,787	-
4b.1.1.19	DG-567-1_CLN	-	77	-	-	-	-	-	12	89	-	-	89	-	-	-	-	-	-	1,501	-
4b.1.1.20	DG-592-1_CLN	-	85	-	-	-	-	-	13	98	-	-	98	-	-	-	-	-	-	1,664	-
4b.1.1.21	DG-617-1_CLN	-	68	-	-	-	-	-	10	78	-	-	78	-	-	-	-	-	-	1,342	-
4b.1.1.22	PT-570-1_PRO	-	255	11	26	327	-	-	118	736	736	-	-	7,659	-	-	-	-	311,055	4,791	-
4b.1.1.23	RX-568-1_BRY	-	946	96	65	-	1,851	-	718	3,676	3,676	-	-	-	6,115	-	-	-	546,003	18,135	-
4b.1.1.24	RX-568-1_PRO	-	442	13	32	394	-	-	176	1,057	1,057	-	-	9,250	-	-	-	-	375,629	8,107	-
4b.1.1.25	RX-592-1_BRY	-	468	38	23	-	662	-	290	1,482	1,482	-	-	-	2,179	-	-	-	195,415	8,708	-
4b.1.1.26	RX-592-1_PRO	-	573	17	39	490	-	-	224	1,343	1,343	-	-	11,487	-	-	-	-	466,506	10,562	-
4b.1.1.27	RX-617-1_BRY	-	667	47	32	-	912	-	404	2,062	2,062	-	-	-	2,997	-	-	-	268,935	12,803	-
4b.1.1.28	RX-617-1_PRO	-	770	19	45	557	-	-	285	1,676	1,676	-	-	13,073	-	-	-	-	530,899	14,245	-
4b.1.1	Totals	-	9,014	432	512	4,066	5,282	-	4,281	23,586	23,321	-	265	95,344	17,864	-	-	-	5,430,084	169,475	-
4b.1.2	Scaffolding in support of decommissioning	-	1,152	11	3	29	12	-	297	1,503	1,503	-	-	616	38	-	-	-	31,151	23,688	-
Decontamination of Site Buildings																					
4b.1.3.1	Reactor Building	1,017	880	103	101	268	1,649	-	1,207	5,226	5,226	-	-	6,296	6,026	-	-	-	792,395	34,938	-
4b.1.3.2	Auxiliary Building	556	340	22	25	51	324	-	458	1,776	1,776	-	-	1,204	1,294	-	-	-	164,812	16,512	-
4b.1.3.3	Contaminated Soil	-	36	870	940	-	13,972	-	3,730	19,548	19,548	-	-	-	56,015	-	-	-	5,026,005	2,858	-
4b.1.3.4	Service Building & Addition	38	1	0	0	-	5	-	20	64	64	-	-	-	18	-	-	-	1,635	638	-
4b.1.3	Totals	1,611	1,256	995	1,067	320	15,950	-	5,415	26,614	26,614	-	-	7,499	63,353	-	-	-	5,984,847	54,946	-
4b.1	Subtotal Period 4b Activity Costs	1,611	11,423	1,438	1,581	4,414	21,243	-	9,992	51,703	51,438	-	265	103,459	81,255	-	-	-	11,446,080	248,109	-
Period 4b Collateral Costs																					
4b.3.1	Process liquid waste	43	-	15	73	-	49	-	46	227	227	-	-	-	293	-	-	-	14,427	65	-
4b.3.2	Small tool allowance	-	211	-	-	-	-	-	32	242	242	-	-	-	-	-	-	-	-	-	-
4b.3	Subtotal Period 4b Collateral Costs	43	211	15	73	-	49	-	78	469	469	-	-	-	293	-	-	-	14,427	65	-
Period 4b Period-Dependent Costs																					
4b.4.1	Decon supplies	581	-	-	-	-	-	-	145	727	727	-	-	-	-	-	-	-	-	-	-
4b.4.2	Insurance	-	-	-	-	-	-	247	25	272	272	-	-	-	-	-	-	-	-	-	-
4b.4.3	Property taxes	-	-	-	-	-	-	708	71	779	779	-	-	-	-	-	-	-	-	-	-
4b.4.4	Health physics supplies	-	1,248	-	-	-	-	-	312	1,560	1,560	-	-	-	-	-	-	-	-	-	-
4b.4.5	Heavy equipment rental	-	2,350	-	-	-	-	-	353	2,703	2,703	-	-	-	-	-	-	-	-	-	-
4b.4.6	Disposal of DAW generated	-	-	83	39	-	252	-	77	451	451	-	-	-	4,527	-	-	-	90,713	1,111	-
4b.4.7	Plant energy budget	-	-	-	-	-	-	1,061	159	1,220	1,220	-	-	-	-	-	-	-	-	-	-
4b.4.8	NRC Fees	-	-	-	-	-	-	487	49	536	536	-	-	-	-	-	-	-	-	-	-
4b.4.9	Emergency Planning Fees	-	-	-	-	-	-	142	14	156	-	156	-	-	-	-	-	-	-	-	-
4b.4.10	Site O&M Cost	-	-	-	-	-	-	177	27	203	203	-	-	-	-	-	-	-	-	-	-
4b.4.11	Spent Fuel Pool O&M	-	-	-	-	-	-	513	77	590	-	590	-	-	-	-	-	-	-	-	-
4b.4.12	Radwaste Processing Equipment/Services	-	-	-	-	-	-	517	78	595	595	-	-	-	-	-	-	-	-	-	-
4b.4.13	Security Staff Cost	-	-	-	-	-	-	1,747	262	2,010	2,010	-	-	-	-	-	-	-	-	-	48,746
4b.4.14	DOC Staff Cost	-	-	-	-	-	-	10,603	1,590	12,194	12,194	-	-	-	-	-	-	-	-	-	159,531
4b.4.15	Utility Staff Cost	-	-	-	-	-	-	17,094	2,564	19,658	19,658	-	-	-	-	-	-	-	-	-	296,906
4b.4	Subtotal Period 4b Period-Dependent Costs	581	3,598	83	39	-	252	33,295	5,802	43,650	42,905	745	-	-	4,527	-	-	-	90,713	1,111	505,183
4b.0	TOTAL PERIOD 4b COST	2,235	15,231	1,537	1,693	4,414	21,544	33,295	15,872	95,822	94,812	745	265	103,459	86,076	-	-	-	11,551,220	249,285	505,183
PERIOD 4c - Fuel Storage Operations/Shipping																					
Period 4c Direct Decommissioning Activities																					
Period 4c Collateral Costs																					
4c.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	8,750	1,313	10,063	-	10,063	-	-	-	-	-	-	-	-	-
4c.3	Subtotal Period 4c Collateral Costs	-	-	-	-	-	-	8,750	1,313	10,063	-	10,063	-	-	-	-	-	-	-	-	-

Table C-1
Zion Nuclear Power Station Unit 1
DECON Decommissioning Cost Estimate
(Thousands of 2006 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
Period 4c Period-Dependent Costs																					
4c.4.1	Insurance	-	-	-	-	-	-	1,997	200	2,197	-	2,197	-	-	-	-	-	-	-	-	-
4c.4.2	Property taxes	-	-	-	-	-	-	5,725	572	6,297	-	6,297	-	-	-	-	-	-	-	-	-
4c.4.3	Health physics supplies	-	742	-	-	-	-	-	186	928	-	928	-	-	-	-	-	-	-	-	-
4c.4.4	Disposal of DAW generated	-	-	26	12	-	80	-	25	144	-	144	-	-	1,441	-	-	-	28,878	354	-
4c.4.5	Plant energy budget	-	-	-	-	-	-	2,288	343	2,632	-	2,632	-	-	-	-	-	-	-	-	-
4c.4.6	NRC Fees	-	-	-	-	-	-	2,471	247	2,718	-	2,718	-	-	-	-	-	-	-	-	-
4c.4.7	Emergency Planning Fees	-	-	-	-	-	-	1,145	114	1,259	-	1,259	-	-	-	-	-	-	-	-	-
4c.4.8	Site O&M Cost	-	-	-	-	-	-	1,431	215	1,646	-	1,646	-	-	-	-	-	-	-	-	-
4c.4.9	Spent Fuel Pool O&M	-	-	-	-	-	-	4,148	622	4,770	-	4,770	-	-	-	-	-	-	-	-	-
4c.4.10	Security Staff Cost	-	-	-	-	-	-	6,853	1,028	7,881	-	7,881	-	-	-	-	-	-	-	-	191,177
4c.4.11	Utility Staff Cost	-	-	-	-	-	-	28,421	4,263	32,684	-	32,684	-	-	-	-	-	-	-	-	442,097
4c.4	Subtotal Period 4c Period-Dependent Costs	-	742	26	12	-	80	54,479	7,815	63,155	-	63,155	-	-	1,441	-	-	-	28,878	354	633,274
4c.0	TOTAL PERIOD 4c COST	-	742	26	12	-	80	63,229	9,128	73,218	-	73,218	-	-	1,441	-	-	-	28,878	354	633,274
PERIOD 4d - Continuing Site Decontamination																					
Period 4d Direct Decommissioning Activities																					
4d.1.1	Remove spent fuel racks	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Disposal of Plant Systems																					
4d.1.2	Totals	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Decontamination of Site Buildings																					
4d.1.3	Totals	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4d.1.4	Scaffolding in support of decommissioning	-	230	2	1	6	2	-	59	301	301	-	-	123	8	-	-	-	6,230	4,738	-
4d.1	Subtotal Period 4d Activity Costs	-	230	2	1	6	2	-	59	301	301	-	-	123	8	-	-	-	6,230	4,738	-
Period 4d Collateral Costs																					
4d.3.1	Process liquid waste	0	-	0	0	-	0	-	0	1	1	-	-	-	2	-	-	-	93	0	-
4d.3.2	Small tool allowance	-	4	-	-	-	-	-	1	5	5	-	-	-	-	-	-	-	-	-	-
4d.3.3	Decommissioning Equipment Disposition	-	-	101	32	284	114	-	86	616	616	-	-	6,000	373	-	-	-	303,507	739	-
4d.3	Subtotal Period 4d Collateral Costs	0	4	101	32	284	114	-	87	622	622	-	-	6,000	375	-	-	-	303,600	740	-
Period 4d Period-Dependent Costs																					
4d.4.1	Decon supplies	25	-	-	-	-	-	-	6	31	31	-	-	-	-	-	-	-	-	-	-
4d.4.2	Insurance	-	-	-	-	-	-	96	10	106	106	-	-	-	-	-	-	-	-	-	-
4d.4.3	Property taxes	-	-	-	-	-	-	277	28	304	304	-	-	-	-	-	-	-	-	-	-
4d.4.4	Health physics supplies	-	163	-	-	-	-	-	41	204	204	-	-	-	-	-	-	-	-	-	-
4d.4.5	Disposal of DAW generated	-	-	10	5	-	31	-	9	55	55	-	-	-	550	-	-	-	11,016	135	-
4d.4.6	Plant energy budget	-	-	-	-	-	-	111	17	127	127	-	-	-	-	-	-	-	-	-	-
4d.4.7	NRC Fees	-	-	-	-	-	-	143	14	157	157	-	-	-	-	-	-	-	-	-	-
4d.4.8	Site O&M Cost	-	-	-	-	-	-	69	10	80	80	-	-	-	-	-	-	-	-	-	-
4d.4.9	Security Staff Cost	-	-	-	-	-	-	331	50	381	381	-	-	-	-	-	-	-	-	-	9,234
4d.4.10	Utility Staff Cost	-	-	-	-	-	-	1,373	206	1,579	1,579	-	-	-	-	-	-	-	-	-	21,354
4d.4	Subtotal Period 4d Period-Dependent Costs	25	163	10	5	-	31	2,399	390	3,023	3,023	-	-	-	550	-	-	-	11,016	135	30,589
4d.0	TOTAL PERIOD 4d COST	25	397	114	38	289	147	2,399	536	3,946	3,946	-	-	6,123	933	-	-	-	320,847	5,612	30,589
PERIOD 4e - License Termination																					
Period 4e Direct Decommissioning Activities																					
4e.1.1	ORISE confirmatory survey	-	-	-	-	-	-	140	42	183	183	-	-	-	-	-	-	-	-	-	-
4e.1.2	Terminate license									a											
4e.1	Subtotal Period 4e Activity Costs	-	-	-	-	-	-	140	42	183	183	-	-	-	-	-	-	-	-	-	-

Table C-1
Zion Nuclear Power Station Unit 1
DECON Decommissioning Cost Estimate
(Thousands of 2006 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
Period 4e Additional Costs																					
4e.2.1	Final Site Survey	-	-	-	-	-	-	8,655	2,597	11,252	11,252	-	-	-	-	-	-	-	-	164,765	-
4e.2	Subtotal Period 4e Additional Costs	-	-	-	-	-	-	8,655	2,597	11,252	11,252	-	-	-	-	-	-	-	-	164,765	-
Period 4e Collateral Costs																					
4e.3.1	DOC staff relocation expenses	-	-	-	-	-	-	829	124	953	953	-	-	-	-	-	-	-	-	-	-
4e.3	Subtotal Period 4e Collateral Costs	-	-	-	-	-	-	829	124	953	953	-	-	-	-	-	-	-	-	-	-
Period 4e Period-Dependent Costs																					
4e.4.1	Insurance	-	-	-	-	-	-	38	4	42	42	-	-	-	-	-	-	-	-	-	-
4e.4.2	Property taxes	-	-	-	-	-	-	382	38	420	420	-	-	-	-	-	-	-	-	-	-
4e.4.3	Health physics supplies	-	783	-	-	-	-	-	196	978	978	-	-	-	-	-	-	-	-	-	-
4e.4.4	Disposal of DAW generated	-	-	7	3	-	21	-	6	38	38	-	-	-	377	-	-	-	7,553	93	-
4e.4.5	Plant energy budget	-	-	-	-	-	-	153	23	176	176	-	-	-	-	-	-	-	-	-	-
4e.4.6	NRC Fees	-	-	-	-	-	-	263	26	289	289	-	-	-	-	-	-	-	-	-	-
4e.4.7	Site O&M Cost	-	-	-	-	-	-	95	14	110	110	-	-	-	-	-	-	-	-	-	-
4e.4.8	Security Staff Cost	-	-	-	-	-	-	450	68	518	518	-	-	-	-	-	-	-	-	-	12,563
4e.4.9	DOC Staff Cost	-	-	-	-	-	-	3,340	501	3,841	3,841	-	-	-	-	-	-	-	-	-	47,430
4e.4.10	Utility Staff Cost	-	-	-	-	-	-	3,764	565	4,329	4,329	-	-	-	-	-	-	-	-	-	58,590
4e.4	Subtotal Period 4e Period-Dependent Costs	-	783	7	3	-	21	8,485	1,441	10,740	10,740	-	-	-	377	-	-	-	7,553	93	118,583
4e.0	TOTAL PERIOD 4e COST	-	783	7	3	-	21	18,110	4,204	23,128	23,128	-	-	-	377	-	-	-	7,553	164,858	118,583
PERIOD 4 TOTALS		2,478	46,640	7,735	5,227	14,730	49,292	162,727	58,568	347,398	266,511	74,681	6,206	350,546	138,465	2,754	918	203	26,729,540	793,640	1,989,387
PERIOD 5b - Site Restoration																					
Period 5b Direct Decommissioning Activities																					
Demolition of Remaining Site Buildings																					
5b.1.1.1	Reactor Building	-	4,151	-	-	-	-	-	623	4,774	-	-	4,774	-	-	-	-	-	-	49,418	-
5b.1.1.2	Auxiliary Building	-	1,895	-	-	-	-	-	284	2,179	-	-	2,179	-	-	-	-	-	-	24,718	-
5b.1.1.3	Crib House	-	644	-	-	-	-	-	97	741	-	-	741	-	-	-	-	-	-	7,389	-
5b.1.1.4	Diesel Generator Building	-	328	-	-	-	-	-	49	377	-	-	377	-	-	-	-	-	-	4,557	-
5b.1.1.5	Discharge Tunnel Outfall	-	154	-	-	-	-	-	23	177	-	-	177	-	-	-	-	-	-	2,192	-
5b.1.1.6	Service Building & Addition	-	1,025	-	-	-	-	-	154	1,179	-	-	1,179	-	-	-	-	-	-	15,231	-
5b.1.1.7	Turbine Building	-	1,835	-	-	-	-	-	275	2,110	-	-	2,110	-	-	-	-	-	-	26,135	-
5b.1.1.8	Turbine Pedestal	-	1,759	-	-	-	-	-	264	2,023	-	-	2,023	-	-	-	-	-	-	19,735	-
5b.1.1	Totals	-	11,792	-	-	-	-	-	1,769	13,561	-	-	13,561	-	-	-	-	-	-	149,376	-
Site Closeout Activities																					
5b.1.2	Grade & landscape site	-	44	-	-	-	-	-	7	50	-	-	50	-	-	-	-	-	-	132	-
5b.1.3	Final report to NRC	-	-	-	-	-	-	147	22	169	169	-	-	-	-	-	-	-	-	-	1,560
5b.1	Subtotal Period 5b Activity Costs	-	11,836	-	-	-	-	147	1,797	13,781	169	-	13,611	-	-	-	-	-	-	149,508	1,560
Period 5b Additional Costs																					
5b.2.1	Concrete Crushing	-	406	-	-	-	-	3	61	470	-	-	470	-	-	-	-	-	-	2,258	-
5b.2	Subtotal Period 5b Additional Costs	-	406	-	-	-	-	3	61	470	-	-	470	-	-	-	-	-	-	2,258	-
Period 5b Collateral Costs																					
5b.3.1	Small tool allowance	-	141	-	-	-	-	-	21	162	-	-	162	-	-	-	-	-	-	-	-
5b.3	Subtotal Period 5b Collateral Costs	-	141	-	-	-	-	-	21	162	-	-	162	-	-	-	-	-	-	-	-

Table C-1
Zion Nuclear Power Station Unit 1
DECON Decommissioning Cost Estimate
(Thousands of 2006 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
Period 5b Period-Dependent Costs																					
5b.4.1	Insurance	-	-	-	-	-	-	104	10	114	-	-	114	-	-	-	-	-	-	-	-
5b.4.2	Property taxes	-	-	-	-	-	-	1,040	104	1,144	-	-	1,144	-	-	-	-	-	-	-	-
5b.4.3	Heavy equipment rental	-	4,704	-	-	-	-	-	706	5,409	-	-	5,409	-	-	-	-	-	-	-	-
5b.4.4	Plant energy budget	-	-	-	-	-	-	208	31	239	-	-	239	-	-	-	-	-	-	-	-
5b.4.5	Site O&M Cost	-	-	-	-	-	-	260	39	299	-	-	299	-	-	-	-	-	-	-	-
5b.4.6	Security Staff Cost	-	-	-	-	-	-	1,148	172	1,320	-	-	1,320	-	-	-	-	-	-	-	32,050
5b.4.7	DOC Staff Cost	-	-	-	-	-	-	9,833	1,475	11,308	-	-	11,308	-	-	-	-	-	-	-	137,886
5b.4.8	Utility Staff Cost	-	-	-	-	-	-	4,928	739	5,667	-	-	5,667	-	-	-	-	-	-	-	78,171
5b.4	Subtotal Period 5b Period-Dependent Costs	-	4,704	-	-	-	-	17,521	3,277	25,501	-	-	25,501	-	-	-	-	-	-	-	248,107
5b.0	TOTAL PERIOD 5b COST	-	17,086	-	-	-	-	17,672	5,156	39,914	169	-	39,745	-	-	-	-	-	-	151,766	249,667
PERIOD 5 TOTALS		-	17,086	-	-	-	-	17,672	5,156	39,914	169	-	39,745	-	-	-	-	-	-	151,766	249,667
TOTAL COST TO DECOMMISSION		3,238	73,134	7,797	5,931	14,730	53,025	279,354	74,863	512,072	342,894	122,031	47,147	350,546	236,612	2,754	918	203	28,072,420	1,047,569	2,910,532

TOTAL COST TO DECOMMISSION WITH 17.12% CONTINGENCY:	**$512,072**	**thousands of 2006 dollars**
TOTAL NRC LICENSE TERMINATION COST IS 66.96% OR:	**342,894**	**thousands of 2006 dollars**
SPENT FUEL MANAGEMENT COST IS 23.83% OR:	**122,031**	**thousands of 2006 dollars**
NON-NUCLEAR DEMOLITION COST IS 9.21% OR:	**$47,147**	**thousands of 2006 dollars**
TOTAL PRIMARY SITE RADWASTE VOLUME BURIED:	**69,763**	**Cubic Feet**
TOTAL SECONDARY SITE RADWASTE VOLUME BURIED:	**170,522**	**Cubic Feet**
TOTAL TERTIARY SITE RADWASTE VOLUME BURIED:		**Cubic Feet**
TOTAL GREATER THAN CLASS C RADWASTE VOLUME GENERATED:	**203**	**Cubic Feet**
TOTAL SCRAP METAL REMOVED:	**41,133**	**Tons**
TOTAL CRAFT LABOR REQUIREMENTS:	**1,047,569**	**Man-hours**

End Notes:
n/a - indicates that this activity not charged as decommissioning expense.
a - indicates that this activity performed by decommissioning staff.
0 - indicates that this value is less than 0.5 but is non-zero.
a cell containing " - " indicates a zero value

Table C-2
Zion Nuclear Power Station Unit 2
DECON Decommissioning Cost Estimate
(Thousands of 2006 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Llc. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
	2006-2014 Decommissioning Expenditures	-	-	-	-	-	-	52,192	-	52,192	-	52,192	-	-	-	-	-	-	-	-	-
PERIOD 3a - Reactivate Site Following SAFSTOR Dormancy																					
Period 3a Direct Decommissioning Activities																					
3a.1.1	Prepare preliminary decommissioning cost	-	-	-	-	-	-	53	8	60	60	-	-	-	-	-	-	-	-	-	556
3a.1.2	Review plant dwgs & specs.	-	-	-	-	-	-	186	28	214	214	-	-	-	-	-	-	-	-	-	1,967
3a.1.3	Perform detailed rad survey									a											
3a.1.4	End product description	-	-	-	-	-	-	40	6	46	46	-	-	-	-	-	-	-	-	-	428
3a.1.5	Detailed by-product inventory	-	-	-	-	-	-	53	8	60	60	-	-	-	-	-	-	-	-	-	556
3a.1.6	Define major work sequence	-	-	-	-	-	-	303	45	348	348	-	-	-	-	-	-	-	-	-	3,207
3a.1.7	Perform SER and EA	-	-	-	-	-	-	125	19	144	144	-	-	-	-	-	-	-	-	-	1,326
3a.1.8	Perform Site-Specific Cost Study	-	-	-	-	-	-	202	30	232	232	-	-	-	-	-	-	-	-	-	2,138
3a.1.9	Prepare/submit License Termination Plan	-	-	-	-	-	-	165	25	190	190	-	-	-	-	-	-	-	-	-	1,751
3a.1.10	Receive NRC approval of termination plan									a											
Activity Specifications																					
3a.1.11.1	Re-activate plant & temporary facilities	-	-	-	-	-	-	298	45	342	308	-	34	-	-	-	-	-	-	-	3,151
3a.1.11.2	Plant systems	-	-	-	-	-	-	168	25	194	174	-	19	-	-	-	-	-	-	-	1,782
3a.1.11.3	Reactor internals	-	-	-	-	-	-	287	43	330	330	-	-	-	-	-	-	-	-	-	3,036
3a.1.11.4	Reactor vessel	-	-	-	-	-	-	263	39	302	302	-	-	-	-	-	-	-	-	-	2,779
3a.1.11.5	Biological shield	-	-	-	-	-	-	20	3	23	23	-	-	-	-	-	-	-	-	-	214
3a.1.11.6	Steam generators	-	-	-	-	-	-	126	19	145	145	-	-	-	-	-	-	-	-	-	1,334
3a.1.11.7	Reinforced concrete	-	-	-	-	-	-	65	10	74	37	-	37	-	-	-	-	-	-	-	684
3a.1.11.8	Main Turbine	-	-	-	-	-	-	16	2	19	-	-	19	-	-	-	-	-	-	-	171
3a.1.11.9	Main Condensers	-	-	-	-	-	-	16	2	19	-	-	19	-	-	-	-	-	-	-	171
3a.1.11.10	Plant structures & buildings	-	-	-	-	-	-	126	19	145	72	-	72	-	-	-	-	-	-	-	1,334
3a.1.11.11	Waste management	-	-	-	-	-	-	186	28	214	214	-	-	-	-	-	-	-	-	-	1,967
3a.1.11.12	Facility & site closeout	-	-	-	-	-	-	36	5	42	21	-	21	-	-	-	-	-	-	-	385
3a.1.11	Total	-	-	-	-	-	-	1,607	241	1,848	1,626	-	221	-	-	-	-	-	-	-	17,009
Planning & Site Preparations																					
3a.1.12	Prepare dismantling sequence	-	-	-	-	-	-	97	15	111	111	-	-	-	-	-	-	-	-	-	1,026
3a.1.13	Plant prep. & temp. svces	-	-	-	-	-	-	2,419	363	2,782	2,782	-	-	-	-	-	-	-	-	-	-
3a.1.14	Design water clean-up system	-	-	-	-	-	-	57	8	65	65	-	-	-	-	-	-	-	-	-	599
3a.1.15	Rigging/Cont. Cntrl Envlps/tooling/etc.	-	-	-	-	-	-	2,048	307	2,355	2,355	-	-	-	-	-	-	-	-	-	-
3a.1.16	Procure casks/liners & containers	-	-	-	-	-	-	50	7	57	57	-	-	-	-	-	-	-	-	-	526
3a.1	Subtotal Period 3a Activity Costs	-	-	-	-	-	-	7,403	1,111	8,514	8,293	-	221	-	-	-	-	-	-	-	31,088
Period 3a Collateral Costs																					
3a.3	Subtotal Period 3a Collateral Costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Period 3a Period-Dependent Costs																					
3a.4.1	Insurance	-	-	-	-	-	-	175	18	193	193	-	-	-	-	-	-	-	-	-	-
3a.4.2	Property taxes	-	-	-	-	-	-	502	50	553	553	-	-	-	-	-	-	-	-	-	-
3a.4.3	Health physics supplies	-	260	-	-	-	-	-	65	326	326	-	-	-	-	-	-	-	-	-	-
3a.4.4	Heavy equipment rental	-	336	-	-	-	-	-	50	387	387	-	-	-	-	-	-	-	-	-	-
3a.4.5	Disposal of DAW generated	-	-	10	5	-	31	-	9	55	55	-	-	-	555	-	-	-	11,118	136	-
3a.4.6	Plant energy budget	-	-	-	-	-	-	1,004	151	1,155	1,155	-	-	-	-	-	-	-	-	-	-
3a.4.7	NRC Fees	-	-	-	-	-	-	260	26	286	286	-	-	-	-	-	-	-	-	-	-
3a.4.8	Emergency Planning Fees	-	-	-	-	-	-	100	10	111	-	111	-	-	-	-	-	-	-	-	-
3a.4.9	Site O&M Cost	-	-	-	-	-	-	126	19	144	144	-	-	-	-	-	-	-	-	-	-
3a.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	364	55	419	-	419	-	-	-	-	-	-	-	-	-
3a.4.11	Security Staff Cost	-	-	-	-	-	-	658	99	756	756	-	-	-	-	-	-	-	-	-	18,350
3a.4.12	Utility Staff Cost	-	-	-	-	-	-	13,339	2,001	15,340	15,340	-	-	-	-	-	-	-	-	-	231,734
3a.4	Subtotal Period 3a Period-Dependent Costs	-	597	10	5	-	31	16,528	2,552	19,723	19,194	529	-	-	555	-	-	-	11,118	136	250,084
3a.0	TOTAL PERIOD 3a COST	-	597	10	5	-	31	23,932	3,663	28,237	27,487	529	221	-	555	-	-	-	11,118	136	281,172

Table C-2
Zion Nuclear Power Station Unit 2
DECON Decommissioning Cost Estimate
(Thousands of 2006 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
PERIOD 3b - Decommissioning Preparations																					
Period 3b Direct Decommissioning Activities																					
Detailed Work Procedures																					
3b.1.1.1	Plant systems	-	-	-	-	-	-	191	29	220	198	-	22	-	-	-	-	-	-	-	2,024
3b.1.1.2	Reactor internals	-	-	-	-	-	-	101	15	116	116	-	-	-	-	-	-	-	-	-	1,069
3b.1.1.3	Remaining buildings	-	-	-	-	-	-	55	8	63	16	-	47	-	-	-	-	-	-	-	577
3b.1.1.4	CRD cooling assembly	-	-	-	-	-	-	40	6	46	46	-	-	-	-	-	-	-	-	-	428
3b.1.1.5	CRD housings & ICI tubes	-	-	-	-	-	-	40	6	46	46	-	-	-	-	-	-	-	-	-	428
3b.1.1.6	Incore instrumentation	-	-	-	-	-	-	40	6	46	46	-	-	-	-	-	-	-	-	-	428
3b.1.1.7	Reactor vessel	-	-	-	-	-	-	147	22	169	169	-	-	-	-	-	-	-	-	-	1,552
3b.1.1.8	Facility closeout	-	-	-	-	-	-	48	7	56	28	-	28	-	-	-	-	-	-	-	513
3b.1.1.9	Missile shields	-	-	-	-	-	-	18	3	21	21	-	-	-	-	-	-	-	-	-	192
3b.1.1.10	Biological shield	-	-	-	-	-	-	48	7	56	56	-	-	-	-	-	-	-	-	-	513
3b.1.1.11	Steam generators	-	-	-	-	-	-	186	28	214	214	-	-	-	-	-	-	-	-	-	1,967
3b.1.1.12	Reinforced concrete	-	-	-	-	-	-	40	6	46	23	-	23	-	-	-	-	-	-	-	428
3b.1.1.13	Main Turbine	-	-	-	-	-	-	63	9	72	-	-	72	-	-	-	-	-	-	-	667
3b.1.1.14	Main Condensers	-	-	-	-	-	-	63	9	72	-	-	72	-	-	-	-	-	-	-	667
3b.1.1.15	Auxiliary building	-	-	-	-	-	-	110	17	127	114	-	13	-	-	-	-	-	-	-	1,167
3b.1.1.16	Reactor building	-	-	-	-	-	-	110	17	127	114	-	13	-	-	-	-	-	-	-	1,167
3b.1.1	Total	-	-	-	-	-	-	1,302	195	1,498	1,207	-	290	-	-	-	-	-	-	-	13,787
3b.1	Subtotal Period 3b Activity Costs	-	-	-	-	-	-	1,302	195	1,498	1,207	-	290	-	-	-	-	-	-	-	13,787
Period 3b Additional Costs																					
3b.2.1	Site Characterization	-	-	-	-	-	-	496	74	570	570	-	-	-	-	-	-	-	-	-	-
3b.2.2	Clean Asbestos Remediation	-	4,101	34	524	-	2,739	-	1,792	9,190	9,190	-	-	-	73,458	-	-	-	985,174	60,916	-
3b.2.3	Contaminated Asbestos Remediation	-	3,553	17	262	-	1,326	-	1,261	6,419	6,419	-	-	-	36,698	-	-	-	477,074	49,815	-
3b.2	Subtotal Period 3b Additional Costs	-	7,654	51	786	-	4,065	496	3,127	16,179	16,179	-	-	-	110,156	-	-	-	1,462,248	110,731	-
Period 3b Collateral Costs																					
3b.3.1	Decon equipment	737	-	-	-	-	-	-	111	847	847	-	-	-	-	-	-	-	-	-	-
3b.3.2	DOC staff relocation expenses	-	-	-	-	-	-	829	124	953	953	-	-	-	-	-	-	-	-	-	-
3b.3.3	Small tool allowance	-	109	-	-	-	-	-	16	125	125	-	-	-	-	-	-	-	-	-	-
3b.3.4	Pipe cutting equipment	-	957	-	-	-	-	-	143	1,100	1,100	-	-	-	-	-	-	-	-	-	-
3b.3	Subtotal Period 3b Collateral Costs	737	1,065	-	-	-	-	829	395	3,025	3,025	-	-	-	-	-	-	-	-	-	-
Period 3b Period-Dependent Costs																					
3b.4.1	Decon supplies	22	-	-	-	-	-	-	6	28	28	-	-	-	-	-	-	-	-	-	-
3b.4.2	Insurance	-	-	-	-	-	-	87	9	96	96	-	-	-	-	-	-	-	-	-	-
3b.4.3	Property taxes	-	-	-	-	-	-	249	25	274	274	-	-	-	-	-	-	-	-	-	-
3b.4.4	Health physics supplies	-	522	-	-	-	-	-	131	653	653	-	-	-	-	-	-	-	-	-	-
3b.4.5	Heavy equipment rental	-	167	-	-	-	-	-	25	192	192	-	-	-	-	-	-	-	-	-	-
3b.4.6	Disposal of DAW generated	-	-	6	3	-	17	-	5	30	30	-	-	-	305	-	-	-	6,114	75	-
3b.4.7	Plant energy budget	-	-	-	-	-	-	498	75	573	573	-	-	-	-	-	-	-	-	-	-
3b.4.8	NRC Fees	-	-	-	-	-	-	129	13	142	142	-	-	-	-	-	-	-	-	-	-
3b.4.9	Emergency Planning Fees	-	-	-	-	-	-	50	5	55	-	55	-	-	-	-	-	-	-	-	-
3b.4.10	Site O&M Cost	-	-	-	-	-	-	62	9	72	72	-	-	-	-	-	-	-	-	-	-
3b.4.11	Spent Fuel Pool O&M	-	-	-	-	-	-	181	27	208	-	208	-	-	-	-	-	-	-	-	-
3b.4.12	Security Staff Cost	-	-	-	-	-	-	326	49	375	375	-	-	-	-	-	-	-	-	-	9,100
3b.4.13	DOC Staff Cost	-	-	-	-	-	-	3,117	468	3,584	3,584	-	-	-	-	-	-	-	-	-	46,800
3b.4.14	Utility Staff Cost	-	-	-	-	-	-	6,615	992	7,607	7,607	-	-	-	-	-	-	-	-	-	114,920
3b.4	Subtotal Period 3b Period-Dependent Costs	22	689	6	3	-	17	11,313	1,838	13,887	13,625	262	-	-	305	-	-	-	6,114	75	170,820
3b.0	TOTAL PERIOD 3b COST	759	9,408	57	788	-	4,082	13,940	5,555	34,590	34,037	262	290	-	110,461	-	-	-	1,468,362	110,806	184,607
PERIOD 3 TOTALS		759	10,005	67	793	-	4,113	37,872	9,218	62,827	61,524	792	512	-	111,016	-	-	-	1,479,480	110,942	465,779

Table C-2
Zion Nuclear Power Station Unit 2
DECON Decommissioning Cost Estimate
(Thousands of 2006 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
PERIOD 4a - Large Component Removal																					
Period 4a Direct Decommissioning Activities																					
Nuclear Steam Supply System Removal																					
4a.1.1.1	Reactor Coolant Piping	19	62	33	22	-	848	-	243	1,227	1,227	-	-	-	2,068	-	-	-	250,088	1,453	-
4a.1.1.2	Pressurizer Relief Tank	3	9	5	3	-	124	-	35	179	179	-	-	-	329	-	-	-	36,571	212	-
4a.1.1.3	Reactor Coolant Pumps & Motors	8	33	41	5	58	2,420	-	631	3,195	3,195	-	-	304	3,919	-	-	-	769,120	1,048	-
4a.1.1.4	Pressurizer	8	57	415	95	-	704	-	250	1,530	1,530	-	-	-	2,446	-	-	-	267,971	2,566	750
4a.1.1.5	Steam Generators	31	3,966	2,230	1,311	1,228	4,978	-	2,855	16,599	16,599	-	-	37,344	17,284	-	-	-	3,132,422	20,507	2,850
4a.1.1.6	CRDMs/ICIs/Service Structure Removal	7	71	170	20	-	176	-	85	529	529	-	-	-	3,052	-	-	-	51,800	1,493	-
4a.1.1.7	Reactor Vessel Internals	29	1,707	1,339	682	-	7,022	171	5,337	16,286	16,286	-	-	-	2,312	501	918	-	397,825	23,619	1,077
4a.1.1.8	Vessel & Internals GTCC Disposal	-	-	-	-	-	3,428	-	514	3,942	3,942	-	-	-	-	-	-	203	41,900	-	-
4a.1.1.9	Reactor Vessel	28	3,509	1,094	497	-	5,669	171	5,904	16,872	16,872	-	-	-	6,672	2,254	-	-	979,178	23,619	1,077
4a.1.1	Totals	132	9,415	5,327	2,635	1,286	25,368	342	15,855	60,360	60,360	-	-	37,648	38,081	2,754	918	203	5,926,877	74,517	5,754
Removal of Major Equipment																					
4a.1.2	Main Turbine/Generator	-	180	121	29	362	-	-	116	808	808	-	-	7,664	-	-	-	-	344,901	3,293	-
4a.1.3	Main Condensers	-	378	114	27	340	-	-	161	1,021	1,021	-	-	7,194	-	-	-	-	323,743	6,807	-
Cascading Costs from Clean Building Demolition																					
4a.1.4.1	Reactor Building	-	712	-	-	-	-	-	107	819	819	-	-	-	-	-	-	-	-	8,643	-
4a.1.4.2	Auxiliary Building	-	211	-	-	-	-	-	32	242	242	-	-	-	-	-	-	-	-	2,746	-
4a.1.4.3	IRSF	-	72	-	-	-	-	-	11	83	83	-	-	-	-	-	-	-	-	948	-
4a.1.4.4	Fuel Building	-	156	-	-	-	-	-	23	180	180	-	-	-	-	-	-	-	-	1,955	-
4a.1.4	Totals	-	1,152	-	-	-	-	-	173	1,324	1,324	-	-	-	-	-	-	-	-	14,292	-
Disposal of Plant Systems																					
4a.1.5.1	AUX-592-1_BRY	-	130	18	9	-	266	-	102	526	526	-	-	-	1,096	-	-	-	78,595	2,420	-
4a.1.5.2	AUX-592-1_PRO	-	774	10	24	302	-	-	243	1,354	1,354	-	-	7,092	-	-	-	-	288,029	14,661	-
4a.1.5.3	AUX-592-2_BRY	-	33	4	2	-	43	-	20	101	101	-	-	-	143	-	-	-	12,808	627	-
4a.1.5.4	AUX-592-2_PRO	-	50	2	4	48	-	-	20	123	123	-	-	1,123	-	-	-	-	45,613	894	-
4a.1.5.5	AUX-592-3_BRY	-	470	102	49	-	1,416	-	489	2,527	2,527	-	-	-	6,249	-	-	-	417,696	9,188	-
4a.1.5.6	AUX-592-3_PRO	-	132	5	11	138	-	-	56	341	341	-	-	3,239	-	-	-	-	131,547	2,503	-
4a.1.5.7	AUX-617-1_CLN	-	22	-	-	-	-	-	3	26	-	-	26	-	-	-	-	-	-	443	-
4a.1.5.8	AUX-617-2_CLN	-	273	-	-	-	-	-	41	314	-	-	314	-	-	-	-	-	-	5,386	-
4a.1.5.9	AUX-617-3_BRY	-	17	3	2	-	46	-	16	84	84	-	-	-	203	-	-	-	13,659	317	-
4a.1.5.10	AUX-617-3_PRO	-	585	7	17	216	-	-	182	1,007	1,007	-	-	5,062	-	-	-	-	205,577	11,027	-
4a.1.5.11	AUX-617-4_PRO	-	44	1	3	35	-	-	17	99	99	-	-	813	-	-	-	-	33,031	805	-
4a.1.5.12	AUX-617-5_BRY	-	122	26	14	-	403	-	136	700	700	-	-	-	1,582	-	-	-	118,805	2,376	-
4a.1.5.13	AUX-630-1_CLN	-	505	-	-	-	-	-	76	581	-	-	581	-	-	-	-	-	-	9,895	-
4a.1.5.14	AUX-642-1_CLN	-	413	-	-	-	-	-	62	475	-	-	475	-	-	-	-	-	-	8,094	-
4a.1.5.15	AUX-642-2_PRO	-	17	0	1	8	-	-	6	31	31	-	-	189	-	-	-	-	7,691	314	-
4a.1.5.16	AUX-654-1_PRO	-	158	2	5	65	-	-	50	280	280	-	-	1,518	-	-	-	-	61,659	3,051	-
4a.1.5.17	RX-592-2_BRY	-	326	25	16	-	460	-	201	1,029	1,029	-	-	-	1,513	-	-	-	135,756	5,985	-
4a.1.5.18	RX-592-2_PRO	-	253	5	11	141	-	-	87	498	498	-	-	3,318	-	-	-	-	134,751	4,656	-
4a.1.5.19	TB-560-1_CLN	-	583	-	-	-	-	-	87	670	-	-	670	-	-	-	-	-	-	11,565	-
4a.1.5.20	TB-560-1_PRO	-	1,128	54	127	1,580	-	-	543	3,432	3,432	-	-	37,046	-	-	-	-	1,504,441	21,380	-
4a.1.5.21	TB-592-1_CLN	-	491	-	-	-	-	-	74	565	-	-	565	-	-	-	-	-	-	9,843	-
4a.1.5.22	TB-592-1_PRO	-	1,102	34	81	1,002	-	-	441	2,661	2,661	-	-	23,507	-	-	-	-	954,629	20,684	-
4a.1.5.23	TB-592-2_CLN	-	587	-	-	-	-	-	88	675	-	-	675	-	-	-	-	-	-	11,641	-
4a.1.5.24	TB-592-2_PRO	-	226	5	12	146	-	-	81	470	470	-	-	3,426	-	-	-	-	139,142	4,132	-
4a.1.5.25	TB-592-3_CLN	-	544	-	-	-	-	-	82	626	-	-	626	-	-	-	-	-	-	10,831	-
4a.1.5.26	TB-592-3_PRO	-	355	11	26	324	-	-	142	858	858	-	-	7,598	-	-	-	-	308,563	6,615	-
4a.1.5.27	TB-592-4_CLN	-	111	-	-	-	-	-	17	127	-	-	127	-	-	-	-	-	-	2,189	-
4a.1.5.28	TB-617-1_CLN	-	531	-	-	-	-	-	80	610	-	-	610	-	-	-	-	-	-	10,631	-
4a.1.5.29	TB-617-1_PRO	-	1,185	55	129	1,607	-	-	562	3,538	3,538	-	-	37,687	-	-	-	-	1,530,477	22,452	-
4a.1.5.30	TB-617-2_CLN	-	187	-	-	-	-	-	28	215	-	-	215	-	-	-	-	-	-	3,737	-
4a.1.5.31	TB-617-2_PRO	-	350	17	41	506	-	-	171	1,085	1,085	-	-	11,858	-	-	-	-	481,578	6,598	-
4a.1.5.32	TB-617-3_CLN	-	761	-	-	-	-	-	114	876	-	-	876	-	-	-	-	-	-	15,199	-

Table C-2
Zion Nuclear Power Station Unit 2
DECON Decommissioning Cost Estimate
(Thousands of 2006 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
Disposal of Plant Systems (continued)																					
4a.1.5.33	TB-617-3_PRO	-	683	16	38	478	-	-	250	1,466	1,466	-	-	11,219	-	-	-	-	455,590	12,336	-
4a.1.5.34	TB-642-1_CLN	-	244	-	-	-	-	-	37	280	-	-	280	-	-	-	-	-	-	4,827	-
4a.1.5.35	TB-642-1_PRO	-	674	57	134	1,668	-	-	444	2,977	2,977	-	-	39,122	-	-	-	-	1,588,772	12,783	-
4a.1.5.36	TB-642-2_CLN	-	46	-	-	-	-	-	7	53	-	-	53	-	-	-	-	-	-	902	-
4a.1.5	Totals	-	14,111	459	757	8,265	2,635	-	5,056	31,281	25,189	-	6,093	193,819	10,788	-	-	-	8,648,410	270,987	-
4a.1.6	Scaffolding in support of decommissioning	-	785	11	3	29	12	-	205	1,045	1,045	-	-	618	38	-	-	-	31,274	16,198	-
4a.1	Subtotal Period 4a Activity Costs	132	26,021	6,032	3,451	10,282	28,015	342	21,566	95,840	89,747	-	6,093	246,944	48,908	2,754	918	203	15,275,200	386,095	5,754
Period 4a Additional Costs																					
4a.2.1	Curie Surcharge (excluding RPV)	-	-	-	-	-	155	-	39	194	194	-	-	-	-	-	-	-	-	-	-
4a.2	Subtotal Period 4a Additional Costs	-	-	-	-	-	155	-	39	194	194	-	-	-	-	-	-	-	-	-	-
Period 4a Collateral Costs																					
4a.3.1	Process liquid waste	112	-	40	190	-	127	-	120	590	590	-	-	-	763	-	-	-	37,523	169	-
4a.3.2	Small tool allowance	-	322	-	-	-	-	-	48	370	333	-	37	-	-	-	-	-	-	-	-
4a.3	Subtotal Period 4a Collateral Costs	112	322	40	190	-	127	-	169	960	923	-	37	-	763	-	-	-	37,523	169	-
Period 4a Period-Dependent Costs																					
4a.4.1	Decon supplies	61	-	-	-	-	-	-	15	76	76	-	-	-	-	-	-	-	-	-	-
4a.4.2	Insurance	-	-	-	-	-	-	236	24	259	259	-	-	-	-	-	-	-	-	-	-
4a.4.3	Property taxes	-	-	-	-	-	-	676	68	744	669	-	74	-	-	-	-	-	-	-	-
4a.4.4	Health physics supplies	-	1,721	-	-	-	-	-	430	2,152	2,152	-	-	-	-	-	-	-	-	-	-
4a.4.5	Heavy equipment rental	-	2,232	-	-	-	-	-	335	2,567	2,567	-	-	-	-	-	-	-	-	-	-
4a.4.6	Disposal of DAW generated	-	-	97	46	-	295	-	90	528	528	-	-	-	5,300	-	-	-	106,211	1,301	-
4a.4.7	Plant energy budget	-	-	-	-	-	-	1,284	193	1,477	1,477	-	-	-	-	-	-	-	-	-	-
4a.4.8	NRC Fees	-	-	-	-	-	-	466	47	512	512	-	-	-	-	-	-	-	-	-	-
4a.4.9	Emergency Planning Fees	-	-	-	-	-	-	135	14	149	-	149	-	-	-	-	-	-	-	-	-
4a.4.10	Site O&M Cost	-	-	-	-	-	-	169	25	194	194	-	-	-	-	-	-	-	-	-	-
4a.4.11	Spent Fuel Pool O&M	-	-	-	-	-	-	490	73	563	-	563	-	-	-	-	-	-	-	-	-
4a.4.12	Radwaste Processing Equipment/Services	-	-	-	-	-	-	494	74	568	568	-	-	-	-	-	-	-	-	-	-
4a.4.13	Security Staff Cost	-	-	-	-	-	-	2,841	426	3,267	3,267	-	-	-	-	-	-	-	-	-	79,266
4a.4.14	DOC Staff Cost	-	-	-	-	-	-	14,574	2,186	16,761	16,761	-	-	-	-	-	-	-	-	-	213,295
4a.4.15	Utility Staff Cost	-	-	-	-	-	-	23,210	3,481	26,691	26,691	-	-	-	-	-	-	-	-	-	391,333
4a.4	Subtotal Period 4a Period-Dependent Costs	61	3,954	97	46	-	295	44,575	7,481	56,509	55,722	712	74	-	5,300	-	-	-	106,211	1,301	683,894
4a.0	TOTAL PERIOD 4a COST	305	30,296	6,170	3,686	10,282	28,592	44,917	29,254	153,503	146,586	712	6,204	246,944	54,971	2,754	918	203	15,418,940	387,565	689,647
PERIOD 4b - Site Decontamination																					
Period 4b Direct Decommissioning Activities																					
Disposal of Plant Systems																					
4b.1.1.1	AUX.BLDG-VPC_BRY	-	67	6	4	-	103	-	44	223	223	-	-	-	338	-	-	-	30,298	1,212	-
4b.1.1.2	AUX.BLDG-VPC_PRO	-	466	7	18	221	-	-	153	865	865	-	-	5,178	-	-	-	-	210,270	8,787	-
4b.1.1.3	AUX-542-1_BRY	-	236	35	18	-	509	-	192	989	989	-	-	-	1,987	-	-	-	150,002	4,419	-
4b.1.1.4	AUX-542-1_PRO	-	524	10	24	294	-	-	180	1,031	1,031	-	-	6,888	-	-	-	-	279,722	9,875	-
4b.1.1.5	AUX-542-2_BRY	-	167	40	25	-	720	-	229	1,181	1,181	-	-	-	2,410	-	-	-	212,350	3,221	-
4b.1.1.6	AUX-542-2_PRO	-	458	11	26	325	-	-	168	989	989	-	-	7,626	-	-	-	-	309,679	8,676	-
4b.1.1.7	AUX-542-3_BRY	-	303	68	33	-	939	-	322	1,664	1,664	-	-	-	4,156	-	-	-	276,936	5,869	-
4b.1.1.8	AUX-542-3_PRO	-	36	1	1	15	-	-	11	64	64	-	-	358	-	-	-	-	14,551	616	-
4b.1.1.9	AUX-560-1_BRY	-	34	8	5	-	140	-	45	232	232	-	-	-	497	-	-	-	41,279	635	-
4b.1.1.10	AUX-560-1_PRO	-	1,122	38	90	1,115	-	-	465	2,830	2,830	-	-	26,147	-	-	-	-	1,061,840	21,100	-
4b.1.1.11	AUX-560-2_BRY	-	157	34	19	-	546	-	182	938	938	-	-	-	2,031	-	-	-	160,956	3,023	-
4b.1.1.12	AUX-560-2_PRO	-	556	18	42	524	-	-	226	1,366	1,366	-	-	12,294	-	-	-	-	499,264	10,495	-
4b.1.1.13	AUX-579-1_BRY	-	175	32	16	-	459	-	164	847	847	-	-	-	1,937	-	-	-	135,483	3,369	-
4b.1.1.14	AUX-579-1_PRO	-	652	10	23	288	-	-	211	1,183	1,183	-	-	6,751	-	-	-	-	274,144	12,318	-
4b.1.1.15	AUX-579-2_BRY	-	89	9	6	-	158	-	63	324	324	-	-	-	518	-	-	-	46,485	1,611	-

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Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
Disposal of Plant Systems (continued)																					
4b.1.1.16	AUX-579-2_PRO	-	251	4	9	117	-	-	82	463	463	-	-	2,752	-	-	-	-	111,741	4,685	-
4b.1.1.17	AUX-579-3_BRY	-	33	8	4	-	108	-	37	189	189	-	-	-	464	-	-	-	31,754	656	-
4b.1.1.18	AUX-579-3_PRO	-	105	3	6	75	-	-	39	227	227	-	-	1,747	-	-	-	-	70,960	2,006	-
4b.1.1.19	CRBHSE-594_CLN	-	506	-	-	-	-	-	76	582	-	-	582	-	-	-	-	-	-	9,926	-
4b.1.1.20	DG-567-1_CLN	-	77	-	-	-	-	-	12	89	-	-	89	-	-	-	-	-	-	1,501	-
4b.1.1.21	DG-567-2_CLN	-	42	-	-	-	-	-	6	48	-	-	48	-	-	-	-	-	-	817	-
4b.1.1.22	DG-592-1_CLN	-	85	-	-	-	-	-	13	97	-	-	97	-	-	-	-	-	-	1,649	-
4b.1.1.23	DG-592-2_CLN	-	45	-	-	-	-	-	7	51	-	-	51	-	-	-	-	-	-	868	-
4b.1.1.24	DG-617-1_CLN	-	68	-	-	-	-	-	10	78	-	-	78	-	-	-	-	-	-	1,342	-
4b.1.1.25	DG-617-2_CLN	-	35	-	-	-	-	-	5	41	-	-	41	-	-	-	-	-	-	699	-
4b.1.1.26	DG-642-1_CLN	-	94	-	-	-	-	-	14	108	-	-	108	-	-	-	-	-	-	1,843	-
4b.1.1.27	FH-584-1_BRY	-	17	1	1	-	27	-	11	57	57	-	-	-	88	-	-	-	7,854	290	-
4b.1.1.28	FH-584-1_PRO	-	36	1	2	30	-	-	14	84	84	-	-	714	-	-	-	-	28,989	638	-
4b.1.1.29	FH-592-1_BRY	-	60	11	7	-	213	-	70	361	361	-	-	-	699	-	-	-	62,749	1,137	-
4b.1.1.30	FH-592-1_PRO	-	101	1	3	36	-	-	31	172	172	-	-	850	-	-	-	-	34,504	1,921	-
4b.1.1.31	FH-592-2_PRO	-	162	3	6	77	-	-	53	301	301	-	-	1,809	-	-	-	-	73,460	3,090	-
4b.1.1.32	FH-617-1_BRY	-	12	2	1	-	34	-	12	61	61	-	-	-	111	-	-	-	10,001	218	-
4b.1.1.33	FH-617-1_PRO	-	283	4	11	131	-	-	93	522	522	-	-	3,084	-	-	-	-	125,237	5,372	-
4b.1.1.34	FH-617-2_BRY	-	5	1	0	-	13	-	5	24	24	-	-	-	43	-	-	-	3,859	89	-
4b.1.1.35	FH-617-2_PRO	-	2	0	0	1	-	-	1	5	5	-	-	30	-	-	-	-	1,201	40	-
4b.1.1.36	PT-570-1_PRO	-	255	11	26	327	-	-	118	736	736	-	-	7,659	-	-	-	-	311,055	4,791	-
4b.1.1.37	RX-568-1_BRY	-	946	96	65	-	1,851	-	718	3,676	3,676	-	-	-	6,115	-	-	-	546,003	18,135	-
4b.1.1.38	RX-568-1_PRO	-	442	13	32	394	-	-	176	1,057	1,057	-	-	9,250	-	-	-	-	375,629	8,107	-
4b.1.1.39	RX-592-1_BRY	-	468	38	23	-	662	-	290	1,482	1,482	-	-	-	2,179	-	-	-	195,415	8,708	-
4b.1.1.40	RX-592-1_PRO	-	573	17	39	490	-	-	224	1,344	1,344	-	-	11,489	-	-	-	-	466,594	10,568	-
4b.1.1.41	RX-617-1_BRY	-	667	47	32	-	912	-	404	2,062	2,062	-	-	-	2,997	-	-	-	268,935	12,803	-
4b.1.1.42	RX-617-1_PRO	-	770	19	45	557	-	-	285	1,676	1,676	-	-	13,073	-	-	-	-	530,899	14,245	-
4b.1.1.43	SERVICE_CLN	-	207	-	-	-	-	-	31	238	-	-	238	-	-	-	-	-	-	4,177	-
4b.1.1.44	WWTF_CLN	-	125	-	-	-	-	-	19	144	-	-	144	-	-	-	-	-	-	2,477	-
4b.1.1.45	YARD_CLN	-	227	-	-	-	-	-	34	261	-	-	261	-	-	-	-	-	-	4,418	-
4b.1.1.46	YARD_PRO	-	449	21	49	608	-	-	213	1,339	1,339	-	-	14,254	-	-	-	-	578,874	8,503	-
4b.1.1.47	YARD-BURIED PIPE_CLN	-	183	-	-	-	-	-	27	210	-	-	210	-	-	-	-	-	-	3,683	-
4b.1.1.48	YARD-BURIED PIPE_PRO	-	120	4	9	108	-	-	48	289	289	-	-	2,543	-	-	-	-	103,268	2,115	-
4b.1.1	Totals	-	12,491	629	720	5,735	7,391	-	5,832	32,799	30,853	-	1,946	134,494	26,570	-	-	-	7,642,237	236,742	-
4b.1.2	Scaffolding in support of decommissioning	-	982	14	3	37	15	-	256	1,306	1,306	-	-	773	48	-	-	-	39,092	20,248	-
Decontamination of Site Buildings																					
4b.1.3.1	Reactor Building	1,017	880	103	101	268	1,649	-	1,207	5,226	5,226	-	-	6,296	6,026	-	-	-	792,422	34,939	-
4b.1.3.2	Auxiliary Building	556	340	22	25	51	324	-	458	1,776	1,776	-	-	1,204	1,294	-	-	-	164,812	16,512	-
4b.1.3.3	IRSF	39	14	3	4	4	49	-	36	148	148	-	-	94	197	-	-	-	21,225	926	-
4b.1.3	Totals	1,612	1,233	129	130	324	2,022	-	1,701	7,150	7,150	-	-	7,594	7,517	-	-	-	978,459	52,377	-
4b.1	Subtotal Period 4b Activity Costs	1,612	14,706	772	853	6,095	9,428	-	7,789	41,255	39,309	-	1,946	142,861	34,135	-	-	-	8,659,789	309,366	-
Period 4b Collateral Costs																					
4b.3.1	Process liquid waste	128	-	46	219	-	146	-	138	677	677	-	-	-	878	-	-	-	43,140	194	-
4b.3.2	Small tool allowance	-	266	-	-	-	-	-	40	306	306	-	-	-	-	-	-	-	-	-	-
4b.3	Subtotal Period 4b Collateral Costs	128	266	46	219	-	146	-	178	983	983	-	-	-	878	-	-	-	43,140	194	-
Period 4b Period-Dependent Costs																					
4b.4.1	Decon supplies	590	-	-	-	-	-	-	148	738	738	-	-	-	-	-	-	-	-	-	-
4b.4.2	Insurance	-	-	-	-	-	-	249	25	274	274	-	-	-	-	-	-	-	-	-	-
4b.4.3	Property taxes	-	-	-	-	-	-	713	71	785	785	-	-	-	-	-	-	-	-	-	-
4b.4.4	Health physics supplies	-	1,468	-	-	-	-	-	367	1,835	1,835	-	-	-	-	-	-	-	-	-	-
4b.4.5	Heavy equipment rental	-	2,368	-	-	-	-	-	355	2,723	2,723	-	-	-	-	-	-	-	-	-	-
4b.4.6	Disposal of DAW generated	-	-	97	46	-	294	-	90	527	527	-	-	-	5,295	-	-	-	106,101	1,300	-
4b.4.7	Plant energy budget	-	-	-	-	-	-	1,069	160	1,229	1,229	-	-	-	-	-	-	-	-	-	-
4b.4.8	NRC Fees	-	-	-	-	-	-	491	49	540	540	-	-	-	-	-	-	-	-	-	-

