ATTACHMENT 2
LICENSE AMENDMENT APPLICATION, LCR 94-08, 94-11 & 94-12
NLR-N94106
FACILITY OPERATING LICENSE NPF-57
HOPE CREEK GENERATING STATION
DOCKET NO. 50-354

TECHNICAL SPECIFICATION PAGES WITH PEN AND INK CHANGES

The following Technical Specifications for Facility Operating License No. NPF-57 are affected by this license amendment request:

Technical Specification	Page
3.7.1.1	3/4 7-1
3.7.1.2	3/4 7-3
3.8.1.1	3/4 8-1
4.8.1.1.2.h	3/4 8-6

3/4.7 PLANT SYSTEMS

3/4.7.1 SERVICE WATER SYSTEMS

SAFETY AUXILIARIES COOLING SYSTEM

LIMITING CONDITION FOR OPERATION

3.7.1.1 At least the following independent safety auxiliaries cooling system (SACS) subsystems, with each subsystem comprised of:

a. Two OPERABLE SACS pumps, and

b. An OPERABLE flow path consisting of a closed loop through the SACS heat exchangers and SACS pumps and to associated safety related equipment

shall be OPERABLE:

a. In OPERATIONAL CONDITION 1, 2 and 3, two subsystems.

b. In OPERATIONAL CONDITION 4, 5, and ** the subsystems associated with systems and components required OPERABLE by Specification ~~3.4.9.1,~~ 3.4.9.2, 3.5.2, 3.8.1.2, 3.9.11.1 and 3.9.11.2.

APPLICABILITY: OPERATIONAL CONDITIONS 1, 2, 3, 4, 5, and **.

ACTION:

a. In OPERATIONAL CONDITION 1, 2, or 3:

1. a. With one SACS pump ~~or heat exchanger~~ inoperable, restore the inoperable pump ~~or heat exchanger~~ to OPERABLE status within 30 days → ~~72 hours~~ or be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours.***

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2. With one SACS subsystem otherwise inoperable, realign at least one of the affected diesel generators to the OPERABLE SACS subsystem within 2 hours, and restore the inoperable subsystem to OPERABLE status with at least one OPERABLE pump and heat exchanger within 72 hours or be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours.***

Restore at least one inoperable pump to OPERABLE status within 72 hours or be →

3. a. With one SACS pump ~~or heat exchanger~~ in each subsystem inoperable, ~~immediately initiate measures to place the unit~~ in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours.***

INSERT B FROM NEXT PAGE →

4. With both SACS subsystems otherwise inoperable, immediately initiate measures to place the unit in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN* in the following 24 hours.

*Whenever both SACS subsystems are inoperable, if unable to attain COLD SHUTDOWN as required by this ACTION, maintain reactor coolant temperature as low as practical by use of alternate heat removal methods.

**When handling irradiated fuel in the secondary containment.

*** At least two diesel generators and service water pumps associated with the HOPE CREEK required OPERABLE SACS pumps must be OPERABLE.

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Insert A

b. With one SACS heat exchanger inoperable, restore the heat exchanger to OPERABLE status within 72 hours or be in at least HOT SHUTDOWN with the next 12 hours and in COLD SHUTDOWN within the following 24 hours.

Insert B

b. With one SACS heat exchanger in each subsystem inoperable, immediately initiate measures to place the unit in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours.

LIMITING CONDITION FOR OPERATION (Continued)

ACTION: (Continued)

having two SACS pumps or one heat exchanger

b. In OPERATIONAL CONDITION 3 or 4 with the SACS subsystem, which is associated with an RHR loop required OPERABLE by Specification 3.4.9.1 or 3.4.9.2, inoperable, declare the associated RHR loop inoperable and take the ACTION required by Specification 3.4.9.1 or 3.4.9.2, as applicable.

c. In OPERATIONAL CONDITION 4 or 5 with the SACS subsystem, which is associated with safety related equipment required OPERABLE by Specification 3.5.2, inoperable, declare the associated safety related equipment inoperable and take the ACTION required by Specification 3.5.2.

d. In OPERATIONAL CONDITION 5 with the SACS subsystem, which is associated with an RHR loop required OPERABLE by Specification 3.9.11.1 or 3.9.11.2, inoperable, declare the associated RHR system inoperable and take the ACTION required by Specification 3.9.11.1 or 3.9.11.2, as applicable.

