Ameren MISSOURI

Callaway Plant

October 31, 2018

ULNRC-06467

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

10 CFR 50.47(b)
10 CFR 50.54(q)

Ladies and Gentlemen:

DOCKET NUMBERS 50-483 AND 72-1045
CALLAWAY PLANT UNIT 1
UNION ELECTRIC CO.
RENEWED FACILITY OPERATING LICENSE NPF-30
RADIOLOGICAL EMERGENCY RESPONSE PLAN APPENDIX J,
"CALLAWAY PLANT ON-SHIFT STAFFING ANALYSIS REPORT," REVISION 004

Enclosed (as Attachment 2) is one copy of Revision 004 to the Callaway Plant Radiological Emergency Response Plan (RERP), Appendix J, "Callaway Plant On Shift Staffing Analysis Report," which is referenced in the RERP as a stand-alone document.

RERP Appendix J has been revised in order to reflect changes to emergency operating procedures. A brief description of each change made to Appendix J is provided in Attachment 1, "RERP Appendix J, Revision 004 - Summary of Changes."

The changes to Appendix J do not represent a reduction in the effectiveness of emergency preparedness for the Callaway Plant. The RERP continues to meet the standards of 10 CFR50.47(b) and the requirements of 10 CFR50.54(q).

If there are any questions concerning this letter, please contact Gene Juricic at 314-225-1149. This letter does not contain new commitments.

Sincerely,

R. C. Wink
Manager, Regulatory Affairs

JPK/

Attachments: 1. RERP Appendix J, Revision 004 - Summary of Changes
2. RERP Appendix J, "Callaway Plant On-Shift Staffing Analysis Report," Rev 004

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RERP Appendix J, Revision 004
Summary of Changes

Section / Step Number	Description of Change	Reason for Change	Reason Change will not be a Reduction in Effectiveness
Page 2, Executive Summary	Updated to include the changes that occurred in this revision (summary of Changes)	New revision 004 of RERP Appendix J contains changes from the previous revision 003.	This change is editorial in nature and is performed just to keep the Executive Summary up-to-date with revisions. There is no effect to the actual Appendix.
Pages 22 & 30, Analysis #2, Table 2A – OTO/EOP Actions and Analysis #3, Table 2A – OTO/EOP Actions	Corrected mistake on line 13 of "Proc/Step" column from "E 2, Step 9" to "E 2, Step 10."	Corrected error in step number from previous revision.	This is an administrative fix to correct a typo.
Page 54, Analysis #6, Table 2A - SGTR	Added a new line (6th line) for step 22 of E-3, Check Adequate RCS Depressurization, to align with revision to E-3. Also moved the "Performance Time After Procedure Implementation" on "Establishing Normal Charging Flow" to "45-50" minutes and "Manually Isolate Accumulators" to "50-55" minutes.	Revised RERP Appendix J to conform to the revised E-3 procedure.	These changes were performed to keep the On-Shift Staffing Analysis aligned with the associated procedures used in the analysis. The changes incorporate the revisions to E-3 and show that while some of the actions are being performed at a different time in the process, the overall time of the analysis has not changed.
Page 76, Analysis #9, Table 2A – Aircraft Probable Threat	Updated the first line of the "Proc/Step" column to align with the revision to OTO-SK-00002. Added a new line (6th line) for OTO-SK-00002, Attachment B15, Secure Exterior Plant Lighting," to align with revision to OTO-SK-00002.	Revised RERP Appendix J to conform to the revised OTO-SK-00002 procedure.	These changes were performed to keep the On-Shift Staffing Analysis aligned with the associated procedures used in the analysis. The changes incorporate the revisions to OTO-SK-00002 and show that while some of the actions are being performed at a different time in the process, the overall time of the analysis has not changed.

RERP Appendix J, Revision 004
Summary of Changes

Section / Step Number	Description of Change	Reason for Change	Reason Change will not be a Reduction in Effectiveness
Page 83, Analysis #10, Table 2A – OTO/EOP Actions – Control Room Fire	In the first line, "Task" column, replaced "Immediate Actions" with actual list of immediate actions.	The change provides clarification of the immediate actions to be taken.	This is an editorial change in that the words "Immediate Actions" were replaced with the actual list of immediate actions. There is no effect to the actual Appendix.
Pages 90 & 91, Analysis #11, Table 2A -	Added a new line (10th line) for Step 5 of ECA-0.0, Load Shed Non Essential Loads, to align with revision to ECA-0.0. Moved a line from later in the table to line 11, and corrected line to read "ECA-0.0, Step 5, Addendum 39, Attempt to Restore AEPS." Also, the "Proc/Step" lines for ECA-0.0, Steps 11-12, Step 14, Step 15, Step 16, and Step 17 all had their "Performance Time After Procedure Implementation" times moved from "15-20" minutes to "20-30" minutes, and the "Proc/Step" line for ECA-0.0, Step 18, had its "Performance Time After Procedure Implementation" time moved from "20-40" minutes to "30-50" minutes.	Revised RERP Appendix J to conform to the revised ECA-0.0 procedure.	These changes were performed to keep the On-Shift Staffing Analysis aligned with the associated procedures used in the analysis. The changes incorporate the revisions to ECA-0.0 and show that while some of the actions are being performed at a different time in the process, the overall time of the analysis has not changed.
Page 98, Analysis #12, Table 2A – OTO/EOP Actions	Corrected mistake on lines 6 thru 10 of "Proc/Step" column from "SACRG-2, Step #" to "SACRG-1, Step #."	Corrected procedure number from previous revision.	This is an administrative fix to correct a typo.

Attachment 2 to

ULNRC-06467

RERP Appendix J, Revision 004

"Callaway Plant On-Shift Staffing Analysis Report"

222 Pages

RERP Appendix J
Revision 004
Callaway Plant

On-Shift Staffing Analysis Report

Callaway Plant On-Shift Staffing Analysis

Table of Contents

Callaway Plant On-Shift Staffing Analysis

Introduction

10 CFR 50 Appendix E, effective on December 23, 2011 directed that a detailed study be performed by December 24, 2012, to ensure on-shift staffing was adequate to perform critical functions until relieved by the augmented Emergency Response Organization (ERO). The NRC in the published staff guidance (Reference 2) endorsed NEI 10-05 as an acceptable means of performing the required staffing analysis. This report documents the result of that analysis for Callaway Plant (CP).

References

1. 10 CFR 50 Appendix E
2. NSIR/DPR-ISG-01, Interim Staff Guidance, Emergency Planning for Nuclear Power Plants
3. NEI 10-05, Revision 0, Assessment of On-Shift Emergency Response Organization Staffing and Capabilities
4. CP RERP, Revision 39, Figure 5-1, On-Shift Emergency Response
5. CP RERP, Revision 39, Table 5-1, Emergency Staffing Requirements/On-Shift Emergency Response
6. CP FSAR Chapter 15
7. CP RERP, Revision 44, Figure 5-1, On-Shift Emergency Response
8. CP RERP, Revision 44, Table 5-1, Emergency Staffing Requirements/On-Shift Emergency Response

Executive Summary

A detailed staffing analysis performed in accordance with NEI 10-05 was conducted to document the adequacy of shift staffing as required by 10 CFR 50 Appendix E.

The minimum staff described in the Figure 5-1 and Table 5-1 of the CP Radiological Emergency Response Plan (RERP), Revision 39, was used to perform the on-shift staffing analysis. Table 1 of this report lists the on-shift staffing as described in Revision 39 of the CP RERP.

NRC staff guidance directs the scenarios that must be used to demonstrate the adequacy of on-shift staffing to perform required functions for event mitigation, radiation protection response, firefighting, chemistry and Emergency Plan functions. Those scenarios include specific design basis events as described in the FSAR as well as specific scenarios defined in the staff guidance document. Table 2 identifies the scenarios that were examined.

The next phase required of NEI 10-05 requires a dedicated team using tabletop techniques to examine the scenarios for conflicts between the functional areas that must be resolved by detailed procedural analysis. For those scenarios where no conflicts are identified in the specified areas no further actions are required. Table 2 also identifies the scenarios that required detailed analysis due to conflicts in response functions. Appendix A to this report documents the results of the procedural analysis. Appendix B includes the completed event scenario analysis tables.

Callaway Plant On-Shift Staffing Analysis

The final phase of NEI 10-05, Time Motion Studies (TMS), identifies any staffing conflicts with the minimum shift that must be resolved. The TMS for Callaway Plant determined that staffing conflicts do not exist. Appendix C summarizes the results of the time motion studies (TMS).

The effective date of this staffing analysis is the date of ORC approval.

Revision 001 is incorporated into this report to support the conversion to NFPA 805, Risk Informed Performance Based Fire Protection standards from the 10CFR50 Appendix R standards. This conversion required a revision to the Control Room Evacuation procedure OTO-ZZ-00001, Control Room Inaccessibility, Revision 040. The revision to the procedure required a re-evaluation of the On-shift Staffing Analysis for the NFPA 805 Control Room Fire with Evacuation and Safe and Stable Plant Conditions event.

Revision 002 is incorporated in this report due to a change in the amount of time required to open all Control Room Cabinet Doors during a Station Blackout scenario. As documented in NRC Inspection Report 2014007, in which Callaway received a Green Non-Cited Violation (NCV) of 10 CFR Part 50.63(a)(2),due to a change that was made to Emergency Operating Procedure Addendum 20, "Control Room Cabinet Door List," without any analysis or calculations performed to justify whether the electronics in the cabinets would have sufficient cooling with a minimum of one door open during a Station Blackout. Changing procedure to have the operator open all doors meets the requirement for adequate ventilation but also requires more time to accomplish than was indicated in previous analysis. Additional timings of this evolution were performed to verify the appropriate amount of time to be added to the Staffing Analysis. This does not affect the overall amount of time required to complete steps of the Station Blackout procedure.

Revision 003 is incorporated in this report to support changes that were made to procedures included in the staffing analysis of this document. In particular, changes were made to the Station Blackout procedure ECA-0.0, Loss of All AC Power. This was due to NRC Order EA-12-049, Order to Modify Licenses With Regard to Requirements for Mitigation Strategies for Beyond-Design Basis External Events (BDBEE) and CAR 201306512 Procedure Development Tracking for Fukushima Project. This does not affect the overall amount of time required to complete steps of the Station Blackout procedure.

Revision 004 is incorporated in this report to support changes that were made to procedures included in the staffing analysis of this document. Specifically procedure E-3, Steam Generator Tube Rupture, was revised to add a new Step 22 to check for adequate RCS Depressurization, and move the action to restore Pressurizer heaters to an earlier spot in the procedure process. These actions do not affect the overall amount of time required to complete the steps in E-3. OTO-SK-00002, Plant Security Event - Aircraft Threat, had added Step B15 to secure exterior plant lighting for an aircraft threat at night. These actions had not been previously included. ECA-0.0, Loss Of All AC Power, Step 5 RNO column add two steps to load shed non-essential loads and to attempt to restore AEPS. These actions and required resources have been added to the Appendix.

Callaway Plant On-Shift Staffing Analysis

Conclusion

The minimum staff identified in Figure 5-1 and Table 5-1 of the Callaway Plant Radiological Emergency Response Plan, Revision 39, is adequate to respond to the scenarios identified in the regulations until relieved by the augmented ERO.

Table 1

Callaway Plant On-Shift Staffing

CP RERP, Rev 039 Figure 5-1, On-Shift Emergency Response Table 5-1, Emergency Staffing Requirements/ On-Shift Emergency Response	
Position	On-Shift
Shift Manager (SM)	1
Control Room Supervisor (SRO)	1
Field Supervisor (SRO)	1
Reactor Operator (RO)	2
Ops/Assistant Ops Technicians (NLO)	4
Other Operations Personnel	2
HP Operations	1
HP Technical Support (DA)	1
Chemistry Technician	1
Shift Security Supervisor	1
Total:	15
Fire Brigade	5
Search & Rescue/MERT	2
Security	Sec plan

Callaway Plant On-Shift Staffing Analysis

The minimum staff identified in Figure 5-1 and Table 5-1 of the Callaway Plant Radiological Emergency Response Plan, Revision 44, is adequate to respond to the NFPA 805 Control Room Fire with Evacuation and Safe and Stable Plant Conditions until relieved by the augmented ERO.

Table 1a

Callaway Plant On-Shift Staffing

CP RERP, Rev 044 Figure 5-1, On-Shift Emergency Response Table 5-1, Emergency Staffing Requirements/ On-Shift Emergency Response	
Position	On-Shift
Shift Manager (SM)	1
Control Room Supervisor (SRO)	1
Field Supervisor (SRO)	1
Reactor Operator (RO)	2
Ops/Assistant Ops Technicians (NLO)	5
Other Operations Personnel	2
HP Operations	1
HP Technical Support (DA)	1
Chemistry Technician	1
Shift Security Supervisor	1
Total:	16
Fire Brigade	5
Search & Rescue/MERT	2
Security	Sec plan

Callaway Plant On-Shift Staffing Analysis

Table 2

Callaway Plant DBA/ISG Analyzed Events

TMS Required	DBA/ISG Event #	Summary Description of Event or Accident
YES	1	Land and/or waterborne HOSTILE ACTION directed against the Protected Area by a HOSTILE FORCE. Assume adversary characteristics defined by the Design Basis Threat (DBT).
NO	2	Steam System Pipe Break (MSLB)
NO	3	Major Rupture of a Main Feedwater Line (MFLB)
NO	4	Reactor Coolant Pump Shaft Seizure (Locked Rotor)
NO	5	Reactor Coolant Pump Shaft Break [1]
NO	6	Spectrum of rod cluster control assembly ejection accidents (RCCA Ejection)
NO	7	Steam Generator Tube Rupture (Stuck ADV)
NO	8	Loss-of-Coolant Accidents (LB LOCA) [2]
NO	9	Fuel Handling Accident [3]
NO	10	ATWS
NO	11	Response actions for an “aircraft probable threat” in accordance with 10 CFR 50.54(hh)(1) and as discussed in RG 1.214, Guidance for Assessment of Beyond-Design-Basis Aircraft Impacts
NO	12	Revised for NFPA 805 Control room fire leading to evacuation and safe and stable plant conditions, as referenced in IN 95-48 “Results of On-Shift Staffing Study”
NO	13	Station (Unit) Blackout
NO	14	NFPA 805 Fire Response [4]
NO	15	SAMG

[1] Per the Callaway FSAR, event consequences and response are the same as for the RCP Locked Rotor Event (Event #4). Therefore, this event is bounded by Event #4 and no further analysis is required.

[2] DBA Event designated as proceeding non-mechanistically to General Emergency with release exceeding Protective Action Guides.

[3] Fuel Handling Accident is not analyzed with the existing on-shift staff. The Callaway FSAR states that this event involves fuel that is decayed for 72 hours after shutdown, therefore it is applicable to refueling conditions. Refueling operations are staffed for the evolution with additional Operations, RP, and support personnel.

[4] The Control Room fire with evacuation and safe and stable plant conditions is the bounding NFPA 805 fire scenario; therefore, no further analysis of this event is required.

Callaway Plant On-Shift Staffing Analysis

Acronyms

ADV ..... Atmospheric Dump Valve
ANI ..... American Nuclear Insurers
ASD ..... Atmospheric Steam Dump
BOP ..... Balance of Plant
CAS ..... Central Alarm Station
CET ..... Core Exit Thermocouple
CFR ..... Code of Federal Regulations
CP ..... Callaway Plant
CR ..... Control Room
CSF ..... Critical Safety Function
CSFST ..... Critical Safety Function Status Tree
CT ..... Chemistry Technician
DA ..... HP Technical Support
DBA ..... Design Basis Accident
DBT ..... Design Basis Threat
ECCS ..... Emergency Core Cooling System
ECL ..... Emergency Classification Level
EDG ..... Emergency Diesel Generator
ENS ..... Emergency Notification System.
EOL ..... End of Live
EOP ..... Emergency Operating Procedure
EP ..... Emergency Preparedness
ERDS ..... Emergency Response Data System
ERO ..... Emergency Response Organization
ESF ..... Engineered Safety Feature
FB ..... Fire Brigade
FS ..... Field Supervisor
FSAR ..... Final Safety Analysis Report
HP ..... Health Physics
IC ..... Instrument and Control
INPO ..... Institute of Nuclear Power Operations
ISG ..... Interim Staff Guidance
LB LOCA ..... Large Break Loss of Coolant Accident
LOOP ..... Loss of Offsite Power
MERT ..... Medical Emergency Response Team
MFLB ..... Major Rupture of Main Feedwater Line
MSIV ..... Main Steam Line Isolation Valve
MSLB ..... Steam System Pipe Break
NEI ..... Nuclear Energy Institute
NLO ..... Ops/Assistant Ops Technician
NRC ..... Nuclear Regulatory Commission
OATC ..... Operator at the Controls
OCA ..... Owner Controlled Area
Ops ..... Operations
ORC ..... Onsite Review Committee
OTO ..... Off-Normal Procedure
PA ..... Protected Area
PAR ..... Protective Action Recommendation
PORV ..... Power Operated Relief Valve

Callaway Plant On-Shift Staffing Analysis

PRZR ..... Pressurizer
RCCA ..... Rod Control Cluster Assembly
RCP ..... Reactor Coolant Pump
RCS ..... Reactor Coolant System
RO ..... Reactor Operator
RP ..... Radiological Protection
RERP ..... Radiological Emergency Response Plan
RVLIS ..... Reactor Vessel Level Indicating System
Rx ..... Reactor
SAMG ..... Severe Accident Mitigating Guideline
SAS ..... Secondary Alarm Station
SB LOCA ..... Small Break Loss of Coolant Accident
SG ..... Steam Generator
SGTR ..... Steam Generator Tube Rupture
SI ..... Safety Injection
SM ..... Shift Manager
SRO ..... Senior Reactor Operator/Control Room Supervisor/Field Supervisor
SSO ..... Safe Shutdown Operator
SSS ..... Security Shift Supervisor
STA ..... Shift Technical Advisor
T-G ..... Turbine Generator
TMS ..... Time Motion Studies
WPA ..... Workman's Protection Assurance

Appendix A Phase II Analysis Results

Callaway Plant On-Shift Staffing Analysis

A multi-disciplined team of subject matter experts from Callaway Plant was assembled October 3-5, 2012 to provide input into the shift staffing analysis of events identified by NSIR/DPR-ISG-01, Interim Staff Guidance, Emergency Planning for Nuclear Power Plants. This team consisted of: the Assistant Operations Manager (Shift Manager/SRO); a Reactor Operator; an Operations Technician (NLO); Chemistry Supervisor; an RP General Supervisor; a Fire Marshal; a Security Supervisor; a Safety Analysis Engineer; and Emergency Planning staff (station and consultants). The team provided analysis support during the Phase II Shift Staffing Analysis as follows:

Table 1
On-Shift Staffing Analysis Team

Team Member	Subject Matter Expertise
Assistant Operations Manager	Emergency Operating Procedure (EOP) actions for SROs and ROs
	Off-Normal Technical Operating Procedure (OTO) actions for SROs and ROs
	Operating Procedure actions
	Site Emergency Director (E Plan) Actions for Shift Manager
	Fire response actions
Reactor Operator	EOP actions for ROs
	OTO actions for ROs
	Operating Procedure actions
	Fire response actions
Operations Technician (NLO)	EOP actions for NLOs
	OTO actions for NLOs
	Operating Procedure actions for NLOs
	Fire response actions for NLOs
Fire Marshal	Fire Brigade Response actions
Chemistry Supervisor	Chemistry Technician response actions
RP Supervisor	HP Technician response actions
Security Supervisor	Security Response actions
	Accountability Response actions
Safety Analysis Engineer	DBA Event response actions
Emergency Planning	Emergency Plan response actions

The Phase II Analysis was conducted in three steps: identification of events for analysis; minimum shift staffing complement determination; and, a table top analysis of the on-shift staffing resources required for response to the identified events. The team reviewed a total of twelve (12) events. The results and recommendations of the Phase II Shift Staffing Analysis are documented in this report.

Phase II Preliminary Conclusions

1. A Time Motion Study (TMS) of the Shift Manager position is required for the Design Basis Threat Event due to competing Emergency Plan functions/tasks – State/Local Notifications and NRC Notifications. The TMS will determine if these functions can be performed by the Shift Manager during an event.

