ATTACHMENT TO SNRC-1740

Insertion Instructions

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7.1.1.1.6 <u>Reactor Manual Control System</u>

This system is not needed to support the storage of the fuel in the fuel pool, therefore it is not included in the DSAR.

7.1.1.1.7 <u>Reactor Vessel Instrumentation</u>

Reactor vessel instrumentation monitors and transmits information concerning key reactor vessel operating variables. Portions of this system will only be used if a wet layup of the reactor vessel is utilized.

7.1.1.1.8 <u>Reactor Recirculation System</u>

This system is not needed to support the storage of the fuel in the fuel pool, therefore it is not included in the DSAR.

7.1.1.1.9 <u>Feedwater Control System</u>

This system is not needed to support the storage of the fuel in the fuel pool, therefore it is not included in the DSAR.

7.1.1.1.10 <u>Pressure Regulator and Turbine-Generator Controls</u>

This system is not needed to support the storage of the fuel in the fuel pool, therefore it is not included in the DSAR.

7.1.1.1.11 <u>Remote Shutdown System</u>

This system is not needed to support the storage of the fuel in the fuel pool, therefore it is not included in the DSAR.

7.1.1.1.12 <u>Screenwell Pumphouse Ventilation System</u>

The screenwell pumphouse ventilation system instrumentation and controls remain functional and are designed to ventilate each of the two rooms of the building using separate, 100 percent outside air ventilation systems.

7.1.1.1.13 <u>Process Computer System</u>

This system is not needed to support the storage of the fuel in the fuel pool, therefore it is not included in the DSAR.

7.1.1.1.14 <u>Reactor Core Isolation Cooling System</u>

This system is not needed to support the storage of the fuel in the fuel pool, therefore it is not included in the DSAR.

7.1.1.1.15 Standby Liquid Control System

This system is not needed to support the storage of the fuel in the fuel pool, therefore it is not included in the DSAR.

7.1.1.1.16 Reactor Water Cleanup System

The reactor water cleanup (RWCU) system instrumentation and controls provide manual initiation of system equipment to maintain high water purity in the reactor water. This system will be used only if the reactor system is placed in a wet layup condition.

7.1.1.1.17 Leakage Detection System

This system is not needed to support the storage of the fuel in the fuel pool, therefore it is not included in the DSAR.

7.1.1.1.18 Reactor Shutdown Cooling Mode-RHR System

This system is not needed to support the storage of the fuel in the fuel pool, therefore it is not included in the DSAR.

7.1.1.1.19 Radwaste System

Radwaste system instrumentation and controls support manual processing and disposing of the radioactive process wastes.

7.1.1.1.20 Emergency Diesel Generators

This system is not needed to support the storage of the fuel in the fuel pool.

7.1.1.1.21 Turbine Building Closed Loop Cooling Water System

The turbine building closed loop cooling water (TBCLCW) system instrumentation and controls remain functional to maintain the turbine building cooling water system at design temperature and monitor system performance. The TBCLCW system also cools the equipment in the radwaste building and supports the station pressurized air compressors.

7.1.1.1.22 Service Water System

Under normal conditions the service water system provides cooling for the plant components.

7.1.1.1.23 Recirculation Pump Trip System

This system is not needed to support the storage of the fuel in the fuel pool.

7.1.1.1.24 Reactor Building Standby Ventilation System

The filtration portion of the system is not needed to support the storage of the fuel in the fuel pool. Certain fans and air operated valves will remain functional to support RBNVS operation. See DSAR section 9.4 for additional information.

7.1.1.1.25 Reactor Building Closed Loop Cooling Water System

This system is not needed to support the storage of the fuel in the fuel pool.

7.1.1.1.26 Primary Containment Atmospheric Control System

This system is not needed to support the storage of the fuel in the fuel pool.

7.1.1.1.27 Fuel Pool Cooling and Cleanup Systems

Fuel pool cooling and cleanup systems instrumentation and controls remain unchanged except that the cooling portion is protected because evaporative cooling is sufficient to remove the small amount of decay heat.

7.1.1.1.28 Control Room Air Conditioning System

The control room air conditioning (CRAC) system instrumentation and controls for one of the two redundant subsystems are functional to maintain the main control room at design temperature during normal and emergency conditions, monitor system performance, and permit manual as well as automatic initiation of an air supply fan.

7.1.1.1.29 Chiller Equipment Room Ventilation System

This system is not needed to support storage of the fuel in the fuel pool.

7.1.1.1.30 Diesel Generator Room Emergency Ventilation Systems

This system is not needed to support the storage of the fuel in the fuel pool and is protected.

7.1.1.1.31 Relay Room, Emergency Switchgear Rooms, And Computer Room Air Conditioning System

The relay room, emergency switchgear rooms, and computer room air conditioning system instrumentation and controls for one of the two redundant subsystems are maintained functional to automatically control the ventilation system to maintain these rooms at their design temperature and system performance.

9.1.4.3 Description of Fuel Transfer

The fuel handling system provides a safe and effective means for transporting and handling fuel from the time it reaches the plant until it leaves the plant after post-irradiation cooling. The preceding subsection describes the equipment and methods used in fuel handling. The following paragraphs describe the integrated fuel transfer system, which ensures that the design bases of the fuel handling system and the requirements of Regulatory Guide 1.13 are satisfied.

9.1.4.3.1 Arrival of Fuel On Site

No new fuel is expected to arrive on site. Therefore this section of the USAR is not required.

9.1.4.3.2 Refueling Procedure

No refueling is planned. Therefore this section of the USAR is not required.

9.1.4.3.3 Departure of Fuel from Site

This section applies as written in the USAR.

In addition:

1. The spent fuel will be removed from the site in certified fuel shipping casks.

2. The casks will be leak tested prior to shipment.

The remainder of USAR Section 9.1.4 is applicable.