e. In OPERATIONAL CONDITION 4, 5, or **, with one SACS subsystem, which is associated with safety related equipment required OPERABLE by Specification 3.8.1.2, inoperable, realign the associated diesel generators within 2 hours to the OPERABLE SACS subsystem, or declare the associated diesel generators inoperable and take the ACTION required by Specification 3.8.1.2. The provisions of Specification 3.0.3 are not applicable.

f. In OPERATIONAL CONDITION 4, 5, or **, with only one SACS pump and heat exchanger and its associated flowpath OPERABLE, restore at least two pumps and two heat exchangers and associated flowpaths to OPERABLE status within 72 hours or, declare the associated safety related equipment inoperable and take the associated ACTION requirements.

SURVEILLANCE REQUIREMENTS

4.7.1.1 At least the above required safety auxiliaries cooling system subsystems shall be demonstrated OPERABLE:

a. At least once per 31 days by verifying that each valve in the flow path that is not locked, sealed or otherwise secured in position, is in its correct position.

b. At least once per 18 months during shutdown by verifying that: 1) Each automatic valve servicing safety-related equipment actuates to its correct position on the appropriate test signal(s), and 2) Each pump starts automatically when its associated diesel generator automatically starts.

PLANT SYSTEMS

STATION SERVICE WATER SYSTEM

LIMITING CONDITION FOR OPERATION

3.7.1.2 At least the following independent station service water system loops, with each loop comprised of:

a. Two OPERABLE station service water pumps, and

b. An OPERABLE flow path capable of taking suction from the Delaware River (ultimate heat sink) and transferring the water to the SACS heat exchangers,

shall be OPERABLE:

a. In OPERATIONAL CONDITION 1, 2 and 3, two loops.

b. In OPERATIONAL CONDITION 4, 5 and *, one loop.

APPLICABILITY: OPERATIONAL CONDITIONS 1, 2, 3, 4, 5 and *.

ACTION:

a. In OPERATIONAL CONDITION 1, 2, or 3:

1. With one station service water pump inoperable, restore the inoperable pump to OPERABLE status within 30 days or be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours.**

2. With one station service water pump in each loop inoperable, restore at least one inoperable pump to OPERABLE status within 72 hours or be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours.**

3. With one station service water system loop otherwise inoperable, restore the inoperable station service water system loop to OPERABLE status with at least one OPERABLE pump within 72 hours or be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours.**

** At least two diesel generators and SACS pumps associated with the required OPERABLE service water pumps must be OPERABLE.

b. In OPERATIONAL CONDITION 4 or 5:

With only one station service water pump and its associated flowpath OPERABLE, restore at least two pumps with at least one flow path to OPERABLE status within 72 hours or declare the associated SACS subsystem inoperable and take the ACTION required by Specification 3.7.1.1.

c. In OPERATIONAL CONDITION *:

With only one station service water pump and its associated flowpath OPERABLE, restore at least two pumps with at least one flow path to OPERABLE status within 72 hours or declare the associated SACS subsystem inoperable and take the ACTION required by Specification 3.7.1.1. The provisions of Specification 3.0.3 are not applicable.

*When handling irradiated fuel in the secondary containment.

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SURVEILLANCE REQUIREMENTS

4.7.1.2 At least the above required station service water system loops shall be demonstrated OPERABLE:

a. At least once per 31 days by verifying that each valve (manual, power operated or automatic), servicing safety related equipment that is not locked, sealed or otherwise secured in position, is in its correct position.

b. At least once per 18 months during shutdown, by verifying that:

1. Each automatic valve servicing non-safety related equipment actuates to its isolation position on an isolation test signal.

2. Each pump starts automatically when its associated diesel generator automatically starts.

3/4.8 ELECTRICAL POWER SYSTEMS

3/4.8.1 A.C. SOURCES

A.C. SOURCES - OPERATING

LIMITING CONDITION FOR OPERATION

3.8.1.1 As a minimum, the following A.C. electrical power sources shall be OPERABLE:

a. Two physically independent circuits between the offsite transmission network and the onsite Class 1E distribution system, and

b. Four separate and independent diesel generators, each with:

1. A separate fuel oil day tank containing a minimum of 200 gallons of fuel,
2. A separate fuel storage system consisting of two storage tanks containing a minimum of 48,800 gallons of fuel, and
3. A separate fuel transfer pump for each storage tank.

