Response to Item #3

Delta Risk value of Zero

The "0.0" for delta CDF and LERF will be removed from Attachment W and replaced with actual change in risk values

PRA Modeling of Recoveries and Modifications

ANO-2 does not have a single location for remotely controlling the plant should a Control Room abandonment be required. The Alternate Shutdown procedure provides guidelines that are necessary to assure a safe shutdown of the unit in the event of a significant fire in which both trains of safe shutdown equipment could be rendered inoperable from the Control Room.

Safe shutdown, as defined by 10 CFR 50, Appendix R, applies to both hot and cold shutdown functions. Initial actions taken in the Control Room and verified with follow-up actions taken outside the Control Room ensure the fuel in the reactor vessel is maintained in a safe and stable condition (i.e., hot standby, Mode 3, as defined by NFPA 805). Additional defense-in-depth (DID) actions are taken by Operations personnel to maintain the unit in Hot Standby and if necessary, place the unit in Cold Shutdown. Therefore, RAs as identified from the fire risk evaluations (FREs) and additional DID actions have been identified for ensuring that the plant is maintained in a safe and stable condition. Key plant parameters to accomplish a safe shutdown are monitored from the Technical Support Center (TSC) using the Safety Parameters Display System (SPDS).

Two analyses were developed to assist in calculating the delta risk for the ANO-2 Control Room: a compliant case and a post transition case. The following describes how the RAs and planned modifications were modeled in each case.

<u>Compliant Case Analysis</u>

In order to calculate the delta risk as part of the FRE, a compliant case was first developed. Because the primary safety functions are challenged for a fire in the Control Room followed by abandonment, the compliant case assumes that a single success train for plant control and mitigation is available to protect the primary safety functions. This approach is based upon Note 2 of Regulatory Guide (RG) 1.205, Revision 2, which states:

> *The "deterministically compliant plant" has been referred to as "an ideal plant" that may not exist or be feasible in practice. Based on experience with the two NFPA 805 pilot plants, the risk of most variances from the deterministic requirements can readily be evaluated by postulating modifications, such as moving or protecting cables, which would meet the deterministic requirements. This provides the base case against which the added risk of the proposed alternative is evaluated. Because of the great similarity between the deterministic criteria of NFPA 805 and the requirements in Appendix R to 10 CFR Part 50, it should be clear, in most cases, what the compliant configuration would be. An exception might occur for fire scenarios where evacuation of the main control room is necessary. This has been addressed in the regulatory guide by defining the term "primary control station," which is used in the NFPA 805 definition of recovery action; see Regulatory Position 2.4*.

For the ANO-2 Control Room compliant case, a successful train is assumed to be available for accident mitigation (i.e., Emergency Feedwater (EFW) Train A supplying inventory to Steam Generator (SG) B). In addition to the success path for ensuring that primary to secondary heat removal is available, the Reactor Coolant System (RCS) is assumed to remain intact by ensuring that fire failures will not impact RCS integrity. These assumptions ensure a conservative single success path is available with operator failures associated with a primary control station effectively set to zero. Only random failures of equipment associated with the single train success path are considered in the compliant case analysis; all other systems are considered failed due to the fire.

The compliant case does not include all plant modifications, nor does the compliant case consider fire related recoveries.

Post Transition Analysis

The Post Transition case (assuming the failures due to a fire in the Control Room) was also analyzed to determine the CDF. With the exception of credited recoveries and modifications identified as necessary to protect the plant from core damage, this analysis assumes all affected equipment in the Control Room fails due to the fire.

Table 1 provides a list of the recoveries that were modeled and credited to reduce risk in the PRA. These recoveries focus on the systems modeled in the Fire PRA and were deemed necessary to ensure that RCS integrity is maintained, SG pressure is maintained, and a source of SG inventory for primary-to-secondary heat removal is provided.

Table 1

Recoveries Credited in FRE

Component ID	Component Description	Event Description (Operator Action)	Notes
2CV-1016-1	SG-A Blowdown Isolation Motor Operated Valve (MOV)	Operator Action to Isolate blowdown with fire damage to valves	Eliminate loss of SG inventory and limit RCS cooldown
2CV-1066-1	SG-B Blowdown Isolation MOV	Operator Action to Isolate blowdown with fire damage to valves	Eliminate loss of SG inventory and limit RCS cooldown
2CV-4816	Chemical & Volume Control System Letdown (CVCS LD) Throttle Control Valve (CV)	Operators Isolates Letdown Flow Outside the Main Control Room	Eliminate potential loss of RCS inventory
2CV-4817	CVCS LD Throttle CV	Operators Isolates Letdown Flow Outside the Main Control Room	Eliminate potential loss of RCS inventory
2P-32A/2P-32B/ 2P32C/2P32D	Reactor Coolant Pumps (RCPs)	Operators trips RCPs at the switchgear	Minimize potential for loss of RCS inventory via RCP controlled bleed-off (CBO)
TBD	New Auxiliary Feedwater (AFW) Pump	Operator Starts and Aligns AFW pump	Establish Primary to Secondary Heat Removal

In addition to the recoveries identified in Table 1, additional recovery actions have been identified to provide defense-in-depth (DID). These additional recovery actions support the safety functions listed for Table 2, as well as protect equipment necessary for additional mitigating actions. The main focus of these DID actions is to ensure that a single train of components is available for plant control. The operator manual actions (OMAs) that are transitioning as RAs are listed in Table 2.