Table C-2
Zion Nuclear Power Station Unit 2
DECON Decommissioning Cost Estimate
(Thousands of 2006 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
Period 4b Period-Dependent Costs (continued)																					
4b.4.9	Emergency Planning Fees	-	-	-	-	-	-	143	14	157	-	157	-	-	-	-	-	-	-	-	-
4b.4.10	Site O&M Cost	-	-	-	-	-	-	178	27	205	205	-	-	-	-	-	-	-	-	-	-
4b.4.11	Spent Fuel Pool O&M	-	-	-	-	-	-	517	78	594	-	594	-	-	-	-	-	-	-	-	-
4b.4.12	Radwaste Processing Equipment/Services	-	-	-	-	-	-	521	78	599	599	-	-	-	-	-	-	-	-	-	-
4b.4.13	Security Staff Cost	-	-	-	-	-	-	3,308	496	3,805	3,805	-	-	-	-	-	-	-	-	-	92,291
4b.4.14	DOC Staff Cost	-	-	-	-	-	-	14,880	2,232	17,112	17,112	-	-	-	-	-	-	-	-	-	217,331
4b.4.15	Utility Staff Cost	-	-	-	-	-	-	24,233	3,635	27,868	27,868	-	-	-	-	-	-	-	-	-	403,403
4b.4	Subtotal Period 4b Period-Dependent Costs	590	3,837	97	46	-	294	46,303	7,826	58,993	58,242	751	-	-	5,295	-	-	-	106,101	1,300	713,026
4b.0	TOTAL PERIOD 4b COST	2,330	18,808	915	1,117	6,095	9,868	46,303	15,793	101,231	98,534	751	1,946	142,861	40,308	-	-	-	8,809,029	310,861	713,026
PERIOD 4c - Fuel Storage Operations/Shipping																					
Period 4c Direct Decommissioning Activities																					
Period 4c Collateral Costs																					
4c.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	8,750	1,313	10,063	-	10,063	-	-	-	-	-	-	-	-	-
4c.3	Subtotal Period 4c Collateral Costs	-	-	-	-	-	-	8,750	1,313	10,063	-	10,063	-	-	-	-	-	-	-	-	-
Period 4c Period-Dependent Costs																					
4c.4.1	Insurance	-	-	-	-	-	-	1,844	184	2,028	-	2,028	-	-	-	-	-	-	-	-	-
4c.4.2	Property taxes	-	-	-	-	-	-	5,287	529	5,815	-	5,815	-	-	-	-	-	-	-	-	-
4c.4.3	Health physics supplies	-	685	-	-	-	-	-	171	857	-	857	-	-	-	-	-	-	-	-	-
4c.4.4	Disposal of DAW generated	-	-	24	11	-	74	-	23	133	-	133	-	-	1,331	-	-	-	26,668	327	-
4c.4.5	Plant energy budget	-	-	-	-	-	-	2,113	317	2,430	-	2,430	-	-	-	-	-	-	-	-	-
4c.4.6	NRC Fees	-	-	-	-	-	-	2,282	228	2,510	-	2,510	-	-	-	-	-	-	-	-	-
4c.4.7	Emergency Planning Fees	-	-	-	-	-	-	1,057	106	1,163	-	1,163	-	-	-	-	-	-	-	-	-
4c.4.8	Site O&M Cost	-	-	-	-	-	-	1,322	198	1,520	-	1,520	-	-	-	-	-	-	-	-	-
4c.4.9	Spent Fuel Pool O&M	-	-	-	-	-	-	3,830	575	4,405	-	4,405	-	-	-	-	-	-	-	-	-
4c.4.10	Security Staff Cost	-	-	-	-	-	-	6,329	949	7,278	-	7,278	-	-	-	-	-	-	-	-	176,549
4c.4.11	Utility Staff Cost	-	-	-	-	-	-	26,246	3,937	30,183	-	30,183	-	-	-	-	-	-	-	-	408,269
4c.4	Subtotal Period 4c Period-Dependent Costs	-	685	24	11	-	74	50,311	7,217	58,323	-	58,323	-	-	1,331	-	-	-	26,668	327	584,817
4c.0	TOTAL PERIOD 4c COST	-	685	24	11	-	74	59,061	8,530	68,385	-	68,385	-	-	1,331	-	-	-	26,668	327	584,817
PERIOD 4d - Continuing Site Decontamination																					
Period 4d Direct Decommissioning Activities																					
4d.1.1	Remove spent fuel racks	357	100	261	60	-	1,711	-	666	3,154	3,154	-	-	-	5,624	-	-	-	504,611	2,194	-
Disposal of Plant Systems																					
4d.1.2	Totals	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Decontamination of Site Buildings																					
4d.1.3.1	Fuel Building	602	668	34	18	32	408	-	581	2,344	2,344	-	-	752	1,421	-	-	-	154,534	23,679	-
4d.1.3	Totals	602	668	34	18	32	408	-	581	2,344	2,344	-	-	752	1,421	-	-	-	154,534	23,679	-
4d.1.4	Scaffolding in support of decommissioning	-	196	3	1	7	3	-	51	261	261	-	-	155	10	-	-	-	7,818	4,050	-
4d.1	Subtotal Period 4d Activity Costs	959	964	297	79	39	2,122	-	1,298	5,759	5,759	-	-	906	7,054	-	-	-	666,963	29,923	-
Period 4d Collateral Costs																					
4d.3.1	Process liquid waste	192	-	69	327	-	219	-	207	1,014	1,014	-	-	-	1,314	-	-	-	64,577	291	-
4d.3.2	Small tool allowance	-	32	-	-	-	-	-	5	36	36	-	-	-	-	-	-	-	-	-	-
4d.3.3	Decommissioning Equipment Disposition	-	-	101	32	284	114	-	86	616	616	-	-	6,000	373	-	-	-	303,507	739	-
4d.3	Subtotal Period 4d Collateral Costs	192	32	171	359	284	333	-	297	1,666	1,666	-	-	6,000	1,687	-	-	-	368,084	1,030	-

Table C-2
Zion Nuclear Power Station Unit 2
DECON Decommissioning Cost Estimate
(Thousands of 2006 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes: Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
Period 4d Period-Dependent Costs																					
4d.4.1	Decon supplies	122	-	-	-	-	-	-	30	152	152	-	-	-	-	-	-	-	-	-	-
4d.4.2	Insurance	-	-	-	-	-	-	96	10	106	106	-	-	-	-	-	-	-	-	-	-
4d.4.3	Property taxes	-	-	-	-	-	-	277	28	304	304	-	-	-	-	-	-	-	-	-	-
4d.4.4	Health physics supplies	-	253	-	-	-	-	-	63	317	317	-	-	-	-	-	-	-	-	-	-
4d.4.5	Heavy equipment rental	-	918	-	-	-	-	-	138	1,056	1,056	-	-	-	-	-	-	-	-	-	-
4d.4.6	Disposal of DAW generated	-	-	20	10	-	62	-	19	111	111	-	-	-	1,114	-	-	-	22,316	273	-
4d.4.7	Plant energy budget	-	-	-	-	-	-	111	17	127	127	-	-	-	-	-	-	-	-	-	-
4d.4.8	NRC Fees	-	-	-	-	-	-	143	14	157	157	-	-	-	-	-	-	-	-	-	-
4d.4.9	Site O&M Cost	-	-	-	-	-	-	69	10	80	80	-	-	-	-	-	-	-	-	-	-
4d.4.10	Radwaste Processing Equipment/Services	-	-	-	-	-	-	202	30	232	232	-	-	-	-	-	-	-	-	-	-
4d.4.11	Security Staff Cost	-	-	-	-	-	-	1,117	168	1,285	1,285	-	-	-	-	-	-	-	-	-	31,166
4d.4.12	DOC Staff Cost	-	-	-	-	-	-	4,021	603	4,624	4,624	-	-	-	-	-	-	-	-	-	57,714
4d.4.13	Utility Staff Cost	-	-	-	-	-	-	6,530	980	7,510	7,510	-	-	-	-	-	-	-	-	-	105,617
4d.4	Subtotal Period 4d Period-Dependent Costs	122	1,171	20	10	-	62	12,566	2,109	16,060	16,060	-	-	-	1,114	-	-	-	22,316	273	194,497
4d.0	TOTAL PERIOD 4d COST	1,272	2,167	488	447	323	2,516	12,566	3,705	23,485	23,485	-	-	6,906	9,855	-	-	-	1,057,362	31,226	194,497
PERIOD 4e - License Termination																					
Period 4e Direct Decommissioning Activities																					
4e.1.1	ORISE confirmatory survey	-	-	-	-	-	-	140	42	183	183	-	-	-	-	-	-	-	-	-	-
4e.1.2	Terminate license									a											
4e.1	Subtotal Period 4e Activity Costs	-	-	-	-	-	-	140	42	183	183	-	-	-	-	-	-	-	-	-	-
Period 4e Additional Costs																					
4e.2.1	Final Site Survey	-	-	-	-	-	-	8,448	2,534	10,983	10,983	-	-	-	-	-	-	-	-	160,578	-
4e.2	Subtotal Period 4e Additional Costs	-	-	-	-	-	-	8,448	2,534	10,983	10,983	-	-	-	-	-	-	-	-	160,578	-
Period 4e Collateral Costs																					
4e.3.1	DOC staff relocation expenses	-	-	-	-	-	-	829	124	953	953	-	-	-	-	-	-	-	-	-	-
4e.3	Subtotal Period 4e Collateral Costs	-	-	-	-	-	-	829	124	953	953	-	-	-	-	-	-	-	-	-	-
Period 4e Period-Dependent Costs																					
4e.4.1	Insurance	-	-	-	-	-	-	38	4	42	42	-	-	-	-	-	-	-	-	-	-
4e.4.2	Property taxes	-	-	-	-	-	-	382	38	420	420	-	-	-	-	-	-	-	-	-	-
4e.4.3	Health physics supplies	-	768	-	-	-	-	-	192	960	960	-	-	-	-	-	-	-	-	-	-
4e.4.4	Disposal of DAW generated	-	-	7	3	-	21	-	6	38	38	-	-	-	377	-	-	-	7,553	93	-
4e.4.5	Plant energy budget	-	-	-	-	-	-	153	23	176	176	-	-	-	-	-	-	-	-	-	-
4e.4.6	NRC Fees	-	-	-	-	-	-	263	26	289	289	-	-	-	-	-	-	-	-	-	-
4e.4.7	Site O&M Cost	-	-	-	-	-	-	95	14	110	110	-	-	-	-	-	-	-	-	-	-
4e.4.8	Security Staff Cost	-	-	-	-	-	-	450	68	518	518	-	-	-	-	-	-	-	-	-	12,563
4e.4.9	DOC Staff Cost	-	-	-	-	-	-	3,340	501	3,841	3,841	-	-	-	-	-	-	-	-	-	47,430
4e.4.10	Utility Staff Cost	-	-	-	-	-	-	3,764	565	4,329	4,329	-	-	-	-	-	-	-	-	-	58,590
4e.4	Subtotal Period 4e Period-Dependent Costs	-	768	7	3	-	21	8,485	1,437	10,721	10,721	-	-	-	377	-	-	-	7,553	93	118,583
4e.0	TOTAL PERIOD 4e COST	-	768	7	3	-	21	17,903	4,138	22,840	22,840	-	-	-	377	-	-	-	7,553	160,671	118,583
PERIOD 4 TOTALS		3,907	52,725	7,605	5,266	16,700	41,071	180,749	61,420	369,443	291,444	69,849	8,150	396,711	106,841	2,754	918	203	25,319,550	890,649	2,300,570

Table C-2
Zion Nuclear Power Station Unit 2
DECON Decommissioning Cost Estimate
(Thousands of 2006 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Llc. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
PERIOD 5b - Site Restoration																					
Period 5b Direct Decommissioning Activities																					
Demolition of Remaining Site Buildings																					
5b.1.1.1	Reactor Building	-	4,151	-	-	-	-	-	623	4,774	-	-	4,774	-	-	-	-	-	-	49,418	-
5b.1.1.2	Auxiliary Building	-	1,895	-	-	-	-	-	284	2,179	-	-	2,179	-	-	-	-	-	-	24,718	-
5b.1.1.3	Crib House	-	644	-	-	-	-	-	97	741	-	-	741	-	-	-	-	-	-	7,389	-
5b.1.1.4	Diesel Generator Building	-	328	-	-	-	-	-	49	377	-	-	377	-	-	-	-	-	-	4,557	-
5b.1.1.5	Discharge Tunnel Outfall	-	154	-	-	-	-	-	23	177	-	-	177	-	-	-	-	-	-	2,192	-
5b.1.1.6	Emergency Operations Facility	-	209	-	-	-	-	-	31	240	-	-	240	-	-	-	-	-	-	3,232	-
5b.1.1.7	IDNS Ragems Facility	-	8	-	-	-	-	-	1	9	-	-	9	-	-	-	-	-	-	132	-
5b.1.1.8	IRSF	-	649	-	-	-	-	-	97	747	-	-	747	-	-	-	-	-	-	8,534	-
5b.1.1.9	Intake Structure	-	92	-	-	-	-	-	14	106	-	-	106	-	-	-	-	-	-	1,221	-
5b.1.1.10	Miscellaneous Site Structures	-	284	-	-	-	-	-	43	327	-	-	327	-	-	-	-	-	-	3,766	-
5b.1.1.11	Miscellaneous Yard	-	748	-	-	-	-	-	112	860	-	-	860	-	-	-	-	-	-	10,409	-
5b.1.1.12	Security Office Building	-	23	-	-	-	-	-	3	27	-	-	27	-	-	-	-	-	-	358	-
5b.1.1.13	Sewage Lift Station	-	3	-	-	-	-	-	0	3	-	-	3	-	-	-	-	-	-	46	-
5b.1.1.14	Sludge Drying Beds	-	8	-	-	-	-	-	1	9	-	-	9	-	-	-	-	-	-	112	-
5b.1.1.15	Technical Support Center	-	146	-	-	-	-	-	22	168	-	-	168	-	-	-	-	-	-	2,174	-
5b.1.1.16	Training Center Addition	-	105	-	-	-	-	-	16	121	-	-	121	-	-	-	-	-	-	1,704	-
5b.1.1.17	Turbine Building	-	1,835	-	-	-	-	-	275	2,110	-	-	2,110	-	-	-	-	-	-	26,135	-
5b.1.1.18	Turbine Pedestal	-	1,759	-	-	-	-	-	264	2,023	-	-	2,023	-	-	-	-	-	-	19,735	-
5b.1.1.19	Wastewater Treatment Building	-	87	-	-	-	-	-	13	100	-	-	100	-	-	-	-	-	-	1,330	-
5b.1.1.20	Fuel Building	-	1,408	-	-	-	-	-	211	1,619	-	-	1,619	-	-	-	-	-	-	17,595	-
5b.1.1	Totals	-	14,537	-	-	-	-	-	2,181	16,717	-	-	16,717	-	-	-	-	-	-	184,757	-
Site Closeout Activities																					
5b.1.2	BackFill Site	-	1,026	-	-	-	-	-	154	1,180	-	-	1,180	-	-	-	-	-	-	4,079	-
5b.1.3	Grade & landscape site	-	59	-	-	-	-	-	9	68	-	-	68	-	-	-	-	-	-	175	-
5b.1.4	Final report to NRC	-	-	-	-	-	-	63	9	72	72	-	-	-	-	-	-	-	-	-	667
5b.1	Subtotal Period 5b Activity Costs	-	15,623	-	-	-	-	63	2,353	18,038	72	-	17,966	-	-	-	-	-	-	189,011	667
Period 5b Additional Costs																					
5b.2.1	Concrete Crushing	-	497	-	-	-	-	4	75	576	-	-	576	-	-	-	-	-	-	2,764	-
5b.2.2	Intake Structure Cofferdam	-	674	-	-	-	-	-	101	775	-	-	775	-	-	-	-	-	-	7,551	-
5b.2.3	Discharge Tunnel Outfall Cofferdam	-	896	-	-	-	-	-	134	1,031	-	-	1,031	-	-	-	-	-	-	10,040	-
5b.2	Subtotal Period 5b Additional Costs	-	2,067	-	-	-	-	4	311	2,382	-	-	2,382	-	-	-	-	-	-	20,355	-
Period 5b Collateral Costs																					
5b.3.1	Small tool allowance	-	190	-	-	-	-	-	29	219	-	-	219	-	-	-	-	-	-	-	-
5b.3	Subtotal Period 5b Collateral Costs	-	190	-	-	-	-	-	29	219	-	-	219	-	-	-	-	-	-	-	-
Period 5b Period-Dependent Costs																					
5b.4.1	Insurance	-	-	-	-	-	-	104	10	114	-	-	114	-	-	-	-	-	-	-	-
5b.4.2	Property taxes	-	-	-	-	-	-	1,040	104	1,144	-	-	1,144	-	-	-	-	-	-	-	-
5b.4.3	Heavy equipment rental	-	4,704	-	-	-	-	-	706	5,409	-	-	5,409	-	-	-	-	-	-	-	-
5b.4.4	Plant energy budget	-	-	-	-	-	-	208	31	239	-	-	239	-	-	-	-	-	-	-	-
5b.4.5	Site O&M Cost	-	-	-	-	-	-	260	39	299	-	-	299	-	-	-	-	-	-	-	-
5b.4.6	Security Staff Cost	-	-	-	-	-	-	1,148	172	1,320	-	-	1,320	-	-	-	-	-	-	-	32,050
5b.4.7	DOC Staff Cost	-	-	-	-	-	-	9,833	1,475	11,308	-	-	11,308	-	-	-	-	-	-	-	137,886
5b.4.8	Utility Staff Cost	-	-	-	-	-	-	4,928	739	5,667	-	-	5,667	-	-	-	-	-	-	-	78,171
5b.4	Subtotal Period 5b Period-Dependent Costs	-	4,704	-	-	-	-	17,521	3,277	25,501	-	-	25,501	-	-	-	-	-	-	-	248,107
5b.0	TOTAL PERIOD 5b COST	-	22,584	-	-	-	-	17,588	5,969	46,140	72	-	46,068	-	-	-	-	-	-	209,366	248,775

Table C-2
Zion Nuclear Power Station Unit 2
DECON Decommissioning Cost Estimate
(Thousands of 2006 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
PERIOD 5 TOTALS		-	22,584	-	-	-	-	17,588	5,969	46,140	72	-	46,068	-	-	-	-	-	-	209,366	248,775
TOTAL COST TO DECOMMISSION		4,667	85,313	7,672	6,059	16,700	45,184	288,402	76,606	530,602	353,040	122,832	54,730	396,711	217,857	2,754	918	203	26,799,030	1,210,957	3,015,124

TOTAL COST TO DECOMMISSION WITH 16.87% CONTINGENCY:	**$530,602**	**thousands of 2006 dollars**
TOTAL NRC LICENSE TERMINATION COST IS 55.09% OR:	**353,040**	**thousands of 2006 dollars**
SPENT FUEL MANAGEMENT COST IS 23.10% OR:	**122,832**	**thousands of 2006 dollars**
NON-NUCLEAR DEMOLITION COST IS 10.31% OR:	**$54,730**	**thousands of 2006 dollars**
TOTAL PRIMARY SITE RADWASTE VOLUME BURIED:	**92,309**	**Cubic Feet**
TOTAL SECONDARY SITE RADWASTE VOLUME BURIED:	**129,221**	**Cubic Feet**
TOTAL TERTIARY SITE RADWASTE VOLUME BURIED:		**Cubic Feet**
TOTAL GREATER THAN CLASS C RADWASTE VOLUME GENERATED:	**203**	**Cubic Feet**
TOTAL SCRAP METAL REMOVED:	**46,651**	**Tons**
TOTAL CRAFT LABOR REQUIREMENTS:	**1,210,957**	**Man-hours**

End Notes:
n/a - indicates that this activity not charged as decommissioning expense.
a - indicates that this activity performed by decommissioning staff.
0 - indicates that this value is less than 0.5 but is non-zero.
a cell containing " - " indicates a zero value

APPENDIX D

DETAILED COST ANALYSIS

DELAYED DECON

Table D-1
Zion Nuclear Power Station Unit 1
Delayed DECON Decommissioning Cost Estimate
(Thousands of 2006 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
	2006-2028 Decommissioning Expenditures	-	-	-	-	-	-	147,465	-	147,465	-	147,465	-	-	-	-	-	-	-	-	-
	Spent Fuel Capital and Transfer	-	-	-	-	-	-	8,750	1,313	10,063	-	10,063	-	-	-	-	-	-	-	-	-
PERIOD 3a - Reactivate Site Following SAFSTOR Dormancy																					
Period 3a Direct Decommissioning Activities																					
3a.1.1	Prepare preliminary decommissioning cost	-	-	-	-	-	-	123	18	141	141	-	-	-	-	-	-	-	-	-	1,300
3a.1.2	Review plant dwgs & specs.	-	-	-	-	-	-	435	65	500	500	-	-	-	-	-	-	-	-	-	4,600
3a.1.3	Perform detailed rad survey									a											
3a.1.4	End product description	-	-	-	-	-	-	94	14	109	109	-	-	-	-	-	-	-	-	-	1,000
3a.1.5	Detailed by-product inventory	-	-	-	-	-	-	123	18	141	141	-	-	-	-	-	-	-	-	-	1,300
3a.1.6	Define major work sequence	-	-	-	-	-	-	708	106	815	815	-	-	-	-	-	-	-	-	-	7,500
3a.1.7	Perform SER and EA	-	-	-	-	-	-	293	44	337	337	-	-	-	-	-	-	-	-	-	3,100
3a.1.8	Perform Site-Specific Cost Study	-	-	-	-	-	-	472	71	543	543	-	-	-	-	-	-	-	-	-	5,000
3a.1.9	Prepare/submit License Termination Plan	-	-	-	-	-	-	387	58	445	445	-	-	-	-	-	-	-	-	-	4,096
3a.1.10	Receive NRC approval of termination plan									a											
Activity Specifications																					
3a.1.11.1	Re-activate plant & temporary facilities	-	-	-	-	-	-	696	104	801	721	-	80	-	-	-	-	-	-	-	7,370
3a.1.11.2	Plant systems	-	-	-	-	-	-	394	59	453	407	-	45	-	-	-	-	-	-	-	4,167
3a.1.11.3	Reactor internals	-	-	-	-	-	-	671	101	771	771	-	-	-	-	-	-	-	-	-	7,100
3a.1.11.4	Reactor vessel	-	-	-	-	-	-	614	92	706	706	-	-	-	-	-	-	-	-	-	6,500
3a.1.11.5	Biological shield	-	-	-	-	-	-	47	7	54	54	-	-	-	-	-	-	-	-	-	500
3a.1.11.6	Steam generators	-	-	-	-	-	-	295	44	339	339	-	-	-	-	-	-	-	-	-	3,120
3a.1.11.7	Reinforced concrete	-	-	-	-	-	-	151	23	174	87	-	87	-	-	-	-	-	-	-	1,600
3a.1.11.8	Main Turbine	-	-	-	-	-	-	38	6	43	-	-	43	-	-	-	-	-	-	-	400
3a.1.11.9	Main Condensers	-	-	-	-	-	-	38	6	43	-	-	43	-	-	-	-	-	-	-	400
3a.1.11.10	Plant structures & buildings	-	-	-	-	-	-	295	44	339	169	-	169	-	-	-	-	-	-	-	3,120
3a.1.11.11	Waste management	-	-	-	-	-	-	435	65	500	500	-	-	-	-	-	-	-	-	-	4,600
3a.1.11.12	Facility & site closeout	-	-	-	-	-	-	85	13	98	49	-	49	-	-	-	-	-	-	-	900
3a.1.11	Total	-	-	-	-	-	-	3,757	564	4,321	3,803	-	517	-	-	-	-	-	-	-	39,777
Planning & Site Preparations																					
3a.1.12	Prepare dismantling sequence	-	-	-	-	-	-	227	34	261	261	-	-	-	-	-	-	-	-	-	2,400
3a.1.13	Plant prep. & temp. svces	-	-	-	-	-	-	2,419	363	2,782	2,782	-	-	-	-	-	-	-	-	-	-
3a.1.14	Design water clean-up system	-	-	-	-	-	-	132	20	152	152	-	-	-	-	-	-	-	-	-	1,400
3a.1.15	Rigging/Cont. Cntrl Envlps/tooling/etc.	-	-	-	-	-	-	2,048	307	2,355	2,355	-	-	-	-	-	-	-	-	-	-
3a.1.16	Procure casks/liners & containers	-	-	-	-	-	-	116	17	134	134	-	-	-	-	-	-	-	-	-	1,230
3a.1	Subtotal Period 3a Activity Costs	-	-	-	-	-	-	11,334	1,700	13,035	12,517	-	517	-	-	-	-	-	-	-	72,703
Period 3a Collateral Costs																					
3a.3	Subtotal Period 3a Collateral Costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Period 3a Period-Dependent Costs																					
3a.4.1	Insurance	-	-	-	-	-	-	161	16	177	177	-	-	-	-	-	-	-	-	-	-
3a.4.2	Property taxes	-	-	-	-	-	-	500	50	550	550	-	-	-	-	-	-	-	-	-	-
3a.4.3	Health physics supplies	-	259	-	-	-	-	-	65	324	324	-	-	-	-	-	-	-	-	-	-
3a.4.4	Heavy equipment rental	-	334	-	-	-	-	-	50	384	384	-	-	-	-	-	-	-	-	-	-
3a.4.5	Disposal of DAW generated	-	-	11	5	-	32	-	10	57	57	-	-	-	575	-	-	-	11,526	141	-
3a.4.6	Plant energy budget	-	-	-	-	-	-	999	150	1,148	1,148	-	-	-	-	-	-	-	-	-	-
3a.4.7	NRC Fees	-	-	-	-	-	-	258	26	284	284	-	-	-	-	-	-	-	-	-	-
3a.4.8	Site O&M Cost	-	-	-	-	-	-	125	19	144	144	-	-	-	-	-	-	-	-	-	-
3a.4.9	Security Staff Cost	-	-	-	-	-	-	1,122	168	1,290	1,290	-	-	-	-	-	-	-	-	-	31,286
3a.4.10	Utility Staff Cost	-	-	-	-	-	-	15,900	2,385	18,285	18,285	-	-	-	-	-	-	-	-	-	266,971
3a.4	Subtotal Period 3a Period-Dependent Costs	-	593	11	5	-	32	19,064	2,938	22,643	22,643	-	-	-	575	-	-	-	11,526	141	298,257
3a.0	TOTAL PERIOD 3a COST	-	593	11	5	-	32	30,398	4,638	35,677	35,160	-	517	-	575	-	-	-	11,526	141	370,960

Table D-1
Zion Nuclear Power Station Unit 1
Delayed DECON Decommissioning Cost Estimate
(Thousands of 2006 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes Class A Cu. Feet	Burial Volumes Class B Cu. Feet	Burial Volumes Class C Cu. Feet	Burial Volumes GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
PERIOD 3b - Decommissioning Preparations																					
Period 3b Direct Decommissioning Activities																					
Detailed Work Procedures																					
3b.1.1.1	Plant systems	-	-	-	-	-	-	447	67	514	463	-	51	-	-	-	-	-	-	-	4,733
3b.1.1.2	Reactor internals	-	-	-	-	-	-	236	35	272	272	-	-	-	-	-	-	-	-	-	2,500
3b.1.1.3	Remaining buildings	-	-	-	-	-	-	128	19	147	37	-	110	-	-	-	-	-	-	-	1,350
3b.1.1.4	CRD cooling assembly	-	-	-	-	-	-	94	14	109	109	-	-	-	-	-	-	-	-	-	1,000
3b.1.1.5	CRD housings & ICI tubes	-	-	-	-	-	-	94	14	109	109	-	-	-	-	-	-	-	-	-	1,000
3b.1.1.6	Incore instrumentation	-	-	-	-	-	-	94	14	109	109	-	-	-	-	-	-	-	-	-	1,000
3b.1.1.7	Reactor vessel	-	-	-	-	-	-	343	51	394	394	-	-	-	-	-	-	-	-	-	3,630
3b.1.1.8	Facility closeout	-	-	-	-	-	-	113	17	130	65	-	65	-	-	-	-	-	-	-	1,200
3b.1.1.9	Missile shields	-	-	-	-	-	-	43	6	49	49	-	-	-	-	-	-	-	-	-	450
3b.1.1.10	Biological shield	-	-	-	-	-	-	113	17	130	130	-	-	-	-	-	-	-	-	-	1,200
3b.1.1.11	Steam generators	-	-	-	-	-	-	435	65	500	500	-	-	-	-	-	-	-	-	-	4,600
3b.1.1.12	Reinforced concrete	-	-	-	-	-	-	94	14	109	54	-	54	-	-	-	-	-	-	-	1,000
3b.1.1.13	Main Turbine	-	-	-	-	-	-	147	22	169	-	-	169	-	-	-	-	-	-	-	1,560
3b.1.1.14	Main Condensers	-	-	-	-	-	-	147	22	169	-	-	169	-	-	-	-	-	-	-	1,560
3b.1.1.15	Auxiliary building	-	-	-	-	-	-	258	39	297	267	-	30	-	-	-	-	-	-	-	2,730
3b.1.1.16	Reactor building	-	-	-	-	-	-	258	39	297	267	-	30	-	-	-	-	-	-	-	2,730
3b.1.1	Total	-	-	-	-	-	-	3,046	457	3,503	2,823	-	679	-	-	-	-	-	-	-	32,243
3b.1	Subtotal Period 3b Activity Costs	-	-	-	-	-	-	3,046	457	3,503	2,823	-	679	-	-	-	-	-	-	-	32,243
Period 3b Additional Costs																					
3b.2.1	Site Characterization	-	-	-	-	-	-	496	74	570	570	-	-	-	-	-	-	-	-	-	-
3b.2.2	Clean Asbestos Remediation	-	3,762	30	464	-	2,527	-	1,645	8,428	8,428	-	-	-	65,280	-	-	-	909,067	55,578	-
3b.2.3	Contaminated Asbestos Remediation	-	3,334	15	232	-	1,154	-	1,158	5,893	5,893	-	-	-	31,936	-	-	-	415,168	46,357	-
3b.2	Subtotal Period 3b Additional Costs	-	7,095	45	696	-	3,681	496	2,878	14,892	14,892	-	-	-	97,216	-	-	-	1,324,235	101,935	-
Period 3b Collateral Costs																					
3b.3.1	Decon equipment	737	-	-	-	-	-	-	111	847	847	-	-	-	-	-	-	-	-	-	-
3b.3.2	DOC staff relocation expenses	-	-	-	-	-	-	829	124	953	953	-	-	-	-	-	-	-	-	-	-
3b.3.3	Small tool allowance	-	100	-	-	-	-	-	15	114	114	-	-	-	-	-	-	-	-	-	-
3b.3.4	Pipe cutting equipment	-	957	-	-	-	-	-	143	1,100	1,100	-	-	-	-	-	-	-	-	-	-
3b.3	Subtotal Period 3b Collateral Costs	737	1,056	-	-	-	-	829	393	3,015	3,015	-	-	-	-	-	-	-	-	-	-
Period 3b Period-Dependent Costs																					
3b.4.1	Decon supplies	23	-	-	-	-	-	-	6	28	28	-	-	-	-	-	-	-	-	-	-
3b.4.2	Insurance	-	-	-	-	-	-	87	9	96	96	-	-	-	-	-	-	-	-	-	-
3b.4.3	Property taxes	-	-	-	-	-	-	251	25	276	276	-	-	-	-	-	-	-	-	-	-
3b.4.4	Health physics supplies	-	492	-	-	-	-	-	123	615	615	-	-	-	-	-	-	-	-	-	-
3b.4.5	Heavy equipment rental	-	168	-	-	-	-	-	25	193	193	-	-	-	-	-	-	-	-	-	-
3b.4.6	Disposal of DAW generated	-	-	6	3	-	18	-	6	33	33	-	-	-	329	-	-	-	6,596	81	-
3b.4.7	Plant energy budget	-	-	-	-	-	-	501	75	576	576	-	-	-	-	-	-	-	-	-	-
3b.4.8	NRC Fees	-	-	-	-	-	-	130	13	143	143	-	-	-	-	-	-	-	-	-	-
3b.4.9	Site O&M Cost	-	-	-	-	-	-	63	9	72	72	-	-	-	-	-	-	-	-	-	-
3b.4.10	Security Staff Cost	-	-	-	-	-	-	1,162	174	1,336	1,336	-	-	-	-	-	-	-	-	-	32,417
3b.4.11	DOC Staff Cost	-	-	-	-	-	-	4,366	655	5,021	5,021	-	-	-	-	-	-	-	-	-	63,789
3b.4.12	Utility Staff Cost	-	-	-	-	-	-	7,972	1,196	9,167	9,167	-	-	-	-	-	-	-	-	-	133,851
3b.4	Subtotal Period 3b Period-Dependent Costs	23	659	6	3	-	18	14,530	2,315	17,555	17,555	-	-	-	329	-	-	-	6,596	81	230,057
3b.0	**TOTAL PERIOD 3b COST**	759	8,811	52	699	-	3,700	18,901	6,043	38,964	38,285	-	679	-	97,545	-	-	-	1,330,832	102,016	262,300
PERIOD 3 TOTALS		759	9,404	62	704	-	3,732	49,299	10,682	74,642	73,445	-	1,197	-	98,120	-	-	-	1,342,357	102,157	633,260

Table D-1
Zion Nuclear Power Station Unit 1
Delayed DECON Decommissioning Cost Estimate
(Thousands of 2006 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
PERIOD 4a - Large Component Removal																					
Period 4a Direct Decommissioning Activities																					
Nuclear Steam Supply System Removal																					
4a.1.1.1	Reactor Coolant Piping	17	56	30	20	-	775	-	222	1,120	1,120	-	-	-	1,891	-	-	-	228,729	1,301	-
4a.1.1.2	Pressurizer Relief Tank	3	9	5	3	-	124	-	35	179	179	-	-	-	329	-	-	-	36,571	212	-
4a.1.1.3	Reactor Coolant Pumps & Motors	8	33	41	5	58	2,420	-	631	3,195	3,195	-	-	304	3,919	-	-	-	769,120	1,048	-
4a.1.1.4	Pressurizer	8	57	415	95	-	704	-	250	1,530	1,530	-	-	-	2,446	-	-	-	267,971	2,566	750
4a.1.1.5	Steam Generators	31	3,966	2,230	1,311	1,228	4,978	-	2,855	16,599	16,599	-	-	37,344	17,284	-	-	-	3,132,422	20,507	2,850
4a.1.1.6	CRDMs/ICIs/Service Structure Removal	7	71	170	20	-	176	-	85	529	529	-	-	-	3,052	-	-	-	51,800	1,493	-
4a.1.1.7	Reactor Vessel Internals	27	1,489	1,061	560	-	5,658	136	4,385	13,318	13,318	-	-	-	2,312	501	950	-	395,755	18,169	859
4a.1.1.8	Vessel & Internals GTCC Disposal	-	-	-	-	-	3,428	-	514	3,942	3,942	-	-	-	-	-	-	203	41,900	-	-
4a.1.1.9	Reactor Vessel	-	3,291	781	180	-	5,698	136	5,578	15,663	15,663	-	-	-	6,672	2,955	-	-	985,324	18,169	859
4a.1.1	Totals	101	8,972	4,734	2,194	1,286	23,960	273	14,557	56,076	56,076	-	-	37,648	37,905	3,455	950	203	5,909,593	63,465	5,318
Removal of Major Equipment																					
4a.1.2	Main Turbine/Generator	-	180	121	29	362	-	-	116	808	808	-	-	7,664	-	-	-	-	344,901	3,293	-
4a.1.3	Main Condensers	-	378	114	27	340	-	-	161	1,021	1,021	-	-	7,194	-	-	-	-	323,743	6,807	-
Cascading Costs from Clean Building Demolition																					
4a.1.4.1	Reactor Building	-	712	-	-	-	-	-	107	819	819	-	-	-	-	-	-	-	-	8,643	-
4a.1.4.2	Auxiliary Building	-	211	-	-	-	-	-	32	242	242	-	-	-	-	-	-	-	-	2,746	-
4a.1.4.3	Service Building & Addition	-	110	-	-	-	-	-	16	126	126	-	-	-	-	-	-	-	-	1,609	-
4a.1.4	Totals	-	1,033	-	-	-	-	-	155	1,188	1,188	-	-	-	-	-	-	-	-	12,998	-
Disposal of Plant Systems																					
4a.1.5.1	AUX-592-1_BRY	-	130	18	9	-	266	-	102	526	526	-	-	-	1,096	-	-	-	78,595	2,420	-
4a.1.5.2	AUX-592-1_PRO	-	768	10	24	296	-	-	241	1,339	1,339	-	-	6,947	-	-	-	-	282,113	14,546	-
4a.1.5.3	AUX-592-2_BRY	-	32	4	1	-	42	-	19	98	98	-	-	-	140	-	-	-	12,525	601	-
4a.1.5.4	AUX-592-2_PRO	-	50	2	4	48	-	-	20	123	123	-	-	1,123	-	-	-	-	45,613	894	-
4a.1.5.5	AUX-592-3_BRY	-	273	56	28	-	790	-	276	1,423	1,423	-	-	-	3,448	-	-	-	233,005	5,319	-
4a.1.5.6	AUX-592-3_PRO	-	118	3	6	77	-	-	42	246	246	-	-	1,805	-	-	-	-	73,290	2,235	-
4a.1.5.7	AUX-617-1_CLN	-	20	-	-	-	-	-	3	23	-	-	23	-	-	-	-	-	-	391	-
4a.1.5.8	AUX-617-2_CLN	-	239	-	-	-	-	-	36	275	-	-	275	-	-	-	-	-	-	4,727	-
4a.1.5.9	AUX-617-3_BRY	-	17	3	2	-	46	-	16	84	84	-	-	-	203	-	-	-	13,659	317	-
4a.1.5.10	AUX-617-3_PRO	-	583	7	17	214	-	-	181	1,002	1,002	-	-	5,012	-	-	-	-	203,536	10,995	-
4a.1.5.11	AUX-617-4_PRO	-	44	1	3	35	-	-	17	99	99	-	-	813	-	-	-	-	33,031	805	-
4a.1.5.12	AUX-617-5_BRY	-	3	1	1	-	16	-	5	25	25	-	-	-	52	-	-	-	4,673	59	-
4a.1.5.13	AUX-630-1_CLN	-	505	-	-	-	-	-	76	581	-	-	581	-	-	-	-	-	-	9,895	-
4a.1.5.14	AUX-642-1_CLN	-	413	-	-	-	-	-	62	475	-	-	475	-	-	-	-	-	-	8,094	-
4a.1.5.15	AUX-642-2_PRO	-	6	0	0	4	-	-	2	13	13	-	-	88	-	-	-	-	3,555	115	-
4a.1.5.16	AUX-654-1_PRO	-	151	2	5	62	-	-	48	268	268	-	-	1,446	-	-	-	-	58,719	2,925	-
4a.1.5.17	RX-592-2_BRY	-	326	25	16	-	460	-	201	1,029	1,029	-	-	-	1,513	-	-	-	135,756	5,985	-
4a.1.5.18	RX-592-2_PRO	-	253	5	11	141	-	-	87	498	498	-	-	3,318	-	-	-	-	134,751	4,656	-
4a.1.5.19	TB-560-1_CLN	-	532	-	-	-	-	-	80	612	-	-	612	-	-	-	-	-	-	10,577	-
4a.1.5.20	TB-560-1_PRO	-	981	50	118	1,462	-	-	487	3,098	3,098	-	-	34,292	-	-	-	-	1,392,636	18,581	-
4a.1.5.21	TB-592-1_CLN	-	491	-	-	-	-	-	74	565	-	-	565	-	-	-	-	-	-	9,843	-
4a.1.5.22	TB-592-1_PRO	-	1,102	34	81	1,002	-	-	441	2,661	2,661	-	-	23,507	-	-	-	-	954,629	20,684	-
4a.1.5.23	TB-592-2_CLN	-	573	-	-	-	-	-	86	659	-	-	659	-	-	-	-	-	-	11,370	-
4a.1.5.24	TB-592-2_PRO	-	185	4	8	104	-	-	63	364	364	-	-	2,443	-	-	-	-	99,218	3,336	-
4a.1.5.25	TB-592-3_CLN	-	538	-	-	-	-	-	81	619	-	-	619	-	-	-	-	-	-	10,710	-
4a.1.5.26	TB-592-3_PRO	-	348	11	25	311	-	-	138	832	832	-	-	7,284	-	-	-	-	295,813	6,478	-
4a.1.5.27	TB-617-1_CLN	-	530	-	-	-	-	-	80	610	-	-	610	-	-	-	-	-	-	10,626	-
4a.1.5.28	TB-617-1_PRO	-	1,185	55	129	1,607	-	-	562	3,538	3,538	-	-	37,687	-	-	-	-	1,530,477	22,452	-
4a.1.5.29	TB-617-2_CLN	-	187	-	-	-	-	-	28	215	-	-	215	-	-	-	-	-	-	3,737	-
4a.1.5.30	TB-617-2_PRO	-	350	17	41	506	-	-	171	1,085	1,085	-	-	11,858	-	-	-	-	481,578	6,598	-
4a.1.5.31	TB-617-3_CLN	-	753	-	-	-	-	-	113	866	-	-	866	-	-	-	-	-	-	15,047	-
4a.1.5.32	TB-617-3_PRO	-	683	16	38	478	-	-	250	1,466	1,466	-	-	11,219	-	-	-	-	455,590	12,336	-
4a.1.5.33	TB-642-1_CLN	-	243	-	-	-	-	-	36	280	-	-	280	-	-	-	-	-	-	4,815	-

Table D-1
Zion Nuclear Power Station Unit 1
Delayed DECON Decommissioning Cost Estimate
(Thousands of 2006 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
Disposal of Plant Systems (continued)																					
4a.1.5.34	TB-642-1_PRO	-	674	57	134	1,668	-	-	444	2,977	2,977	-	-	39,122	-	-	-	-	1,588,772	12,783	-
4a.1.5.35	TB-642-2_CLN	-	45	-	-	-	-	-	7	51	-	-	51	-	-	-	-	-	-	878	-
4a.1.5	Totals	-	13,331	380	701	8,015	1,621	-	4,576	28,625	22,794	-	5,830	187,964	6,453	-	-	-	8,111,535	255,832	-
4a.1.6	Scaffolding in support of decommissioning	-	922	9	2	23	9	-	237	1,203	1,203	-	-	493	31	-	-	-	24,921	18,950	-
4a.1	Subtotal Period 4a Activity Costs	101	24,816	5,357	2,954	10,027	25,590	273	19,802	88,920	83,090	-	5,830	240,964	44,389	3,455	950	203	14,714,690	361,346	5,318
Period 4a Additional Costs																					
4a.2.1	Curie Surcharge (excluding RPV)	-	-	-	-	-	91	-	23	114	114	-	-	-	-	-	-	-	-	-	-
4a.2	Subtotal Period 4a Additional Costs	-	-	-	-	-	91	-	23	114	114	-	-	-	-	-	-	-	-	-	-
Period 4a Collateral Costs																					
4a.3.1	Process liquid waste	24	-	9	41	-	27	-	26	126	126	-	-	-	163	-	-	-	8,018	36	-
4a.3.2	Small tool allowance	-	302	-	-	-	-	-	45	347	312	-	35	-	-	-	-	-	-	-	-
4a.3	Subtotal Period 4a Collateral Costs	24	302	9	41	-	27	-	71	473	438	-	35	-	163	-	-	-	8,018	36	-
Period 4a Period-Dependent Costs																					
4a.4.1	Decon supplies	50	-	-	-	-	-	-	13	63	63	-	-	-	-	-	-	-	-	-	-
4a.4.2	Insurance	-	-	-	-	-	-	194	19	214	214	-	-	-	-	-	-	-	-	-	-
4a.4.3	Property taxes	-	-	-	-	-	-	560	56	616	554	-	62	-	-	-	-	-	-	-	-
4a.4.4	Health physics supplies	-	1,573	-	-	-	-	-	393	1,966	1,966	-	-	-	-	-	-	-	-	-	-
4a.4.5	Heavy equipment rental	-	1,848	-	-	-	-	-	277	2,125	2,125	-	-	-	-	-	-	-	-	-	-
4a.4.6	Disposal of DAW generated	-	-	87	41	-	262	-	80	470	470	-	-	-	4,717	-	-	-	94,516	1,158	-
4a.4.7	Plant energy budget	-	-	-	-	-	-	1,063	159	1,223	1,223	-	-	-	-	-	-	-	-	-	-
4a.4.8	NRC Fees	-	-	-	-	-	-	385	39	424	424	-	-	-	-	-	-	-	-	-	-
4a.4.9	Site O&M Cost	-	-	-	-	-	-	140	21	161	161	-	-	-	-	-	-	-	-	-	-
4a.4.10	Radwaste Processing Equipment/Services	-	-	-	-	-	-	409	61	471	471	-	-	-	-	-	-	-	-	-	-
4a.4.11	Security Staff Cost	-	-	-	-	-	-	2,424	364	2,787	2,787	-	-	-	-	-	-	-	-	-	67,614
4a.4.12	DOC Staff Cost	-	-	-	-	-	-	12,093	1,814	13,907	13,907	-	-	-	-	-	-	-	-	-	176,898
4a.4.13	Utility Staff Cost	-	-	-	-	-	-	17,733	2,660	20,393	20,393	-	-	-	-	-	-	-	-	-	299,435
4a.4	Subtotal Period 4a Period-Dependent Costs	50	3,421	87	41	-	262	35,002	5,957	44,819	44,757	-	62	-	4,717	-	-	-	94,516	1,158	543,947
4a.0	TOTAL PERIOD 4a COST	175	28,539	5,453	3,036	10,027	25,971	35,274	25,853	134,327	128,400	-	5,927	240,964	49,268	3,455	950	203	14,817,230	362,540	549,264
PERIOD 4b - Site Decontamination																					
Period 4b Direct Decommissioning Activities																					
4b.1.1	Remove spent fuel racks	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Disposal of Plant Systems																					
4b.1.2.1	AUX-542-1_BRY	-	127	11	6	-	168	-	76	387	387	-	-	-	552	-	-	-	49,471	2,294	-
4b.1.2.2	AUX-542-1_PRO	-	501	9	21	265	-	-	169	966	966	-	-	6,224	-	-	-	-	252,763	9,446	-
4b.1.2.3	AUX-542-2_BRY	-	141	36	23	-	662	-	208	1,069	1,069	-	-	-	2,176	-	-	-	195,234	2,723	-
4b.1.2.4	AUX-542-2_PRO	-	364	9	20	253	-	-	133	779	779	-	-	5,931	-	-	-	-	240,844	6,871	-
4b.1.2.5	AUX-542-3_BRY	-	128	24	12	-	346	-	123	633	633	-	-	-	1,493	-	-	-	101,952	2,439	-
4b.1.2.6	AUX-542-3_PRO	-	36	1	1	15	-	-	11	64	64	-	-	358	-	-	-	-	14,551	616	-
4b.1.2.7	AUX-560-1_BRY	-	14	1	1	-	17	-	8	40	40	-	-	-	56	-	-	-	5,002	235	-
4b.1.2.8	AUX-560-1_PRO	-	1,009	19	44	546	-	-	342	1,959	1,959	-	-	12,794	-	-	-	-	519,581	18,898	-
4b.1.2.9	AUX-560-2_BRY	-	70	12	7	-	203	-	71	363	363	-	-	-	668	-	-	-	59,933	1,304	-
4b.1.2.10	AUX-560-2_PRO	-	555	18	42	524	-	-	225	1,364	1,364	-	-	12,285	-	-	-	-	498,917	10,474	-
4b.1.2.11	AUX-579-1_BRY	-	61	6	3	-	94	-	40	203	203	-	-	-	310	-	-	-	27,770	1,112	-
4b.1.2.12	AUX-579-1_PRO	-	650	10	23	284	-	-	210	1,177	1,177	-	-	6,668	-	-	-	-	270,810	12,291	-
4b.1.2.13	AUX-579-2_BRY	-	89	9	6	-	158	-	64	325	325	-	-	-	520	-	-	-	46,627	1,624	-
4b.1.2.14	AUX-579-2_PRO	-	250	4	9	117	-	-	82	462	462	-	-	2,739	-	-	-	-	111,231	4,677	-
4b.1.2.15	AUX-579-3_BRY	-	33	8	4	-	108	-	37	189	189	-	-	-	464	-	-	-	31,754	656	-
4b.1.2.16	AUX-579-3_PRO	-	104	2	6	72	-	-	38	223	223	-	-	1,697	-	-	-	-	68,920	1,984	-
4b.1.2.17	AUX.BLDG-VPC_BRY	-	66	6	4	-	102	-	43	220	220	-	-	-	335	-	-	-	30,014	1,186	-
4b.1.2.18	AUX.BLDG-VPC_PRO	-	466	7	18	221	-	-	153	865	865	-	-	5,178	-	-	-	-	210,270	8,787	-

