Florida Power
A Progress Energy Company

Crystal River Nuclear Plant
Docket No. 50-302
Operating License No. DPR-72

Ref: 10 CFR 50.90

July 14, 2003
3F0703-04

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

Subject: Crystal River Unit 3 – License Amendment Request #280, Revision 0
Revised Improved Technical Specification (ITS) 3.7.9, Nuclear Services Seawater System

Dear Sir:

Progress Energy Florida, Inc. (PEF) hereby submits License Amendment Request (LAR) #280, Revision 0, which requests a change to the Crystal River Unit 3 (CR-3) Facility Operating License in accordance with 10 CFR 50.90. LAR #280 revises Technical Specifications (ITS) 3.7.9 to allow a one-time increase in the Completion Time for restoring an inoperable Nuclear Services Seawater System train to Operable status. The proposed change is being submitted to allow the refurbishment of one Nuclear Services Seawater System Emergency Pump (RWP-2A or RWP-2B) online.

The acceptability of the changes proposed by this submittal is supported by risk-informed considerations. This information is provided in Attachments A and E of this submittal.

PEF respectfully requests that this request be noticed in the Federal Register as soon as practical and the review of this LAR be performed on an expedited basis to support an approval date of March 1, 2004.

The CR-3 Plant Nuclear Safety Committee has reviewed this request and recommended it for approval.

A001

Progress Energy Florida, Inc.
Crystal River Nuclear Plant
15760 W. Powerline Street
Crystal River, FL 34428

If you have any questions regarding this submittal, please contact Mr. Sid Powell, Supervisor, Licensing and Regulatory Programs at (352) 563-4883.

Sincerely,

Dale E Young

Dale E. Young
Vice President
Crystal River Nuclear Plant

DEY/lvc

Attachments:

A. Background, Description of Proposed Change, Reason for Request, and Evaluation of Request
B. Regulatory Analysis
C. Proposed Revised Improved Technical Specifications Pages – Strikeout/Shadowed Format
D. Proposed Revised Improved Technical Specifications Pages – Revision Bar Format
E. PSA Risk Assessment of RWP-2A/2B Extended AOT

xc: NRR Project Manager
Regional Administrator, Region II
Senior Resident Inspector

STATE OF FLORIDA

COUNTY OF CITRUS

Dale E. Young states that he is the Vice President, Crystal River Nuclear Plant for Progress Energy Florida, Inc. (PEF); that he is authorized on the part of said company to sign and file with the Nuclear Regulatory Commission the information attached hereto; and that all such statements made and matters set forth therein are true and correct to the best of his knowledge, information, and belief.

Dale E. Young

Dale E. Young
Vice President
Crystal River Nuclear Plant

The foregoing document was acknowledged before me this 14th day of July, 2003, by Dale E. Young.

Janet Schroeder

Signature of Notary Public
State of Florida

JANET SCHROEDER
MY COMMISSION # DD 128063
EXPIRES: June 20, 2006
Bonded Thru Notary Public Underwriters

(Print, type, or stamp Commissioned Name of Notary Public)

Personally Known ✓ -OR- Produced Identification ______

PROGRESS ENERGY FLORIDA, INC.

CRYSTAL RIVER UNIT 3

DOCKET NUMBER 50-302/LICENSE NUMBER DPR-72

ATTACHMENT A

LICENSE AMENDMENT REQUEST #280, REVISION 0

Background, Description of Proposed Change, Reason for Request, and Evaluation of Request

Background

The Crystal River Unit 3 (CR-3) Nuclear Services Seawater System contains one normal duty pump (RWP-1) and two emergency services pumps (RWP-2A and RWP-2B). RWP-2A takes suction from the "A" Raw Water Pit; RWP-1 and RWP-2B take suction from the "B" Raw Water Pit. The pits are supplied by water from the Gulf of Mexico. As explained in subsequent sections, the system provides cooling water to the Nuclear Services Closed Cycle Cooling Water (SW) System which, in turn, removes heat from many safety related structures, systems and components (SSCs).

Nuclear Services Seawater System Emergency Pump RWP-2A has been exhibiting a trend of decreasing pump differential pressure (dP). The RWP-2A pump refurbishment is planned for Refueling Outage 13 (13R), currently scheduled for Fall 2003.

RWP-2B is in the "Alert Range" for vibration. CR-3 would like to repair RWP-2B during 13R. The challenge for accomplishing this is that there is only one spare rotating unit available. Thus, once this rotating unit is utilized in the refurbishment of the RWP-2A pump, the replaced rotating unit also has to be refurbished. There is not sufficient time for refurbishing the replaced rotating unit and installing it on RWP-2B during the 13R Outage Schedule.

Improved Technical Specification (ITS) 3.7.9, "Nuclear Services Seawater System," requires that two Nuclear Services Seawater System trains shall be OPERABLE. If one train is inoperable, Condition "A" allows operation to continue for 72 hours. It is estimated that the rebuild activity of either RWP-2A or RWP-2B will take approximately five (5) days. Thus, to perform the refurbishment activity online, an extension of the ITS 3.7.9 Completion Time is needed.

Description of the Proposed License Amendment Request

This one-time License Amendment Request (LAR) #280, Revision 0, is proposing to add a NOTE to ITS 3.7.9, Condition A, Required Action A.1, Completion Time, as follows:

> **"*On a one-time basis, a Nuclear Services Seawater System train may be inoperable for up to 10 days to allow performance of Nuclear Services Seawater System Emergency Pump RWP-2A or RWP-2B repairs. The ability to apply the 10-day Completion Time will expire on December 30, 2004."**

The ITS Bases for 3.7.9, Action A.1, will be revised as follows:

> "With one of the Nuclear Services Seawater pumps inoperable, action must be taken to restore the pump to OPERABLE status within 72* hours..."
>
> **"*On a one-time basis, a Nuclear Services Seawater System train may be inoperable for up to 10 days to allow performance of Nuclear Services Seawater System Emergency Pump RWP-2A or RWP-2B repairs. The ability to apply the 10-day Completion Time will expire on December 30, 2004."**

Reason for Request

As explained above, recent in-service testing of RWP-2A and RWP-2B shows changes in the performance of the pumps which indicates declining performance of the pumps, and presents the need for their refurbishment. As described in the Background information, performance of the repair activity for both pumps during 13R is impractical. Since the duration of the repair activity is greater than the 72 hour Completion Time specified in ITS 3.7.9, the repair can only be performed in MODE 5 or 6 unless a one-time extension of the Completion Time for up to 10 days is approved. Thus, approval of the proposed LAR will allow the performance of the repair online, and will prevent a forced shutdown.

Evaluation of Request

System Description

The Decay Heat Seawater System and the Nuclear Services Seawater System comprise the RW system which is shown in simplified schematics in Figure 1. Seawater is drawn from the intake canal and conveyed to the sump pit via two redundant 48-inch intake conduits. The "A" intake conduit shares a common intake structure, bar racks, and traveling screens with the Circulating Water System (CW) system while the other intake conduit is supplied with a bar rack and separate traveling screen located in a separate intake structure. The intake conduits are installed individually to one of the two compartments comprising the sump pit. A permanently closed sluice gate separates the two compartments. The seawater pumps, of the vertical wet-pit type, are apportioned in the sump pit as follows: One 100% capacity normal nuclear services seawater pump, one 100% capacity emergency nuclear services seawater pump, and one 100% capacity decay heat service seawater pump in the "B" compartment; and another group of one 100% capacity emergency nuclear services seawater pump and one 100% capacity decay heat service seawater pump in the "A" compartment. The RW system (Figure 1) supplies flow to the SW heat exchangers. The SW system cools SSCs that are relied upon for accident mitigation such as the Control Complex Chillers and the Reactor Building Cooling Units.

Seawater is circulated through the nuclear services heat exchangers and merged with the seawater from the decay heat closed cycle heat exchangers to the redundant 48-inch discharge pipes leading to the discharge canal. Three of the four nuclear service heat exchangers supply the full normal and emergency cooling requirements, with the fourth unit on reserve.

The Nuclear Services Seawater pumps are designed to the parameters shown below:

Nuclear Service Seawater Pumps	
Number	2 Emerg; 1 Normal
Flow, gpm	14,100 Emerg; 10,800 Normal
Design Head, ft	143 Emerg; 97 Normal
Design Pressure, psig	100
Design Temperature, °F	109
Seismic Class	I

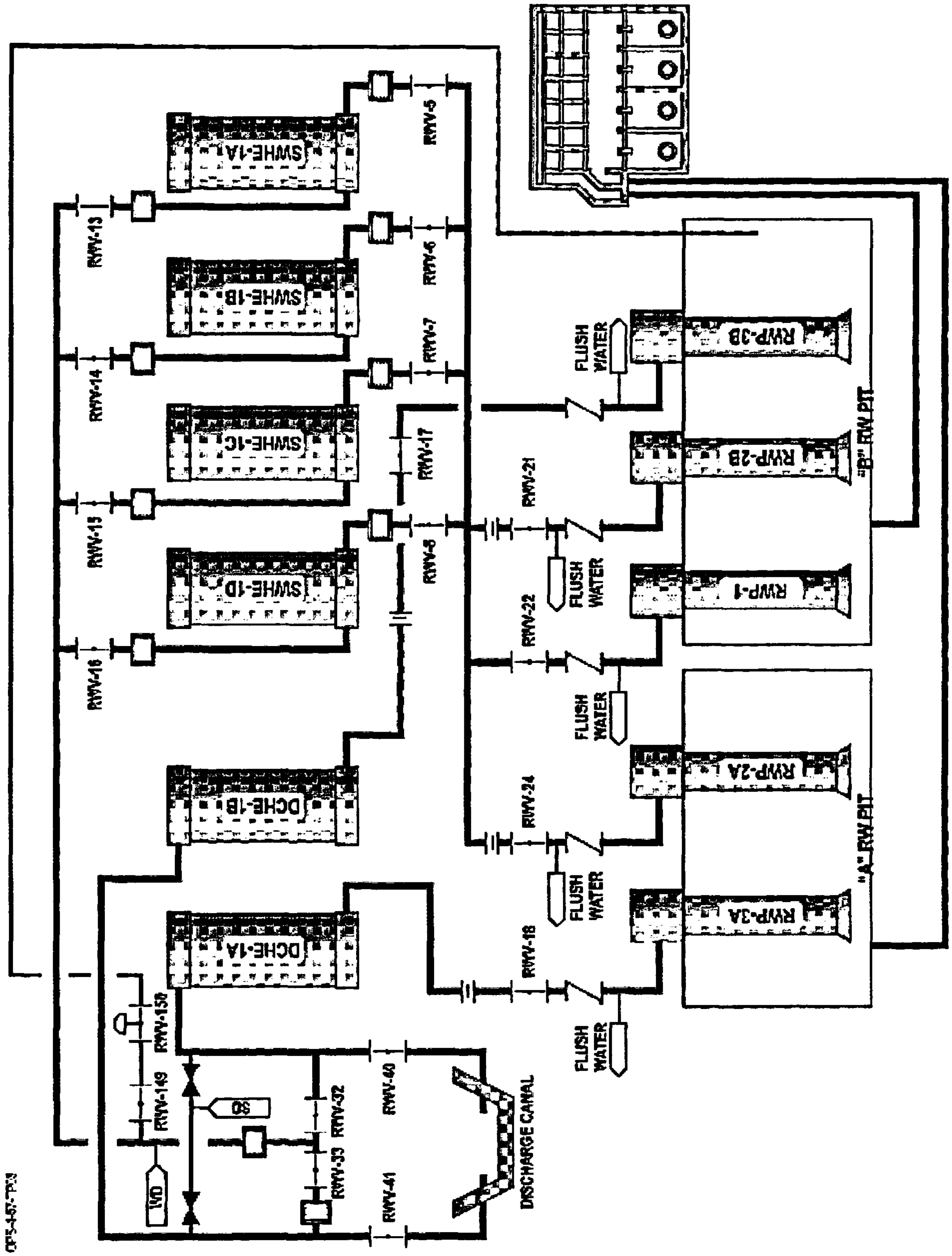

Figure 1 - RW System Flowpaths

Technical Evaluation

The performance of RWP-2A has been recently evaluated and it has been concluded that the pump is fully capable of supporting CR-3 operation. Although RWP-2B has exhibited vibration and a slightly declining dP trend, it is also fully capable of performing its safety function. Both RWP-2A and RWP-2B are on increased testing frequency consistent with the requirements of the Operating and Maintenance Code (OM), Part 6 and the CR-3 In-Service Testing Program.