Phase II Recommendations:

1. Determine most effective methodologies to perform remaining scenarios requiring detailed time motion studies (Simulator based Drill, timed in-plant response, combinations, other).
2. Schedule and conduct Phase III analysis for the following event:
   a. Design Basis Threat

Appendix B Phase II Event Analysis Tables

Callaway Plant On-Shift Staffing Analysis

Phase II Event Analysis Table Index

Callaway Plant On-Shift Staffing Analysis

On-Shift Personnel Assignments Used During Phase II Analysis

Position	Designation	Assignment
Shift Manager	Shift Manager	Shift Manager/Emergency Coordinator
Control Room Supervisor	SRO #1	Control Room Supervisor/STA
Field Supervisor	SRO #2	Field Supervisor /STA
Reactor Operator	RO #1	Reactor Operator
Reactor Operator	RO #2	Balance of Plant (BOP) Operator
Ops/Assistant Ops Technician	NLO #1	Secondary NLO/Fire Brigade Member
Ops/Assistant Ops Technician	NLO #2	Inside NLO/Fire Brigade Member
Ops/Assistant Ops Technician	NLO #3	Polisher NLO/Fire Brigade Member
Ops/Assistant Ops Technician	NLO #4	Radwaste NLO/Fire Brigade Member
Other Operations Personnel	NLO #5	Offsite Communicator Outside NLO
Other Operations personnel	NLO #6	Primary NLO /FBL
Reactor Operator	RO #3	WPA RO/CSF Monitor

Other On-Shift Assignments Used During Analysis

Position	Designation	Assignment
HP Technician	HP #1	HP Operations
HP Technician	HP #2	Offsite Dose Assessment
Chemistry Technician	CT #1	Chemistry Sampling/Count Room

On-Shift Personnel Assignments Used During the NFPA 805 Control Room Fire Leading to Evacuation and Safe and Stable Plant Conditions (Analysis 10).

Position	Designation	Assignment
Shift Manager	Shift Manager	Shift Manager/Emergency Coordinator
Control Room Supervisor	SRO1	Control Room Supervisor/STA
Field Supervisor	SRO2	Field Supervisor /STA
Reactor Operator	RO1	Reactor Operator
Reactor Operator	RO2	Balance of Plant (BOP) Operator
Ops/Assistant Ops Technician	NLO1	Secondary NLO/Fire Brigade Member/FBL
Ops/Assistant Ops Technician	NLO2	Inside NLO/Fire Brigade Member/FBL
Ops/Assistant Ops Technician	NLO3	Polisher NLO/Fire Brigade Member/FBL
Ops/Assistant Ops Technician	NLO4	Radwaste NLO/Fire Brigade Member/FBL
Other Operations Personnel	NLO5	Outside Operator / Offsite Communicator
Safe Shutdown Operator	SSO1	WPARO or NLO (extra NLO position staffed if only 2 RO's)
Ops/Ass Ops Technician	NLO6	Primary NLO /FBL

Other On-Shift Assignments Used During the NFPA 805 Control Room Fire Leading to Evacuation and Safe and Stable Plant Conditions (Analysis 10).

Position	Designation	Assignment
Security Officer	SEC1	Medical Emergency Response (MERT)
Security Officer	SEC2	Medical Emergency Response (MERT)
Security Shift Supervisor	SSS	Fire Response
Secondary Alarm Station Operator	SAS	Fire Response

Callaway Plant On-Shift Staffing Analysis

Appendix B

Analysis #1: DBA/ISG Event #1 - DBT **ECL: Site Area Emergency**

TABLE 1 – On-shift Positions

Line	On-shift Position	Emergency Plan Reference	Augmentation Elapsed Time (min)	Role in Table#/Line#	Unanalyzed Task?	TMS Required?
1.	Shift Manager	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L1 T5/L1 T5/L3 T5/L7 T5/L8 T5/L9 T5/L10 T5/L13	No	Yes
2.	Operating Supervisor – CR (SRO #1)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L2	No	No
3.	Operating Supervisor - FS (SRO #2) [1]	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L3 T5/L11	No	No
4.	Reactor Operator (RO #1)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L4	No	No
5.	Reactor Operator (RO #2)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L5 T5/L5	No	No
6.	Security Shift Supervisor	CP RERP, Figure 5-1, Table 5-1	75	T2/L7	No	No
7.	SAS Operator	CP RERP, Figure 5-1, Table 5-1	N/A	T5/L6	No	No

Notes: [1] STA is a function and not a position. STA is a collateral duty of the Operating Supervisors (CR or FS).

Callaway Plant On-Shift Staffing Analysis

TABLE 2 - Plant Operations & Safe Shutdown Analysis # 1

One Unit - One Control Room
Minimum Operations Crew Necessary to Implement
OTOs and EOPs, or SAMGs if applicable

Line	Generic Title/Role	On-Shift Position	Task Performance Validation
1.	Shift Manager	Shift Manager	Operator Training
2.	Shift Supervisor	Operating Supervisor – CR (SRO #1)	Operator Training
3.	Shift Supervisor	Operating Supervisor – FS (SRO #2) [1]	Operator Training
4.	Reactor Operator (OATC)	Reactor Operator (RO #1)	Operator Training
5.	Reactor Operator (BOP)	Plant Operator (RO #2)	Operator Training

Notes: See Table 2A for OTO/EOP actions

[1] STA function is a collateral duty of the Operating Supervisor.

Other (non-Operations) Personnel Necessary to Implement
OTOs and EOPs, or SAMGs if applicable

Line	Generic Title/Role	On-Shift Position	Task Performance Validation
7.	Security Shift Supervisor	Security Shift Supervisor	Security Training

Notes: Notify and remain available to Shift Manager

Callaway Plant On-Shift Staffing Analysis

Analysis #1, Table 2A – OTO/EOP Actions

Design Basis Threat

Procedure Step/Actions			Performance Time (mins) After Procedure Implementation														
Proc/Step	Task	Assigned Resource	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75
OTO-SK-00001, Attachment A	Close CR Doors, Plant Announcement	SRO1 RO2	x														
OTO-SK-00001, Step 10-13	Trip the Reactor, Actuate CRVIS, Start Both Diesels	SRO1 RO1 RO2	x														
E-0, Steps 1-4	Verify Reactor Trip	SRO1 RO1	x														
CSF-0.1	Perform CSF Status Tree Monitoring	SRO2	x														
NA	STA Functions	SRO2		x													
ES-0.1, Steps 1-7	Verify Reactor Trip Response	SRO1 RO1 RO2	x														
ES-0.1, Steps 8	Transfer Pressure Control to Steam Pressure Mode	SRO1 RO2		x													
ES-0.1, Steps 9-10	Verify Reactor Trip Response	SRO1 RO1 RO2		x													
ES-0.1, Steps 11	EOP Addendum 10, Secure Unnecessary Equipment	SRO1 RO1		x													
ES-0.1, Steps 12	Throttle Auxiliary Feedwater	SRO1 RO2		x													
ES-0.1, Steps 13	Transition to OTG-ZZ-00005: Hot Standby Procedure	SRO1 RO1 RO2			x												
OTO-SK-00001, Step 20	Initiate RCS Cooldown using Steam Dumps	SRO1 RO1 RO2			x												

Callaway Plant On-Shift Staffing Analysis

TABLE 3 – Firefighting Analysis #1

Line	Performed By	Task Analysis Controlling Method
1.	N/A	N/A
2.	N/A	N/A
3.	N/A	N/A
4.	N/A	N/A
5.	N/A	N/A

Notes: N/A no Fire Brigade response required

Callaway Plant On-Shift Staffing Analysis

TABLE 4 – Radiation Protection & Chemistry Analysis #1

Line	Position Performing Function/Task	Performance Time Period After Emergency Declaration (minutes)																	
		0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75	75-80	80-85	85-90
1.	In-Plant Survey On-Shift Position: HP #1																		
2.	Out of Plant Survey On-Shift Position: HP #1																		
3.	Personnel Monitoring On-Shift Position:																		
4.	Job Coverage On-Shift Position:																		
5.	Offsite Radiological Assessment On-Shift Position: HP #2																		
6.	Other Site-Specific RP – Describe: On-Shift Position:																		
7.	Chemistry function/task #1 – Describe: On-Shift Position: CT #1																		
8.	Chemistry function/task #2 – Describe: On-Shift Position: CT #1																		

Notes: No response – Chemistry and HP in duck and cover

Callaway Plant On-Shift Staffing Analysis

TABLE 5 – Emergency Plan Implementation Analysis #1

Line	Function/Task	On-Shift Position	Task Analysis Controlling Method
1.	Declare the Emergency Classification Level (ECL)	Shift Manager	EP/Ops Training and EP Drill Program
2.	Approve Offsite Protective Action Recommendations	N/A	N/A
3.	Approve content of State/local notifications	Shift Manager	EP/Ops Training and EP Drill Program
4.	Approve extension to allowable dose limits	N/A	N/A
5.	Notification and direction to on-shift staff (e.g., to assemble, evacuate, etc.)	RO#2	EP/Ops Training and EP Drill Program
6.	ERO notification	SAS Operator	EP/Security Training and EP Drill Program
7.	Abbreviated NRC notification for DBT event	Shift Manager	EP/Ops Training and EP Drill Program
8.	Complete State/local notification form	Shift Manager	EP/Ops Training and EP Drill Program
9.	Perform State/local notifications	Shift Manager	EP Training and EP Drill Program
10.	Complete NRC event notification form	Shift Manager	EP/Ops Training and EP Drill Program
11.	Activate ERDS	SRO#2	EP/Ops Training and EP Drill Program
12.	Offsite radiological assessment	N/A	N/A
13.	Perform NRC notifications	Shift Manager	EP/Ops Training and EP Drill Program
14.	Perform other site-specific event notifications (e.g., INPO, ANI, etc.)	N/A	N/A
15.	Personnel accountability	N/A – after ERO augmentation	N/A

Notes: Site Area Emergency, EAL HS4.1
EIP-ZZ-00101, Classification of Emergencies
EIP-ZZ-00102, Emergency Implementing Actions
EIP-ZZ-00200, Augmentation of the Emergency Organization
EIP-ZZ-00201, Notifications
EIP-ZZ-00217, Emergency Data System Activation

Callaway Plant On-Shift Staffing Analysis

Event Timelines and Assumptions

Event #1 Design Basis Threat

Initial Conditions:

Time: Sunday @0230

Unit @ 100% Power

RCS @ normal operating temperature and pressure

Sequence of Events:

0235 Adversary force assaults Callaway and attempts to breach the protected area fence

Security engages adversaries and notifies Shift Manager

0236 CR personnel initiate Security Event response OTO

Rx manually tripped

On-site protective actions initiated

Emergency Plan entered

0240 Security informs Shift Manager that PA has been breached

0245 Security informs Shift Manager that adversaries have been neutralized

No injuries to site personnel
No fires or collateral damage to plant equipment
No adverse consequences to plant safety

Callaway Plant On-Shift Staffing Analysis

Appendix B

Analysis #2: DBA/ISG Event #2 - Steam Line Break **ECL: Unusual Event**

TABLE 1 – On-shift Positions

Line	On-shift Position	Emergency Plan Reference	Augmentation Elapsed Time (min)	Role in Table#/Line#	Unanalyzed Task?	TMS Required?
1.	Shift Manager	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L1 T5/L1 T5/L3 T5/L5	No	No
2.	Operating Supervisor – CR (SRO #1)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L2	No	No
3.	Operating Supervisor - FS (SRO #2) [1]	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L3	No	No
4.	Reactor Operator (RO #1)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L4	No	No
5.	Reactor Operator (RO #2)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L5	No	No
6.	Ops/Asst Ops Technician (NLO #1)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L6	No	No
7.	Ops/Asst Ops Technician (NLO #3)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L7	No	No
8.	Offsite Communicator (NLO #5)	CP RERP, Figure 5-1, Table 5-1	75	T5/L8 T5/L9 T5/L10 T5/L13	No	No
9.	Ops Technician (NLO #6)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L8	No	No
10.	HP Technician (HP #1)	CP RERP, Figure 5-1, Table 5-1	75	T4/L1	No	No
11.	HP Technician (HP #2)	CP RERP, Figure 5-1, Table 5-1	75	T4/L5	No	No
12.	Chemistry Technician (CT #1)	CP RERP, Figure 5-1, Table 5-1	75	T4/L7	No	No

Notes: [1] STA is a function and not a position. STA is a collateral duty of the Operating Supervisors (CR or FS).

Callaway Plant On-Shift Staffing Analysis

TABLE 2 - Plant Operations & Safe Shutdown Analysis # 2

One Unit - One Control Room
Minimum Operations Crew Necessary to Implement
OTOs and EOPs, or SAMGs if applicable

Line	Generic Title/Role	On-Shift Position	Task Performance Validation
1.	Shift Manager	Shift Manager	Operator Training
2.	Shift Supervisor	Operating Supervisor – CR (SRO #1)	Operator Training
3.	Shift Supervisor	Operating Supervisor – FS (SRO #2) [1]	Operator Training
4.	Reactor Operator (OATC)	Reactor Operator (RO #1)	Operator Training
5.	Reactor Operator (BOP)	Plant Operator (RO #2)	Operator Training
6.	Auxiliary Operator	Ops/Asst Ops Technician (NLO #1)	Operator Training
7.	Auxiliary Operator	Ops/Asst Ops Technician (NLO #3)	Operator Training
8.	Auxiliary Operator	Ops Technician (NLO #6)	Operator Training

Notes: See Table 2A for OTO/EOP actions

[1] STA function is a collateral duty of the Operating Supervisor.

Callaway Plant On-Shift Staffing Analysis

Analysis #2, Table 2A – OTO/EOP Actions

Main Steam Line Break

Procedure Step/Actions			Performance Time (mins) After Procedure Implementation														
Proc/Step	Task	Assigned Resource	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75
E-0 Immediate Actions	Perform Reactor Trip Immediate Actions	SRO1 RO1 RO2	x														
E-0-FOP-2	Isolate AFW to Faulted SG	SRO1 RO2	x														
E-0, Steps 1-4	Verify Reactor Trip/SI	SRO1 RO1	x														
NA	STA Functions	SRO2	x														
E-0, Step 5	Perform Attachment A – Actuation Verification	SRO1 RO2		x													
E-0, Steps 6-12	Verify Equipment Conditions	SRO1 RO1		x													
E-0, Step 13	Throttle AFW to Reduce RCS Cooldown	SRO1 RO2			x												
E-0, Step 14	Transition to E-2 due to Faulted SG	SRO1 RO1			x												
CSF-0.1	Perform CSF Status Tree Monitoring	SRO2			x												
E-2, Steps 1-7	Check Conditions, Verify SG Isolated, Restore Instrument Air	SRO1 RO1 RO2 NLO6			x												
E-2, Step 6	Sample SGs and Survey Steam Lines	CT1 HP1			x												
E-2, Steps 8-9	Reset SI	SRO1 RO1				x											
E-2, Step 10	Transition to ES-1.1 “SI Termination”	SRO1				x											
ES-1.1, Steps 3-4	Reset Containment Isolation Phase A	SRO1 RO1				x											
ES-1.1, Steps 5-8	Isolate Boron Injection Header & Establish Charging	SRO1 RO1					x										
ES-1.1, Steps 9-12	Secure SI, RHR and Containment Spray	SRO1 RO2						x									
ES-1.1, Step 13	Restore Breakers for Boric Acid Pumps	NLO1						x									

Callaway Plant On-Shift Staffing Analysis

Main Steam Line Break

Procedure Step/Actions			Performance Time (mins) After Procedure Implementation														
Proc/Step	Task	Assigned Resource	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75
ES-1.1, Steps 13-15	Restore VCT and Excess Letdown	SRO1 RO1						x									
ES-1.1, Steps 16-18	Check Equipment, Use ASDs for Temperature Control	SRO1 RO2							x								
ES-1.1, Step 19	EOP Addendum 7: Emergency Purge H2 from Main Generator	R02 NLO1								x							
ES-1.1, Step 19	EOP Addendum 8: Load Equipment on AC Buses	RO1 NLO3 NLO6								x							
ES-1.1, Steps 19-20	Continuous Action to Restore Power	RO2								Hold for Power Restoration							
ES-1.1, Steps 21-30	Secure Unnecessary Equipment and Restore Normal Lineups	SRO1 RO2									x						

Callaway Plant On-Shift Staffing Analysis

TABLE 3 – Firefighting Analysis # 2

Line	Performed By	Task Analysis Controlling Method
1.	N/A	N/A
2.	N/A	N/A
3.	N/A	N/A
4.	N/A	N/A
5.	N/A	N/A

Notes: No Fire Brigade response for this event.

Callaway Plant On-Shift Staffing Analysis

TABLE 4 – Radiation Protection & Chemistry Analysis # 2

Line	Position Performing Function/Task	Performance Time Period After Emergency Declaration (minutes)																	
		0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75	75-80	80-85	85-90
1.	In-Plant Survey On-Shift Position: HP #1	X																	
2.	Out of Plant Survey On-Shift Position: HP #1																		
3.	Personnel Monitoring On-Shift Position:																		
4.	Job Coverage On-Shift Position:																		
5.	Offsite Radiological Assessment On-Shift Position: HP #2	X																	
6.	Other Site-Specific RP – Describe: On-Shift Position:																		
7.	Chemistry function/task #1 – Describe: SG sampling and analysis On-Shift Position: CT #1	X																	
8.	Chemistry function/task #2 – Describe: On-Shift Position: CT #1																		

Notes: EIP-ZZ-01211, Accident Dose Assessment
CTP-ZZ-02590, Primary to Secondary Leak Rate Determination

Callaway Plant On-Shift Staffing Analysis

TABLE 5 – Emergency Plan Implementation Analysis # 2

Line	Function/Task	On-Shift Position	Task Analysis Controlling Method
1.	Declare the Emergency Classification Level (ECL)	Shift Manager	EP/Ops Training and EP Drill Program
2.	Approve Offsite Protective Action Recommendations	N/A	N/A
3.	Approve content of State/local notifications	Shift Manager	EP/Ops Training and EP Drill Program
4.	Approve extension to allowable dose limits	N/A	N/A
5.	Notification and direction to on-shift staff (e.g., to assemble, evacuate, etc.)	Shift Manager	EP/Ops Training and EP Drill Program
6.	ERO notification	N/A	N/A
7.	Abbreviated NRC notification for DBT event	N/A	N/A
8.	Complete State/local notification form	NLO #5	EP/Ops Training and EP Drill Program
9.	Perform State/local notifications	NLO #5	EP Training and EP Drill Program
10.	Complete NRC event notification form	NLO #5	EP/Ops Training and EP Drill Program
11.	Activate ERDS	N/A	N/A
12.	Offsite radiological assessment	N/A	N/A
13.	Perform NRC notifications	NLO #5	EP/Ops Training and EP Drill Program
14.	Perform other site-specific event notifications (e.g., INPO, ANI, etc.)	N/A	N/A
15.	Personnel accountability	N/A	N/A

Notes: NUE, EAL SU1.1
EIP-ZZ-00101, Classification of Emergencies
EIP-ZZ-00102, Emergency Implementing Actions
EIP-ZZ-00200, Augmentation of the Emergency Organization
EIP-ZZ-00201, Notifications
EIP-ZZ-00212, Protective Action Recommendations
EIP-ZZ-00217, Emergency Data System Activation
EIP-ZZ-00230, Accountability

Callaway Plant On-Shift Staffing Analysis

Event Timelines and Assumptions

Event #2 Steam System Pipe Break
(Main Steam Line Break)

Initial Conditions:

Time: Saturday @ 0250

Unit @ Mode 3, Hot Zero Power; EOL

RCS @ Hot Zero Power operating temperature (T_{avg} = 557 ◦F) and pressure

Sequence of Events:

0250 SG B Main Steam Line fails (double-ended rupture), outside of containment but upstream of MSIV.

LOOP occurs coincident with steam line break
EDG's start and load supplying power to ESF busses

MSIVs closed within 17 seconds

Rx Trip initiated on low steamline pressure signal
Most reactive RCCA stuck in full withdrawn position

SI initiated
'A' High Head Safety Injection Pump starts and supplies flow
'B' Train of SI fails

0255 Emergency Plan Initiated

Callaway Plant On-Shift Staffing Analysis

Appendix B

Analysis #3: DBA/ISG Event #3 - Main Feedwater Line Break **ECL Unusual Event**

TABLE 1 – On-shift Positions

Line	On-shift Position	Emergency Plan Reference	Augmentation Elapsed Time (min)	Role in Table#/Line#	Unanalyzed Task?	TMS Required?
1.	Shift Manager	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L1 T5/L1 T5/L3 T5/L5	No	No
2.	Operating Supervisor – CR (SRO #1)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L2	No	No
3.	Operating Supervisor - FS (SRO #2) [1]	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L3	No	No
4.	Reactor Operator (RO #1)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L4	No	No
5.	Reactor Operator (RO #2)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L5	No	No
6.	Ops/Asst Ops Technician (NLO #1)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L6	No	No
7.	Ops/Asst Ops Technician (NLO #3)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L7	No	No
8.	Offsite Communicator (NLO #5)	CP RERP, Figure 5-1, Table 5-1	75	T5/L8 T5/L9 T5/L10 T5/L13	No	No
9.	Ops Technician (NLO #6)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L8	No	No
10.	HP Technician (HP #1)	CP RERP, Figure 5-1, Table 5-1	75	T4/L1	No	No
11.	HP Technician (HP #2)	CP RERP, Figure 5-1, Table 5-1	75	T4/L5	No	No
12.	Chemistry Technician (CT #1)	CP RERP, Figure 5-1, Table 5-1	75	T4/L7	No	No

Notes: [1] STA is a function and not a position. STA is a collateral duty of the Operating Supervisors (CR or FS).