Table D-1
Zion Nuclear Power Station Unit 1
Delayed DECON Decommissioning Cost Estimate
(Thousands of 2006 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
Disposal of Plant Systems (continued)																					
4b.1.2.19	DG-567-1_CLN	-	77	-	-	-	-	-	12	89	-	-	89	-	-	-	-	-	-	1,501	-
4b.1.2.20	DG-592-1_CLN	-	85	-	-	-	-	-	13	98	-	-	98	-	-	-	-	-	-	1,664	-
4b.1.2.21	DG-617-1_CLN	-	68	-	-	-	-	-	10	78	-	-	78	-	-	-	-	-	-	1,342	-
4b.1.2.22	PT-570-1_PRO	-	255	11	26	327	-	-	118	736	736	-	-	7,659	-	-	-	-	311,055	4,791	-
4b.1.2.23	RX-568-1_BRY	-	946	96	65	-	1,851	-	718	3,676	3,676	-	-	-	6,115	-	-	-	546,003	18,135	-
4b.1.2.24	RX-568-1_PRO	-	442	13	32	394	-	-	176	1,057	1,057	-	-	9,250	-	-	-	-	375,629	8,107	-
4b.1.2.25	RX-592-1_BRY	-	468	38	23	-	662	-	290	1,482	1,482	-	-	-	2,179	-	-	-	195,415	8,708	-
4b.1.2.26	RX-592-1_PRO	-	573	17	39	490	-	-	224	1,343	1,343	-	-	11,487	-	-	-	-	466,506	10,562	-
4b.1.2.27	RX-617-1_BRY	-	667	47	32	-	912	-	404	2,062	2,062	-	-	-	2,997	-	-	-	268,935	12,803	-
4b.1.2.28	RX-617-1_PRO	-	770	19	45	557	-	-	285	1,676	1,676	-	-	13,073	-	-	-	-	530,899	14,245	-
4b.1.2	Totals	-	9,014	432	512	4,066	5,282	-	4,281	23,586	23,321	-	265	95,344	17,864	-	-	-	5,430,084	169,475	-
4b.1.3	Scaffolding in support of decommissioning	-	1,383	13	3	35	14	-	356	1,804	1,804	-	-	739	46	-	-	-	37,381	28,425	-
Decontamination of Site Buildings																					
4b.1.4.1	Reactor Building	1,017	880	103	101	268	1,649	-	1,207	5,226	5,226	-	-	6,296	6,026	-	-	-	792,395	34,938	-
4b.1.4.2	Auxiliary Building	556	340	22	25	51	324	-	458	1,776	1,776	-	-	1,204	1,294	-	-	-	164,812	16,512	-
4b.1.4.3	Contaminated Soil	-	36	870	940	-	13,972	-	3,730	19,548	19,548	-	-	-	56,015	-	-	-	5,026,005	2,858	-
4b.1.4.4	Service Building & Addition	38	1	0	0	-	5	-	20	64	64	-	-	-	18	-	-	-	1,635	638	-
4b.1.4	Totals	1,611	1,256	995	1,067	320	15,950	-	5,415	26,614	26,614	-	-	7,499	63,353	-	-	-	5,984,847	54,946	-
4b.1	Subtotal Period 4b Activity Costs	1,611	11,653	1,440	1,582	4,420	21,246	-	10,052	52,004	51,739	-	265	103,583	81,263	-	-	-	11,452,310	252,846	-
Period 4b Collateral Costs																					
4b.3.1	Process liquid waste	43	-	16	74	-	49	-	47	229	229	-	-	-	297	-	-	-	14,593	66	-
4b.3.2	Small tool allowance	-	215	-	-	-	-	-	32	247	247	-	-	-	-	-	-	-	-	-	-
4b.3.3	Decommissioning Equipment Disposition	-	-	101	32	284	114	-	86	616	616	-	-	6,000	373	-	-	-	303,507	739	-
4b.3	Subtotal Period 4b Collateral Costs	43	215	117	106	284	163	-	165	1,092	1,092	-	-	6,000	670	-	-	-	318,100	805	-
Period 4b Period-Dependent Costs																					
4b.4.1	Decon supplies	582	-	-	-	-	-	-	146	728	728	-	-	-	-	-	-	-	-	-	-
4b.4.2	Insurance	-	-	-	-	-	-	249	25	274	274	-	-	-	-	-	-	-	-	-	-
4b.4.3	Property taxes	-	-	-	-	-	-	716	72	788	788	-	-	-	-	-	-	-	-	-	-
4b.4.4	Health physics supplies	-	1,271	-	-	-	-	-	318	1,589	1,589	-	-	-	-	-	-	-	-	-	-
4b.4.5	Heavy equipment rental	-	2,377	-	-	-	-	-	357	2,734	2,734	-	-	-	-	-	-	-	-	-	-
4b.4.6	Disposal of DAW generated	-	-	83	39	-	251	-	77	450	450	-	-	-	4,517	-	-	-	90,512	1,109	-
4b.4.7	Plant energy budget	-	-	-	-	-	-	1,073	161	1,234	1,234	-	-	-	-	-	-	-	-	-	-
4b.4.8	NRC Fees	-	-	-	-	-	-	493	49	542	542	-	-	-	-	-	-	-	-	-	-
4b.4.9	Site O&M Cost	-	-	-	-	-	-	179	27	206	206	-	-	-	-	-	-	-	-	-	-
4b.4.10	Radwaste Processing Equipment/Services	-	-	-	-	-	-	523	78	602	602	-	-	-	-	-	-	-	-	-	-
4b.4.11	Security Staff Cost	-	-	-	-	-	-	1,768	265	2,033	2,033	-	-	-	-	-	-	-	-	-	49,311
4b.4.12	DOC Staff Cost	-	-	-	-	-	-	10,726	1,609	12,335	12,335	-	-	-	-	-	-	-	-	-	161,383
4b.4.13	Utility Staff Cost	-	-	-	-	-	-	15,356	2,303	17,660	17,660	-	-	-	-	-	-	-	-	-	268,971
4b.4	Subtotal Period 4b Period-Dependent Costs	582	3,649	83	39	-	251	31,083	5,486	41,173	41,173	-	-	-	4,517	-	-	-	90,512	1,109	479,666
4b.0	TOTAL PERIOD 4b COST	2,237	15,516	1,640	1,726	4,704	21,660	31,083	15,703	94,269	94,005	-	265	109,583	86,450	-	-	-	11,860,920	254,760	479,666
PERIOD 4d - Delay before License Termination																					
Period 4d Direct Decommissioning Activities																					
Period 4d Collateral Costs																					
4d.3	Subtotal Period 4d Collateral Costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table D-1
Zion Nuclear Power Station Unit 1
Delayed DECON Decommissioning Cost Estimate
(Thousands of 2006 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
Period 4d Period-Dependent Costs																					
4d.4.1	Insurance	-	-	-	-	-	-	32	3	36	36	-	-	-	-	-	-	-	-	-	-
4d.4.2	Property taxes	-	-	-	-	-	-	323	32	355	355	-	-	-	-	-	-	-	-	-	-
4d.4.3	Health physics supplies	-	42	-	-	-	-	-	10	52	52	-	-	-	-	-	-	-	-	-	-
4d.4.4	Disposal of DAW generated	-	-	1	1	-	4	-	1	7	7	-	-	-	71	-	-	-	1,431	18	-
4d.4.5	Plant energy budget	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4d.4.6	NRC Fees	-	-	-	-	-	-	139	14	153	153	-	-	-	-	-	-	-	-	-	-
4d.4.7	Site O&M Cost	-	-	-	-	-	-	81	12	93	93	-	-	-	-	-	-	-	-	-	-
4d.4.8	Security Staff Cost	-	-	-	-	-	-	48	7	56	56	-	-	-	-	-	-	-	-	-	1,349
4d.4.9	Utility Staff Cost	-	-	-	-	-	-	550	82	632	632	-	-	-	-	-	-	-	-	-	9,440
4d.4	Subtotal Period 4d Period-Dependent Costs	-	42	1	1	-	4	1,174	163	1,385	1,385	-	-	-	71	-	-	-	1,431	18	10,789
4d.0	TOTAL PERIOD 4d COST	-	42	1	1	-	4	1,174	163	1,385	1,385	-	-	-	71	-	-	-	1,431	18	10,789
PERIOD 4e - License Termination																					
Period 4e Direct Decommissioning Activities																					
4e.1.1	ORISE confirmatory survey	-	-	-	-	-	-	140	42	183	183	-	-	-	-	-	-	-	-	-	-
4e.1.2	Terminate license									a											
4e.1	Subtotal Period 4e Activity Costs	-	-	-	-	-	-	140	42	183	183	-	-	-	-	-	-	-	-	-	-
Period 4e Additional Costs																					
4e.2.1	Final Site Survey	-	-	-	-	-	-	8,655	2,597	11,252	11,252	-	-	-	-	-	-	-	-	164,765	-
4e.2	Subtotal Period 4e Additional Costs	-	-	-	-	-	-	8,655	2,597	11,252	11,252	-	-	-	-	-	-	-	-	164,765	-
Period 4e Collateral Costs																					
4e.3.1	DOC staff relocation expenses	-	-	-	-	-	-	829	124	953	953	-	-	-	-	-	-	-	-	-	-
4e.3	Subtotal Period 4e Collateral Costs	-	-	-	-	-	-	829	124	953	953	-	-	-	-	-	-	-	-	-	-
Period 4e Period-Dependent Costs																					
4e.4.1	Insurance	-	-	-	-	-	-	38	4	42	42	-	-	-	-	-	-	-	-	-	-
4e.4.2	Property taxes	-	-	-	-	-	-	382	38	420	420	-	-	-	-	-	-	-	-	-	-
4e.4.3	Health physics supplies	-	783	-	-	-	-	-	196	978	978	-	-	-	-	-	-	-	-	-	-
4e.4.4	Disposal of DAW generated	-	-	7	3	-	21	-	6	38	38	-	-	-	377	-	-	-	7,553	93	-
4e.4.5	Plant energy budget	-	-	-	-	-	-	153	23	176	176	-	-	-	-	-	-	-	-	-	-
4e.4.6	NRC Fees	-	-	-	-	-	-	263	26	289	289	-	-	-	-	-	-	-	-	-	-
4e.4.7	Site O&M Cost	-	-	-	-	-	-	95	14	110	110	-	-	-	-	-	-	-	-	-	-
4e.4.8	Security Staff Cost	-	-	-	-	-	-	450	68	518	518	-	-	-	-	-	-	-	-	-	12,563
4e.4.9	DOC Staff Cost	-	-	-	-	-	-	3,340	501	3,841	3,841	-	-	-	-	-	-	-	-	-	47,430
4e.4.10	Utility Staff Cost	-	-	-	-	-	-	3,764	565	4,329	4,329	-	-	-	-	-	-	-	-	-	58,590
4e.4	Subtotal Period 4e Period-Dependent Costs	-	783	7	3	-	21	8,485	1,441	10,740	10,740	-	-	-	377	-	-	-	7,553	93	118,583
4e.0	TOTAL PERIOD 4e COST	-	783	7	3	-	21	18,110	4,204	23,128	23,128	-	-	-	377	-	-	-	7,553	164,858	118,583
PERIOD 4 TOTALS		2,412	44,880	7,101	4,766	14,730	47,656	85,641	45,922	253,108	246,917	-	6,191	350,546	136,167	3,455	950	203	26,687,130	782,176	1,158,301
PERIOD 5b - Site Restoration																					
Period 5b Direct Decommissioning Activities																					
Demolition of Remaining Site Buildings																					
5b.1.1.1	Reactor Building	-	4,151	-	-	-	-	-	623	4,774	-	-	4,774	-	-	-	-	-	-	49,418	-
5b.1.1.2	Auxiliary Building	-	1,895	-	-	-	-	-	284	2,179	-	-	2,179	-	-	-	-	-	-	24,718	-
5b.1.1.3	Crib House	-	644	-	-	-	-	-	97	741	-	-	741	-	-	-	-	-	-	7,389	-
5b.1.1.4	Diesel Generator Building	-	328	-	-	-	-	-	49	377	-	-	377	-	-	-	-	-	-	4,557	-
5b.1.1.5	Discharge Tunnel Outfall	-	154	-	-	-	-	-	23	177	-	-	177	-	-	-	-	-	-	2,192	-
5b.1.1.6	Service Building & Addition	-	1,025	-	-	-	-	-	154	1,179	-	-	1,179	-	-	-	-	-	-	15,231	-
5b.1.1.7	Turbine Building	-	1,835	-	-	-	-	-	275	2,110	-	-	2,110	-	-	-	-	-	-	26,135	-
5b.1.1.8	Turbine Pedestal	-	1,759	-	-	-	-	-	264	2,023	-	-	2,023	-	-	-	-	-	-	19,735	-
5b.1.1	Totals	-	11,792	-	-	-	-	-	1,769	13,561	-	-	13,561	-	-	-	-	-	-	149,376	-

Table D-1
Zion Nuclear Power Station Unit 1
Delayed DECON Decommissioning Cost Estimate
(Thousands of 2006 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
Site Closeout Activities																					
5b.1.2	Grade & landscape site	-	44	-	-	-	-	-	7	50	-	-	50	-	-	-	-	-	-	132	-
5b.1.3	Final report to NRC	-	-	-	-	-	-	147	22	169	169	-	-	-	-	-	-	-	-	-	1,560
5b.1	Subtotal Period 5b Activity Costs	-	11,836	-	-	-	-	147	1,797	13,781	169	-	13,611	-	-	-	-	-	-	149,508	1,560
Period 5b Additional Costs																					
5b.2.1	Concrete Crushing	-	406	-	-	-	-	3	61	470	-	-	470	-	-	-	-	-	-	2,258	-
5b.2	Subtotal Period 5b Additional Costs	-	406	-	-	-	-	3	61	470	-	-	470	-	-	-	-	-	-	2,258	-
Period 5b Collateral Costs																					
5b.3.1	Small tool allowance	-	141	-	-	-	-	-	21	162	-	-	162	-	-	-	-	-	-	-	-
5b.3	Subtotal Period 5b Collateral Costs	-	141	-	-	-	-	-	21	162	-	-	162	-	-	-	-	-	-	-	-
Period 5b Period-Dependent Costs																					
5b.4.1	Insurance	-	-	-	-	-	-	104	10	114	-	-	114	-	-	-	-	-	-	-	-
5b.4.2	Property taxes	-	-	-	-	-	-	1,040	104	1,144	-	-	1,144	-	-	-	-	-	-	-	-
5b.4.3	Heavy equipment rental	-	4,704	-	-	-	-	-	706	5,409	-	-	5,409	-	-	-	-	-	-	-	-
5b.4.4	Plant energy budget	-	-	-	-	-	-	208	31	239	-	-	239	-	-	-	-	-	-	-	-
5b.4.5	Site O&M Cost	-	-	-	-	-	-	260	39	299	-	-	299	-	-	-	-	-	-	-	-
5b.4.6	Security Staff Cost	-	-	-	-	-	-	1,148	172	1,320	-	-	1,320	-	-	-	-	-	-	-	32,050
5b.4.7	DOC Staff Cost	-	-	-	-	-	-	9,833	1,475	11,308	-	-	11,308	-	-	-	-	-	-	-	137,886
5b.4.8	Utility Staff Cost	-	-	-	-	-	-	4,928	739	5,667	-	-	5,667	-	-	-	-	-	-	-	78,171
5b.4	Subtotal Period 5b Period-Dependent Costs	-	4,704	-	-	-	-	17,521	3,277	25,501	-	-	25,501	-	-	-	-	-	-	-	248,107
5b.0	TOTAL PERIOD 5b COST	-	17,086	-	-	-	-	17,672	5,156	39,914	169	-	39,745	-	-	-	-	-	-	151,766	249,667
PERIOD 5 TOTALS		-	17,086	-	-	-	-	17,672	5,156	39,914	169	-	39,745	-	-	-	-	-	-	151,766	249,667
TOTAL COST TO DECOMMISSION		3,171	71,370	7,163	5,469	14,730	51,388	308,827	63,073	525,192	320,531	157,528	47,133	350,546	234,287	3,455	950	203	28,029,490	1,036,098	2,041,229

TOTAL COST TO DECOMMISSION WITH 13.65% CONTINGENCY:	**$525,192**	**thousands of 2006 dollars**
TOTAL NRC LICENSE TERMINATION COST IS 61.03% OR:	**$320,531**	**thousands of 2006 dollars**
SPENT FUEL MANAGEMENT COST IS 29.99% OR:	**$157,528**	**thousands of 2006 dollars**
NON-NUCLEAR DEMOLITION COST IS 8.97% OR:	**$47,133**	**thousands of 2006 dollars**
TOTAL PRIMARY SITE RADWASTE VOLUME BURIED:	**70,481**	**Cubic Feet**
TOTAL SECONDARY SITE RADWASTE VOLUME BURIED:	**168,211**	**Cubic Feet**
TOTAL TERTIARY SITE RADWASTE VOLUME BURIED:		**Cubic Feet**
TOTAL GREATER THAN CLASS C RADWASTE VOLUME GENERATED:	**203**	**Cubic Feet**
TOTAL SCRAP METAL REMOVED:	**41,133**	**Tons**
TOTAL CRAFT LABOR REQUIREMENTS:	**1,036,098**	**Man-hours**

End Notes:
n/a - indicates that this activity not charged as decommissioning expense.
a - indicates that this activity performed by decommissioning staff.
0 - indicates that this value is less than 0.5 but is non-zero.
a cell containing " - " indicates a zero value

Table D-2
Zion Nuclear Power Station Unit 2
Delayed DECON Decommissioning Cost Estimate
(Thousands of 2006 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes: Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
	2006-2029 Decommissioning Expenditures	-	-	-	-	-	-	151,681	-	151,681	-	151,681	-	-	-	-	-	-	-	-	-
	Spent Fuel Capital and Transfer	-	-	-	-	-	-	8,750	1,313	10,063	-	10,063	-	-	-	-	-	-	-	-	-
PERIOD 3a - Reactivate Site Following SAFSTOR Dormancy																					
Period 3a Direct Decommissioning Activities																					
3a.1.1	Prepare preliminary decommissioning cost	-	-	-	-	-	-	53	8	60	60	-	-	-	-	-	-	-	-	-	556
3a.1.2	Review plant dwgs & specs.	-	-	-	-	-	-	186	28	214	214	-	-	-	-	-	-	-	-	-	1,967
3a.1.3	Perform detailed rad survey									a											
3a.1.4	End product description	-	-	-	-	-	-	40	6	46	46	-	-	-	-	-	-	-	-	-	428
3a.1.5	Detailed by-product inventory	-	-	-	-	-	-	53	8	60	60	-	-	-	-	-	-	-	-	-	556
3a.1.6	Define major work sequence	-	-	-	-	-	-	303	45	348	348	-	-	-	-	-	-	-	-	-	3,207
3a.1.7	Perform SER and EA	-	-	-	-	-	-	125	19	144	144	-	-	-	-	-	-	-	-	-	1,326
3a.1.8	Perform Site-Specific Cost Study	-	-	-	-	-	-	202	30	232	232	-	-	-	-	-	-	-	-	-	2,138
3a.1.9	Prepare/submit License Termination Plan	-	-	-	-	-	-	165	25	190	190	-	-	-	-	-	-	-	-	-	1,751
3a.1.10	Receive NRC approval of termination plan									a											
Activity Specifications																					
3a.1.11.1	Re-activate plant & temporary facilities	-	-	-	-	-	-	298	45	342	308	-	34	-	-	-	-	-	-	-	3,151
3a.1.11.2	Plant systems	-	-	-	-	-	-	168	25	194	174	-	19	-	-	-	-	-	-	-	1,782
3a.1.11.3	Reactor internals	-	-	-	-	-	-	287	43	330	330	-	-	-	-	-	-	-	-	-	3,036
3a.1.11.4	Reactor vessel	-	-	-	-	-	-	263	39	302	302	-	-	-	-	-	-	-	-	-	2,779
3a.1.11.5	Biological shield	-	-	-	-	-	-	20	3	23	23	-	-	-	-	-	-	-	-	-	214
3a.1.11.6	Steam generators	-	-	-	-	-	-	126	19	145	145	-	-	-	-	-	-	-	-	-	1,334
3a.1.11.7	Reinforced concrete	-	-	-	-	-	-	65	10	74	37	-	37	-	-	-	-	-	-	-	684
3a.1.11.8	Main Turbine	-	-	-	-	-	-	16	2	19	-	-	19	-	-	-	-	-	-	-	171
3a.1.11.9	Main Condensers	-	-	-	-	-	-	16	2	19	-	-	19	-	-	-	-	-	-	-	171
3a.1.11.10	Plant structures & buildings	-	-	-	-	-	-	126	19	145	72	-	72	-	-	-	-	-	-	-	1,334
3a.1.11.11	Waste management	-	-	-	-	-	-	186	28	214	214	-	-	-	-	-	-	-	-	-	1,967
3a.1.11.12	Facility & site closeout	-	-	-	-	-	-	36	5	42	21	-	21	-	-	-	-	-	-	-	385
3a.1.11	Total	-	-	-	-	-	-	1,607	241	1,848	1,626	-	221	-	-	-	-	-	-	-	17,009
Planning & Site Preparations																					
3a.1.12	Prepare dismantling sequence	-	-	-	-	-	-	97	15	111	111	-	-	-	-	-	-	-	-	-	1,026
3a.1.13	Plant prep. & temp. svces	-	-	-	-	-	-	2,419	363	2,782	2,782	-	-	-	-	-	-	-	-	-	-
3a.1.14	Design water clean-up system	-	-	-	-	-	-	57	8	65	65	-	-	-	-	-	-	-	-	-	599
3a.1.15	Rigging/Cont. Cntrl Envlps/tooling/etc.	-	-	-	-	-	-	2,048	307	2,355	2,355	-	-	-	-	-	-	-	-	-	-
3a.1.16	Procure casks/liners & containers	-	-	-	-	-	-	50	7	57	57	-	-	-	-	-	-	-	-	-	526
3a.1	Subtotal Period 3a Activity Costs	-	-	-	-	-	-	7,403	1,111	8,514	8,293	-	221	-	-	-	-	-	-	-	31,088
Period 3a Collateral Costs																					
3a.3	Subtotal Period 3a Collateral Costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Period 3a Period-Dependent Costs																					
3a.4.1	Insurance	-	-	-	-	-	-	161	16	177	177	-	-	-	-	-	-	-	-	-	-
3a.4.2	Property taxes	-	-	-	-	-	-	500	50	550	550	-	-	-	-	-	-	-	-	-	-
3a.4.3	Health physics supplies	-	259	-	-	-	-	-	65	324	324	-	-	-	-	-	-	-	-	-	-
3a.4.4	Heavy equipment rental	-	334	-	-	-	-	-	50	384	384	-	-	-	-	-	-	-	-	-	-
3a.4.5	Disposal of DAW generated	-	-	10	5	-	30	-	9	54	54	-	-	-	538	-	-	-	10,777	132	-
3a.4.6	Plant energy budget	-	-	-	-	-	-	999	150	1,148	1,148	-	-	-	-	-	-	-	-	-	-
3a.4.7	NRC Fees	-	-	-	-	-	-	258	26	284	284	-	-	-	-	-	-	-	-	-	-
3a.4.8	Site O&M Cost	-	-	-	-	-	-	125	19	144	144	-	-	-	-	-	-	-	-	-	-
3a.4.9	Security Staff Cost	-	-	-	-	-	-	654	98	752	752	-	-	-	-	-	-	-	-	-	18,250
3a.4.10	Utility Staff Cost	-	-	-	-	-	-	11,915	1,787	13,703	13,703	-	-	-	-	-	-	-	-	-	208,571
3a.4	Subtotal Period 3a Period-Dependent Costs	-	593	10	5	-	30	14,612	2,270	17,520	17,520	-	-	-	538	-	-	-	10,777	132	226,821
3a.0	TOTAL PERIOD 3a COST	-	593	10	5	-	30	22,016	3,380	26,034	25,813	-	221	-	538	-	-	-	10,777	132	257,909

Table D-2
Zion Nuclear Power Station Unit 2
Delayed DECON Decommissioning Cost Estimate
(Thousands of 2006 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
PERIOD 3b - Decommissioning Preparations																					
Period 3b Direct Decommissioning Activities																					
Detailed Work Procedures																					
3b.1.1.1	Plant systems	-	-	-	-	-	-	191	29	220	198	-	22	-	-	-	-	-	-	-	2,024
3b.1.1.2	Reactor internals	-	-	-	-	-	-	101	15	116	116	-	-	-	-	-	-	-	-	-	1,069
3b.1.1.3	Remaining buildings	-	-	-	-	-	-	55	8	63	16	-	47	-	-	-	-	-	-	-	577
3b.1.1.4	CRD cooling assembly	-	-	-	-	-	-	40	6	46	46	-	-	-	-	-	-	-	-	-	428
3b.1.1.5	CRD housings & ICI tubes	-	-	-	-	-	-	40	6	46	46	-	-	-	-	-	-	-	-	-	428
3b.1.1.6	Incore instrumentation	-	-	-	-	-	-	40	6	46	46	-	-	-	-	-	-	-	-	-	428
3b.1.1.7	Reactor vessel	-	-	-	-	-	-	147	22	169	169	-	-	-	-	-	-	-	-	-	1,552
3b.1.1.8	Facility closeout	-	-	-	-	-	-	48	7	56	28	-	28	-	-	-	-	-	-	-	513
3b.1.1.9	Missile shields	-	-	-	-	-	-	18	3	21	21	-	-	-	-	-	-	-	-	-	192
3b.1.1.10	Biological shield	-	-	-	-	-	-	48	7	56	56	-	-	-	-	-	-	-	-	-	513
3b.1.1.11	Steam generators	-	-	-	-	-	-	186	28	214	214	-	-	-	-	-	-	-	-	-	1,967
3b.1.1.12	Reinforced concrete	-	-	-	-	-	-	40	6	46	23	-	23	-	-	-	-	-	-	-	428
3b.1.1.13	Main Turbine	-	-	-	-	-	-	63	9	72	-	-	72	-	-	-	-	-	-	-	667
3b.1.1.14	Main Condensers	-	-	-	-	-	-	63	9	72	-	-	72	-	-	-	-	-	-	-	667
3b.1.1.15	Auxiliary building	-	-	-	-	-	-	110	17	127	114	-	13	-	-	-	-	-	-	-	1,167
3b.1.1.16	Reactor building	-	-	-	-	-	-	110	17	127	114	-	13	-	-	-	-	-	-	-	1,167
3b.1.1	Total	-	-	-	-	-	-	1,302	195	1,498	1,207	-	290	-	-	-	-	-	-	-	13,787
3b.1	Subtotal Period 3b Activity Costs	-	-	-	-	-	-	1,302	195	1,498	1,207	-	290	-	-	-	-	-	-	-	13,787
Period 3b Additional Costs																					
3b.2.1	Site Characterization	-	-	-	-	-	-	496	74	570	570	-	-	-	-	-	-	-	-	-	-
3b.2.2	Clean Asbestos Remediation	-	4,101	34	524	-	2,739	-	1,792	9,190	9,190	-	-	-	73,458	-	-	-	985,174	60,916	-
3b.2.3	Contaminated Asbestos Remediation	-	3,553	17	262	-	1,326	-	1,261	6,419	6,419	-	-	-	36,698	-	-	-	477,074	49,815	-
3b.2	Subtotal Period 3b Additional Costs	-	7,654	51	786	-	4,065	496	3,127	16,179	16,179	-	-	-	110,156	-	-	-	1,462,248	110,731	-
Period 3b Collateral Costs																					
3b.3.1	Decon equipment	737	-	-	-	-	-	-	111	847	847	-	-	-	-	-	-	-	-	-	-
3b.3.2	DOC staff relocation expenses	-	-	-	-	-	-	829	124	953	953	-	-	-	-	-	-	-	-	-	-
3b.3.3	Small tool allowance	-	109	-	-	-	-	-	16	125	125	-	-	-	-	-	-	-	-	-	-
3b.3.4	Pipe cutting equipment	-	957	-	-	-	-	-	143	1,100	1,100	-	-	-	-	-	-	-	-	-	-
3b.3	Subtotal Period 3b Collateral Costs	737	1,065	-	-	-	-	829	395	3,025	3,025	-	-	-	-	-	-	-	-	-	-
Period 3b Period-Dependent Costs																					
3b.4.1	Decon supplies	23	-	-	-	-	-	-	6	28	28	-	-	-	-	-	-	-	-	-	-
3b.4.2	Insurance	-	-	-	-	-	-	87	9	96	96	-	-	-	-	-	-	-	-	-	-
3b.4.3	Property taxes	-	-	-	-	-	-	251	25	276	276	-	-	-	-	-	-	-	-	-	-
3b.4.4	Health physics supplies	-	523	-	-	-	-	-	131	654	654	-	-	-	-	-	-	-	-	-	-
3b.4.5	Heavy equipment rental	-	168	-	-	-	-	-	25	193	193	-	-	-	-	-	-	-	-	-	-
3b.4.6	Disposal of DAW generated	-	-	6	3	-	17	-	5	30	30	-	-	-	300	-	-	-	6,007	74	-
3b.4.7	Plant energy budget	-	-	-	-	-	-	501	75	576	576	-	-	-	-	-	-	-	-	-	-
3b.4.8	NRC Fees	-	-	-	-	-	-	130	13	143	143	-	-	-	-	-	-	-	-	-	-
3b.4.9	Site O&M Cost	-	-	-	-	-	-	63	9	72	72	-	-	-	-	-	-	-	-	-	-
3b.4.10	Security Staff Cost	-	-	-	-	-	-	328	49	377	377	-	-	-	-	-	-	-	-	-	9,150
3b.4.11	DOC Staff Cost	-	-	-	-	-	-	3,134	470	3,604	3,604	-	-	-	-	-	-	-	-	-	47,057
3b.4.12	Utility Staff Cost	-	-	-	-	-	-	5,974	896	6,870	6,870	-	-	-	-	-	-	-	-	-	104,571
3b.4	Subtotal Period 3b Period-Dependent Costs	23	690	6	3	-	17	10,466	1,713	12,917	12,917	-	-	-	300	-	-	-	6,007	74	160,779
3b.0	TOTAL PERIOD 3b COST	759	9,410	57	788	-	4,082	13,093	5,430	33,620	33,329	-	290	-	110,456	-	-	-	1,468,255	110,805	174,566
PERIOD 3 TOTALS		759	10,003	67	793	-	4,112	35,109	8,811	59,654	59,142	-	512	-	110,994	-	-	-	1,479,032	110,937	432,475

Table D-2
Zion Nuclear Power Station Unit 2
Delayed DECON Decommissioning Cost Estimate
(Thousands of 2006 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
PERIOD 4a - Large Component Removal																					
Period 4a Direct Decommissioning Activities																					
Nuclear Steam Supply System Removal																					
4a.1.1.1	Reactor Coolant Piping	43	148	34	22	-	848	-	277	1,372	1,372	-	-	-	2,068	-	-	-	250,088	3,718	-
4a.1.1.2	Pressurizer Relief Tank	6	22	5	3	-	124	-	40	201	201	-	-	-	329	-	-	-	36,571	543	-
4a.1.1.3	Reactor Coolant Pumps & Motors	19	76	52	5	58	2,420	-	648	3,278	3,278	-	-	304	3,919	-	-	-	769,120	2,332	-
4a.1.1.4	Pressurizer	8	57	415	95	-	704	-	250	1,530	1,530	-	-	-	2,446	-	-	-	267,971	2,566	750
4a.1.1.5	Steam Generators	70	3,966	2,230	1,311	1,228	4,978	-	2,875	16,659	16,659	-	-	37,344	17,284	-	-	-	3,132,422	20,507	2,850
4a.1.1.6	CRDMs/ICIs/Service Structure Removal	17	71	171	20	-	176	-	90	545	545	-	-	-	3,052	-	-	-	51,800	1,714	-
4a.1.1.7	Reactor Vessel Internals	67	1,489	1,061	560	-	5,652	136	4,402	13,369	13,369	-	-	-	2,312	501	950	-	395,755	18,169	859
4a.1.1.8	Vessel & Internals GTCC Disposal	-	-	-	-	-	3,428	-	514	3,942	3,942	-	-	-	-	-	-	203	41,900	-	-
4a.1.1.9	Reactor Vessel	-	3,291	781	180	-	5,697	136	5,577	15,662	15,662	-	-	-	6,672	2,955	-	-	985,324	18,169	859
4a.1.1	Totals	230	9,121	4,750	2,196	1,286	24,025	273	14,675	56,556	56,556	-	-	37,648	38,081	3,455	950	203	5,930,952	67,718	5,318
Removal of Major Equipment																					
4a.1.2	Main Turbine/Generator	-	344	126	29	362	-	-	157	1,019	1,019	-	-	7,664	-	-	-	-	344,901	6,439	-
4a.1.3	Main Condensers	-	835	118	27	340	-	-	276	1,596	1,596	-	-	7,194	-	-	-	-	323,743	15,549	-
Cascading Costs from Clean Building Demolition																					
4a.1.4.1	Reactor Building	-	712	-	-	-	-	-	107	819	819	-	-	-	-	-	-	-	-	8,643	-
4a.1.4.2	Auxiliary Building	-	211	-	-	-	-	-	32	242	242	-	-	-	-	-	-	-	-	2,746	-
4a.1.4.3	IRSF	-	72	-	-	-	-	-	11	83	83	-	-	-	-	-	-	-	-	948	-
4a.1.4.4	Fuel Building	-	156	-	-	-	-	-	23	180	180	-	-	-	-	-	-	-	-	1,955	-
4a.1.4	Totals	-	1,152	-	-	-	-	-	173	1,324	1,324	-	-	-	-	-	-	-	-	14,292	-
Disposal of Plant Systems																					
4a.1.5.1	AUX-592-1_BRY	-	130	18	9	-	266	-	102	526	526	-	-	-	1,096	-	-	-	78,595	2,420	-
4a.1.5.2	AUX-592-1_PRO	-	774	10	24	302	-	-	243	1,354	1,354	-	-	7,092	-	-	-	-	288,029	14,661	-
4a.1.5.3	AUX-592-2_BRY	-	33	4	2	-	43	-	20	101	101	-	-	-	143	-	-	-	12,808	627	-
4a.1.5.4	AUX-592-2_PRO	-	50	2	4	48	-	-	20	123	123	-	-	1,123	-	-	-	-	45,613	894	-
4a.1.5.5	AUX-592-3_BRY	-	470	102	49	-	1,416	-	489	2,527	2,527	-	-	-	6,249	-	-	-	417,696	9,188	-
4a.1.5.6	AUX-592-3_PRO	-	132	5	11	138	-	-	56	341	341	-	-	3,239	-	-	-	-	131,547	2,503	-
4a.1.5.7	AUX-617-1_CLN	-	22	-	-	-	-	-	3	26	-	-	26	-	-	-	-	-	-	443	-
4a.1.5.8	AUX-617-2_CLN	-	273	-	-	-	-	-	41	314	-	-	314	-	-	-	-	-	-	5,386	-
4a.1.5.9	AUX-617-3_BRY	-	17	3	2	-	46	-	16	84	84	-	-	-	203	-	-	-	13,659	317	-
4a.1.5.10	AUX-617-3_PRO	-	585	7	17	216	-	-	182	1,007	1,007	-	-	5,062	-	-	-	-	205,577	11,027	-
4a.1.5.11	AUX-617-4_PRO	-	44	1	3	35	-	-	17	99	99	-	-	813	-	-	-	-	33,031	805	-
4a.1.5.12	AUX-617-5_BRY	-	122	26	14	-	403	-	136	700	700	-	-	-	1,582	-	-	-	118,805	2,376	-
4a.1.5.13	AUX-630-1_CLN	-	505	-	-	-	-	-	76	581	-	-	581	-	-	-	-	-	-	9,895	-
4a.1.5.14	AUX-642-1_CLN	-	413	-	-	-	-	-	62	475	-	-	475	-	-	-	-	-	-	8,094	-
4a.1.5.15	AUX-642-2_PRO	-	17	0	1	8	-	-	6	31	31	-	-	189	-	-	-	-	7,691	314	-
4a.1.5.16	AUX-654-1_PRO	-	158	2	5	65	-	-	50	280	280	-	-	1,518	-	-	-	-	61,659	3,051	-
4a.1.5.17	RX-592-2_BRY	-	326	25	16	-	460	-	201	1,029	1,029	-	-	-	1,513	-	-	-	135,756	5,985	-
4a.1.5.18	RX-592-2_PRO	-	253	5	11	141	-	-	87	498	498	-	-	3,318	-	-	-	-	134,751	4,656	-
4a.1.5.19	TB-560-1_CLN	-	583	-	-	-	-	-	87	670	-	-	670	-	-	-	-	-	-	11,565	-
4a.1.5.20	TB-560-1_PRO	-	1,128	54	127	1,580	-	-	543	3,432	3,432	-	-	37,046	-	-	-	-	1,504,441	21,380	-
4a.1.5.21	TB-592-1_CLN	-	491	-	-	-	-	-	74	565	-	-	565	-	-	-	-	-	-	9,843	-
4a.1.5.22	TB-592-1_PRO	-	1,102	34	81	1,002	-	-	441	2,661	2,661	-	-	23,507	-	-	-	-	954,629	20,684	-
4a.1.5.23	TB-592-2_CLN	-	587	-	-	-	-	-	88	675	-	-	675	-	-	-	-	-	-	11,641	-
4a.1.5.24	TB-592-2_PRO	-	226	5	12	146	-	-	81	470	470	-	-	3,426	-	-	-	-	139,142	4,132	-
4a.1.5.25	TB-592-3_CLN	-	544	-	-	-	-	-	82	626	-	-	626	-	-	-	-	-	-	10,831	-
4a.1.5.26	TB-592-3_PRO	-	355	11	26	324	-	-	142	858	858	-	-	7,598	-	-	-	-	308,563	6,615	-
4a.1.5.27	TB-592-4_CLN	-	111	-	-	-	-	-	17	127	-	-	127	-	-	-	-	-	-	2,189	-
4a.1.5.28	TB-617-1_CLN	-	531	-	-	-	-	-	80	610	-	-	610	-	-	-	-	-	-	10,631	-
4a.1.5.29	TB-617-1_PRO	-	1,185	55	129	1,607	-	-	562	3,538	3,538	-	-	37,687	-	-	-	-	1,530,477	22,452	-
4a.1.5.30	TB-617-2_CLN	-	187	-	-	-	-	-	28	215	-	-	215	-	-	-	-	-	-	3,737	-
4a.1.5.31	TB-617-2_PRO	-	350	17	41	506	-	-	171	1,085	1,085	-	-	11,858	-	-	-	-	481,578	6,598	-
4a.1.5.32	TB-617-3_CLN	-	761	-	-	-	-	-	114	876	-	-	876	-	-	-	-	-	-	15,199	-

Table D-2
Zion Nuclear Power Station Unit 2
Delayed DECON Decommissioning Cost Estimate
(Thousands of 2006 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
Disposal of Plant Systems (continued)																					
4a.1.5.33	TB-617-3_PRO	-	683	16	38	478	-	-	250	1,466	1,466	-	-	11,219	-	-	-	-	455,590	12,336	-
4a.1.5.34	TB-642-1_CLN	-	244	-	-	-	-	-	37	280	-	-	280	-	-	-	-	-	-	4,827	-
4a.1.5.35	TB-642-1_PRO	-	674	57	134	1,668	-	-	444	2,977	2,977	-	-	39,122	-	-	-	-	1,588,772	12,783	-
4a.1.5.36	TB-642-2_CLN	-	46	-	-	-	-	-	7	53	-	-	53	-	-	-	-	-	-	902	-
4a.1.5	Totals	-	14,111	459	757	8,265	2,635	-	5,056	31,281	25,189	-	6,093	193,819	10,788	-	-	-	8,648,410	270,987	-
4a.1.6	Scaffolding in support of decommissioning	-	785	11	3	29	12	-	205	1,045	1,045	-	-	618	38	-	-	-	31,274	16,198	-
4a.1	Subtotal Period 4a Activity Costs	230	26,347	5,464	3,012	10,282	26,672	273	20,541	92,822	86,729	-	6,093	246,944	48,908	3,455	950	203	15,279,280	391,183	5,318
Period 4a Additional Costs																					
4a.2.1	Curie Surcharge (excluding RPV)	-	-	-	-	-	90	-	22	112	112	-	-	-	-	-	-	-	-	-	-
4a.2	Subtotal Period 4a Additional Costs	-	-	-	-	-	90	-	22	112	112	-	-	-	-	-	-	-	-	-	-
Period 4a Collateral Costs																					
4a.3.1	Process liquid waste	111	-	44	189	-	126	-	120	589	589	-	-	-	757	-	-	-	37,216	247	-
4a.3.2	Small tool allowance	-	329	-	-	-	-	-	49	379	341	-	38	-	-	-	-	-	-	-	-
4a.3	Subtotal Period 4a Collateral Costs	111	329	44	189	-	126	-	169	968	930	-	38	-	757	-	-	-	37,216	247	-
Period 4a Period-Dependent Costs																					
4a.4.1	Decon supplies	51	-	-	-	-	-	-	13	64	64	-	-	-	-	-	-	-	-	-	-
4a.4.2	Insurance	-	-	-	-	-	-	196	20	216	216	-	-	-	-	-	-	-	-	-	-
4a.4.3	Property taxes	-	-	-	-	-	-	565	57	622	560	-	62	-	-	-	-	-	-	-	-
4a.4.4	Health physics supplies	-	1,682	-	-	-	-	-	421	2,103	2,103	-	-	-	-	-	-	-	-	-	-
4a.4.5	Heavy equipment rental	-	1,866	-	-	-	-	-	280	2,146	2,146	-	-	-	-	-	-	-	-	-	-
4a.4.6	Disposal of DAW generated	-	-	99	45	-	291	-	89	524	524	-	-	-	5,227	-	-	-	104,752	1,283	-
4a.4.7	Plant energy budget	-	-	-	-	-	-	1,073	161	1,234	1,234	-	-	-	-	-	-	-	-	-	-
4a.4.8	NRC Fees	-	-	-	-	-	-	389	39	428	428	-	-	-	-	-	-	-	-	-	-
4a.4.9	Site O&M Cost	-	-	-	-	-	-	141	21	163	163	-	-	-	-	-	-	-	-	-	-
4a.4.10	Radwaste Processing Equipment/Services	-	-	-	-	-	-	413	62	475	475	-	-	-	-	-	-	-	-	-	-
4a.4.11	Security Staff Cost	-	-	-	-	-	-	2,332	350	2,682	2,682	-	-	-	-	-	-	-	-	-	65,065
4a.4.12	DOC Staff Cost	-	-	-	-	-	-	12,169	1,825	13,994	13,994	-	-	-	-	-	-	-	-	-	178,133
4a.4.13	Utility Staff Cost	-	-	-	-	-	-	17,650	2,648	20,298	20,298	-	-	-	-	-	-	-	-	-	299,460
4a.4	Subtotal Period 4a Period-Dependent Costs	51	3,548	99	45	-	291	34,930	5,985	44,949	44,887	-	62	-	5,227	-	-	-	104,752	1,283	542,658
4a.0	TOTAL PERIOD 4a COST	392	30,225	5,607	3,246	10,282	27,178	35,203	26,717	138,850	132,657	-	6,193	246,944	54,892	3,455	950	203	15,421,250	392,714	547,976
PERIOD 4b - Site Decontamination																					
Period 4b Direct Decommissioning Activities																					
4b.1.1	Remove spent fuel racks	815	100	271	60	-	1,711	-	896	3,852	3,852	-	-	-	5,624	-	-	-	504,611	2,397	-
Disposal of Plant Systems																					
4b.1.2.1	AUX.BLDG-VPC_BRY	-	67	6	4	-	103	-	44	223	223	-	-	-	338	-	-	-	30,298	1,212	-
4b.1.2.2	AUX.BLDG-VPC_PRO	-	466	7	18	221	-	-	153	865	865	-	-	5,178	-	-	-	-	210,270	8,787	-
4b.1.2.3	AUX-542-1_BRY	-	236	35	18	-	509	-	192	989	989	-	-	-	1,987	-	-	-	150,002	4,419	-
4b.1.2.4	AUX-542-1_PRO	-	524	10	24	294	-	-	180	1,031	1,031	-	-	6,888	-	-	-	-	279,722	9,875	-
4b.1.2.5	AUX-542-2_BRY	-	167	40	25	-	720	-	229	1,181	1,181	-	-	-	2,410	-	-	-	212,350	3,221	-
4b.1.2.6	AUX-542-2_PRO	-	458	11	26	325	-	-	168	989	989	-	-	7,626	-	-	-	-	309,679	8,676	-
4b.1.2.7	AUX-542-3_BRY	-	303	68	33	-	939	-	322	1,664	1,664	-	-	-	4,156	-	-	-	276,936	5,869	-
4b.1.2.8	AUX-542-3_PRO	-	36	1	1	15	-	-	11	64	64	-	-	358	-	-	-	-	14,551	616	-
4b.1.2.9	AUX-560-1_BRY	-	34	8	5	-	140	-	45	232	232	-	-	-	497	-	-	-	41,279	635	-
4b.1.2.10	AUX-560-1_PRO	-	1,122	38	90	1,115	-	-	465	2,830	2,830	-	-	26,147	-	-	-	-	1,061,840	21,100	-
4b.1.2.11	AUX-560-2_BRY	-	157	34	19	-	546	-	182	938	938	-	-	-	2,031	-	-	-	160,956	3,023	-
4b.1.2.12	AUX-560-2_PRO	-	556	18	42	524	-	-	226	1,366	1,366	-	-	12,294	-	-	-	-	499,264	10,495	-
4b.1.2.13	AUX-579-1_BRY	-	175	32	16	-	459	-	164	847	847	-	-	-	1,937	-	-	-	135,483	3,369	-
4b.1.2.14	AUX-579-1_PRO	-	652	10	23	288	-	-	211	1,183	1,183	-	-	6,751	-	-	-	-	274,144	12,318	-
4b.1.2.15	AUX-579-2_BRY	-	89	9	6	-	158	-	63	324	324	-	-	-	518	-	-	-	46,485	1,611	-
4b.1.2.16	AUX-579-2_PRO	-	251	4	9	117	-	-	82	463	463	-	-	2,752	-	-	-	-	111,741	4,685	-

Table D-2
Zion Nuclear Power Station Unit 2
Delayed DECON Decommissioning Cost Estimate
(Thousands of 2006 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
Disposal of Plant Systems (continued)																					
4b.1.2.17	AUX-579-3_BRY	-	33	8	4	-	108	-	37	189	189	-	-	-	464	-	-	-	31,754	656	-
4b.1.2.18	AUX-579-3_PRO	-	105	3	6	75	-	-	39	227	227	-	-	1,747	-	-	-	-	70,960	2,006	-
4b.1.2.19	CRBHSE-594_CLN	-	506	-	-	-	-	-	76	582	-	-	582	-	-	-	-	-	-	9,926	-
4b.1.2.20	DG-567-1_CLN	-	77	-	-	-	-	-	12	89	-	-	89	-	-	-	-	-	-	1,501	-
4b.1.2.21	DG-567-2_CLN	-	42	-	-	-	-	-	6	48	-	-	48	-	-	-	-	-	-	817	-
4b.1.2.22	DG-592-1_CLN	-	85	-	-	-	-	-	13	97	-	-	97	-	-	-	-	-	-	1,649	-
4b.1.2.23	DG-592-2_CLN	-	45	-	-	-	-	-	7	51	-	-	51	-	-	-	-	-	-	868	-
4b.1.2.24	DG-617-1_CLN	-	68	-	-	-	-	-	10	78	-	-	78	-	-	-	-	-	-	1,342	-
4b.1.2.25	DG-617-2_CLN	-	35	-	-	-	-	-	5	41	-	-	41	-	-	-	-	-	-	699	-
4b.1.2.26	DG-642-1_CLN	-	94	-	-	-	-	-	14	108	-	-	108	-	-	-	-	-	-	1,843	-
4b.1.2.27	FH-584-1_BRY	-	17	1	1	-	27	-	11	57	57	-	-	-	88	-	-	-	7,854	290	-
4b.1.2.28	FH-584-1_PRO	-	36	1	2	30	-	-	14	84	84	-	-	714	-	-	-	-	28,989	638	-
4b.1.2.29	FH-592-1_BRY	-	60	11	7	-	213	-	70	361	361	-	-	-	699	-	-	-	62,749	1,137	-
4b.1.2.30	FH-592-1_PRO	-	101	1	3	36	-	-	31	172	172	-	-	850	-	-	-	-	34,504	1,921	-
4b.1.2.31	FH-592-2_PRO	-	162	3	6	77	-	-	53	301	301	-	-	1,809	-	-	-	-	73,460	3,090	-
4b.1.2.32	FH-617-1_BRY	-	12	2	1	-	34	-	12	61	61	-	-	-	111	-	-	-	10,001	218	-
4b.1.2.33	FH-617-1_PRO	-	283	4	11	131	-	-	93	522	522	-	-	3,084	-	-	-	-	125,237	5,372	-
4b.1.2.34	FH-617-2_BRY	-	5	1	0	-	13	-	5	24	24	-	-	-	43	-	-	-	3,859	89	-
4b.1.2.35	FH-617-2_PRO	-	2	0	0	1	-	-	1	5	5	-	-	30	-	-	-	-	1,201	40	-
4b.1.2.36	PT-570-1_PRO	-	255	11	26	327	-	-	118	736	736	-	-	7,659	-	-	-	-	311,055	4,791	-
4b.1.2.37	RX-568-1_BRY	-	946	96	65	-	1,851	-	718	3,676	3,676	-	-	-	6,115	-	-	-	546,003	18,135	-
4b.1.2.38	RX-568-1_PRO	-	442	13	32	394	-	-	176	1,057	1,057	-	-	9,250	-	-	-	-	375,629	8,107	-
4b.1.2.39	RX-592-1_BRY	-	468	38	23	-	662	-	290	1,482	1,482	-	-	-	2,179	-	-	-	195,415	8,708	-
4b.1.2.40	RX-592-1_PRO	-	573	17	39	490	-	-	224	1,344	1,344	-	-	11,489	-	-	-	-	466,594	10,568	-
4b.1.2.41	RX-617-1_BRY	-	667	47	32	-	912	-	404	2,062	2,062	-	-	-	2,997	-	-	-	268,935	12,803	-
4b.1.2.42	RX-617-1_PRO	-	770	19	45	557	-	-	285	1,676	1,676	-	-	13,073	-	-	-	-	530,899	14,245	-
4b.1.2.43	SERVICE_CLN	-	207	-	-	-	-	-	31	238	-	-	238	-	-	-	-	-	-	4,177	-
4b.1.2.44	WWTF_CLN	-	125	-	-	-	-	-	19	144	-	-	144	-	-	-	-	-	-	2,477	-
4b.1.2.45	YARD_CLN	-	227	-	-	-	-	-	34	261	-	-	261	-	-	-	-	-	-	4,418	-
4b.1.2.46	YARD_PRO	-	449	21	49	608	-	-	213	1,339	1,339	-	-	14,254	-	-	-	-	578,874	8,503	-
4b.1.2.47	YARD-BURIED PIPE_CLN	-	183	-	-	-	-	-	27	210	-	-	210	-	-	-	-	-	-	3,683	-
4b.1.2.48	YARD-BURIED PIPE_PRO	-	120	4	9	108	-	-	48	289	289	-	-	2,543	-	-	-	-	103,268	2,115	-
4b.1.2	Totals	-	12,491	629	720	5,735	7,391	-	5,832	32,799	30,853	-	1,946	134,494	26,570	-	-	-	7,642,237	236,742	-
4b.1.3	Scaffolding in support of decommissioning	-	1,178	16	4	44	18	-	308	1,567	1,567	-	-	927	58	-	-	-	46,911	24,297	-
Decontamination of Site Buildings																					
4b.1.4.1	Reactor Building	1,017	880	103	101	268	1,649	-	1,207	5,226	5,226	-	-	6,296	6,026	-	-	-	792,422	34,939	-
4b.1.4.2	Auxiliary Building	556	340	22	25	51	324	-	458	1,776	1,776	-	-	1,204	1,294	-	-	-	164,812	16,512	-
4b.1.4.3	IRSF	39	14	3	4	4	49	-	36	148	148	-	-	94	197	-	-	-	21,225	926	-
4b.1.4.4	Fuel Building	602	668	34	18	32	408	-	581	2,344	2,344	-	-	752	1,421	-	-	-	154,534	23,679	-
4b.1.4	Totals	2,214	1,901	163	148	356	2,430	-	2,282	9,493	9,493	-	-	8,345	8,938	-	-	-	1,132,993	76,056	-
4b.1	Subtotal Period 4b Activity Costs	3,029	15,670	1,079	932	6,135	11,549	-	9,318	47,712	45,766	-	1,946	143,767	41,190	-	-	-	9,326,752	339,492	-
Period 4b Collateral Costs																					
4b.3.1	Process liquid waste	324	-	128	552	-	370	-	350	1,724	1,724	-	-	-	2,218	-	-	-	109,019	723	-
4b.3.2	Small tool allowance	-	305	-	-	-	-	-	46	351	351	-	-	-	-	-	-	-	-	-	-
4b.3.3	Decommissioning Equipment Disposition	-	-	105	32	284	114	-	86	620	620	-	-	6,000	373	-	-	-	303,507	739	-
4b.3	Subtotal Period 4b Collateral Costs	324	305	233	584	284	483	-	482	2,695	2,695	-	-	6,000	2,591	-	-	-	412,526	1,463	-

Table D-2
Zion Nuclear Power Station Unit 2
Delayed DECON Decommissioning Cost Estimate
(Thousands of 2006 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Period 4b Period-Dependent Costs																					
4b.4.1	Decon supplies	687	-	-	-	-	-	-	172	858	858	-	-	-	-	-	-	-	-	-	-
4b.4.2	Insurance	-	-	-	-	-	-	246	25	270	270	-	-	-	-	-	-	-	-	-	-
4b.4.3	Property taxes	-	-	-	-	-	-	708	71	779	779	-	-	-	-	-	-	-	-	-	-
4b.4.4	Health physics supplies	-	1,577	-	-	-	-	-	394	1,971	1,971	-	-	-	-	-	-	-	-	-	-
4b.4.5	Heavy equipment rental	-	2,350	-	-	-	-	-	353	2,703	2,703	-	-	-	-	-	-	-	-	-	-
4b.4.6	Disposal of DAW generated	-	-	108	49	-	315	-	97	569	569	-	-	-	5,668	-	-	-	113,586	1,392	-
4b.4.7	Plant energy budget	-	-	-	-	-	-	1,061	159	1,220	1,220	-	-	-	-	-	-	-	-	-	-
4b.4.8	NRC Fees	-	-	-	-	-	-	487	49	536	536	-	-	-	-	-	-	-	-	-	-
4b.4.9	Site O&M Cost	-	-	-	-	-	-	177	27	203	203	-	-	-	-	-	-	-	-	-	-
4b.4.10	Radwaste Processing Equipment/Services	-	-	-	-	-	-	517	78	595	595	-	-	-	-	-	-	-	-	-	-
4b.4.11	Security Staff Cost	-	-	-	-	-	-	3,283	492	3,776	3,776	-	-	-	-	-	-	-	-	-	91,583
4b.4.12	DOC Staff Cost	-	-	-	-	-	-	14,766	2,215	16,981	16,981	-	-	-	-	-	-	-	-	-	215,663
4b.4.13	Utility Staff Cost	-	-	-	-	-	-	21,926	3,289	25,215	25,215	-	-	-	-	-	-	-	-	-	366,331
4b.4	Subtotal Period 4b Period-Dependent Costs	687	3,927	108	49	-	315	43,171	7,419	55,675	55,675	-	-	-	5,668	-	-	-	113,586	1,392	673,577
4b.0	TOTAL PERIOD 4b COST	4,039	19,902	1,420	1,565	6,418	12,348	43,171	17,219	106,082	104,136	-	1,946	149,767	49,449	-	-	-	9,852,864	342,347	673,577
PERIOD 4e - License Termination																					
Period 4e Direct Decommissioning Activities																					
4e.1.1	ORISE confirmatory survey	-	-	-	-	-	-	140	42	183	183	-	-	-	-	-	-	-	-	-	-
4e.1.2	Terminate license									a											
4e.1	Subtotal Period 4e Activity Costs	-	-	-	-	-	-	140	42	183	183	-	-	-	-	-	-	-	-	-	-
Period 4e Additional Costs																					
4e.2.1	Final Site Survey	-	-	-	-	-	-	8,448	2,534	10,983	10,983	-	-	-	-	-	-	-	-	160,578	-
4e.2	Subtotal Period 4e Additional Costs	-	-	-	-	-	-	8,448	2,534	10,983	10,983	-	-	-	-	-	-	-	-	160,578	-
Period 4e Collateral Costs																					
4e.3.1	DOC staff relocation expenses	-	-	-	-	-	-	829	124	953	953	-	-	-	-	-	-	-	-	-	-
4e.3	Subtotal Period 4e Collateral Costs	-	-	-	-	-	-	829	124	953	953	-	-	-	-	-	-	-	-	-	-
Period 4e Period-Dependent Costs																					
4e.4.1	Insurance	-	-	-	-	-	-	38	4	42	42	-	-	-	-	-	-	-	-	-	-
4e.4.2	Property taxes	-	-	-	-	-	-	382	38	420	420	-	-	-	-	-	-	-	-	-	-
4e.4.3	Health physics supplies	-	768	-	-	-	-	-	192	960	960	-	-	-	-	-	-	-	-	-	-
4e.4.4	Disposal of DAW generated	-	-	7	3	-	21	-	6	38	38	-	-	-	377	-	-	-	7,553	93	-
4e.4.5	Plant energy budget	-	-	-	-	-	-	153	23	176	176	-	-	-	-	-	-	-	-	-	-
4e.4.6	NRC Fees	-	-	-	-	-	-	263	26	289	289	-	-	-	-	-	-	-	-	-	-
4e.4.7	Site O&M Cost	-	-	-	-	-	-	95	14	110	110	-	-	-	-	-	-	-	-	-	-
4e.4.8	Security Staff Cost	-	-	-	-	-	-	450	68	518	518	-	-	-	-	-	-	-	-	-	12,563
4e.4.9	DOC Staff Cost	-	-	-	-	-	-	3,340	501	3,841	3,841	-	-	-	-	-	-	-	-	-	47,430
4e.4.10	Utility Staff Cost	-	-	-	-	-	-	3,764	565	4,329	4,329	-	-	-	-	-	-	-	-	-	58,590
4e.4	Subtotal Period 4e Period-Dependent Costs	-	768	7	3	-	21	8,485	1,437	10,722	10,722	-	-	-	377	-	-	-	7,553	93	118,583
4e.0	TOTAL PERIOD 4e COST	-	768	7	3	-	21	17,903	4,138	22,840	22,840	-	-	-	377	-	-	-	7,553	160,671	118,583
PERIOD 4 TOTALS		4,431	50,895	7,034	4,814	16,700	39,547	96,276	48,074	267,772	259,633	-	8,139	396,711	104,718	3,455	950	203	25,281,660	895,731	1,340,136