During the requested extended time period of ten days, the redundant Emergency Nuclear Services Seawater pump will be available and capable of providing cooling for containment heat loads and essential equipment during emergency conditions. RWP-1 is the CR-3 normal duty Nuclear Closed Cycle Cooling Water pump. Although RWP-1 is non-safety related and its motor is non-seismic, has a lower flow capability than either RWP-2A or RWP-2B, and is not connected to an emergency power source, it will also be available and capable of removing emergency heat loads from essential equipment for all design basis events where offsite power remains available. Informal calculations performed show that below a UHS temperature of approximately 90°F, RWP-1 can provide enough flow to remove heat loads in accident conditions.

To ensure defense-in-depth capabilities and the assumptions in the risk assessment are maintained during the proposed one-time extended Completion Time, CR-3 will continue the performance of 10 CFR 50.65(a)(4) assessments before performing maintenance or surveillance activities and no maintenance activities of other risk sensitive equipment beyond that required for the refurbishment activity will be scheduled concurrent with the repair activity. Other compensatory actions that may be implemented include: use of pre-job briefings and periodic operator walkdowns to assess the status of risk sensitive equipment in the redundant train, selection of beneficial Makeup Pump configurations, selection of beneficial power supply configuration to the remaining Emergency Nuclear Services Seawater System pump, no elective maintenance to be scheduled in the switchyard, and the establishment of fire watches in fire areas identified in Attachment E of this submittal. These actions are more fully described in subsequent sections.

Risk Evaluation

Attachment E provides the calculation performed to assess the risk associated with increasing the ITS Completion Time to perform repairs to RWP-2A or RWP-2B. The calculation includes the risk associated with having an Emergency Nuclear Services Seawater pump out-of-service for 10 days using the current CR-3 Equipment Out-Of-Service (EOOS) computer model based on the most current plant Probabilistic Safety Analysis (PSA).

The PSA risk associated with the activity to repair the Emergency Nuclear Services Seawater pump supports the one-time extension proposed in this LAR. Assuming either RWP-2A or RWP-2B is out-of-service for 10 days, the bounding risk for this activity is estimated with a Change in Core Damage Frequency (ΔCDF) of 8.02E-07. This number is below the Regulatory Guide (RG) 1.174, "An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis," limit of 1E-06 and is considered a very small increase. The Change in Large Early Release Frequency (ΔLERF) for all cases evaluated is well below the RG 1.174 limit of 1E-07 and is considered very small. The risk evaluation concludes that the one-time 10-day Completion Time proposed in this LAR results in

a ΔCDF and a ΔLERF that is reasonable compared to the criteria in RG 1.174. Although not directly applicable, those results are also reasonable when compared to the guidance in RG 1.177, "An Approach for Plant-Specific Risk-Informed Decisionmaking: Technical Specifications."

Quality of the Crystal River Unit 3 PSA

The models used for this application were generated using updated Individual Plant Examination (IPE) models developed in response to Generic Letter 88-20, "Individual Plant Examination for Severe Accident Vulnerabilities," and associated supplements. The original development work was a level one Probabilistic Risk Assessment (PRA) study completed in 1987 (Crystal River Unit 3 Probabilistic Risk Assessment, Florida Power Corporation, Science Applications Intl. Corporation, July 1987), which was submitted to the NRC and reviewed by Argonne National Laboratory (NUREG/CR-5245). This study was subsequently updated for the Generic Letter 88-20 IPE submittal to include a level two containment analysis and an internal flooding analysis.

Revisions to the models have been made to maintain the models consistent with plant design changes and operational changes. These changes have been made by individuals knowledgeable in risk assessment techniques and methods, and reviewed by plant Engineering and Operations personnel familiar with the plant design and operation. The current PSA model and the risk assessment performed for this application have been documented as a calculation.

Current administrative controls include written procedures and review of all model changes, data updates, and risk assessments performed using PSA methods and models. Risk assessments are performed by a PSA engineer, reviewed by another PSA engineer, and approved by the PSA Supervisor or designee. Procedures, PSA model documentation, and associated records for applications of the PSA models are controlled documents.

Since the submittal of the original PRA study in 1987, the PSA models have been maintained consistent with the current plant configuration such that they are considered "living" models which reflect the as-built, as-operated plant. The PSA models are updated for different reasons, including plant changes and modifications, procedure changes, accrual of new plant data, discovery of modeling errors, and advances in PSA technology. The update process ensures that the applicable changes are implemented and documented in a timely manner so that risk analyses performed in support of plant operations reflect the current plant configuration, operating philosophy, and transient and component failure history. The PSA maintenance and update process is described in administrative procedure ADM-NGGC-0004, "Updates to PSA Models." Model updates are performed at a frequency dependent on the estimated impact of the accumulated changes. Guidance to determine the need for a model update is provided in the procedure. Prior to startup from a refueling outage, known outstanding changes, including identified model errors and enhancements, are reviewed, and either model changes are implemented, or the outstanding item is dispositioned to be deferred for a future model update.

PSA Software

Computer programs that process PSA model inputs are verified and validated in accordance with administrative procedure CSP-NGGC-2505, "Software Quality Assurance and Configuration Control of Business Computer Systems." This procedure provides for software verification and validation to ensure the software meets the software requirement specifications and functional

requirements, and typically includes a comparison of results generated to the results generated from previously approved software.

Validation requirements for each quality related PSA computer program are documented in the Software Life Cycle document, which consists of a Software Verification/Validation Plan (SVVP) and Report (SVVR). These requirements include the method of validation, the frequency of validation, the documentation required and the acceptance criteria. Actual validation benchmark problems can exercise more than one program, but a separate SVVR must be submitted for each program. Each SVVP and SVVR is reviewed, and then approved by the software owner, who is the PSA Supervisor. Software validation tests both the software and the hardware. Validation tests are also performed following any significant change in the hardware, operating system, or program, or if the validation period established in the SVVP procedure expires.

Model Changes Since Submittal of the IPE

Since the submittal of the IPE, there has been several significant plant design changes incorporated into the PSA model which have resulted in a reduction in the Core Damage Frequency (CDF). Updates have been made to plant-specific data (through 1999) and initiating events data, as well as updates to the methods used for human reliability, common cause, internal flooding and level two analyses.

As of the date of this submittal, there are no outstanding or planned plant changes requiring a change to the PSA model which would affect the conclusions of the analysis in Attachment E.

PSA Reviews

As discussed above, the original CR-3 PRA study was reviewed by Argonne National Laboratory as documented in NUREG/CR-5245. For the IPE submittal, multiple levels of review were used, including an assessment by Engineering and Operations personnel familiar with the plant design and operation. Subsequent revisions to the PSA models were performed by qualified individuals with knowledge of PSA methods and plant systems. Involvement by Engineering and Operations personnel in providing input and review of results was obtained, when required, based on the scope of the changes being implemented.

The CR-3 PSA model and documentation was subjected to the industry peer certification review process in September 2001. In preparation for this review, an external consultant was hired to develop system notebook documentation. This required a review of the system models against plant drawings and procedures, and identification of any inconsistencies with the models. Items identified from this review were considered and dispositioned. The internal flooding and common cause failure analyses were updated to current industry methodologies and data sources. An internal review of the PSA model elements and their corresponding documentation was conducted to assure the model and documentation reflected the plant design.

The industry peer certification review was conducted by a diverse group of PSA engineers from other Babcock & Wilcox (B&W) plants, industry PSA consultants familiar with the B&W plant design, and a representative from the Institute of Nuclear Power Operations (INPO). The certification review covered all aspects of the PSA model and the administrative processes used to maintain and update the model. This review generated specific recommendations for model

changes to correct errors, as well as guidance for improvements to processes and methodologies used in the CR-3 PSA model, and enhancements to the documentation of the model and the administrative procedures used for model updates.

Following completion of this review, the CR-3 PSA model was revised to address each issue identified which affected the model. The significant changes identified included:

- Update of plant-specific thermal-hydraulic analyses which provide the bases for accident sequences, system success criteria, and timing for operator actions
- Revision of accident sequence logic for steam generator tube rupture (SGTR) and anticipated transient without scram (ATWS) mitigation
- Development of an initiating event to address the loss of all raw water pumps (loss of ultimate heat sink)
- Update of the interfacing systems loss of coolant accident (ISLOCA) analyses
- Update of the human reliability analysis including the dependency analysis for multiple operator action responses to an event, and
- Update of the level two analysis

Issues involving model documentation are being addressed as each individual PSA document is reviewed and approved under Progress Energy corporate procedures. Other changes involving guidance documents and administrative processes used for model updates are planned to be addressed by Progress Energy corporate procedures, once the peer review process has been completed for all PSA models (including the Robinson Nuclear Plant, Brunswick Nuclear Plant, and Harris Nuclear Plant). The issues identified by the peer review in these areas have been reviewed and determined not to have any impact on this submittal, and so deferral of completion of these items is acceptable for this application of the PSA model. All other peer review items which impact the PSA model have been addressed and are reflected in this submittal.

At the time of the peer review, the level two model was not yet completed, and only a preliminary draft version, along with the original IPE level two results, were available for review. The level two model is now complete, and the findings identified from the peer certification review of the preliminary results and the IPE model have been addressed.

<u>Compensatory Measures</u>

The PSA Risk Assessment assumes the continued performance of 10 CFR 50.65(a)(4) assessments before performing maintenance or surveillance activities. It also assumes that no maintenance will be scheduled on other related risk sensitive equipment beyond that required for the refurbishment activity [Nuclear Services and Decay Heat Seawater System, Decay Heat System, Decay Heat Closed Cycle Cooling Water System, Nuclear Services Closed Cycle Cooling Water, Emergency Diesel Generators, Chilled Water, Emergency Feedwater System, Emergency Feedwater Initiation and Controls System (EFIC), Auxiliary Feedwater Pump].

Although the risk associated with the proposed maintenance activity is considered very small without taking special actions, the compensatory actions listed below can further reduce the risk:

1. The 4160-A Engineered Safeguards (ES) Bus is normally aligned to the Offsite Power Transformer (OPT) and the 4160-B ES Bus is aligned to the Backup Engineered Safeguards Transformer (BEST). This compensatory measure is to consider changing the

alignment of the 4160-B ES Bus to the OPT to keep RWP-2B continuously powered and available for autostart in case of a partial loss of offsite power event. A loss of offsite power to the OPT would not cause a plant trip. The 4160-A ES Bus will be aligned to the BEST for redundancy. This compensatory action has a more significant benefit effect on lowering CDF for RWP-2A refurbishment activity due to plant asymmetries.