Callaway Plant On-Shift Staffing Analysis

TABLE 2 - Plant Operations & Safe Shutdown Analysis # 3

One Unit - One Control Room
Minimum Operations Crew Necessary to Implement
OTOs and EOPs, or SAMGs if applicable

Line	Generic Title/Role	On-Shift Position	Task Performance Validation
1.	Shift Manager	Shift Manager	Operator Training
2.	Shift Supervisor	Operating Supervisor – CR (SRO #1)	Operator Training
3.	Shift Supervisor	Operating Supervisor – FS (SRO #2) [1]	Operator Training
4.	Reactor Operator (OATC)	Reactor Operator (RO #1)	Operator Training
5.	Reactor Operator (BOP)	Plant Operator (RO #2)	Operator Training
6.	Auxiliary Operator	Ops/Asst Ops Technician (NLO #1)	Operator Training
7.	Auxiliary Operator	Ops/Asst Ops Technician (NLO #3)	Operator Training
8.	Auxiliary Operator	Ops Technician (NLO #6)	Operator Training

Notes: See Table 2A for OTO/EOP actions

[1] STA function is a collateral duty of the Operating Supervisor.

Callaway Plant On-Shift Staffing Analysis

Analysis #3, Table 2A – OTO/EOP Actions

Feed Line Break

Procedure Step/Actions			Performance Time (mins) After Procedure Implementation														
Proc/Step	Task	Assigned Resource	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75
E-0 Immediate Actions	Perform Reactor Trip Immediate Actions	SRO1 RO1 RO2	x														
E-0-FOP-2	Isolate AFW to Faulted SG	SRO1 RO2	x														
E-0, Steps 1-4	Verify Reactor Trip/SI	SRO1 RO1	x														
NA	STA Functions	SRO2	x														
E-0, Steps 5	Perform Attachment A – Actuation Verification	SRO1 RO2		x													
E-0, Steps 6-12	Verify Equipment Conditions	SRO1 RO1		x													
E-0, Steps 13	Throttle AFW to Reduce RCS Cooldown	SRO1 RO2			x												
E-0, Steps 14	Transition to E-2 due to Faulted SG	SRO1 RO1			x												
CSF-0.1	Perform CSF Status Tree Monitoring	SRO2			x												
E-2, Steps 1-7	Check Conditions, Verify SG Isolated, Restore Instrument Air	SRO1 RO1 RO2 NLO6			x												
E-2, Step6	Sample SGs and Survey Steam Lines	CT1 HP1			x												
E-2, Steps 8-9	Reset SI	SRO1 RO1				x											
E-2, Step 10	Transition to ES-1.1 “SI Termination”	SRO1				x											
ES-1.1, Steps 3-4	Reset Containment Isolation Phase A	SRO1 RO1				x											
ES-1.1, Steps 5-8	Isolate Boron Injection Header & Establish Charging	SRO1 RO1					x										
ES-1.1, Step 9-12	Secure SI, RHR and Containment Spray Pumps	SRO1 RO2						x									
ES-1.1, Step 13	Restore Breakers for Boric Acid Pumps	NLO1						x									

Callaway Plant On-Shift Staffing Analysis

Feed Line Break

Procedure Step/Actions			Performance Time (mins) After Procedure Implementation														
Proc/Step	Task	Assigned Resource	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75
ES-1.1, Steps 13-15	Restore VCT and Normal Letdown	SRO1 RO1						x									
ES-1.1, Steps 16-18	Check Equipment, Use ASDs for Temperature Control	SRO1 RO2							x								
ES-1.1, Step 19	EOP Addendum 7: Emergency Purge H2 from Main Generator	R02 NLO1								x							
ES-1.1, Step 19	EOP Addendum 8: Load Equipment on AC Buses	RO1 NLO3 NLO6								x							
ES-1.1, Step 19-20	Continuous Action to Restore Power	RO2								Hold for Power Restoration							
ES-1.1, Step 21-30	Secure Unnecessary Equipment and Restore Normal Lineups	SRO1 RO1									x						

Callaway Plant On-Shift Staffing Analysis

TABLE 3 – Firefighting Analysis # 3

Line	Performed By	Task Analysis Controlling Method
1.	N/A	N/A
2.	N/A	N/A
3.	N/A	N/A
4.	N/A	N/A
5.	N/A	N/A

Notes: No Fire Brigade response required for this event.

Callaway Plant On-Shift Staffing Analysis

TABLE 4 – Radiation Protection & Chemistry Analysis # 3

Line	Position Performing Function/Task	Performance Time Period After Emergency Declaration (minutes)																	
		0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75	75-80	80-85	85-90
1.	In-Plant Survey On-Shift Position: HP #1	X																	
2.	Out of Plant Survey On-Shift Position: HP #1																		
3.	Personnel Monitoring On-Shift Position:																		
4.	Job Coverage On-Shift Position:																		
5.	Offsite Radiological Assessment On-Shift Position: HP #2	X																	
6.	Other Site-Specific RP – Describe: On-Shift Position:																		
7.	Chemistry function/task #1 – Describe: SG sampling and analysis On-Shift Position: CT #1	X																	
8.	Chemistry function/task #2 – Describe: On-Shift Position: CT #1																		

Notes: EIP-ZZ-01211, Accident Dose Assessment
CTP-ZZ-02590, Primary to Secondary Leak Rate Determination

Callaway Plant On-Shift Staffing Analysis

TABLE 5 – Emergency Plan Implementation Analysis # 3

Line	Function/Task	On-Shift Position	Task Analysis Controlling Method
1.	Declare the Emergency Classification Level (ECL)	Shift Manager	EP/Ops Training and EP Drill Program
2.	Approve Offsite Protective Action Recommendations	N/A	N/A
3.	Approve content of State/local notifications	Shift Manager	EP/Ops Training and EP Drill Program
4.	Approve extension to allowable dose limits	N/A	N/A
5.	Notification and direction to on-shift staff (e.g., to assemble, evacuate, etc.)	Shift Manager	EP/Ops Training and EP Drill Program
6.	ERO notification	N/A	N/A
7.	Abbreviated NRC notification for DBT event	N/A	N/A
8.	Complete State/local notification form	NLO #5	EP/Ops Training and EP Drill Program
9.	Perform State/local notifications	NLO #5	EP Training and EP Drill Program
10.	Complete NRC event notification form	NLO #5	EP/Ops Training and EP Drill Program
11.	Activate ERDS	N/A	N/A
12.	Offsite radiological assessment	N/A	N/A
13.	Perform NRC notifications	NLO #5	EP/Ops Training and EP Drill Program
14.	Perform other site-specific event notifications (e.g., INPO, ANI, etc.)	N/A	N/A
15.	Personnel accountability	N/A	N/A

Notes: NUE, EAL SU1.1
EIP-ZZ-00101, Classification of Emergencies
EIP-ZZ-00102, Emergency Implementing Actions
EIP-ZZ-00200, Augmentation of the Emergency Organization
EIP-ZZ-00201, Notifications
EIP-ZZ-00212, Protective Action Recommendations
EIP-ZZ-00217, Emergency Data System Activation
EIP-ZZ-00230, Accountability

Callaway Plant On-Shift Staffing Analysis

Event Timelines and Assumptions

Event #3 Major Rupture of A Main Feedwater Line
(Main Feedwater Line Break)

Initial Conditions:

Time: Wednesday @ 2250

Unit @ 100% Power

RCS @ normal operating temperature and pressure

Sequence of Events:

2250 Main Feedwater Control System fails

Rx Trip initiated on Lo-Lo Steam Generator Level
LOOP occurs coincident with Rx Trip
EDGs start and supply power to ESF busses

Main Feedwater line to SG C ruptures (double ended) downstream of the check valve inside containment

Main Feedwater isolation valves closed

Aux Feedwater Flow initiated

2300 Emergency Plan initiated

Callaway Plant On-Shift Staffing Analysis

Appendix B

Analysis #4: DBA/ISG Event #4 - RCP Locked Rotor **ECL: Unusual Event**

TABLE 1 – On-shift Positions

Line	On-shift Position	Emergency Plan Reference	Augmentation Elapsed Time (min)	Role in Table#/Line#	Unanalyzed Task?	TMS Required?
1.	Shift Manager	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L1 T5/L1 T5/L3 T5/L5	No	No
2.	Operating Supervisor – CR (SRO #1)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L2	No	No
3.	Operating Supervisor - FS (SRO #2) [1]	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L3	No	No
4.	Reactor Operator (RO #1)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L4	No	No
5.	Reactor Operator (RO #2)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L5	No	No
6.	Ops/Asst Ops Technician (NLO #1)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L6	No	No
7.	Ops/Asst Ops Technician (NLO #3)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L7	No	No
8.	Offsite Communicator (NLO #5)	CP RERP, Figure 5-1, Table 5-1	75	T5/L8 T5/L9 T5/L10 T5/L13	No	No
9.	Ops Technician (NLO #6)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L8	No	No
10.	HP Technician (HP #2)	CP RERP, Figure 5-1, Table 5-1	75	T4/L5	No	No

Notes: [1] STA is a function and not a position. STA is a collateral duty of the Operating Supervisors (CR or FS).

Callaway Plant On-Shift Staffing Analysis

TABLE 2 - Plant Operations & Safe Shutdown Analysis # 4

One Unit - One Control Room
Minimum Operations Crew Necessary to Implement
OTOs and EOPs, or SAMGs if applicable

Line	Generic Title/Role	On-Shift Position	Task Performance Validation
1.	Shift Manager	Shift Manager	Operator Training
2.	Shift Supervisor	Operating Supervisor – CR (SRO #1)	Operator Training
3.	Shift Supervisor	Operating Supervisor – FS (SRO #2) [1]	Operator Training
4.	Reactor Operator (OATC)	Reactor Operator (RO #1)	Operator Training
5.	Reactor Operator (BOP)	Plant Operator (RO #2)	Operator Training
6.	Auxiliary Operator	Ops/Asst Ops Technician (NLO #1)	Operator Training
7.	Auxiliary Operator	Ops/Asst Ops Technician (NLO #3)	Operator Training
8.	Auxiliary Operator	Ops Technician (NLO #6)	Operator Training

Notes: See Table 2A for OTO/EOP actions

[1] STA function is a collateral duty of the Operating Supervisor.

Callaway Plant On-Shift Staffing Analysis
Analysis #4, Table 2A – OTO/EOP Actions

Locked Rotor

Procedure Step/Actions			Performance Time (mins) After Procedure Implementation														
Proc/Step	Task	Assigned Resource	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75
E-0 Immediate Actions	Perform Reactor Trip Immediate Actions	SRO1 RO1 RO2	x														
E-0, Steps 1-4	Verify Reactor Trip	SRO1 RO1	x														
CSF-0.1	Perform CSF Status Tree Monitoring	SRO2	x														
NA	STA Functions	SRO2		x													
ES-0.1, Step 1	Transfer Pressure Control to Steam Pressure Mode	SRO1 RO2	x														
ES-0.1, Step 2	EOP Addendum 7: Emergency Purge H2 from Main Generator or Restore Power to PJ-31	R02 NLO1									x						
ES-0.1, Step 2	EOP Addendum 8: Load Equipment on AC Buses	RO2 NLO3 NLO6		x													
ES-0.1, Step 3	Restore PZR Heaters and Auxiliary Spray (If Needed)	SRO1 RO1		x													
ES-0.1, Steps 4-6	Verify Charging and Letdown Lineup and Feedwater Isolation	SRO1 RO1		x													
ES-0.1, Step 7	Throttle Auxiliary Feedwater Flow	SRO1 RO2		x													
ES-0.1, Step 9	Verify Natural Circulation	SRO1 RO1			x												
ES-0.1, Step 10	Check Source Range Detector Energized	SRO1 RO1			x												
ES-0.1, Step 11	EOP Addendum 10, Secure Unnecessary Equipment	SRO1 RO2			x												
ES-0.1, Steps 12-13	Maintain Stable Conditions & Transition to OTG-ZZ-00005: Hot Standby Procedure	SRO1 RO1 RO2			x												
OTG-ZZ-00005	Hold for Offsite Power Restoration	SRO1			x												

Callaway Plant On-Shift Staffing Analysis

TABLE 3 – Firefighting Analysis # 4

Line	Performed By	Task Analysis Controlling Method
1.	N/A	N/A
2.	N/A	N/A
3.	N/A	N/A
4.	N/A	N/A
5.	N/A	N/A

Notes: No Fire Brigade response required for this event

Callaway Plant On-Shift Staffing Analysis

TABLE 4 – Radiation Protection & Chemistry Analysis #4

Line	Position Performing Function/Task	Performance Time Period After Emergency Declaration (minutes)																	
		0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75	75-80	80-85	85-90
1.	In-Plant Survey On-Shift Position: HP #1																		
2.	Out of Plant Survey On-Shift Position: HP #1																		
3.	Personnel Monitoring On-Shift Position:																		
4.	Job Coverage On-Shift Position:																		
5.	Offsite Radiological Assessment On-Shift Position: HP #2	X																	
6.	Other Site-Specific RP – Describe: On-Shift Position:																		
7.	Chemistry function/task #1 – Describe: Sample and analyze SG. On-Shift Position: CT #1																		
8.	Chemistry function/task #2 – Describe: On-Shift Position: CT #1																		

Notes: EIP-ZZ-01211, Accident Dose Assessment

Callaway Plant On-Shift Staffing Analysis

TABLE 5 – Emergency Plan Implementation Analysis # 4

Line	Function/Task	On-Shift Position	Task Analysis Controlling Method
1.	Declare the Emergency Classification Level (ECL)	Shift Manager	EP/Ops Training and EP Drill Program
2.	Approve Offsite Protective Action Recommendations	N/A	N/A
3.	Approve content of State/local notifications	Shift Manager	EP/Ops Training and EP Drill Program
4.	Approve extension to allowable dose limits	N/A	N/A
5.	Notification and direction to on-shift staff (e.g., to assemble, evacuate, etc.)	Shift Manager	EP/Ops Training and EP Drill Program
6.	ERO notification	N/A	N/A
7.	Abbreviated NRC notification for DBT event	N/A	N/A
8.	Complete State/local notification form	NLO #5	EP/Ops Training and EP Drill Program
9.	Perform State/local notifications	NLO #5	EP Training and EP Drill Program
10.	Complete NRC event notification form	NLO #5	EP/Ops Training and EP Drill Program
11.	Activate ERDS	N/A	N/A
12.	Offsite radiological assessment	N/A	N/A
13.	Perform NRC notifications	NLO #5	EP/Ops Training and EP Drill Program
14.	Perform other site-specific event notifications (e.g., INPO, ANI, etc.)	N/A	N/A
15.	Personnel accountability	N/A	N/A

Notes: Unusual Event, EAL SU1.1
EIP-ZZ-00101, Classification of Emergencies
EIP-ZZ-00102, Emergency Implementing Actions
EIP-ZZ-00200, Augmentation of the Emergency Organization
EIP-ZZ-00201, Notifications
EIP-ZZ-00217, Emergency Data System Activation

Callaway Plant On-Shift Staffing Analysis

Event Timelines and Assumptions

Event #4 Reactor Coolant Pump Shaft Seizure (Locked Rotor)

Initial Conditions:

Time: Friday @ 2045

Unit @ 100% Power

RCS @ maximum steady-state temperature and pressure

Sequence of Events:

2050:00 B RCP rotor seizes

Rx Trip initiated on low RCS flow signal

T-G Trip

Loss of Offsite Power occurs; EDGs start and load to essential buses

2050:05 RCS pressure increases peaks and begins to decrease

PRZR Spray fails to initiate
PORV/PRZR safeties setpoint reached; however, PORVs fail to open

Callaway Plant On-Shift Staffing Analysis

Appendix B

Analysis #5: DBA/ISG Event #6 - RCCA assembly ejection **ECL: Alert**

TABLE 1 – On-shift Positions

Line	On-shift Position	Emergency Plan Reference	Augmentation Elapsed Time (min)	Role in Table#/Line#	Unanalyzed Task?	TMS Required?
1.	Shift Manager	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L1 T5/L1 T5/L3 T5/L5	No	No
2.	Operating Supervisor – CR (SRO #1)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L2	No	No
3.	Operating Supervisor - FS (SRO #2) [1]	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L3 T5/L11	No	No
4.	Reactor Operator (RO #1)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L4	No	No
5.	Reactor Operator (RO #2)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L5	No	No
6.	Ops/Asst Ops Technician (NLO #1)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L6	No	No
7.	Ops/Asst Ops Technician (NLO #3)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L7	No	No
8.	Offsite Communicator (NLO #5)	CP RERP, Figure 5-1, Table 5-1	75	T5/L8 T5/L9 T5/L10 T5/L13	No	No
9.	Ops Technician (NLO #6)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L8	No	No
10.	HP Technician (HP #1)	CP RERP, Figure 5-1, Table 5-1	75	T4/L1	No	No
11.	HP Technician (HP #2)	CP RERP, Figure 5-1, Table 5-1	75	T4/L5	No	No
12.	Chemistry Technician (CT #1)	CP RERP, Figure 5-1, Table 5-1	75	T4/L7 T4/L8 T4/L9	No	No
13.	SAS Operator	CP RERP, Figure 5-1, Table 5-1	N/A	T5/L6	No	No

Notes: [1] STA is a function and not a position. STA is a collateral duty of the Operating Supervisors (CR or FS).

Callaway Plant On-Shift Staffing Analysis

TABLE 2 - Plant Operations & Safe Shutdown Analysis # 5

One Unit - One Control Room
Minimum Operations Crew Necessary to Implement
OTOs and EOPs, or SAMGs if applicable

Line	Generic Title/Role	On-Shift Position	Task Performance Validation
1.	Shift Manager	Shift Manager	Operator Training
2.	Shift Supervisor	Operating Supervisor – CR (SRO #1)	Operator Training
3.	Shift Supervisor	Operating Supervisor – FS (SRO #2) [1]	Operator Training
4.	Reactor Operator (OATC)	Reactor Operator (RO #1)	Operator Training
5.	Reactor Operator (BOP)	Plant Operator (RO #2)	Operator Training
6.	Auxiliary Operator	Ops/Asst Ops Technician (NLO #1)	Operator Training
7.	Auxiliary Operator	Ops/Asst Ops Technician (NLO #3)	Operator Training
8.	Auxiliary Operator	Ops Technician (NLO #6)	Operator Training

Notes: See Table 2A for OTO/EOP actions

[1] STA function is a collateral duty of the Operating Supervisor.