Table D-2
Zion Nuclear Power Station Unit 2
Delayed DECON Decommissioning Cost Estimate
(Thousands of 2006 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
PERIOD 5b - Site Restoration																					
Period 5b Direct Decommissioning Activities																					
Demolition of Remaining Site Buildings																					
5b.1.1.1	Reactor Building	-	4,151	-	-	-	-	-	623	4,774	-	-	4,774	-	-	-	-	-	-	49,418	-
5b.1.1.2	Auxiliary Building	-	1,895	-	-	-	-	-	284	2,179	-	-	2,179	-	-	-	-	-	-	24,718	-
5b.1.1.3	Crib House	-	644	-	-	-	-	-	97	741	-	-	741	-	-	-	-	-	-	7,389	-
5b.1.1.4	Diesel Generator Building	-	328	-	-	-	-	-	49	377	-	-	377	-	-	-	-	-	-	4,557	-
5b.1.1.5	Discharge Tunnel Outfall	-	154	-	-	-	-	-	23	177	-	-	177	-	-	-	-	-	-	2,192	-
5b.1.1.6	Emergency Operations Facility	-	209	-	-	-	-	-	31	240	-	-	240	-	-	-	-	-	-	3,232	-
5b.1.1.7	IDNS Ragems Facility	-	8	-	-	-	-	-	1	9	-	-	9	-	-	-	-	-	-	132	-
5b.1.1.8	IRSF	-	649	-	-	-	-	-	97	747	-	-	747	-	-	-	-	-	-	8,534	-
5b.1.1.9	Intake Structure	-	92	-	-	-	-	-	14	106	-	-	106	-	-	-	-	-	-	1,221	-
5b.1.1.10	Miscellaneous Site Structures	-	284	-	-	-	-	-	43	327	-	-	327	-	-	-	-	-	-	3,766	-
5b.1.1.11	Miscellaneous Yard	-	748	-	-	-	-	-	112	860	-	-	860	-	-	-	-	-	-	10,409	-
5b.1.1.12	Security Office Building	-	23	-	-	-	-	-	3	27	-	-	27	-	-	-	-	-	-	358	-
5b.1.1.13	Sewage Lift Station	-	3	-	-	-	-	-	0	3	-	-	3	-	-	-	-	-	-	46	-
5b.1.1.14	Sludge Drying Beds	-	8	-	-	-	-	-	1	9	-	-	9	-	-	-	-	-	-	112	-
5b.1.1.15	Technical Support Center	-	146	-	-	-	-	-	22	168	-	-	168	-	-	-	-	-	-	2,174	-
5b.1.1.16	Training Center Addition	-	105	-	-	-	-	-	16	121	-	-	121	-	-	-	-	-	-	1,704	-
5b.1.1.17	Turbine Building	-	1,835	-	-	-	-	-	275	2,110	-	-	2,110	-	-	-	-	-	-	26,135	-
5b.1.1.18	Turbine Pedestal	-	1,759	-	-	-	-	-	264	2,023	-	-	2,023	-	-	-	-	-	-	19,735	-
5b.1.1.19	Wastewater Treatment Building	-	87	-	-	-	-	-	13	100	-	-	100	-	-	-	-	-	-	1,330	-
5b.1.1.20	Fuel Building	-	1,408	-	-	-	-	-	211	1,619	-	-	1,619	-	-	-	-	-	-	17,595	-
5b.1.1	Totals	-	14,537	-	-	-	-	-	2,181	16,717	-	-	16,717	-	-	-	-	-	-	184,757	-
Site Closeout Activities																					
5b.1.2	BackFill Site	-	1,178	-	-	-	-	-	177	1,355	-	-	1,355	-	-	-	-	-	-	5,998	-
5b.1.3	Grade & landscape site	-	62	-	-	-	-	-	9	72	-	-	72	-	-	-	-	-	-	238	-
5b.1.4	Final report to NRC	-	-	-	-	-	-	63	9	72	72	-	-	-	-	-	-	-	-	-	667
5b.1	Subtotal Period 5b Activity Costs	-	15,777	-	-	-	-	63	2,376	18,216	72	-	18,144	-	-	-	-	-	-	190,993	667
Period 5b Additional Costs																					
5b.2.1	Concrete Crushing	-	497	-	-	-	-	4	75	576	-	-	576	-	-	-	-	-	-	2,764	-
5b.2.2	Intake Structure Cofferdam	-	674	-	-	-	-	-	101	775	-	-	775	-	-	-	-	-	-	7,551	-
5b.2.3	Discharge Tunnel Outfall Cofferdam	-	896	-	-	-	-	-	134	1,031	-	-	1,031	-	-	-	-	-	-	10,040	-
5b.2	Subtotal Period 5b Additional Costs	-	2,067	-	-	-	-	4	311	2,382	-	-	2,382	-	-	-	-	-	-	20,355	-
Period 5b Collateral Costs																					
5b.3.1	Small tool allowance	-	192	-	-	-	-	-	29	221	-	-	221	-	-	-	-	-	-	-	-
5b.3	Subtotal Period 5b Collateral Costs	-	192	-	-	-	-	-	29	221	-	-	221	-	-	-	-	-	-	-	-
Period 5b Period-Dependent Costs																					
5b.4.1	Insurance	-	-	-	-	-	-	104	10	114	-	-	114	-	-	-	-	-	-	-	-
5b.4.2	Property taxes	-	-	-	-	-	-	1,040	104	1,144	-	-	1,144	-	-	-	-	-	-	-	-
5b.4.3	Heavy equipment rental	-	4,704	-	-	-	-	-	706	5,409	-	-	5,409	-	-	-	-	-	-	-	-
5b.4.4	Plant energy budget	-	-	-	-	-	-	208	31	239	-	-	239	-	-	-	-	-	-	-	-
5b.4.5	Site O&M Cost	-	-	-	-	-	-	260	39	299	-	-	299	-	-	-	-	-	-	-	-
5b.4.6	Security Staff Cost	-	-	-	-	-	-	1,148	172	1,320	-	-	1,320	-	-	-	-	-	-	-	32,050
5b.4.7	DOC Staff Cost	-	-	-	-	-	-	9,833	1,475	11,308	-	-	11,308	-	-	-	-	-	-	-	137,886
5b.4.8	Utility Staff Cost	-	-	-	-	-	-	4,928	739	5,667	-	-	5,667	-	-	-	-	-	-	-	78,171
5b.4	Subtotal Period 5b Period-Dependent Costs	-	4,704	-	-	-	-	17,521	3,277	25,501	-	-	25,501	-	-	-	-	-	-	-	248,107
5b.0	TOTAL PERIOD 5b COST	-	22,740	-	-	-	-	17,588	5,992	46,320	72	-	46,248	-	-	-	-	-	-	211,348	248,775

Table D-2
Zion Nuclear Power Station Unit 2
Delayed DECON Decommissioning Cost Estimate
(Thousands of 2006 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
PERIOD 5 TOTALS		-	22,740	-	-	-	-	17,588	5,992	46,320	72	-	46,248	-	-	-	-	-	-	211,348	248,775
TOTAL COST TO DECOMMISSION		5,191	83,638	7,101	5,607	16,700	43,658	309,404	64,189	535,489	318,848	161,743	54,898	396,711	215,711	3,455	950	203	26,760,690	1,218,016	2,021,385

TOTAL COST TO DECOMMISSION WITH 13.62% CONTINGENCY:	**$535,489**	**thousands of 2006 dollars**	
TOTAL NRC LICENSE TERMINATION COST IS 59.54% OR:	**$318,848**	**thousands of 2006 dollars**	
SPENT FUEL MANAGEMENT COST IS 30.2% OR:	**$161,743**	**thousands of 2006 dollars**	
NON-NUCLEAR DEMOLITION COST IS 10.25% OR:	**$54,898**	**thousands of 2006 dollars**	
TOTAL PRIMARY SITE RADWASTE VOLUME BURIED:	**93,061**	**Cubic Feet**	
TOTAL SECONDARY SITE RADWASTE VOLUME BURIED:	**127,055**	**Cubic Feet**	
TOTAL TERTIARY SITE RADWASTE VOLUME BURIED		**Cubic Feet**	
TOTAL GREATER THAN CLASS C RADWASTE VOLUME GENERATED	**203**	**Cubic Feet**	
TOTAL SCRAP METAL REMOVED:	**46,651**	**Tons**	
TOTAL CRAFT LABOR REQUIREMENTS:	**1,218,016**	**Man-hours**	

End Notes:
n/a - indicates that this activity not charged as decommissioning expense.
a - indicates that this activity performed by decommissioning staff.
0 - indicates that this value is less than 0.5 but is non-zero.
a cell containing " - " indicates a zero value

APPENDIX E

DETAILED COST ANALYSIS

SAFSTOR

Table E-1
Zion Nuclear Power Station Unit 1
SAFSTOR Decommissioning Cost Estimate
(Thousands of 2006 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
	2006-2028 Decommissioning Expenditures	-	-	-	-	-	-	147,465	-	147,465	-	147,465	-	-	-	-	-	-	-	-	-
	Spent Fuel Capital and Transfer	-	-	-	-	-	-	8,750	1,313	10,063	-	10,063	-	-	-	-	-	-	-	-	-
PERIOD 2c - SAFSTOR Dormancy without Spent Fuel Storage																					
Period 2c Direct Decommissioning Activities																					
2c.1.1	Quarterly Inspection									a											
2c.1.2	Semi-annual environmental survey									a											
2c.1.3	Prepare reports									a											
2c.1.4	Bituminous roof replacement	-	-	-	-	-	-	215	32	247	247	-	-	-	-	-	-	-	-	-	-
2c.1.5	Maintenance supplies	-	-	-	-	-	-	2,985	746	3,732	3,732	-	-	-	-	-	-	-	-	-	-
2c.1	Subtotal Period 2c Activity Costs	-	-	-	-	-	-	3,200	779	3,979	3,979	-	-	-	-	-	-	-	-	-	-
Period 2c Collateral Costs																					
2c.3	Subtotal Period 2c Collateral Costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Period 2c Period-Dependent Costs																					
2c.4.1	Insurance	-	-	-	-	-	-	2,633	263	2,897	2,897	-	-	-	-	-	-	-	-	-	-
2c.4.2	Property taxes	-	-	-	-	-	-	11,867	1,187	13,054	13,054	-	-	-	-	-	-	-	-	-	-
2c.4.3	Health physics supplies	-	1,538	-	-	-	-	-	385	1,923	1,923	-	-	-	-	-	-	-	-	-	-
2c.4.4	Disposal of DAW generated	-	-	182	85	-	549	-	168	984	984	-	-	-	9,881	-	-	-	198,009	2,426	-
2c.4.5	Plant energy budget	-	-	-	-	-	-	2,372	356	2,728	2,728	-	-	-	-	-	-	-	-	-	-
2c.4.6	NRC Fees	-	-	-	-	-	-	5,122	512	5,634	5,634	-	-	-	-	-	-	-	-	-	-
2c.4.7	Site O&M Cost	-	-	-	-	-	-	2,967	445	3,412	3,412	-	-	-	-	-	-	-	-	-	-
2c.4.8	Security Staff Cost	-	-	-	-	-	-	20,455	3,068	23,524	23,524	-	-	-	-	-	-	-	-	-	594,446
2c.4.9	Utility Staff Cost	-	-	-	-	-	-	25,522	3,828	29,350	29,350	-	-	-	-	-	-	-	-	-	433,450
2c.4	Subtotal Period 2c Period-Dependent Costs	-	1,538	182	85	-	549	70,938	10,212	83,505	83,505	-	-	-	9,881	-	-	-	198,009	2,426	1,027,896
2c.0	TOTAL PERIOD 2c COST	-	1,538	182	85	-	549	74,138	10,991	87,483	87,483	-	-	-	9,881	-	-	-	198,009	2,426	1,027,896
PERIOD 2 TOTALS		-	1,538	182	85	-	549	74,138	10,991	87,483	87,483	-	-	-	9,881	-	-	-	198,009	2,426	1,027,896
PERIOD 3a - Reactivate Site Following SAFSTOR Dormancy																					
Period 3a Direct Decommissioning Activities																					
3a.1.1	Prepare preliminary decommissioning cost	-	-	-	-	-	-	123	18	141	141	-	-	-	-	-	-	-	-	-	1,300
3a.1.2	Review plant dwgs & specs.	-	-	-	-	-	-	435	65	500	500	-	-	-	-	-	-	-	-	-	4,600
3a.1.3	Perform detailed rad survey									a											
3a.1.4	End product description	-	-	-	-	-	-	94	14	109	109	-	-	-	-	-	-	-	-	-	1,000
3a.1.5	Detailed by-product inventory	-	-	-	-	-	-	123	18	141	141	-	-	-	-	-	-	-	-	-	1,300
3a.1.6	Define major work sequence	-	-	-	-	-	-	708	106	815	815	-	-	-	-	-	-	-	-	-	7,500
3a.1.7	Perform SER and EA	-	-	-	-	-	-	293	44	337	337	-	-	-	-	-	-	-	-	-	3,100
3a.1.8	Perform Site-Specific Cost Study	-	-	-	-	-	-	472	71	543	543	-	-	-	-	-	-	-	-	-	5,000
3a.1.9	Prepare/submit License Termination Plan	-	-	-	-	-	-	387	58	445	445	-	-	-	-	-	-	-	-	-	4,096
3a.1.10	Receive NRC approval of termination plan									a											
Activity Specifications																					
3a.1.11.1	Re-activate plant & temporary facilities	-	-	-	-	-	-	696	104	801	721	-	80	-	-	-	-	-	-	-	7,370
3a.1.11.2	Plant systems	-	-	-	-	-	-	394	59	453	407	-	45	-	-	-	-	-	-	-	4,167
3a.1.11.3	Reactor internals	-	-	-	-	-	-	671	101	771	771	-	-	-	-	-	-	-	-	-	7,100
3a.1.11.4	Reactor vessel	-	-	-	-	-	-	614	92	706	706	-	-	-	-	-	-	-	-	-	6,500
3a.1.11.5	Biological shield	-	-	-	-	-	-	47	7	54	54	-	-	-	-	-	-	-	-	-	500
3a.1.11.6	Steam generators	-	-	-	-	-	-	295	44	339	339	-	-	-	-	-	-	-	-	-	3,120
3a.1.11.7	Reinforced concrete	-	-	-	-	-	-	151	23	174	87	-	87	-	-	-	-	-	-	-	1,600
3a.1.11.8	Main Turbine	-	-	-	-	-	-	38	6	43	-	-	43	-	-	-	-	-	-	-	400
3a.1.11.9	Main Condensers	-	-	-	-	-	-	38	6	43	-	-	43	-	-	-	-	-	-	-	400
3a.1.11.10	Plant structures & buildings	-	-	-	-	-	-	295	44	339	169	-	169	-	-	-	-	-	-	-	3,120
3a.1.11.11	Waste management	-	-	-	-	-	-	435	65	500	500	-	-	-	-	-	-	-	-	-	4,600
3a.1.11.12	Facility & site closeout	-	-	-	-	-	-	85	13	98	49	-	49	-	-	-	-	-	-	-	900
3a.1.11	Total	-	-	-	-	-	-	3,757	564	4,321	3,803	-	517	-	-	-	-	-	-	-	39,777

Table E-1
Zion Nuclear Power Station Unit 1
SAFSTOR Decommissioning Cost Estimate
(Thousands of 2006 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
Planning & Site Preparations																					
3a.1.12	Prepare dismantling sequence	-	-	-	-	-	-	227	34	261	261	-	-	-	-	-	-	-	-	-	2,400
3a.1.13	Plant prep. & temp. svces	-	-	-	-	-	-	2,419	363	2,782	2,782	-	-	-	-	-	-	-	-	-	-
3a.1.14	Design water clean-up system	-	-	-	-	-	-	132	20	152	152	-	-	-	-	-	-	-	-	-	1,400
3a.1.15	Rigging/Cont. Cntrl Envlps/tooling/etc.	-	-	-	-	-	-	2,048	307	2,355	2,355	-	-	-	-	-	-	-	-	-	-
3a.1.16	Procure casks/liners & containers	-	-	-	-	-	-	116	17	134	134	-	-	-	-	-	-	-	-	-	1,230
3a.1	Subtotal Period 3a Activity Costs	-	-	-	-	-	-	11,334	1,700	13,035	12,517	-	517	-	-	-	-	-	-	-	72,703
Period 3a Collateral Costs																					
3a.3	Subtotal Period 3a Collateral Costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Period 3a Period-Dependent Costs																					
3a.4.1	Insurance	-	-	-	-	-	-	161	16	177	177	-	-	-	-	-	-	-	-	-	-
3a.4.2	Property taxes	-	-	-	-	-	-	500	50	550	550	-	-	-	-	-	-	-	-	-	-
3a.4.3	Health physics supplies	-	259	-	-	-	-	-	65	324	324	-	-	-	-	-	-	-	-	-	-
3a.4.4	Heavy equipment rental	-	334	-	-	-	-	-	50	384	384	-	-	-	-	-	-	-	-	-	-
3a.4.5	Disposal of DAW generated	-	-	11	5	-	32	-	10	57	57	-	-	-	575	-	-	-	11,526	141	-
3a.4.6	Plant energy budget	-	-	-	-	-	-	999	150	1,148	1,148	-	-	-	-	-	-	-	-	-	-
3a.4.7	NRC Fees	-	-	-	-	-	-	258	26	284	284	-	-	-	-	-	-	-	-	-	-
3a.4.8	Site O&M Cost	-	-	-	-	-	-	125	19	144	144	-	-	-	-	-	-	-	-	-	-
3a.4.9	Security Staff Cost	-	-	-	-	-	-	1,077	161	1,238	1,238	-	-	-	-	-	-	-	-	-	31,286
3a.4.10	Utility Staff Cost	-	-	-	-	-	-	15,900	2,385	18,285	18,285	-	-	-	-	-	-	-	-	-	266,971
3a.4	Subtotal Period 3a Period-Dependent Costs	-	593	11	5	-	32	19,019	2,932	22,591	22,591	-	-	-	575	-	-	-	11,526	141	298,257
3a.0	TOTAL PERIOD 3a COST	-	593	11	5	-	32	30,353	4,632	35,626	35,108	-	517	-	575	-	-	-	11,526	141	370,960
PERIOD 3b - Decommissioning Preparations																					
Period 3b Direct Decommissioning Activities																					
Detailed Work Procedures																					
3b.1.1.1	Plant systems	-	-	-	-	-	-	447	67	514	463	-	51	-	-	-	-	-	-	-	4,733
3b.1.1.2	Reactor internals	-	-	-	-	-	-	236	35	272	272	-	-	-	-	-	-	-	-	-	2,500
3b.1.1.3	Remaining buildings	-	-	-	-	-	-	128	19	147	37	-	110	-	-	-	-	-	-	-	1,350
3b.1.1.4	CRD cooling assembly	-	-	-	-	-	-	94	14	109	109	-	-	-	-	-	-	-	-	-	1,000
3b.1.1.5	CRD housings & ICI tubes	-	-	-	-	-	-	94	14	109	109	-	-	-	-	-	-	-	-	-	1,000
3b.1.1.6	Incore instrumentation	-	-	-	-	-	-	94	14	109	109	-	-	-	-	-	-	-	-	-	1,000
3b.1.1.7	Reactor vessel	-	-	-	-	-	-	343	51	394	394	-	-	-	-	-	-	-	-	-	3,630
3b.1.1.8	Facility closeout	-	-	-	-	-	-	113	17	130	65	-	65	-	-	-	-	-	-	-	1,200
3b.1.1.9	Missile shields	-	-	-	-	-	-	43	6	49	49	-	-	-	-	-	-	-	-	-	450
3b.1.1.10	Biological shield	-	-	-	-	-	-	113	17	130	130	-	-	-	-	-	-	-	-	-	1,200
3b.1.1.11	Steam generators	-	-	-	-	-	-	435	65	500	500	-	-	-	-	-	-	-	-	-	4,600
3b.1.1.12	Reinforced concrete	-	-	-	-	-	-	94	14	109	54	-	54	-	-	-	-	-	-	-	1,000
3b.1.1.13	Main Turbine	-	-	-	-	-	-	147	22	169	-	-	169	-	-	-	-	-	-	-	1,560
3b.1.1.14	Main Condensers	-	-	-	-	-	-	147	22	169	-	-	169	-	-	-	-	-	-	-	1,560
3b.1.1.15	Auxiliary building	-	-	-	-	-	-	258	39	297	267	-	30	-	-	-	-	-	-	-	2,730
3b.1.1.16	Reactor building	-	-	-	-	-	-	258	39	297	267	-	30	-	-	-	-	-	-	-	2,730
3b.1.1	Total	-	-	-	-	-	-	3,046	457	3,503	2,823	-	679	-	-	-	-	-	-	-	32,243
3b.1	Subtotal Period 3b Activity Costs	-	-	-	-	-	-	3,046	457	3,503	2,823	-	679	-	-	-	-	-	-	-	32,243
Period 3b Additional Costs																					
3b.2.1	Site Characterization	-	-	-	-	-	-	496	74	570	570	-	-	-	-	-	-	-	-	-	-
3b.2.2	Clean Asbestos Remediation	-	3,762	30	464	-	2,527	-	1,645	8,428	8,428	-	-	-	65,280	-	-	-	909,067	55,578	-
3b.2.3	Contaminated Asbestos Remediation	-	3,334	15	232	-	1,154	-	1,158	5,893	5,893	-	-	-	31,936	-	-	-	415,168	46,357	-
3b.2	Subtotal Period 3b Additional Costs	-	7,095	45	696	-	3,681	496	2,878	14,892	14,892	-	-	-	97,216	-	-	-	1,324,235	101,935	-

Table E-1
Zion Nuclear Power Station Unit 1
SAFSTOR Decommissioning Cost Estimate
(Thousands of 2006 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
Period 3b Collateral Costs																					
3b.3.1	Decon equipment	737	-	-	-	-	-	-	111	847	847	-	-	-	-	-	-	-	-	-	-
3b.3.2	DOC staff relocation expenses	-	-	-	-	-	-	829	124	953	953	-	-	-	-	-	-	-	-	-	-
3b.3.3	Small tool allowance	-	100	-	-	-	-	-	15	114	114	-	-	-	-	-	-	-	-	-	-
3b.3.4	Pipe cutting equipment	-	957	-	-	-	-	-	143	1,100	1,100	-	-	-	-	-	-	-	-	-	-
3b.3	Subtotal Period 3b Collateral Costs	737	1,056	-	-	-	-	829	393	3,015	3,015	-	-	-	-	-	-	-	-	-	-
Period 3b Period-Dependent Costs																					
3b.4.1	Decon supplies	23	-	-	-	-	-	-	6	28	28	-	-	-	-	-	-	-	-	-	-
3b.4.2	Insurance	-	-	-	-	-	-	87	9	96	96	-	-	-	-	-	-	-	-	-	-
3b.4.3	Property taxes	-	-	-	-	-	-	251	25	276	276	-	-	-	-	-	-	-	-	-	-
3b.4.4	Health physics supplies	-	492	-	-	-	-	-	123	615	615	-	-	-	-	-	-	-	-	-	-
3b.4.5	Heavy equipment rental	-	168	-	-	-	-	-	25	193	193	-	-	-	-	-	-	-	-	-	-
3b.4.6	Disposal of DAW generated	-	-	6	3	-	18	-	6	33	33	-	-	-	329	-	-	-	6,596	81	-
3b.4.7	Plant energy budget	-	-	-	-	-	-	501	75	576	576	-	-	-	-	-	-	-	-	-	-
3b.4.8	NRC Fees	-	-	-	-	-	-	130	13	143	143	-	-	-	-	-	-	-	-	-	-
3b.4.9	Site O&M Cost	-	-	-	-	-	-	63	9	72	72	-	-	-	-	-	-	-	-	-	-
3b.4.10	Security Staff Cost	-	-	-	-	-	-	1,116	167	1,283	1,283	-	-	-	-	-	-	-	-	-	32,417
3b.4.11	DOC Staff Cost	-	-	-	-	-	-	4,366	655	5,021	5,021	-	-	-	-	-	-	-	-	-	63,789
3b.4.12	Utility Staff Cost	-	-	-	-	-	-	7,972	1,196	9,167	9,167	-	-	-	-	-	-	-	-	-	133,851
3b.4	Subtotal Period 3b Period-Dependent Costs	23	659	6	3	-	18	14,484	2,309	17,501	17,501	-	-	-	329	-	-	-	6,596	81	230,057
3b.0	TOTAL PERIOD 3b COST	759	8,811	52	699	-	3,700	18,854	6,036	38,910	38,231	-	679	-	97,545	-	-	-	1,330,832	102,016	262,300
PERIOD 3 TOTALS		759	9,404	62	704	-	3,732	49,207	10,668	74,536	73,340	-	1,197	-	98,120	-	-	-	1,342,357	102,157	633,260
PERIOD 4a - Large Component Removal																					
Period 4a Direct Decommissioning Activities																					
Nuclear Steam Supply System Removal																					
4a.1.1.1	Reactor Coolant Piping	17	56	30	19	22	698	-	206	1,048	1,048	-	-	189	1,702	-	-	-	226,850	1,301	-
4a.1.1.2	Pressurizer Relief Tank	3	9	5	3	4	112	-	33	168	168	-	-	33	296	-	-	-	36,571	212	-
4a.1.1.3	Reactor Coolant Pumps & Motors	8	33	41	11	133	2,178	-	582	2,987	2,987	-	-	696	3,527	-	-	-	769,120	1,048	-
4a.1.1.4	Pressurizer	8	57	415	95	-	704	-	250	1,530	1,530	-	-	-	2,446	-	-	-	267,971	2,566	750
4a.1.1.5	Steam Generators	31	3,966	2,230	1,311	1,228	4,978	-	2,855	16,599	16,599	-	-	37,344	17,284	-	-	-	3,132,422	20,507	2,650
4a.1.1.6	CRDMs/ICIs/Service Structure Removal	7	71	170	20	-	176	-	85	529	529	-	-	-	3,052	-	-	-	51,800	1,493	-
4a.1.1.7	Reactor Vessel Internals	21	1,448	998	490	-	5,521	130	4,249	12,857	12,857	-	-	-	2,383	501	950	-	396,325	17,135	817
4a.1.1.8	Vessel & Internals GTCC Disposal	-	-	-	-	-	3,428	-	514	3,942	3,942	-	-	-	-	-	-	203	41,900	-	-
4a.1.1.9	Reactor Vessel	-	3,250	734	180	-	5,688	130	5,529	15,510	15,510	-	-	-	6,672	2,955	-	-	985,324	17,135	817
4a.1.1	Totals	95	8,889	4,624	2,130	1,387	23,481	260	14,304	55,170	55,170	-	-	38,262	37,362	3,455	950	203	5,908,283	61,399	5,235
Removal of Major Equipment																					
4a.1.2	Main Turbine/Generator	-	180	121	29	362	-	-	116	808	808	-	-	7,664	-	-	-	-	344,901	3,293	-
4a.1.3	Main Condensers	-	378	114	27	340	-	-	161	1,021	1,021	-	-	7,194	-	-	-	-	323,743	6,807	-
Cascading Costs from Clean Building Demolition																					
4a.1.4.1	Reactor Building	-	712	-	-	-	-	-	107	819	819	-	-	-	-	-	-	-	-	8,643	-
4a.1.4.2	Auxiliary Building	-	211	-	-	-	-	-	32	242	242	-	-	-	-	-	-	-	-	2,746	-
4a.1.4.3	Service Building & Addition	-	110	-	-	-	-	-	16	126	126	-	-	-	-	-	-	-	-	1,609	-
4a.1.4	Totals	-	1,033	-	-	-	-	-	155	1,188	1,188	-	-	-	-	-	-	-	-	12,998	-
Disposal of Plant Systems																					
4a.1.5.1	AUX-592-1_BRY	-	130	18	9	-	266	-	102	526	526	-	-	-	1,096	-	-	-	78,595	2,420	-
4a.1.5.2	AUX-592-1_PRO	-	768	10	24	296	-	-	241	1,339	1,339	-	-	6,947	-	-	-	-	282,113	14,546	-
4a.1.5.3	AUX-592-2_BRY	-	32	4	1	-	42	-	19	98	98	-	-	-	140	-	-	-	12,525	601	-
4a.1.5.4	AUX-592-2_PRO	-	50	2	4	48	-	-	20	123	123	-	-	1,123	-	-	-	-	45,613	894	-
4a.1.5.5	AUX-592-3_BRY	-	273	56	28	-	790	-	276	1,423	1,423	-	-	-	3,448	-	-	-	233,005	5,319	-
4a.1.5.6	AUX-592-3_PRO	-	118	3	6	77	-	-	42	246	246	-	-	1,805	-	-	-	-	73,290	2,235	-
4a.1.5.7	AUX-617-1_CLN	-	20	-	-	-	-	-	3	23	-	-	23	-	-	-	-	-	-	391	-

Table E-1
Zion Nuclear Power Station Unit 1
SAFSTOR Decommissioning Cost Estimate
(Thousands of 2006 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
Disposal of Plant Systems (continued)																					
4a.1.5.8	AUX-617-2_CLN	-	239	-	-	-	-	-	36	275	-	-	275	-	-	-	-	-	-	4,727	-
4a.1.5.9	AUX-617-3_BRY	-	17	3	2	-	46	-	16	84	84	-	-	-	203	-	-	-	13,659	317	-
4a.1.5.10	AUX-617-3_PRO	-	583	7	17	214	-	-	181	1,002	1,002	-	-	5,012	-	-	-	-	203,536	10,995	-
4a.1.5.11	AUX-617-4_PRO	-	44	1	3	35	-	-	17	99	99	-	-	813	-	-	-	-	33,031	805	-
4a.1.5.12	AUX-617-5_BRY	-	3	1	1	-	16	-	5	25	25	-	-	-	52	-	-	-	4,673	59	-
4a.1.5.13	AUX-630-1_CLN	-	505	-	-	-	-	-	76	581	-	-	581	-	-	-	-	-	-	9,895	-
4a.1.5.14	AUX-642-1_CLN	-	413	-	-	-	-	-	62	475	-	-	475	-	-	-	-	-	-	8,094	-
4a.1.5.15	AUX-642-2_PRO	-	6	0	0	4	-	-	2	13	13	-	-	88	-	-	-	-	3,555	115	-
4a.1.5.16	AUX-654-1_PRO	-	151	2	5	62	-	-	48	268	268	-	-	1,446	-	-	-	-	58,719	2,925	-
4a.1.5.17	RX-592-2_BRY	-	326	25	16	-	460	-	201	1,029	1,029	-	-	-	1,513	-	-	-	135,756	5,985	-
4a.1.5.18	RX-592-2_PRO	-	253	5	11	141	-	-	87	498	498	-	-	3,318	-	-	-	-	134,751	4,656	-
4a.1.5.19	TB-560-1_CLN	-	532	-	-	-	-	-	80	612	-	-	612	-	-	-	-	-	-	10,577	-
4a.1.5.20	TB-560-1_PRO	-	981	50	118	1,462	-	-	487	3,098	3,098	-	-	34,292	-	-	-	-	1,392,636	18,581	-
4a.1.5.21	TB-592-1_CLN	-	491	-	-	-	-	-	74	565	-	-	565	-	-	-	-	-	-	9,843	-
4a.1.5.22	TB-592-1_PRO	-	1,102	34	81	1,002	-	-	441	2,661	2,661	-	-	23,507	-	-	-	-	954,629	20,684	-
4a.1.5.23	TB-592-2_CLN	-	573	-	-	-	-	-	86	659	-	-	659	-	-	-	-	-	-	11,370	-
4a.1.5.24	TB-592-2_PRO	-	185	4	8	104	-	-	63	364	364	-	-	2,443	-	-	-	-	99,218	3,336	-
4a.1.5.25	TB-592-3_CLN	-	538	-	-	-	-	-	81	619	-	-	619	-	-	-	-	-	-	10,710	-
4a.1.5.26	TB-592-3_PRO	-	348	11	25	311	-	-	138	832	832	-	-	7,284	-	-	-	-	295,813	6,478	-
4a.1.5.27	TB-617-1_CLN	-	530	-	-	-	-	-	80	610	-	-	610	-	-	-	-	-	-	10,626	-
4a.1.5.28	TB-617-1_PRO	-	1,185	55	129	1,607	-	-	562	3,538	3,538	-	-	37,687	-	-	-	-	1,530,477	22,452	-
4a.1.5.29	TB-617-2_CLN	-	187	-	-	-	-	-	28	215	-	-	215	-	-	-	-	-	-	3,737	-
4a.1.5.30	TB-617-2_PRO	-	350	17	41	506	-	-	171	1,085	1,085	-	-	11,858	-	-	-	-	481,578	6,598	-
4a.1.5.31	TB-617-3_CLN	-	753	-	-	-	-	-	113	866	-	-	866	-	-	-	-	-	-	15,047	-
4a.1.5.32	TB-617-3_PRO	-	683	16	38	478	-	-	250	1,466	1,466	-	-	11,219	-	-	-	-	455,590	12,336	-
4a.1.5.33	TB-642-1_CLN	-	243	-	-	-	-	-	36	280	-	-	280	-	-	-	-	-	-	4,815	-
4a.1.5.34	TB-642-1_PRO	-	674	57	134	1,668	-	-	444	2,977	2,977	-	-	39,122	-	-	-	-	1,588,772	12,783	-
4a.1.5.35	TB-642-2_CLN	-	45	-	-	-	-	-	7	51	-	-	51	-	-	-	-	-	-	678	-
4a.1.5	Totals	-	13,331	380	701	8,015	1,621	-	4,576	28,625	22,794	-	5,830	187,964	6,453	-	-	-	8,111,535	255,832	-
4a.1.6	Scaffolding in support of decommissioning	-	922	9	2	23	9	-	237	1,203	1,203	-	-	493	31	-	-	-	24,921	18,950	-
4a.1	Subtotal Period 4a Activity Costs	95	24,733	5,248	2,889	10,127	25,112	260	19,550	88,014	82,183	-	5,830	241,578	43,846	3,455	950	203	14,713,380	359,279	5,235
Period 4a Additional Costs																					
4a.2.1	Curie Surcharge (excluding RPV)	-	-	-	-	-	68	-	17	85	85	-	-	-	-	-	-	-	-	-	-
4a.2	Subtotal Period 4a Additional Costs	-	-	-	-	-	68	-	17	85	85	-	-	-	-	-	-	-	-	-	-
Period 4a Collateral Costs																					
4a.3.1	Process liquid waste	14	-	5	24	-	16	-	15	75	75	-	-	-	98	-	-	-	4,812	22	-
4a.3.2	Small tool allowance	-	300	-	-	-	-	-	45	345	311	-	35	-	-	-	-	-	-	-	-
4a.3	Subtotal Period 4a Collateral Costs	14	300	5	24	-	16	-	60	420	385	-	35	-	98	-	-	-	4,812	22	-
Period 4a Period-Dependent Costs																					
4a.4.1	Decon supplies	49	-	-	-	-	-	-	12	61	61	-	-	-	-	-	-	-	-	-	-
4a.4.2	Insurance	-	-	-	-	-	-	190	19	209	209	-	-	-	-	-	-	-	-	-	-
4a.4.3	Property taxes	-	-	-	-	-	-	546	55	601	541	-	60	-	-	-	-	-	-	-	-
4a.4.4	Health physics supplies	-	1,558	-	-	-	-	-	390	1,948	1,948	-	-	-	-	-	-	-	-	-	-
4a.4.5	Heavy equipment rental	-	1,803	-	-	-	-	-	270	2,073	2,073	-	-	-	-	-	-	-	-	-	-
4a.4.6	Disposal of DAW generated	-	-	86	40	-	259	-	79	465	465	-	-	-	4,666	-	-	-	93,499	1,146	-
4a.4.7	Plant energy budget	-	-	-	-	-	-	1,037	156	1,193	1,193	-	-	-	-	-	-	-	-	-	-
4a.4.8	NRC Fees	-	-	-	-	-	-	376	38	414	414	-	-	-	-	-	-	-	-	-	-
4a.4.9	Site O&M Cost	-	-	-	-	-	-	137	20	157	157	-	-	-	-	-	-	-	-	-	-
4a.4.10	Radwaste Processing Equipment/Services	-	-	-	-	-	-	399	60	459	459	-	-	-	-	-	-	-	-	-	-
4a.4.11	Security Staff Cost	-	-	-	-	-	-	2,260	339	2,599	2,599	-	-	-	-	-	-	-	-	-	65,687
4a.4.12	DOC Staff Cost	-	-	-	-	-	-	11,794	1,769	13,563	13,563	-	-	-	-	-	-	-	-	-	172,528
4a.4.13	Utility Staff Cost	-	-	-	-	-	-	17,278	2,592	19,870	19,870	-	-	-	-	-	-	-	-	-	291,886
4a.4	Subtotal Period 4a Period-Dependent Costs	49	3,361	86	40	-	259	34,017	5,799	43,611	43,551	-	60	-	4,666	-	-	-	93,499	1,146	530,100

Table E-1
Zion Nuclear Power Station Unit 1
SAFSTOR Decommissioning Cost Estimate
(Thousands of 2006 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
4a.0	TOTAL PERIOD 4a COST	158	28,395	5,339	2,954	10,127	25,456	34,276	25,426	132,130	126,205	-	5,925	241,578	48,609	3,455	950	203	14,811,690	360,447	535,335
PERIOD 4b - Site Decontamination																					
Period 4b Direct Decommissioning Activities																					
4b.1.1	Remove spent fuel racks	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Disposal of Plant Systems																					
4b.1.2.1	AUX-542-1_BRY	-	127	11	6	-	168	-	76	387	387	-	-	-	552	-	-	-	49,471	2,294	-
4b.1.2.2	AUX-542-1_PRO	-	501	9	21	265	-	-	169	966	966	-	-	6,224	-	-	-	-	252,763	9,446	-
4b.1.2.3	AUX-542-2_BRY	-	141	36	23	-	662	-	208	1,069	1,069	-	-	-	2,176	-	-	-	195,234	2,723	-
4b.1.2.4	AUX-542-2_PRO	-	364	9	20	253	-	-	133	779	779	-	-	5,931	-	-	-	-	240,844	6,871	-
4b.1.2.5	AUX-542-3_BRY	-	128	24	12	-	346	-	123	633	633	-	-	-	1,493	-	-	-	101,952	2,439	-
4b.1.2.6	AUX-542-3_PRO	-	36	1	1	15	-	-	11	64	64	-	-	358	-	-	-	-	14,551	616	-
4b.1.2.7	AUX-560-1_BRY	-	14	1	1	-	17	-	8	40	40	-	-	-	56	-	-	-	5,002	235	-
4b.1.2.8	AUX-560-1_PRO	-	1,009	19	44	546	-	-	342	1,959	1,959	-	-	12,794	-	-	-	-	519,581	18,898	-
4b.1.2.9	AUX-560-2_BRY	-	70	12	7	-	203	-	71	363	363	-	-	-	668	-	-	-	59,933	1,304	-
4b.1.2.10	AUX-560-2_PRO	-	555	18	42	524	-	-	225	1,364	1,364	-	-	12,285	-	-	-	-	498,917	10,474	-
4b.1.2.11	AUX-579-1_BRY	-	61	6	3	-	94	-	40	203	203	-	-	-	310	-	-	-	27,770	1,112	-
4b.1.2.12	AUX-579-1_PRO	-	650	10	23	284	-	-	210	1,177	1,177	-	-	6,668	-	-	-	-	270,810	12,291	-
4b.1.2.13	AUX-579-2_BRY	-	89	9	6	-	158	-	64	325	325	-	-	-	520	-	-	-	46,627	1,624	-
4b.1.2.14	AUX-579-2_PRO	-	250	4	9	117	-	-	82	462	462	-	-	2,739	-	-	-	-	111,231	4,677	-
4b.1.2.15	AUX-579-3_BRY	-	33	8	4	-	108	-	37	189	189	-	-	-	464	-	-	-	31,754	656	-
4b.1.2.16	AUX-579-3_PRO	-	104	2	6	72	-	-	38	223	223	-	-	1,697	-	-	-	-	68,920	1,984	-
4b.1.2.17	AUX.BLDG-VPC_BRY	-	66	6	4	-	102	-	43	220	220	-	-	-	335	-	-	-	30,014	1,186	-
4b.1.2.18	AUX.BLDG-VPC_PRO	-	466	7	18	221	-	-	153	865	865	-	-	5,178	-	-	-	-	210,270	8,787	-
4b.1.2.19	DG-567-1_CLN	-	77	-	-	-	-	-	12	89	-	-	89	-	-	-	-	-	-	1,501	-
4b.1.2.20	DG-592-1_CLN	-	85	-	-	-	-	-	13	98	-	-	98	-	-	-	-	-	-	1,664	-
4b.1.2.21	DG-617-1_CLN	-	68	-	-	-	-	-	10	78	-	-	78	-	-	-	-	-	-	1,342	-
4b.1.2.22	PT-570-1_PRO	-	255	11	26	327	-	-	118	736	736	-	-	7,659	-	-	-	-	311,055	4,791	-
4b.1.2.23	RX-568-1_BRY	-	946	96	65	-	1,851	-	718	3,676	3,676	-	-	-	6,115	-	-	-	546,003	18,135	-
4b.1.2.24	RX-568-1_PRO	-	442	13	32	394	-	-	176	1,057	1,057	-	-	9,250	-	-	-	-	375,629	8,107	-
4b.1.2.25	RX-592-1_BRY	-	468	38	23	-	662	-	290	1,482	1,482	-	-	-	2,179	-	-	-	195,415	8,708	-
4b.1.2.26	RX-592-1_PRO	-	573	17	39	490	-	-	224	1,343	1,343	-	-	11,487	-	-	-	-	466,506	10,562	-
4b.1.2.27	RX-617-1_BRY	-	667	47	32	-	912	-	404	2,062	2,062	-	-	-	2,997	-	-	-	268,935	12,803	-
4b.1.2.28	RX-617-1_PRO	-	770	19	45	557	-	-	285	1,676	1,676	-	-	13,073	-	-	-	-	530,899	14,245	-
4b.1.2	Totals	-	9,014	432	512	4,066	5,282	-	4,281	23,586	23,321	-	265	95,344	17,864	-	-	-	5,430,084	169,475	-
4b.1.3	Scaffolding in support of decommissioning	-	1,383	13	3	35	14	-	356	1,804	1,804	-	-	739	46	-	-	-	37,381	28,425	-
Decontamination of Site Buildings																					
4b.1.4.1	Reactor Building	1,017	880	103	101	268	1,649	-	1,207	5,226	5,226	-	-	6,296	6,026	-	-	-	792,395	34,938	-
4b.1.4.2	Auxiliary Building	556	340	22	25	51	324	-	458	1,776	1,776	-	-	1,204	1,294	-	-	-	164,812	16,512	-
4b.1.4.3	Contaminated Soil	-	36	870	940	-	13,972	-	3,730	19,548	19,548	-	-	-	56,015	-	-	-	5,026,005	2,858	-
4b.1.4.4	Service Building & Addition	38	1	0	0	-	5	-	20	64	64	-	-	-	18	-	-	-	1,635	638	-
4b.1.4	Totals	1,611	1,256	995	1,067	320	15,950	-	5,415	26,614	26,614	-	-	7,499	63,353	-	-	-	5,984,847	54,946	-
4b.1	Subtotal Period 4b Activity Costs	1,611	11,653	1,440	1,582	4,420	21,246	-	10,052	52,004	51,739	-	265	103,583	81,263	-	-	-	11,452,310	252,846	-
Period 4b Collateral Costs																					
4b.3.1	Process liquid waste	25	-	10	45	-	30	-	28	139	139	-	-	-	182	-	-	-	8,963	40	-
4b.3.2	Small tool allowance	-	215	-	-	-	-	-	32	247	247	-	-	-	-	-	-	-	-	-	-
4b.3.3	Decommissioning Equipment Disposition	-	-	101	32	284	114	-	86	616	616	-	-	6,000	373	-	-	-	303,507	739	-
4b.3	Subtotal Period 4b Collateral Costs	25	215	111	77	284	144	-	146	1,002	1,002	-	-	6,000	556	-	-	-	312,470	780	-

Table E-1
Zion Nuclear Power Station Unit 1
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(Thousands of 2006 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
Period 4b Period-Dependent Costs																					
4b.4.1	Decon supplies	581	-	-	-	-	-	-	145	726	726	-	-	-	-	-	-	-	-	-	-
4b.4.2	Insurance	-	-	-	-	-	-	245	24	269	269	-	-	-	-	-	-	-	-	-	-
4b.4.3	Property taxes	-	-	-	-	-	-	705	70	775	775	-	-	-	-	-	-	-	-	-	-
4b.4.4	Health physics supplies	-	1,266	-	-	-	-	-	316	1,582	1,582	-	-	-	-	-	-	-	-	-	-
4b.4.5	Heavy equipment rental	-	2,341	-	-	-	-	-	351	2,692	2,692	-	-	-	-	-	-	-	-	-	-
4b.4.6	Disposal of DAW generated	-	-	83	39	-	250	-	77	449	449	-	-	-	4,504	-	-	-	90,250	1,106	-
4b.4.7	Plant energy budget	-	-	-	-	-	-	1,057	159	1,215	1,215	-	-	-	-	-	-	-	-	-	-
4b.4.8	NRC Fees	-	-	-	-	-	-	485	49	534	534	-	-	-	-	-	-	-	-	-	-
4b.4.9	Site O&M Cost	-	-	-	-	-	-	176	26	203	203	-	-	-	-	-	-	-	-	-	-
4b.4.10	Radwaste Processing Equipment/Services	-	-	-	-	-	-	515	77	592	592	-	-	-	-	-	-	-	-	-	-
4b.4.11	Security Staff Cost	-	-	-	-	-	-	1,671	251	1,922	1,922	-	-	-	-	-	-	-	-	-	48,557
4b.4.12	DOC Staff Cost	-	-	-	-	-	-	10,562	1,584	12,146	12,146	-	-	-	-	-	-	-	-	-	158,914
4b.4.13	Utility Staff Cost	-	-	-	-	-	-	15,121	2,268	17,390	17,390	-	-	-	-	-	-	-	-	-	264,857
4b.4	Subtotal Period 4b Period-Dependent Costs	581	3,607	83	39	-	250	30,538	5,398	40,496	40,496	-	-	-	4,504	-	-	-	90,250	1,106	472,329
4b.0	TOTAL PERIOD 4b COST	2,218	15,474	1,634	1,698	4,704	21,640	30,538	15,596	93,502	93,237	-	265	109,583	86,323	-	-	-	11,855,030	254,732	472,329
PERIOD 4d - Delay before License Termination																					
Period 4d Direct Decommissioning Activities																					
Period 4d Collateral Costs																					
4d.3	Subtotal Period 4d Collateral Costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Period 4d Period-Dependent Costs																					
4d.4.1	Insurance	-	-	-	-	-	-	31	3	34	34	-	-	-	-	-	-	-	-	-	-
4d.4.2	Property taxes	-	-	-	-	-	-	309	31	340	340	-	-	-	-	-	-	-	-	-	-
4d.4.3	Health physics supplies	-	40	-	-	-	-	-	10	50	50	-	-	-	-	-	-	-	-	-	-
4d.4.4	Disposal of DAW generated	-	-	1	1	-	4	-	1	7	7	-	-	-	68	-	-	-	1,370	17	-
4d.4.5	Plant energy budget	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4d.4.6	NRC Fees	-	-	-	-	-	-	134	13	147	147	-	-	-	-	-	-	-	-	-	-
4d.4.7	Site O&M Cost	-	-	-	-	-	-	77	12	89	89	-	-	-	-	-	-	-	-	-	-
4d.4.8	Security Staff Cost	-	-	-	-	-	-	44	7	51	51	-	-	-	-	-	-	-	-	-	1,291
4d.4.9	Utility Staff Cost	-	-	-	-	-	-	527	79	606	606	-	-	-	-	-	-	-	-	-	9,040
4d.4	Subtotal Period 4d Period-Dependent Costs	-	40	1	1	-	4	1,122	156	1,324	1,324	-	-	-	68	-	-	-	1,370	17	10,331
4d.0	TOTAL PERIOD 4d COST	-	40	1	1	-	4	1,122	156	1,324	1,324	-	-	-	68	-	-	-	1,370	17	10,331
PERIOD 4e - License Termination																					
Period 4e Direct Decommissioning Activities																					
4e.1.1	ORISE confirmatory survey	-	-	-	-	-	-	140	42	183	183	-	-	-	-	-	-	-	-	-	-
4e.1.2	Terminate license									a											
4e.1	Subtotal Period 4e Activity Costs	-	-	-	-	-	-	140	42	183	183	-	-	-	-	-	-	-	-	-	-
Period 4e Additional Costs																					
4e.2.1	Final Site Survey	-	-	-	-	-	-	8,655	2,597	11,252	11,252	-	-	-	-	-	-	-	-	164,765	-
4e.2	Subtotal Period 4e Additional Costs	-	-	-	-	-	-	8,655	2,597	11,252	11,252	-	-	-	-	-	-	-	-	164,765	-
Period 4e Collateral Costs																					
4e.3.1	DOC staff relocation expenses	-	-	-	-	-	-	829	124	953	953	-	-	-	-	-	-	-	-	-	-
4e.3	Subtotal Period 4e Collateral Costs	-	-	-	-	-	-	829	124	953	953	-	-	-	-	-	-	-	-	-	-

Table E-1
Zion Nuclear Power Station Unit 1
SAFSTOR Decommissioning Cost Estimate
(Thousands of 2006 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Period 4e Period-Dependent Costs																					
4e.4.1	Insurance	-	-	-	-	-	-	38	4	42	42	-	-	-	-	-	-	-	-	-	-
4e.4.2	Property taxes	-	-	-	-	-	-	382	38	420	420	-	-	-	-	-	-	-	-	-	-
4e.4.3	Health physics supplies	-	783	-	-	-	-	-	196	978	978	-	-	-	-	-	-	-	-	-	-
4e.4.4	Disposal of DAW generated	-	-	7	3	-	21	-	6	38	38	-	-	-	377	-	-	-	7,553	93	-
4e.4.5	Plant energy budget	-	-	-	-	-	-	153	23	176	176	-	-	-	-	-	-	-	-	-	-
4e.4.6	NRC Fees	-	-	-	-	-	-	263	26	289	289	-	-	-	-	-	-	-	-	-	-
4e.4.7	Site O&M Cost	-	-	-	-	-	-	95	14	110	110	-	-	-	-	-	-	-	-	-	-
4e.4.8	Security Staff Cost	-	-	-	-	-	-	432	65	497	497	-	-	-	-	-	-	-	-	-	12,563
4e.4.9	DOC Staff Cost	-	-	-	-	-	-	3,340	501	3,841	3,841	-	-	-	-	-	-	-	-	-	47,430
4e.4.10	Utility Staff Cost	-	-	-	-	-	-	3,764	565	4,329	4,329	-	-	-	-	-	-	-	-	-	58,590
4e.4	Subtotal Period 4e Period-Dependent Costs	-	783	7	3	-	21	8,467	1,438	10,719	10,719	-	-	-	377	-	-	-	7,553	93	118,583
4e.0	TOTAL PERIOD 4e COST	-	783	7	3	-	21	18,092	4,201	23,107	23,107	-	-	-	377	-	-	-	7,553	164,858	118,583
PERIOD 4 TOTALS		2,375	44,692	6,981	4,656	14,831	47,121	84,028	45,379	250,062	243,872	-	6,190	351,160	135,377	3,455	950	203	26,675,650	780,053	1,136,578
PERIOD 5b - Site Restoration																					
Period 5b Direct Decommissioning Activities																					
Demolition of Remaining Site Buildings																					
5b.1.1.1	Reactor Building	-	4,151	-	-	-	-	-	623	4,774	-	-	4,774	-	-	-	-	-	-	49,418	-
5b.1.1.2	Auxiliary Building	-	1,895	-	-	-	-	-	284	2,179	-	-	2,179	-	-	-	-	-	-	24,718	-
5b.1.1.3	Crib House	-	644	-	-	-	-	-	97	741	-	-	741	-	-	-	-	-	-	7,389	-
5b.1.1.4	Diesel Generator Building	-	328	-	-	-	-	-	49	377	-	-	377	-	-	-	-	-	-	4,557	-
5b.1.1.5	Discharge Tunnel Outfall	-	154	-	-	-	-	-	23	177	-	-	177	-	-	-	-	-	-	2,192	-
5b.1.1.6	Service Building & Addition	-	1,025	-	-	-	-	-	154	1,179	-	-	1,179	-	-	-	-	-	-	15,231	-
5b.1.1.7	Turbine Building	-	1,835	-	-	-	-	-	275	2,110	-	-	2,110	-	-	-	-	-	-	26,135	-
5b.1.1.8	Turbine Pedestal	-	1,759	-	-	-	-	-	264	2,023	-	-	2,023	-	-	-	-	-	-	19,735	-
5b.1.1	Totals	-	11,792	-	-	-	-	-	1,769	13,561	-	-	13,561	-	-	-	-	-	-	149,376	-
Site Closeout Activities																					
5b.1.2	Grade & landscape site	-	44	-	-	-	-	-	7	50	-	-	50	-	-	-	-	-	-	132	-
5b.1.3	Final report to NRC	-	-	-	-	-	-	147	22	169	169	-	-	-	-	-	-	-	-	-	1,560
5b.1	Subtotal Period 5b Activity Costs	-	11,836	-	-	-	-	147	1,797	13,781	169	-	13,611	-	-	-	-	-	-	149,508	1,560
Period 5b Additional Costs																					
5b.2.1	Concrete Crushing	-	406	-	-	-	-	3	61	470	-	-	470	-	-	-	-	-	-	2,258	-
5b.2	Subtotal Period 5b Additional Costs	-	406	-	-	-	-	3	61	470	-	-	470	-	-	-	-	-	-	2,258	-
Period 5b Collateral Costs																					
5b.3.1	Small tool allowance	-	141	-	-	-	-	-	21	162	-	-	162	-	-	-	-	-	-	-	-
5b.3	Subtotal Period 5b Collateral Costs	-	141	-	-	-	-	-	21	162	-	-	162	-	-	-	-	-	-	-	-
Period 5b Period-Dependent Costs																					
5b.4.1	Insurance	-	-	-	-	-	-	104	10	114	-	-	114	-	-	-	-	-	-	-	-
5b.4.2	Property taxes	-	-	-	-	-	-	1,040	104	1,144	-	-	1,144	-	-	-	-	-	-	-	-
5b.4.3	Heavy equipment rental	-	4,704	-	-	-	-	-	706	5,409	-	-	5,409	-	-	-	-	-	-	-	-
5b.4.4	Plant energy budget	-	-	-	-	-	-	208	31	239	-	-	239	-	-	-	-	-	-	-	-
5b.4.5	Site O&M Cost	-	-	-	-	-	-	260	39	299	-	-	299	-	-	-	-	-	-	-	-
5b.4.6	Security Staff Cost	-	-	-	-	-	-	1,102	165	1,267	-	-	1,267	-	-	-	-	-	-	-	32,050
5b.4.7	DOC Staff Cost	-	-	-	-	-	-	9,833	1,475	11,308	-	-	11,308	-	-	-	-	-	-	-	137,886
5b.4.8	Utility Staff Cost	-	-	-	-	-	-	4,928	739	5,667	-	-	5,667	-	-	-	-	-	-	-	78,171
5b.4	Subtotal Period 5b Period-Dependent Costs	-	4,704	-	-	-	-	17,475	3,270	25,448	-	-	25,448	-	-	-	-	-	-	-	248,107
5b.0	TOTAL PERIOD 5b COST	-	17,086	-	-	-	-	17,626	5,150	39,861	169	-	39,692	-	-	-	-	-	-	151,766	249,667
PERIOD 5 TOTALS		-	17,086	-	-	-	-	17,626	5,150	39,861	169	-	39,692	-	-	-	-	-	-	151,766	249,667