9.2 WATER SYSTEMS

9.2.1 Service Water System

The Service Water (SW) System is as described in USAR Sections 9.2.1.1 thru 9.2.1.5 with the following changes because of the reduced heat removal requirements with the plant in the de-fueled state.

a) The RBSW system is considered non-safety related because it does not provide cooling water to any plant equipment required to perform a safety function.

b) One RBSW pump will supply cooling water to one RBSVS/CRAC chiller condenser and to all Turbine Building Service Water (TBSW) cooling loads. (See item e below.) No service water is required for RHR, diesel generator cooling, RBCLCW, drywell cooling, and makeup water to the reactor vessel

ultimate cooling connection (UCC). The testable check valve in the UCC will not require testing to verify forward flow. Emergency service water to the spent fuel pool is not required (per DSAR Chapter 15) because of the very low heat generation by the fuel.

c) Automatic start/initiation due to accident signals are not required.

d) The double isolation valves which split the RBSW from the TBSW subsystems will be opened to intertie the subsystems.

e) Normal operation will now consist of only one RBSW pump in use because of the minimal heat load imposed by the TBCLCW system to support the station air compressors. It will supply cooling water to one TBCLCW heat exchanger, the circulating water pump bearing and the fish retention pool. Cooling water for the vacuum priming pump seal cooler is not required. The second RBSW pump will remain in standby.

f) The only tests and inspections to be performed on the TBSW system in the defueled condition are those that are deemed to be required for proper operation and maintenance.

g) Table 9.2.1-1 has been revised.

9.2.1.5 Instrumentation Application

This section remains unchanged except that only the instrumentation needed for the Service Water System as described in 9.2.1 a) through g) is required.

9.2.2 Reactor Building Closed Loop Cooling Water (RBCLCW) System

This system is not needed to support the storage of fuel in the spent fuel pool.

9.2.3 Makeup Water Demineralizer System

The description contained under this heading in the latest revision of the Shoreham USAR remains unchanged except as follows:

1. SBLC, RBCLCW, seal water injection, and vacuum priming are no longer users of demineralized water in the defueled condition.

2. The HPCI suction line from the condensate storage tank is not required to be maintained as safety related in the defueled condition.

For further information relative to this system refer to the USAR.

9.2.4 Potable and Sanitary Water Systems

The description contained under this heading in the latest revision of the Shoreham USAR remains unchanged in the defueled condition. For further information on this subject refer to the USAR.

9.2.5 Ultimate Heat Sink

With the fuel in the Spent Fuel Pool, the ultimate heat sink (Long Island Sound) no longer has any safety significance, since the decay heat of the fuel is insignificant. However, the ultimate heat sink will continue to be used as a source of cooling water for normal plant needs (refer to DSAR Section 9.2.1).

9.2.6 Condensate Storage Facilities

While in the defueled condition the condensate storage facilities provide makeup water for the fuel storage pool. The description of this system in the USAR remains unchanged except as follows:

1. Condensate, feedwater, reactor systems, HPCI and RCIC will no longer be users.

2. HPCI test discharge and CRD pump return lines to the CST are not required to be active.

3. The first three paragraphs of USAR 9.2.6.3 are no longer applicable.

4. The last paragraph of USAR 9.2.6.4 and 9.2.6.5 are no longer applicable.

9.2.7 Turbine Building Closed Loop Cooling Water System

The description contained under this heading in the latest revision of the Shoreham USAR remains unchanged in the defueled condition. The only exception is that many of the coolers listed in DSAR Table 9.2.7-1 will normally be valved out of service while the plant remains in the defueled state.

For further information on this subject refer to the USAR.

9.2.8 Main Chilled Water System

This system will not be maintained as an operable system since it is not needed with the plant in the defueled condition.

9.2.9 Reactor Building Standby Ventilation System And Control Room Air Conditioning Chilled Water System

Redundancy in this system is not needed since the RBSVS system is not required to operate in the defueled condition. The heat loads generated by the electrical equipment in the control room, relay room and the emergency switchgear room are greatly reduced, such that only one chiller is required to maintain the control room, relay room and switchgear room at design conditions. The operating chiller and associated pumps will be manually controlled from the control room. Aside from the above, the system design remains unchanged and further information can be found under the above heading in the Shoreham USAR.

9.3 PROCESS AUXILIARIES

9.3.1 Compressed Air Systems

The description contained under this heading in the latest revision of the USAR remains unchanged in the defueled condition except for the following:

1. Piping that has been installed as ASME III code class 2 is no longer considered safety related and is reclassified QA Category IIA.

2. Nitrogen will no longer be used for inerting the primary containment or for equipment within the primary containment.

3. Safety related functions of the compressed air system no longer exist. No pneumatically operated valves are required for safe shutdown.

For further information on the compressed air system, refer to the USAR.

9.3.2 Process Sampling System

The Process Sampling System provides monitoring of certain process operations while fuel is in the spent fuel pool for either short or long term storage. The process monitoring is accomplished as necessary by means of measuring, analyzing and/or recording for conductivity, pH, and silica concentration, as shown on DSAR Table 9.3.2-1.

9.3.3 Equipment and Floor Drainage System

With the Reactor defueled and the fuel assemblies stored in the Fuel Pool, large portions of the Equipment and Floor Drainage System are not required.

System Description

This system is described in the USAR. Changes in status are addressed below.

Reactor Building

The only source of radioactive waste to the Equipment and Floor Drainage System in the Reactor Building is the Fuel Pool and associated service equipment leakage. Sources in the USAR that are no longer applicable are the Drywell Equipment Drain System and the Reactor Recirculation Pumps Drainage System. The Drywell Equipment Drain Tank is no longer required. One or more floor drain sumps are no longer required, as applicable.

Turbine Building

The Turbine Building Floor Drain and Equipment Drain Systems are no longer required, as applicable, except for the Decontamination Sump drains and associated equipment. There is no steam and the turbine is no longer required, so that the only source of radioactive waste is the Chemical Laboratory.