APPLICABILITY: OPERATIONAL CONDITIONS 1, 2, and 3.

ACTION:

a. With one offsite circuit of the above required A.C. electrical power sources inoperable, demonstrate the OPERABILITY of the remaining A.C. sources by performing Surveillance Requirement 4.8.1.1.1.a within 1 hour and at least once per 8 hours thereafter. If any diesel generator has not been successfully tested within the past 24 hours, demonstrate its OPERABILITY by performing Surveillance Requirement 4.8.1.1.2.a.4 and 4.8.1.1.2.a.5 for each such diesel generator separately within 24 hours. Restore the inoperable offsite circuit to OPERABLE status within 72 hours or be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours.

b. With one diesel generator of the above required A.C. electrical power sources inoperable, demonstrate the OPERABILITY of the above required A.C. offsite sources by performing Surveillance Requirement 4.8.1.1.1.a within 1 hour and at least once per 8 hours thereafter. If the diesel generator became inoperable due to any cause other than preplanned preventive maintenance or testing, demonstrate the OPERABILITY of the remaining diesel generators by performing Surveillance Requirement 4.8.1.1.2.a.4 and 4.8.1.1.2.a.5 separately for each diesel generator within 24 hours*; restore the inoperable diesel generator to OPERABLE status within 72 hours or be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours.

30 days

c. With one offsite circuit of the above required A.C. sources and one diesel generator of the above required A.C. electrical power sources inoperable, demonstrate the OPERABILITY of the remaining A.C. sources by performing Surveillance Requirement 4.8.1.1.1.a within 1 hour and

*This test is required to be completed regardless of when the inoperable diesel generator is restored to OPERABILITY.

LIMITING CONDITION FOR OPERATION (Continued)

ACTION: (Continued)

at least once per 8 hours thereafter. If a diesel generator became inoperable due to any causes other than preplanned preventive maintenance or testing, demonstrate the OPERABILITY of the remaining OPERABLE diesel generators separately for each diesel generator by performing Surveillance Requirement 4.8.1.1.2.a.4 and 4.8.1.1.2.a.5 within 24 hours.* Restore at least two offsite circuits and all four of the above required diesel generators to OPERABLE status within 72 hours from time of the initial loss or be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours. A successful test(s) of diesel generator OPERABILITY per Surveillance Requirement 4.8.1.1.2.a.4 and 4.8.1.1.2.a.5 performed under this ACTION statement for the OPERABLE diesel generators satisfies the diesel generator test requirements of ACTION Statement b.

d. With both of the above required offsite circuits inoperable, demonstrate the OPERABILITY of all of the above required diesel generators by performing Surveillance Requirement 4.8.1.1.2.a.4 and 4.8.1.1.2.a.5 separately for each diesel generator within 8 hours unless the diesel generators are already operating; restore at least one of the above required offsite circuits to OPERABLE status within 24 hours or be in at least HOT SHUTDOWN within the next 12 hours. With only one offsite circuit restored to OPERABLE status, restore at least two offsite circuits to OPERABLE status within 72 hours from time of initial loss or be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours. A successful test(s) of diesel generator OPERABILITY per Surveillance Requirement 4.8.1.1.2.a.4 and 4.8.1.1.2.a.5 performed under this ACTION statement for the OPERABLE diesel generators satisfies the diesel generator test requirements of ACTION statement a.

e. With two diesel generators of the above required A.C. electrical power sources inoperable, demonstrate the OPERABILITY of the above required A.C. offsite sources by performing Surveillance Requirement 4.8.1.1.1.a within 1 hour and at least once per 8 hours thereafter and demonstrate the OPERABILITY of the remaining diesel generators by performing Surveillance Requirement 4.8.1.1.2.a.4 and 4.8.1.1.2.a.5 separately for each diesel generator within 8 hours.* Restore at least one of the inoperable diesel generators to OPERABLE status within ~~24~~ 72 hours or be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours. ~~Restore both of the inoperable diesel generators to OPERABLE status within 72 hours from time of initial loss or be in at least HOT SHUTDOWN within the next 12 hours and in~~

*This test is required to be completed regardless of when the inoperable diesel generator is restored to OPERABILITY.