Table E-1
Zion Nuclear Power Station Unit 1
SAFSTOR Decommissioning Cost Estimate
(Thousands of 2006 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
TOTAL COST TO DECOMMISSION		3,135	72,720	7,225	5,444	14,831	51,402	381,215	73,500	609,471	404,865	157,528	47,078	351,160	243,378	3,455	950	203	28,216,010	1,036,402	3,047,401

TOTAL COST TO DECOMMISSION WITH 13.71% CONTINGENCY:	**$609,471**	**thousands of 2006 dollars**
TOTAL NRC LICENSE TERMINATION COST IS 66.43% OR:	**$404,865**	**thousands of 2006 dollars**
SPENT FUEL MANAGEMENT COST IS 25.85% OR:	**$157,528**	**thousands of 2006 dollars**
NON-NUCLEAR DEMOLITION COST IS 7.72% OR:	**$47,078**	**thousands of 2006 dollars**
TOTAL PRIMARY SITE RADWASTE VOLUME BURIED:	**69,759**	**Cubic Feet**
TOTAL SECONDARY SITE RADWASTE VOLUME BURIED:	**178,025**	**Cubic Feet**
TOTAL TERTIARY SITE RADWASTE VOLUME BURIED:		**Cubic Feet**
TOTAL GREATER THAN CLASS C RADWASTE VOLUME GENERATED:	**203**	**Cubic Feet**
TOTAL SCRAP METAL REMOVED:	**41,133**	**Tons**
TOTAL CRAFT LABOR REQUIREMENTS:	**1,036,402**	**Man-hours**

End Notes:
n/a - indicates that this activity not charged as decommissioning expense.
a - indicates that this activity performed by decommissioning staff.
0 - indicates that this value is less than 0.5 but is non-zero.
a cell containing " - " indicates a zero value

Table E-2
Zion Nuclear Power Station Unit 2
SAFSTOR Decommissioning Cost Estimate
(Thousands of 2006 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes: Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
	2006-2028 Decommissioning Expenditures	-	-	-	-	-	-	147,465	-	147,465	-	147,465	-	-	-	-	-	-	-	-	-
	Spent Fuel Capital and Transfer	-	-	-	-	-	-	8,750	1,313	10,063	-	10,063	-	-	-	-	-	-	-	-	-
PERIOD 2c - SAFSTOR Dormancy without Spent Fuel Storage																					
Period 2c Direct Decommissioning Activities																					
2c.1.1	Quarterly Inspection									a											
2c.1.2	Semi-annual environmental survey									a											
2c.1.3	Prepare reports									a											
2c.1.4	Bituminous roof replacement	-	-	-	-	-	-	311	47	358	358	-	-	-	-	-	-	-	-	-	-
2c.1.5	Maintenance supplies	-	-	-	-	-	-	3,061	765	3,826	3,826	-	-	-	-	-	-	-	-	-	-
2c.1	Subtotal Period 2c Activity Costs	-	-	-	-	-	-	3,372	812	4,184	4,184	-	-	-	-	-	-	-	-	-	-
Period 2c Collateral Costs																					
2c.3	Subtotal Period 2c Collateral Costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Period 2c Period-Dependent Costs																					
2c.4.1	Insurance	-	-	-	-	-	-	2,700	270	2,970	2,970	-	-	-	-	-	-	-	-	-	-
2c.4.2	Property taxes	-	-	-	-	-	-	12,167	1,217	13,384	13,384	-	-	-	-	-	-	-	-	-	-
2c.4.3	Health physics supplies	-	1,577	-	-	-	-	-	394	1,971	1,971	-	-	-	-	-	-	-	-	-	-
2c.4.4	Disposal of DAW generated	-	-	183	86	-	555	-	170	994	994	-	-	-	9,976	-	-	-	199,918	2,449	-
2c.4.5	Plant energy budget	-	-	-	-	-	-	2,432	365	2,797	2,797	-	-	-	-	-	-	-	-	-	-
2c.4.6	NRC Fees	-	-	-	-	-	-	5,251	525	5,776	5,776	-	-	-	-	-	-	-	-	-	-
2c.4.7	Site O&M Cost	-	-	-	-	-	-	3,042	456	3,498	3,498	-	-	-	-	-	-	-	-	-	-
2c.4.8	Security Staff Cost	-	-	-	-	-	-	2,185	328	2,512	2,512	-	-	-	-	-	-	-	-	-	63,486
2c.4.9	Utility Staff Cost	-	-	-	-	-	-	11,181	1,677	12,858	12,858	-	-	-	-	-	-	-	-	-	203,154
2c.4	Subtotal Period 2c Period-Dependent Costs	-	1,577	183	86	-	555	38,957	5,402	46,760	46,760	-	-	-	9,976	-	-	-	199,918	2,449	266,640
2c.0	TOTAL PERIOD 2c COST	-	1,577	183	86	-	555	42,329	6,214	50,944	50,944	-	-	-	9,976	-	-	-	199,918	2,449	266,640
PERIOD 2 TOTALS		-	1,577	183	86	-	555	42,329	6,214	50,944	50,944	-	-	-	9,976	-	-	-	199,918	2,449	266,640
PERIOD 3a - Reactivate Site Following SAFSTOR Dormancy																					
Period 3a Direct Decommissioning Activities																					
3a.1.1	Prepare preliminary decommissioning cost	-	-	-	-	-	-	53	8	60	60	-	-	-	-	-	-	-	-	-	556
3a.1.2	Review plant dwgs & specs.	-	-	-	-	-	-	186	28	214	214	-	-	-	-	-	-	-	-	-	1,967
3a.1.3	Perform detailed rad survey									a											
3a.1.4	End product description	-	-	-	-	-	-	40	6	46	46	-	-	-	-	-	-	-	-	-	428
3a.1.5	Detailed by-product inventory	-	-	-	-	-	-	53	8	60	60	-	-	-	-	-	-	-	-	-	556
3a.1.6	Define major work sequence	-	-	-	-	-	-	303	45	348	348	-	-	-	-	-	-	-	-	-	3,207
3a.1.7	Perform SER and EA	-	-	-	-	-	-	125	19	144	144	-	-	-	-	-	-	-	-	-	1,326
3a.1.8	Perform Site-Specific Cost Study	-	-	-	-	-	-	202	30	232	232	-	-	-	-	-	-	-	-	-	2,138
3a.1.9	Prepare/submit License Termination Plan	-	-	-	-	-	-	165	25	190	190	-	-	-	-	-	-	-	-	-	1,751
3a.1.10	Receive NRC approval of termination plan									a											
Activity Specifications																					
3a.1.11.1	Re-activate plant & temporary facilities	-	-	-	-	-	-	298	45	342	308	-	34	-	-	-	-	-	-	-	3,151
3a.1.11.2	Plant systems	-	-	-	-	-	-	168	25	194	174	-	19	-	-	-	-	-	-	-	1,782
3a.1.11.3	Reactor internals	-	-	-	-	-	-	287	43	330	330	-	-	-	-	-	-	-	-	-	3,036
3a.1.11.4	Reactor vessel	-	-	-	-	-	-	263	39	302	302	-	-	-	-	-	-	-	-	-	2,779
3a.1.11.5	Biological shield	-	-	-	-	-	-	20	3	23	23	-	-	-	-	-	-	-	-	-	214
3a.1.11.6	Steam generators	-	-	-	-	-	-	126	19	145	145	-	-	-	-	-	-	-	-	-	1,334
3a.1.11.7	Reinforced concrete	-	-	-	-	-	-	65	10	74	37	-	37	-	-	-	-	-	-	-	684
3a.1.11.8	Main Turbine	-	-	-	-	-	-	16	2	19	-	-	19	-	-	-	-	-	-	-	171
3a.1.11.9	Main Condensers	-	-	-	-	-	-	16	2	19	-	-	19	-	-	-	-	-	-	-	171
3a.1.11.10	Plant structures & buildings	-	-	-	-	-	-	126	19	145	72	-	72	-	-	-	-	-	-	-	1,334
3a.1.11.11	Waste management	-	-	-	-	-	-	186	28	214	214	-	-	-	-	-	-	-	-	-	1,967
3a.1.11.12	Facility & site closeout	-	-	-	-	-	-	36	5	42	21	-	21	-	-	-	-	-	-	-	385
3a.1.11	Total	-	-	-	-	-	-	1,607	241	1,848	1,626	-	221	-	-	-	-	-	-	-	17,009

Table E-2
Zion Nuclear Power Station Unit 2
SAFSTOR Decommissioning Cost Estimate
(Thousands of 2006 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
Planning & Site Preparations																					
3a.1.12	Prepare dismantling sequence	-	-	-	-	-	-	97	15	111	111	-	-	-	-	-	-	-	-	-	1,026
3a.1.13	Plant prep. & temp. svces	-	-	-	-	-	-	2,419	363	2,782	2,782	-	-	-	-	-	-	-	-	-	-
3a.1.14	Design water clean-up system	-	-	-	-	-	-	57	8	65	65	-	-	-	-	-	-	-	-	-	599
3a.1.15	Rigging/Cont. Cntrl Envlps/tooling/etc.	-	-	-	-	-	-	2,048	307	2,355	2,355	-	-	-	-	-	-	-	-	-	-
3a.1.16	Procure casks/liners & containers	-	-	-	-	-	-	50	7	57	57	-	-	-	-	-	-	-	-	-	526
3a.1	Subtotal Period 3a Activity Costs	-	-	-	-	-	-	7,403	1,111	8,514	8,293	-	221	-	-	-	-	-	-	-	31,088
Period 3a Collateral Costs																					
3a.3	Subtotal Period 3a Collateral Costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Period 3a Period-Dependent Costs																					
3a.4.1	Insurance	-	-	-	-	-	-	161	16	177	177	-	-	-	-	-	-	-	-	-	-
3a.4.2	Property taxes	-	-	-	-	-	-	500	50	550	550	-	-	-	-	-	-	-	-	-	-
3a.4.3	Health physics supplies	-	259	-	-	-	-	-	65	324	324	-	-	-	-	-	-	-	-	-	-
3a.4.4	Heavy equipment rental	-	334	-	-	-	-	-	50	384	384	-	-	-	-	-	-	-	-	-	-
3a.4.5	Disposal of DAW generated	-	-	10	5	-	30	-	9	54	54	-	-	-	538	-	-	-	10,777	132	-
3a.4.6	Plant energy budget	-	-	-	-	-	-	999	150	1,148	1,148	-	-	-	-	-	-	-	-	-	-
3a.4.7	NRC Fees	-	-	-	-	-	-	258	26	284	284	-	-	-	-	-	-	-	-	-	-
3a.4.8	Site O&M Cost	-	-	-	-	-	-	125	19	144	144	-	-	-	-	-	-	-	-	-	-
3a.4.9	Security Staff Cost	-	-	-	-	-	-	628	94	722	722	-	-	-	-	-	-	-	-	-	18,250
3a.4.10	Utility Staff Cost	-	-	-	-	-	-	11,915	1,787	13,703	13,703	-	-	-	-	-	-	-	-	-	208,571
3a.4	Subtotal Period 3a Period-Dependent Costs	-	593	10	5	-	30	14,586	2,266	17,490	17,490	-	-	-	538	-	-	-	10,777	132	226,821
3a.0	TOTAL PERIOD 3a COST	-	593	10	5	-	30	21,989	3,377	26,004	25,782	-	221	-	538	-	-	-	10,777	132	257,909
PERIOD 3b - Decommissioning Preparations																					
Period 3b Direct Decommissioning Activities																					
Detailed Work Procedures																					
3b.1.1.1	Plant systems	-	-	-	-	-	-	191	29	220	198	-	22	-	-	-	-	-	-	-	2,024
3b.1.1.2	Reactor internals	-	-	-	-	-	-	101	15	116	116	-	-	-	-	-	-	-	-	-	1,069
3b.1.1.3	Remaining buildings	-	-	-	-	-	-	55	8	63	16	-	47	-	-	-	-	-	-	-	577
3b.1.1.4	CRD cooling assembly	-	-	-	-	-	-	40	6	46	46	-	-	-	-	-	-	-	-	-	428
3b.1.1.5	CRD housings & ICI tubes	-	-	-	-	-	-	40	6	46	46	-	-	-	-	-	-	-	-	-	428
3b.1.1.6	Incore instrumentation	-	-	-	-	-	-	40	6	46	46	-	-	-	-	-	-	-	-	-	428
3b.1.1.7	Reactor vessel	-	-	-	-	-	-	147	22	169	169	-	-	-	-	-	-	-	-	-	1,552
3b.1.1.8	Facility closeout	-	-	-	-	-	-	48	7	56	28	-	28	-	-	-	-	-	-	-	513
3b.1.1.9	Missile shields	-	-	-	-	-	-	18	3	21	21	-	-	-	-	-	-	-	-	-	192
3b.1.1.10	Biological shield	-	-	-	-	-	-	48	7	56	56	-	-	-	-	-	-	-	-	-	513
3b.1.1.11	Steam generators	-	-	-	-	-	-	186	28	214	214	-	-	-	-	-	-	-	-	-	1,967
3b.1.1.12	Reinforced concrete	-	-	-	-	-	-	40	6	46	23	-	23	-	-	-	-	-	-	-	428
3b.1.1.13	Main Turbine	-	-	-	-	-	-	63	9	72	-	-	72	-	-	-	-	-	-	-	667
3b.1.1.14	Main Condensers	-	-	-	-	-	-	63	9	72	-	-	72	-	-	-	-	-	-	-	667
3b.1.1.15	Auxiliary building	-	-	-	-	-	-	110	17	127	114	-	13	-	-	-	-	-	-	-	1,167
3b.1.1.16	Reactor building	-	-	-	-	-	-	110	17	127	114	-	13	-	-	-	-	-	-	-	1,167
3b.1.1	Total	-	-	-	-	-	-	1,302	195	1,498	1,207	-	290	-	-	-	-	-	-	-	13,787
3b.1	Subtotal Period 3b Activity Costs	-	-	-	-	-	-	1,302	195	1,498	1,207	-	290	-	-	-	-	-	-	-	13,787
Period 3b Additional Costs																					
3b.2.1	Site Characterization	-	-	-	-	-	-	496	74	570	570	-	-	-	-	-	-	-	-	-	-
3b.2.2	Clean Asbestos Remediation	-	4,101	34	524	-	2,739	-	1,792	9,190	9,190	-	-	-	73,458	-	-	-	985,174	60,916	-
3b.2.3	Contaminated Asbestos Remediation	-	3,553	17	262	-	1,326	-	1,261	6,419	6,419	-	-	-	36,698	-	-	-	477,074	49,815	-
3b.2	Subtotal Period 3b Additional Costs	-	7,654	51	786	-	4,065	496	3,127	16,179	16,179	-	-	-	110,156	-	-	-	1,462,248	110,731	-

Table E-2
Zion Nuclear Power Station Unit 2
SAFSTOR Decommissioning Cost Estimate
(Thousands of 2006 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
Period 3b Collateral Costs																					
3b.3.1	Decon equipment	737	-	-	-	-	-	-	111	847	847	-	-	-	-	-	-	-	-	-	-
3b.3.2	DOC staff relocation expenses	-	-	-	-	-	-	829	124	953	953	-	-	-	-	-	-	-	-	-	-
3b.3.3	Small tool allowance	-	109	-	-	-	-	-	16	125	125	-	-	-	-	-	-	-	-	-	-
3b.3.4	Pipe cutting equipment	-	957	-	-	-	-	-	143	1,100	1,100	-	-	-	-	-	-	-	-	-	-
3b.3	Subtotal Period 3b Collateral Costs	737	1,065	-	-	-	-	829	395	3,025	3,025	-	-	-	-	-	-	-	-	-	-
Period 3b Period-Dependent Costs																					
3b.4.1	Decon supplies	23	-	-	-	-	-	-	6	28	28	-	-	-	-	-	-	-	-	-	-
3b.4.2	Insurance	-	-	-	-	-	-	87	9	96	96	-	-	-	-	-	-	-	-	-	-
3b.4.3	Property taxes	-	-	-	-	-	-	251	25	276	276	-	-	-	-	-	-	-	-	-	-
3b.4.4	Health physics supplies	-	523	-	-	-	-	-	131	654	654	-	-	-	-	-	-	-	-	-	-
3b.4.5	Heavy equipment rental	-	168	-	-	-	-	-	25	193	193	-	-	-	-	-	-	-	-	-	-
3b.4.6	Disposal of DAW generated	-	-	6	3	-	17	-	5	30	30	-	-	-	300	-	-	-	6,007	74	-
3b.4.7	Plant energy budget	-	-	-	-	-	-	501	75	576	576	-	-	-	-	-	-	-	-	-	-
3b.4.8	NRC Fees	-	-	-	-	-	-	130	13	143	143	-	-	-	-	-	-	-	-	-	-
3b.4.9	Site O&M Cost	-	-	-	-	-	-	63	9	72	72	-	-	-	-	-	-	-	-	-	-
3b.4.10	Security Staff Cost	-	-	-	-	-	-	315	47	362	362	-	-	-	-	-	-	-	-	-	9,150
3b.4.11	DOC Staff Cost	-	-	-	-	-	-	3,134	470	3,604	3,604	-	-	-	-	-	-	-	-	-	47,057
3b.4.12	Utility Staff Cost	-	-	-	-	-	-	5,974	896	6,870	6,870	-	-	-	-	-	-	-	-	-	104,571
3b.4	Subtotal Period 3b Period-Dependent Costs	23	690	6	3	-	17	10,453	1,711	12,902	12,902	-	-	-	300	-	-	-	6,007	74	160,779
3b.0	TOTAL PERIOD 3b COST	759	9,410	57	788	-	4,082	13,080	5,428	33,604	33,314	-	290	-	110,456	-	-	-	1,468,255	110,805	174,566
PERIOD 3 TOTALS		759	10,003	67	793	-	4,112	35,070	8,805	59,608	59,096	-	512	-	110,994	-	-	-	1,479,032	110,937	432,475
PERIOD 4a - Large Component Removal																					
Period 4a Direct Decommissioning Activities																					
Nuclear Steam Supply System Removal																					
4a.1.1.1	Reactor Coolant Piping	19	62	33	21	24	763	-	226	1,148	1,148	-	-	207	1,861	-	-	-	248,034	1,453	-
4a.1.1.2	Pressurizer Relief Tank	3	9	5	3	4	112	-	33	168	168	-	-	33	296	-	-	-	36,571	212	-
4a.1.1.3	Reactor Coolant Pumps & Motors	8	33	41	11	133	2,178	-	582	2,987	2,987	-	-	696	3,527	-	-	-	769,120	1,048	-
4a.1.1.4	Pressurizer	8	57	415	95	-	704	-	250	1,530	1,530	-	-	-	2,446	-	-	-	267,971	2,566	750
4a.1.1.5	Steam Generators	31	3,966	2,230	1,311	1,228	4,978	-	2,855	16,599	16,599	-	-	37,344	17,284	-	-	-	3,132,422	20,507	2,850
4a.1.1.6	CRDMs/ICIs/Service Structure Removal	7	71	170	20	-	176	-	85	529	529	-	-	-	3,052	-	-	-	51,800	1,493	-
4a.1.1.7	Reactor Vessel Internals	21	1,448	998	490	-	5,520	130	4,248	12,855	12,855	-	-	-	2,383	501	950	-	396,325	17,135	817
4a.1.1.8	Vessel & Internals GTCC Disposal	-	-	-	-	-	3,428	-	514	3,942	3,942	-	-	-	-	-	-	203	41,900	-	-
4a.1.1.9	Reactor Vessel	-	3,250	734	180	-	5,687	130	5,529	15,510	15,510	-	-	-	6,672	2,955	-	-	985,324	17,135	817
4a.1.1	Totals	97	8,896	4,627	2,131	1,389	23,545	260	14,323	55,268	55,268	-	-	38,280	37,521	3,455	950	203	5,929,467	61,550	5,235
Removal of Major Equipment																					
4a.1.2	Main Turbine/Generator	-	180	121	29	362	-	-	116	808	808	-	-	7,664	-	-	-	-	344,901	3,293	-
4a.1.3	Main Condensers	-	378	114	27	340	-	-	161	1,021	1,021	-	-	7,194	-	-	-	-	323,743	6,807	-
Cascading Costs from Clean Building Demolition																					
4a.1.4.1	Reactor Building	-	712	-	-	-	-	-	107	819	819	-	-	-	-	-	-	-	-	8,643	-
4a.1.4.2	Auxiliary Building	-	211	-	-	-	-	-	32	242	242	-	-	-	-	-	-	-	-	2,746	-
4a.1.4.3	IRSF	-	72	-	-	-	-	-	11	83	83	-	-	-	-	-	-	-	-	948	-
4a.1.4.4	Fuel Building	-	156	-	-	-	-	-	23	180	180	-	-	-	-	-	-	-	-	1,955	-
4a.1.4	Totals	-	1,152	-	-	-	-	-	173	1,324	1,324	-	-	-	-	-	-	-	-	14,292	-
Disposal of Plant Systems																					
4a.1.5.1	AUX-592-1_BRY	-	130	18	9	-	266	-	102	526	526	-	-	-	1,096	-	-	-	78,595	2,420	-
4a.1.5.2	AUX-592-1_PRO	-	774	10	24	302	-	-	243	1,354	1,354	-	-	7,092	-	-	-	-	288,029	14,661	-
4a.1.5.3	AUX-592-2_BRY	-	33	4	2	-	43	-	20	101	101	-	-	-	143	-	-	-	12,808	627	-
4a.1.5.4	AUX-592-2_PRO	-	50	2	4	48	-	-	20	123	123	-	-	1,123	-	-	-	-	45,613	894	-
4a.1.5.5	AUX-592-3_BRY	-	470	102	49	-	1,416	-	489	2,527	2,527	-	-	-	6,249	-	-	-	417,696	9,188	-
4a.1.5.6	AUX-592-3_PRO	-	132	5	11	138	-	-	56	341	341	-	-	3,239	-	-	-	-	131,547	2,503	-

Table E-2
Zion Nuclear Power Station Unit 2
SAFSTOR Decommissioning Cost Estimate
(Thousands of 2006 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
Disposal of Plant Systems (continued)																					
4a.1.5.7	AUX-617-1_CLN	-	22	-	-	-	-	-	3	26	-	-	26	-	-	-	-	-	-	443	-
4a.1.5.8	AUX-617-2_CLN	-	273	-	-	-	-	-	41	314	-	-	314	-	-	-	-	-	-	5,386	-
4a.1.5.9	AUX-617-3_BRY	-	17	3	2	-	46	-	16	84	84	-	-	-	203	-	-	-	13,659	317	-
4a.1.5.10	AUX-617-3_PRO	-	585	7	17	216	-	-	182	1,007	1,007	-	-	5,062	-	-	-	-	205,577	11,027	-
4a.1.5.11	AUX-617-4_PRO	-	44	1	3	35	-	-	17	99	99	-	-	813	-	-	-	-	33,031	805	-
4a.1.5.12	AUX-617-5_BRY	-	122	26	14	-	403	-	136	700	700	-	-	-	1,582	-	-	-	118,805	2,376	-
4a.1.5.13	AUX-630-1_CLN	-	505	-	-	-	-	-	76	581	-	-	581	-	-	-	-	-	-	9,895	-
4a.1.5.14	AUX-642-1_CLN	-	413	-	-	-	-	-	62	475	-	-	475	-	-	-	-	-	-	8,094	-
4a.1.5.15	AUX-642-2_PRO	-	17	0	1	8	-	-	6	31	31	-	-	189	-	-	-	-	7,691	314	-
4a.1.5.16	AUX-654-1_PRO	-	158	2	5	65	-	-	50	280	280	-	-	1,518	-	-	-	-	61,659	3,051	-
4a.1.5.17	RX-592-2_BRY	-	326	25	16	-	460	-	201	1,029	1,029	-	-	-	1,513	-	-	-	135,756	5,985	-
4a.1.5.18	RX-592-2_PRO	-	253	5	11	141	-	-	87	498	498	-	-	3,318	-	-	-	-	134,751	4,656	-
4a.1.5.19	TB-560-1_CLN	-	583	-	-	-	-	-	87	670	-	-	670	-	-	-	-	-	-	11,565	-
4a.1.5.20	TB-560-1_PRO	-	1,128	54	127	1,580	-	-	543	3,432	3,432	-	-	37,046	-	-	-	-	1,504,441	21,380	-
4a.1.5.21	TB-592-1_CLN	-	491	-	-	-	-	-	74	565	-	-	565	-	-	-	-	-	-	9,843	-
4a.1.5.22	TB-592-1_PRO	-	1,102	34	81	1,002	-	-	441	2,661	2,661	-	-	23,507	-	-	-	-	954,629	20,684	-
4a.1.5.23	TB-592-2_CLN	-	587	-	-	-	-	-	88	675	-	-	675	-	-	-	-	-	-	11,641	-
4a.1.5.24	TB-592-2_PRO	-	226	5	12	146	-	-	81	470	470	-	-	3,426	-	-	-	-	139,142	4,132	-
4a.1.5.25	TB-592-3_CLN	-	544	-	-	-	-	-	82	626	-	-	626	-	-	-	-	-	-	10,831	-
4a.1.5.26	TB-592-3_PRO	-	355	11	26	324	-	-	142	858	858	-	-	7,598	-	-	-	-	308,563	6,615	-
4a.1.5.27	TB-592-4_CLN	-	111	-	-	-	-	-	17	127	-	-	127	-	-	-	-	-	-	2,189	-
4a.1.5.28	TB-617-1_CLN	-	531	-	-	-	-	-	80	610	-	-	610	-	-	-	-	-	-	10,631	-
4a.1.5.29	TB-617-1_PRO	-	1,185	55	129	1,607	-	-	562	3,538	3,538	-	-	37,687	-	-	-	-	1,530,477	22,452	-
4a.1.5.30	TB-617-2_CLN	-	187	-	-	-	-	-	28	215	-	-	215	-	-	-	-	-	-	3,737	-
4a.1.5.31	TB-617-2_PRO	-	350	17	41	506	-	-	171	1,085	1,085	-	-	11,858	-	-	-	-	481,578	6,598	-
4a.1.5.32	TB-617-3_CLN	-	761	-	-	-	-	-	114	876	-	-	876	-	-	-	-	-	-	15,199	-
4a.1.5.33	TB-617-3_PRO	-	683	16	38	478	-	-	250	1,466	1,466	-	-	11,219	-	-	-	-	455,590	12,336	-
4a.1.5.34	TB-642-1_CLN	-	244	-	-	-	-	-	37	280	-	-	280	-	-	-	-	-	-	4,827	-
4a.1.5.35	TB-642-1_PRO	-	674	57	134	1,668	-	-	444	2,977	2,977	-	-	39,122	-	-	-	-	1,588,772	12,783	-
4a.1.5.36	TB-642-2_CLN	-	46	-	-	-	-	-	7	53	-	-	53	-	-	-	-	-	-	902	-
4a.1.5	Totals	-	14,111	459	757	8,265	2,635	-	5,056	31,281	25,189	-	6,093	193,819	10,788	-	-	-	8,648,410	270,987	-
4a.1.6	Scaffolding in support of decommissioning	-	785	11	3	29	12	-	205	1,045	1,045	-	-	618	38	-	-	-	31,274	16,198	-
4a.1	Subtotal Period 4a Activity Costs	97	25,502	5,332	2,947	10,385	26,192	260	20,034	90,747	84,654	-	6,093	247,576	48,347	3,455	950	203	15,277,790	373,128	5,235
Period 4a Additional Costs																					
4a.2.1	Curie Surcharge (excluding RPV)	-	-	-	-	-	68	-	17	85	85	-	-	-	-	-	-	-	-	-	-
4a.2	Subtotal Period 4a Additional Costs	-	-	-	-	-	68	-	17	85	85	-	-	-	-	-	-	-	-	-	-
Period 4a Collateral Costs																					
4a.3.1	Process liquid waste	63	-	24	113	-	75	-	70	345	345	-	-	-	452	-	-	-	22,242	100	-
4a.3.2	Small tool allowance	-	313	-	-	-	-	-	47	359	323	-	36	-	-	-	-	-	-	-	-
4a.3	Subtotal Period 4a Collateral Costs	63	313	24	113	-	75	-	117	704	668	-	36	-	452	-	-	-	22,242	100	-
Period 4a Period-Dependent Costs																					
4a.4.1	Decon supplies	49	-	-	-	-	-	-	12	61	61	-	-	-	-	-	-	-	-	-	-
4a.4.2	Insurance	-	-	-	-	-	-	190	19	209	209	-	-	-	-	-	-	-	-	-	-
4a.4.3	Property taxes	-	-	-	-	-	-	546	55	601	541	-	60	-	-	-	-	-	-	-	-
4a.4.4	Health physics supplies	-	1,608	-	-	-	-	-	402	2,010	2,010	-	-	-	-	-	-	-	-	-	-
4a.4.5	Heavy equipment rental	-	1,803	-	-	-	-	-	270	2,073	2,073	-	-	-	-	-	-	-	-	-	-
4a.4.6	Disposal of DAW generated	-	-	90	42	-	273	-	83	488	488	-	-	-	4,902	-	-	-	98,225	1,203	-
4a.4.7	Plant energy budget	-	-	-	-	-	-	1,037	156	1,193	1,193	-	-	-	-	-	-	-	-	-	-
4a.4.8	NRC Fees	-	-	-	-	-	-	376	38	414	414	-	-	-	-	-	-	-	-	-	-
4a.4.9	Site O&M Cost	-	-	-	-	-	-	137	20	157	157	-	-	-	-	-	-	-	-	-	-
4a.4.10	Radwaste Processing Equipment/Services	-	-	-	-	-	-	399	60	459	459	-	-	-	-	-	-	-	-	-	-
4a.4.11	Security Staff Cost	-	-	-	-	-	-	2,135	320	2,455	2,455	-	-	-	-	-	-	-	-	-	62,039
4a.4.12	DOC Staff Cost	-	-	-	-	-	-	11,746	1,762	13,508	13,508	-	-	-	-	-	-	-	-	-	171,980
4a.4.13	Utility Staff Cost	-	-	-	-	-	-	16,988	2,548	19,536	19,536	-	-	-	-	-	-	-	-	-	288,580
4a.4	Subtotal Period 4a Period-Dependent Costs	49	3,411	90	42	-	273	33,553	5,746	43,164	43,104	-	60	-	4,902	-	-	-	98,225	1,203	522,599

Table E-2
Zion Nuclear Power Station Unit 2
SAFSTOR Decommissioning Cost Estimate
(Thousands of 2006 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
4a.0	TOTAL PERIOD 4a COST	209	29,225	5,446	3,102	10,385	26,608	33,813	25,913	134,700	128,511	-	6,189	247,576	53,701	3,455	950	203	15,398,260	374,432	527,834
PERIOD 4b - Site Decontamination																					
Period 4b Direct Decommissioning Activities																					
4b.1.1	Remove spent fuel racks	357	100	261	60	-	1,711	-	666	3,154	3,154	-	-	-	5,624	-	-	-	504,611	2,194	-
Disposal of Plant Systems																					
4b.1.2.1	AUX.BLDG-VPC_BRY	-	67	6	4	-	103	-	44	223	223	-	-	-	338	-	-	-	30,298	1,212	-
4b.1.2.2	AUX.BLDG-VPC_PRO	-	466	7	18	221	-	-	153	865	865	-	-	5,178	-	-	-	-	210,270	8,787	-
4b.1.2.3	AUX-542-1_BRY	-	236	35	18	-	509	-	192	989	989	-	-	-	1,987	-	-	-	150,002	4,419	-
4b.1.2.4	AUX-542-1_PRO	-	524	10	24	294	-	-	180	1,031	1,031	-	-	6,888	-	-	-	-	279,722	9,875	-
4b.1.2.5	AUX-542-2_BRY	-	167	40	25	-	720	-	229	1,181	1,181	-	-	-	2,410	-	-	-	212,350	3,221	-
4b.1.2.6	AUX-542-2_PRO	-	458	11	26	325	-	-	168	989	989	-	-	7,626	-	-	-	-	309,679	8,676	-
4b.1.2.7	AUX-542-3_BRY	-	303	68	33	-	939	-	322	1,664	1,664	-	-	-	4,156	-	-	-	276,936	5,869	-
4b.1.2.8	AUX-542-3_PRO	-	36	1	1	15	-	-	11	64	64	-	-	358	-	-	-	-	14,551	616	-
4b.1.2.9	AUX-560-1_BRY	-	34	8	5	-	140	-	45	232	232	-	-	-	497	-	-	-	41,279	635	-
4b.1.2.10	AUX-560-1_PRO	-	1,122	38	90	1,115	-	-	465	2,830	2,830	-	-	26,147	-	-	-	-	1,061,840	21,100	-
4b.1.2.11	AUX-560-2_BRY	-	157	34	19	-	546	-	182	938	938	-	-	-	2,031	-	-	-	160,956	3,023	-
4b.1.2.12	AUX-560-2_PRO	-	556	18	42	524	-	-	226	1,366	1,366	-	-	12,294	-	-	-	-	499,264	10,495	-
4b.1.2.13	AUX-579-1_BRY	-	175	32	16	-	459	-	164	847	847	-	-	-	1,937	-	-	-	135,483	3,369	-
4b.1.2.14	AUX-579-1_PRO	-	652	10	23	288	-	-	211	1,183	1,183	-	-	6,751	-	-	-	-	274,144	12,318	-
4b.1.2.15	AUX-579-2_BRY	-	89	9	6	-	158	-	63	324	324	-	-	-	518	-	-	-	46,485	1,611	-
4b.1.2.16	AUX-579-2_PRO	-	251	4	9	117	-	-	82	463	463	-	-	2,752	-	-	-	-	111,741	4,685	-
4b.1.2.17	AUX-579-3_BRY	-	33	8	4	-	108	-	37	189	189	-	-	-	464	-	-	-	31,754	656	-
4b.1.2.18	AUX-579-3_PRO	-	105	3	6	75	-	-	39	227	227	-	-	1,747	-	-	-	-	70,960	2,006	-
4b.1.2.19	CRBHSE-594_CLN	-	506	-	-	-	-	-	76	582	-	-	582	-	-	-	-	-	-	9,926	-
4b.1.2.20	DG-567-1_CLN	-	77	-	-	-	-	-	12	89	-	-	89	-	-	-	-	-	-	1,501	-
4b.1.2.21	DG-567-2_CLN	-	42	-	-	-	-	-	6	48	-	-	48	-	-	-	-	-	-	817	-
4b.1.2.22	DG-592-1_CLN	-	85	-	-	-	-	-	13	97	-	-	97	-	-	-	-	-	-	1,649	-
4b.1.2.23	DG-592-2_CLN	-	45	-	-	-	-	-	7	51	-	-	51	-	-	-	-	-	-	888	-
4b.1.2.24	DG-617-1_CLN	-	68	-	-	-	-	-	10	78	-	-	78	-	-	-	-	-	-	1,342	-
4b.1.2.25	DG-617-2_CLN	-	35	-	-	-	-	-	5	41	-	-	41	-	-	-	-	-	-	699	-
4b.1.2.26	DG-642-1_CLN	-	94	-	-	-	-	-	14	108	-	-	108	-	-	-	-	-	-	1,843	-
4b.1.2.27	FH-584-1_BRY	-	17	1	1	-	27	-	11	57	57	-	-	-	88	-	-	-	7,854	290	-
4b.1.2.28	FH-584-1_PRO	-	36	1	2	30	-	-	14	84	84	-	-	714	-	-	-	-	28,989	638	-
4b.1.2.29	FH-592-1_BRY	-	60	11	7	-	213	-	70	361	361	-	-	-	699	-	-	-	62,749	1,137	-
4b.1.2.30	FH-592-1_PRO	-	101	1	3	36	-	-	31	172	172	-	-	850	-	-	-	-	34,504	1,921	-
4b.1.2.31	FH-592-2_PRO	-	162	3	6	77	-	-	53	301	301	-	-	1,809	-	-	-	-	73,460	3,090	-
4b.1.2.32	FH-617-1_BRY	-	12	2	1	-	34	-	12	61	61	-	-	-	111	-	-	-	10,001	218	-
4b.1.2.33	FH-617-1_PRO	-	283	4	11	131	-	-	93	522	522	-	-	3,084	-	-	-	-	125,237	5,372	-
4b.1.2.34	FH-617-2_BRY	-	5	1	0	-	13	-	5	24	24	-	-	-	43	-	-	-	3,859	89	-
4b.1.2.35	FH-617-2_PRO	-	2	0	0	1	-	-	1	5	5	-	-	30	-	-	-	-	1,201	40	-
4b.1.2.36	PT-570-1_PRO	-	255	11	26	327	-	-	118	736	736	-	-	7,659	-	-	-	-	311,055	4,791	-
4b.1.2.37	RX-568-1_BRY	-	946	96	65	-	1,851	-	718	3,676	3,676	-	-	-	6,115	-	-	-	546,003	18,135	-
4b.1.2.38	RX-568-1_PRO	-	442	13	32	394	-	-	176	1,057	1,057	-	-	9,250	-	-	-	-	375,629	8,107	-
4b.1.2.39	RX-592-1_BRY	-	468	38	23	-	662	-	290	1,482	1,482	-	-	-	2,179	-	-	-	195,415	8,708	-
4b.1.2.40	RX-592-1_PRO	-	573	17	39	490	-	-	224	1,344	1,344	-	-	11,489	-	-	-	-	466,594	10,568	-
4b.1.2.41	RX-617-1_BRY	-	667	47	32	-	912	-	404	2,062	2,062	-	-	-	2,997	-	-	-	268,935	12,803	-
4b.1.2.42	RX-617-1_PRO	-	770	19	45	557	-	-	285	1,676	1,676	-	-	13,073	-	-	-	-	530,899	14,245	-
4b.1.2.43	SERVICE_CLN	-	207	-	-	-	-	-	31	238	-	-	238	-	-	-	-	-	-	4,177	-
4b.1.2.44	WWTF_CLN	-	125	-	-	-	-	-	19	144	-	-	144	-	-	-	-	-	-	2,477	-
4b.1.2.45	YARD_CLN	-	227	-	-	-	-	-	34	261	-	-	261	-	-	-	-	-	-	4,418	-
4b.1.2.46	YARD_PRO	-	449	21	49	608	-	-	213	1,339	1,339	-	-	14,254	-	-	-	-	578,874	8,503	-
4b.1.2.47	YARD-BURIED PIPE_CLN	-	183	-	-	-	-	-	27	210	-	-	210	-	-	-	-	-	-	3,683	-
4b.1.2.48	YARD-BURIED PIPE_PRO	-	120	4	9	108	-	-	48	289	289	-	-	2,543	-	-	-	-	103,268	2,115	-
4b.1.2	Totals	-	12,491	629	720	5,735	7,391	-	5,832	32,799	30,853	-	1,946	134,494	26,570	-	-	-	7,642,237	236,742	-
4b.1.3	Scaffolding in support of decommissioning	-	1,178	16	4	44	18	-	308	1,567	1,567	-	-	927	58	-	-	-	46,911	24,297	-

Table E-2
Zion Nuclear Power Station Unit 2
SAFSTOR Decommissioning Cost Estimate
(Thousands of 2006 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
Decontamination of Site Buildings																					
4b.1.4.1	Reactor Building	1,017	880	103	101	268	1,649	-	1,207	5,226	5,226	-	-	6,296	6,026	-	-	-	792,422	34,939	-
4b.1.4.2	Auxiliary Building	556	340	22	25	51	324	-	458	1,776	1,776	-	-	1,204	1,294	-	-	-	164,812	16,512	-
4b.1.4.3	IRSF	39	14	3	4	4	49	-	36	148	148	-	-	94	197	-	-	-	21,225	926	-
4b.1.4.4	Fuel Building	602	668	34	18	32	408	-	581	2,344	2,344	-	-	752	1,421	-	-	-	154,534	23,679	-
4b.1.4	Totals	2,214	1,901	163	148	356	2,430	-	2,282	9,493	9,493	-	-	8,345	8,938	-	-	-	1,132,993	76,056	-
4b.1	Subtotal Period 4b Activity Costs	2,571	15,670	1,069	932	6,135	11,549	-	9,088	47,014	45,068	-	1,946	143,767	41,190	-	-	-	9,326,752	339,289	-
Period 4b Collateral Costs																					
4b.3.1	Process liquid waste	187	-	71	335	-	224	-	207	1,024	1,024	-	-	-	1,345	-	-	-	66,129	298	-
4b.3.2	Small tool allowance	-	297	-	-	-	-	-	45	342	342	-	-	-	-	-	-	-	-	-	-
4b.3.3	Decommissioning Equipment Disposition	-	-	101	32	284	114	-	86	616	616	-	-	6,000	373	-	-	-	303,507	739	-
4b.3	Subtotal Period 4b Collateral Costs	187	297	172	367	284	338	-	337	1,982	1,982	-	-	6,000	1,719	-	-	-	369,636	1,037	-
Period 4b Period-Dependent Costs																					
4b.4.1	Decon supplies	687	-	-	-	-	-	-	172	859	859	-	-	-	-	-	-	-	-	-	-
4b.4.2	Insurance	-	-	-	-	-	-	248	25	273	273	-	-	-	-	-	-	-	-	-	-
4b.4.3	Property taxes	-	-	-	-	-	-	715	71	786	786	-	-	-	-	-	-	-	-	-	-
4b.4.4	Health physics supplies	-	1,578	-	-	-	-	-	395	1,973	1,973	-	-	-	-	-	-	-	-	-	-
4b.4.5	Heavy equipment rental	-	2,373	-	-	-	-	-	356	2,729	2,729	-	-	-	-	-	-	-	-	-	-
4b.4.6	Disposal of DAW generated	-	-	104	49	-	315	-	97	565	565	-	-	-	5,674	-	-	-	113,706	1,393	-
4b.4.7	Plant energy budget	-	-	-	-	-	-	1,071	161	1,232	1,232	-	-	-	-	-	-	-	-	-	-
4b.4.8	NRC Fees	-	-	-	-	-	-	492	49	541	541	-	-	-	-	-	-	-	-	-	-
4b.4.9	Site O&M Cost	-	-	-	-	-	-	179	27	205	205	-	-	-	-	-	-	-	-	-	-
4b.4.10	Radwaste Processing Equipment/Services	-	-	-	-	-	-	522	78	601	601	-	-	-	-	-	-	-	-	-	-
4b.4.11	Security Staff Cost	-	-	-	-	-	-	3,182	477	3,659	3,659	-	-	-	-	-	-	-	-	-	92,469
4b.4.12	DOC Staff Cost	-	-	-	-	-	-	14,909	2,236	17,145	17,145	-	-	-	-	-	-	-	-	-	217,749
4b.4.13	Utility Staff Cost	-	-	-	-	-	-	22,138	3,321	25,459	25,459	-	-	-	-	-	-	-	-	-	369,874
4b.4	Subtotal Period 4b Period-Dependent Costs	687	3,951	104	49	-	315	43,456	7,465	56,027	56,027	-	-	-	5,674	-	-	-	113,706	1,393	680,091
4b.0	TOTAL PERIOD 4b COST	3,445	19,918	1,346	1,348	6,418	12,203	43,456	16,890	105,022	103,076	-	1,946	149,767	48,582	-	-	-	9,810,094	341,719	680,091
PERIOD 4e - License Termination																					
Period 4e Direct Decommissioning Activities																					
4e.1.1	ORISE confirmatory survey	-	-	-	-	-	-	140	42	183	183	-	-	-	-	-	-	-	-	-	-
4e.1.2	Terminate license									a											
4e.1	Subtotal Period 4e Activity Costs	-	-	-	-	-	-	140	42	183	183	-	-	-	-	-	-	-	-	-	-
Period 4e Additional Costs																					
4e.2.1	Final Site Survey	-	-	-	-	-	-	8,448	2,534	10,983	10,983	-	-	-	-	-	-	-	-	160,578	-
4e.2	Subtotal Period 4e Additional Costs	-	-	-	-	-	-	8,448	2,534	10,983	10,983	-	-	-	-	-	-	-	-	160,578	-
Period 4e Collateral Costs																					
4e.3.1	DOC staff relocation expenses	-	-	-	-	-	-	829	124	953	953	-	-	-	-	-	-	-	-	-	-
4e.3	Subtotal Period 4e Collateral Costs	-	-	-	-	-	-	829	124	953	953	-	-	-	-	-	-	-	-	-	-
Period 4e Period-Dependent Costs																					
4e.4.1	Insurance	-	-	-	-	-	-	38	4	42	42	-	-	-	-	-	-	-	-	-	-
4e.4.2	Property taxes	-	-	-	-	-	-	382	38	420	420	-	-	-	-	-	-	-	-	-	-
4e.4.3	Health physics supplies	-	768	-	-	-	-	-	192	960	960	-	-	-	-	-	-	-	-	-	-
4e.4.4	Disposal of DAW generated	-	-	7	3	-	21	-	6	38	38	-	-	-	377	-	-	-	7,553	93	-
4e.4.5	Plant energy budget	-	-	-	-	-	-	153	23	176	176	-	-	-	-	-	-	-	-	-	-
4e.4.6	NRC Fees	-	-	-	-	-	-	263	26	289	289	-	-	-	-	-	-	-	-	-	-
4e.4.7	Site O&M Cost	-	-	-	-	-	-	95	14	110	110	-	-	-	-	-	-	-	-	-	-
4e.4.8	Security Staff Cost	-	-	-	-	-	-	432	65	497	497	-	-	-	-	-	-	-	-	-	12,563
4e.4.9	DOC Staff Cost	-	-	-	-	-	-	3,340	501	3,841	3,841	-	-	-	-	-	-	-	-	-	47,430
4e.4.10	Utility Staff Cost	-	-	-	-	-	-	3,764	565	4,329	4,329	-	-	-	-	-	-	-	-	-	58,590
4e.4	Subtotal Period 4e Period-Dependent Costs	-	768	7	3	-	21	8,467	1,434	10,701	10,701	-	-	-	377	-	-	-	7,553	93	118,583

Table E-2
Zion Nuclear Power Station Unit 2
SAFSTOR Decommissioning Cost Estimate
(Thousands of 2006 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
4e.0	TOTAL PERIOD 4e COST	-	768	7	3	-	21	17,885	4,135	22,819	22,819	-	-	-	377	-	-	-	7,553	160,671	118,583
PERIOD 4 TOTALS		3,654	49,911	6,798	4,453	16,803	38,831	95,153	46,937	262,541	254,406	-	8,135	397,343	102,660	3,455	950	203	25,215,910	876,822	1,326,508
PERIOD 5b - Site Restoration																					
Period 5b Direct Decommissioning Activities																					
Demolition of Remaining Site Buildings																					
5b.1.1.1	Reactor Building	-	4,151	-	-	-	-	-	623	4,774	-	-	4,774	-	-	-	-	-	-	49,418	-
5b.1.1.2	Auxiliary Building	-	1,895	-	-	-	-	-	284	2,179	-	-	2,179	-	-	-	-	-	-	24,718	-
5b.1.1.3	Crib House	-	644	-	-	-	-	-	97	741	-	-	741	-	-	-	-	-	-	7,389	-
5b.1.1.4	Diesel Generator Building	-	328	-	-	-	-	-	49	377	-	-	377	-	-	-	-	-	-	4,557	-
5b.1.1.5	Discharge Tunnel Outfall	-	154	-	-	-	-	-	23	177	-	-	177	-	-	-	-	-	-	2,192	-
5b.1.1.6	Emergency Operations Facility	-	209	-	-	-	-	-	31	240	-	-	240	-	-	-	-	-	-	3,232	-
5b.1.1.7	IDNS Ragems Facility	-	8	-	-	-	-	-	1	9	-	-	9	-	-	-	-	-	-	132	-
5b.1.1.8	IRSF	-	649	-	-	-	-	-	97	747	-	-	747	-	-	-	-	-	-	8,534	-
5b.1.1.9	Intake Structure	-	92	-	-	-	-	-	14	106	-	-	106	-	-	-	-	-	-	1,221	-
5b.1.1.10	Miscellaneous Site Structures	-	284	-	-	-	-	-	43	327	-	-	327	-	-	-	-	-	-	3,766	-
5b.1.1.11	Miscellaneous Yard	-	748	-	-	-	-	-	112	860	-	-	860	-	-	-	-	-	-	10,409	-
5b.1.1.12	Security Office Building	-	23	-	-	-	-	-	3	27	-	-	27	-	-	-	-	-	-	358	-
5b.1.1.13	Sewage Lift Station	-	3	-	-	-	-	-	0	3	-	-	3	-	-	-	-	-	-	46	-
5b.1.1.14	Sludge Drying Beds	-	8	-	-	-	-	-	1	9	-	-	9	-	-	-	-	-	-	112	-
5b.1.1.15	Technical Support Center	-	146	-	-	-	-	-	22	168	-	-	168	-	-	-	-	-	-	2,174	-
5b.1.1.16	Training Center Addition	-	105	-	-	-	-	-	16	121	-	-	121	-	-	-	-	-	-	1,704	-
5b.1.1.17	Turbine Building	-	1,835	-	-	-	-	-	275	2,110	-	-	2,110	-	-	-	-	-	-	26,135	-
5b.1.1.18	Turbine Pedestal	-	1,759	-	-	-	-	-	264	2,023	-	-	2,023	-	-	-	-	-	-	19,735	-
5b.1.1.19	Wastewater Treatment Building	-	87	-	-	-	-	-	13	100	-	-	100	-	-	-	-	-	-	1,330	-
5b.1.1.20	Fuel Building	-	1,408	-	-	-	-	-	211	1,619	-	-	1,619	-	-	-	-	-	-	17,595	-
5b.1.1	Totals	-	14,537	-	-	-	-	-	2,181	16,717	-	-	16,717	-	-	-	-	-	-	184,757	-
Site Closeout Activities																					
5b.1.2	BackFill Site	-	1,026	-	-	-	-	-	154	1,180	-	-	1,180	-	-	-	-	-	-	4,079	-
5b.1.3	Grade & landscape site	-	59	-	-	-	-	-	9	68	-	-	68	-	-	-	-	-	-	175	-
5b.1.4	Final report to NRC	-	-	-	-	-	-	63	9	72	72	-	-	-	-	-	-	-	-	-	667
5b.1	Subtotal Period 5b Activity Costs	-	15,623	-	-	-	-	63	2,353	18,038	72	-	17,966	-	-	-	-	-	-	189,011	667
Period 5b Additional Costs																					
5b.2.1	Concrete Crushing	-	497	-	-	-	-	4	75	576	-	-	576	-	-	-	-	-	-	2,764	-
5b.2.2	Intake Structure Cofferdam	-	674	-	-	-	-	-	101	775	-	-	775	-	-	-	-	-	-	7,551	-
5b.2.3	Discharge Tunnel Outfall Cofferdam	-	896	-	-	-	-	-	134	1,031	-	-	1,031	-	-	-	-	-	-	10,040	-
5b.2	Subtotal Period 5b Additional Costs	-	2,067	-	-	-	-	4	311	2,382	-	-	2,382	-	-	-	-	-	-	20,355	-
Period 5b Collateral Costs																					
5b.3.1	Small tool allowance	-	190	-	-	-	-	-	29	219	-	-	219	-	-	-	-	-	-	-	-
5b.3	Subtotal Period 5b Collateral Costs	-	190	-	-	-	-	-	29	219	-	-	219	-	-	-	-	-	-	-	-
Period 5b Period-Dependent Costs																					
5b.4.1	Insurance	-	-	-	-	-	-	104	10	114	-	-	114	-	-	-	-	-	-	-	-
5b.4.2	Property taxes	-	-	-	-	-	-	1,040	104	1,144	-	-	1,144	-	-	-	-	-	-	-	-
5b.4.3	Heavy equipment rental	-	4,704	-	-	-	-	-	706	5,409	-	-	5,409	-	-	-	-	-	-	-	-
5b.4.4	Plant energy budget	-	-	-	-	-	-	208	31	239	-	-	239	-	-	-	-	-	-	-	-
5b.4.5	Site O&M Cost	-	-	-	-	-	-	260	39	299	-	-	299	-	-	-	-	-	-	-	-
5b.4.6	Security Staff Cost	-	-	-	-	-	-	1,102	165	1,267	-	-	1,267	-	-	-	-	-	-	-	32,050
5b.4.7	DOC Staff Cost	-	-	-	-	-	-	9,833	1,475	11,308	-	-	11,308	-	-	-	-	-	-	-	137,886
5b.4.8	Utility Staff Cost	-	-	-	-	-	-	4,928	739	5,667	-	-	5,667	-	-	-	-	-	-	-	78,171
5b.4	Subtotal Period 5b Period-Dependent Costs	-	4,704	-	-	-	-	17,475	3,270	25,448	-	-	25,448	-	-	-	-	-	-	-	248,107
5b.0	TOTAL PERIOD 5b COST	-	22,584	-	-	-	-	17,542	5,962	46,087	72	-	46,015	-	-	-	-	-	-	209,366	248,775

Table E-2
Zion Nuclear Power Station Unit 2
SAFSTOR Decommissioning Cost Estimate
(Thousands of 2006 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt, Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
PERIOD 5 TOTALS		-	22,584	-	-	-	-	17,542	5,962	46,087	72	-	46,015	-	-	-	-	-	-	209,366	248,775
TOTAL COST TO DECOMMISSION		4,413	84,075	7,048	5,332	16,803	43,497	346,309	69,230	576,708	364,519	157,528	54,661	397,343	223,630	3,455	950	203	26,894,860	1,199,574	2,274,397

TOTAL COST TO DECOMMISSION WITH 13.64% CONTINGENCY:	**$576,708**	**thousands of 2006 dollars**
TOTAL NRC LICENSE TERMINATION COST IS 63.21% OR:	**$364,519**	**thousands of 2006 dollars**
SPENT FUEL MANAGEMENT COST IS 27.32% OR:	**$157,528**	**thousands of 2006 dollars**
NON-NUCLEAR DEMOLITION COST IS 9.48% OR:	**$54,661**	**thousands of 2006 dollars**
TOTAL PRIMARY SITE RADWASTE VOLUME BURIED:	**91,323**	**Cubic Feet**
TOTAL SECONDARY SITE RADWASTE VOLUME BURIED:	**136,712**	**Cubic Feet**
TOTAL TERTIARY SITE RADWASTE VOLUME BURIED:		**Cubic Feet**
TOTAL GREATER THAN CLASS C RADWASTE VOLUME GENERATED:	**203**	**Cubic Feet**
TOTAL SCRAP METAL REMOVED:	**46,651**	**Tons**
TOTAL CRAFT LABOR REQUIREMENTS:	**1,199,574**	**Man-hours**

End Notes:
n/a - indicates that this activity not charged as decommissioning expense.
a - indicates that this activity performed by decommissioning staff.
0 - indicates that this value is less than 0.5 but is non-zero.
a cell containing " - " indicates a zero value

APPENDIX F

WORK DIFFICULTY FACTOR ADJUSTMENTS

GUIDELINES FOR APPLYING WORK DURATION ADJUSTMENT FACTORS

TLG has historically applied work duration adjustment factors in determining unit cost factors to account for working in a radiologically controlled environment. In performing an area-by-area decommissioning estimate, the work duration factors are applied on an "area" basis based on the nominal area conditions. Where practical, areas are established based on similar working conditions.