Radwaste Building

The Radwaste Building Equipment and Floor Drainage System is maintained operational. The Dirty Waste Sump and Pumps (1N52-TK 114 and 1N52-P-187A/B) and Regenerant Recovery Sump and Pumps (1N52-TK-115 and 1N52-P-181A/B) are no longer required.

9.3.4 Chemical, Volume Control, and Liquid Poison Systems

The Standby Liquid Control System is no longer required in the defueled condition. The RWCU System is also no longer required unless the Reactor is layed up wet.

9.3.5 Failed Fuel Detection System

With the fuel in the pool, the description in the USAR Section is no longer applicable.

In the event of gross fuel rod failure in the fuel pool (see "Worst Case Fuel Damage Accident" in DSAR Chapter 15), the refueling floor process radiation monitors will detect this radioactivity if it becomes airborne.

9.3.6 Suppression Pool Pumpback System

This system not required to support storage of fuel in the fuel pool.

9.4 AIR CONDITIONING, HEATING, COOLING, AND VENTILATION SYSTEMS

9.4.1 Control Room Air Conditioning System

The Control Room AC system remains unchanged in design and operating functions. However, the system is reclassified to QA Category IIA, the filter portion of the system will no longer be required and one of each of the redundant fans and ACUs will no longer be required. The AC system will only function to provide an OSHA environment for the operators during the fuel storage period. This requires the operation of only one RBSVS/CRAC chiller. Automatic initiation systems and interlocks for the habitability portion of the system will be protected and the AC system will be manually controlled from the control room. For further discussion on this system refer to the Shoreham USAR.

9.4.2 Reactor Building Normal Ventilation System

9.4.2.1 Design Basis

The RBNVS remains unchanged in design and operating function except that the system will only:

1. Provide ventilation by introducing filtered outside air in the reactor building at a rate of approximately 2.7 air changes per hour
2. Remove heat generated by solar and external heat transmission, lighting and the fuel pool.
3. Support monitoring system for radioactive release through the exhaust air system.
4. Induces negative pressure in reactor building for secondary containment integrity.

For further discussion on this system refer to the USAR.

9.4.3 Radwaste Building Ventilation

The description contained under this heading in the latest Shoreham USAR remains unchanged, except that the charcoal exhaust filtration system is no longer required and one of the two redundant supply and exhaust fans, mechanical refrigeration units and circulating pumps are also no longer required. Refer to the USAR for information on this subject.

9.4.4 Turbine Building Ventilation System And Station Exhaust System

A) Turbine Building Ventilation System

This system is not required to support the storage of fuel in the spent fuel pool.

B) Station Exhaust System

This system will expel the exhaust air from the radwaste building and the reactor building. However, only one fan will be needed for this purpose, allowing one fan to be protected and still maintain a fan on standby. This will ensure that the Isokinetic nozzles located in the upper level of the exhaust duct will see a sufficiently high velocity to be operational. For further discussion regarding this system refer to the Shoreham USAR.

9.4.5 Battery Room Heating And Ventilation

The description contained under this heading in the latest revision of Shoreham USAR remains unchanged. Refer to USAR for information on this subject. This system is reclassified to Q.A. Category IIA.

9.4.6 Drywell Air Cooling System

This system is not needed while the fuel is stored in the spent fuel pool.

9.4.7 Screenwell Pump House Heating And Ventilation

The description contained under this heading in the latest revision of Shoreham USAR remains unchanged. Refer to USAR for information on this subject. This sytem is reclassified to Q.A. Category IIA.

9.4.8 Plant Heating

The description contained under this heading in the latest revision of Shoreham USAR remains unchanged. Refer to USAR for information on this subject.

9.4.9 Primary Containment Purge System

This system is not needed while the fuel is stored in the spent fuel pool.

9.4.10 Diesel Generator Room Ventilation

This system is not needed while the fuel is stored in the spent fuel pool. This system is reclassified to Q.A. Category IIA.

9.4.11 Relay Room, Emergency Switchgear Room And Computer Room Air Conditioning System

The description contained under this heading in the latest revision of Shoreham USAR remains unchanged with the exception that only one train of equipment will remain functional. Refer to USAR for information on this subject. This system is reclassified to QA Category IIA.

9.5 OTHER AUXILIARY SYSTEMS

9.5.1 Fire Protection System

9.5.1.1 Design Basis

The design basis section applies with the following addition:

The basic premise of the fire protection discussions in the USAR and FHAR is protection from fire for safety related areas including areas containing equipment or circuits that are (1) required for safe shutdown, or (2) required to prevent or mitigate radiological releases comparable to 10CFR 100 limits. Since safe shutdown is assured by non-operation of the plant, and all of the nuclear fuel is in the fuel storage pool, the only remaining safety related area is the Reactor Building. Structures, systems components and administrative controls in place to protect areas, equipment or circuits previously identified as safety related will be maintained as required for property loss prevention purposes and should be considered the same as those fire protection features described in the USAR for protection of non-safety related areas.

Three documents which were used in the design of the plant's fire protection features and continue to be part of the fire protection program are:

1. Evaluation of the SNPS Fire Protection Program as compared to 10CFR50, Appendix R criteria submitted via SNRC 572 dated May 21, 1981.

2. Fire Hazards Analysis Report.

3. Cable Separation Analysis Report:
   SNRC 532 dated February 10, 1981
   SNRC 811 dated April 13, 1983

However, the term "safety related", as used in those documents and in USAR section 9.5.1, applies only to the Reactor Building.

Section 6 of the Fire Hazards Analysis Report (FHAR) contains technical requirements that formerly were fire protection technical specifications.

FHAR Chapter 6 reflects reductions in the technical requirements that are consistent with the text of this DSAR Section 9.5.1.

Types of Fires

The "types of fires" section applies with no changes.