LIMITING CONDITION FOR OPERATION (Continued)

ACTION: (Continued)

~~COLD SHUTDOWN within the following 24 hours.~~ A successful test(s) of diesel generator OPERABILITY per Surveillance Requirement 4.8.1.1.2.a.4 and 4.8.1.1.2.a.5 performed under this ACTION statement for the OPERABLE diesel generators satisfies the diesel generator test requirements of ACTION Statements a and b.

f. With two diesel generators of the above required A.C. electrical power sources inoperable, in addition to ACTION e., above, verify within 2 hours that all required systems, subsystems, trains, components, and devices that depend on the remaining diesel generators as a source of emergency power are also OPERABLE; otherwise, be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours.

g. With one offsite circuit and two diesel generators of the above required A.C. electrical power sources inoperable, demonstrate the OPERABILITY of the remaining A.C. sources by performing Surveillance Requirement 4.8.1.1.1.a within 1 hour and at least once per 8 hours thereafter and demonstrate the OPERABILITY of the remaining diesel generators by performing Surveillance Requirements 4.8.1.1.2.a.4 and 4.8.1.1.2.a.5 separately for each diesel generator within 8 hours.* Restore at least one of the above required inoperable A.C. sources to OPERABLE status within 2 hours or be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours. Restore the inoperable offsite circuit and both of the inoperable diesel generators to OPERABLE status within 72 hours from time of initial loss or be in at least HOT SHUTDOWN within 12 hours and in COLD SHUTDOWN within the following 24 hours.

h. With the buried fuel oil transfer piping's cathodic protection system inoperable for more than 30 days, prepare and submit a Special Report to the Commission pursuant to Specification 6.9.2 within the next 10 days outlining the cause of the malfunction and the plans for restoring the system to OPERABLE status.

*This test is required to be completed regardless of when the inoperable diesel generator is restored to OPERABILITY.

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SURVEILLANCE REQUIREMENTS

4.8.1.1.1 Each of the above required independent circuits between the offsite transmission network and the onsite Class 1E distribution system shall be:

a. Determined OPERABLE at least once per 7 days by verifying correct breaker alignments and indicated power availability, and

b. Demonstrated OPERABLE at least once per 18 months during shutdown by transferring, manually and automatically, unit power supply from the normal circuit to the alternate circuit.

4.8.1.1.2 Each of the above required diesel generators shall be demonstrated OPERABLE:

a. In accordance with the frequency specified in Table 4.8.1.1.2-1 on a STAGGERED TEST BASIS by:

1. Verifying the fuel level in the fuel oil day tank.

2. Verifying the fuel level in the fuel oil storage tank.

3. Verifying the fuel transfer pump starts and transfers fuel from the storage system to the fuel oil day tank.

4. Verifying the diesel starts from ambient conditions and accelerates to at least 514 rpm in less than or equal to 10 seconds after receipt of the start signal.* The generator voltage and frequency shall be 4160 ± 420 volts and 60 ± 1.2 Hz within 10 seconds after receipt of the start signal. The diesel generator shall be started for this test by using one of the following signals:

a) Manual.

b) Simulated loss of offsite power by itself.

c) Simulated loss of offsite power in conjunction with an ESF actuation test signal.

d) An ESF actuation test signal by itself.

5. Verifying the diesel generator is synchronized, loaded to between 4300 and 4400** kw in less than or equal to 130 seconds,* and operates with this load for at least 60 minutes.

*The diesel generator start (10 sec) and subsequent loading (130 sec) from ambient conditions shall be performed at least once per 184 days in these surveillance tests. All other engine starts and loading for the purpose of this surveillance testing may be preceded by an engine prelube period and/or other warmup procedures recommended by the manufacturer so that mechanical stress and wear on the diesel engine is minimized.

**This band is meant as guidance to avoid routine overloading of the engine. Loads in excess of this band shall not invalidate the test; the loads, however, shall not be less than 4300 kw nor greater than 4430 kw.