The WDFs fall into five categories: access, respiratory protection, ALARA, protective clothing (PC), and work breaks. The guidelines of how these factors are assessed for each area is described below. Table F-1 details the WDFs used for each of the seven unit cost factor sets contained in the estimates. Table F-2 outlines the unit cost factors used for each area of the Zion station.

1) Access Factor:

Controlling Variables:
- Height of the component above the working floor
- Difficulty in working around the component (restricted access)

Source of Variable Information:
- Estimators observation or judgment
- Plant drawings

Range of Access Factor Adjustments:

0% - Components are accessible and located near a working level floor or platform

10% - Scaffolding or other aids (component less than 12 feet above floor) are required to access many of the components *or* the area around the components is congested.

20% - Scaffolding or other aids (component less than 12 feet above floor) are required to access many of the components *and* the area around the components is congested.

30% - Scaffolding or other aids (component between 12 - 20 feet above floor) are required to access many of the components *or* the area around the components is extremely congested.

40% - Scaffolding or other aids (component between 20 - 45 feet above floor) are required to access many of the components).

50% - Scaffolding or other aids (component greater than 45 feet above floor) are required to access many of the components).

2) Respiratory Protection Factor:

Controlling Variables:

- Component surface contamination levels (internal or external)
- Type of work (potential to create an airborne problem)
- General area surface contamination levels
- Site specific requirements for maintaining respirator qualifications (initial qualification, requalification, etc.)
- Personal air sampler requirements

Sources of Variable Information:

- Radiation Work Permit Requirements
- Area Survey Maps
- Site Radiation Protection Program Manual

Range of Respiratory Protection Factor Adjustments:

0% Engineering controls and/or respiratory protection are not required (clean system or loose surface contamination has been removed).

12.5% Engineering controls and/or respiratory protection may be required during clean demolition work

25% Engineering controls and/or respiratory protection are only required during limited segments of the work (i.e. physical cutting)

50% Engineering controls and/or respiratory protection are continuously required while working on the component.

3) Radiation/ALARA Factor:

Controlling Variables:

- Assumed component contact dose rate at time of decommissioning
- Assumed general area dose rate at time of decommissioning
- Site specific requirements for maintaining radiation worker qualification (initial qualification, requalification, etc.)
- Dosimetry requirements
- HAZWOPER training requirements

Sources of Variable Information:
- Area Survey Maps
- Site Radiation Protection Program Manual
- Radiation Work Permit Requirements

Range of Radiation / ALARA Factor Adjustments:
(Note that surface contamination levels are principally accounted for in protective clothing requirements and respiratory protection requirements)

0% Is used only for clean demolition

5% The component is clean and is not located in a radiologically controlled area

10% The component is located in a radiologically controlled area (General Area Radiation field < 2 .5 mrem/hr).

20% The component is located in a radiologically controlled area (General Area Radiation field between 2. 5 to 15 mrem/hr).

40% The component is located in a radiologically controlled area (General Area Radiation field between 16 and 99 mrem/hr).

100% The component is located in a radiologically controlled area (General Area Radiation field > 100 mrem/hr).

4) Protective Clothing Factor:

Controlling Variables:
- Component surface contamination levels (internal or external)
- General area surface contamination levels
- Type of activity (wet/dry work, potential to create a surface contamination problem)
- Site specific work schedule arrangements

Sources of Variable Information:
- Radiation Work Permit Requirements
- Area Survey Maps
- Site Radiation Protection Program Manual

Range of Protective Clothing Factor Adjustments (alternate site-specific schedules may dictate alternate adjustments):

0% - Is used only for clean demolition

5% - The component is clean and is not located in a radiologically controlled area.

30% - The component is clean or contaminated and is located in a surface contamination controlled area. Work is to be completed in accordance with the requirements of an RWP, which specifies a single or double set of "PCs".

50% - The components is located in a surface contamination controlled area. Work is to be completed in accordance with the requirements of an RWP, which specifies "plastics" in addition to double PCs for protective clothing.

5) Work Break Factor:

Controlling Variables:

- Site specific work schedule arrangements

Sources of Variable Information:

- Typical site work schedule

Range of Work Break Factor Adjustments:

8.33% - Workday schedule outlined in AIF/NESP-036 (alternate site-specific schedules may dictate alternate adjustments).

TABLE F-1

UNIT COST FACTOR SETS AND THEIR WORK DIFFICULTY ADJUSTMENT FACTORS

	DECON / Clean				DECON / Contam.			
	Percentage				Percentage			
UCF Set ID	Access	Resp.	PCs	ALARA	Access	Resp.	PCs	ALARA
1	10.0	0.0	0	10	10.0	0.0	0	10
2	20.0	0.0	30	10	20.0	0.0	30	10
3	20.0	25.0	30	30	20.0	25.0	30	30
4	30.0	25.0	50	30	30.0	25.0	50	30
5	50.0	25.0	50	40	50.0	25.0	50	40
6	30.0	25.0	50	50	30.0	25.0	50	100
7	20.0	0.0	0	0	20.0	25.0	30	30

	SAFSTOR / Clean				SAFSTOR / Contam.			
	Percentage				Percentage			
	Access	Resp.	PCs	ALARA	Access	Resp.	PCs	ALARA
1	10.0	0.0	0	10	10.0	0.0	0	10
2	20.0	0.0	30	10	20.0	0.0	30	10
3	20.0	25.0	30	10	20.0	25.0	30	10
4	30.0	25.0	50	10	30.0	25.0	50	10
5	50.0	25.0	50	10	50.0	25.0	50	10
6	30.0	25.0	50	10	30.0	25.0	50	10
7	20.0	0.0	0	0	20.0	25.0	30	10

TABLE F-2

ZION AREA DESIGNATIONS AND ASSOCIATED UNIT COST FACTORS

AREA	AREA DESCRIPTION	UCF SET
All	Clean Structures	7
AUX.BLDG- VPC	Vertical Pipe Chase All Elevations	6
AUX-542-1	Auxiliary Building 542 ft Elevation	3
AUX-542-2	Auxiliary Building 542 ft Elevation	5
AUX-542-3	Auxiliary Building 542 ft Elevation	3
AUX-560-1	Auxiliary Building 560 ft Elevation	3
AUX-560-2	Auxiliary Building 560 ft Elevation	4
AUX-579-1	Auxiliary Building 579 ft Elevation	3
AUX-579-2	Auxiliary Building 579 ft Elevation	4
AUX-579-3	Auxiliary Building 579 ft Elevation	4
AUX-592-1	Auxiliary Building 592 ft Elevation	4
AUX-592-2	Auxiliary Building 592 ft Elevation	3
AUX-592-3	Auxiliary Building 592 ft Elevation	4
AUX-617-1	Auxiliary Building 617 ft Elevation	3
AUX-617-2	Auxiliary Building 617 ft Elevation	4
AUX-617-3	Auxiliary Building 617 ft Elevation	4
AUX-617-4	Auxiliary Building 617 ft Elevation	3
AUX-617-5	Auxiliary Building 617 ft Elevation	4
AUX-630-1	Auxiliary Building 630 ft Elevation	1
AUX-642-1	Auxiliary Building 642 ft Elevation	1
AUX-642-2	Auxiliary Building 642 ft Elevation	3
AUX-654-1	Auxiliary Building 654 ft Elevation	2
CRBHSE-594	Crib House	4
DG-567-1	Diesel Generator Room 560 ft Elevation	2
DG-592-1	Diesel Generator Room 592 ft Elevation	4
DG-592-2	Diesel Generator Room 592 ft Elevation	4
DG-617-1	Diesel Generator Room 617 ft Elevation	1
DG-617-2	Diesel Generator Room 617 ft Elevation	1
DG-642-1	Diesel Generator Room 642 ft Elevation	1
FH-584-1	Fuel Handling Building 584 ft Elevation	2
FH-592-1	Fuel Handling Building 592 ft Elevation	2
FH-592-2	Fuel Handling Building 592 ft Elevation	2
FH-617-1	Fuel Handling Building 617 ft Elevation	2
FH-617-2	Fuel Handling Building 617 ft Elevation	2

TABLE F-2

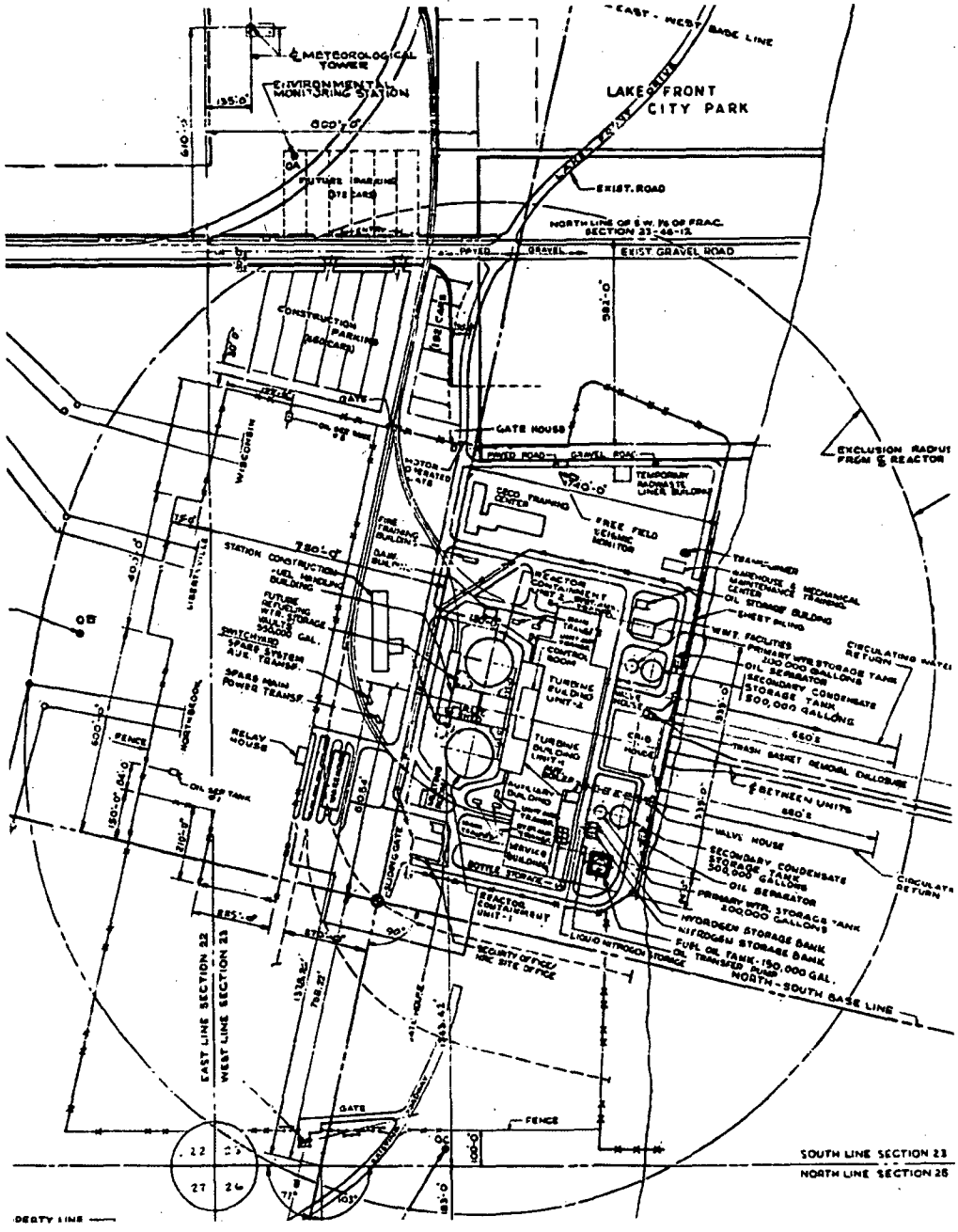
ZION AREA DESIGNATIONS AND ASSOCIATED UNIT COST FACTORS (continued)

AREA	AREA DESCRIPTION	UCF SET
PT-570-1	Main Steam Pipe Tunnel 570 Elevation	3
RX-568-1	Reactor Building 568 ft Elevation	3
RX-592-1	Reactor Building Outside Missile Shield 592 ft Elevation	3
RX-592-2	Reactor Building Inside Missile Shield 592 ft Elevation	5
RX-617-1	Reactor Building 617 ft Elevation	4
SERVICE	Service Building	1
TB-560-1	Turbine Building 560 ft Elevation	6
TB-592-1	Turbine Building 592 ft Elevation	6
TB-592-2	Turbine Building 592 ft Elevation	6
TB-592-3	Turbine Building 592 ft Elevation	6
TB-592-4	Turbine Building 592 ft Elevation	6
TB-617-1	Turbine Building 617 ft Elevation	6
TB-617-2	Turbine Building 617 ft Elevation	6
TB-617-3	Turbine Building 617 ft Elevation	6
TB-642-1	Turbine Building 642 ft Elevation	6
TB-642-2	Turbine Building 642 ft Elevation	6
WWTF	Waste Water Treatment Facility	1
YARD	Yard Protected Area	1
YARD-BURIED PIPE	Yard Protected Area	1

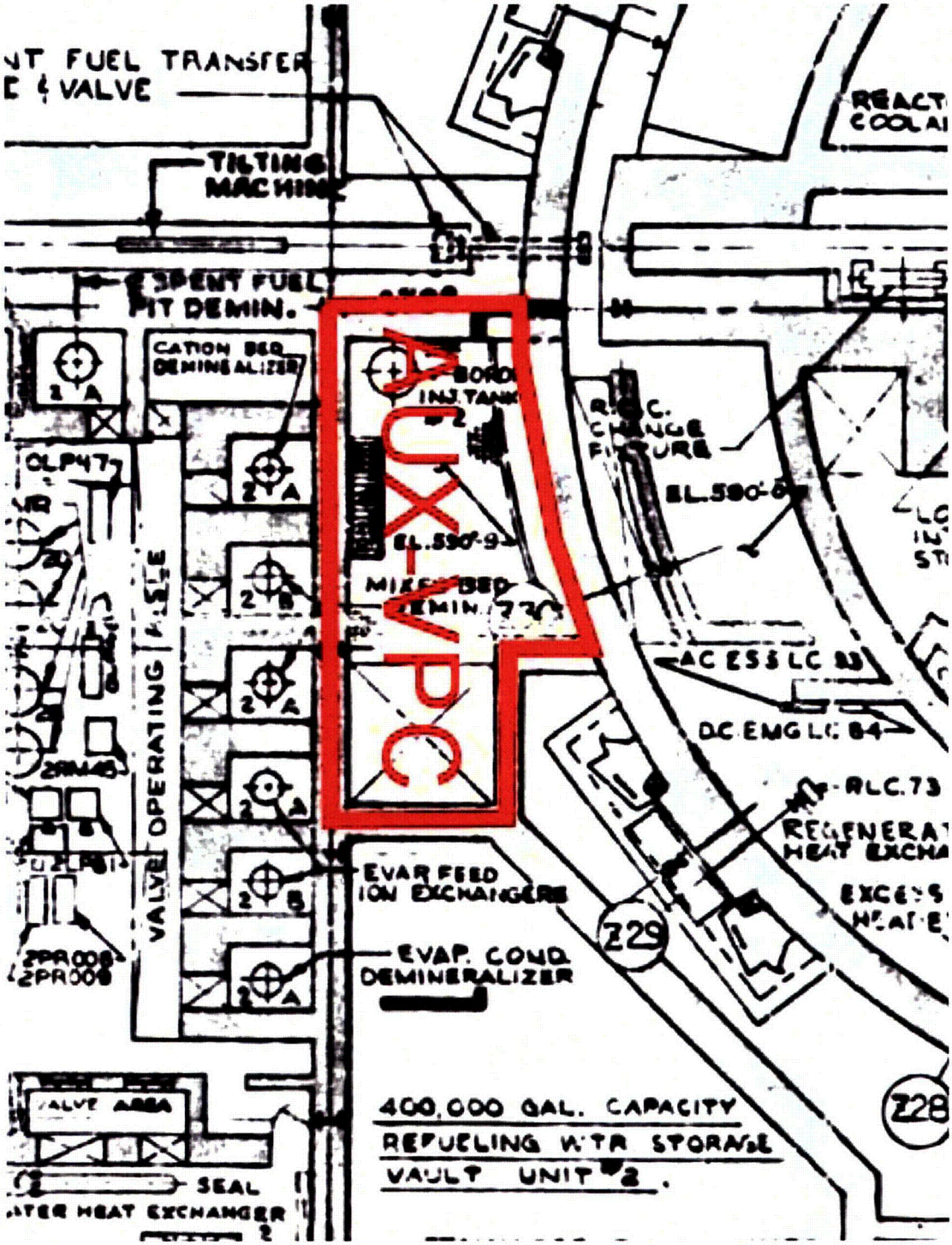
APPENDIX G

AREA MAPS

APPENDIX G
ZION STATION SITE



WORK AREA MAPS



AREA MAPS
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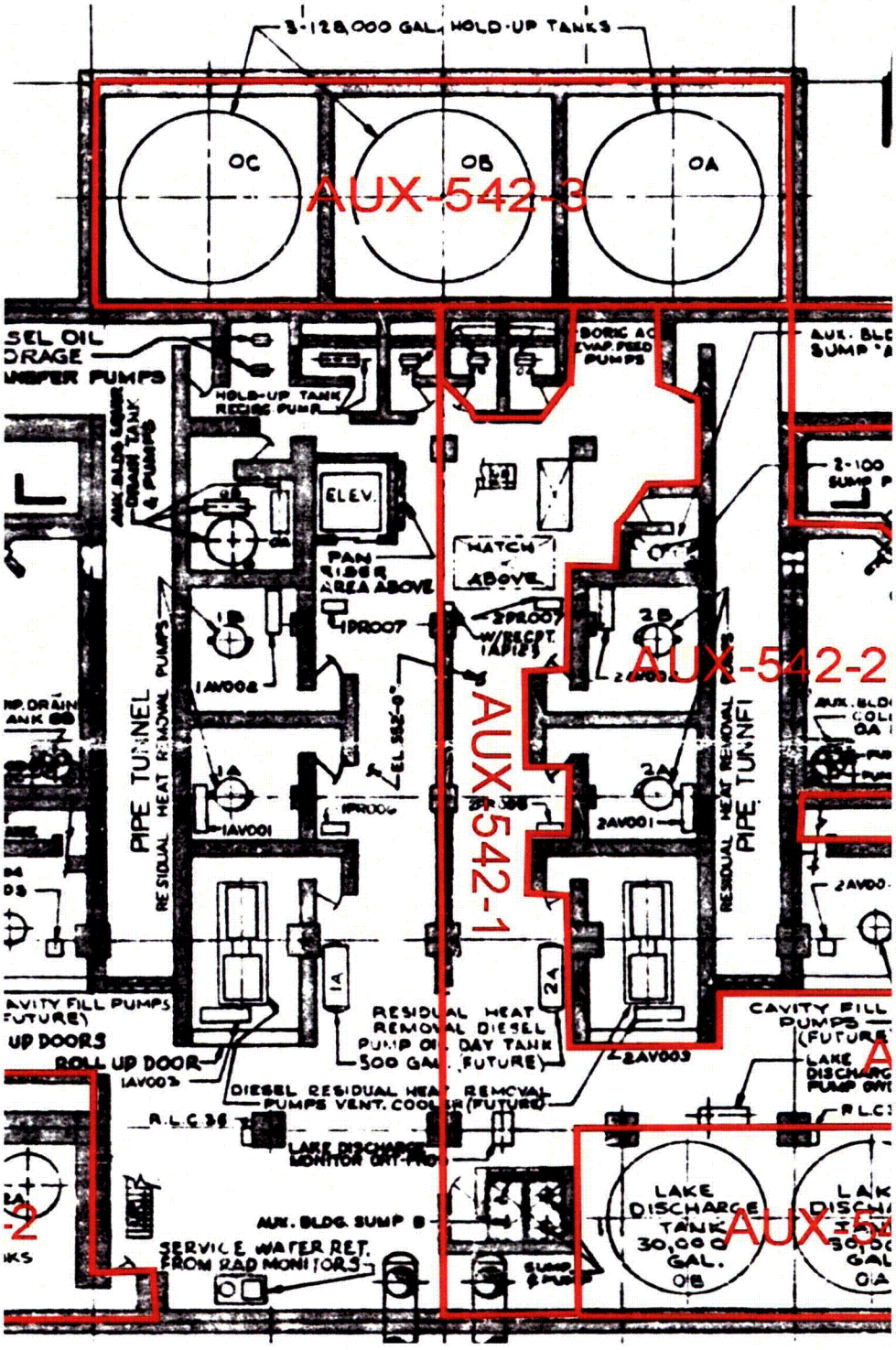

AREA MAPS
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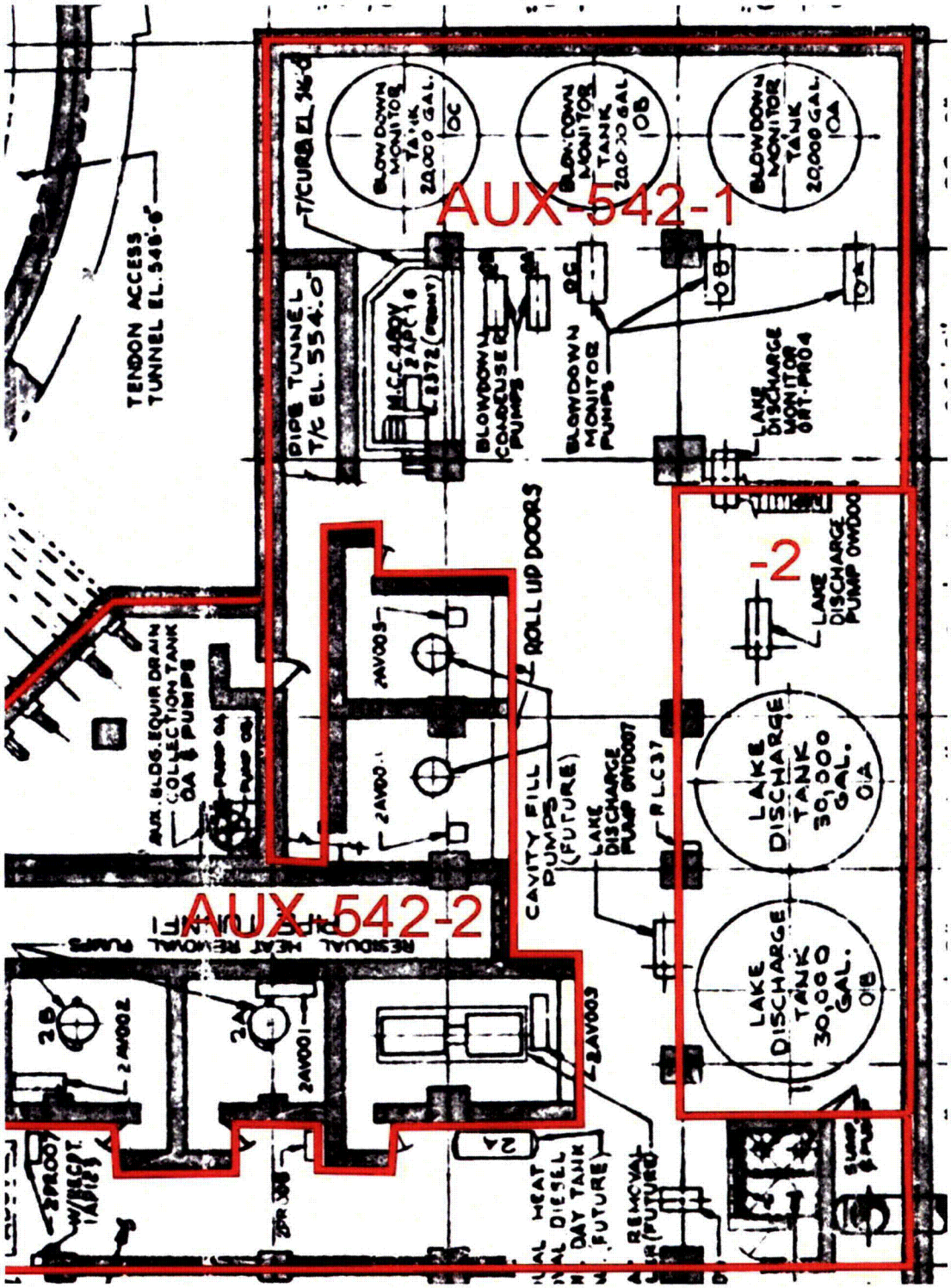

AREA MAPS
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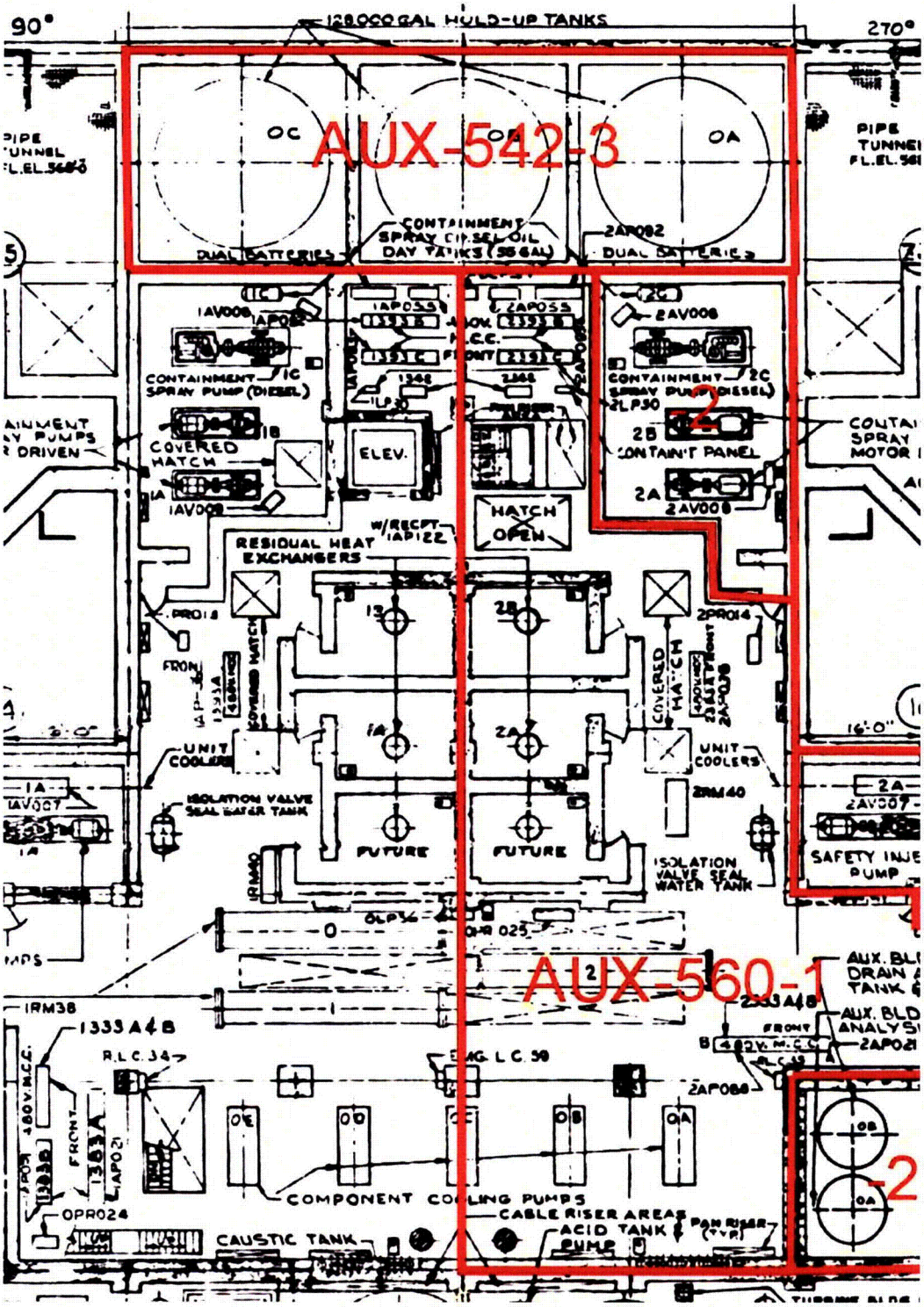

AREA MAPS
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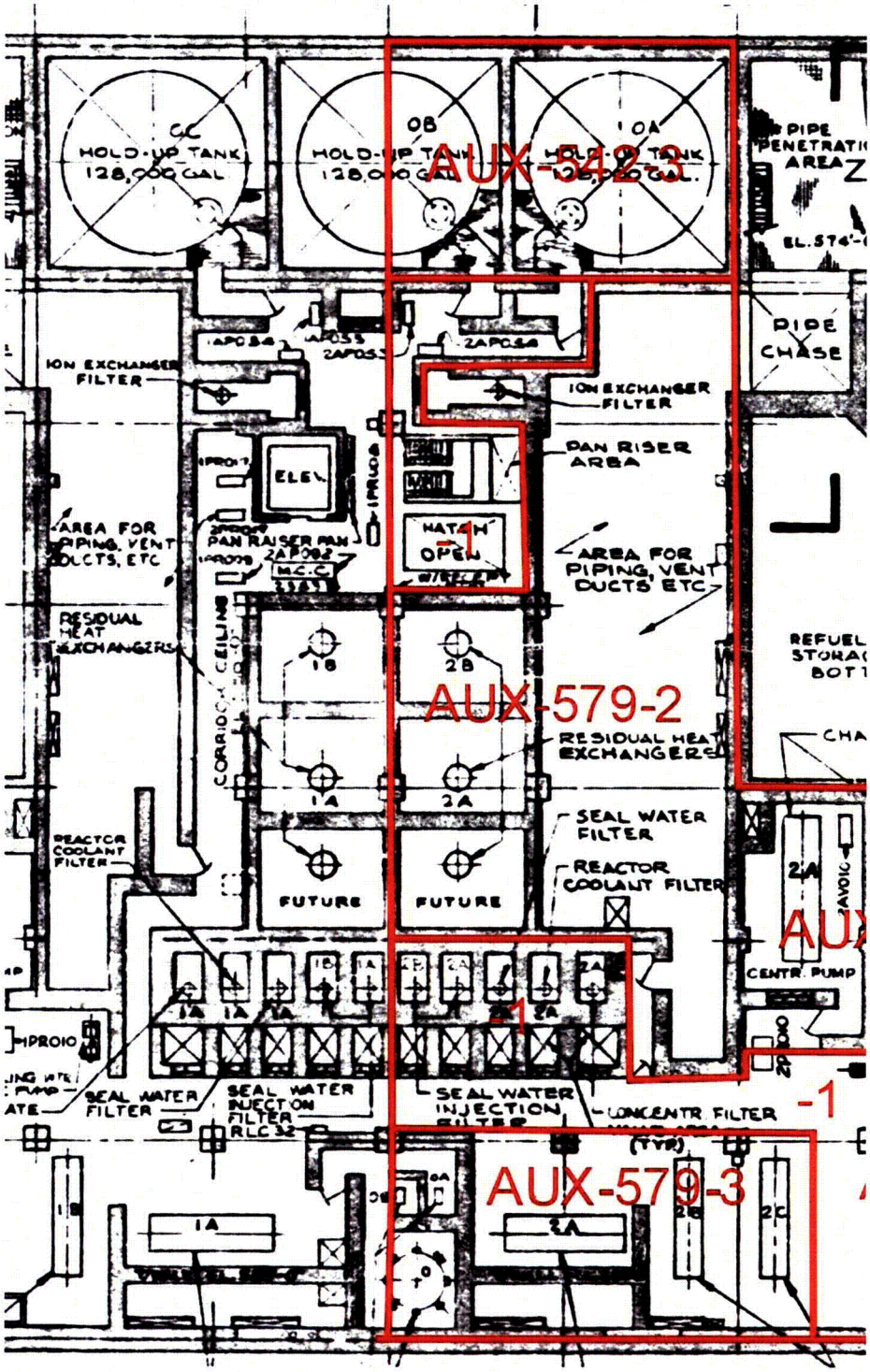

AREA MAPS
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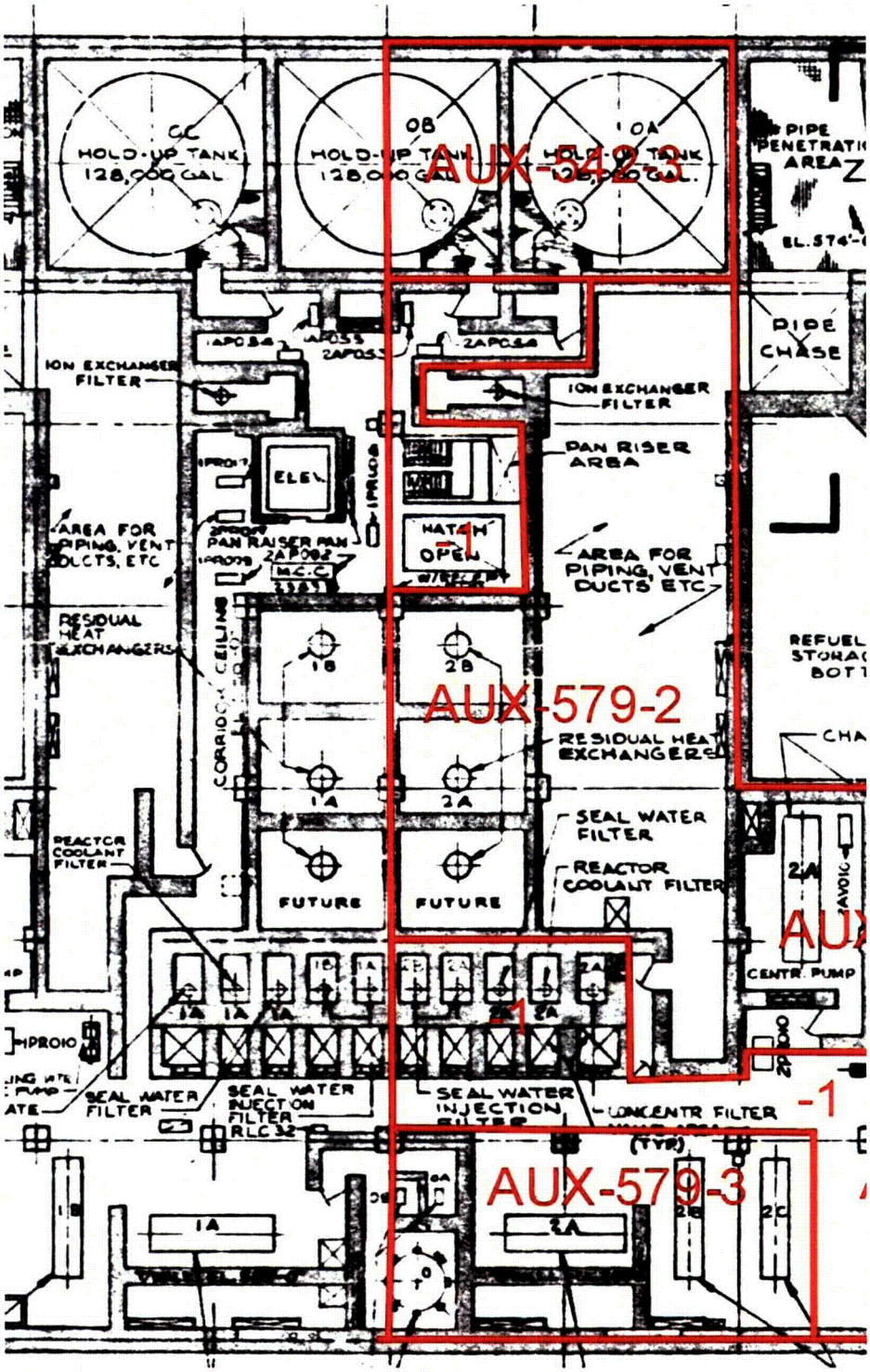

AREA MAPS
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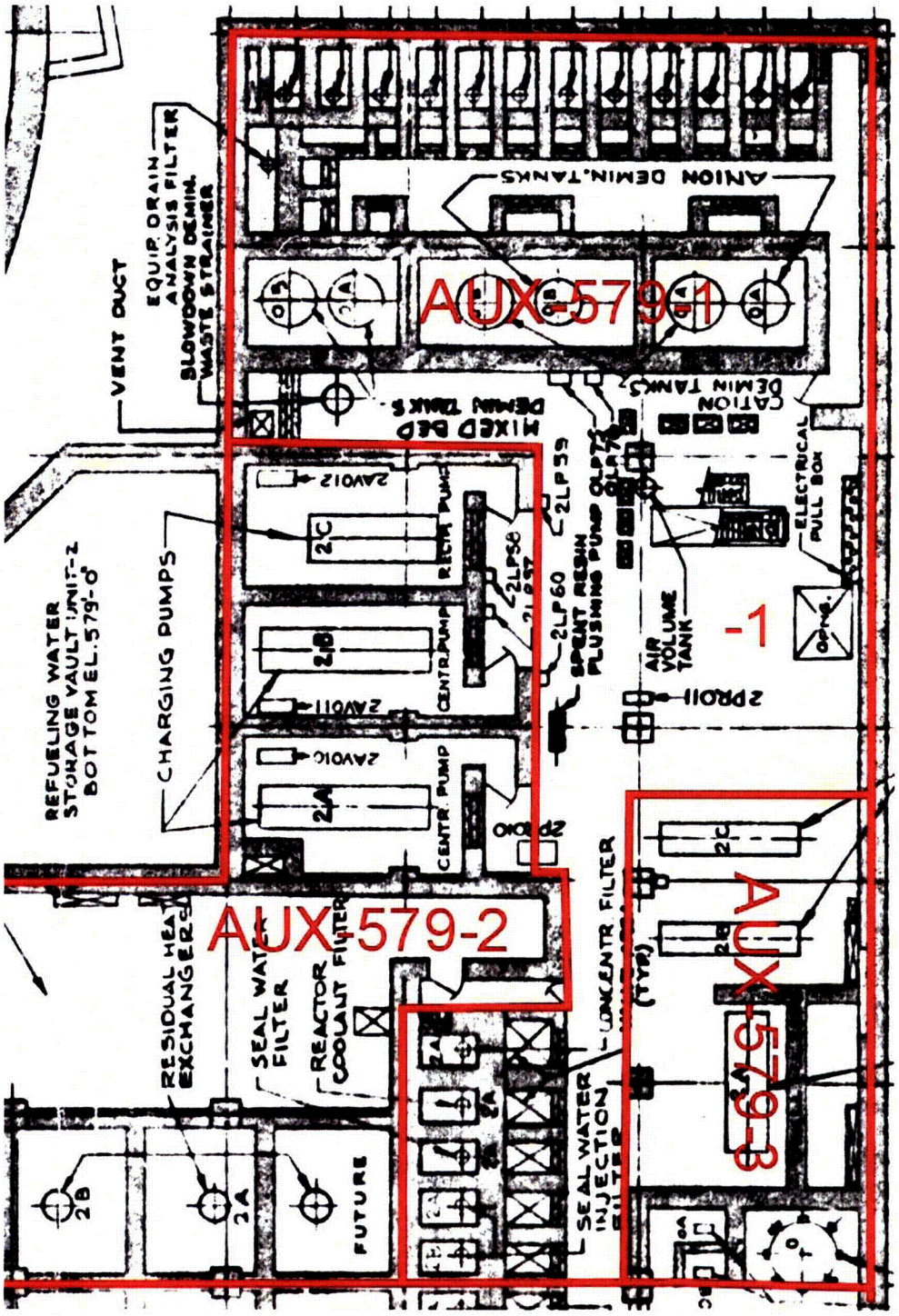
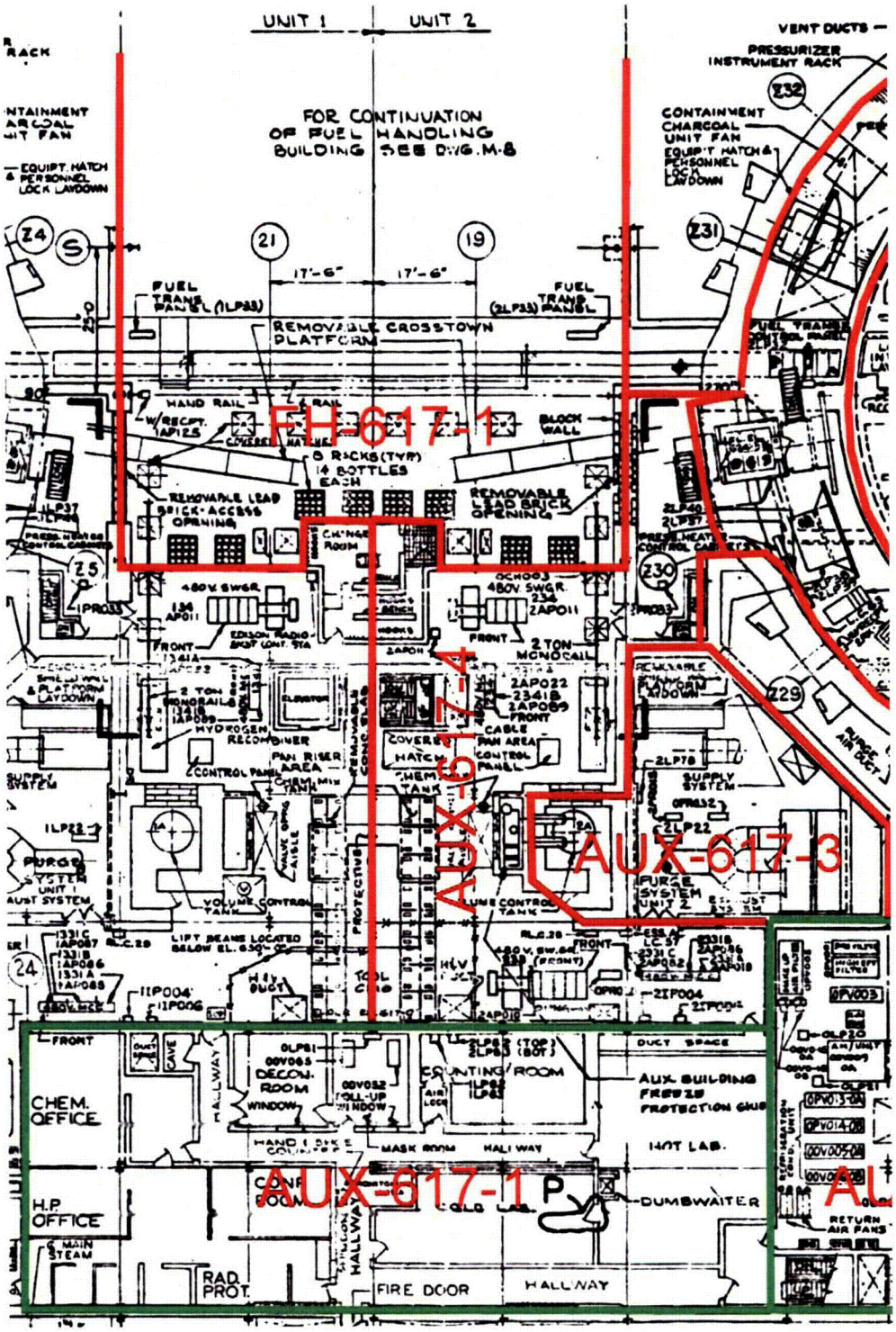


AREA MAPS
(continued)



AREA MAPS
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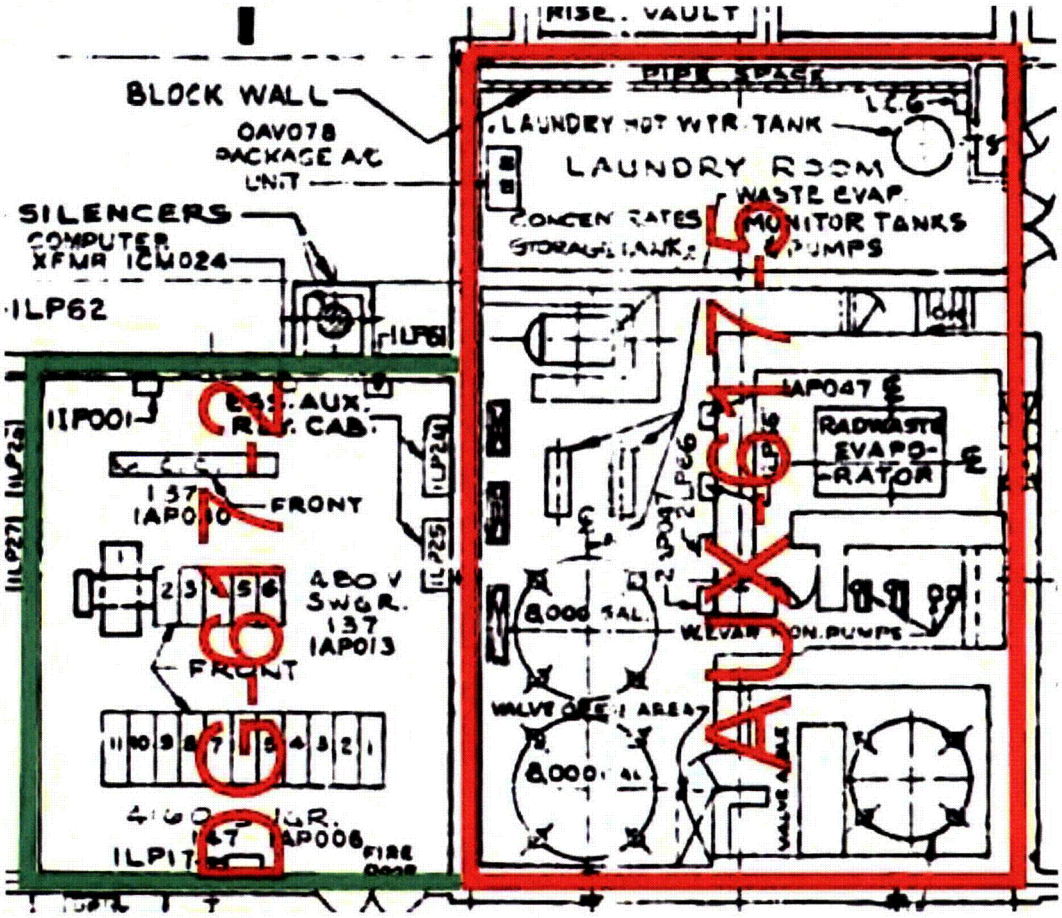

AREA MAPS
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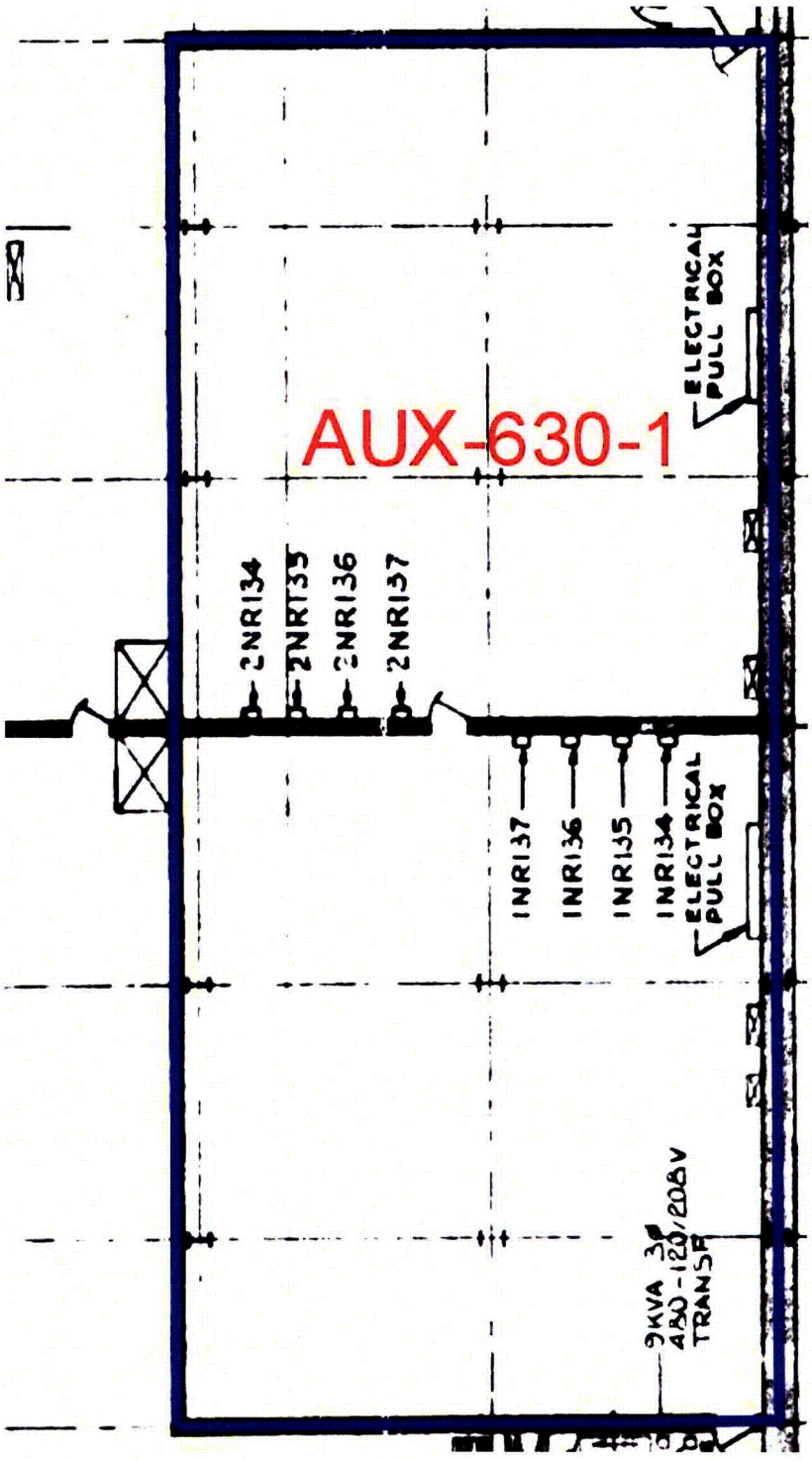

AREA MAPS
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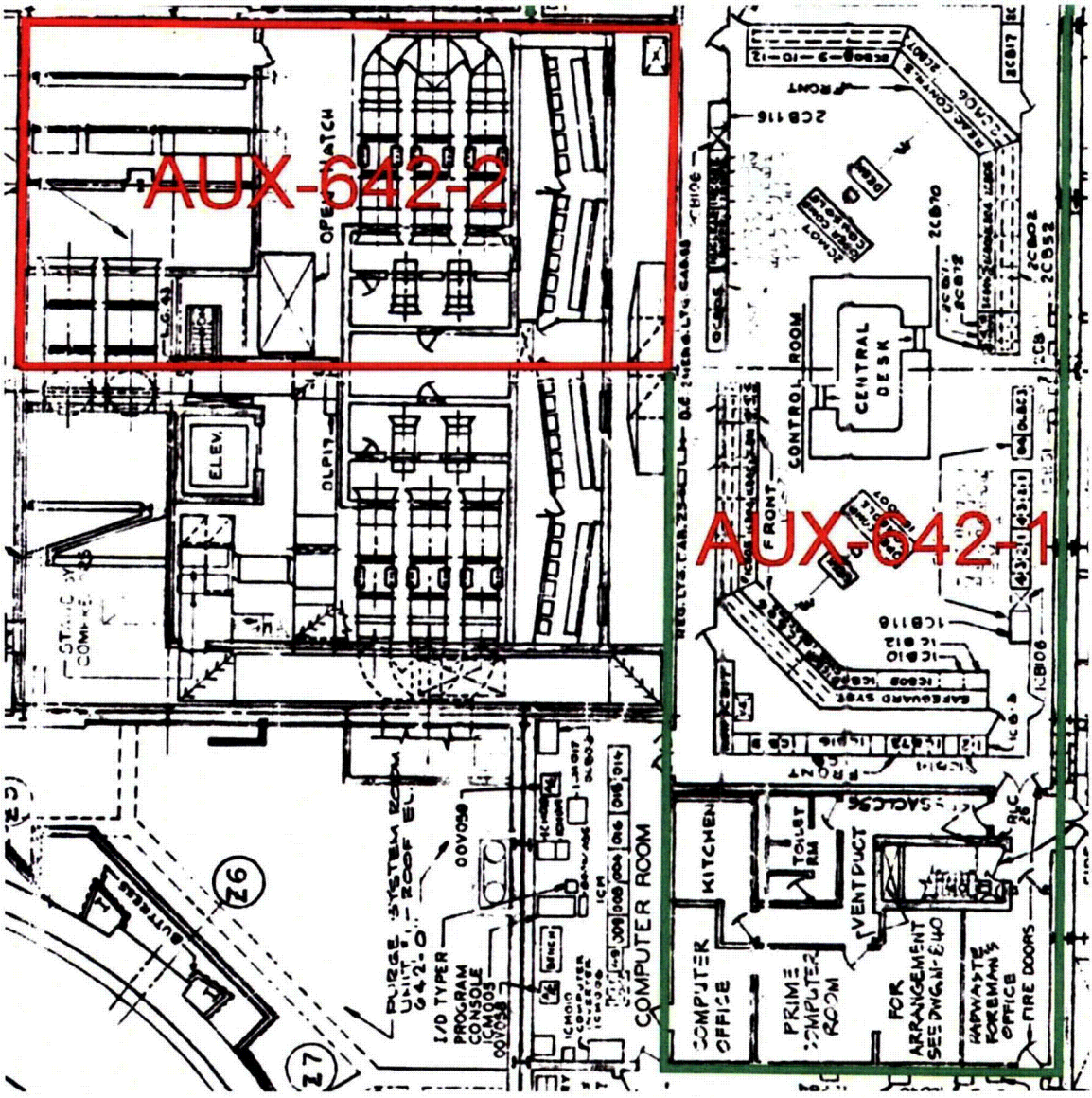

AREA MAPS
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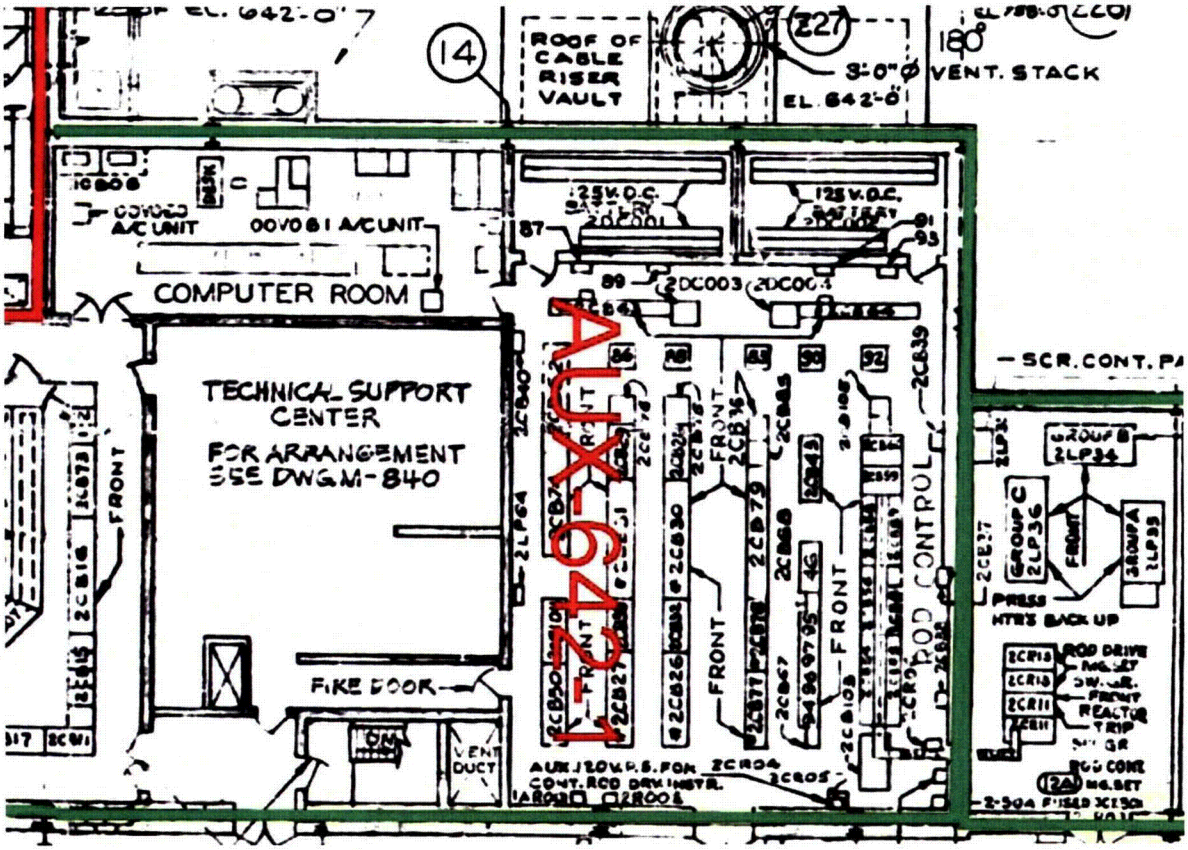