Design Criteria

The "design criteria" section applies with the following addition:

As discussed above, this design will be maintained for property loss prevention purposes. However, the "safety related" application of the listed documents, particularly NRC's Branch Technical Position APCSB 9.5-1 and Appendix A thereto, is limited to the Reactor Building.

Locations of Fires

The "locations of fires" section applies with the following changes:

The rooms listed parenthetically as examples of safety related areas having a concentration of cables are reclassified to Q.A. Category IIA. The rooms listed as examples of where oil fires could occur near safety related equipment no longer fit that description because these areas are reclassified to QA Category IIA. Furthermore, the fire hazard associated with this equipment is significantly reduced while the equipment is not being used because the ignition sources associated with the operating equipment have been eliminated.

Intensity of fires

This section applies without change.

Fire Characteristics

This section applies without change.

Building Arrangement and Structural Features

The "building arrangement and structural features" section applies with the following changes:

In the response to NRC question 3, as shown in FHAR revision 3, SNPS has stated our intention to replace existing motorized fire dampers with newly designed fire dampers. All of the areas where these new dampers were to be installed are in the Control Building and are reclassified to Q.A. Category IIA. Therefore, this proposed modification will not be implemented. The CO_2 systems for those rooms are in electric lockout. When a fire is detected, the CO_2 system controls would cause the dampers to close on an electrical signal. As a backup, the fusible link of each of the existing fire dampers is sufficient to cause closure of a damper in the event of a fire, thus assuring integrity of the fire barriers.

In contrast with this USAR section, an unprotected HVAC opening exists in the east wall of each of the three diesel generator rooms within 50 feet of an oil-filled (Reserve Station Service) transformer. This deviation was reported to the NRC on Licensee Event Report 87-021. The proposed corrective action was to install a deluge water curtain system below the existing missile shield wall between the transformer and the wall openings. Since the diesel generator rooms are reclassified to QA Category IIA, this modification will not be implemented. The partial protection provided by the missile barrier is considered sufficient for non-safety related areas.

Seismic Design

This section applies without change.

Water Requirements

The "water requirements" section applies with the following additional statement:

Although some areas previously identified as safety related are reclassified to QA Category IIA, the water supply is not being reduced.

Codes and Standards

This section applies without changes. SNPS will continue to meet the requirements of the applicable NFPA codes for fire protection systems that remain functional.

9.5.1.2 System Description

The "System Description" section applies with the following changes:

As discussed earlier, all fire protection features remain in place. Several rooms/areas listed in this section as safety related are reclassified to Q.A. Category IIA. Essential circuitry installed for safe shutdown of the plant is no longer needed for that purpose. No removal of such cable or change in its physical separation is contemplated. Similarly, the service water line inside the Reactor Building, where a spare connection exists for manual hookup to the fire protection water system, is reclassified to Q.A. Category IIA. Modifications that would degrade its seismic design are not contemplated at this time.

9.5.1.3 Safety Evaluation

Electrical Insulation Fires

This section applies without change.

Charcoal Fires

This section applies without change.

Oil Fires

The "oil fires" section of the safety evaluation applies with the following change:

As discussed earlier, the fire hazards associated with non-operating equipment are significantly reduced because the primary ignition sources - electrical energy and hot surfaces - are eliminated.

Severity, Intensity and Duration of Fires

This section applies without changes.

Time Estimates

This section applies without changes.

Failure Mode and Effects Analysis

This section applies without changes.

Accidental Initiation of Fire Protection System

The "accidental initiation of fire protection system" section applies with the following change:

Areas protected by CO_2 systems are among those that are no longer considered safety related.

Single Failure in Fire Protection Systems

This section applies without change.

Pipe Breaks in Fire Protection Systems

This section applies without changes.

Failure of Fire Protection System Affecting Safety Related Equipment

This section applies with the following change:

Of the areas listed, only the Reactor Building is still considered safety related.

9.5.1.4 Tests and Inspections

This section applies without changes.

9.5.1.5 Personnel Qualification and Training

This section applies without changes.

9.5.2 Communications System

9.5.2.1 Design Bases

This section of the USAR remains unchanged.

9.5.2.2 System Description

This section of the USAR remains unchanged except for the following:

1. For the very low frequency (VLF) portable radio systems, one low-powered VLF radio base station will be used in conjunction with two mobile car units to provide offsite radio communications (instead of two VLF base stations and four mobile car units).

2. The Emergency Operations Facility (EOF) is not required, since no emergency requiring EOF activation can occur with the fuel in the Spent Fuel Pool.

9.5.2.3 Tests and Inspections

This section of the USAR remains unchanged.

9.5.3 Lighting Systems

While in the defueled condition this system will provide all the necessary required lighting to the plant and the site. The description of this system in the USAR remains unchanged except for the following:

1. Section 9.5.3.2, item #2 - the standby AC lighting system will receive power from plant service buses which are powered from offsite.

2. Same section, item #5 - the fifth lighting subsystem will receive power from DC battery sources while the plant remains in the defueled condition.

3. The last paragraph of the same section, the independent power sources for lighting, remains unchanged but the source of power will be from plant service buses and DC battery sources if needed.

9.5.4 Diesel Generator Fuel Oil Storage and Transfer System

Since emergency power is no longer required with the fuel in the Spent Fuel Pool, the Emergency Diesel Generators are not required, and sections 9.5.4 - 9.5.7 of the USAR no longer apply.

9.5.5 Diesel Generator Cooling Water System

9.5.6 Diesel Generator Starting System

9.5.7 Diesel Generator Lubrication System

9.5.8 Primary Containment Leakage Monitoring System

With the fuel in the Spent Fuel Pool, the Primary Containment Leakage Monitoring System is not required.