2. Selection of beneficial Makeup Pump configurations.

3. Increase of operator attention to loss/restoration of RW/SW/redundant train Control Complex Chiller [walkdowns of the operable redundant train, pre-job discussion on the impact of losing service water and the potential EFIC control problems if there is a loss of the redundant train Control Complex Chiller].

4. Operator attention to potential use of the Appendix R Chiller, non-safety grade FWP-7 and Standby Diesel Generator (MTDG-1).

5. Periodic operator walkdowns of the redundant train.

6. No elective maintenance to be scheduled in the switchyard that would challenge the availability of offsite power to the ES Buses or to the Bus for RWP-1.

7. Establishing a periodic fire watch in fire zones identified as containing circuits applicable to the RW-SW pumps to minimize fire risk in these areas. Those fire zones were identified by a review of the CR-3 Individual Plant Examination of External Events (IPEEE) Evaluation (See Attachment E).

Performance Monitoring

All equipment relied upon for supplying electric power and mitigating loss of power events is included in the CR-3 Maintenance Rule Program and is monitored for equipment unavailability.

Conclusion

Based on the above evaluation, PEF believes that approval of the proposed change to ITS 3.7.9 will pose an insignificant risk to the plant or to the health and safety of the public.

Precedent

There are similarities between this submittal and the request made by Exelon Generation to the NRC dated June 11, 2003, Request for a License Amendment for a One-Time Extension of the Essential Service Water Train Completion Time. The submittal was applicable to the Braidwood Station, Units 1 and 2 and to the Byron Station, Units 1 and 2. The NRC had previously approved a similar change for the Donald C. Cook Nuclear Plant in Amendments No. 270 and No. 251 for Units 1 and 2, respectively, issued September 9, 2002.

PROGRESS ENERGY FLORIDA, INC.

CRYSTAL RIVER UNIT 3

DOCKET NUMBER 50-302/LICENSE NUMBER DPR-72

ATTACHMENT B

LICENSE AMENDMENT REQUEST #280, Revision 0

Regulatory Analysis

No Significant Hazards Consideration Determination
Applicable Regulatory Requirements
Environmental Impact Evaluation

No Significant Hazards Consideration Determination

License Amendment Request (LAR) #280, Revision 0, proposed changes include a change to Improved Technical Specifications (ITS) 3.7.9 to allow a one-time increase in the Completion Time for restoring an inoperable Nuclear Services Seawater System train to Operable status online.

This LAR proposes to extend the Completion Time of ITS 3.7.9, Required Action A.1 from 72 hours to 10 days. This request has been evaluated against the standards in 10 CFR 50.92, and has been determined to not involve a significant hazards consideration. In support of this conclusion, the following analysis is provided:

1. *Does not involve a significant increase in the probability or consequences of an accident previously evaluated.*

The proposed license amendment extends, on a one-time basis, the Completion Time for restoring an inoperable Nuclear Services Seawater System train to Operable status. The Nuclear Services Seawater System is designed to provide cooling for components essential to the mitigation of plant transients and accidents. The system is not an initiator of design basis accidents. During the requested extended time period of ten days, the redundant Emergency Nuclear Services Seawater pump will be available and capable of providing cooling for containment heat loads and essential equipment during emergency conditions. RWP-1 is the CR-3 normal duty Nuclear Closed Cycle Cooling Water pump. Although RWP-1 is non-safety related and its motor is non-seismic, has a lower flow capability than either RWP-2B or RWP-2A and is not connected to an emergency power source, it will also be available and capable of removing emergency heat loads from essential equipment from all design basis events. Informal calculations performed show that below a Ultimate Heat Sink (UHS) temperature of approximately 90°F, RWP-1 can maintain adequate heat removal under accident conditions.

A Probabilistic Safety Assessment (PSA) has been performed to assess the risk impact of an increase in Completion Time. Although the proposed one-time change results in an increase in Core Damage Frequency (CDF) and Large Early Release Frequency (LERF), the value of these increases are considered as very small in the current regulatory guidance.

Therefore, granting this LAR does not involve a significant increase in the probability or consequences of an accident previously evaluated.

2. *Does not create the possibility of a new or different type of accident from any accident previously evaluated.*

The proposed license amendment extends, on a one-time basis, the Completion Time for restoring an inoperable Nuclear Services Seawater System train to Operable status.

The proposed LAR will not result in changes to the design, physical configuration of the plant or the assumptions made in the safety analysis. Therefore, the proposed change will not create the possibility of a new or different kind of accident from any previously evaluated.

3. *Does not involve a significant reduction in the margin of safety.*

The proposed license amendment extends, on a one-time basis, the Completion Time for restoring an inoperable Nuclear Services Seawater System train to Operable status. The proposed change will allow online repair of one of the Emergency Nuclear Services Seawater pumps to improve its reliability and useful lifetime, thus increasing the long term margin of safety of the system.

The proposed LAR will reduce the probability (and associated risk) of a plant shutdown to repair an Emergency Nuclear Services Seawater pump. To ensure defense in depth capabilities and the assumptions in the risk assessment are maintained during the proposed one-time extended Completion Time, CR-3 will continue the performance of 10 CFR 50.65(a)(4) assessments before performing maintenance or surveillance activities and no maintenance activities of other risk sensitive equipment beyond that required for the refurbishment activity will be scheduled concurrent with the repair activity. Other compensatory actions that may be implemented, include: Use of pre-job briefings and periodic operator walkdowns to assess status of risk sensitive equipment in the redundant train, selection of beneficial Makeup Pump configurations and redundant off-site power feeds to the remaining Emergency Nuclear Services Seawater System pump, no elective maintenance to be scheduled in the switchyard, and the establishment of fire watches in fire areas identified in Attachment E of this submittal.

As described above in Item 1, a PSA has been performed to assess the risk impact of an increase in Completion Time. Although the proposed one-time change results in an increase in Core Damage Frequency (CDF), and Large Early Release Frequency, the value of these increases are considered as very small in the current regulatory guidance.

Therefore, granting this LAR does not involve a significant reduction in the margin of safety.

Based on the above, Progress Energy Florida, Inc. (PEF) concludes that the proposed LAR presents no significant hazards consideration under the standards set forth in 10 CFR 50.92(c), and accordingly, a finding of "no significant hazards consideration" is justified.

Applicable Regulatory Requirements

PEF has evaluated the Regulatory Requirements applicable to the proposed changes to ITS 3.7.9 which include 10 CFR 50.65, Requirements for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants. PEF has determined that the proposed change does not require any exemptions or relief from regulatory requirements other that the changes requested to ITS 3.7.9.

Environmental Impact Evaluation

10 CFR 51.22(c)(9) provides criteria for identification of licensing and regulatory actions eligible for categorical exclusion from performing an environmental assessment. A proposed amendment to an operating license for a facility requires no environmental assessment if operation of the facility in accordance with the proposed amendment would not:

(i) involve a significant hazards consideration,

(ii) result in a significant change in the types or significant increase in the amounts of any effluents that may be released offsite, and

(iii) result in a significant increase in individual or cumulative occupational radiation exposure.

PEF has reviewed proposed License Amendment Request #280, Revision 0, and concludes it meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(c), no environmental impact statement or environmental assessment needs to be prepared in connection with this request.

PROGRESS ENERGY FLORIDA, INC.

CRYSTAL RIVER UNIT 3

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ATTACHMENT C

LICENSE AMENDMENT REQUEST #280, REVISION 0

Proposed Revised Improved Technical Specifications Pages

Strikeout/Shadowed Format

~~Strikeout Text~~ Indicates Deleted Text
Shadowed Text Indicates Added Text

3.7 PLANT SYSTEMS

3.7.9 Nuclear Services Seawater System

LCO 3.7.9 Two Nuclear Services Seawater System trains shall be OPERABLE.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One Nuclear Services Seawater System train inoperable.	A.1 Restore Nuclear Services Seawater System train to OPERABLE status.	72 hours
B. Required Action and associated Completion Time not met.	B.1 Be in Mode 3	6 hours
	AND	
	B.2 Be in Mode 5.	36 hours

On a one-time basis, a Nuclear Services Seawater System train may be inoperable for up to 10 days to allow performance of Nuclear Services Seawater System Emergency Pump RWP-2A or RWP-2B repairs. The ability to apply the 10-day Completion Time will expire on December 30, 2004.

LCO

The requirement for the OPERABILITY of the Nuclear Services Seawater System including two emergency nuclear services seawater pumps provides redundancy necessary to ensure the system will provide adequate post-accident heat removal in the event of a coincident single failure.

Emergency nuclear services seawater pump OPERABILITY requires that each be capable of being powered from separate OPERABLE emergency buses. OPERABILITY of the associated flow paths requires that each valve in the flow path must be aligned to permit sea water flow from the intake canal to the SW heat exchangers, and subsequently to the discharge canal. The OPERABILITY of the SW heat exchangers, required to ensure proper heat removal capability, is addressed in LCO 3.7.7, "Nuclear Services Closed Cycle Cooling Water System".

APPLICABILITY

In MODES 1 through 4 the SW and Nuclear Services Seawater Systems are normally operating systems which must be prepared to provide post-accident cooling for components required for RCS and containment heat removal, equipment essential in providing the capability to safely shutdown the plant, and equipment required for adequate spent fuel pool cooling. The Nuclear Services Seawater System must be capable of providing its post-accident cooling assuming a single active failure. Therefore, both emergency pumps are required to be OPERABLE during these MODES.

In MODES 5 and 6, the Nuclear Services Seawater System is not required to be OPERABLE due to the limitations on RCS temperature and pressure in these MODES. Additionally, there are no other Technical Specification LCOs supported by the system which are applicable during these plant conditions.

ACTIONS

A.1

With one of the Nuclear Services Seawater pumps inoperable, action must be taken to restore the pump to OPERABLE status within 72 hours. The 72 hour Completion Time for restoring full Nuclear Services Seawater System OPERABILITY is consistent with that for ECCS Systems, whose safety functions are supported by the system. This Completion Time is based on engineering judgement and is consistent with accepted industry-accepted practice.

On a one-time basis, a Nuclear Services Seawater System train may be inoperable for up to 10 days to allow performance of Nuclear Services Seawater System Emergency Pump RWP-2A or RWP-2B repairs. The ability to apply the 10-day Completion Time will expire on December 30, 2004.

(continued)

PROGRESS ENERGY FLORIDA, INC.

CRYSTAL RIVER UNIT 3

DOCKET NUMBER 50-302/LICENSE NUMBER DPR-72

ATTACHMENT D

LICENSE AMENDMENT REQUEST #280, REVISION 0

Proposed Revised Improved Technical Specifications Pages

Revision Bar Format

3.7 PLANT SYSTEMS

3.7.9 Nuclear Services Seawater System

LCO 3.7.9 Two Nuclear Services Seawater System trains shall be OPERABLE.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One Nuclear Services Seawater System train inoperable.	A.1 Restore Nuclear Services Seawater System train to OPERABLE status.	72* hours
B. Required Action and associated Completion Time not met.	B.1 Be in Mode 3 AND B.2 Be in Mode 5.	6 hours 36 hours

*On a one-time basis, a Nuclear Services Seawater System train may be inoperable for up to 10 days to allow performance of Nuclear Services Seawater System Emergency Pump RWP-2A or RWP-2B repairs. The ability to apply the 10-day Completion Time will expire on December 30, 2004.