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SURVEILLANCE REQUIREMENTS (Continued)

6. Verifying the diesel generator is aligned to provide standby power to the associated emergency busses.

7. Verifying the pressure in all diesel generator air start receivers to be greater than or equal to 325 psig.

8. Verifying the lube oil pressure, temperature and differential pressure across the lube oil filters to be within manufacturer's specifications.

b. At least once per 31 days by visually examining a sample of lube oil from the diesel engine to verify absence of water.

c. At least once per 31 days and after each operation of the diesel where the period of operation was greater than or equal to 1 hour by checking for and removing accumulated water from the fuel oil day tank.

d. At least once per 92 days by removing accumulated water from the fuel oil storage tanks.

e. At least once per 31 days by performing a functional test on the emergency load sequencer to verify operability.

f. At least once per 92 days and from new fuel oil prior to addition to the storage tanks by obtaining a sample in accordance with ASTM-D4057 and by verifying that the sample meets the following minimum requirements and is tested within the specified time limits:

1. As soon as sample is taken or from new fuel prior to addition to the storage tank, as applicable, verify in accordance with the tests specified in ASTM-D975-77 that the sample has:

a) A water and sediment content of less than or equal to 0.05 volume percent.

b) A kinematic viscosity @ 40°C of greater than or equal to 1.9 centistokes, but less than or equal to 4.1 centistokes or a Saybolt Second Universal (SSU) viscosity at 100°F of greater than or equal to 32 SSU but less than or equal to 40.1 SSU.

c) A specific gravity as specified by the manufacturer as API gravity @ 60°F of greater than or equal to 28 degrees but less than or equal to 42 degrees.

2. Within one week after obtaining the sample, verify an impurity level of less than 2 mg of insolubles per 100 ml. when tested in accordance with ASTM-D2274-70.

SURVEILLANCE REQUIREMENTS (Continued)

3. Within 2 weeks after obtaining the sample, verify that the other properties specified in Table 1 of ASTM-D975-77 and Regulatory Guide 1.137, Position 2.a, are met when tested in accordance with ASTM-D975-77.

g. Deleted

h. At least once per ~~18 months #, during shutdown, by:~~ refueling cycle*, by:

1. Subjecting the diesel to an inspection in accordance with procedures prepared in conjunction with its manufacturer's recommendations for this class of standby service.

2. Verifying the diesel generator capability to reject a load of greater than or equal to that of the RHR pump motor (1003 kW) for each diesel generator while maintaining voltage at 4160 ± 420 volts and frequency at 60 ± 1.2 Hz.

3. Verifying the diesel generator capability to reject a load of 4430 kW without tripping. The generator voltage shall not exceed 4785 volts during and following the load rejection.

4. Simulating a loss of offsite power by itself, and:

a) Verifying loss of power is detected and deenergization of the emergency busses and load shedding from the emergency busses.

b) Verifying the diesel generator starts* on the auto-start signal, energizes the emergency busses with permanently connected loads within 10 seconds after receipt of the start signal, energizes the autoconnected shutdown loads through the load sequencer and operates for greater than or equal to 5 minutes while its generator is loaded with the shutdown loads. After energization, the steady state voltage and frequency of the emergency busses shall be maintained at 4160 ± 420 volts and 60 ± 1.2 Hz during this test.

*This diesel generator start (10 sec) and subsequent loading (130 sec) from ambient conditions may be preceded by an engine prelube period and/or other warmup procedures recommended by the manufacturer so that mechanical stress and wear on the diesel engine is minimized.

#For any start of a diesel generator, the diesel must be loaded in accordance with the manufacturer's recommendations.

ATTACHMENT 3
LICENSE AMENDMENT APPLICATION, LCR 94-08, 94-11 & 94-12
NLR-N94106
FACILITY OPERATING LICENSE NPF-57
HOPE CREEK GENERATING STATION
DOCKET NO. 50-354

PROBABILISTIC SAFETY ASSESSMENT ANALYSES

PROBABILISTIC SAFETY ASSESSMENT (PSA) ANALYSES

PSA analyses were performed to determine the increase in risk resulting from the Technical Specification changes discussed in this LCR. Risk is defined here as the frequency of core damage multiplied by the time interval over which the plant is exposed to a condition. For example, a Core Damage Frequency (CDF) of 1.29 E-5/year corresponds to a CDF of 3.53 E-8/day. The "risk" of maintaining this condition over a period of 30 days would therefore be:

3.53 E-8/day * 30 days = 1.06 E-6

The increased AOTs for the SSWS, SACS and EDG systems each represent an increase in plant risk, but as this analysis shows, the risk increase is acceptable. For this analysis, risk increases of ≤ 1E-6 were determined to be insignificant and were used as a criterion to determine if an AOT extension is acceptable.