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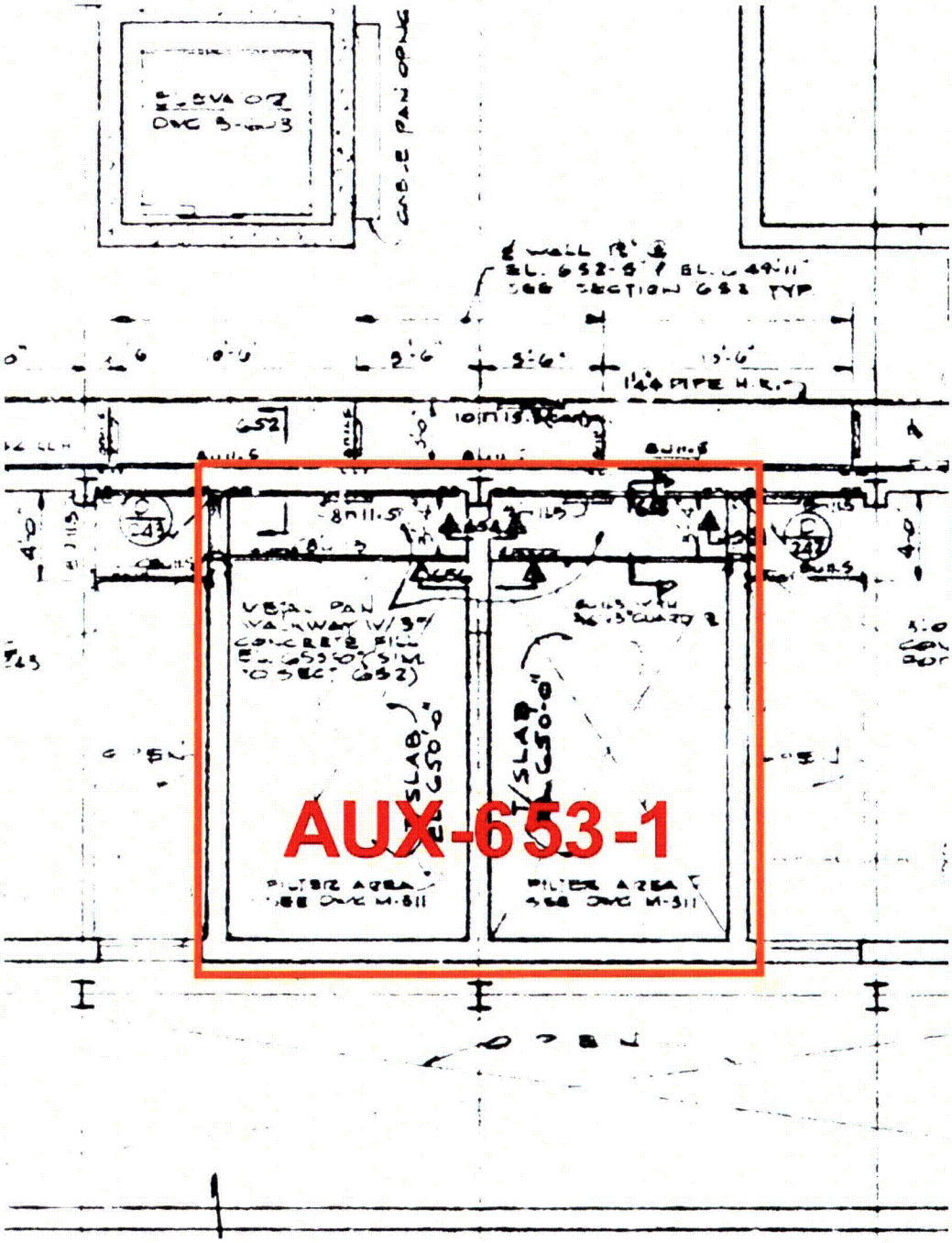

AREA MAPS
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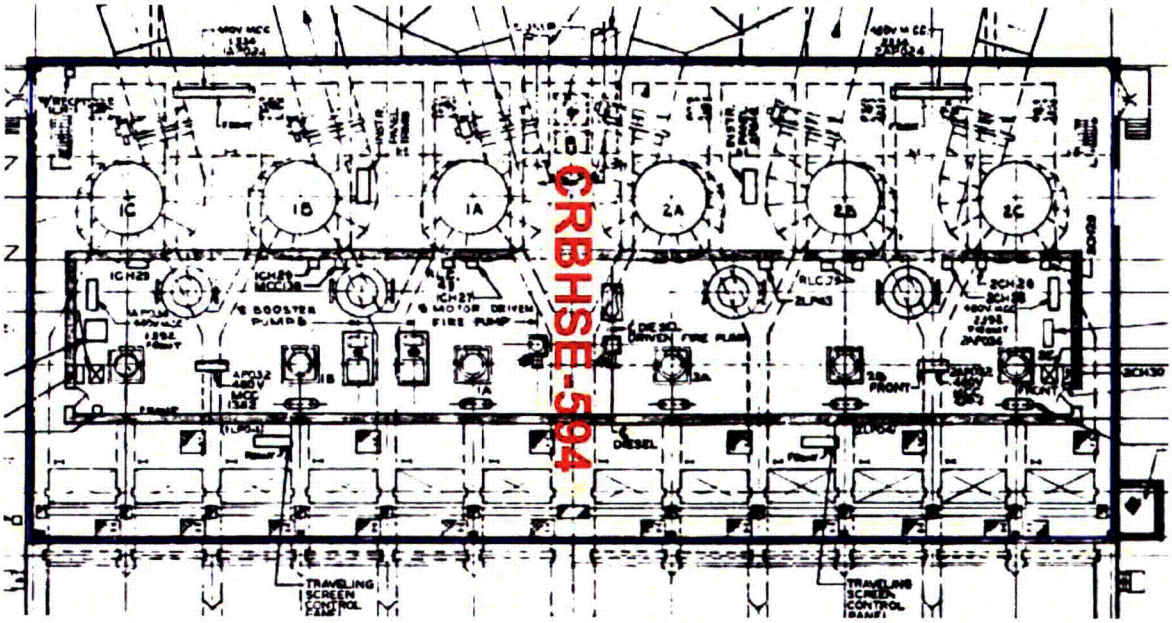

AREA MAPS
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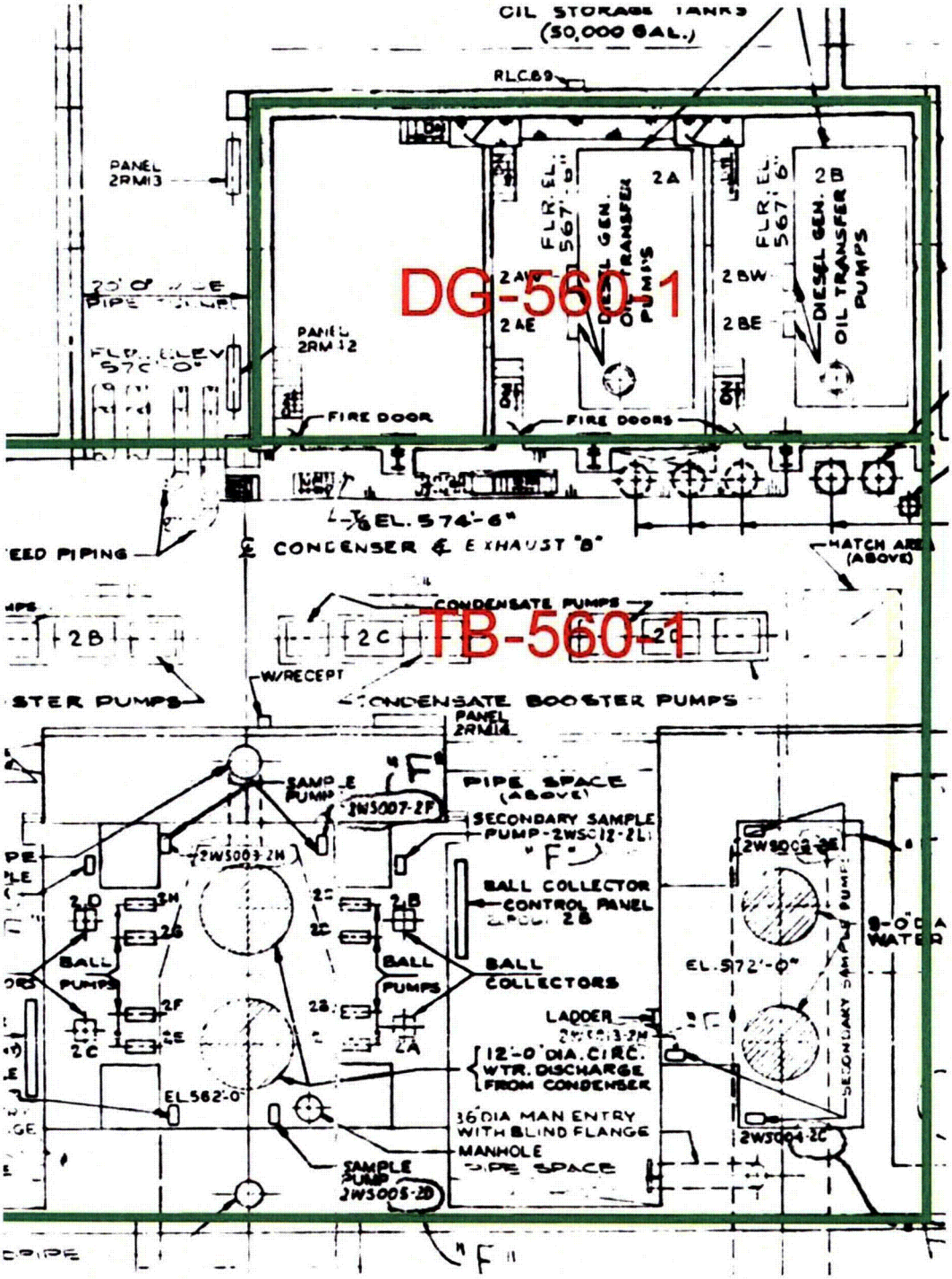

AREA MAPS
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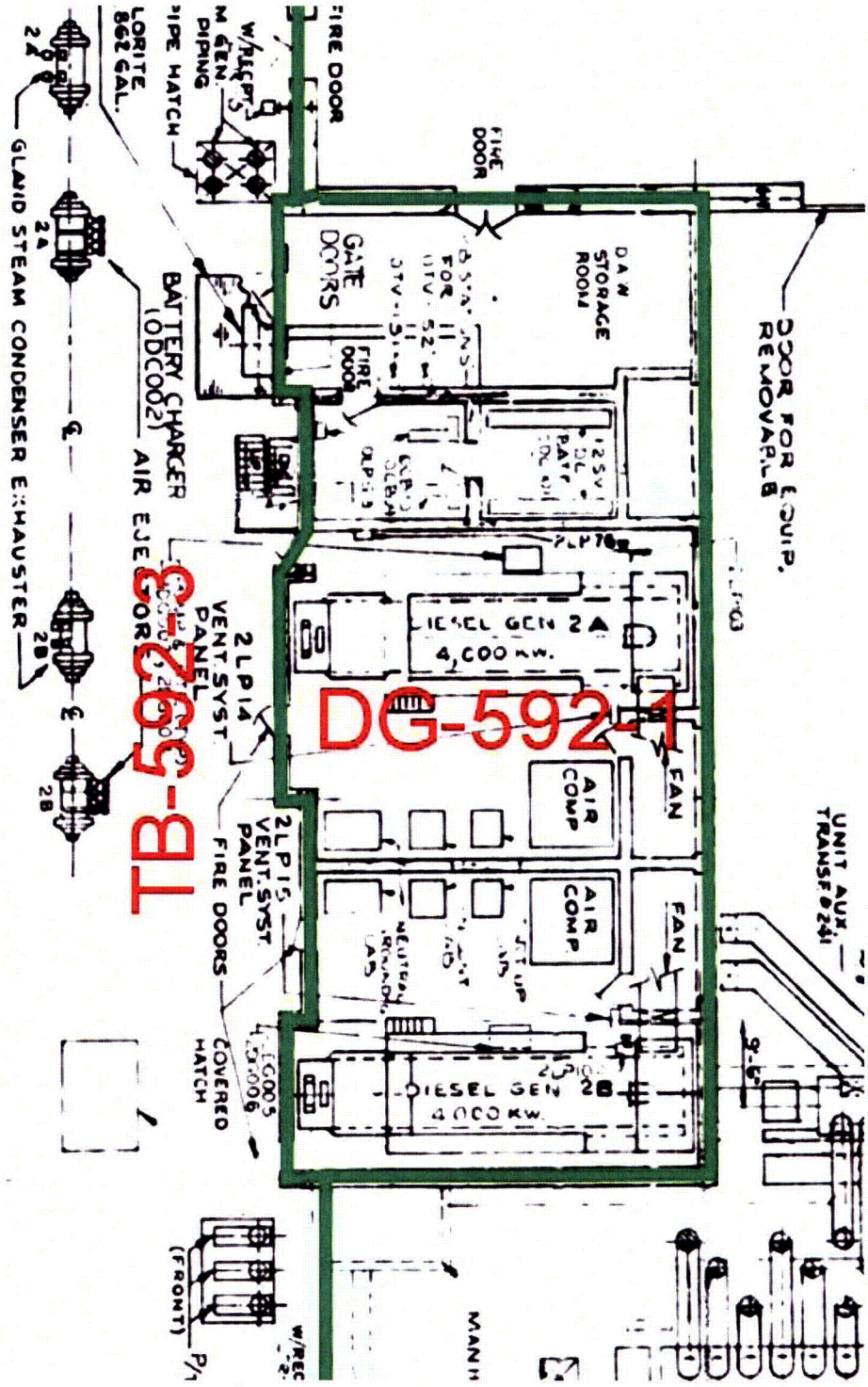

AREA MAPS
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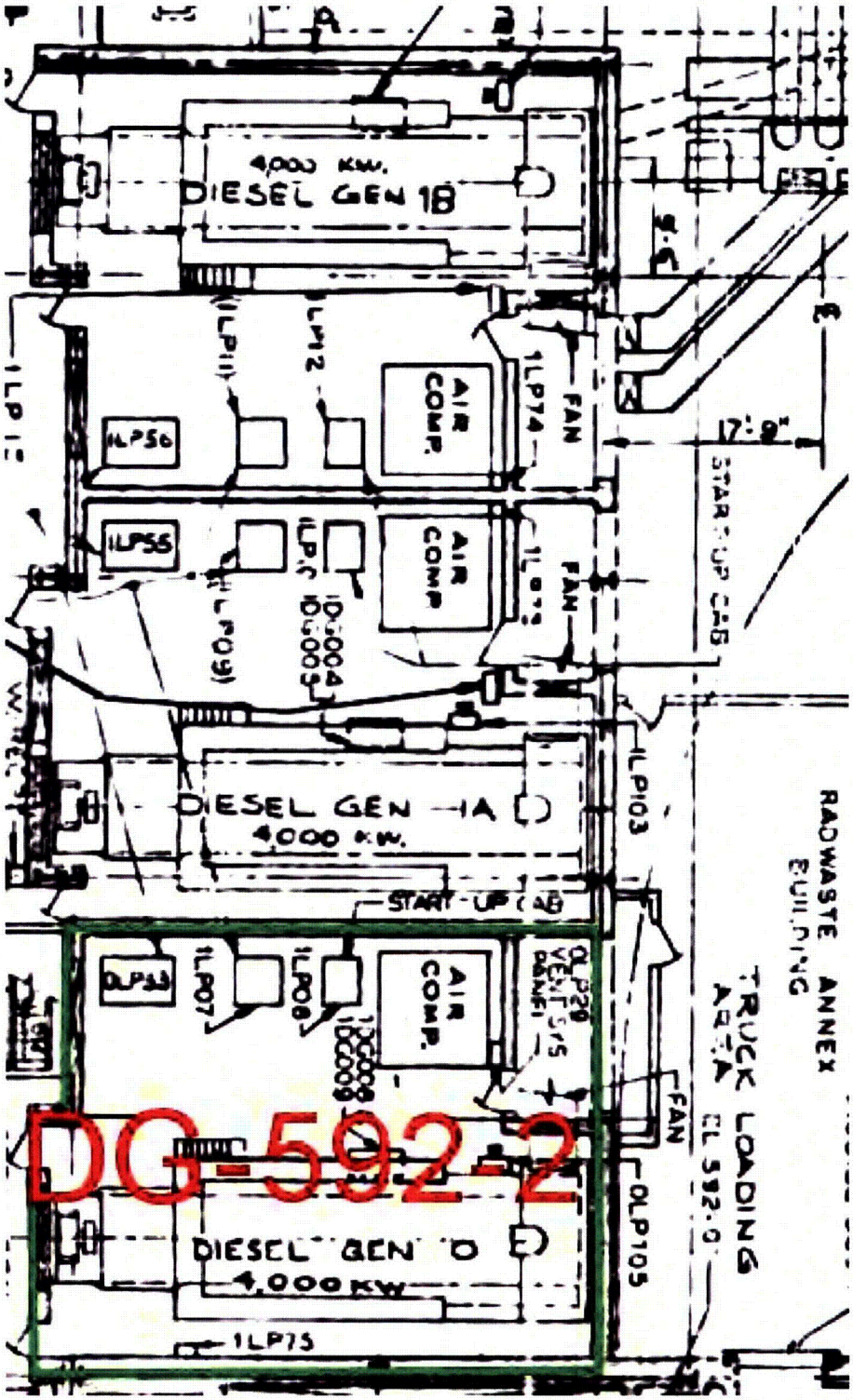

AREA MAPS
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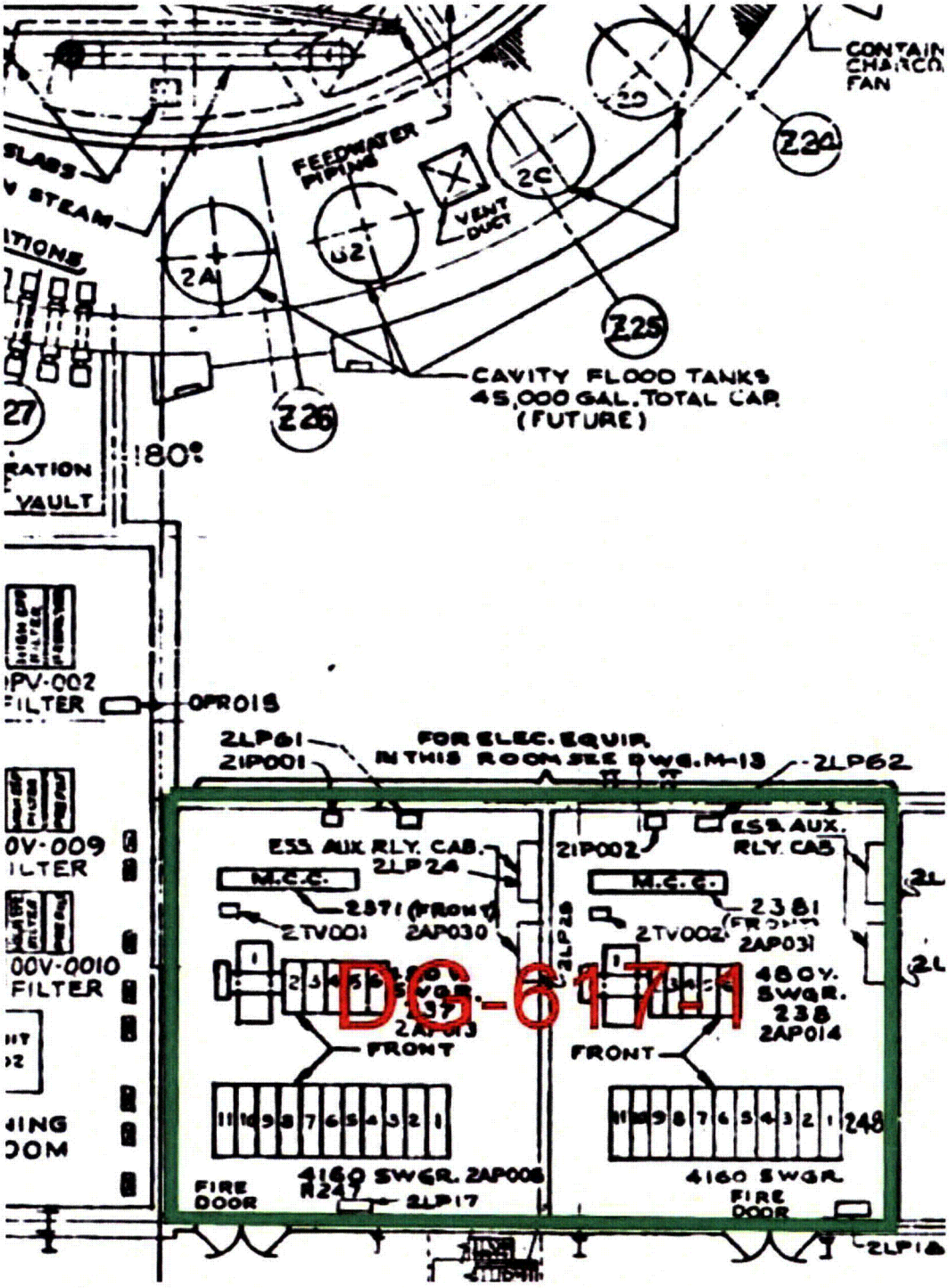

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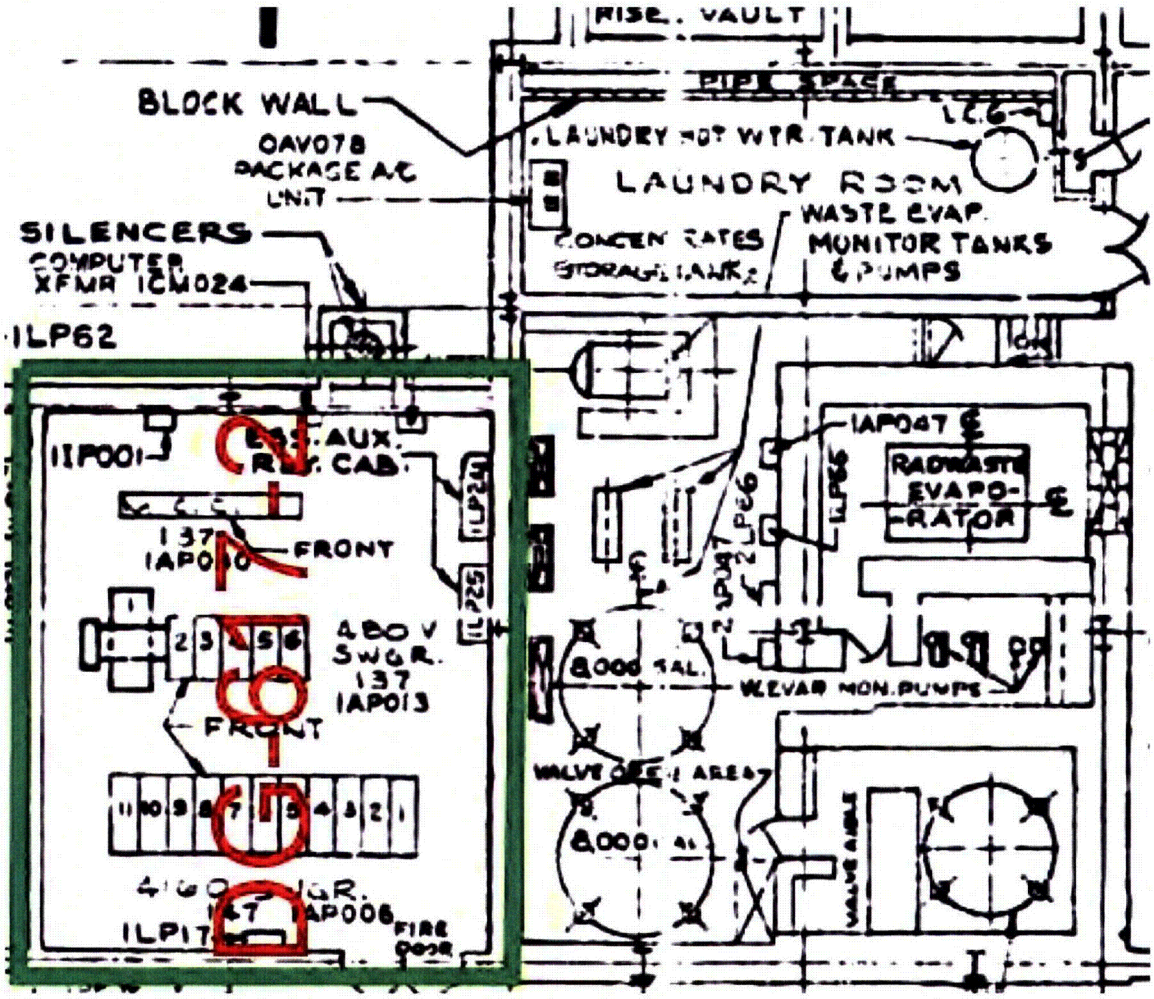

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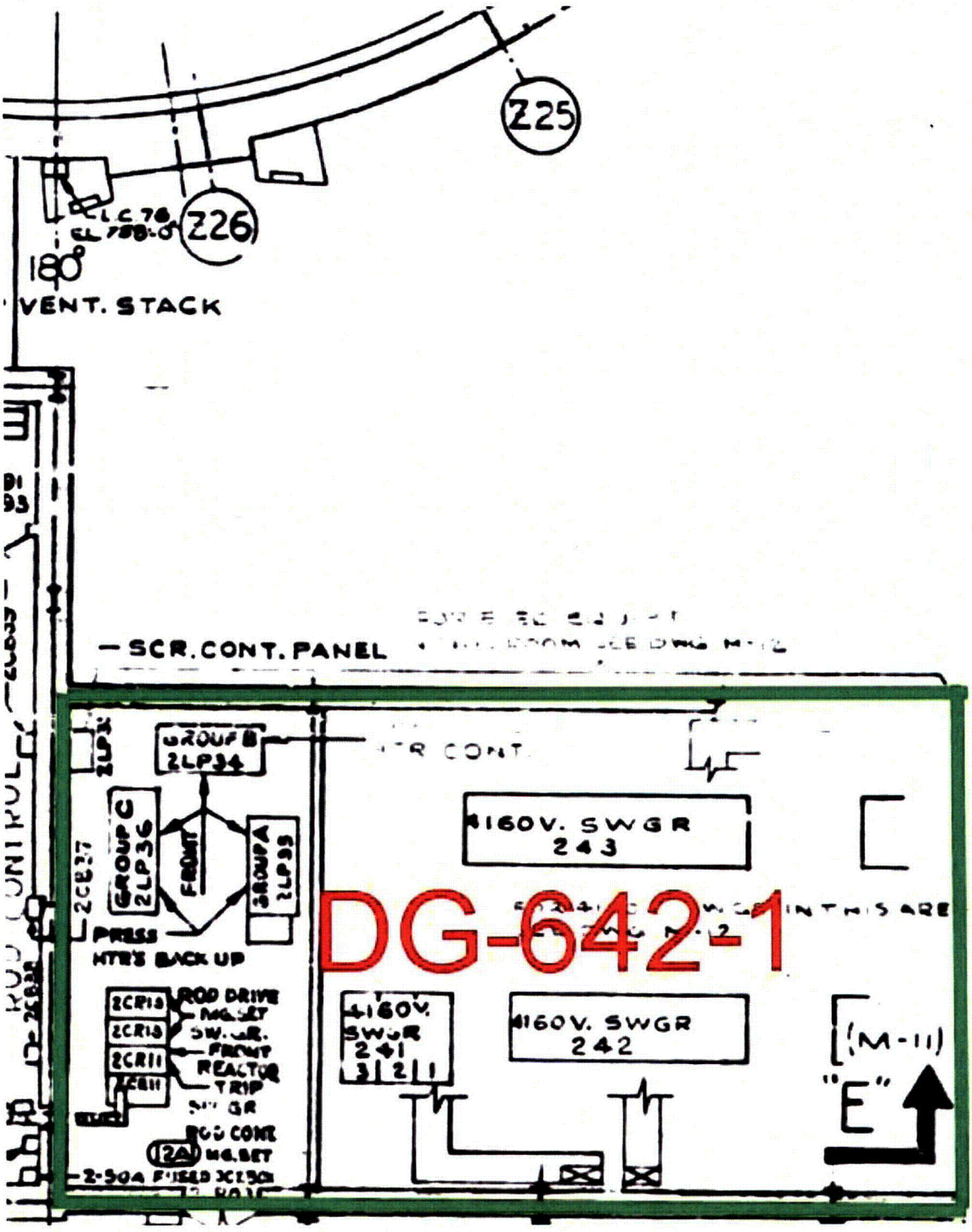

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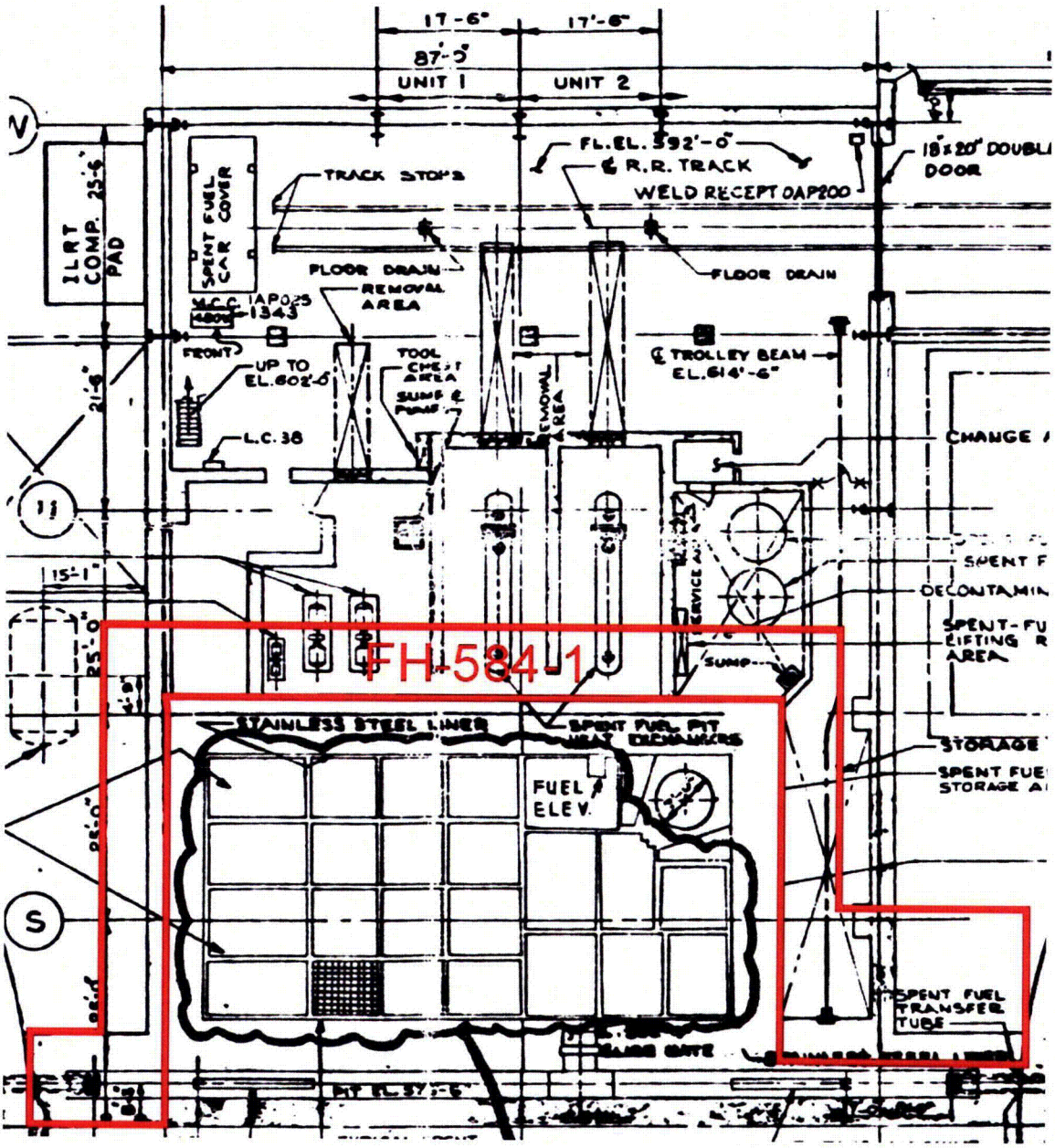

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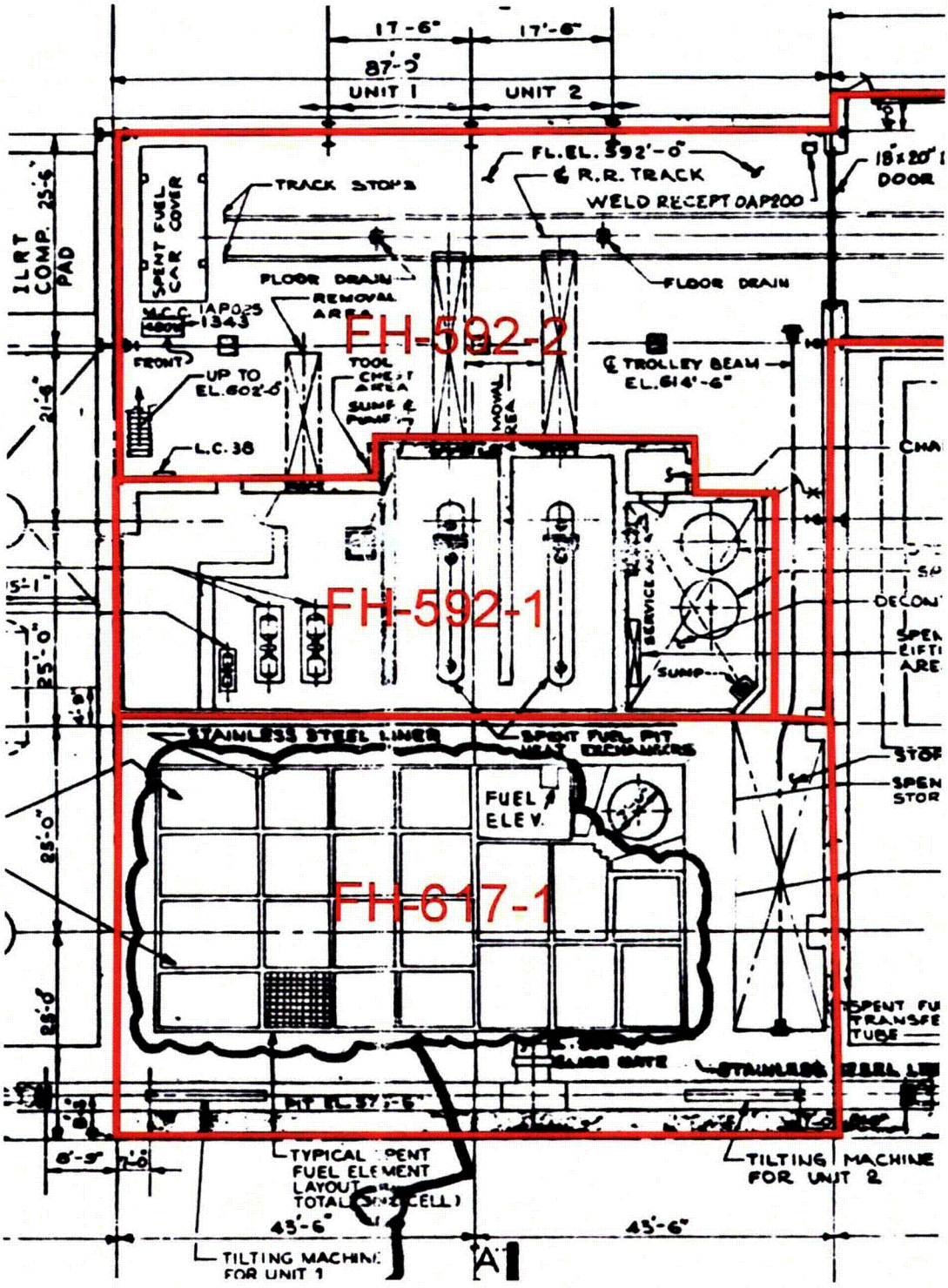

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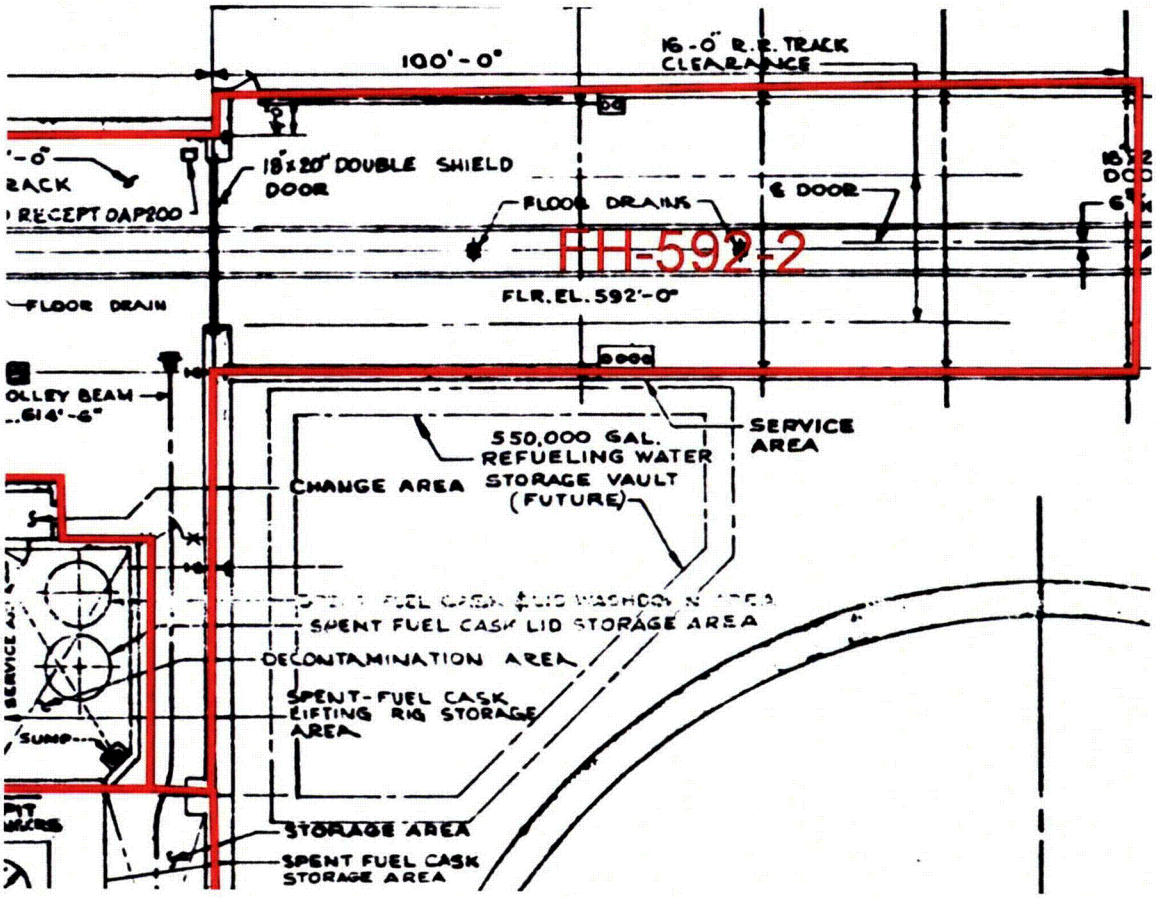

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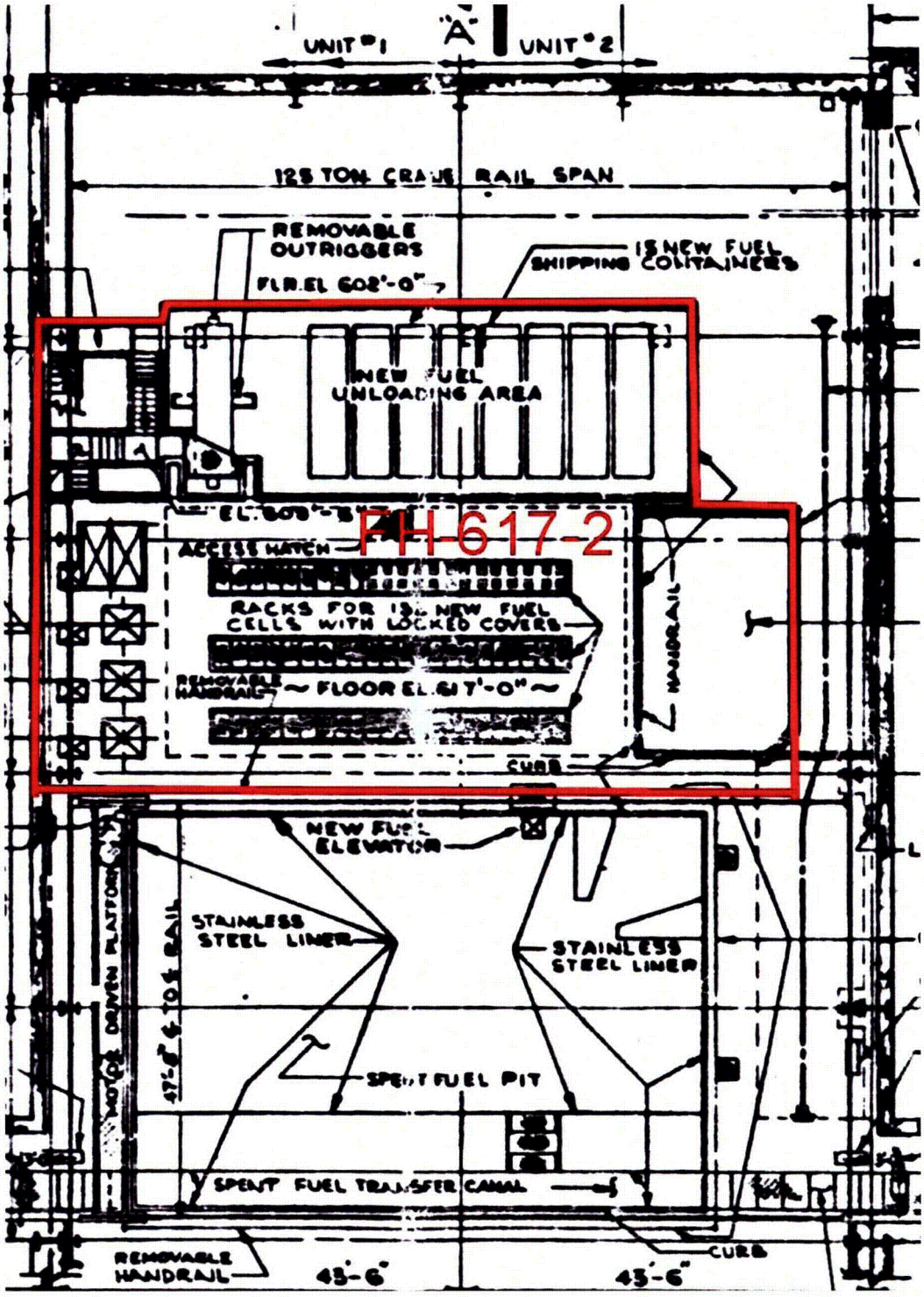

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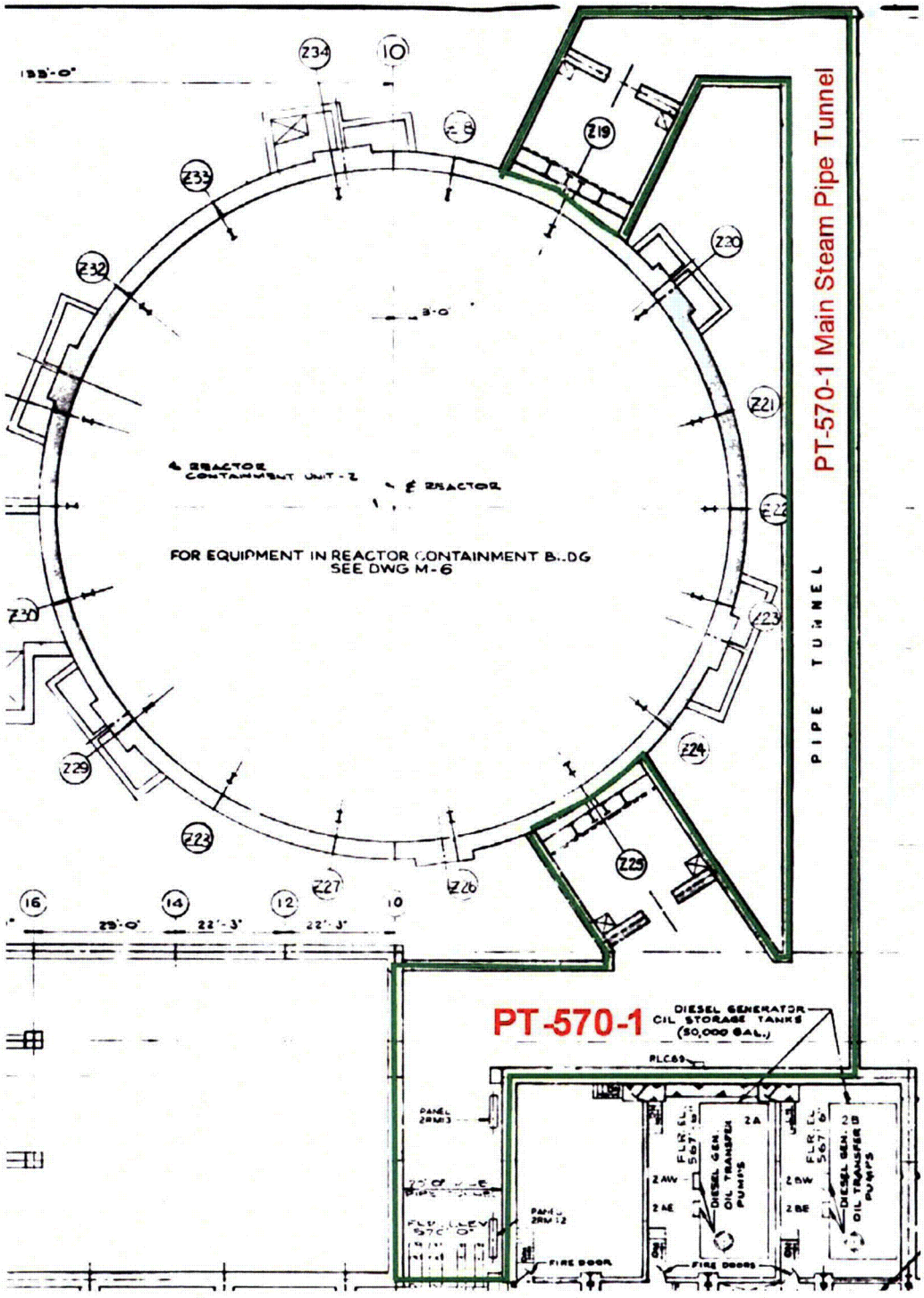

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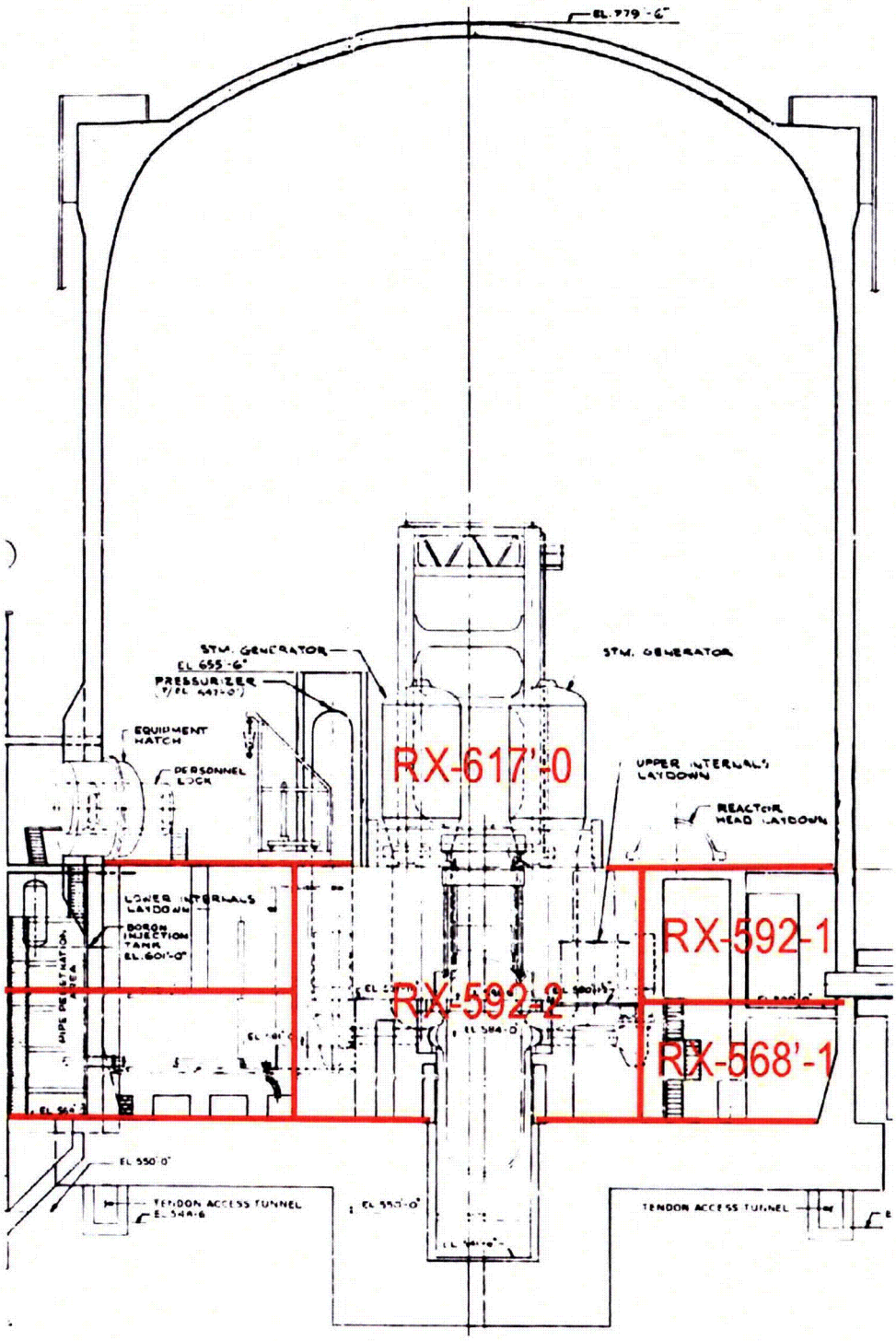

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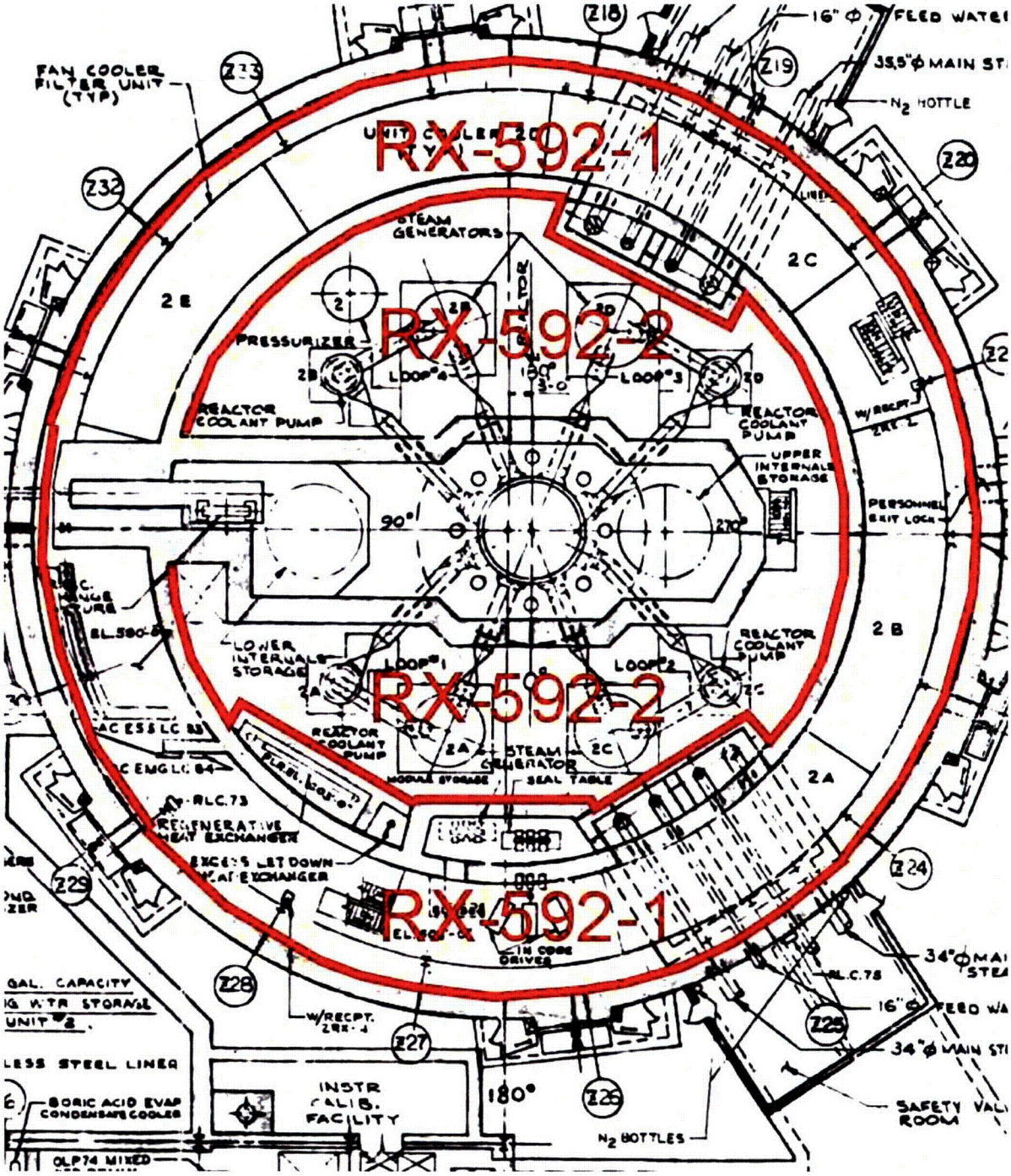