BASES

LCO

The requirement for the OPERABILITY of the Nuclear Services Seawater System including two emergency nuclear services seawater pumps provides redundancy necessary to ensure the system will provide adequate post-accident heat removal in the event of a coincident single failure.

Emergency nuclear services seawater pump OPERABILITY requires that each be capable of being powered from separate OPERABLE emergency buses. OPERABILITY of the associated flow paths requires that each valve in the flow path must be aligned to permit sea water flow from the intake canal to the SW heat exchangers, and subsequently to the discharge canal. The OPERABILITY of the SW heat exchangers, required to ensure proper heat removal capability, is addressed in LCO 3.7.7, "Nuclear Services Closed Cycle Cooling Water System".

APPLICABILITY

In MODES 1 through 4 the SW and Nuclear Services Seawater Systems are normally operating systems which must be prepared to provide post-accident cooling for components required for RCS and containment heat removal, equipment essential in providing the capability to safely shutdown the plant, and equipment required for adequate spent fuel pool cooling. The Nuclear Services Seawater System must be capable of providing its post-accident cooling assuming a single active failure. Therefore, both emergency pumps are required to be OPERABLE during these MODES.

In MODES 5 and 6, the Nuclear Services Seawater System is not required to be OPERABLE due to the limitations on RCS temperature and pressure in these MODES. Additionally, there are no other Technical Specification LCOs supported by the system which are applicable during these plant conditions.

ACTIONS

A.1

With one of the Nuclear Services Seawater pumps inoperable, action must be taken to restore the pump to OPERABLE status within 72* hours. The 72 hour Completion Time for restoring full Nuclear Services Seawater System OPERABILITY is consistent with that for ECCS Systems, whose safety functions are supported by the system. This Completion Time is based on engineering judgement and is consistent with accepted industry-accepted practice.

*On a one-time basis, a Nuclear Services Seawater System train may be inoperable for up to 10 days to allow performance of Nuclear Services Seawater System Emergency Pump RWP-2A or RWP-2B repairs. The ability to apply the 10-day Completion Time will expire on December 30, 2004.

(continued)

PROGRESS ENERGY FLORIDA, INC.

CRYSTAL RIVER UNIT 3

DOCKET NUMBER 50-302/LICENSE NUMBER DPR-72

ATTACHMENT E

LICENSE AMENDMENT REQUEST #280, REVISION 0

PSA Risk Assessment of RWP-2A/2B Extended AOT

SYSTEM # N/A

CALC. SUB-TYPE N/A

PRIORITY CODE 4

QUALITY CLASS Nonsafety

NUCLEAR GENERATION GROUP

P-03-0001

(CALCULATION #)

PSA Risk Assessment of RWP-2A /2B Extended AOT

(Title including structures, systems, components)

☐ BNP UNIT _____

☒ CR3 ☐ HNP ☐ RNP ☐ NES ☐ ALL

APPROVAL

REV	PREPARED BY	REVIEWED BY	SUPERVISOR
0	Signature D.N. Miskiewicz Name David N. Miskiewicz Date 7-7-03	Signature Andrew J. Howe Name Andrew J. Howe Date 7-7-03	Signature Steven A. Laur Name Steven A. Laur Date 7-7-03
	Signature Name Date	Signature Name Date	Signature Name Date

(For Vendor Calculations)

Vendor_____________________ Vendor Document No. ____________

Owner's Review By ____________________ Date ______________

LIST OF EFFECTIVE PAGES

PAGE	REV	PAGE	REV	ATTACHMENTS		
i-v	0			Number	Rev	Number of Pages
1-13	0			1	0	7
				AMENDMENTS		
				Letter	Rev	Number of Pages

Rev. #	Revision Summary (list of ECs incorporated)
0	Initial issue of calculation

Document Indexing Table

Document Type (e.g. CALC, DWG, TAG, PROCEDURE, SOFTWARE)	**ID Number** (e.g., Calc No., Dwg. No., Equip. Tag No., Procedure No., Software name and version)	**Function** (i.e. IN for design inputs or references; OUT for affected documents)	**Relationship to Calc.** (e.g. design input, assumption basis, reference, document affected by results)
CALC	P-02-0002, Rev 0	IN	Design input, Reference
CALC	N-01-0002, Rev 2	IN	Design input, Reference

Record of Lead Review

Design P03-0001, **Revision** 0

The signature below of the Lead Reviewer records that:
- the review indicated below has been performed by the Lead Reviewer;
- appropriate reviews were performed and errors/deficiencies (for all reviews performed) have been resolved and these records are included in the design package;
- the review was performed in accordance with EGR-NGGC-0003.

☐ **Design Verification Review** ☒ **Engineering Review** ☐ **Owner's Review**
- ☐ Design Review
- ☐ Alternate Calculation
- ☐ Qualification Testing

☐ **Special Engineering Review** ____________

☐ YES ☐ N/A **Other Records are attached**

Andrew Howe	Andrew Howe	PSA	7/7/03
Lead Reviewer (print)	**(sign)**	**Discipline**	**Date**

Item No.	Deficiency	Resolution
1)	Minor administrative errors were corrected.	None required.
2)		

FORM EGR-NGGC-0003-2-5
This form is a QA Record when completed and included with a completed design package. Owner's Reviews may be processed as stand alone QA records when Owner's Review is completed

Calculation No.	P-03-0001
Page	iv
Revision	0

Record of Interdisciplinary Reviews

PART I — DESIGN ASSUMPTION / INPUT REVIEW: APPLICABLE ☑ Yes ☐ No

The following organizations have reviewed and concur with the design assumptions and inputs used in this calculation:

	Name	Signature	Date
Systems Engineering	KRCAMPBELL	[illegible]	7/7/03
Operations	Ken Ross	[illegible]	7/7/03
Other: Licensing	Loretta V Cecilia	Loretta V Cecilia	7-7-03

PART II — RESULTS REVIEW:

The following organizations are aware of the impact of the results of this calculation (on designs, programs and procedures):

Systems Engineering ☑ Yes ☐ NO

Name	Signature	Date
KRCAMPBELL	[illegible]	7/7/03

Comments:

Operations ☑ Yes ☐ NO

Name	Signature	Date
[illegible]	Kenneth C. Ross	7/7/03

Comments:

Licensing

Name	Signature	Date
Loretta V. Cecilia	Loretta V Cecilia	7-7-03

Comments:

Other

Name	Signature	Date

Comments:

TABLE OF CONTENTS

Purpose

This calculation assesses the risk associated with increasing the ITS allowed outage time (one time from 72 hours to 10 days) in order to perform maintenance to RWP-2A or RWP-2B. The work associated with RWP-2A maintenance may include necessary periods of unavailability (< 72 hours) for RWP-3A due to physical interference issues. This assessment will include the increase in CDF and LERF associated with each pump and recommended compensatory actions which can be used to minimize the risk.

References

1. CR3 calculation N-01-0002, Rev.2, "CR3 PSA Model of Record - MOR_02"
2. CR3 Calculation P-02-0002, Rev.1, "CR3 EOOS Model - EOOS_02"
3. CR3 IPEEE, Rev. 1, March 1997
4. NRC RG 1.174, "An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant Specific Changes to the Licensing Basis"
5. NRC RG 1.177, "An Approach for Plant-Specific Risk-Informed Decisionmaking: Technical Specifications"

Body of Calculation

The risk assessment for this task was performed using EOOS with an updated plant model. This model includes some improvements over the baseline model of record (MOR), and is more suited to performing sensitivity cases. The EOOS and MOR fault trees and data are essentially the same. The primary difference is that the EOOS model uses an initial condition of zero maintenance and allows normally prohibited activities to be evaluated. These differences should not be an issue since the plant will be minimizing maintenance activities beyond the scope of this analysis while invoking the extended AOT. Also, EOOS is the accepted tool used to perform this type of assessment for more routine work weeks, and will continue to be used during the AOT.

The model used for this analysis contains some changes that are not currently in the production model. These changes include enhancements to the functionality and prevent problems that can occur when subsuming (ref NCR 95713). These changes are documented by an NTM (49074) for inclusion in the production EOOS model, and are listed in Table 1.

Several cases were run using and the results are provided in Table 2. The runs were performed using a truncation of 1E-8. 1E-8 is the normal EOOS truncation and is higher than the MOR truncation of 1E-10. This accounts for the lower CDF shown for case 1 (compared to case a) in Table 2. The higher truncation is not expected to be a problem for determining the increase in risk because the re-quantification will still reveal the most significant contributors to increased risk, while allowing faster solution times and more flexibility with the configurations evaluated. A few sensitivities were run using 1E-10 truncation and average maintenance values for comparison.

Since the baseline EOOS runs do not include any maintenance events other than those explicitly input, it is assumed that no other risk significant maintenance activities will be scheduled while performing the RWP work. This includes equipment associated with the availability of RW-DC, RW-SW, SW, DC, MU, EF/EC, EG, and CH. This also includes FWP-7, MTDG-1, and CHHE-2. It is also assumed that the available/redundant RW pump is fully operable and capable of performing its accident mitigation function.

CR3 has a diverse support system arrangement for the makeup/HPI system. Because the RW pumps being analyzed provide support to makeup, there are many possible plant configurations, and the risks can vary. The cases run for this evaluation are in 4 general groups.

- Baseline cases,
- RWP-2A cases,
- RWP-2A/3A cases, and
- RWP-2B cases.

Each of these groups were run with various pump cooling, power, and operating equipment selected. Additionally, alternative off-site power alignment was evaluated which can lower the risk in certain configurations by increasing the diversity of the power supply to the operable RW pumps (RWP-2B, RWP-3B). The normal alignment powers both RWP-1 and RWP-2B off the same feed (Breakers 1691 & 1692 to the SUT/BEST). Swapping the feeds puts RWP-2B on the OPT (breakers 4900 & 4902), providing some diversity when RWP-2A is out-of-service, and preventing a single failure from losing off-site power to both pumps . The benefit of swapping feeds is more significant when RWP-2A is out-of-service do to plant asymmetries.

Some of the asymmetries which are impacting this analysis include:

-RWP-2B auto-starts on low pressure but not RWP-2A
-CHHE-2 (App R chiller) is powered from the ES 4160 "B" bus
-EFP-3 (train "A") is less dependent on OTSG control than EFP-2 (train "B")

The assumed "normal" or historically preferred configuration for CR3 is:

- MUP-1B is running powered from "A", and ES selected
- MUP-1C is ES standby and cooled from DHCCC
- MUP-1A is not ES selected, but available and cooled from NSCCC
- ES 4160 "A" is powered from the OPT
- ES 4160 "B" is powered from the BEST
- RWP-1 and SWP-1C are the normally running cooling pumps

Because removing an RW-SW pump from service lowers the overall reliability of the RW-SW system to support NCSSS, the initiating event frequency for a loss of NSCCC (SW) cooling was increased by a factor of 10. This generally caused only small increase in CDF and LERF.