Callaway Plant On-Shift Staffing Analysis
Analysis #5, Table 2A – OTO/EOP Actions

RCCA Ejection

Procedure Step/Actions			Performance Time (mins) After Procedure Implementation														
Proc/Step	Task	Assigned Resource	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75
E-0 Immediate Actions	Perform Reactor Trip Immediate Actions	SRO1 RO1 RO2	x														
E-0-FOP-1	Trip RCPs	SRO1 RO2	x														
E-0, Steps 1-4	Verify Reactor Trip/SI	SRO1 RO1	x														
NA	STA Functions	SRO2	x														
E-0, Step 5	Perform Attachment A – Actuation Verification	SRO1 RO2		x													
E-0, Steps 6-12	Verify Equipment Conditions	SRO1 RO1		x													
E-0, Step 13	Throttle AFW to Reduce RCS Cooldown	SRO1 RO2			x												
E-0, Step 14	Check for Faulted SG	SRO1 RO1			x												
E-0, Step 15	Check SG Tubes Intact	SRO1 RO1			x												
E-0, Step 16	Check RCS Intact, Transition to E-1	SRO1 RO1			x												
CSF-0.1	Perform CSF Status Tree Monitoring	SRO2			x												
E-1, Step 1-3	Check RCP,SG Faulted, RCS Rupture Criteria	SRO1 RO1 RO2			x												
E-1, Step 4	Check Secondary Radiation Normal	SRO1 RO2 CT1 HP1			x												
E-1, Step 5-7	Check PORV, ECCS, Containment Spray Flow	SRO1 RO1				x											
E-1, Steps 8-9	Secure RHR Pumps, Check Pressure Stable	SRO1 RO1				x											
E-1, Step 10	EOP Addendum 7: Emergency Purge H2 or Restore PJ-31 Power within 2 hrs.	SRO1 RO2 NLO1								x							

Callaway Plant On-Shift Staffing Analysis

RCCA Ejection

Procedure Step/Actions			Performance Time (mins) After Procedure Implementation													
Proc/Step	Task	Assigned Resource	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75
E-1, Step 10	EOP Addendum 8: Load Equipment on AC Buses	RO1 NLO3 NLO6				x											
E-1, Step 11	Check Ultimate Heat Sink Lineup	SRO1 RO2					x										
E-1, Step 12	Check Equipment Availability, Align H2 Analyzers	SRO1 RO1					x										
E-1, Step 12	Check RCS Boron Activity and Containment Atmosphere Sample	RO1 CT1						x									
E-1, Step 12	Evaluate Long-Term Recovery	SM						x									
E-1, Step 13	Transition to ES-1.2 “Cooldown/Depressurization”	SRO1							x								
ES-1.2, Step 1-3	Verify SI Reset, Reset CSI-A/B, Align Instrument Air to Containment	SRO1 RO2							x								
ES-1.2, Step 4-7	Verify PZR Heaters OFF, RHR Pumps OFF, SG Levels	SRO1 RO1								x							
ES-1.2, Step 9	Initiate RCS Cooldown	SRO1 RO2								x							
ES-1.2, Step 10, 23, 24	Check Subcooling, Isolate SI Accumulators	SRO1 NLO6								x							
ES-1.2, FOP-4	Transition to Cold Leg Recirculation ES-1.3	SRO1										x					
ES-1.3, Steps 1-5	Align ECCS Pumps for Cold Leg Recirculation	SRO1 RO1										x					
ES-1.3, Step 6	Align Containment Spray for Recirculation	SRO1 RO2															x
ES-1.3, Steps 7-10	Monitor ECCS for Leaks, Monitor Spent Fuel, Makeup to RWST when Offsite Power Available	SRO1 RO2 NLO3												x			
ES-1.3, Step 11	Transition to ES-1.2	SRO1												x			
ES-1.2, Step 26	Restore CCW Normal Flowpath to RCPs	SRO1 RO1													x		
ES-1.2, Steps 27-30	Check Source Range Detectors, Secure Unnecessary Equipment	SRO1 RO1														x	
ES-1.2, Steps 31, 34	Monitor for RHR Start Conditions @ 350F	SRO1 RO2														x	
ES-1.2, Step 36	Loop in Procedure Until <200F	SRO1 RO1															x

Callaway Plant On-Shift Staffing Analysis

TABLE 3 – Firefighting Analysis #5

Line	Performed By	Task Analysis Controlling Method
1.	N/A	N/A
2.	N/A	N/A
3.	N/A	N/A
4.	N/A	N/A
5.	N/A	N/A

Notes: No Fire Brigade response for this event

Callaway Plant On-Shift Staffing Analysis

TABLE 4 – Radiation Protection & Chemistry Analysis #5

Line	Position Performing Function/Task	Performance Time Period After Emergency Declaration (minutes)																	
		0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75	75-80	80-85	85-90
1.	In-Plant Survey On-Shift Position: HP #1	X																	
2.	Out of Plant Survey On-Shift Position: HP #1																		
3.	Personnel Monitoring On-Shift Position:																		
4.	Job Coverage On-Shift Position:																		
5.	Offsite Radiological Assessment On-Shift Position: HP #2	X																	
6.	Other Site-Specific RP – Describe: On-Shift Position:																		
7.	Chemistry function/task #1 – Describe: Steam Generator Sampling and analysis On-Shift Position: CT #1	X																	
8.	Chemistry function/task #2 – Describe: RCS Sampling On-Shift Position: CT #1										X								
9.	Chemistry function/task #3 – Describe: RCS Analysis On-Shift Position: CT #1														X				

Notes: EIP-ZZ-01211, Accident Dose Assessment
In Plant surveys of Main Steam Line per EOP
Chemistry sampling per EOP
CTP-ZZ-02590, Primary to Secondary Leak Rate Determination
Chemistry directed by EOP to sample containment atmosphere however, no procedure guidance exist (CAR 201201251).

Callaway Plant On-Shift Staffing Analysis

TABLE 5 – Emergency Plan Implementation Analysis # 5

Line	Function/Task	On-Shift Position	Task Analysis Controlling Method
1.	Declare the Emergency Classification Level (ECL)	Shift Manager	EP/Ops Training and EP Drill Program
2.	Approve Offsite Protective Action Recommendations	N/A	N/A
3.	Approve content of State/local notifications	Shift Manager	EP/Ops Training and EP Drill Program
4.	Approve extension to allowable dose limits	N/A	N/A
5.	Notification and direction to on-shift staff (e.g., to assemble, evacuate, etc.)	Shift Manager	EP/Ops Training and EP Drill Program
6.	ERO notification	SAS Operator	EP/Security Training and EP Drill Program
7.	Abbreviated NRC notification for DBT event	N/A	N/A
8.	Complete State/local notification form	NLO #5	EP/Ops Training and EP Drill Program
9.	Perform State/local notifications	NLO #5	EP Training and EP Drill Program
10.	Complete NRC event notification form	NLO #5	EP/Ops Training and EP Drill Program
11.	Activate ERDS	SRO #2	EP/Ops Training and EP Drill Program
12.	Offsite radiological assessment	N/A	N/A
13.	Perform NRC notifications	NLO #5	EP/Ops Training and EP Drill Program
14.	Perform other site-specific event notifications (e.g., INPO, ANI, etc.)	N/A	N/A
15.	Personnel accountability	N/A	N/A

Notes: Alert EAL FA1.1
EIP-ZZ-00101, Classification of Emergencies
EIP-ZZ-00102, Emergency Implementing Actions
EIP-ZZ-00200, Augmentation of the Emergency Organization
EIP-ZZ-00201, Notifications
EIP-ZZ-00217, Emergency Data System Activation

Callaway Plant On-Shift Staffing Analysis

Event Timelines and Assumptions

Event #6 RCCA Ejection

Initial Conditions:

Time: Monday @ 0430

Unit @ 100% Power @ BOL; Control Bank D inserted to its insertion limit

RCS @ normal operating temperature and pressure

Sequence of Events:

0430 RCCA H5 is ejected due to unidentified SCC around the housing (circumferential crack)

Rx trips on high neutron flux

One control rod, adjacent to ejected rod, sticks (does not fully insert)

SB LOCA conditions exist

LOOP occurs coincident with Rx trip

EDGs start and load to ESF buses

0435 Emergency Plan initiated

Callaway Plant On-Shift Staffing Analysis
Appendix B
Analysis #6: DBA/ISG Event #7 - Steam Generator Tube Rupture (Stuck ADV) **ECL: Alert**
TABLE 1 – On-shift Positions

Line	On-shift Position	Emergency Plan Reference	Augmentation Elapsed Time (min)	Role in Table#/Line#	Unanalyzed Task?	TMS Required?
1.	Shift Manager	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L1 T5/L1 T5/L3 T5/L5	No	No
2.	Operating Supervisor – CR (SRO #1)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L2	No	No
3.	Operating Supervisor - FS (SRO #2) [1]	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L3 T5/L11	No	No
4.	Reactor Operator (RO #1)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L4	No	No
5.	Reactor Operator (RO #2)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L5	No	No
6.	Ops/Asst Ops Technician (NLO #1)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L6	No	No
7.	Ops/Asst Ops Technician (NLO #2)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L7	No	No
8.	Ops/Asst Ops Technician (NLO #3)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L8	No	No
9.	Ops/Asst Ops Technician (NLO #4)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L9	No	No
10.	Offsite Communicator (NLO #5)	CP RERP, Figure 5-1, Table 5-1	75	T5/L8 T5/L9 T5/L10 T5/L13	No	No
11.	Ops Technician (NLO #6)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L10	No	No
12.	HP Technician (HP #1)	CP RERP, Figure 5-1, Table 5-1	75	T4/L1	No	No
13.	HP Technician (HP #2)	CP RERP, Figure 5-1, Table 5-1	75	T4/L5	No	No
14.	Chemistry Technician (CT #1)	CP RERP, Figure 5-1, Table 5-1	75	T4/L7 T4/L8 T4/L9	No	No
15.	SAS Operator	CP RERP, Figure 5-1, Table 5-1	N/A	T5/L6	No	No

Notes: [1] STA is a function and not a position. STA is a collateral duty of the Operating Supervisors (CR or FS).

Callaway Plant On-Shift Staffing Analysis

TABLE 2 - Plant Operations & Safe Shutdown Analysis # 6

One Unit - One Control Room
Minimum Operations Crew Necessary to Implement
OTOs and EOPs, or SAMGs if applicable

Line	Generic Title/Role	On-Shift Position	Task Performance Validation
1.	Shift Manager	Shift Manager	Operator Training
2.	Shift Supervisor	Operating Supervisor – CR (SRO #1)	Operator Training
3.	Shift Supervisor	Operating Supervisor – FS (SRO #2) [1]	Operator Training
4.	Reactor Operator (OATC)	Reactor Operator (RO #1)	Operator Training
5.	Reactor Operator (BOP)	Plant Operator (RO #2)	Operator Training
6.	Auxiliary Operator	Ops/Asst Ops Technician (NLO #1)	Operator Training
7.	Auxiliary Operator	Ops/Asst Ops Technician (NLO #2)	Operator Training
8.	Auxiliary Operator	Ops/Asst Ops Technician (NLO #3)	Operator Training
9.	Auxiliary Operator	Ops/Asst Ops Technician (NLO #4)	Operator Training
10.	Auxiliary Operator	Ops Technician (NLO #6)	Operator Training

Notes: See Table 2A for OTO/EOP actions

[1] STA function is a collateral duty of the Operating Supervisor.

Callaway Plant On-Shift Staffing Analysis
Analysis #6, Table 2A – OTO/EOP Actions

SGTR

Procedure Step/Actions			Performance Time (mins) After Procedure Implementation														
Proc/Step	Task	Assigned Resource	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75
OTO-BB-00001, Step 1	Maximize Charging, Isolate Letdown, Trip Rx, Inject SI Manually, Transition to E-0	SRO1 RO1	x														
E-0 Immediate Actions	Perform Reactor Trip Immediate Actions	SRO1 RO1 RO2	x														
E-0-FOP-3	Isolate Auxiliary Feed to D SG	SRO1 RO2	x														
E-0, Steps 1-4	Verify Reactor Trip/SI	SRO1 RO1	x														
NA	STA Functions	SRO2	x														
E-0, Step 5	Perform Attachment A – Actuation Verification	SRO1 RO2		x													
E-0, Steps 6-12	Verify Equipment Conditions	SRO1 RO1		x													
E-0-FOP-2	Fast Close MSIVs, Dispatch NLO to Manually Isolate D ASD	SRO1 RO2 NLO6		x													
E-0, Step 13	Throttle AFW to Reduce RCS Cooldown	SRO1 RO2			x												
E-0, Step 14	Transition to E-2 due to Faulted SG	SRO1 RO1			x												
CSF-0.1	Perform CSF Status Tree Monitoring	SRO2			x												
E-2, Steps 1-5	Check Conditions, Verify SG Isolated	SRO1 RO1			x												
E-2, Step 6	Check Secondary Radiation EOP Addendum 11, Restore SG Sampling after SI	RO2 NLO4			x												
E-2, Step 6	Chemistry Sampling, Survey Steam Lines	SRO1 RO2 CT1 HP1			x												
E-2, Step 6	Transition to E-3, SGTR	SRO1				x											
E-3, Steps 1-3	Identify & Isolate Ruptured SG (D)	SRO1 RO1				x											
E-3, Steps 4-5	Check Ruptured SG Level/Pressure	SRO1 RO1					x										

Callaway Plant On-Shift Staffing Analysis

SGTR

Procedure Step/Actions			Performance Time (mins) After Procedure Implementation														
Proc/Step	Task	Assigned Resource	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75
E-3, Steps 6-7	Initiate RCS Cooldown	SRO1 RO1 RO2						x									
E-3, Steps 8-12	Check PORVs, Reset SI, Reset CISA, Stop RHR Pumps	SRO1 RO1							x								
E-3, Steps 13-15	Stop Cooldown, Ensure Stable SG Conditions	SRO1 RO1								x							
E-3, Steps 16-17	Depressurize RCS	SRO1 RO1								x							
E-3, Steps 18-21	Terminate ECCS Flow	SRO1 RO1									x						
E-3, Step 22	Check Adequate RCS Depressurization	SRO1 RO1									x						
E-3, Steps 23-25	Establish Normal Charging Flow	SRO1 RO1										x					
E-3, Steps 26-28	Restore VCT & Excess Letdown and PRZ Heaters	SRO1 RO1 NLO6										x					
E-3, Step 29	Manually Isolate Accumulators	SRO1 RO2 NLO4											x				
E-3, Step 30	Balance RCS & SG Pressure to Minimize Leakage	SRO1 RO1											x				
E-3, Step 31	Check Containment Spray Not Running	SRO1 RO1											x				
E-3, Step 32	EOP Addendum 7: Emergency Purge H2 or Restore PJ-31 Power within 2 hrs.	SRO1 RO2 NLO1													x		
E-3, Step 33	EOP Addendum 8: Load Equipment on AC Buses	RO1 NLO3 NLO6												x			
E-3, Step 34	Minimize Secondary System Contamination	RO2 NLO2													x		
E-3, Steps 35-39	Normal CCW Lineups, Verify Source Range Energized, EOP Addendum 10 "Shutdown Unnecessary Equipment"	SRO1 RO1														x	
E-3, Step 40	Transition to ES-3.1 "Post SGTR Cooldown"	SRO1															x

Callaway Plant On-Shift Staffing Analysis

TABLE 3 – Firefighting Analysis #6

Line	Performed By	Task Analysis Controlling Method
1.	N/A	N/A
2.	N/A	N/A
3.	N/A	N/A
4.	N/A	N/A
5.	N/A	N/A

Notes: No Fire Brigade response for this event

Callaway Plant On-Shift Staffing Analysis

TABLE 4 – Radiation Protection & Chemistry Analysis #6

Line	Position Performing Function/Task	Performance Time Period After Emergency Declaration (minutes)																	
		0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75	75-80	80-85	85-90
1.	In-Plant Survey On-Shift Position: HP #1	X																	
2.	Out of Plant Survey On-Shift Position: HP #1																		
3.	Personnel Monitoring On-Shift Position:																		
4.	Job Coverage On-Shift Position:																		
5.	Offsite Radiological Assessment On-Shift Position: HP #2	X																	
6.	Other Site-Specific RP – Describe: On-Shift Position:																		
7.	Chemistry function/task #1 – Describe: Steam Generator Sampling and analysis On-Shift Position: CT #1	X																	
8.	Chemistry function/task #2 – Describe: RCS Sampling On-Shift Position: CT #1										X								
9.	Chemistry function/task #3 – Describe: RCS Analysis On-Shift Position: CT #1														X				

Notes: EIP-ZZ-01211, Accident Dose Assessment
In Plant surveys of Main Steam Line per EOP
Chemistry sampling per EOP
CTP-ZZ-02590, Primary to Secondary Leak Rate Determination

Callaway Plant On-Shift Staffing Analysis

TABLE 5 – Emergency Plan Implementation Analysis # 6

Line	Function/Task	On-Shift Position	Task Analysis Controlling Method
1.	Declare the Emergency Classification Level (ECL)	Shift Manager	EP/Ops Training and EP Drill Program
2.	Approve Offsite Protective Action Recommendations	N/A	N/A
3.	Approve content of State/local notifications	Shift Manager	EP/Ops Training and EP Drill Program
4.	Approve extension to allowable dose limits	N/A	N/A
5.	Notification and direction to on-shift staff (e.g., to assemble, evacuate, etc.)	Shift Manager	EP/Ops Training and EP Drill Program
6.	ERO notification	SAS Operator	EP/Security Training and EP Drill Program
7.	Abbreviated NRC notification for DBT event	N/A	N/A
8.	Complete State/local notification form	NLO #5	EP/Ops Training and EP Drill Program
9.	Perform State/local notifications	NLO #5	EP Training and EP Drill Program
10.	Complete NRC event notification form	NLO #5	EP/Ops Training and EP Drill Program
11.	Activate ERDS	SRO #2	EP/Ops Training and EP Drill Program
12.	Offsite radiological assessment	N/A	N/A
13.	Perform NRC notifications	NLO #5	EP/Ops Training and EP Drill Program
14.	Perform other site-specific event notifications (e.g., INPO, ANI, etc.)	N/A	N/A
15.	Personnel accountability	N/A	N/A

Notes: Alert, EAL FA1.1
EIP-ZZ-00101, Classification of Emergencies
EIP-ZZ-00102, Emergency Implementing Actions
EIP-ZZ-00200, Augmentation of the Emergency Organization
EIP-ZZ-00201, Notifications
EIP-ZZ-00217, Emergency Data System Activation

Callaway Plant On-Shift Staffing Analysis

Event Timelines and Assumptions

Event #7 Steam Generator Tube Rupture

Initial Conditions:

Time: Wednesday @ 2100

Unit @ 100% Power
RCS @ normal operating temperature and pressure

Sequence of Events:

2105 SGTR occurs – double ended guillotine break of one hot leg SG tube in D SG

AB-RE-0016D, N16 monitor

GE-RE-92, Condenser off Gas

2111 Rx trip on overtemperature ΔT or manual trip by RO
Highest worth control rod stuck in fully withdrawn position

SI initiated

Loss of offsite power occurs; EDG startup and provide power to necessary engineered safeguards equipment

D ASD fails open

AB-RE-114, D Main Steam Line ASD Monitor, in alarm

Emergency Plan initiated

2131 Operators manually close D ASD block valve

Callaway Plant On-Shift Staffing Analysis

Appendix B

Analysis #7: DBA/ISG Event #8 - LOCA, with release and PARS **ECL: Site Area Emergency- General Emergency**

TABLE 1 – On-shift Positions

Line	On-shift Position	Emergency Plan Reference	Augmentation Elapsed Time (min)	Role in Table#/Line#	Unanalyzed Task?	TMS Required?
1.	Shift Manager	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L1 T5/L1 T5/L2 T5/L3 T5/L4 T5/L5	No	No
2.	Operating Supervisor – CR (SRO #1)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L2	No	No
3.	Operating Supervisor - FS (SRO #2) [1]	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L3 T5/L11	No	No
4.	Reactor Operator (RO #1)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L4	No	No
5.	Reactor Operator (RO #2)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L5	No	No
6.	Ops/Asst Ops Technician (NLO #1)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L6	No	No
7.	Ops/Asst Ops Technician (NLO #3)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L7	No	No
8.	Offsite Communicator (NLO #5)	CP RERP, Figure 5-1, Table 5-1	75	T5/L8 T5/L9 T5/L10 T5/L13	No	No
9.	Ops Technician (NLO #6)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L8	No	No
10.	HP Technician (HP #1)	CP RERP, Figure 5-1, Table 5-1	75	T4/L1	No	No
11.	HP Technician (HP #2)	CP RERP, Figure 5-1, Table 5-1	75	T4/L5	No	No
12.	Chemistry Technician (CT #1)	CP RERP, Figure 5-1, Table 5-1	75	T4/L7	No	No
13.	SAS Operator	CP RERP, Figure 5-1, Table 5-1	N/A	T5/L6	No	No
14.	CAS Operator	CP RERP, Figure 5-1, Table 5-1	N/A	T5/L15	No	No

Notes: [1] STA is a function and not a position. STA is a collateral duty of the Operating Supervisors (CR or FS).

Callaway Plant On-Shift Staffing Analysis

TABLE 2 - Plant Operations & Safe Shutdown Analysis # 7

One Unit - One Control Room
Minimum Operations Crew Necessary to Implement
OTOs and EOPs, or SAMGs if applicable

Line	Generic Title/Role	On-Shift Position	Task Performance Validation
1.	Shift Manager	Shift Manager	Operator Training
2.	Shift Supervisor	Operating Supervisor – CR (SRO #1)	Operator Training
3.	Shift Supervisor	Operating Supervisor – FS (SRO #2) [1]	Operator Training
4.	Reactor Operator (OATC)	Reactor Operator (RO #1)	Operator Training
5.	Reactor Operator (BOP)	Plant Operator (RO #2)	Operator Training
6.	Auxiliary Operator	Ops/Asst Ops Technician (NLO #1)	Operator Training
7.	Auxiliary Operator	Ops/Asst Ops Technician (NLO #3)	Operator Training
8.	Auxiliary Operator	Ops Technician (NLO #6)	Operator Training

Notes: See Table 2A for OTO/EOP actions

[1] STA function is a collateral duty of the Operating Supervisor.