This attachment is divided into three sections. The first is a summary of the changes to the PSA models that have occurred since the HCGS Individual Plant Examination (IPE) was submitted to the NRC. The second section is a description of the methodology used to calculate the risk increases for this LCR, along with one example of a risk increase calculation. The third section presents the results of all of the PSA analyses for this LCR.

Changes To PSA Models Since The HCGS IPE Submittal:

The HCGS IPE, the PSE&G response to GL 88-20, was submitted to the NRC in May 1994. The baseline CDF reported in the HCGS IPE was 4.58 E-5/year. However, as stated in the Suggestions for Plant Improvement (Section 6.4) of that report, PSE&G had committed to review and finalize Safety Auxiliaries Cooling System (SACS) and Station Service Water System (SSWS) analyses to remove modeling conservatism. This work was completed, and the following changes were made to the SACS and SSWS fault tree success criteria:

- A SSWS loop is successful if at least one pump (and associated flowpath) is successful in providing its design flow. The HCGS IPE success criterion for a SSWS loop was that both pumps (and associated flowpaths) needed to provide their design flow.

- A SACS subsystem is successful if both pumps and both SACS/SSWS heat exchangers (and associated flowpaths) in that subsystem are successful, or if one pump in <u>each</u> SACS subsystem (with both heat exchangers per loop) are successful, provided that operators are successful in manipulating SACS loads to allow such a configuration. The HCGS IPE success

criterion for a SACS subsystem was that both pumps and both heat exchangers (and associated flowpaths) in one subsystem needed to perform their design function.

A few other minor changes were made to the PSA fault tree and event tree models used in the HCGS IPE. However, these changes are at a very low level of detail, and are not relevant to the analyses presented here.

The effect of the changes to the PSA models is that the HCGS CDF is calculated to be 1.29 E-5/year, a factor 3.5 times lower than the CDF reported in the HCGS IPE. This change is attributed to the improvement that the revised SACS and SSWS success criteria have on the frequency of Station Blackout (SBO) events. In the HCGS IPE, the CDF attributable to SBO was calculated to be 3.38 E-5/year, or 73.7% of the total CDF. With the revised PSA calculation, the CDF attributable to SBO is calculated to be 2.33 E-6/year, or 18.1% of the total CDF.

Methodology For Risk Increase Calculations:

Risk is defined as the frequency of core damage multiplied by the time interval over which the plant is exposed to a condition. For example, the HCGS CDF of 1.29 E-5/year corresponds to a CDF of 3.53 E-8/day. The "risk" of operating the HCGS over a period of 30 days would therefore be:

3.53 E-8/day * 30 days = 1.06 E-6.

This risk is considered the baseline risk of plant operation. When a piece of equipment credited in the PSA is inoperable for a time period, there is an increase in risk over the baseline risk. This PSA analysis calculates the Risk Increase (RI) associated with the AOT extensions described in this LCR.

The PSA software used by PSE&G calculates CDF as a yearly frequency. With this software, it is possible to select a piece of equipment (e.g., a SSWS pump) and assign it a failure rate of 1.0. The PSA software then calculates a conditional CDF, given that the specified equipment is unavailable for one year.

To calculate the RI of extending the AOT for equipment, it is appropriate to calculate a yearly conditional CDF (given that the equipment is unavailable), convert this to a daily CDF, and multiply this frequency by the exposure time (the duration of the AOT). The calculation of RI for SSWS pump AP502 is shown below:

CDF when SSWS pump AP502 is unavailable for one year = 1.32 E-5/year;

Δ CDF (yearly) = 1.32 E-5/year - 1.29 E-5/year = 3.0 E-7/year

Δ CDF (daily) = 3.0 E-7/year * 1 yr / 365 days = 8.22 E-10/day

RI (30 days) = 8.22 E-10/day * 30 days = 2.47 E-8

An RI is then calculated for SSWS pumps BP502, CP502 and DP502

For this analysis, an RI of ≤ 1E-6 was used as a criterion to determine if the AOT extension is acceptable. If the RI for a 30 day AOT for each of the SSWS pumps is ≤ 1E-6, then the 30 day AOT is acceptable.