Table 1 (EOOS changes)

File	Description of Change	Comment
EOOS_02.CAF	Rename flag events FL_X, FL_HVAC, FL_SW, FL_ES, FL_TQR, FL_TQS as FLG_*	Allows differentiation from alignment flags FL_*
EOOS_02.BE	Rename flag events FL_X, FL_HVAC, FL_SW, FL_ES, FL_TQR, FL_TQS as FLG_*	Changes to match EOOS_02.CAF
EOOS_02.RUL	Rename flag events FL_X, FL_HVAC as FLG_*	Changes to match EOOS_02.CAF
EOOS_02.FML	Set values of alignment flags to TRUE (-1) instead of 1.0.	Allows alignment flags to be compressed when solving cutsets with FORTE
Riskmon.ini	Change FlagEvents option to FLG_* from FL*	Allows flag events to be to set true when subsuming
EOOS_02.CAF	Added D261_S and removed D261 from gate Q970	The DC power is a short term requirement to open ASV-5 following an EFIC actuation.
EOOS_02.CAF	MTX_00044 add HF_OOSAM,BM,CM MTX_00037 add HPM001CM, HF_OOSCM delete HHUMBACY MTX_00019 add HHUMBACY delete HPM001CM MTX_00038 add SF_RW2AM MTX_00039 add SF_RW2BM MTX_00031 add SF_RWP1M MTX_00023 add SCVSW10C delete SPMSWPCM MTX_00035 add SPMSWPCM or SF_SWPCM delete SCVSW10C	These changes add mutually exclusive event pairs based on the the EOOS maintenance flags every where there is a normal maintenance event
EOOS_02.CAF	S307 (change to AND) Add S320 delete - FL_HANMU S320 OR FL_HBNMU, FL_HCNMU	Removes an unnecessary NOT gate
EOOS_02.CAF	RENAME gates FL_RC500, FL_R1500, FL_1625, FL_ESAS, FL_NESAS, FL_RB4 to FG_*	These eliminates confusion with Flag events
EOOS_02.ENV	Add IE_T10,LO SW,2,10	This allows easy sensitivity cases for loss of NSCCC
EOOS_02M.CAF	Added the MTX_M subtree to the mutually exclusive tree	This allows EOOS to properly solve a tree using average maintenance values. (instead of zero)

Table 2 – EOOS Cases Run for RWP-2A/2B Maintenance Activity

Case	Configuration	CDF (E-10)	CDFI (E-8)	LERFI (E-10)	dCDFI (/yr)	dLERFI (/yr)	dCDFI (/hr)	ICCDP (7d)	ICCDP (10d)	ICLERP (10d)	Days to 1E-06
a	Current Model of Record (1)	6.83E-06									
b	External Events (2)	4.20E-05									
1	baseline (3)	6.92E-06	2.59E-06	3.59E-07	na						
2	alt baseline (4)		2.55E-06		-3.10E-08						
21	alt baseline (7)		6.77E-06		4.19E-06						
22	alt baseline (8)		2.55E-06		-3.10E-08						
23	alt baseline (7,9)		2.53E-06		-5.80E-08						
24	alt baseline (8,9)		2.54E-06		-4.50E-08						
3	RWP-2A	7.50E-06	2.06E-05	3.82E-07	1.80E-05	2.25E-08	2.06E-09	3.45E-07	4.93E-07	6.16E-10	20.3
4	RWP-2A (4)		4.05E-06		1.46E-06		1.67E-10	2.81E-08	4.01E-08		249.3
9	RWP-2A (5)		2.07E-05	3.82E-07	1.81E-05	2.34E-08	2.07E-09	3.47E-07	4.96E-07	6.41E-10	20.2
10	RWP-2A (4,5)		4.15E-06		1.56E-06		1.78E-10	3.00E-08	4.28E-08		233.5
25	RWP-2A (5,7)		1.75E-05		1.49E-05		1.70E-09	2.86E-07	4.09E-07		24.5
26	RWP-2A (5,8)		9.50E-06		6.91E-06		7.89E-10	1.33E-07	1.89E-07		52.8
43	RWP-2A (4,5,7)		1.15E-05		8.87E-06		1.01E-09	1.70E-07	2.43E-07		41.2
44	RWP-2A (4,5,8)		3.37E-06		7.85E-07		8.96E-11	1.51E-08	2.15E-08		465.0
45	RWP-2A (4,5,10)		3.72E-06		1.13E-06		1.29E-10	2.17E-08	3.10E-08		322.7
27	RWP-2A (5,7,9)		3.11E-06		5.29E-07		6.04E-11	1.01E-08	1.45E-08		690.0
28	RWP-2A (5,8,9)		3.10E-06		5.17E-07		5.90E-11	9.92E-09	1.42E-08		706.0
29	RWP-2A (4,5,7,9)		2.90E-06		3.19E-07		3.64E-11	6.12E-09	8.74E-09		1144.2
30	RWP-2A (4,5,8,9)		2.83E-06		2.48E-07		2.83E-11	4.76E-09	6.79E-09		1471.8

Table 2 (cont.) – EOOS Cases Run for RWP-2A/2B Maintenance Activity

Case	Configuration	CDF (E-10)	CDFi (E-8)	LERFi (E-10)	dCDFi (/yr)	dLERFi (/yr)	dCDFi (/hr)	ICCDP (7d)	ICCDP (10d)	ICLERP (10d)	Days to 1E-06
5	RWP-2A & RWP-3A		6.48E-05	4.05E-07	6.22E-05	4.56E-08	7.10E-09	1.19E-06	1.71E-06	1.25E-09	5.9
11	RWP-2A & RWP-3A (5)		6.53E-05	4.06E-07	6.27E-05	4.70E-08	7.16E-09	1.20E-06	1.72E-06	1.29E-09	5.8
6	RWP-2A & RWP-3A (4)		5.07E-05		4.81E-05		5.49E-09	9.23E-07	1.32E-06		7.6
12	RWP-2A & RWP-3A (4,5)		5.12E-05		4.86E-05		5.55E-09	9.33E-07	1.33E-06		7.5
35	RWP-2A & RWP-3A (5,7)		9.35E-05		9.09E-05		1.04E-08	1.74E-06	**2.49E-06**		4.0
36	RWP-2A & RWP-3A (5,8)		6.53E-05		6.27E-05		7.16E-09	1.20E-06	1.72E-06		5.8
37	RWP-2A & RWP-3A (5,10)		6.72E-05		6.46E-05		7.38E-09	1.24E-06	1.77E-06		5.6
38	RWP-2A & RWP-3A (4,5,7)		7.82E-05		7.56E-05		8.63E-09	1.45E-06	2.07E-06		4.8
39	RWP-2A & RWP-3A (4,5,8)		5.12E-05		4.86E-05		5.55E-09	9.33E-07	1.33E-06		7.5
40	RWP-2A & RWP-3A (4,5,10)		5.18E-05		4.93E-05		5.62E-09	9.45E-07	1.35E-06		7.4
15	RWP-2A, RWP-3A (4,5,6)		4.41E-05		4.15E-05		4.74E-09	7.96E-07	1.14E-06		8.8
7	RWP-2A, RWP-3A, DCP-1A, DHP-1A		6.48E-05		6.22E-05		7.10E-09	1.19E-06	1.71E-06		5.9
8	RWP-2A, RWP-3A, DCP-1A, DHP-1A (4)		5.07E-05		4.81E-05		5.49E-09	9.23E-07	1.32E-06		7.6
13	RWP-2A, RWP-3A, DCP-1A, DHP-1A (5)		6.53E-05		6.27E-05		7.16E-09	1.20E-06	1.72E-06		5.8
14	RWP-2A, RWP-3A, DCP-1A, DHP-1A (4,5)		5.12E-05		4.86E-05		5.55E-09	9.33E-07	1.33E-06		7.5
16	Case10 (10 days - 60 hrs) + Case12 (60 hrs)	7.79e-06							**3.65E-07**		
17	Case10 (7 days - 60 hrs) + Case12 (60 hrs)							3.52E-07			
41	Case09 (10 days - 60 hrs) + Case11 (60 hrs)								**8.02E-07**		
42	Case09 (7 days - 60 hrs) + Case11 (60 hrs)							6.53E-07			

Table 2 (cont.) – EOOS Cases Run for RWP-2A/2B Maintenance Activity

Case	Configuration	CDF (E-10)	CDFi (E-8)	LERFi (E-10)	dCDFi (/yr)	dLERFi (/yr)	dCDFi (/hr)	ICCDP (7d)	ICCDP (10d)	ICLERP (10d)	Days to 1E-06
18	RWP-2B	6.93E-06	2.60E-06		1.10E-08		1.26E-12	2.11E-10	3.01E-10		33181.8
19	RWP-2B (5)		2.70E-06		1.10E-07		1.26E-11	2.11E-09	3.01E-09		3318.2
20	RWP-2B (4,5)		2.87E-06		2.86E-07		3.26E-11	5.48E-09	7.84E-09		1276.2
31	RWP-2B (4,5,7)		2.39E-05		2.13E-05		2.43E-09	4.09E-07	5.84E-07		17.1
32	RWP-2B (4,5,8)		2.77E-06		1.87E-07		2.13E-11	3.59E-09	5.12E-09		1951.9
33	RWP-2B (4,5,7,9)		1.57E-05		1.31E-05		1.50E-09	2.52E-07	3.60E-07		27.8
34	RWP-2B (4,5,8,9)		2.77E-06		1.87E-07		2.13E-11	3.59E-09	5.12E-09		1951.9

Notes

(1)	Internal Events w/average maintenance @ 1E-10, alignments :	MUP-1B running, MUP-1B/1C ES selected, MUP-1C cooled by DHCCC, MUP-1A cooled by NSCCC
(1 cont.)		HVAC "A" running, RWP-1running, SWP-1C running, ES 4160 "A" = OPT, ES 4160 "B" = BEST
(2)	IPEEE (ref 3) primarily fire risk	
(3)	zero maintenance @ 1E-8, normal alignments	MUP-1B running, MUP-1B/1C ES selected, MUP-1C cooled by DHCCC, MUP-1A cooled by NSCCC
(3 cont.)		HVAC "A" running, RWP-1running, SWP-1C running, ES 4160 "A" = OPT, ES 4160 "B" = BEST
(4)	swap normal OSP feed	ES 4160 "A" = BEST, ES 4160 "B" = OPT
(5)	Loss of NSCCC x 10	
(6)	Includes effect of performing a functional test of DHV-111 calibration	
(7)	MUP-1A/1B ES selected	
(8)	MUP-1A/1C ES selected, MUP-1A running	
(9)	MUP-1A cooled by DHCCC (appendix R concern)	
(10)	MUP-1A/1C ES selected, MUP-1C running	

The data in Table 2 can be interpreted as follows;

Case –	The identification number for the specific configuration analyzed
Configuration –	Description of the case analyzed
CDF (E-10) –	These are sensitivity values based on quantification at 1E-10 truncation, and including average maintenance probabilities.
CDFi (E-8) –	This is the instantaneous core damage frequency determined by quantification at 1E-08 with zero maintenance except as indicated for the case
LERFi (E-10) –	This is the instantaneous LERF as determined by adjusting the model of record LERF cutsets for the specific case
dCDFi –	This is the delta CDFi for the case (= $CDFi_{case} - CDFi_{baseline}$)
dLERFi –	This is the delta LERF for the case (= $LERFi_{case} - LERFi_{baseline}$)
ICCDP (time) –	This is the Incremental Conditional Core Damage Probability for the case and a specified time period (= $dCDFi_{case}$ * (time/1yr)). For this evaluation, this value can also be interpreted as the delta CDF (dCDF) for the year
ICLERP (time) –	This is the Incremental Conditional Large Early Release Probability for the case and a specified time period (= $dLERFi_{case}$ * (time/1yr)) For this evaluation, this value can also be interpreted as the delta LERF (dLERF) for the year
Days to 1E-06 –	This the number of days the configuration can remain to reach a delta CDF of 1E-06 for the case configuration. This is the limit specified by RG 1.174 as a very small change. (= (1E-06 * dCDFi) / 365 days)

The results show a range of risk values for the various configurations based on a 10 day AOT. Reviewing each of the general groups together reveals that none of the analyzed configurations for RWP-2A or RWP-2B in maintenance alone will exceed an ICCDP (or dCDF) of 1E-06 which ranks these activity as a very small risk (RG 1.174). If RWP-3A is removed from service to work on RWP-2A there is a noticeable increase up to 2.49E-06. Based on input from system engineering and maintenance, the time required for RWP-3A to be out-of-service can be limited to smaller windows at the beginning and end of the RWP-2A maintenance activity. Table 3 shows the estimated work schedule based on the need to remove of the RWP-3A header. Applying these limited times for RWP-3A reduces the risk below 1E-06 (case 41). Applying additional compensatory actions beyond limiting maintenance activities, such as realigning off-site power feeds or selecting alternate makeup pump configurations can further reduce the ICCDP to below 5E-07 (case 16).