Table 2

DID Actions

Component ID	Component Description	Event Description (Operator Action)	Notes
2P-89B	High Pressure Safety Injection (HPSI) Pump	Locally open breakers for HPSI pump	Pump protection
2P-60B	Low Pressure Safety Injection (LPSI) Pump	Locally open breakers for LPSI pump	Pump protection
2P-35B	Containment Spray Pump	Locally open breakers for Containment Spray pump	Pump protection
2CV-5630-1/ 2CV-5631-2	Refueling Water Tank (RWT) Outlet Valves	Close both RWT Outlet valves locally	Prevent inventory transfer to Containment Sump
2CV-4920-1/ 2CV-4921-1	Boric Acid Makeup Tank (BAMT) Gravity Feed Valves	Open both BAMT Gravity Feed valves locally	Ensure borated water source to Charging Pumps
2CV-4873-1	CVCS Volume Control Tank (VCT) Outlet Valve	Close VCT outlet valve locally	Remove potential for loss of Charging
2T-1	Pressurizer Heaters	Turn OFF and operate pressurizer heaters as necessary	RCS pressure control
2P-36A/B/C	Charging Pumps	Stop and operate Charging pumps locally, as needed	Operator action to prevent RCS overfill and control Pressurizer level
2K-4B	#2 Emergency Diesel Generator (EDG)	Place #2 EDG in LOCKOUT locally	Protect EDG
2A-4	4160V Vital Power	De-energize/energize 2A-4	Establish manual control over power supplies
2B-6	480V Vital Power	De-energize 2B6 locally	Establish manual control over power supplies
2D24-2,4,6,8,9, and 10	DC Power to various equipment	Open breakers to remove DC power to various equipment	Establish manual control over power supplies
2CV-4840-2	Charging Header Isolation	Verify open charging header isolation	Ensure availability of Charging
2CV-1504-2	#2 EDG Service Water (SW) Outlet	Verify open #2 EDG SW Outlet	Protect EDG

Component ID	Component Description	Event Description (Operator Action)	Notes
2CV-4950-2	RWT Suction Valve	Verify RWT suction valve open for charging capability if necessary	Backup borated water source to Charging Pumps
2P-4C	SW Pump	Align Loop 2 SW header locally	Ensure cooling source to Emergency Core Cooling System (ECCS) components
2CV-0795-2	EFW pump 2P-7A suction MOV	Verify open 2P-7A Condensate suction MOV (2CV-0795-2) locally	Ensure EFW availability for RCS Heat Removal

In addition to the recoveries identified in Tables 1 and 2, modifications have been identified in the FREs that ensure the safety functions necessary to maintain the plant in a safe and stable condition will be protected. The modifications listed in Table 3 were credited in the PRA.

Table 3

Proposed Modifications Credited in FRE

Comp ID	Component Description	Notes
2CV-1002	2CV-1002 Upstream Atmospheric Dump Valve (ADV) Isolation MOV TRANSFERS OPEN	Credit modification to eliminate potential spurious operation. Only one cable in the Control Room can result in spurious opening of the valve. Therefore, a modification is proposed to prevent spurious opening from a fire in the Control Room by installing flexible metallic conduit on conductor 1F of cable G2 (see Table S-1, Item S1-9).
2CV-1052	2CV-1052 Upstream ADV Isolation TRANSFERS OPEN	Credit modification to eliminate potential spurious operation. Only one cable in the Control Room can result in spurious opening of the valve. Therefore, a modification is proposed to prevent spurious opening from a fire in the Control Room by installing flexible metallic conduit on conductor 1F of cable R2 (see Table S-1, Item S1-9).
2CV-4698-1	RCS Pressurizer Emergency Core Cooling Vent TRANSFERS OPEN	Credit modification to eliminate potential spurious operation.
TBD	AFW Pump MODIFICATION	Provides independent source of SG inventory (see Table S-1, Item S1-11).

The following table provides the results of the quantification of the compliant and post transition base case, along with the delta CDF for the control room analysis.

Table 4

Fire Area G ΔCDF and ΔLERF Evaluation Summary

Zone	Scenario Description	IGF2 (/rx-yr)	NSP	SF	CCDP	CDF (/rx-yr)	CLERP	LERF (/rx-yr)
2199-G	Deterministically Compliant Case	3.79E-05	1.00E+00	1.00E+00	1.40E-01	5.29E-06	3.50E-03	1.33E-07
2199-G	Post Transition Baseline Case	3.79E-05	1.00E+00	1.00E+00	6.97E-02	2.64E-06	9.29E-04	3.52E-08
				Results	delta CDF	-2.65E-06	delta LERF	-9.78E-08