9.5.9 Storage of Gases Under Pressure

The quantities and type of gases stored in pressurized containers in the defueled condition is reduced from that previously on hand. The design bases remain unchanged. Storage facilities are provided for the following gases as shown in Table 9.5.9-1:

1. Carbon Dioxide for fire protection.
2. Halon 1301 for fire protection.
3. Air for instrument, control, breathing and service.
4. Nitrogen for glycol and HW heating.
5. Propane for auxiliary boiler ignition.

The following gases are no longer used or required to be stored in the defueled condition:

1. Hydrogen for ma[illegible] generator.
2. Hydrogen and oxygen for gas analyzers.
3. Nitrogen for containment inerting.
4. Nitrogen for drywell floor seals.
5. Nitrogen for electrohydraulic control.
6. Air for MSIV accumulators (inboard and outboard).
7. Air for long term accumulators.
8. Air for standby diesel generators.

The statement in the USAR relative to maintenance and laboratory gases remain unchanged. The safety evaluation discussed in section 9.5.9.3 of the USAR is only applicable for air for instruments, service breathing, and control and for carbon dioxide and halon. Statements relative to the pressure relief valves and gas release hazards remain as discussed in the USAR. Gas use for safe shutdown is no longer necessary in the defueled condition.

Appendix

9A FUEL CRITICALITY ANALYSIS

The Shoreham Spent Fuel Rack (SFR) is of a stainless steel and water neutron flux trap design which uses no additional poison. A description of the storage racks is provided in 9.1.2. The criticality analysis of this rack design is described in detail in Appendix 9A of the Shoreham USAR. The reactivity results which are summarized in USAR Table 9A-4 remain valid for the conditions existing at Shoreham after defueling. Furthermore, due to the differences in U-235 enrichment between the SFR designed and the current Shoreham fuel, a large negative reactivity credit should be taken into account. This is explained as follows:

> The Shoreham SFR design is based on a maximum U-235 enrichment of 3.1 wt. %. The resulting basic cell k is calculated to be 0.9129 without uncertainty and model adjustments (Table 9A-4, Appendix 9A, Shoreham USAR). The Shoreham Cycle 1 fuel loading uses three (3) enrichments. Of the 560 fuel assemblies in the core, 340 bundles have the highest bundle average U-235 enrichment of 2.19 wt. %, 144 bundles of 1.76 wt. % and 76 remaining bundles uses natural uranium.
>
> If the six inch natural uranium segments at the top and bottom of the fuel are excluded, the average enrichment of a 2.19 wt. % bundle becomes 2.33 wt. %. Using this enrichment and linearly extrapolating the reactivity vs. U-235 enrichment results given in Figure 9A-5 of Appendix 9A, Shoreham USAR, the reactivity difference between the SFR design enrichment of 3.1 wt. % and the current maxiumum loading enrichment of 2.33 wt. % is found to be about -6.0% in k (k -0.060). This brings the basic cell k under nominal storage conditions for the current fuel down to 0.85, which is well below the regulatory acceptance criterion of k 0.95. All the corrective and uncertainty adjustments listed in Table 9A-4 of the Shoreham USAR remain applicable.

During the period from July, 1985 to June, 1987, Shoreham went through three separate stages of low power testing (less than 5% of rated power), which resulted in a total core exposure of approximately 48 MWd/MT as determined by a series of core-follow analyses. The net effect of the core exposure is a slight decrease in reactivity (-0.002 in k) mainly due to the offsetting contributions from the formation of Sm-149 and the slight depletion of the burnable Gd poison in the fuel bundles. In light of the large reactivity margin described previously (k 0.85), no additional credit will be claimed here.

9B EVALUATION OF SPENT FUEL POOL MAKEUP REQUIREMENTS

An analysis was performed to determine the rate of water loss from the spent fuel pool through evaporation under the worst case scenario described below. The following conservative assumptions are used in the analysis to maximize the calculated pool evaporation rate:

1) The spent fuel pool temperature is 110°F.

2) The ambient temperature above the spent fuel pool is conservatively assumed to have zero relative humidity.

3) The reactor building air flow exists due to normal ventilation system operation to maximize evaporation.

The result of the calculation shows that the maximum evaporation rate from the pool is approximately 0.6 gpm which translates to a pool level depletion rate of one foot per eleven days. Based on this very low maximum depletion rate, external cooling of the spent fuel pool is not required. Technical Specifications require that the water level above the spent fuel be a least twenty-one feet. In addition, it should be noted that pool water level is alarmed in the control room and alarm response procedures exist to provide appropriate operator action.

TABLE 9.2.1-1

SERVICE WATER SYSTEM COMPONENT DESIGN DATA

Component	Quantity	Nominal Capacity Each (gpm)	Number of Components Utilized in Defueled Condition
Reactor Building Service Water Pumps	4	8,600	1
Turbine Building Service Water Pumps	3	8,000	---
Reactor Building Subsystem Components:			
Reactor Building Service Water Strainers	4	250	1
Diesel Generator Jacket Coolers	3	700	---
Residual Heat Removal Heat Exchangers	2	8,000	---
Reactor Building Closed Loop Cooling Water Heat Exchangers	2	6,370	---
Reactor Building Standby Ventilation System Chiller Condensers	4	525	1
Main Chilled Water System Chiller Condensers	3 1	1,500 400	---
Drywell Cooling Booster Heat Exchangers	2	1,460	---

TABLE 9.2.1-1

SERVICE WATER SYSTEM COMPONENT DESIGN DATA (Cont'd.)

Component	Quantity	Nominal Capacity Each (gpm)	Number of Components Utilized in Defueled Condition
Turbine Building Subsystem Components:			
Turbine Building Service Water Strainers	2	420	---
Circ Water Pump Bearing Cooling	4	6	Note 1
Fish Retention Pool	1	185	1
Turbine Building Closed Loop Cooling Water Heat Exchangers	2	14,200	1
Vacuum Priming Pumps Seal Water Coolers	3	100	---

Note 1: One circ water pump bearing cooler will be needed if a circ water pump is used to provide dilution of chlorine.