The impact of this activity on LERF was assessed by reviewing the MOR_02 cutsets. None of the cases indicated a LERF risk in excess of any of the published limits (5E-8, RG 1.177).

Based on estimated scheduling information from maintenance and operations, the activities impacting this analysis are listed in Table 3 below:

Table 3 RWP-2A Maintenance Activities

Start Time (hrs)	Duration (hrs)	Activity
0	4	Remove RWP-2A from service and prepare to remove motor
4	8	Remove RWP-3A header piping to allow removal of the RWP-2A motor
12	6	Remove RWP-2A motor
18	16	Replace RWP-3A header
34	52	Perform RWP-2A maintenance
86	8	Remove RWP-3A header piping to allow replacement of the RWP-2A motor
94	6	Replace RWP-2A motor
100	16	Replace RWP-3A header piping, return RWP-3A to service
116	4	Return RWP-2A to service
complete	**120**	**TOTAL (5 days)**

The total job is expected take about 5 days and there is a 30 hour window at the beginning and at the end of the job when both RWP-2A and RWP-3A will be out of service. Because it is accepted practice to plan only 50 percent of the allowed outage time, a 10 day AOT is desired. The risk for this AOT is based on RWP-2A out-of-service for 10 days (240 hours), with two 30 hour windows of out-of-service time for RWP-3A overlapping. This is represented by case 16 in Table 2 and calculated as follows:

$$ICCDP_{case16} = \text{(RWP-2A OOS only) (AOT-60 hours) + (RWP-2A \& RWP-3A OOS) (60 hours)}$$

$$= (dCDFi_{case10}/hr)\ (240 - 60\ hours) + (dCDFi_{case12}/hr)\ (60\ hours)$$

$$= (1.78E\text{-}10/hr)\ (180\ hr) + (5.55E\text{-}09/hr)\ (60\ hr) = 3.65E\text{-}07$$

A few sensitivity cases were run to assess the use of a lower truncation and average maintenance events. Runs were made to for case 1 (baseline), case 3 (RWP-2A), case 16 (RWP-2A w/RWP-3A), and case 18 (RWP-2B). For cases 3 and 18, 240 hours were added to the RWP-2A/2B unavailability respectively. For case 16, 240 hours were added to RWP-2A and 60 hours to RWP-3A. The results for all of these cases produced a dCDF of less than 1E-06 which meets the RG 1.174 criteria as a very small increase. These sensitivities do not include compensatory actions which can further reduce the risk

The CR3 IPEEE and supporting data was reviewed to identify external event influences to the risk for the subject activities. Table 4 lists the fire zones identified as containing circuits applicable to the RW-SW pumps. Measures to assure that the fire risk is minimized in these areas may be prudent during the extend AOT periods.

Table 4 – RW-SW Pump Related Fire Zones

ZONE	DESC	RWP-1	RWP-2A	RWP-2B
AB-95-3AA	MAKE-UP PUMP ROOM 3B	X	X	
AB-95-3B	NORTH HALLWAY & NUCLEAR SAMPLE ROOM	X	X	X
AB-95-3D	HALLWAY			X
AB-95-3E	MAKE-UP PUMP ROOM 3A	X	X	
AB-95-3F	MAKE-UP PUMP ROOM 3C	X	X	
AB-95-3G	CENTRAL HALLWAY	X	X	X
AB-95-3K	MISC. RAD WASTE ROOMS & HALLWAY	X	X	X
AB-95-3T	REACTOR COOLANT BLEED TANK ROOM	X	X	
AB-95-3U	DECANT AND SLURRY PUMP ROOM	X	X	
AB-95-3W	WASTE TRANSFER PUMP ROOMS	X	X	
AB-95-3X	NUCLEAR SERVICE BOOSTER PUMP ROOM			X
AB-95-3Z	RWSW PUMP ROOM	X	X	X
CC-108-102	HALLWAY AND REMOTE SHUTDOWN ROOM		X	X
CC-108-105	BATTERY CHARGER ROOM 3B		X	
CC-108-107	4160V ES SWITCHGEAR BUS ROOM 3B			X
CC-108-108	4160V ES SWITCHGEAR BUS ROOM 3A	X	X	
CC-124-111	CRD & COMMUNICATION EQUIP ROOM		X	X
CC-124-116	480V ES SWITCHGEAR BUS ROOM 3B			X
CC-124-117	480V ES SWITCHGEAR BUS ROOM 3A		X	
CC-134-118A	CABLE SPREADING ROOM	X	X	X
CC-145-118B	CONTROL ROOM	X	X	X
CC-95-101C	COUNT ROOM			X
IB-95-200C	TURB. EFW PUMP, PENET. AREA, FAN ROOM	X		
TB-119-403	4160V SWITCHGEAR ROOM	X		
TB-95-400A	TURBINE BUILDING BASEMENT FLOOR	X		
TB-95-401	480V SWITCHGEAR ROOM	X		

Reviewing the Fussell-Vesely report (attachment 1) for case 12 provides a ranking which can identify potentially important operator actions. The most significant event is a pre-initiator for misaligned LPI "B" train valves (LMMTRNBX). This event is dominated by DHV-111 flow controller calibration error. A sensitivity case was run (case 15) assuming a functional test can be run to validate controller operation. This demonstrates the potential to further reduce the risk for a 10 day AOT. Another action which can have impact is manually controlling (opening by removing power) the EFW control valves (EFV-55 – 58) in the event HVAC is lost due to a loss NSCCC causing EFIC to inadvertently close the valve(s) (QHUEFWMZ). Although this is not a proceduralized action, additional credit could be given if it is discussed as part of the pre-job brief and communicated to the control room during the activity. Reducing this event has minimal impact.

Table 5 summarizes the credited compensatory actions included in this assessment and recommendations for additional actions which can be qualitatively shown to have benefit.

Table 5 – Potential Compensatory Actions

Item	Discussion	Credited in CDF
Limited maintenance beyond RWP-2A and RWP-3A	Normal (a)(4) assessments will be used. Maintenance activities which will increase risk beyond acceptable limits will be re-scheduled	The assessment assumes zero maintenance except as noted.
Consider swapping off-site power feeds to ES 4160 buses "A" and "B"	Align the OPT to "B" and the BEST to "A". This provides redundant power feeds to the remaining RW pumps.	The action can have a beneficial effect in lowering CDF during the RWP-2A proposed activity.
Consider beneficial makeup pump configurations	Depending of what is out-of-service, or other actions (such as realigning power), the diversity of available support options can be increased.	This action can have significant effect, but should be evaluated in combination with all actions considered.
Walkdowns / validation of the operable ("B") train equipment as practical.	Provides additional qualitative assurance that the available equipment will perform as required. SP-300 can be referenced.	No probabilistic credit is given in the evaluation for these activities.
Pre-job discussions on the impact of losing service water. The use of RWP-1 for accident mitigation, and the potential for EFIC control problems due to failed HVAC.	Although RWP-1 is non-safety related, it can be manually operated for certain accident scenarios. High EFIC room temperatures can cause EFIC control to fail. Removing power will cause the valves to open. Using CHHE-2 can also be effective.	The PRA does not credit this action in very many scenarios, however, if the probability of this action is reduced there is still a small benefit.
Establish fire watches covering the appropriate zones shown in table 4.	Limit activities associated with initiation of a fire (welding/grinding/etc.) or storage of transient combustibles.	The risk of fires in general is a major contributor to the external events risk in the IPEEE. No specific quantitative result were generated for this review.

Conclusions

The PSA risk associated with the activity to repair RWP-2A or RWP-2B is reasonable to support a one time on-line AOT extension request for 10 days based on ICCDP and ICLERP. Consideration is given due to the need to also remove RWP-3A from service to perform the RWP-2A activity. The evaluation assumes no other equipment beyond the evaluated systems will be removed from service if the risk is adversely impacted based on maintenance rule (a)(4) risk assessments, which will be performed before and during the activity. Additional compensatory actions are provided in table 5 which can further reduce the risk if practical. Their use should be based on the specific plant configuration during the use of the extended AOT.

The bounding risk for this activity is estimated with an ICCDP of 8.02E-07 (case 41). This is below 1E-06 and is considered a very small increase per RG 1.174. Also, the ICLERP for all cases evaluated is well below the RG 1.174 limit of 1E-07 to be considered very small.