Callaway Plant On-Shift Staffing Analysis

Analysis #7, Table 2A – OTO/EOP Actions

LB LOCA with Release and PARs

Procedure Step/Actions			Performance Time (mins) After Procedure Implementation														
Proc/Step	Task	Assigned Resource	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75
E-0 Immediate Actions	Perform Reactor Trip Immediate Actions	SRO1 RO1 RO2	x														
E-0, Steps 1-4	Verify Reactor Trip/SI	SRO1 RO1	x														
NA	STA Functions	SRO2	x														
E-0, Step 5	Perform Attachment A – Actuation Verification	SRO1 RO2		x													
E-0, Steps 6-12	Verify Equipment Conditions	SRO1 RO1		x													
E-0, Step 13	Throttle AFW	SRO1 RO2			x												
E-0, Step 14	Check for Faulted SG	SRO1 RO1			x												
E-0, FOP-4	Transition to Cold Leg Recirculation ES-1.3	SRO1			x												
ES-1.3, Steps 1-5	Align ECCS Pumps for Cold Leg Recirculation	SRO1 RO1			x												
ES-1.3, Step 6	Align Containment Spray for Recirculation	SRO1 RO2				x											
ES-1.3, Steps 7-10	Monitor ECCS for Leaks, Monitor Spent Fuel, Makeup to RWST when Offsite Power Available	SRO1 RO2 NL03				x											
ES-1.3, Step 10	Transition to E-0, Step 15	SRO1					x										
E-0, Step 15	Check SG Tubes Intact	SRO1 RO1					x										
E-0, Step 16	Check RCS Intact, Transition to E-1	SRO1 RO1					x										
CSF-0.1	Perform CSF Status Tree Monitoring	SRO2					x										
E-1, Steps 1-3	Check RCP, SG Faulted, RCS Rupture Criteria	SRO1 RO1 RO2					x										

Callaway Plant On-Shift Staffing Analysis

LB LOCA with Release and PARs

Procedure Step/Actions			Performance Time (mins) After Procedure Implementation														
Proc/Step	Task	Assigned Resource	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75
E-1, Step 4	EOP Addendum 11: Check Secondary Radiation Normal	SRO1 RO2 CT1 HP1					x										
E-1, Steps 5-7	Check PORV, ECCS, Containment Spray Flow	SRO1 RO1						x									
E-1, Step 8	Check RHR Pumps	SRO1 RO1						x									
E-1, Step 10	EOP Addendum 7: Emergency Purge H2 or Restore PJ-31 Power within 2 hrs.	SRO1 RO2 NLO1								x							
E-1, Step 10	EOP Addendum 8: Load Equipment on AC Buses	RO1 NLO3 NLO6						x									
E-1, Step 11	Check Ultimate Heat Sink Lineup	SRO1 RO2							x								
CSF-ST	Transition to FR-C.1 (RED Path on Core Cooling)	SRO1							x								
FR-C.1, Steps 1-2	Check ECCS Lineup and Flow	SRO1 RO1							x								
FR-C.1, Steps 3-7	Check RCPs, Accumulators Dumped, Conditions Improving (They are not)	SRO1 RO1								x							
FR-C.1, Step 8	Align H2 Analyzers and Check H2 Concentration	SRO1 RO1									x						
FR-C.1, Steps 9-10	Check SG Level and RCS Vent Path	SRO1 RO2									x						
FR-C.1, Step 11	Depressurize SGs to 220 psig	SRO1 RO2									x						
(Core Exit Thermocouple Temperature 1200F) - SAMGs																	

Callaway Plant On-Shift Staffing Analysis

TABLE 3 – Firefighting Analysis #7

Line	Performed By	Task Analysis Controlling Method
1.	N/A	N/A
2.	N/A	N/A
3.	N/A	N/A
4.	N/A	N/A
5.	N/A	N/A

Notes: No Fire Brigade response for this event

Callaway Plant On-Shift Staffing Analysis

TABLE 4 – Radiation Protection & Chemistry Analysis #7

Line	Position Performing Function/Task	Performance Time Period After Emergency Declaration (minutes)																	
		0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75	75-80	80-85	85-90
1.	In-Plant Survey On-Shift Position: HP #1	X																	
2.	Out of Plant Survey On-Shift Position: HP #1																		
3.	Personnel Monitoring On-Shift Position:																		
4.	Job Coverage On-Shift Position:																		
5.	Offsite Radiological Assessment On-Shift Position: HP #2	X																	
6.	Other Site-Specific RP – Describe: On-Shift Position:																		
7.	Chemistry function/task #1 – Describe: Steam Generator Sampling and analysis On-Shift Position: CT #1	X																	

Notes: EIP-ZZ-01211, Accident Dose Assessment
In Plant surveys of Main Steam Line per EOP
Chemistry sampling per EOP
CTP-ZZ-02590, Primary to Secondary Leak Rate Determination
Chemistry directed by EOP to sample containment atmosphere however, no procedure guidance exist (CAR 201201251).

Callaway Plant On-Shift Staffing Analysis

TABLE 5 – Emergency Plan Implementation Analysis # 7

Line	Function/Task	On-Shift Position	Task Analysis Controlling Method
1.	Declare the Emergency Classification Level (ECL)	Shift Manager	EP/Ops Training and EP Drill Program
2.	Approve Offsite Protective Action Recommendations	Shift Manager (GE)	EP/Ops Training and EP Drill Program
3.	Approve content of State/local notifications	Shift Manager	EP/Ops Training and EP Drill Program
4.	Approve extension to allowable dose limits	Shift Manager (GE)	EP/Ops Training and EP Drill Program
5.	Notification and direction to on-shift staff (e.g., to assemble, evacuate, etc.)	Shift Manager	EP/Ops Training and EP Drill Program
6.	ERO notification	SAS Operator	EP/Security Training and EP Drill Program
7.	Abbreviated NRC notification for DBT event	N/A	N/A
8.	Complete State/local notification form	NLO #5	EP/Ops Training and EP Drill Program
9.	Perform State/local notifications	NLO #5	EP Training and EP Drill Program
10.	Complete NRC event notification form	NLO #5	EP/Ops Training and EP Drill Program
11.	Activate ERDS	SRO #2	EP/Ops Training and EP Drill Program
12.	Offsite radiological assessment	N/A	N/A
13.	Perform NRC notifications	NLO #5	EP/Ops Training and EP Drill Program
14.	Perform other site-specific event notifications (e.g., INPO, ANI, etc.)	N/A	N/A
15.	Personnel accountability	CAS Operator	EP/Security Training and EP Drill Program

Notes: Site Area Emergency – General Emergency EAL FS1.1 and FG1.1
EIP-ZZ-00101, Classification of Emergencies
EIP-ZZ-00102, Emergency Implementing Actions
EIP-ZZ-00200, Augmentation of the Emergency Organization
EIP-ZZ-00201, Notifications
EIP-ZZ-00212, Protective Action Recommendations
EIP-ZZ-00217, Emergency Data System Activation
EIP-ZZ-00230, Accountability
State and local notifications communicated electronically (Sentry). NLO #5 is able to maintain NRC communication during GE.

Callaway Plant On-Shift Staffing Analysis

Event Timelines and Assumptions

Event #8 Loss of Coolant Accident (LB LOCA) with release exceeding PAGs and resulting PARs

Initial Conditions:

Time: Monday @ 2200

Unit @100% Power
RCS @ normal operating temperature and pressure

Sequence of Events:

2200 LB LOCA (guillotine break on A cold leg) initiated
RCS leak rate > charging pump capacity

Rx trip on low pressurizer pressure
T-G trip
Loss of offsite power; EDGs start and supply power to respective ESF buses

SI initiated
B train fails
A train pumps on and supplying flow (high head charging pump/safety injection pump/low head injection pump) trips

2201 Operators enter OTO/EOPs

2202 Emergency Plan initiated

2215 RVLIS level 42% with RCP off
Initial Emergency Classification determined

2230 Initial notification to offsite agencies initiated

2235 Conditions degrade
CSFST indicates Core Cooling Red
CSFST indicates Containment Red
Containment Press > 47 psig
RCS Subcooling Margin < 0 ˚F

General Emergency Conditions exist
Release occurs
PARs required

Callaway Plant On-Shift Staffing Analysis

Appendix B

Analysis #8: DBA/ISG – Event #10 - ATWS **ECL: Alert**

TABLE 1 – On-shift Positions

Line	On-shift Position	Emergency Plan Reference	Augmentation Elapsed Time (min)	Role in Table#/Line#	Unanalyzed Task?	TMS Required?
1.	Shift Manager	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L1 T5/L1 T5/L3 T5/L5	No	No
2.	Operating Supervisor – CR (SRO #1)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L2	No	No
3.	Operating Supervisor - FS (SRO #2) [1]	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L3 T5/L11	No	No
4.	Reactor Operator (RO #1)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L4	No	No
5.	Reactor Operator (RO #2)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L5	No	No
6.	Offsite Communicator (NLO #5)	CP RERP, Figure 5-1, Table 5-1	75	T5/L8 T5/L9 T5/L10 T5/L13	No	No
7.	HP Technician (HP #2)	CP RERP, Figure 5-1, Table 5-1	75	T4/L5	No	No
8.	SAS Operator	CP RERP, Figure 5-1, Table 5-1	N/A	T5/L6	No	No

Notes: [1] STA is a function and not a position. STA is a collateral duty of the Operating Supervisors (CR or FS).

Callaway Plant On-Shift Staffing Analysis

TABLE 2 - Plant Operations & Safe Shutdown Analysis # 8

One Unit - One Control Room
Minimum Operations Crew Necessary to Implement
OTOs and EOPs, or SAMGs if applicable

Line	Generic Title/Role	On-Shift Position	Task Performance Validation
1.	Shift Manager	Shift Manager	Operator Training
2.	Shift Supervisor	Operating Supervisor – CR (SRO #1)	Operator Training
3.	Shift Supervisor	Operating Supervisor – FS (SRO #2) [1]	Operator Training
4.	Reactor Operator (OATC)	Reactor Operator (RO #1)	Operator Training
5.	Reactor Operator (BOP)	Plant Operator (RO #2)	Operator Training

Notes: See Table 2A for OTO/EOP actions

[1] STA function is a collateral duty of the Operating Supervisor.

Callaway Plant On-Shift Staffing Analysis

Analysis #8, Table 2A – OTO/EOP Actions

ATWS

Procedure Step/Actions			Performance Time (mins) After Procedure Implementation														
Proc/Step	Task	Assigned Resource	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75
E-0 Immediate Actions	Trip the Reactor and Perform Immediate Actions	SRO1 RO1 RO2	x														
E-0, Steps 1-4	Verify Reactor Trip	SRO1 RO1	x														
CSF-0.1	Perform CSF Status Tree Monitoring	SRO2	x														
NA	STA Functions	SRO2		x													
ES-0.1, Steps 1-7	Verify Reactor Trip Response	SRO1 RO1 RO2	x														
ES-0.1, Step 8	Transfer Pressure Control to Steam Pressure Mode	SRO1 RO2		x													
ES-0.1, Steps 9-10	Verify Reactor Trip Response	SRO1 RO1 RO2		x													
ES-0.1, Step 11	EOP Addendum 10, Secure Unnecessary Equipment	SRO1 RO1			x												
ES-0.1, Step 12	Throttle Auxiliary Feedwater	SRO1 RO2			x												
ES-0.1, Step 13	Transition to OTG-ZZ-00005: Hot Standby Procedure, Maintain Stable Plant Conditions	SRO1 RO1 RO2			x												

Callaway Plant On-Shift Staffing Analysis

TABLE 3 – Firefighting Analysis # 8

Line	Performed By	Task Analysis Controlling Method
1.	N/A	N/A
2.	N/A	N/A
3.	N/A	N/A
4.	N/A	N/A
5.	N/A	N/A

Notes: No Fire Brigade response for this event.

Callaway Plant On-Shift Staffing Analysis

TABLE 4 – Radiation Protection & Chemistry Analysis #8

Line	Position Performing Function/Task	Performance Time Period After Emergency Declaration (minutes)																	
		0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75	75-80	80-85	85-90
1.	In-Plant Survey On-Shift Position: HP #1																		
2.	Out of Plant Survey On-Shift Position: HP #1																		
3.	Personnel Monitoring On-Shift Position:																		
4.	Job Coverage On-Shift Position:																		
5.	Offsite Radiological Assessment On-Shift Position: HP #2	X																	
6.	Other Site-Specific RP – Describe: On-Shift Position:																		
7.	Chemistry function/task #1 – Describe: On-Shift Position: CT #1																		
8.	Chemistry function/task #2 – Describe: On-Shift Position: CT #1																		

Notes: EIP-ZZ-01211, Accident Dose Assessment
Chemistry post trip sampling after augmentation

Callaway Plant On-Shift Staffing Analysis

TABLE 5 – Emergency Plan Implementation Analysis # 8

Line	Function/Task	On-Shift Position	Task Analysis Controlling Method
1.	Declare the Emergency Classification Level (ECL)	Shift Manager	EP/Ops Training and EP Drill Program
2.	Approve Offsite Protective Action Recommendations	N/A	N/A
3.	Approve content of State/local notifications	Shift Manager	EP/Ops Training and EP Drill Program
4.	Approve extension to allowable dose limits	N/A	N/A
5.	Notification and direction to on-shift staff (e.g., to assemble, evacuate, etc.)	Shift Manager	EP/Ops Training and EP Drill Program
6.	ERO notification	SAS Operator	EP/Security Training and EP Drill Program
7.	Abbreviated NRC notification for DBT event	N/A	N/A
8.	Complete State/local notification form	NLO #5	EP/Ops Training and EP Drill Program
9.	Perform State/local notifications	NLO #5	EP Training and EP Drill Program
10.	Complete NRC event notification form	NLO #5	EP/Ops Training and EP Drill Program
11.	Activate ERDS	SRO #2	EP/Ops Training and EP Drill Program
12.	Offsite radiological assessment	N/A	N/A
13.	Perform NRC notifications	NLO #5	EP/Ops Training and EP Drill Program
14.	Perform other site-specific event notifications (e.g., INPO, ANI, etc.)	N/A	N/A
15.	Personnel accountability	N/A	N/A

Notes: Alert**,** EAL SA2.1
EIP-ZZ-00101, Classification of Emergencies
EIP-ZZ-00102, Emergency Implementing Actions
EIP-ZZ-00200, Augmentation of the Emergency Organization
EIP-ZZ-00201, Notifications
EIP-ZZ-00217, Emergency Data System Activation

Callaway Plant On-Shift Staffing Analysis

Event Timelines and Assumptions

Event #10 ATWS

Initial Conditions:

Time: Saturday @ 1400

Unit @ 100% Power

RCS @ normal operating temperature and pressure

Sequence of Events:

1400 Turbine trip occurs due to loss of main condenser vacuum without RPS initiated Rx Trip signal

Manual Rx trip by RO in control room is successful

1405 Control Room Supervisor informs Shift Manager of initiating conditions and event

Emergency Plan initiated

Callaway Plant On-Shift Staffing Analysis
Appendix B

Analysis #9: DBA/ISG Event #11 - Aircraft Probable Threat **ECL: Alert**

TABLE 1 – On-shift Positions

Line	On-shift Position	Emergency Plan Reference	Augmentation Elapsed Time (min)	Role in Table#/Line#	Unanalyzed Task?	TMS Required?
1.	Shift Manager	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L1 T5/L1 T5/L3 T5/L8	No	No
2.	Operating Supervisor – CR (SRO #1)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L2	No	No
3.	Operating Supervisor - FS (SRO #2) [1]	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L3 T5/L11	No	No
4.	Reactor Operator (RO #1)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L4	No	No
5.	Reactor Operator (RO #2)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L5 T5/L5	No	No
6.	Ops/Asst Ops Technician (NLO #1)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L6	No	No
7.	Ops/Asst Ops Technician (NLO #2)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L7	No	No
8.	Ops/Asst Ops Technician (NLO #3)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L8	No	No
9.	Ops/Asst Ops Technician (NLO #4)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L9	No	No
10.	Offsite Communicator (NLO #5)	CP RERP, Figure 5-1, Table 5-1	75	T5/L9 T5/L10 T5/L13	No	No
11.	Ops Technician (NLO #6)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L10	No	No
12.	Security Shift Supervisor	CP RERP, Figure 5-1, Table 5-1	75	T2/L11	No	No
13.	SAS Operator	CP RERP, Figure 5-1, Table 5-1	N/A	T5/L6	No	No

Notes: [1] STA is a function and not a position. STA is a collateral duty of the Operating Supervisors (CR or FS).

Callaway Plant On-Shift Staffing Analysis

TABLE 2 - Plant Operations & Safe Shutdown Analysis # 9

One Unit - One Control Room
Minimum Operations Crew Necessary to Implement
OTOs and EOPs, or SAMGs if applicable

Line	Generic Title/Role	On-Shift Position	Task Performance Validation
1.	Shift Manager	Shift Manager	Operator Training
2.	Shift Supervisor	Operating Supervisor – CR (SRO #1)	Operator Training
3.	Shift Supervisor	Operating Supervisor – FS (SRO #2) [1]	Operator Training
4.	Reactor Operator (OATC)	Reactor Operator (RO #1)	Operator Training
5.	Reactor Operator (BOP)	Plant Operator (RO #2)	Operator Training
6.	Auxiliary Operator	Ops/Asst Ops Technician (NLO #1)	Operator Training
7.	Auxiliary Operator	Ops/Asst Ops Technician (NLO #2)	Operator Training
8.	Auxiliary Operator	Ops/Asst Ops Technician (NLO #3)	Operator Training
9.	Auxiliary Operator	Ops/Asst Ops Technician (NLO #4)	Operator Training
10.	Auxiliary Operator	Ops/Asst Ops Technician (NLO #6)	Operator Training

Notes: See Table 2A for OTO/EOP actions

[1] STA function is a collateral duty of the Operating Supervisor.

Other (non-Operations) Personnel Necessary to Implement
OTOs and EOPs, or SAMGs if applicable

Line	Generic Title/Role	On-Shift Position	Task Performance Validation
11.	Security Shift Supervisor (SSS)	Security Shift Supervisor	Security Training

Notes: SSS remains available for contact with Shift Manager and directs closure of main gate.

Callaway Plant On-Shift Staffing Analysis

Analysis #9, Table 2A – OTO/EOP Actions

Aircraft Probable Threat

Procedure Step/Actions			Performance Time (mins) After Procedure Implementation														
Proc/Step	Task	Assigned Resource	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75
OTO-SK-00002, Steps 1-5	Document NRC Initial Call/Evaluate	SRO1	x														
OTO-SK-00002, Attachment B	Ensuring at Probable Event	SRO1	x														
OTO-SK-00002, Attachment D (via Attachment B3)	Plant Announcement, Close CR Doors	SRO1 RO2	x														
OTO-SK-00002, Attachment B7	Contact Security, Close Main Gate	SM SEC	x														
OTO-SK-00002, Attachment B11-B14	Check Equipment Status, Actuate CRVIS and FBIS	SRO1 RO1	x														
OTO-SK-00002, Attachment B15	Secure Exterior Plant Lighting	SRO1 RO2 NLO2 NLO4		x													
OTO-SK-00002, Attachment B16	Direct OT to NB02 Switchgear and NE02	SRO1 NLO1 NLO3		x													
OTO-SK-00002, Attachment B17-21	Verify Equipment Status	SRO1 RO1		x													
OTO-SK-00002, Attachment B22	Top Off Tanks to Upper Limits	SRO1 RO2 NLO2			x												
OTO-SK-00002, Attachment B24	Secure SFP Cleanup	RO1 NLO6			x												
OTO-SK-00002, Attachment D8	Go to RP Access Control	SRO2 NLO4			x												
OTO-SK-00002, Attachment B25	Contact County Emergency Operations Center	SRO1			x												

Callaway Plant On-Shift Staffing Analysis

TABLE 3 – Firefighting Analysis # 9

Line	Performed By	Task Analysis Controlling Method
1.	Fire Brigade Leader (NLO6 - FBL)	Ops/Fire Brigade Training
2.	Ops/Asst Ops Technician (NLO #1)	Ops/Fire Brigade Training
3.	Ops/Asst Ops Technician (NLO #2)	Ops/Fire Brigade Training
4.	Ops/Asst Ops Technician (NLO #3)	Ops/Fire Brigade Training
5.	Ops/Asst Ops Technician (NLO #4)	Ops/Fire Brigade Training

Notes: No Fire Brigade response required for this event. FB personnel dispersed per OTO-SK-00002 (see Table 2A)

Callaway Plant On-Shift Staffing Analysis

TABLE 4 – Radiation Protection & Chemistry Analysis #9

Line	Position Performing Function/Task	Performance Time Period After Emergency Declaration (minutes)																	
		0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75	75-80	80-85	85-90
1.	In-Plant Survey On-Shift Position: HP #1																		
2.	Out of Plant Survey On-Shift Position: HP #1																		
3.	Personnel Monitoring On-Shift Position:																		
4.	Job Coverage On-Shift Position:																		
5.	Offsite Radiological Assessment On-Shift Position: HP #2																		
6.	Other Site-Specific RP – Describe: On-Shift Position:																		
7.	Chemistry function/task #1 – Describe: On-Shift Position: CT #1																		
8.	Chemistry function/task #2 – Describe: On-Shift Position: CT #1																		

Notes: No required actions for this event.