10.4.4 Turbine Bypass System

The purpose for which the turbine bypass system was built no longer exists. The components of this system as described in the USAR are not required in the defueled condition.

The portion of the bypass system upstream of the bypass valves was built to ASME III cc2 criteria. As the function of the bypass system no longer exists in the defueled condition, the bypass system is reclassified Q.A. Category IIA.

10.4.5 Circulating Water System

The purpose for which the circulating water system was built no longer exists. The components of this system as described in the USAR will not be required in the defueled condition. The only exception is that a circulating water pump and the circulating water discharge system may be used to provide dilution capacity for elimination of liquid radwaste and SPDES limits on chlorine and suspended solids to the Long Island Sound.

10.4.6 Condensate Demineralizer System

Since there is no fuel in the Reactor and no Reactor steam produced, there is no need for the Condensate Demineralizer System. This system will be protected. However, the Acid and Caustic Storage Tanks (1N52-TK-035 and -TK-036) will remain operable to provide regeneration chemicals for the continued operation of the Demineralizer and Makeup Water System (P21). The Chemical Waste Sump (1N52-TK-113) will remain operable as a pathway for further treatment of non-radioactive regenerant waste from the Demineralizer and Makeup Water System.

10.4.7 Condensate and Feedwater System

The purpose for which the condensate and feedwater system was built no longer exists. The components of this system as described in the USAR will not be required in the defueled condition.

Piping built and designed to ASME III cc1 is considered Q.A. Category IIA while in the defueled condition. Inservice inspection according to ASME XI need not be performed while in the defueled condition.

CHAPTER 11

RADIOACTIVE WASTE MANAGEMENT

11.1 RADIATION SOURCE TERMS

The description contained under this heading in the latest revision of Shoreham USAR remains unchanged as it is used to develop the basic design criteria of the plant. However, the actual source terms in the plant's present defueled condition are as follows:

a. Liquid Radioactivity Sources

As of August 1989, since all SNPS' fuel had been placed in the spent fuel pool, there were no liquid sources with nuclide concentrations greater than the Lower Limit of Detection (LLD), outside of radwaste streams. It must be recognized that in the future some concentrations greater than LLD will be seen (e.g., as sludge at the bottom of sumps is processed to Radwaste). However, these should be minor and temporary occurrences. Sources related to the decontamination and decommissioning should also be minor, as the degree of overall plant contamination is low. These liquid sources would be dealt with in accordance with the Liquid Radwaste, ALARA, and Health Physics programs as discussed in DSAR Sections 11.2, 12.1, and 12.5, respectively.

Isotopic concentrations above the LLD levels in the Radwaste System as of 6/30/89 are indicated in Table 11.1-1, from References 2, 3 and 4.

b. Gaseous Sources

There are no detectable gaseous sources at SNPS, either present or anticipated. This statement is supported by the fact that the Semi-Annual Radiological Effluent Release Report for the first and second quarter 1989 (Reference 1) indicates there were no detectable releases during the six-month period, either from the offgas system or the various building exhaust systems.

c. Activated Materials Sources

It is expected that materials which were located in the reactor vessel during low power testing (eg, control rods, TIPs, IRMs, and the like) have been activated to some extent. With the exception of some portions of the liquid radwaste system (10 mrem/hr maximum), dose rates outside of plant systems are very low, less than 0.5 mrem/hr. These low dose rates are indicative of a low deposition of sources within plant systems.

meteorological, land, and water use data. The range of analyses performed on a sample depend on the type of sample taken.

Sampling locations are designated as either indicator or control. Indicator locations provide representative measurements of radiation and radioactive materials for those exposure pathways and radionuclides (from SNPS) that lead to the highest potential radiation exposures. Control locations are placed sufficiently far from SNPS so that they will be beyond the measurable influence of SNPS or any other nuclear facility. This monitoring program implements Section IV.B.2 of Appendix I to 10CFR Part 50, by verifying that measured concentrations of radioactive materials and direct radiation are representative of the actual contamination levels and doses to the public.

SNPS' REMP has been subdivided over three distinct time intervals: Preoperational REMP (prior to SNPS' initially achieving criticality), Operational REMP (from initial criticality until removal of the fuel from the core), and Post-Defuel REMP (after the core was transferred to the spent fuel pool).

Preoperational REMP was performed to identify and determine background levels of environmental activity around SNPS. Preoperational REMP also served to verify that indeed the media being sampled and analyzed is sensitive to radiological fluctuations in SNPS' environs (indicator locations) and to provide effective monitoring of potential critical pathways.

Preoperational and Operational REMP samples within the aquatic environment included surface water, algae, fish, invertebrates (clams, lobsters, etc.) and sediment. The atmospheric environment was sampled for airborne particulates, iodine, and noble gases. Milk, potable water, precipitation, game and food products were obtained from the terrestrial environment. Direct radiation was measured using thermoluminescent dosimeters (TLDs). The range of analyses for each sample were: gamma spectrometry, Sr-89 and Sr-90; I-131; H-3, gross beta, direct radiation and noble gases. Under Post-Defuel REMP, several of the above sampling locations and/or range of analyses are discontinued. The current Post-Defuel REMP program is outlined in Tables 11.6.3-1 & 11.6.3-2.

Preoperational REMP began in February 1977 and continued through 1984, although the official Preoperational REMP period; i.e. the time frame against which the data base from Operational REMP was compared, occurred during 1983 and 1984. The Operational REMP began on February 15, 1985 when initial criticality was achieved. Except for reactor operator training programs which required the reactor to operate at '0.0% power' (during January 1989), SNPS has not generated radioisotopes since the last 5.0% power test, completed on June 6, 1987. Comparisons between the

above two phases of REMP were documented in each Semiannual Radiological Effluent Release Report.