Attachments

1. Fussell-Vesely report for Case 12.

Importance Measure Report
RWCASE12.CUT
CDF = 5.12E-05

Event Name	Probability	Fus Ves	BirnBm	Red W	Ach W	Description
SPMRW3AM	1.00E+00	9.61E-01	4.92E-05	25.687	1.00	
FLG_X	1.00E+00	7.41E-01	3.80E-05	3.863	1.00	
IE_S	5.00E-04	3.90E-01	3.93E-02	1.640	768.75	
LMMTRNBX	1.54E-02	3.00E-01	9.99E-04	1.428	20.21	
FLG_TQR	1.00E+00	2.93E-01	1.50E-05	1.415	1.00	
FLG_HVAC	1.00E+00	2.53E-01	1.30E-05	1.340	1.00	
FLG_SW	1.00E+00	2.47E-01	1.26E-05	1.327	1.00	
SF_RW2AM	1.00E+00	2.33E-01	1.19E-05	1.304	1.00	
QHUEFWMR	1.00E+00	2.33E-01	1.19E-05	1.304	1.00	
QSPLHVAC	5.00E-01	2.33E-01	2.39E-05	1.304	1.23	
IE_T3	4.81E-03	2.27E-01	2.42E-03	1.294	47.95	
QHUFW7LR	1.00E+00	2.05E-01	1.05E-05	1.258	1.00	
DACPWCNR	1.00E+00	2.05E-01	1.05E-05	1.257	1.00	
QHUFW7LZ	3.00E-01	1.97E-01	3.37E-05	1.246	1.46	
RMMRCVSC	2.50E-02	1.80E-01	3.67E-04	1.219	7.99	
APWNR01R	7.40E-01	1.45E-01	1.00E-05	1.169	1.05	
IE_T14	4.10E-03	1.33E-01	1.65E-03	1.153	33.18	
HHUTHRTY	9.10E-02	1.11E-01	6.25E-05	1.125	2.11	
RMMRCVLC	1.90E-01	1.11E-01	3.00E-05	1.125	1.47	
ADGES3BA	7.71E-03	1.05E-01	6.98E-04	1.118	14.53	
RHURPS8X	3.00E-02	1.02E-01	1.75E-04	1.114	4.31	
LMMDHPBF	4.92E-03	9.15E-02	9.53E-04	1.101	19.52	
LMMDV43F	4.65E-03	8.65E-02	9.51E-04	1.095	19.48	
LMMDV12F	4.65E-03	8.60E-02	9.46E-04	1.094	19.38	
APWNR03R	1.10E-01	8.25E-02	3.84E-05	1.090	1.67	
AMMDG3BF	4.07E-02	8.23E-02	1.04E-04	1.090	2.94	
IE_T7	4.94E-02	6.88E-02	7.13E-05	1.074	2.32	
SMMDHCCB	2.73E-03	4.99E-02	9.37E-04	1.053	19.25	
IE_T4	3.57E-02	4.87E-02	6.99E-05	1.051	2.32	
SMMRW3BF	2.60E-03	4.76E-02	9.37E-04	1.050	19.25	
RRVRC10N	1.26E-02	4.00E-02	1.63E-04	1.042	4.14	
AMMBCBBF	2.42E-03	3.26E-02	6.92E-04	1.034	14.47	
QMMEFP3F	3.71E-02	3.24E-02	4.47E-05	1.033	1.84	
QHUEFWMZ	3.00E-01	3.11E-02	5.31E-06	1.032	1.07	
IE_M	4.00E-05	3.00E-02	3.79E-02	1.031	740.27	
ADGMTDGF	8.42E-02	2.25E-02	1.37E-05	1.023	1.24	
SMMDPBCF	1.17E-03	2.01E-02	8.79E-04	1.021	18.15	

QHUFW7EY	1.00E+00	1.95E-02	1.00E-06	1.020	1.00	
IE_T15	1.18E-01	1.93E-02	8.39E-06	1.020	1.14	
QMMCST	3.34E-02	1.93E-02	2.97E-05	1.020	1.56	
IE_T5	1.30E-02	1.69E-02	6.65E-05	1.017	2.28	
SMMHEBCF	8.75E-04	1.43E-02	8.37E-04	1.015	17.33	
JHUCHP2R	1.00E+00	1.35E-02	6.93E-07	1.014	1.00	
IE_T1	8.57E-01	1.31E-02	7.81E-07	1.013	1.00	
PMSTTF	1.00E-02	1.31E-02	6.68E-05	1.013	2.29	
AT15R02Z	1.80E-01	1.28E-02	3.66E-06	1.013	1.06	
JHUCHP2Z	5.00E-02	1.24E-02	1.27E-05	1.013	1.24	
IE_T10	1.27E-02	1.01E-02	4.09E-05	1.010	1.79	
QMMEFP2F	3.37E-02	1.00E-02	1.52E-05	1.010	1.29	
IE_Z	5.00E-07	9.76E-03	1.00E+00	1.010	1.95E+04	
SMM3137X	5.95E-04	9.55E-03	8.21E-04	1.010	17.03	
RHUPORVY	5.00E-01	8.29E-03	8.49E-07	1.008	1.01	
IE_A	5.00E-06	8.22E-03	8.14E-02	1.008	1.59E+03	
QHUEFT2Y	7.70E-04	7.61E-03	5.06E-04	1.008	10.88	
IE_T2	2.14E-01	7.59E-03	1.82E-06	1.008	1.03	
AHUMTDGY	5.00E-01	7.29E-03	7.46E-07	1.007	1.01	
AHUMTDGZ	2.20E-02	7.29E-03	1.70E-05	1.007	1.32	
JHUAHFSY	2.40E-03	6.96E-03	1.48E-04	1.007	3.89	
HHUHPRCY	4.40E-04	6.90E-03	8.03E-04	1.007	16.67	
SMMHR3BX	4.32E-04	6.77E-03	8.03E-04	1.007	16.67	
AT15R01Z	5.50E-01	6.49E-03	6.04E-07	1.007	1.01	
IE_T9	3.21E-03	5.16E-03	8.23E-05	1.005	2.60	
IE_R	2.90E-03	5.01E-03	8.85E-05	1.005	2.72	
RHUCOOLY	5.80E-04	5.01E-03	4.42E-04	1.005	9.64	
ZHUCOM2Z	2.80E-01	4.60E-03	8.41E-07	1.005	1.01	
DMMBT1BF	3.63E-04	4.38E-03	6.18E-04	1.004	13.07	
QHUFWP7Y	5.60E-03	4.20E-03	3.84E-05	1.004	1.75	
QHUEFW9Y	2.70E-03	4.02E-03	7.63E-05	1.004	2.49	
ZHUCOM1Z	2.80E-01	3.69E-03	6.75E-07	1.004	1.01	
IE_T13	4.10E-03	3.62E-03	4.52E-05	1.004	1.88	
QMMEFP2A	1.48E-02	3.56E-03	1.23E-05	1.004	1.24	
SCCHDABF	2.39E-04	3.14E-03	6.73E-04	1.003	14.15	
QPDEFP3A	5.70E-03	2.99E-03	2.69E-05	1.003	1.52	
RMVRC11C	4.65E-03	2.73E-03	3.01E-05	1.003	1.58	
RRVRC10C	1.26E-02	2.73E-03	1.11E-05	1.003	1.21	
AMMEB3BF	1.63E-04	2.61E-03	8.16E-04	1.003	16.94	

SPLT_RA	5.00E-01	2.51E-03	2.57E-07	1.003	1.00	
SPLT_RB	5.00E-01	2.51E-03	2.57E-07	1.003	1.00	
LHULPRCY	2.50E-02	2.44E-03	5.00E-06	1.002	1.10	
LMMD111K	2.12E-02	2.07E-03	5.00E-06	1.002	1.10	
IE_F6A	2.63E-03	2.03E-03	3.95E-05	1.002	1.77	
HCCMV44N	1.43E-04	1.88E-03	6.73E-04	1.002	14.15	
SMMRWBFL	3.40E-03	1.80E-03	2.72E-05	1.002	1.53	
WMMXVDSP	2.66E-02	1.80E-03	3.48E-06	1.002	1.07	
HHUXTYSR	5.00E-02	1.69E-03	1.73E-06	1.002	1.03	
HPM001CA	1.84E-03	1.55E-03	4.32E-05	1.002	1.84	
PMMICSCC	5.91E-02	1.54E-03	1.33E-06	1.002	1.02	
RMMRC10N	1.31E-03	1.41E-03	5.54E-05	1.001	2.08	
DMMDP5BF	1.79E-05	1.40E-03	4.00E-03	1.001	79.18	
ADGMTDGA	7.91E-03	1.33E-03	8.63E-06	1.001	1.17	
LMMPMCCF	1.02E-04	1.20E-03	6.03E-04	1.001	12.77	
PMMICSAH	7.45E-02	1.14E-03	7.83E-07	1.001	1.01	
PMMICSBH	7.45E-02	1.14E-03	7.83E-07	1.001	1.01	
QHUA204R	5.00E-01	1.02E-03	1.04E-07	1.001	1.00	
FLG_TQS	1.00E+00	1.01E-03	5.19E-08	1.001	1.00	
RHURCPTY	2.50E-01	1.01E-03	2.08E-07	1.001	1.00	
SCCHALLF	1.06E-04	1.01E-03	4.90E-04	1.001	10.56	
IE_V	5.14E-08	1.00E-03	1.00E+00	1.001	1.95E+04	
ATSBKUPF	4.46E-05	9.56E-04	1.10E-03	1.001	22.41	
ATSSTUPF	4.46E-05	9.56E-04	1.10E-03	1.001	22.41	
QMMFWP7F	3.63E-03	8.67E-04	1.22E-05	1.001	1.24	
ALBDG3BF	8.28E-05	8.63E-04	5.34E-04	1.001	11.43	
QMMEFP7X	3.30E-03	7.87E-04	1.22E-05	1.001	1.24	
QHUA204Z	1.00E-01	7.73E-04	3.96E-07	1.001	1.01	
SHUDC40X	1.10E-03	7.65E-04	3.56E-05	1.001	1.69	
FHUF6A1Y	1.90E-03	7.62E-04	2.05E-05	1.001	1.40	
SMMDCBR	7.24E-05	7.07E-04	5.00E-04	1.001	10.76	
DBDDP1BF	1.11E-05	6.91E-04	3.19E-03	1.001	63.21	
IE_T16	1.20E-03	6.21E-04	2.65E-05	1.001	1.52	
AB24KEBF	8.81E-06	5.48E-04	3.19E-03	1.001	63.21	
LCC1112N	5.49E-05	5.36E-04	5.00E-04	1.001	10.76	
LCC4243N	5.49E-05	5.36E-04	5.00E-04	1.001	10.76	
JHUCHPSY	5.40E-04	5.16E-04	4.90E-05	1.001	1.96	
ACVDF31N	4.94E-05	5.15E-04	5.34E-04	1.001	11.43	
PMMDEAF	3.38E-02	4.95E-04	7.51E-07	1.000	1.01	

JCHHE1AF	6.50E-04	4.65E-04	3.66E-05	1.000	1.71	
LMM0206F	4.70E-03	4.59E-04	5.00E-06	1.000	1.10	
ACCPMBDA	3.61E-05	3.76E-04	5.34E-04	1.000	11.43	
QMMCMPAE	7.65E-03	3.74E-04	2.50E-06	1.000	1.05	
QMMCMPBE	7.65E-03	3.74E-04	2.50E-06	1.000	1.05	
SPLT_T5A	5.00E-01	3.74E-04	3.83E-08	1.000	1.00	
SPLT_T5B	5.00E-01	3.74E-04	3.83E-08	1.000	1.00	
LHUD789X	3.40E-02	3.65E-04	5.50E-07	1.000	1.01	
LHUDHV7X	1.10E-03	3.65E-04	1.70E-05	1.000	1.33	
SMMDCCCF	3.52E-05	3.44E-04	5.00E-04	1.000	10.76	
CHULTABX	3.00E-03	2.93E-04	5.00E-06	1.000	1.10	
JCCAHCDA	2.70E-05	2.82E-04	5.34E-04	1.000	11.43	
SMMRW3CF	2.62E-05	2.56E-04	5.00E-04	1.000	10.76	
HMMMUPCS	5.16E-04	2.52E-04	2.50E-05	1.000	1.49	
QHUEFP1Y	5.00E-01	2.46E-04	2.52E-08	1.000	1.00	
SHUDC22X	1.10E-03	2.28E-04	1.06E-05	1.000	1.21	
QHUMSIVY	5.00E-01	2.27E-04	2.32E-08	1.000	1.00	
QHUMSIVZ	1.90E-01	2.27E-04	6.11E-08	1.000	1.00	
LSPSCRNP	2.20E-05	2.15E-04	5.00E-04	1.000	10.76	
QCPFWP9A	2.25E-03	2.14E-04	4.88E-06	1.000	1.10	
ACB3208K	3.36E-06	2.09E-04	3.19E-03	1.000	63.21	
AB3A175F	2.35E-04	0.00E+00	0.00E+00	1.000	1.00	
ACB3227R	1.53E-04	0.00E+00	0.00E+00	1.000	1.00	
ACCEDG2A	1.47E-04	0.00E+00	0.00E+00	1.000	1.00	
ACCEDG2F	1.04E-03	0.00E+00	0.00E+00	1.000	1.00	
ACCPABDA	9.90E-06	0.00E+00	0.00E+00	1.000	1.00	
ACCPALLA	8.08E-05	0.00E+00	0.00E+00	1.000	1.00	
ACCPBCDA	9.90E-06	0.00E+00	0.00E+00	1.000	1.00	
ACCS689N	4.38E-06	0.00E+00	0.00E+00	1.000	1.00	
ACCS789N	4.38E-06	0.00E+00	0.00E+00	1.000	1.00	
ACCSV89N	9.23E-06	0.00E+00	0.00E+00	1.000	1.00	
ACVDF25N	4.94E-05	0.00E+00	0.00E+00	1.000	1.00	
ADGES3AA	7.71E-03	0.00E+00	0.00E+00	1.000	1.00	
AHU4KVXY	1.40E-01	0.00E+00	0.00E+00	1.000	1.00	
AHU4KVXZ	4.10E-02	0.00E+00	0.00E+00	1.000	1.00	
ALSDF03H	2.51E-03	0.00E+00	0.00E+00	1.000	1.00	
ALSDF04H	2.51E-03	0.00E+00	0.00E+00	1.000	1.00	
AMM3212F	5.59E-05	0.00E+00	0.00E+00	1.000	1.00	
AMMDF1BF	3.49E-03	0.00E+00	0.00E+00	1.000	1.00	