Callaway Plant On-Shift Staffing Analysis

TABLE 5 – Emergency Plan Implementation Analysis # 9

Line	Function/Task	On-Shift Position	Task Analysis Controlling Method
1.	Declare the Emergency Classification Level (ECL)	Shift Manager	EP/Ops Training and EP Drill Program
2.	Approve Offsite Protective Action Recommendations	N/A	N/A
3.	Approve content of State/local notifications	Shift Manager	EP/Ops Training and EP Drill Program
4.	Approve extension to allowable dose limits	N/A	N/A
5.	Notification and direction to on-shift staff (e.g., to assemble, evacuate, etc.)	RO#2	EP/Ops Training and EP Drill Program
6.	ERO notification	SAS Operator	EP/Security Training and EP Drill Program
7.	Abbreviated NRC notification for DBT event	N/A	N/A
8.	Complete State/local notification form	Shift Manager	EP/Ops Training and EP Drill Program
9.	Perform State/local notifications	NLO #5	EP Training and EP Drill Program
10.	Complete NRC event notification form	NLO #5	EP/Ops Training and EP Drill Program
11.	Activate ERDS	SRO #2	EP/Ops Training and EP Drill Program
12.	Offsite radiological assessment	N/A	N/A
13.	Perform NRC notifications	NLO #5	EP/Ops Training and EP Drill Program
14.	Perform other site-specific event notifications (e.g., INPO, ANI, etc.)	N/A	N/A
15.	Personnel accountability	N/A	N/A

Notes: Alert, EAL HA4.1
EIP-ZZ-00101, Classification of Emergencies
EIP-ZZ-00102, Emergency Implementing Actions
EIP-ZZ-00200, Augmentation of the Emergency Organization
EIP-ZZ-00201, Notifications
EIP-ZZ-00217, Emergency Data System Activation

Callaway Plant On-Shift Staffing Analysis

Event Timelines and Assumptions

Event #11 Aircraft Probable Threat

Initial Conditions:

Time: Wednesday @ 0300

Unit @ 100% Power

RCS @ normal operating temperature and pressure

Sequence of Events:

0300 NRC notifies Callaway control room of confirmed aircraft threat

Probable Threat - > 5 minutes < 30 minutes

0301 CR personnel initiate Security Event response OTO

On-site actions initiated

Emergency Plan initiated

Callaway Plant On-Shift Staffing Analysis

Analysis #10: DBA/ISG Event #12 – NFPA 805 Control Room Fire with Evacuation and Safe and Stable Plant Conditions ECL: Alert
TABLE 1 – On-shift Positions

Line	On-shift Position	Emergency Plan Reference	Augmentation Elapsed Time (min)	Role in Table#/Line#	Unanalyzed Task?	TMS Required?
1.	Shift Manager	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L1 T5/L1	No	No
2.	Operating Supervisor – CR (SRO1) [1]	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L2 T5/L5	No	No
3.	Operating Supervisor - FS (SRO2) [1]	CP RERP, Figure 5-1, Table 5-1	N/A	T5/L10	No	No
4.	Reactor Operator (RO1)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L3	No	No
5.	Reactor Operator (RO2)	CP RERP, Figure 5-1, Table 5-1	N/A	T3/L4	No	No
6.	Ops/Asst Ops Technician (NLO1) [2]	CP RERP, Figure 5-1, Table 5-1	N/A	T3/L2	No	No
7.	Ops/Asst Ops Technician (NLO2) [2]	CP RERP, Figure 5-1, Table 5-1	N/A	T3/L3	No	No
8.	Ops/Asst Ops Technician (NLO3) [2]	CP RERP, Figure 5-1, Table 5-1	N/A	T3/L4	No	No
9.	Ops/Asst Ops Technician (NLO4) [2]	CP RERP, Figure 5-1, Table 5-1	N/A	T3/L5	No	No
10.	Offsite Communicator (NLO5)	CP RERP, Figure 5-1, Table 5-1	75	T2/L5 T5/L9 T5/L11 T5/L13	No	No
11.	Shift Security Supervisor (SSS)	CP RERP, Figure 5-1, Table 5-1	N/A	T3/L8	No	No
12.	Security Officer 1 (Sec1)	CP RERP, Figure 5-1, Table 5-1	N/A	T3/L6	No	No
13.	Security Officer 2 (Sec2)	CP RERP, Figure 5-1, Table 5-1	N/A	T3/L7	No	No
14.	SAS Operator	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L7	No	No
15.	Ops Technician (NLO6-FBL) [2]	CP RERP, Figure 5-1, Table 5-1	N/A	T3/L1	No	No
16.	Safe Shutdown Operator (SS01)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L6	No	No
17.	CAS Operator	CP RERP, Figure 5-1, Table 5-1	N/A	T5/L6	No	No

Notes:
[1] STA is a function and not a position. STA is a collateral duty of the Operating Supervisors (CR or FS).
[2] Fire Brigade response is a collateral duty of assigned Ops/Asst Ops Technicians

Callaway Plant On-Shift Staffing Analysis

TABLE 2 - Plant Operations & Safe and Stable Plant Conditions Analysis # 10

One Unit - One Control Room
Minimum Operations Crew Necessary to Implement
OTOs and EOPs, or SAMGs if applicable

Line	Generic Title/Role	On-Shift Position	Task Performance Validation
1.	Shift Manager	Shift Manager	Operator Training
2.	Shift Supervisor	Operating Supervisor – CR (SRO1)	Operator Training
3.	Reactor Operator (OATC)	Reactor Operator (RO1)	Operator Training
4.	Reactor Operator (BOP)	Plant Operator (RO2)	Operator Training
5.	Auxiliary Operator	Ops Technician (NLO5)	Operator Training
6.	Other Operator	Safe Shutdown Operator (SSO1)	Operator Training

Notes: See Table 2A for OTO/EOP actions

Other (non-Operations) Personnel Necessary to Implement
OTOs and EOPs, or SAMGs if applicable

Line	Generic Title/Role	On-Shift Position	Task Performance Validation
7.	SAS Operator	SAS Operator	Security Training

Notes: SAS Operator reports to Auxiliary Shutdown Panel with Shift Manager at evacuation.

Callaway Plant On-Shift Staffing Analysis
Analysis #10, Table 2A – OTO/EOP Actions

Control Room Fire

Procedure Step/Actions			Performance Time (mins) After Procedure Implementation														
Procedure /Step	Task	Assigned Resource	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75
OTO-ZZ-00001 Steps 1 to 5	Trip Reactor "B" CCP in PTL Fast Close MSIVs Trip RCPs	SM SRO1 RO1 RO2 SSO1	X														
Step 6 to 7	CR Evacuation & Notify Plant Personnel	SM SRO1	X														
Step 8 to 10	Direct Each Operator to Perform Attachments, Obtain Keys, SAS call out ERO	SM SRO1 RO1 RO2 NLO5 SSO1 SAS	X														
Step 11 to 13	Transfer Control to Aux Shutdown Panel	SM		X													
Step 14	Energize NBO2	RO1		X													
Step 15 to 19	Start Motor Driven AFP B and Feed SG D	SM		X													
Step 20	Open ALHV0036	SRO1				X											
Step 21 to 24	Start Turbine Driven AFW and Feed SG B	SM				X											
Step 25 to 26	Align and Start CCW Pump B or D	RO1 RO2 SSO1		X													
Step 27 to 28	Align and Start CCP B	SRO1 RO1 RO2 SSO1			X												
Step 29 to 32	Maintain Pressurizer Level, Pressure and Natural Circulation	SM									X						
Step 33 to 36	Maintain Safe and Stable Plant Conditions	SM										X					
Step 34	Energize NG08	RO1										X					
Attachment A, Step A1 to A33	Safe Shutdown Operator Actions	SSO1		X													
Attachment B, Step B1 to B30	BOP Reactor Operator Actions	RO2		X													
Attachment C, Step C1 to C36	RO Reactor Operator Actions	RO1		X													
Attachment D, Step D1 to D45	CRS Actions	SRO1		X													

Callaway Plant On-Shift Staffing Analysis

TABLE 3 – Firefighting Analysis # 10

Line	Performed By	Task Analysis Controlling Method
1.	Fire Brigade Leader (NLO6 - FBL)	Ops/Fire Brigade Training
2.	Ops/Asst Ops Technician (NLO1)	Ops/Fire Brigade Training
3.	Ops/Asst Ops Technician (NLO2)	Ops/Fire Brigade Training
4.	Ops/Asst Ops Technician (NLO3)	Ops/Fire Brigade Training
5.	Ops/Asst Ops Technician (NLO4)	Ops/Fire Brigade Training
6.	Security Officer (Sec1)	Security Training
7.	Security Officer (Sec2)	Security Training
8.	Security Shift Supervisor (SSS)	Security Training

Notes: Sec 1 and Sec 2 serve as MERT Team

Callaway Plant On-Shift Staffing Analysis

TABLE 4 – Radiation Protection & Chemistry Analysis #10

Line	Position Performing Function/Task	Performance Time Period After Emergency Declaration (minutes)																	
		0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75	75-80	80-85	85-90
1.	In-Plant Survey On-Shift Position: HP #1																		
2.	Out of Plant Survey On-Shift Position: HP #1																		
3.	Personnel Monitoring On-Shift Position:																		
4.	Job Coverage On-Shift Position:																		
5.	Offsite Radiological Assessment On-Shift Position: HP #2																		
6.	Other Site-Specific RP – Describe: On-Shift Position:																		
7.	Chemistry function/task #1 – Describe: On-Shift Position: CT #1																		
8.	Chemistry function/task #2 – Describe: On-Shift Position: CT #1																		

Notes: No duties are required for this Scenario. Assistance provided to the Fire Brigade if requested.

Callaway Plant On-Shift Staffing Analysis

TABLE 5 – Emergency Plan Implementation Analysis # 10

Line	Function/Task	On-Shift Position	Task Analysis Controlling Method
1.	Declare the Emergency Classification Level (ECL)	Shift Manager	EP/Ops Training and EP Drill Program
2.	Approve Offsite Protective Action Recommendations	N/A	N/A
3.	Approve content of State/local notifications	N/A [1]	EP/Ops Training and EP Drill Program
4.	Approve extension to allowable dose limits	N/A	N/A
5.	Notification and direction to on-shift staff (e.g., to assemble, evacuate, etc.)	SRO1	EP/Ops Training and EP Drill Program
6.	ERO notification	CAS Operator	EP/Sec Training and EP Drill Program
7.	Abbreviated NRC notification for DBT event	N/A	N/A
8.	Complete State/local notification form	N/A [1]	EP/Ops Training and EP Drill Program
9.	Perform State/local notifications	NLO5	EP Training and EP Drill Program
10.	Complete NRC event notification form	SRO2	EP/Ops Training and EP Drill Program
11.	Activate ERDS	NLO5	EP/Ops Training and EP Drill Program
12.	Offsite radiological assessment	N/A	N/A
13.	Perform NRC notifications	NLO5	EP/Ops Training and EP Drill Program
14.	Perform other site-specific event notifications (e.g., INPO, ANI, etc.)	N/A	N/A
15.	Personnel accountability	N/A	N/A

Notes: Alert, EAL HA5.1
[1] For this event, there is a preapproved notification form, with procedure guidance in EIP-ZZ-00201, ADD A. NO direct SM actions are required.

Callaway Plant On-Shift Staffing Analysis

Event Timelines and Assumptions

Event #12 Control Room Fire with evacuation and Safe and Stable Plant Conditions

Initial Conditions:

Time: Friday @ 2100

Unit @ 100% Power, RCS @ normal operating temperature and pressure

Sequence of Events:

2105 Operators observe smoke coming from behind control board

2106 Smoke in CR becomes thicker/flames observed

2107 Operators attempt to extinguish flames without success

Callaway Plant On-Shift Staffing Analysis

Appendix B

Analysis #11: DBA/ISG Event #13 - SBO **ECL: Site Area Emergency**

TABLE 1 – On-shift Positions

Line	On-shift Position	Emergency Plan Reference	Augmentation Elapsed Time (min)	Role in Table#/Line#	Unanalyzed Task?	TMS Required?
1.	Shift Manager	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L1 T5/L1 T5/L3 T5/L5	No	No
2.	Operating Supervisor – CR (SRO #1)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L2	No	No
3.	Operating Supervisor - FS (SRO #2) [1]	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L3 T5/L11	No	No
4.	Reactor Operator (RO #1)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L4	No	No
5.	Reactor Operator (RO #2)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L5	No	No
6.	Ops/Asst Ops Technician (NLO #1)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L6	No	No
7.	Ops/Asst Ops Technician (NLO #2)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L7	No	No
8.	Ops/Asst Ops Technician (NLO #3)	CP RERP, Figure 5-1, Table 5-1	N/A	T2.L8	No	No
9.	Ops/Asst Ops Technician (NLO #4)	CP RERP, Figure 5-1, Table 5-1	N/A	T2.L9	No	No
10.	Offsite Communicator (NLO #5)	CP RERP, Figure 5-1, Table 5-1	75	T5/L8 T5/L9 T5/L10 T5/L13	No	No
11.	Ops Technician (NLO #6)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L10	No	No
12.	HP Technician (HP #1)	CP RERP, Figure 5-1, Table 5-1	75	T4/L1 T4/L3	No	No
13.	HP Technician (HP #2)	CP RERP, Figure 5-1, Table 5-1	75	T4/L5	No	No
14.	CAS Operator	CP RERP, Figure 5-1, Table 5-1	N/A	T5/L15	No	No
15.	SAS Operator	CP RERP, Figure 5-1, Table 5-1	N/A	T5/L6	No	No

Notes: [1] STA is a function and not a position. STA is a collateral duty of the Operating Supervisors (CR or FS).

Callaway Plant On-Shift Staffing Analysis

TABLE 2 - Plant Operations & Safe Shutdown Analysis # 11

One Unit - One Control Room
Minimum Operations Crew Necessary to Implement
OTOs and EOPs, or SAMGs if applicable

Line	Generic Title/Role	On-Shift Position	Task Performance Validation
1.	Shift Manager	Shift Manager	Operator Training
2.	Shift Supervisor	Operating Supervisor – CR (SRO #1)	Operator Training
3.	Shift Supervisor	Operating Supervisor – FS (SRO #2) [1]	Operator Training
4.	Reactor Operator (OATC)	Reactor Operator (RO #1)	Operator Training
5.	Reactor Operator (BOP)	Plant Operator (RO #2)	Operator Training
6.	Auxiliary Operator	Ops/Asst Ops Technician (NLO #1)	Operator Training
7.	Auxiliary Operator	Ops/Asst Ops Technician (NLO #2)	Operator Training
8.	Auxiliary Operator	Ops/Asst Ops Technician (NLO #3)	Operator Training
9.	Auxiliary Operator	Ops/Asst Ops Technician (NLO #4)	Operator Training
10.	Auxiliary Operator	Ops Technician (NLO #6)	Operator Training

Notes: See Table 2A for OTO/EOP actions

[1] STA function is a collateral duty of the Operating Supervisor.

Callaway Plant On-Shift Staffing Analysis

Analysis #11, Table 2A – OTO/EOP Actions

Station Blackout

Procedure Step/Actions			Performance Time (mins) After Procedure Implementation														
Proc/Step	Task	Assigned Resource	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75
E-0 Immediate Actions	Perform Immediate Actions, Transition to ECA-0.0	SRO1 RO1 RO2	x														
ECA-0.0 Immediate Actions	Perform Immediate Actions	SRO1 RO1 RO2	x														
ECA-0.0, Steps 1-2	Verify Immediate Actions	SRO1 RO1 RO2	x														
NA	Perform CSF Status Trees	SRO2	x														
NA	STA Duties	SRO2		x													
ECA-0.0, Steps 3-4	Check RCS Isolated, TDAFWP Running	SRO1 RO2	x														
ECA-0.0, Step 5	Restore Emergency Diesels	SRO1 NLO1	x														
ECA-0.0, Step 5	EOP Addendum 7: Emergency Purge H2 from Main Generator	R02 NLO3								x							
ECA-0.0, Step 5	Open Instrument Panel Doors (Loss of AC)	SRO1 RO2		x													
ECA-0.0, Step 5	Load Shed Non-Essential Loads	SRO1 RO2 NLO2				x											
ECA-0.0, Step 5	Addendum 39, Attempt to Restore AEPS	SRO1 RO1 NLO4[1]			x												
ECA-0.0, Step 6	Place Pumps in PTL (except ESW)	SRO1 RO1		x													
ECA-0.0, Step 7	Addendum 21, Attempt to Locally Start DGs	SRO1 NLO1		x													
ECA-0.0, Step 8	Addendum 22, Locally Isolate RCP Seals	SRO1 NLO6			x												
ECA-0.0, Step 9	Check AC Power can be Restored within 4 hours	SM			x												

[1] Inspect PB-05

Callaway Plant On-Shift Staffing Analysis

Station Blackout

Procedure Step/Actions			Performance Time (mins) After Procedure Implementation														
Proc/Step	Task	Assigned Resource	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75
ECA-0.0, Step 10	Isolate CST to Condenser Makeup	SRO1 RO2 NLO3				x											
ECA-0.0, Steps 11-12	Check SG Isolation	SRO1 RO2						x									
ECA-0.0, Step 13	Check SG Tube Leak	SRO1 RO1 HP1				x											
ECA-0.0, Step 14	Check SG Levels	SRO1 RO2						x									
ECA-0.0, Step 15	Check DC Bus Loads (No Engineering Support for Load Shed), Check Security Diesel Running, Check Vital Instrumentation	SRO1 RO1 NLO2						x									
ECA-0.0, Step 16	Check TDAFWP Suction Pressure to Ensure CST/HCST Available	SRO1 RO2						x									
ECA-0.0, Step 17	Monitor RCS Integrity	SRO1 RO1						x									
ECA-0.0, Step 18	Depressurize SGs to 290 psig	SRO1 RO2							x								
ECA-0.0, Step 19-24	Check Actuations, and ,1200 CETC Temperature	SRO1 RO1					x										
ECA-0.0, Step 25	Maintain Plant Conditions, Monitor SFP Temperature	SRO1 RO1 RO2 NLO6						x									

Callaway Plant On-Shift Staffing Analysis

TABLE 3 – Firefighting Analysis # 11

Line	Performed By	Task Analysis Controlling Method
1.	N/A	N/A
2.	N/A	N/A
3.	N/A	N/A
4.	N/A	N/A
5.	N/A	N/A

Notes: No Fire Brigade response required for this event.