As of August 9, 1989, SNPS' core was transferred to the spent fuel pool -- as part of the agreement between LILCO, state and local governments not to operate Shoreham. This transfer prevents criticality from being reestablished. In addition, since SNPS' last 5.0% power test was completed during June 1987, per Ref. 9, virtually all iodines and gaseous effluents have decayed away. Consequently, the surveillance requirements for SNPS' Post-Defuel REMP were reduced to below the operational level.

Justification for Reducing REMP to Post-Defuel Surveillance Levels

Pursuant to Reg Guide 4.1, once the initial core of the licensee has reached the point (in time) of maximum burnup, and the licensee has demonstrated (using results from environmental media or calculations) that the doses and concentrations associated with a particular pathway are sufficiently small (comparable to preoperational levels), then the number of media sampled in the pathway and the frequency of sampling may be reduced to normal Tech Spec requirements. Since (as of August 9, 1989) the core has been in the spent fuel pool, the initial core has "exceeded" the point of maximum burnup.

It should be noted that the concept of "normal" Tech Spec requirements as referred to in Reg. Guide 4.1, refers to a fully operational station with normal surveillance requirements. Reg. Guide 4.1 does not account for the unique condition at SNPS. Consequently, the justification for the reduced surveillance program will be performed in two steps. Step one reduces Operational REMP to the level mandated when SNPS was to become operational. Step two reduces the surveillance program further, to the revised requirements corresponding to the defueled condition.

Dose calculations to SNPS' environs (1983 - 1988) were performed by analyzing positive concentrations of radioactivity detected in collected samples. Table 11.6.1-4 compares the radiological impact from each major pathway to the public during SNPS' preoperational and operational REMPs. Specifically, the radiological impact during SNPS' 5.0% power testing program (1985 - 1987) was compared to preoperational REMP.

In all cases, the calculated doses during both the operational and preoperational phases of REMP were comparable. Therefore, no environmental radioactivity was identified (during any of the 5.0% power tests) as having originated at SNPS. These results satisfy the criteria established in Reg. Guide 4.1 for reducing post-defuel REMP to the level originally mandated by SNPS' license. The sampling points not required by the license are:

1) Game;
2) Aquatic Plants;
3) Aquatic Sediment;
4) Rain Water; and
5) Noble Gases.

Justification for reducing REMP to the revised requirements (after the core was defueled) is given based on the above information; i.e., the measured environmental impact due to 5.0% power testing was comparable to that of preoperational REMP, and as of August 9, 1989, the core was removed from the reactor pressure vessel. SNPS' last 5.0% power test was completed on June 6, 1987, and per Ref. 9, with the exception of I-129 and Kr-85 (4.0 mCi and 1560.0 Ci, respectively), all iodines and gaseous effluents have since decayed away. In addition, radwaste system activities are quite low (listed in DSAR Sections 11.1 & 12.2). As a result, the only remaining radioisotopes (and their release pathways) are:

	Isotope(s)	Source	Effluent Pathway
1)	Kr-85	Spent Fuel	Gaseous
2)	Solubles and Particulates	Radwaste	Gaseous and Liquid

SNPS' Post-Defuel REMP Surveillance Program Outline

1) DIRECT RADIATION: Reduce from 36 to 18 locations
Quarterly Surveillance Frequency

2) AQUATIC
 a. Aquatic Plants and Beach Sediments - Delete, not required

 b. Fish, Surface Water and Invertebrates - Retain, may be impacted from liquid release path to L.I. Sound

Perform Semiannual surveillances as available

3) AIRBORNE
 a. Iodine - Delete, insignificant quantity
 b. Particulates and Gross Beta - Retain, particulates and and solubles still exist.
 c. Noble Gas - Delete Noble Gas, not required.

Quarterly Surveillance Frequency

11.6.3.1.2 Atmospheric Environment

The atmospheric environment is examined by analyzing airborne particulates collected on Gelman Type A/E filters using low volume air samplers (approximately 1 cfm). The samplers used are equipped with vacuum recorders for sample volume correction and to indicate sample validity and maintenance problems when they occur. Should the sampler lose vacuum due to a leak the vacuum level reading will drop to zero. Since this may occur without a corresponding loss of electric supply the exact time of the maintenance problem will be evident on the recorder chart.

Sample volumes are measured using dry gas meters and corrected for differences between the actual pressure that the volume meter sees and the average atmospheric pressure. Sample volumes are corrected to standard pressure using average weekly barometric pressure (measured at Environmental Engineering Department, Melville) and air sampler vacuum readings. Time totalizers indicate the duration of time the sample is taken.

11.6.3.1.3 Terrestrial Environment

The terrestrial environment is examined by analyzing samples of milk and food products. When available, milk samples are collected quarterly, except during the pasture season (May through October) when the sampling is increased to monthly. Milk samples are prepared for shipment in accordance with the instruction of the laboratory performing the analysis. Food products consisting of vegetables and fruit are collected from area farm stands and shipped fresh to the laboratory.

11.6.3.1.4 Direct Radiation

Direct radiation levels in the environs are measured with energy compensated calcium sulfate (CaSO4:Dy) TLDs, each containing four separate readout areas. The TLDs are annealed by LILCO prior to placement in the field. One TLD is placed at each of the 18 locations, and exchanged on a quarterly bases; these locations correspond to the 16 meteorological sectors in the general areas of the site boundary, plus two control locations (actual locations are listed in Table 11.6.3-1). The units are then packaged and shipped to the laboratory for analysis.

11.6.3.2 Sampling Locations and Frequency

Typical REMP sampling locations and frequency are given in Table 11.6.3-1. These locations are described in Table 11.6.5-2 and shown in Figures 11.6.3-1 and 11.6.3-2.

11.6.4 NOT USED IN THE DSAR (Data Incorporated Into Section 11.6.1)

11.6.5 Data Analysis, Presentation and Interpretation

The discussion contained in the latest version of the Shoreham USAR (Section 11.6.5, 11.6.5.1, and 11.6.5.2) continues to apply.