AMMDF1DF	3.49E-03	0.00E+00	0.00E+00	1.000	1.00	
AMMDG3AF	4.07E-02	0.00E+00	0.00E+00	1.000	1.00	
AMMEB3AF	1.63E-04	0.00E+00	0.00E+00	1.000	1.00	
APWNR02R	4.10E-01	0.00E+00	0.00E+00	1.000	1.00	
APWNR04R	8.30E-02	0.00E+00	0.00E+00	1.000	1.00	
APWNR05R	5.20E-02	0.00E+00	0.00E+00	1.000	1.00	
APWNR3CR	1.60E-01	0.00E+00	0.00E+00	1.000	1.00	
APWNR5BR	7.00E-02	0.00E+00	0.00E+00	1.000	1.00	
APWNR6DR	3.20E-02	0.00E+00	0.00E+00	1.000	1.00	
ATRMT11F	2.03E-03	0.00E+00	0.00E+00	1.000	1.00	
ATSOSPRF	4.46E-05	0.00E+00	0.00E+00	1.000	1.00	
AXVDF46K	1.77E-05	0.00E+00	0.00E+00	1.000	1.00	
AXVDF58K	1.77E-05	0.00E+00	0.00E+00	1.000	1.00	
AXVEG39K	5.83E-06	0.00E+00	0.00E+00	1.000	1.00	
DACPWANR	1.00E+00	0.00E+00	0.00E+00	1.000	1.00	
DACPWBNR	1.00E+00	0.00E+00	0.00E+00	1.000	1.00	
DMMBT1CF	3.69E-04	0.00E+00	0.00E+00	1.000	1.00	
DMMDP6BF	1.79E-05	0.00E+00	0.00E+00	1.000	1.00	
DSWDS1BF	6.00E-06	0.00E+00	0.00E+00	1.000	1.00	
EHURCPTX	1.60E-03	0.00E+00	0.00E+00	1.000	1.00	
FHUF6A3Y	2.00E-02	0.00E+00	0.00E+00	1.000	1.00	
FLG_ES	1.00E+00	0.00E+00	0.00E+00	1.000	1.00	
HCCPM33A	1.01E-04	0.00E+00	0.00E+00	1.000	1.00	
HHUINJAY	5.00E-01	0.00E+00	0.00E+00	1.000	1.00	
HHUINJAZ	1.80E-01	0.00E+00	0.00E+00	1.000	1.00	
HHUMANUY	1.40E-01	0.00E+00	0.00E+00	1.000	1.00	
HHUMANUZ	2.10E-02	0.00E+00	0.00E+00	1.000	1.00	
HMMMU1CX	7.40E-05	0.00E+00	0.00E+00	1.000	1.00	
HMV0025N	4.65E-03	0.00E+00	0.00E+00	1.000	1.00	
HMV0026N	4.65E-03	0.00E+00	0.00E+00	1.000	1.00	
HPM001CF	3.35E-04	0.00E+00	0.00E+00	1.000	1.00	
JCCA224A	7.07E-05	0.00E+00	0.00E+00	1.000	1.00	
JCCAACDA	1.28E-05	0.00E+00	0.00E+00	1.000	1.00	
JCCABCDA	1.28E-05	0.00E+00	0.00E+00	1.000	1.00	
JCCCHABF	1.53E-05	0.00E+00	0.00E+00	1.000	1.00	
JCCPMCHA	6.08E-04	0.00E+00	0.00E+00	1.000	1.00	
JCCPMCHF	1.64E-05	0.00E+00	0.00E+00	1.000	1.00	
JCHHE1AA	2.78E-03	0.00E+00	0.00E+00	1.000	1.00	
JCHHE1BA	2.78E-03	0.00E+00	0.00E+00	1.000	1.00	

JFN022CA	3.80E-03	0.00E+00	0.00E+00	1.000	1.00	
JFN022DA	3.80E-03	0.00E+00	0.00E+00	1.000	1.00	
JFN054AA	3.80E-03	0.00E+00	0.00E+00	1.000	1.00	
JFN054BA	3.80E-03	0.00E+00	0.00E+00	1.000	1.00	
JMMCHHE2	3.43E-03	0.00E+00	0.00E+00	1.000	1.00	
JMMCHP2F	1.01E-02	0.00E+00	0.00E+00	1.000	1.00	
JPMCH1AA	9.67E-03	0.00E+00	0.00E+00	1.000	1.00	
JPMCH1AF	4.67E-04	0.00E+00	0.00E+00	1.000	1.00	
JPMCH1BA	9.67E-03	0.00E+00	0.00E+00	1.000	1.00	
JXVCH25N	3.12E-03	0.00E+00	0.00E+00	1.000	1.00	
JXVCH26N	3.12E-03	0.00E+00	0.00E+00	1.000	1.00	
JXVCH27N	3.12E-03	0.00E+00	0.00E+00	1.000	1.00	
LMMDHRSF	1.94E-02	0.00E+00	0.00E+00	1.000	1.00	
PMMSTUPA	6.42E-02	0.00E+00	0.00E+00	1.000	1.00	
QCCCV34N	5.96E-06	0.00E+00	0.00E+00	1.000	1.00	
QCCP123A	1.02E-04	0.00E+00	0.00E+00	1.000	1.00	
QCCPP23A	4.74E-05	0.00E+00	0.00E+00	1.000	1.00	
QCCSVEFD	2.42E-05	0.00E+00	0.00E+00	1.000	1.00	
QCPFWP9F	1.55E-03	0.00E+00	0.00E+00	1.000	1.00	
QHUAFSUY	7.70E-04	0.00E+00	0.00E+00	1.000	1.00	
QHUCMLCX	2.10E-05	0.00E+00	0.00E+00	1.000	1.00	
QHUEFP1Z	5.40E-03	0.00E+00	0.00E+00	1.000	1.00	
QHUEFVTY	2.50E-02	0.00E+00	0.00E+00	1.000	1.00	
QHUFW7EZ	2.60E-02	0.00E+00	0.00E+00	1.000	1.00	
QMMCMPA	1.25E-03	0.00E+00	0.00E+00	1.000	1.00	
QMMCMPB	1.25E-03	0.00E+00	0.00E+00	1.000	1.00	
QMMEFP1	6.55E-03	0.00E+00	0.00E+00	1.000	1.00	
QMMEFP3A	3.20E-03	0.00E+00	0.00E+00	1.000	1.00	
QMMEFP3FE	1.66E-04	0.00E+00	0.00E+00	1.000	1.00	
QMMSGAP1E	1.09E-02	0.00E+00	0.00E+00	1.000	1.00	
QMMSGBP1E	1.09E-02	0.00E+00	0.00E+00	1.000	1.00	
QMVA005N	4.65E-03	0.00E+00	0.00E+00	1.000	1.00	
QMVEF11C	4.65E-03	0.00E+00	0.00E+00	1.000	1.00	
QMVEF32C	4.65E-03	0.00E+00	0.00E+00	1.000	1.00	
QTL07A1F	9.72E-04	0.00E+00	0.00E+00	1.000	1.00	
QTL07A2F	9.72E-04	0.00E+00	0.00E+00	1.000	1.00	
QTL07B1F	9.72E-04	0.00E+00	0.00E+00	1.000	1.00	
QTL07B2F	9.72E-04	0.00E+00	0.00E+00	1.000	1.00	
QXVA215K	1.42E-04	0.00E+00	0.00E+00	1.000	1.00	

QXVC289N	3.12E-03	0.00E+00	0.00E+00	1.000	1.00	
QXVE147K	1.42E-04	0.00E+00	0.00E+00	1.000	1.00	
QXVF918N	3.12E-03	0.00E+00	0.00E+00	1.000	1.00	
RCCDRODA	1.00E-06	0.00E+00	0.00E+00	1.000	1.00	
RHUPORVZ	3.50E-03	0.00E+00	0.00E+00	1.000	1.00	
RRVRCV8N	1.26E-02	0.00E+00	0.00E+00	1.000	1.00	
RRVRCV9N	1.26E-02	0.00E+00	0.00E+00	1.000	1.00	
SCCPMR2A	1.48E-05	0.00E+00	0.00E+00	1.000	1.00	
SCCSWABA	1.53E-05	0.00E+00	0.00E+00	1.000	1.00	
SCVRW35N	4.94E-05	0.00E+00	0.00E+00	1.000	1.00	
SCVRW36C	4.94E-05	0.00E+00	0.00E+00	1.000	1.00	
SCVSW10C	4.94E-05	0.00E+00	0.00E+00	1.000	1.00	
SHUMCNSY	5.00E-01	0.00E+00	0.00E+00	1.000	1.00	
SHUMCNSZ	1.40E-01	0.00E+00	0.00E+00	1.000	1.00	
SHURW2BX	1.50E-04	0.00E+00	0.00E+00	1.000	1.00	
SHURWP1Y	5.00E-01	0.00E+00	0.00E+00	1.000	1.00	
SHURWP1Z	9.60E-03	0.00E+00	0.00E+00	1.000	1.00	
SMMDHCCK	5.02E-05	0.00E+00	0.00E+00	1.000	1.00	
SMMEFP1	3.01E-02	0.00E+00	0.00E+00	1.000	1.00	
SMMHSWAX	4.89E-03	0.00E+00	0.00E+00	1.000	1.00	
SMMHSWBX	4.89E-03	0.00E+00	0.00E+00	1.000	1.00	
SMMR3B1F	2.66E-02	0.00E+00	0.00E+00	1.000	1.00	
SMMR3B2F	2.66E-02	0.00E+00	0.00E+00	1.000	1.00	
SMMRW2BF	6.37E-04	0.00E+00	0.00E+00	1.000	1.00	
SMMRWP1F	1.82E-04	0.00E+00	0.00E+00	1.000	1.00	
SMMXVR2B	3.57E-04	0.00E+00	0.00E+00	1.000	1.00	
SPMRW2BA	9.26E-04	0.00E+00	0.00E+00	1.000	1.00	
WMMFWRWB	6.71E-05	0.00E+00	0.00E+00	1.000	1.00	

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