When determining if an RI is acceptable for an AOT, the worst case component is always considered. In the PSA fault tree models for a normally operating system (e.g., SACS and SSWS), it is necessary to assume that certain portions of the system are normally operating and others are in standby. For example, in the HCGS SSWS fault tree model, it is assumed that SSWS pumps A and B are normally operating, and pumps C and D are in standby. Therefore, SSWS pumps C and D have some failure modes that differ from the failure modes of the other pumps. This sometimes has the effect of overstating the importance of some components and understating the importance of others. For this reason, and also since differences in component importance are often in fact true, the worst case component in terms of RI is always conservatively considered when comparing the RI with the 1E-6 criterion.

It should be noted that the values presented in the following results section represent the increase in risk attributable to establishment of the new AOT. It does not represent the increase in risk attributable to the difference between the old AOT and the new AOT. That risk increase would be less. It should also be noted that risk increase values were derived assuming that the particular component was out of service for the full AOT. During plant operation, however, it is expected that a component would be out-of-service (i.e., to perform preventative maintenance) for only a fraction of what the proposed AOTs permit. Thus, the actual risk increase would again be less than following results indicate.

Results Of PSA Analyses:

A. Station Service Water System:

1. Increase AOT for one pump inoperable to 30 days

RI (30 days) for SSWS pump AP502 = 2.47 E-8
RI (30 days) for SSWS pump BP502 = 1.64 E-8
RI (30 days) for SSWS pump CP502 = 4.40 E-8
RI (30 days) for SSWS pump DP502 = 3.36 E-9

The limiting SSWS pump is CP502, with a RI (30 days) = 4.40 E-8. Since this is less than 1E-6, this RI is considered acceptable.

B. Safety Auxiliaries Cooling System:

1. Increase AOT for one pump inoperable to 30 days

RI (30 days) for SACS pump AP210 = 2.47 E-8
RI (30 days) for SACS pump BP210 = 2.47 E-8
RI (30 days) for SACS pump CP210 = 2.47 E-8
RI (30 days) for SACS pump DP210 = 2.47 E-8

The RI (30 days) for each SACS pump = 2.47 E-8. Since this is less than 1E-6, this RI is considered acceptable.

2. Increase AOT for one SACS pump in each loop inoperable to 72 hours

RI (72 hours) for SACS pump A/BP210 = 6.64 E-7
RI (72 hours) for SACS pump A/DP210 = 6.64 E-7
RI (72 hours) for SACS pump B/CP210 = 6.64 E-7
RI (72 hours) for SACS pump C/DP210 = 6.64 E-7

The RI (72 hours) for each combination of inoperable SACS pumps is 6.64 E-7. Since this is less than 1E-6, this RI is considered acceptable.

C. Emergency Diesel Generators:

1. Increase the AOT for one EDG inoperable to 30 days

RI (30 days) for EDG A/G400 = 7.23 E-7
RI (30 days) for EDG B/G400 = 6.58 E-7
RI (30 days) for EDG C/G400 = 4.45 E-7
RI (30 days) for EDG D/G400 = 2.15 E-7

The limiting EDG is AG400, with a RI (30 days) = 7.23 E-7. Since this is less than 1E-6, this RI is considered acceptable.

2. Increase the AOT for two EDGs inoperable to 72 hours

RI (72 hours) for EDG A/BG400 = 4.32 E-7
RI (72 hours) for EDG A/CG400 = 3.08 E-7
RI (72 hours) for EDG A/DG400 = 3.98 E-7
RI (72 hours) for EDG B/CG400 = 3.95 E-7
RI (72 hours) for EDG B/DG400 = 3.07 E-7
RI (72 hours) for EDG C/DG400 = 3.85 E-7

The limiting combination of inoperable EDGs is the A/BG400 combination. This combination has an RI (72 hours) of 4.32 E-7. Since this is less than 1E-6, this RI is considered acceptable.