11.6.6 Program Statistical Sensitivity

The discussion contained in the latest version of the Shoreham USAR (Section 11.6.6) continues to apply.

REFERENCES In Section 11.6

1) Regulatory Guide 4.1 "Programs for Monitoring Radioactivity in the Environs of Nuclear Power Plants"

2) Not Used

3) Not Used

4) Radiological Branch Technical Position, Rev. 1, Nov. 1979

5) Reg. Guide 4.15, Rev. 1, February 1979, "Quality Assurance For Radiological Monitoring Program (Normal Operation) Effluent Streams and the Environment"

6) SNPS Technical Specifications
   3/4.12 Radiological Environmental Monitoring
   3/4.12.1 Monitoring Program   Table 3.12.1-1 "REMP"

7) Not Used

8) SNPS' Operational REMP Annual Reports: January 1, to December 31, 1983, 1984, 1985, 1986, 1987, & 1988 issued by Nuclear Engineering and Environmental Engineering Departments of LILCO.

9) C-RPD-476, Rev. 0, 10/21/88, "SNPS Core Thermal Power After Shutdown"

TABLE 11.6.1.-4

Comparison Of Operational - Preoperational REMP Data

SAMPLE TYPE	Unit/Isotope	(—— Operational REMP			——)	(— Preoperational REMP —)	
		1988	1987	1986	1985	1984	1983
Potable Water	pCi/l (H-3)	240 - 410	140 - 450	130 - 420	150 - 290	120 - 540	70 - 220
Game	pCi/Kg(Cs-137)	76.7 - 9270	35.1 - 6490	54 - 3230	992 - 4330	641 - 5340	34.0 - 6310
Direct (gamma)	mrem Monthly	2.3 - 5.2	2.8 - 6.9	1.9 - 5.7	3.0 - 6.2	2.7 - 6.9	2.3 - 5.7
Radiation	Quarterly	2.7 - 4.8	2.9 - 5.0	2.9 - 4.9	2.8 - 5.5	3.1 - 6.2	2.8 - 5.4
Air:Gross Beta	[x1.0E-3]	5.0 - 44.0	4.0 - 32.0	5.0 - 360	6 - 47	4.2 - 61.	5 - 54
Particulate Sr-90	pCi/m³ x 1.E-3	LT 0.8	LT 0.8	0.11 - 0.27	LT 0.8	LT 0.07	1.3 - 1.4
Iodine-131	pCi/m³ x 1.E-3	LT 10.0	LT 10.0	35 - 1230**	LT 10.0	LT 10.0	LT 30.0
Aquatic	pCi/Kg (Sr-90)	LT 1.0	LT 1.0	LT 1.0	6.8 - 27.	* 33.	LT 20.0
Plants	pCi/Kg (Cs-137)	LT 6.0	* 85.5	* 47.9	* 45.	69.7 - 140.	36 - 55
	pCi/l (Sr-90)	0.76 - 6.00	0.61 - 5.70	0.98 - 13.0	0.86 - 4.60	0.69 - 5.3	0.9 - 7.7
Milk	pCi/l (Cr-137)	6.00 - 14.8	5.90 - 11.5	7.0 - 8.9	* 4.4	9.6 - 14	12.9 - 14.1
	pCi/l (I-131)	LT 0.20	LT 0.20	2.1 - 4.8	LT 0.20	LT 0.20	NA
Food	pCi/Kg (I-131)	LT 4.0	LT 4.0	LT 4.0	LT 4.0	LT 3.0	NA
Products	(wet) (Cs-137)	LT 5.0	LT 5.0	* 12.2	LT 5.0	LT 5.0	* 24.7

* Ranges are not given since only one data point contained an identified isotope.

** Evidence of Chernobyl accident.

SHOREHAM DSAR TABLE 11.6.3-1

Post-Operational Radiological Environmental Monitoring Program (REMP)

Media	Sampling Locations	Sampling Frequency	Analysis
Direct (1) Radiation	1S1,2A2,3S1,4S1,5S2, 6S2,7A2,8A3,9S1,10A1, 11A1,12A1,13S3,14S2, 15S1,16S2,*5E2,*6E1	Quarterly	Gamma Exposure
Fish and (2) Invertebrates	3C1, 14C1, *13G2	Semi-annually or when in season	Gamma-isotopic
Fruits, (3) and Vegetables	8B1, 6B21, *12H1	At time of Annual Harvest	Gamma-isotopic
Airborne (4) Particulates	6S2,2A2,3S1,7B1,*11G1	Quarterly	Gross-Beta Gamma-isotopic
Milk (5)	13B1,*10F1, or *8G2	Quarterly. During Pasture Season, Monthly	Gamma-isotopic
Surface Water	3C1 or 14C1, and *13G2	Semiannual Grab Sample	Gamma-isotopic H-3

(*) Designates Control Locations

(1) Eighteen monitoring stations, DR1 through DR18, (16 indicator and 2 control) are used. One indicator location is positioned in each meteorological sector near the site boundary. One dosimeter or continuously measuring dose rate instrument is placed at each location.

(2) At each Indicator location, one sample of each commercially and recreationally important species. One sample of same species in control location.

(3) Sample three different kinds of broad leafy vegetables grown nearest to two indicator locations -- having highest predicted average ground level D/Q (when milk samples not available). Also take one sample of same leafy vegetation grown nearest to Control Location.

(4) Three samples (near SNPS), one from each of the three Meteorological sectors having the largest annually averaged ground-level D/Q, are taken. One sample (near a community) also having the highest calculated annually averaged ground-level D/Q is taken. Establish one Control Location.

(5) Indicator samples from milking animals having highest potential dose. Sample within 5 km distance (preferably), within 5 to 8 km where doses are calculated to exceed 1 mrem/yr (second choice) or from 8 to 17 km. Control location is 15 to 30 km from SNPS and in the least prevalent wind direction.