Callaway Plant On-Shift Staffing Analysis

TABLE 4 – Radiation Protection & Chemistry Analysis #11

Line	Position Performing Function/Task	Performance Time Period After Emergency Declaration (minutes)																	
		0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75	75-80	80-85	85-90
1.	In-Plant Survey On-Shift Position: HP #1				X														
2.	Out of Plant Survey On-Shift Position: HP #1																		
3.	Personnel Monitoring On-Shift Position: HP #1			X															
4.	Job Coverage On-Shift Position:																		
5.	Offsite Radiological Assessment On-Shift Position: HP #2	X																	
6.	Other Site-Specific RP – Describe: On-Shift Position:																		
7.	Chemistry function/task #1 – Describe: On-Shift Position: CT #1																		
8.	Chemistry function/task #2 – Describe: On-Shift Position: CT #1																		

Notes: EIP-ZZ-01211, Accident Dose Assessment
Chemistry Post trip Sample after augmentation
HP#1 surveys of Main Steam Lines after personnel monitoring of NLO #6 (RCP seal isolation)

Callaway Plant On-Shift Staffing Analysis

TABLE 5 – Emergency Plan Implementation Analysis # 11

Line	Function/Task	On-Shift Position	Task Analysis Controlling Method
1.	Declare the Emergency Classification Level (ECL)	Shift Manager	EP/Ops Training and EP Drill Program
2.	Approve Offsite Protective Action Recommendations	N/A	N/A
3.	Approve content of State/local notifications	Shift Manager	EP/Ops Training and EP Drill Program
4.	Approve extension to allowable dose limits	N/A	N/A
5.	Notification and direction to on-shift staff (e.g., to assemble, evacuate, etc.)	Shift Manager	EP/Ops Training and EP Drill Program
6.	ERO notification	SAS Operator	EP/Security Training and EP Drill Program
7.	Abbreviated NRC notification for DBT event	N/A	N/A
8.	Complete State/local notification form	NLO #5	EP/Ops Training and EP Drill Program
9.	Perform State/local notifications	NLO #5	EP Training and EP Drill Program
10.	Complete NRC event notification form	NLO #5	EP/Ops Training and EP Drill Program
11.	Activate ERDS	SRO #2	EP/Ops Training and EP Drill Program
12.	Offsite radiological assessment	N/A	N/A
13.	Perform NRC notifications	NLO #5	EP/Ops Training and EP Drill Program
14.	Perform other site-specific event notifications (e.g., INPO, ANI, etc.)	N/A	N/A
15.	Personnel accountability	CAS Operator	EP/Security Training and EP Drill Program

Notes: Site Area Emergency, EAL SS1.1
EIP-ZZ-00101, Classification of Emergencies
EIP-ZZ-00102, Emergency Implementing Actions
EIP-ZZ-00200, Augmentation of the Emergency Organization
EIP-ZZ-00201, Notifications
EIP-ZZ-00217, Emergency Data System Activation
EIP-ZZ-00230, Accountability

Callaway Plant On-Shift Staffing Analysis

Event Timelines and Assumptions

Event #13 Station Blackout

Initial Conditions:

Time: Sunday @ 0100

Weather: Thunderstorms with heavy rain; .5" recorded in last 15 minutes

Unit @ 100% Power; EOL

RCS @ normal operating temperature and pressure

Sequence of Events:

0110	Lightning strike affects offsite power grid resulting in loss of Off-site power
	Unit Main Turbine trips resulting in Rx Trip
0110:35	Unit EDGs fail to start and load to essential buses – no AC power is available
	Operators initiate OTOs/EOPs in response
	Safety diesel fails to start (Alternate Emergency Power Supply)
	Emergency Plan initiated

Callaway Plant On-Shift Staffing Analysis

Appendix B

Analysis #12: DBA/ISG Event #15 - SAMG **ECL: General Emergency conditions existed (see Analysis #7)**

TABLE 1 – On-shift Positions

Line	On-shift Position	Emergency Plan Reference	Augmentation Elapsed Time (min)	Role in Table#/Line#	Unanalyzed Task?	TMS Required?
1.	Shift Manager	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L1 T5/L4	No	No
2.	Operating Supervisor – CR (SRO #1)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L2	No	No
3.	Reactor Operator (RO #1)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L3	No	No
4.	Reactor Operator (RO #2)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L4	No	No
5.	Offsite Communicator (NLO #5)	CP RERP, Figure 5-1, Table 5-1	75	T5/L13	No	No

Notes:

Callaway Plant On-Shift Staffing Analysis

TABLE 2 - Plant Operations & Safe Shutdown Analysis # 12

One Unit - One Control Room
Minimum Operations Crew Necessary to Implement
OTOs and EOPs, or SAMGs if applicable

Line	Generic Title/Role	On-Shift Position	Task Performance Validation
1.	Shift Manager	Shift Manager	Operator Training
2.	Shift Supervisor	Operating Supervisor – CR (SRO #1)	Operator Training
3.	Reactor Operator (OATC)	Reactor Operator (RO #1)	Operator Training
4.	Reactor Operator (BOP)	Plant Operator (RO #2)	Operator Training

Notes: See Table 2A for OTO/EOP actions

Callaway Plant On-Shift Staffing Analysis

Analysis #12, Table 2A – OTO/EOP Actions

SAMGs

Procedure Step/Actions			Performance Time (mins) After Procedure Implementation														
Proc/Step	Task	Assigned Resource	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75
FR-C.1, Step 11	Check Hot Leg Temperature after SG Depressurization (Jump to Step 18)	SRO1 RO1											x				
FR-C.1, Step 18	Open All PZR PORVs and Reactor Head Vent Valves	SRO1 RO2											x				
FR-C.1, Step 19	Depressurize SGs to Atmospheric Pressure	SRO1 RO2											x				
FR-C.1, Step 20	Transition to SACRG-1	SRO1												x			
SACRG-1, Step 1	Declare 50.54(x)	SM												x			
SACRG-1, Step 2	Place Non-Operating Equipment in PTL	SRO1 RO1 RO2												x			
SACRG-1, Steps 3-4	Check H2 Analyzers, Stop H2 Recombiners	SRO1 RO1													x		
SACRG-1, Steps 5-9	Reset CIS-B, Establish Instrument Air to Containment	SRO1 RO2														x	
SACRG-1, Step 10	Depressurize RCS	SRO1 RO1														x	
SACRG-1, Steps 11-12	Check ECCS Pumps Available, Stop Containment Coolers	SRO1 RO2															x

Callaway Plant On-Shift Staffing Analysis

TABLE 3 – Firefighting Analysis # 12

Line	Performed By	Task Analysis Controlling Method
1.	N/A	N/A
2.	N/A	N/A
3.	N/A	N/A
4.	N/A	N/A
5.	N/A	N/A

Notes: No Fire Brigade response for this event

Callaway Plant On-Shift Staffing Analysis

TABLE 4 – Radiation Protection & Chemistry Analysis #12

Line	Position Performing Function/Task	Performance Time Period After Emergency Declaration (minutes)																	
		0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75	75-80	80-85	85-90
1.	In-Plant Survey On-Shift Position: HP #1																		
2.	Out of Plant Survey On-Shift Position: HP #1																		
3.	Personnel Monitoring On-Shift Position:																		
4.	Job Coverage On-Shift Position:																		
5.	Offsite Radiological Assessment On-Shift Position: HP #2	See Analysis #7																	
6.	Other Site-Specific RP – Describe: On-Shift Position:																		
7.	Chemistry function/task #1 – Describe: On-Shift Position: CT #1																		
8.	Chemistry function/task #2 – Describe: On-Shift Position: CT #1																		

Notes: EIP-ZZ-01211, Accident Dose Assessment

Callaway Plant On-Shift Staffing Analysis

TABLE 5 – Emergency Plan Implementation Analysis # 12

Line	Function/Task	On-Shift Position	Task Analysis Controlling Method
1.	Declare the Emergency Classification Level (ECL)	N/A	N/A
2.	Approve Offsite Protective Action Recommendations	N/A	N/A
3.	Approve content of State/local notifications	N/A	N/A
4.	Approve extension to allowable dose limits	Shift Manager	EP/Ops Training and EP Drill Program
5.	Notification and direction to on-shift staff (e.g., to assemble, evacuate, etc.)	N/A	N/A
6.	ERO notification	N/A	N/A
7.	Abbreviated NRC notification for DBT event	N/A	N/A
8.	Complete State/local notification form	N/A	N/A
9.	Perform State/local notifications	N/A	N/A
10.	Complete NRC event notification form	N/A	N/A
11.	Activate ERDS	N/A	N/A
12.	Offsite radiological assessment	N/A	N/A
13.	Perform NRC notifications [1]	NLO #5	EP/Ops Training and EP Drill Program
14.	Perform other site-specific event notifications (e.g., INPO, ANI, etc.)	N/A	N/A
15.	Personnel accountability	N/A	N/A

Notes: EAL (GE conditions already existed – see Analysis #7)
Emergency Plan functions completed during Analysis #7
[1] 10 CFR 50.54x notification

Callaway Plant On-Shift Staffing Analysis

Event Timelines and Assumptions

Event #15 SAMG Response Actions

Initial Conditions:

Time: Monday @ 2250

Unit @ 0% Power – General Emergency conditions exist (follow up to Event #8, 50 minutes after LB LOCA initiating event)

Sequence of Events:

2250 Loss of SI Trains occur – no ECCS equipment available

2300 >5 CETs reading 1200 °F and trending higher

SAMG entry conditions met

Appendix C Phase III Time Motion Study Analysis Results

Callaway Plant On-Shift Staffing Analysis

The results of the Phase II On-Shift Staffing Analysis conducted October 3-5, 2012 identified one (1) event with potential conflicts requiring further Phase III Time Motion Study analysis. The event is listed in Table 1 below.

Table 1
Callaway Plant – Phase III Time Motion Study Event

Event/Scenario	Functions to be Evaluated	Affected Position	TMS Method
Design Basis Threat	State/Local Notifications (T5/L9) [1]	Shift Manager	Simulator Run
	NRC Notifications (T5/L13) [1]		

[1] NEI 10-05, Appendix B, Table 5 reference

On November 1, 2012 the selected scenario for the Time Motion Study (TMS) was conducted in the Callaway Plant Training Center on the simulator. In attendance to conduct the TMS Scenario were:

Fred Bianco	Operations – Shift Manager
Shannon Gaydos	Operations – Control Room Supervisor
Randy Bisig	Operations – Field Supervisor
Dan Parker	Operations – Reactor Operator (OATC)
Jeff Landrum	Operations – Reactor Operator (BOP)
Micah Benningfield	Operations – Reactor Operator
Nick Turner	EP Coordinator
Rodney Brown	EP Consulting, LLC
Kevin Bruckerhoff	EP Consulting, LLC
Rex Krohn	EP Consulting, LLC

The following tables document the results of the TMS for the identified event.

Callaway Plant On-Shift Staffing Analysis

APPENDIX D
Function / Responsibility (Task) Analysis Template

Event: Design Bases Threat (Event #1) Position: Shift Manager Line #: T5/L9, T5/L13

Function	Responsibility (Task)	Action Step	Duration
1. Emergency Plan Implementation	1.1 Complete State/Local Notification form	1.1.1 Field Supervisor (FS) starts to fill out notification form on computer @ 0742 for Alert	2 minutes
		1.1.2 Shift Manager (SM) approves notification form @ 0743	< 1 minute
		1.1.3 FS starts to fill out notification form on computer @ 0746 for Site Area Emergency (SAE)	2 minutes
		1.1.4 SM approves notification form @ 0748	< 1 minute
	1.2 Perform State/Local Notifications	1.2.1 FS transmits notification by SENTRY [1] @ 0744 for Alert	2 minutes
		1.2.2 FS transmits notification by SENTRY [1] @ 0748 for SAE	2 minutes
	1.3 Complete NRC Notification form	1.3.1 FS starts additional data form for NRC @ 0750	2 minutes
	1.4 Perform NRC Notification	1.4.1 FS contacts NRC Resident Inspector of event @ 0750	< 1 minute
		1.4.2 FS updates NRC HQ on event and maintains an open line with head set @ 0752	Duration
		1.4.3 FS transmits additional data to NRC Operations Center @ 0753	1 minutes

Conflict for Shift Manager resolved by assigning all notifications except for the Abbreviated NRC notification (which is allowed by NEI 10-05) to the Field Supervisor. The Field Supervisor's assigned work location is directly across from the Control Room (hallway separation), which allows for quick access to the Control Room. Per the RERP (5.1.2), the Field Supervisor reports to the Control Room and performs actions as directed by the Shift Manager. During this event, the SM directed the FS to perform State/Local and NRC Notifications.

[1] SENTRY is a computer driven emergency notification process that is used to complete and transmit the State/Local Notification Form to required offsite agencies.

Callaway Plant On-Shift Staffing Analysis

Timeline – Design Basis Threat (Event #1)

Time	Task
0734	Crew brief on plant conditions
0735	Security PA announcement of entry into Code RED – adversaries inside OCA
0736	Shift Manager (SM) directs RO#2-BOP to close the security missile door to control room
0736	SM talks with security about event and security state that there are 5 adversaries
0737	SM performs abbreviated notification to NRC about event
0737	Manual Reactor trip by Control Room crew
	Control Room Supervisor (CRS) initiates E-0 actions
	CR missile door is closed by RO#2
0738	GAI Tronics announcement – Code RED by RO#2
	SM and Field Supervisor (FS) discuss the EALS
0739	SM declares **Alert** (EAL HA4.1)
0740	Security PA announcement of Code BLACK – adversaries inside PA
0741	Control Room Supervisor (CRS) verifies that missile door is closed
	RO#2 makes PA announcement over radio and activates plant siren/alarms
0742	FS starts to fill out notification form on computer
0743	SM approves notification form
0744	FS transmits notification by SENTRY system (notification completed in 2 minutes) – crew update
0744	SM updates crew about Alert classification
0745	SM and Security discuss event
	RO#2 informs SM that security made an announcement at 0740 about Code BLACK
0746	SM upgrades classification to **Site Area Emergency** (EAL HS4.1)
	FS starts filling out notification form on SENTRY
0746	RO makes PA announcement
0747	SM verifies with CRS and ROs that the announcements are complete
0748	SM approves notification form and FS transmits for on SENTRY (notification completed in 2 minutes)
	SM activates ERO through Security – message #12
0750	FS completes Control Room Notification Package (NRC Notification Form), EIP-ZZ-00201, Addendum A
	FS contacts NRC Resident Inspector of event
0752	FS updates NRC HQ on event and maintains an open line with head set
0752	CRS update ROs and SM on plant conditions
0753	FS transmitted additional data to NRC Operations Center
0757	CRS announces transition from E-0 to OTG
0759	SM calls security for update on event and adversaries – all adversaries are neutralized
	SM update crew that site is still in a Code BLACK
0802	SM reviews EAL for any upgrade in classifications
0806	SM and CRS discuss plant condition and where they are – plant is in stable condition
	SM contacts EDO about plant event and conditions – EDO expected to arrive onsite in 20 minutes
0808	SM informs CRS to stay in Mode 3 until plant access is allowed
0809	CRS informs crew that they will be staying in Mode 3
0812	TMS terminated

Callaway Plant On-Shift Staffing Analysis

Phase III Time Motion Study Results

The conflicts for the Shift Manager identified in the Phase II On-Shift Staffing Analysis were resolved by assigning State/Local and NRC Notifications to the Field Supervisor. With the Field Supervisor's normal work location being located adjacent to the control room, separated by a hallway, the Field Supervisor is able to rapidly respond to the Control Room during this event prior to the control room door being secured. Per NEI 10-05 guidance, personnel are assumed to be at their normal work location at the initiation of the event.

Additional Observations/Comments

The use of SENTRY for State/Local Notifications facilitates the notification process, such that State/Local agencies are notified within 4 minutes (as demonstrated during the TMS) of the start of the notification process. The location of the NRC ENS phone inside the Control Room also provides the ENS communicator with immediate access to the Shift Manager and plant data system, enabling the ENS communicator, if STA qualified, to perform STA functions and maintain an open-line with the NRC.

The following pages are the Interim Report that will help users understand aspects of the Final Report that may need further clarifications. Originally a separate document, it was attached to the back of the Final Report for user convenience and to assure that the two documents would not be separated.

Interim Report

Callaway Plant On-Shift Staffing Analysis

Purpose

Changes to 10 CFR 50 Appendix E were effective on December 23, 2011 directing a number of changes to EP Regulations. This report is focused on the requirement to perform a detailed staffing analysis validating the ability of the minimum on-shift staffing component described in the Emergency Plan to respond to a variety of scenarios specified in the new regulation. This report provides interim status of the analysis of the scenarios.

Schedule/Requirements

The detailed staffing analysis is required to be completed by December 24, 2012. Any deficiencies identified by the analysis are required to be entered into the licensee Corrective Action Program and interim compensatory measures be put in place within 30 days of time of discovery. This interim report identifies areas requiring further detailed study and does not constitute identification of staffing deficiencies.

Process

The Interim Staff Guidance (NSIR/DPR ISG-01) supporting the Emergency Preparedness Rule endorses the staffing methodology contained in NEI 10-05, Revision 0, "Assessment of On-Shift Emergency Response Organization Staffing and Capabilities" as an approved methodology for conducting the detailed staffing analysis. No other methodology has been endorsed to date. Callaway Plant initiated the study using NEI 10-05.

NEI 10-05 separates the study into three phases:

Phase I – Identification of required scenarios. Appendix A to this report documents completion of Phase I. Twelve (12) scenarios were carried forward to Phase II.

Phase II – titled by NEI 10-05 as On-Shift Staffing Analysis is conducted by a multi-disciplined team using site procedures to determine if tasks have been sufficiently analyzed for performance by the minimum on-shift staff as designated in the Emergency Plan. Task areas analyzed include:

- Event Mitigation (EOP/AOP, other site procedures)
- Fire Response (as determined by the scenario)
- RP/Chemistry Functions (as specified in site response procedures)
- Emergency Preparedness Functions (NUREG-0654 Table B-1/ISG -01)

Phase II is not designed to identify staffing deficiencies. Phase II documents areas requiring further study as designated in Phase III of NEI 10-05. Phase III determines if any Phase II identified conflicts will result in any position not being able to perform the assigned functions. Any conflicts that cannot be resolved will require compensatory measures within 30 days of acceptance of the Phase III results.

Interim Report

Callaway Plant On-Shift Staffing Analysis

Executive Summary

NRC changes to 10 CFR 50 Appendix E require each utility to perform a detailed staffing analysis for specified scenarios to determine if the minimum staffing designated in the Emergency Plan is sufficient to permit required mitigation response and effectively implement the Emergency Plan. The staffing study is required to be completed by December 24, 2012. NEI 10-05, "Assessment of On-Shift Emergency Response Organization Staffing and Capabilities," has been endorsed by the NRC as an acceptable means of performing the analysis.

This interim report addresses completion of Phase I and II in accordance with NEI 10-05 and identifies areas which require further time motion study (TMS). Phase II is not designed to identify areas requiring immediate compensatory measures. Any deficiencies noted upon approval of the study completed in Phase III must be addressed in the Corrective Action Program and compensatory measures established within 30 days of discovery.

The rule requires that the following events be analyzed which result in Classification by the approved Emergency Action Level Scheme:

1. Condition IV events as described in the updated Safety Analysis Report
2. Station DBT
3. Response actions for an "aircraft probable threat" in accordance with 10 CFR 50.54(hh)(1) and as discussed in RG 1.214, "Guidance for Assessment of Beyond-Design-Basis Aircraft Impacts;" and
4. Control Room fire leading to evacuation and remote shutdown, as referenced in IN 95-48 "Results of On-Shift Staffing Study."

The rule also requires an analysis of the following additional areas to be performed unless justification exists, which would allow the licensee to not perform them.

1. Station Blackout (Using existing FSAR assumptions)
2. Appendix R Fire Response
3. SAMG Response (to the extent performed by on-shift personnel prior to augmentation)

Events requiring analysis were determined by reviewing the Callaway Plant (CP) FSAR. Callaway personnel reviewed the listing and validated that the identified FSAR DBA events listed in Appendix A were applicable for review according to the NEI 10-05 guidance.

Interim Report

Callaway Plant On-Shift Staffing Analysis

The regulatory analysis requires that the scenarios be evaluated using the approved minimum staffing in the Emergency Plan. A comparison of the Callaway Plant Radiological Emergency Plan (CP RERP) to other administrative guidance (e.g., ODP-ZZ-00001, Operations Department – Code of Conduct) identified inconsistent minimum on-shift staffing requirements.

Staffing Table

CP RERP, Rev 039 Figure 5-1, On-Shift Emergency Response Table 5-1, Emergency Staffing Requirements/ On-Shift Emergency Response		ODP-ZZ-00001, Rev 076 Operations Department – Code of Conduct [1]	
Position	On-Shift	Position	On-Shift
Shift Manager (SM)	1	Shift Manager (SM)	1
Control Room Supervisor (SRO) [2]	1	Control Room Supervisor (SRO) [2]	1
Field Supervisor (SRO) [2]	1	Field Supervisor (SRO) [2]	1
Reactor Operator (RO)	2	Unit Reactor Operator	2
Ops/Assistant Ops Technicians (NLO)	4	Ops/Assistant Ops Technicians	5
Other Operations Personnel [3]	2	Additional Operations Personnel [3]	2
HP Operations	1		
HP Technical Support (DA)	1		
Chemistry Technician	1		
Shift Security Supervisor	1		
Total:	15	Total:	12
Fire Brigade [4]	5	Fire Brigade [4]	5
Search & Rescue [5]/MERT [6]	2		
Security	Sec plan		

[1] ODP-ZZ-00001, Operations Department – Code of Conduct, **is not** consistent with Figure 5-1 and Table 5-1of the CP RERP.

[2] Shift Technical Advisor (STA) and Fire Brigade Leader (FBL) are collateral duties of the Operating Supervisors. Typically, one Operating Supervisor is assigned as Control Room Supervisor and the other is assigned as the Field Supervisor. STA and FBL are qualifications.

[3] Offsite Communications is assigned to one of the Other Operations Personnel.

[4] Fire Brigade is collateral duty of on-shift Operations personnel. The Fire Brigade consists of 1 Incident Commander (FBL) and 4 Fire Brigade Members.