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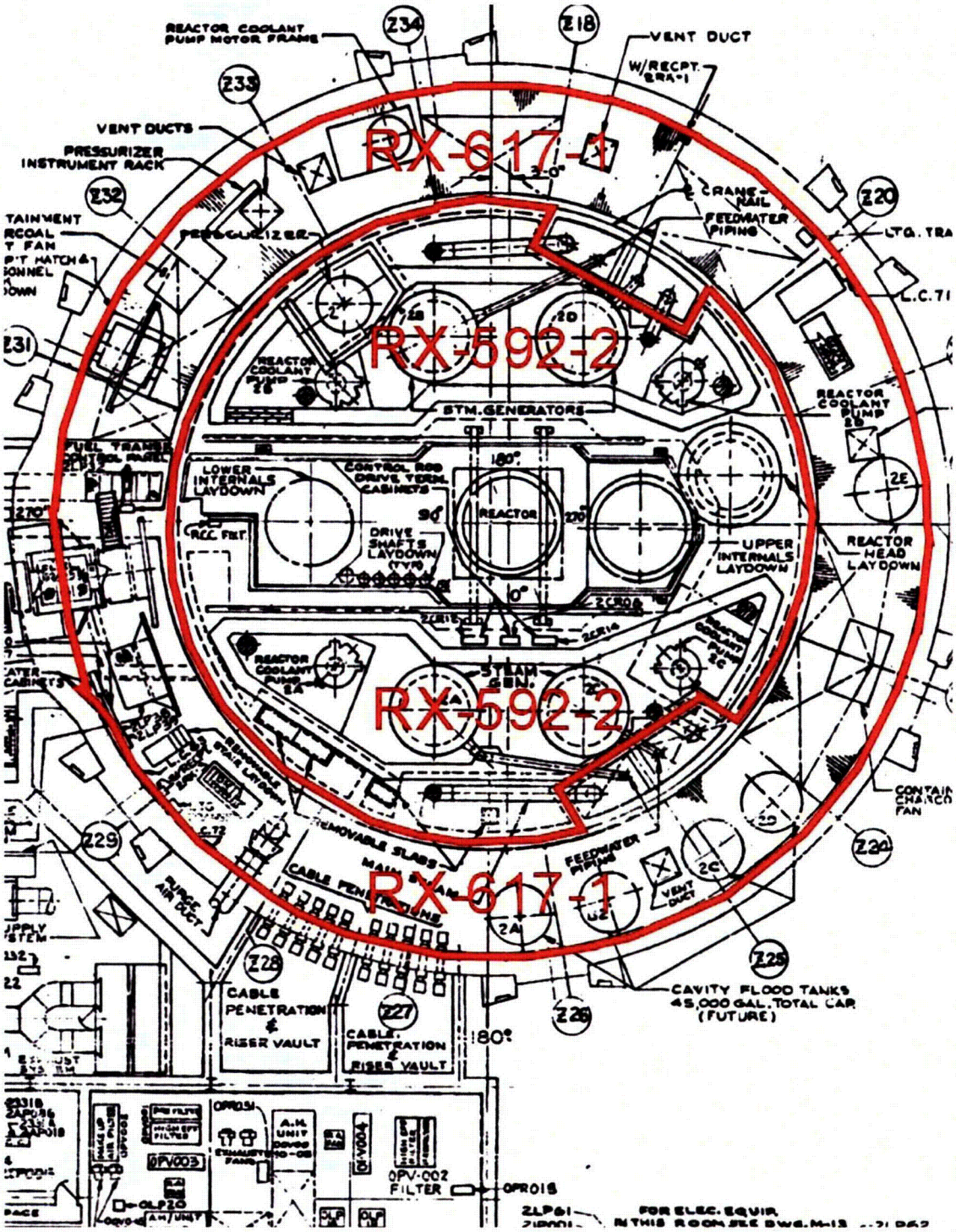

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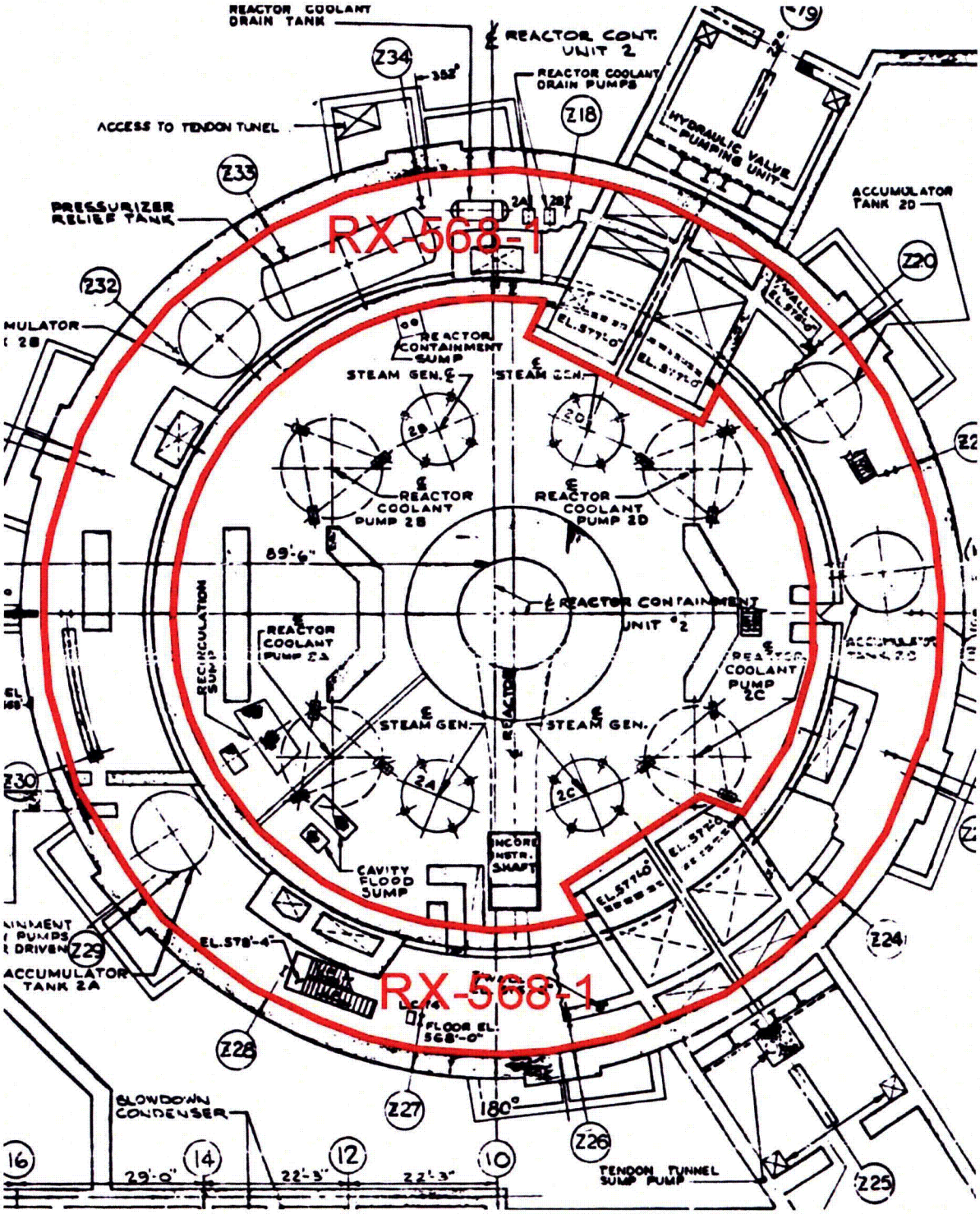

AREA MAPS
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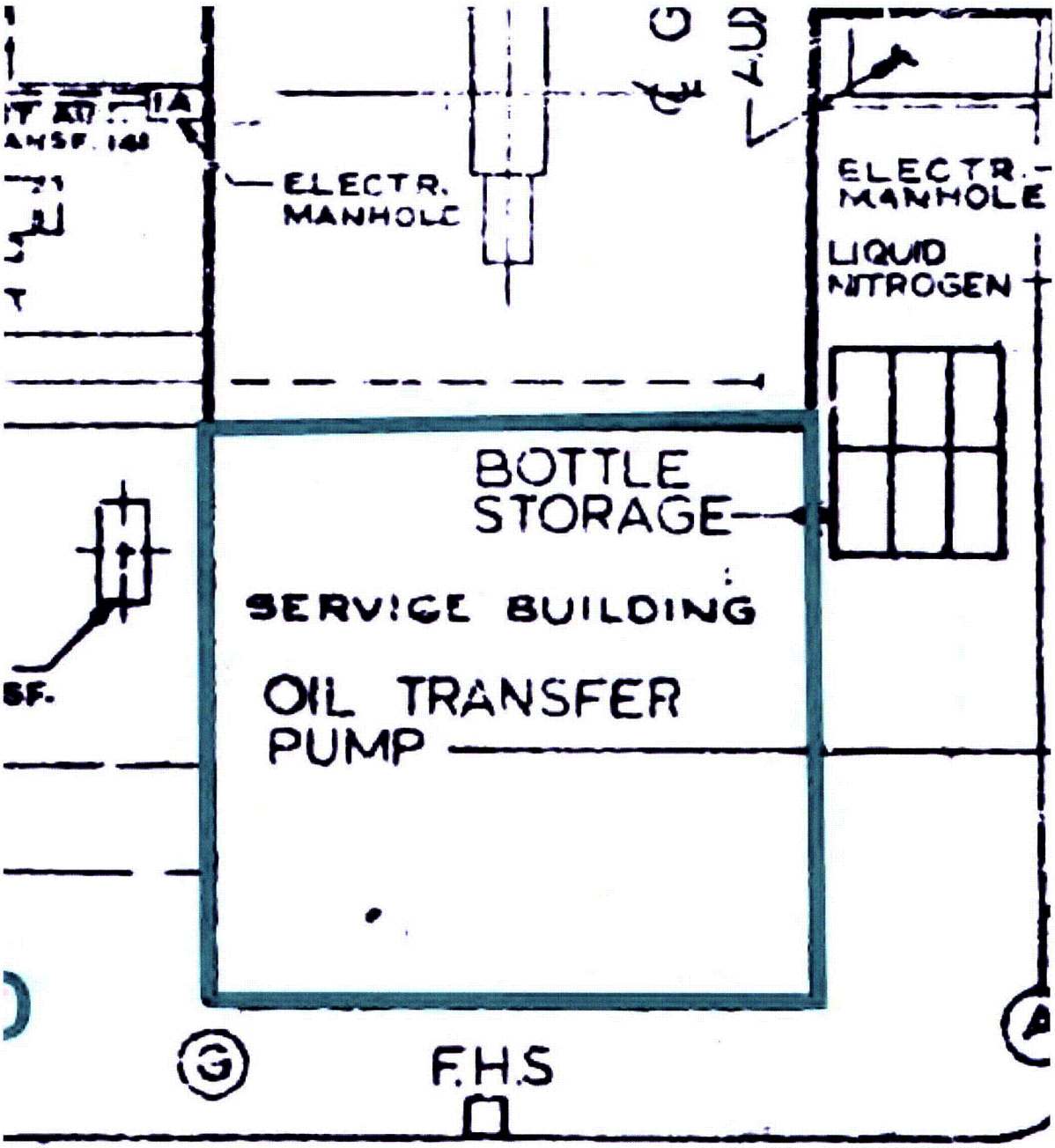

AREA MAPS
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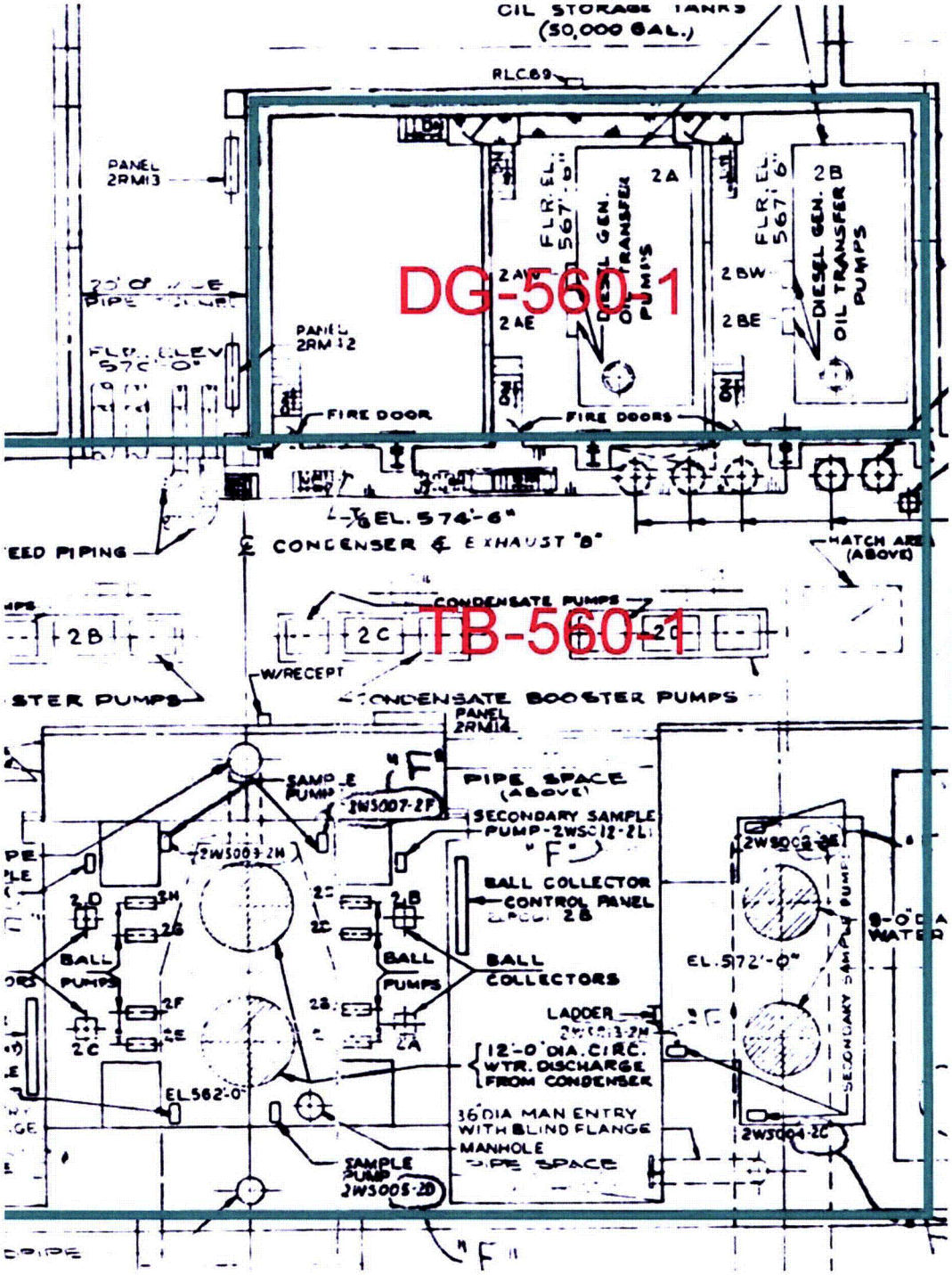

AREA MAPS
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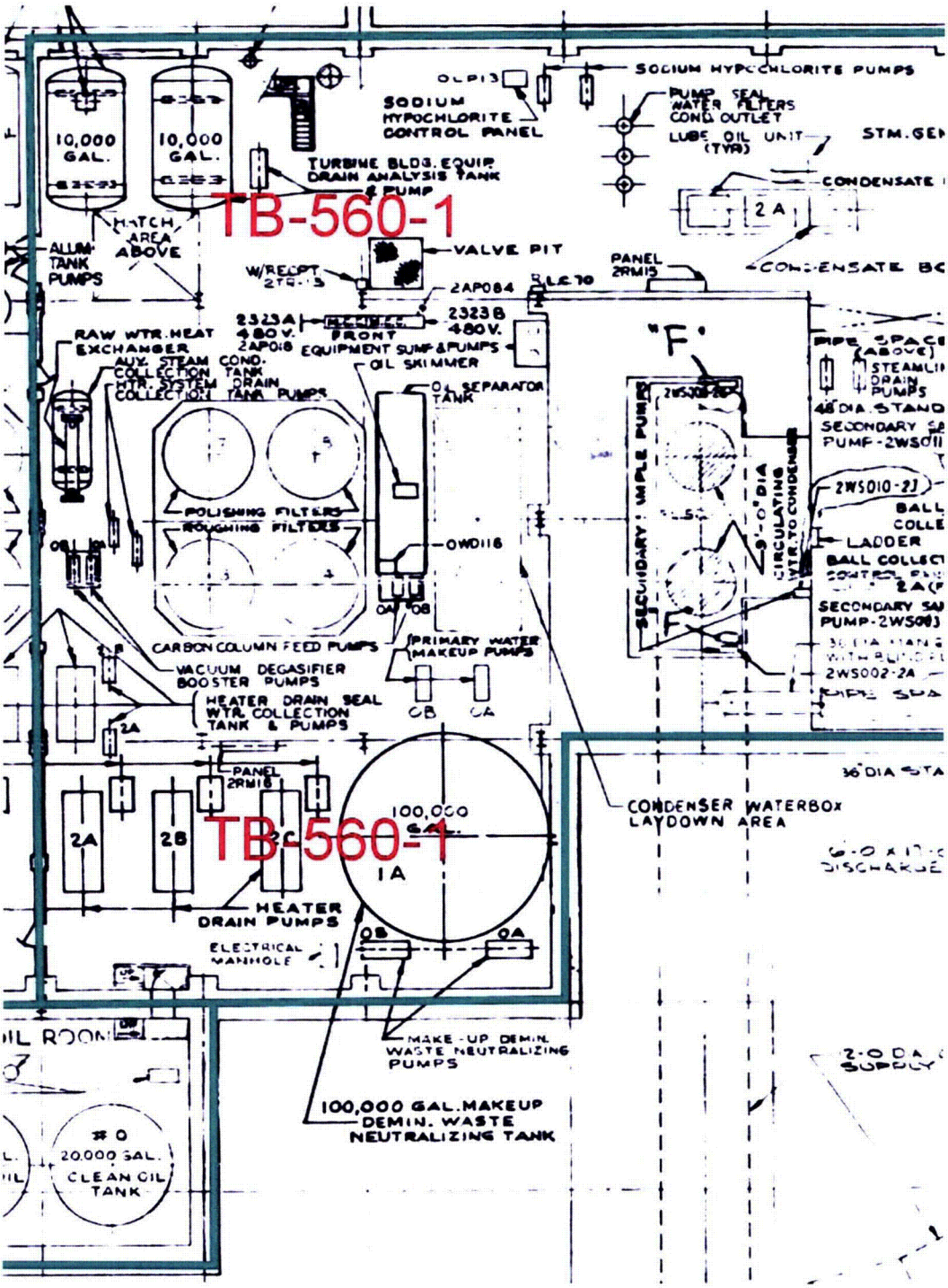

AREA MAPS
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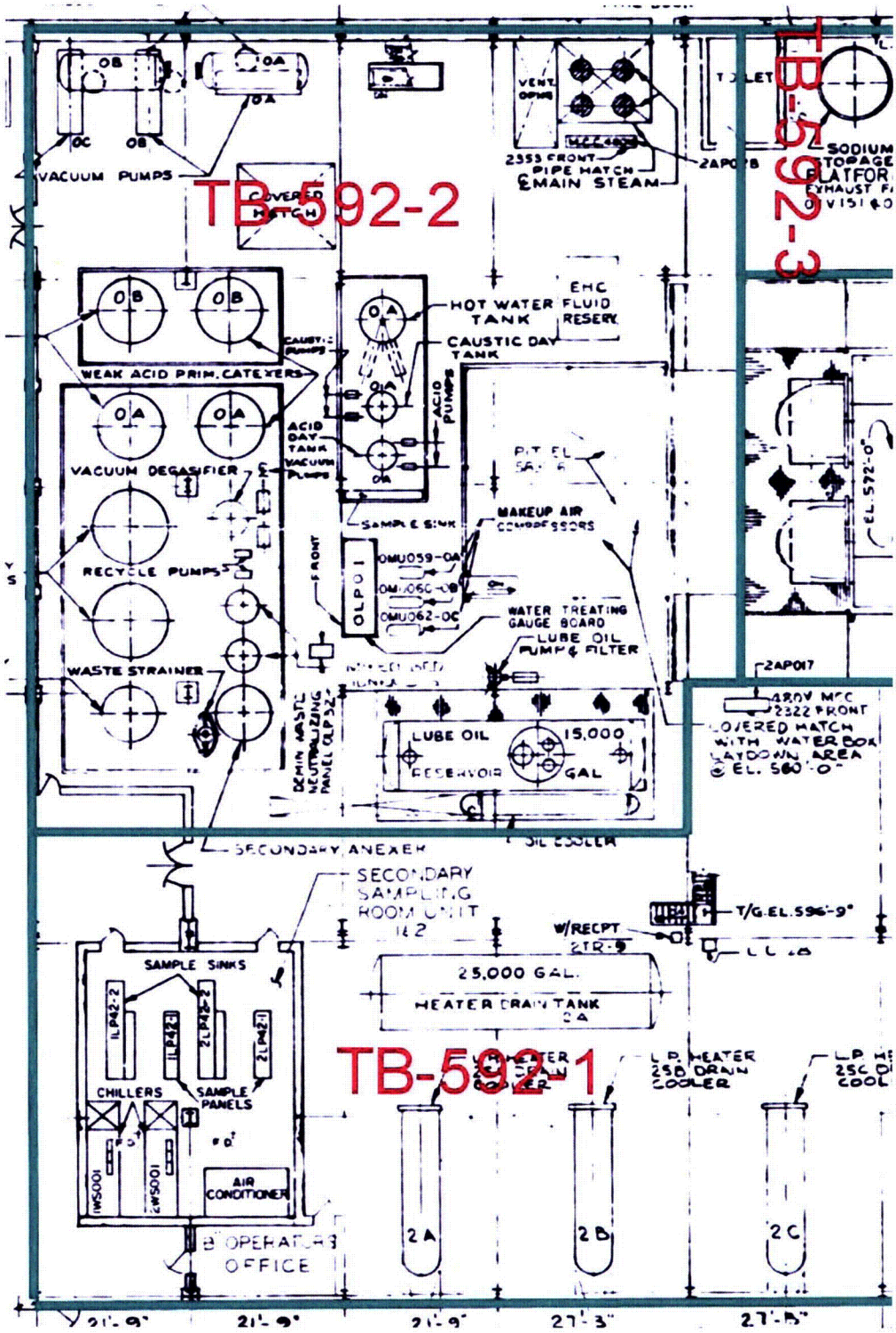

AREA MAPS
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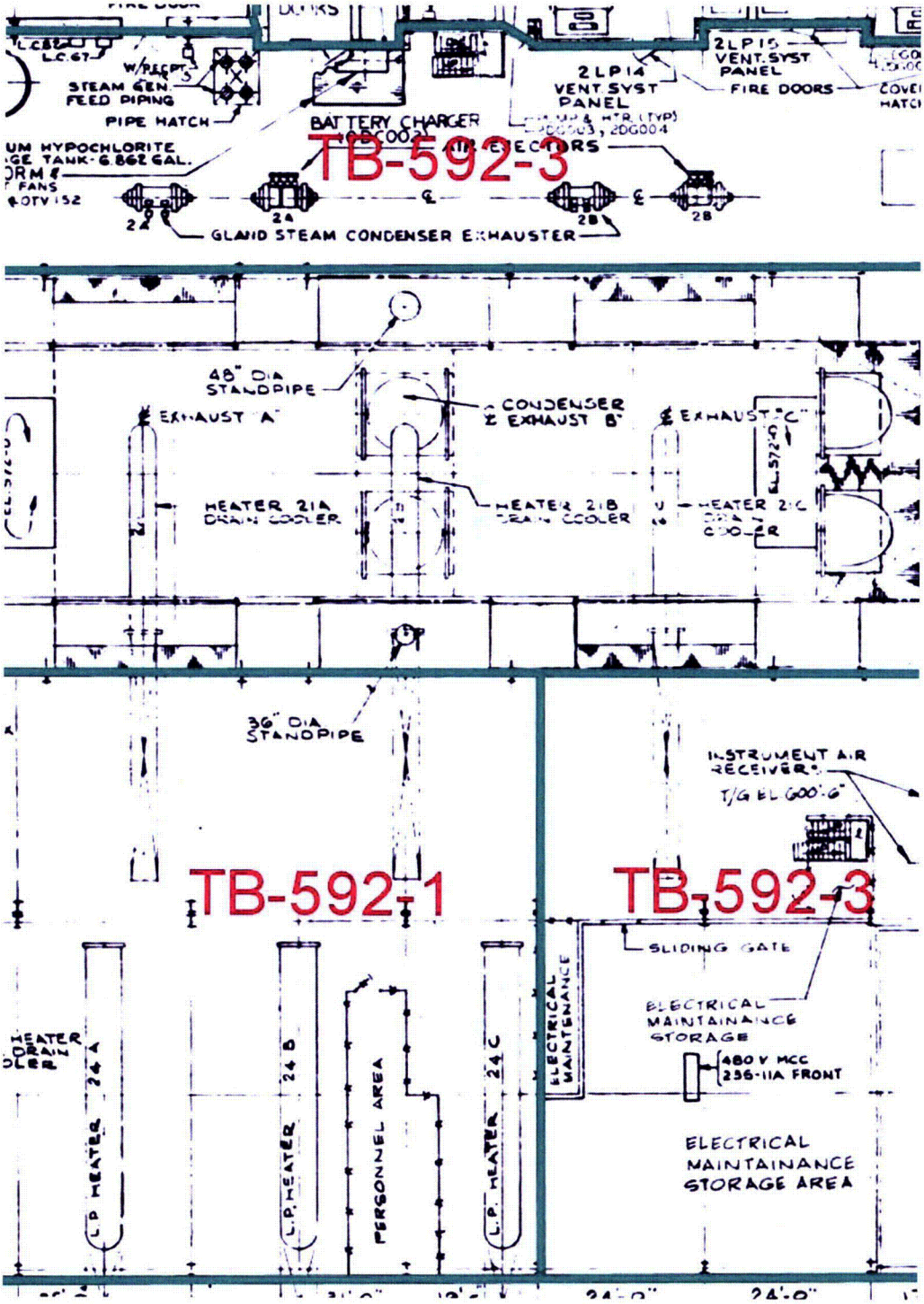

AREA MAPS
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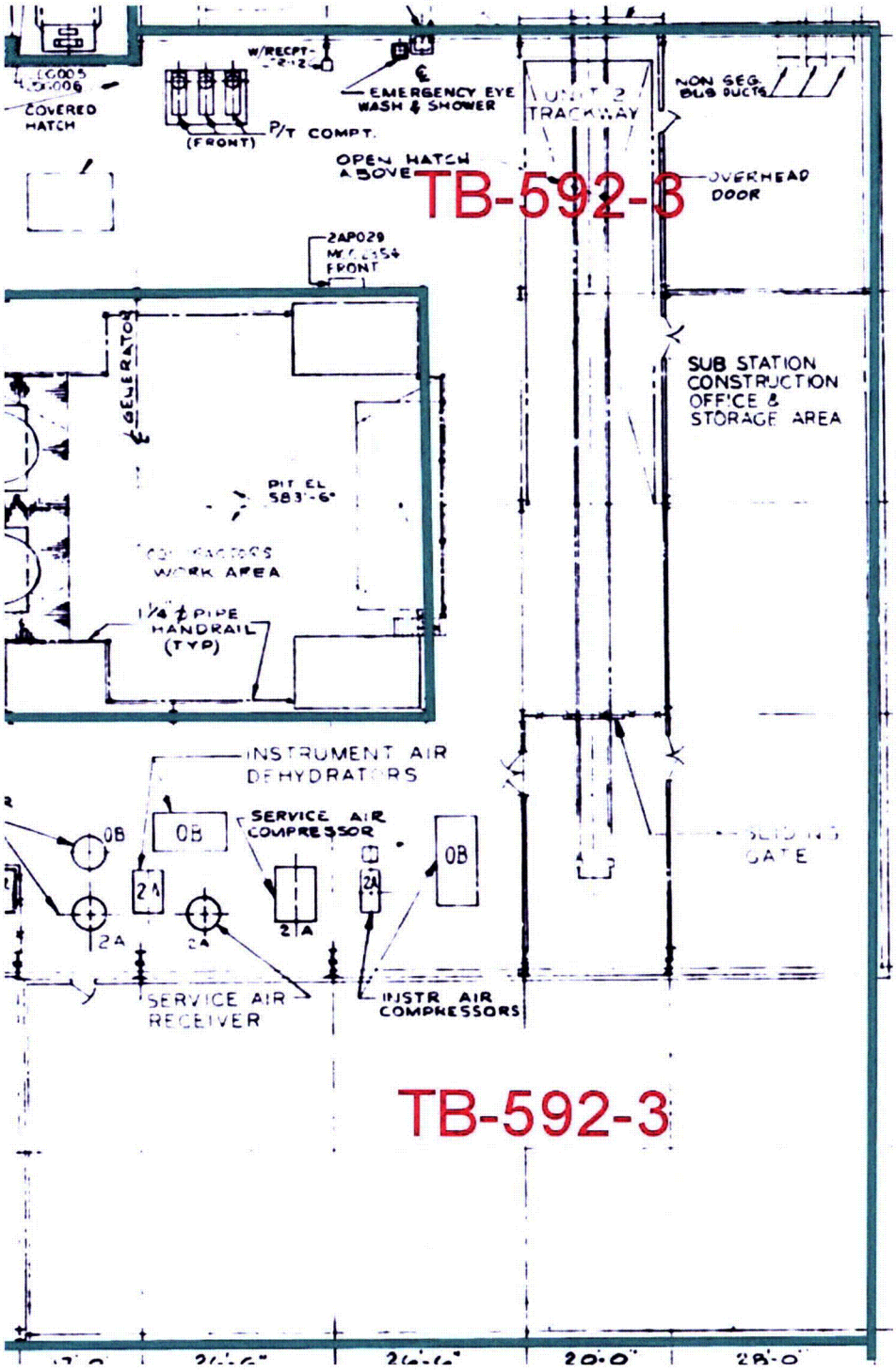

AREA MAPS
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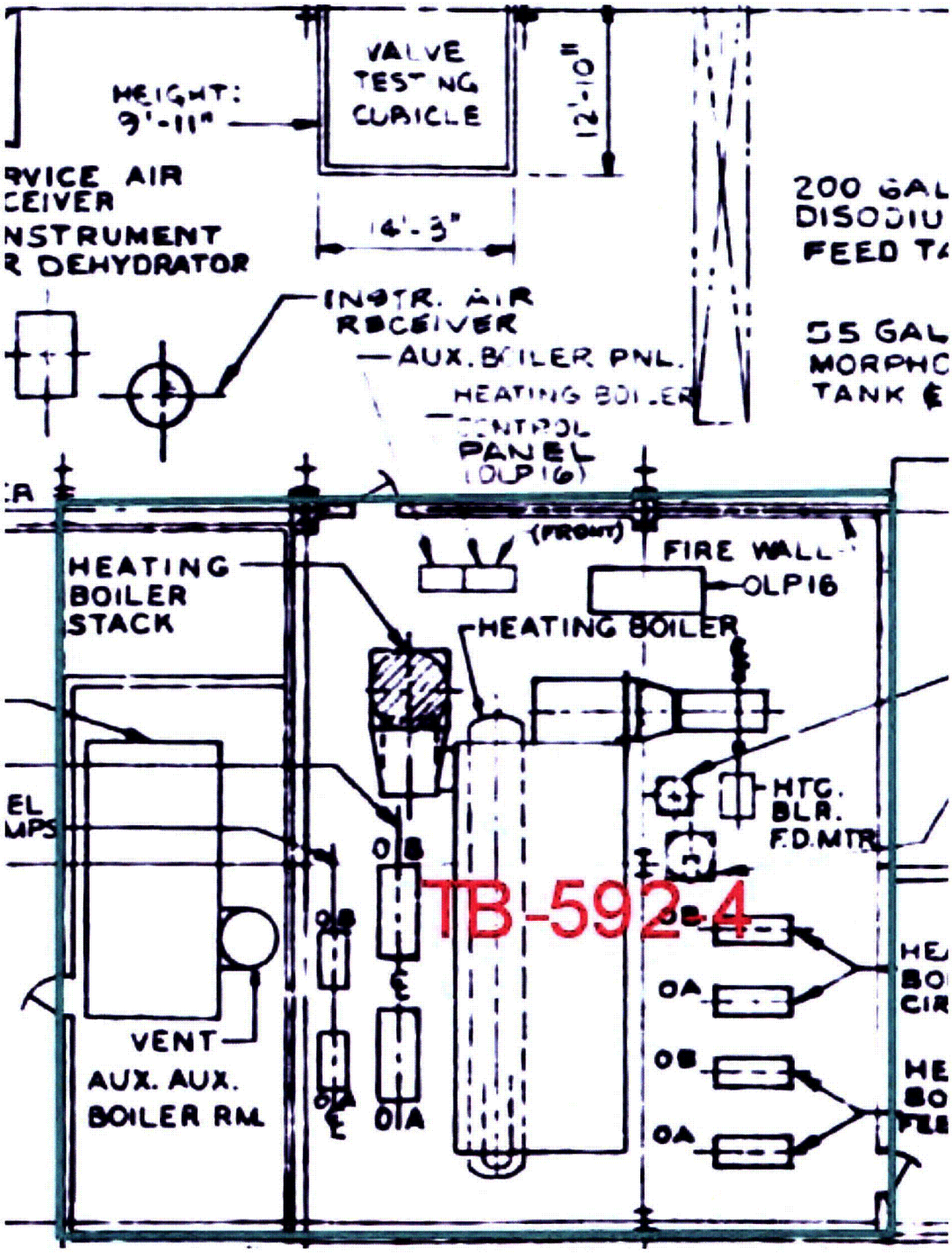

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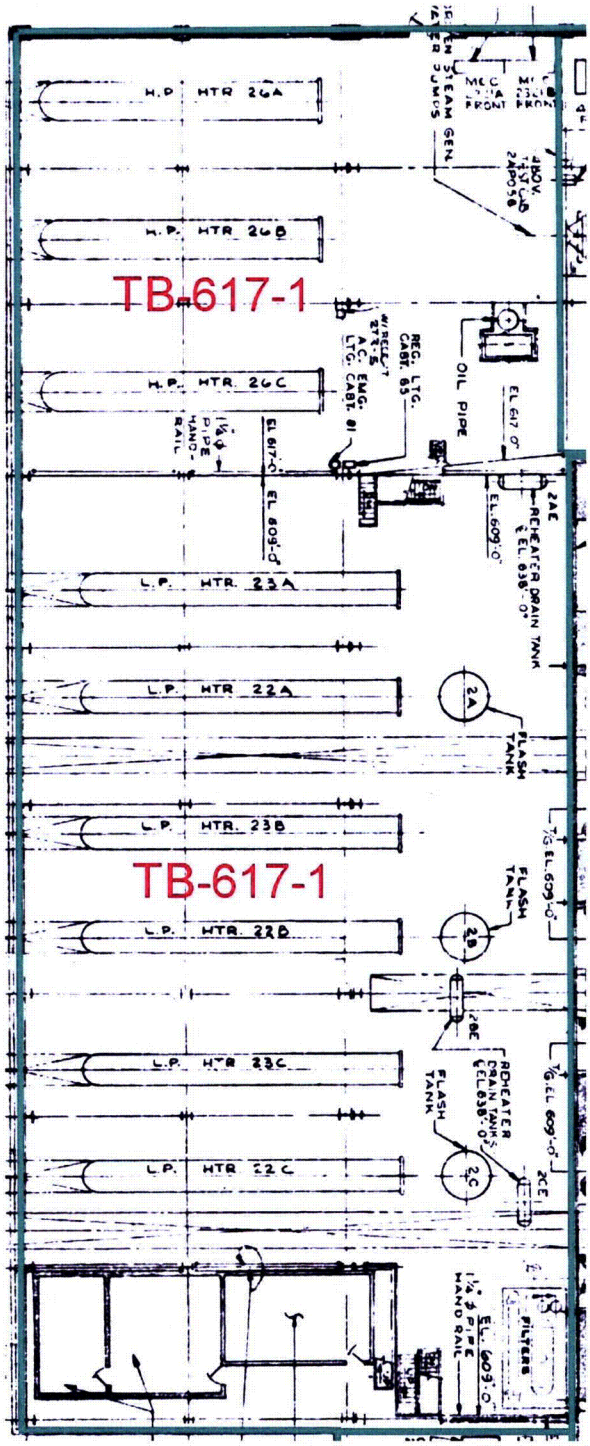

AREA MAPS
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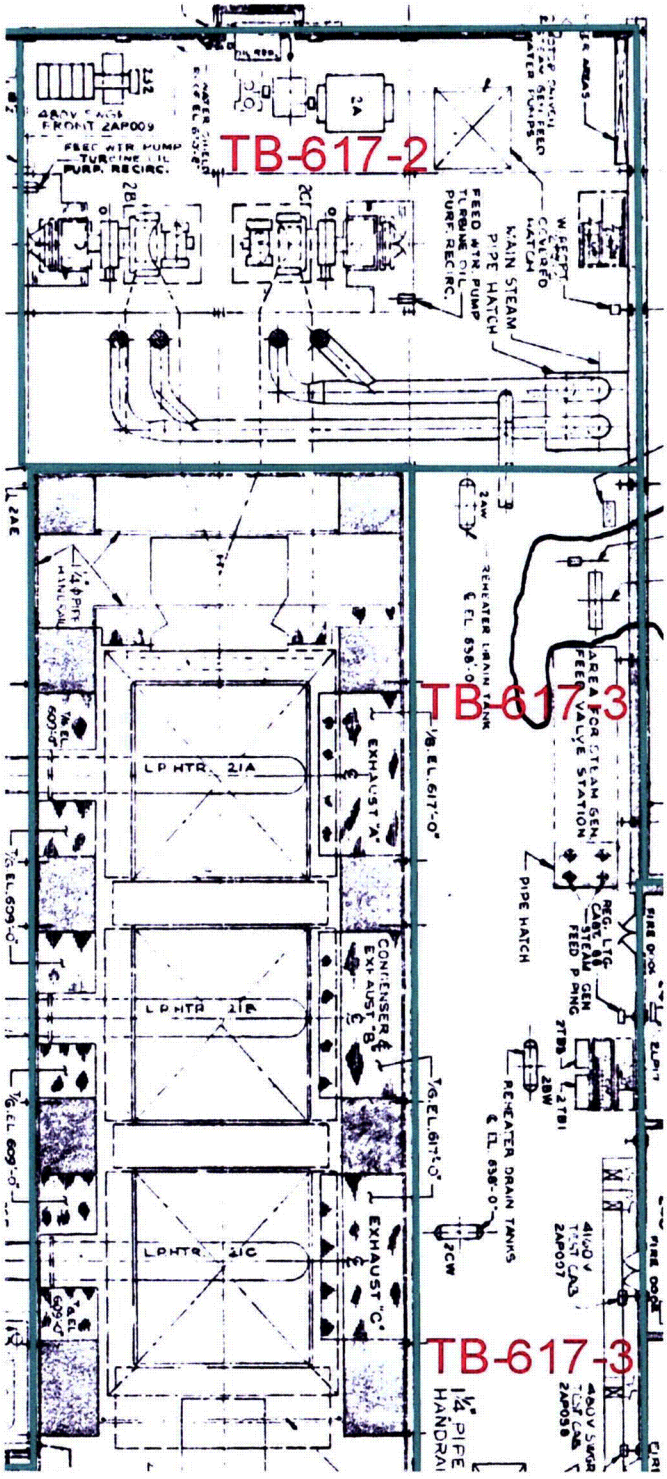

AREA MAPS
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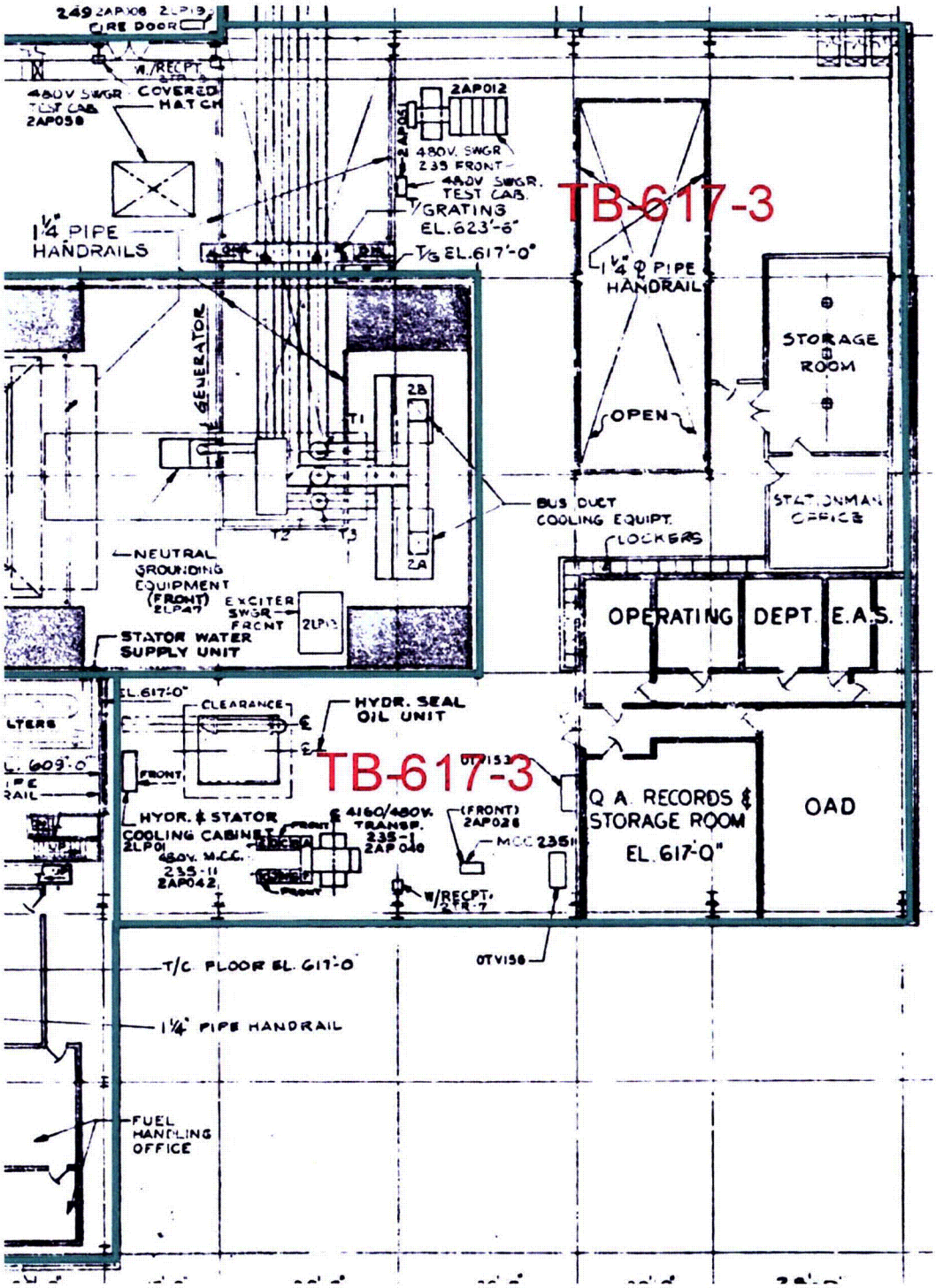

AREA MAPS
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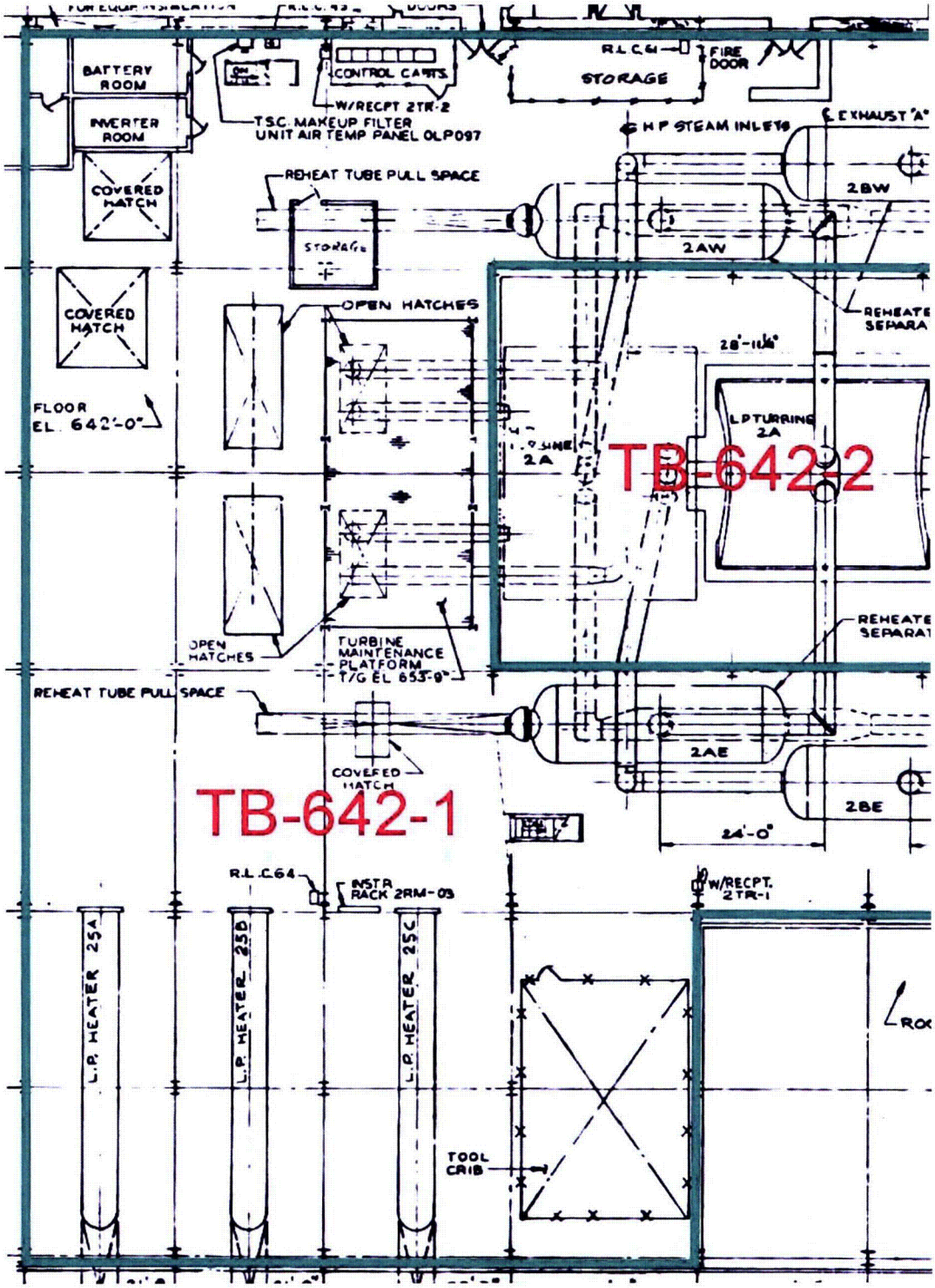

AREA MAPS
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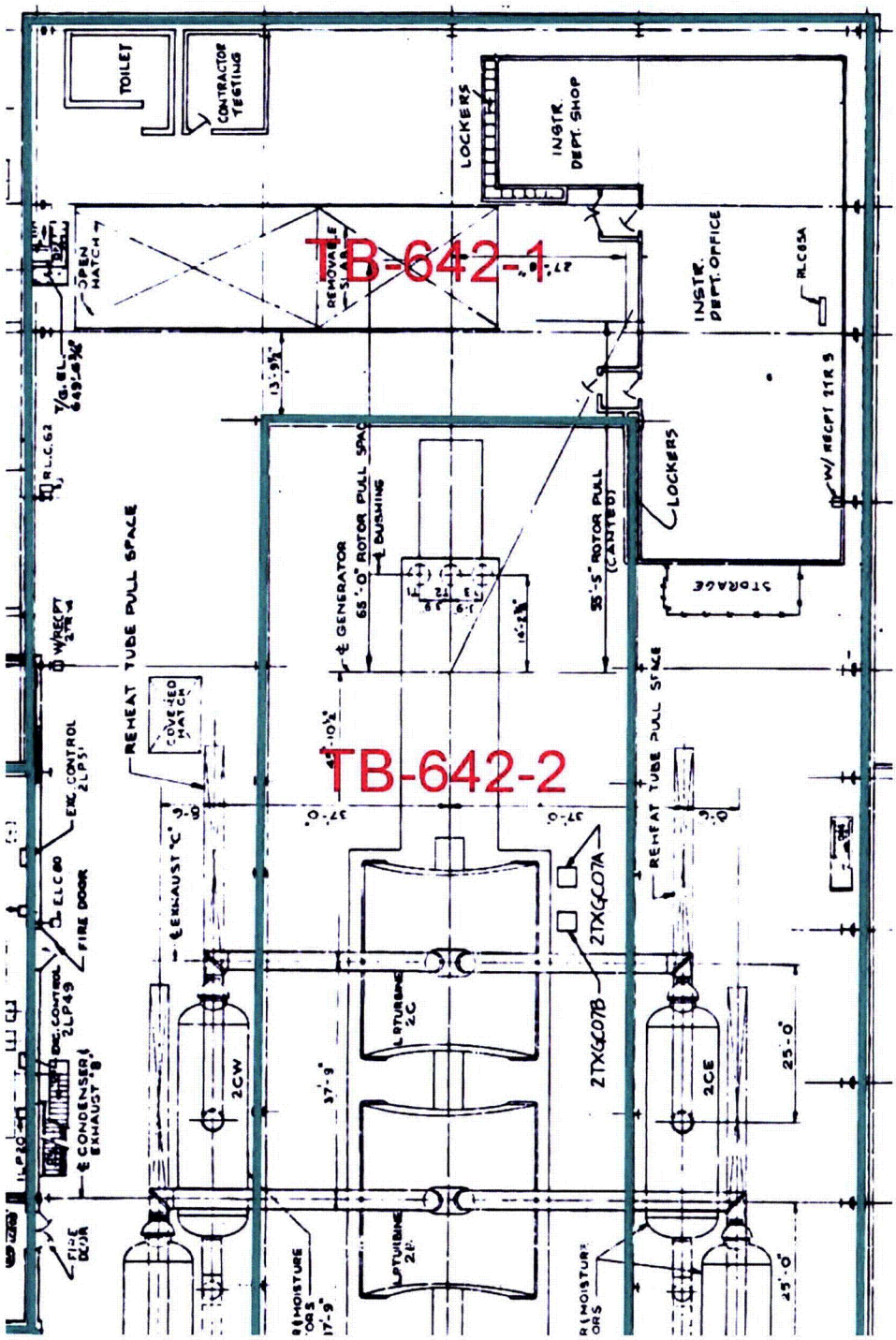

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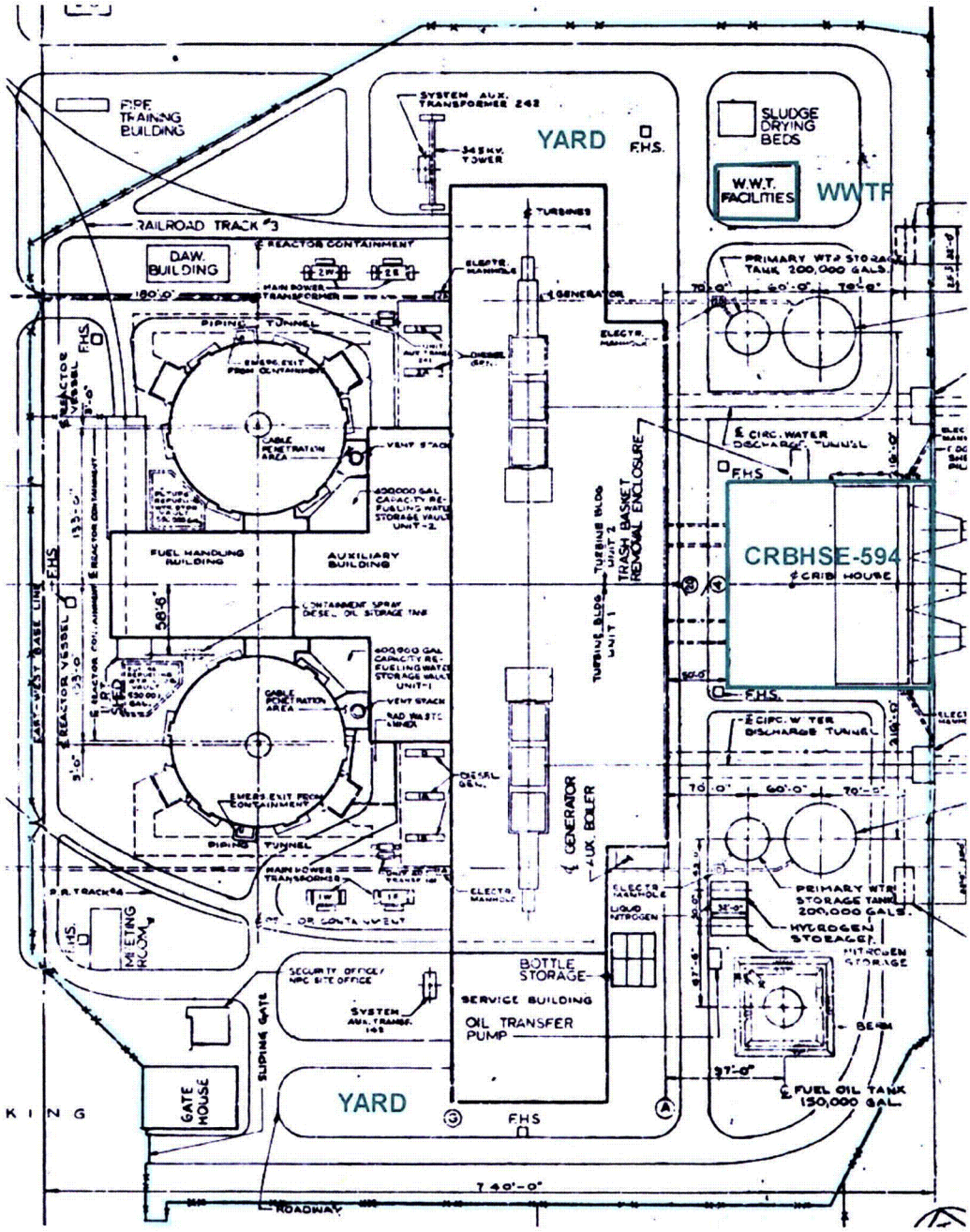

AREA MAPS
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