[5] Search & Rescue is a collateral duty of Operations, Security, and Chemistry personnel.

[6] MERT is a collateral duty of Security.

Summary of DBA/ISG Events Requiring Further Evaluation:

1. Design Basis Threat

Interim Report

Callaway Plant On-Shift Staffing Analysis

DBA/ISG Events Not Requiring Further Evaluation

1. Steam System Pipe Break (MSLB)
2. Major Rupture of a Main Feedwater Line (MFLB)
3. Reactor Coolant Pump Shaft Seizure (Locked Rotor)
4. Rod Cluster Control Assembly Ejection Accident
5. Steam Generator Tube Rupture
6. Loss of Coolant Accident (LB LOCA) with release exceeding PAGs and resulting PARs
7. ATWS
8. Aircraft Probable Threat
9. Control Room Fire with Evacuation and Remote Shutdown
10. Station Blackout
11. SAMG

DBA/ISG Events Not Requiring Analysis

1. Reactor Coolant Pump Shaft Break – bounded by Reactor Coolant Pump Shaft Seizure (Locked Rotor)
2. Fuel Handling Accident – Per the Callaway FSAR, this event is applicable during a refueling outage and is not analyzed with the existing on-shift staff.
3. Appendix R Fire Response – Per Callaway personnel, this event is bounded by the Control Room Fire with Evacuation and Remote Shutdown event.

Preliminary Results:

- A Time Motion Study (TMS) of the Shift Manager position is required for the Design Basis Threat Event due to competing Emergency Plan functions/tasks – State/Local Notifications and NRC Notifications. The TMS will determine if these functions can be performed by the Shift Manager (SM) during an event.

Other Identified Issues

- ERDS activation after Control Room evacuation. No procedural guidance exists. (EP to evaluate and resolve – CAR 201207097)
- Step 12 of E-1 directs Chemistry sampling of the Containment atmosphere. Currently no procedure guidance exists for this process. (Chemistry and Operations to evaluate - CAR 201201251)
- STA availability during the Control Room Fire with evacuation and remote shutdown event. During this event an STA is not available for 30 minutes. (Operations to evaluate - CAR 201207095)
- Current practice at Callaway Plant utilizes a non-licensed operator as the NRC Communicator. NRC expectation is that this communicator be a licensed operator (SRO preferred). (EP to evaluate)

Recommendations:

1. Determine most effective methodologies to perform remaining scenarios requiring detailed time motion studies (Simulator based Drill, timed in-plant response, combinations, other).
2. Schedule and conduct Phase III analysis for the following event:
   a. Design Basis Threat

Interim Report

Callaway Plant On-Shift Staffing Analysis

Details

The On-shift Staffing Analysis (Phase II of NEI 10-05) for the Callaway Plant was conducted October 3-5, 2012 using NEI 10-05, Assessment of On-Shift Emergency Response Organization Staffing and Capabilities.

The NRC Commission amended 10 CFR Part 50, Appendix E, Section IV.A, "Organization," to address concerns regarding the assignment of tasks or responsibilities to on-shift emergency response organization (ERO) personnel that would potentially overburden them and prevent the timely performance of their emergency plan functions. Licensees must have enough on-shift staff to perform specified tasks in various functional areas of emergency response. All shifts must have the capability to perform these emergency functions 24 hours a day, 7 days a week, to minimize the impact of radiological emergencies and to provide for the protection of public health and safety.

The rule became effective on December 23, 2011 with implementations dates associated with this issue as follows:

1. On-shift Staffing Analysis completed by December 24, 2012.
2. Analysis results indicating insufficient staffing must provide for compensatory measures with 30 days of completion of the analysis.
3. Permanent staffing changes must be completed within 24 months of completion of the analysis.

NEI developed the document NEI 10-05, "Assessment of On-Shift Emergency Response Organization Staffing and Capabilities," Revision 0, dated June 2011 (ADAMS Accession No. ML111751698), to establish a standard methodology for a licensee to perform the required staffing analysis. The NRC has reviewed NEI 10-05 and found it to be an acceptable methodology for this purpose.

The following departments and personnel were present to complete the assessment:

Emergency Preparedness	Nick Turner
Operations – AOM	Mark Covey
Operations – RO	Jake Santie
Operations – NLO	Zach Brauks
Radiation Protection	Vince Miller
Chemistry	Joe Howard
Security	Roger Baumeister
Fire Marshal	Jeff Wallendorff
Safety Analysis Engineer	Malcolm Smith
EP Consulting, LLC	Rodney Brown, Kevin Bruckerhoff, Rich Brown

Interim Report

Callaway Plant On-Shift Staffing Analysis

In accordance with NEI 10-05, the following Callaway Plant DBA/ISG events were considered for the analysis:

DBA/ISG Event #	Summary Description of Event or Accident
1	Land and/or waterborne HOSTILE ACTION directed against the Protected Area by a HOSTILE FORCE. Adversary characteristics defined by the Design Basis Threat (DBT).
2	Steam System Pipe Rupture (MSLB)
3	Major Rupture of a Main Feedwater Line (MFLB)
4	Reactor Coolant Pump Shaft Seizure (Locked Rotor)
5	Reactor Coolant Pump Shaft Break
6	Spectrum of Rod Cluster Control Assembly Ejection Accidents (RCCA Ejection)
7	Steam Generator Tube Rupture (Stuck ADV)
8	Loss of Coolant Accident (LB LOCA) with release exceeding PAGs and resulting PARs
9	Fuel Handling Accident
10	ATWS
11	Response actions for an “aircraft probable threat” in accordance with 10 CFR 50.54(hh)(1) and as discussed in RG 1.214
12	NFPA 805 Control room fire leading to evacuation and remote shutdown, as referenced in IN 95-48.
13	Station Blackout (Current Licensing Basis)
14	Appendix R Fire Response
15	SAMG

These events were determined for analysis by review of the FSAR Design Basis Accidents (DBA), selecting those events that are identified as Condition IV events per the following guidance provided in NSIR/DPR-ISG-01, Interim Staff Guidance, Emergency Planning for Nuclear Power Plants:
To ensure that the on-shift staff can carry out their assigned emergency response functions until the augmenting ERO arrives, each licensee should:

- Define the events that will be used in the staffing analysis. These events should include the following:
  (1) Postulated DBAs (Condition IV events) presented in the FSAR, as updated, and which would result in an emergency declaration. At least one DBA should result in the declaration of a General Emergency and radiological doses to the public that exceed the EPA PAGs and necessitate licensee PARs;
  (2) Station DBT;
  (3) Response actions for an “aircraft probable threat” in accordance with 10 CFR 50.54(hh)(1) and as discussed in RG 1.214; and
  (4) Control room fire leading to evacuation and remote shutdown, as referenced in IN 95-48.

Interim Report

Callaway Plant On-Shift Staffing Analysis

NSIR/DPR ISG-01 also specifies three additional scenarios for 'consideration.' If these scenarios are not performed justification must be provided in the final analysis. The three scenarios for considerations are:

- Station Blackout (Current Licensing Basis) – this event scenario was performed in the Phase II analysis.
- Appendix R – this event scenario was considered but not performed in the Phase II analysis since it is bounded by the Control Room fire with evacuation and remote shutdown.
- SAMG Response – Response was limited to actions performed prior to activation of the TSC and SAMG augmented personnel. This scenario was initially included in the Phase II analysis; however, during the analysis it was determined that SAMG actions implemented in accordance with SACRG-1 did not require on-shift support outside of licensed and non-licensed operators. Per the guidance in NEI 10-05, no further analysis of this event is required.

The Loss Of Coolant Accident (LB LOCA) was selected as the DBA event to be taken to General Emergency with corresponding release exceeding EPA PAGs. This scenario was also the basis for the initial SAMG analysis.

Methodology

A multi-disciplined team of subject matter experts from Callaway Plant was assembled to provide input into the shift staffing analysis of events identified by NSIR/DPR-ISG-01, Interim Staff Guidance, Emergency Planning for Nuclear Power Plants. This team consisted of: the Assistant Operations Manager (Shift Manager/SRO); a Reactor Operator; an Operations Technician (NLO); Chemistry Supervisor; an RP General Supervisor; a Fire Marshal; a Security Supervisor; a Safety Analysis Engineer; and Emergency Planning staff (station and consultants). The team provided analysis support during the Phase II Shift Staffing Analysis as follows:

Interim Report
Callaway Plant On-Shift Staffing Analysis

Table 1
On-Shift Staffing Analysis Team

Team Member	Subject Matter Expertise
Assistant Operations Manager	Emergency Operating Procedure (EOP) actions for SROs and ROs
	Off-Normal Technical Operating Procedure (OTO) actions for SROs and ROs
	Operating Procedure actions
	Site Emergency Director (E Plan) Actions for Shift Manager
	Fire response actions
Reactor Operator	EOP actions for ROs
	OTO actions for ROs
	Operating Procedure actions
	Fire response actions
Operations Technician (NLO)	EOP actions for NLOs
	OTO actions for NLOs
	Operating Procedure actions for NLOs
	Fire response actions for NLOs
Fire Marshal	Fire Brigade Response actions
Chemistry Supervisor	Chemistry Technician response actions
RP Supervisor	HP Technician response actions
Security Supervisor	Security Response actions
	Accountability Response actions
Safety Analysis Engineer	DBA Event response actions
Emergency Planning	Emergency Plan response actions

The Phase II On-Shift Staffing analysis was conducted in three steps: identification of events for analysis; minimum shift staffing complement determination; and, a tabletop analysis of the on-shift staffing resources required for response to the identified events.

Identification of Events for Analysis

Prior to the analysis, a review of Chapter 15 of the CP FSAR identified the Design Basis Accident (DBA) events to be analyzed during Phase II. Section 15.0.1.4 of the CP FSAR identifies those DBA events that are designated as Condition IV events and meet the requirements of NSIR/DPR-ISG-01 (Attachment 1). These events were incorporated in Appendix A, Analyzed Events and Accidents. The on-shift staffing analysis team validated these events and included an analysis of an ATWS event, even though it is not identified as a FSAR Chapter 15 DBA Condition IV event. This resulted in a preliminary listing of FSAR Chapter 15 DBA events for review and assessment by the team. The FSAR Chapter 15 Large Break Loss of Coolant Accident (LB LOCA) DBA event (Section 15.6.5) was determined by the team to be the event to be analyzed as requiring a General Emergency classification with an offsite radiological release (NSIR/DPR-ISG-01 requirement) and resulting PARs.

Interim Report
Callaway Plant On-Shift Staffing Analysis

Additional events identified in NSIR/DPR-ISG-01 were also identified for review by the team. Those events identified for the shift staffing analysis were the Security DBT event; aircraft probable threat event; Control Room fire with evacuation and remote shutdown; Station Blackout; Appendix R Fire response; and, SAMG response prior to augmentation of the on-shift ERO.

The team assigned and validated the event emergency classifications for the events to be analyzed. The results of this review are documented in Appendix A. The events listed in Appendix A were then used to perform the initial Phase II Shift Staffing analysis.

Minimum Shift Staffing Complement Determination

NSIR/DPR-ISG-01 allows the use of guidance in NEI 10-05, Assessment of On-Shift Emergency Response Organization Staffing and Capabilities to conduct the Phase II Shift Staffing Analysis. Using the guidance from NEI 10-05, the team reviewed the minimum on-shift emergency response organization (ERO) numbers identified in Figure 5-1 and Table 5-1 of the CP RERP and used these numbers to perform the Initial Phase II Shift Staffing Analysis. Table 2 identifies the on-shift ERO staffing used for the initial Phase II Shift Staffing Analysis.

Table 2
CP RERP, Rev 039
Figure 5-1, On-Shift Emergency Response
Table 5-1, Emergency Staffing Requirements/
On-Shift Emergency Response

Position	On-Shift
Shift Manager (SM)	1
Control Room Supervisor (SRO)	1
Field Supervisor (SRO)	1
Reactor Operator (RO)	2
Ops/Assistant Ops Technicians (NLO)	4
Other Operations Personnel	2
HP Operations	1
HP Technical Support (DA)	1
Chemistry Technician	1
Shift Security Supervisor	1
Total:	15
Fire Brigade	5
Search & Rescue/MERT	2
Security	Sec plan

Tabletop Analysis of On-Shift Staffing for Identified Events

The tabletop reviews were conducted in the Callaway EOF which enabled the team to have ready access to procedures and other support documents. Using the guidance in NEI 10-05, the team performed a tabletop review of on-shift actions in response to those events identified in Appendix A. This review included the identification of needed resources and the time required to complete identified actions until augmentation of the on-shift ERO. Each event was analyzed separately and documented in the applicable event analysis tables.

Interim Report
Callaway Plant On-Shift Staffing Analysis

The shift staffing analysis was conducted by first reviewing the event described in Appendix A. This review provided the team with a basic understanding of the event and resulting emergency classification. The SRO reviewed EOP, OTO and other operating procedure actions and identified them to the team. Specific resources needed to perform initial event response actions were identified from the EOP, OTO, or other operations procedures and documented as per the guidance in NEI 10-05. The team determined when other on-shift resources, such as the RP or Chemistry Technician, would be required and identified the time required to perform expected emergency plan functions. This information was documented on the applicable tables identified in NEI 10-05. The Emergency Plan functions for the event were reviewed and assigned to the on-shift resource responsible for performance of the identified function and documented as per NEI 10-05. Finally, the on-shift resources and their actions were summarized in a table (NEI 10-05 Table 1), with conflicts requiring additional analysis identified as per NEI 10-05.

The team reviewed a total of twelve (12) events. The results and recommendations of the initial Phase II Shift Staffing Analysis are documented in this report.

Preliminary Conclusions:

- A Time Motion Study (TMS) of the Shift Manager position is required for the Design Basis Threat Event due to competing Emergency Plan functions/tasks – State/Local Notifications and NRC Notifications. The TMS will determine if these functions can be performed by the STA during an event
- Further Phase III analysis is required for the following events:
  1. Design Basis Threat

Recommendations:

3. Determine most effective methodologies to perform remaining scenarios requiring detailed time motion studies (Simulator based Drill, timed in-plant response, combinations, other).

4. Schedule and conduct Phase III analysis for the following event:
   b. Design Basis Threat

Interim Report

Callaway Plant On-Shift Staffing Analysis

APPENDIX A

Analyzed Events and Accidents

Event #	Event Type	Summary Description of Event	Plant Mode	Reference Document(s)	Event ECL	Analysis Required?
1.	DBT	Land and/or waterborne HOSTILE ACTION directed against the Protected Area by a HOSTILE FORCE. Assume adversary characteristics defined by the Design Basis Threat (DBT).	Any	ISG IV.C	Site Area Emergency	Yes
2.	DBA	Steam System Pipe Break (MSLB)	3	FSAR Chapter 15.1.5	Unusual Event	Yes
3.	DBA	Major Rupture of a Main Feedwater Line (MFLB)	1-4	FSAR Chapter 15.2.8	Unusual Event	Yes
4.	DBA	Reactor Coolant Pump Shaft Seizure (Locked Rotor)	1-4	FSAR Chapter 15.3.3	Unusual Event	Yes
5.	DBA	Reactor Coolant Pump Shaft Break (Note 1)	1-4	FSAR Chapter 15.3.4	None	No
6.	DBA	Spectrum of rod cluster control assembly ejection accidents (RCCA Ejection)	1-4	FSAR Chapter 15.4.8	Alert	Yes
7.	DBA	Steam Generator Tube Rupture (Stuck ADV)	1-4	FSAR Chapter 15.6.3	Alert	Yes
8.	DBA	Loss-of-Coolant Accidents (LB LOCA) (Note 2)	1	FSAR Chapter 15.6.5	Site Area - General Emergency	Yes
9.	DBA	Fuel Handling Accident (Note 3)	6	FSAR Chapter 15.7.4	Alert	No
10.	ISG	ATWS	1-2	ISG IV.C FSAR Chapter 15.8	Alert	Yes

Interim Report

Callaway Plant On-Shift Staffing Analysis

Event #	Event Type	Summary Description of Event	Plant Mode	Reference Document(s)	Event ECL	Analysis Required?
11.	ISG	Response actions for an "aircraft probable threat" in accordance with 10 CFR 50.54(hh)(1) and as discussed in RG 1.214, Guidance for Assessment of Beyond-Design-Basis Aircraft Impacts	Any	ISG IV.C	Alert	Yes
12.	ISG	NFPA 805 Control room fire leading to evacuation and remote shutdown, as referenced in IN 95-48 "Results of On-Shift Staffing Study	1-4	ISG IV.C	Alert	Yes
13.	ISG	Station (Unit) Blackout	Any	ISG IV.C	Site Area Emergency	Yes
14.	ISG	Appendix R Fire Response (Note 4)	Any	ISG IV.C	Alert	No
15.	ISG	SAMG	Any	ISG IV.C	General Emergency	Yes

Note 1: Per the Callaway FSAR, event consequences and response are the same as for the RCP Locked Rotor Event (Event #4). Therefore, this event is bounded by Event #4 and no further analysis is required.

Note 2: DBA event designated as proceeding non-mechanistically to GE with release exceeding Protective Action Guides

Note 3: Fuel Handling Accident is not analyzed with the existing onshift staff. The Callaway FSAR states that this event involves fuel that is conditioned at least 72 hours after shutdown, therefore it is applicable to refueling conditions. Refueling operations are staffed for the evolution with additional operations, RP and support personnel.

Note 4: Per Callaway personnel, the Control Room fire with evacuation and remote shutdown is the bounding Appendix R fire scenario; therefore, no further analysis of this event is required.

Interim Report

Callaway Plant On-Shift Staffing Analysis
APPENDIX A.1
Event Timelines and Assumptions

Event #1 Design Basis Threat

Initial Conditions:

Time: Sunday @0230

Unit @ 100% Power

RCS @ normal operating temperature and pressure

Sequence of Events:

0235 Adversary force assaults Callaway and attempts to breach the protected area fence

Security engages adversaries and notifies Shift Manager

0236 CR personnel initiate Security Event response OTO

Rx manually tripped

On-site protective actions initiated

Emergency Plan entered

0240 Security informs Shift Manager that PA has been breached

0245 Security informs Shift Manager that adversaries have been neutralized

No injuries to site personnel
No fires or collateral damage to plant equipment
No adverse consequences to plant safety

Interim Report

Callaway Plant On-Shift Staffing Analysis
APPENDIX A.1
Event Timelines and Assumptions

Event #2 Steam System Pipe Break
(Main Steam Line Break)

Initial Conditions:

Time: Saturday @ 0250

Unit @ Mode 3, Hot Zero Power; EOL

RCS @ Hot Zero Power operating temperature (T_{avg} = 557 ◦F) and pressure

Sequence of Events:

0250 SG B Main Steam Line fails (double-ended rupture), outside of containment but upstream of MSIV.

LOOP occurs coincident with steam line break
EDG's start and load supplying power to ESF busses

MSIVs closed within 17 seconds

Rx Trip initiated on low steamline pressure signal
Most reactive RCCA stuck in full withdrawn position

SI initiated
'A' High Head Safety Injection Pump starts and supplies flow
'B' Train of SI fails

0255 Emergency Plan Initiated

Interim Report

Callaway Plant On-Shift Staffing Analysis
APPENDIX A.1
Event Timelines and Assumptions

Event #3 Major Rupture of A Main Feedwater Line
(Main Feedwater Line Break)

Initial Conditions:

Time: Wednesday @ 2250

Unit @ 100% Power

RCS @ normal operating temperature and pressure

Sequence of Events:

2250 Main Feedwater Control System fails

Rx Trip initiated on Lo-Lo Steam Generator Level
LOOP occurs coincident with Rx Trip
EDGs start and supply power to ESF busses

Main Feedwater line to SG C ruptures (double ended) downstream of the check valve inside containment

Main Feedwater isolation valves closed

Aux Feedwater Flow initiated

2300 Emergency Plan initiated

Interim Report

Callaway Plant On-Shift Staffing Analysis
APPENDIX A.1
Event Timelines and Assumptions

Event #4 Reactor Coolant Pump Shaft Seizure (Locked Rotor)

Initial Conditions:

Time: Friday @ 2045

Unit @ 100% Power

RCS @ maximum steady-state temperature and pressure

Sequence of Events:

2050:00 B RCP rotor seizes

Rx Trip initiated on low RCS flow signal

T-G Trip
Loss of Offsite Power occurs; EDGs start and load to essential buses

2050:05 RCS pressure increases peaks and begins to decrease

PRZR Spray fails to initiate
PORV/PRZR safeties setpoint reached; however, PORVs fail to open

Interim Report

Callaway Plant On-Shift Staffing Analysis
APPENDIX A.1
Event Timelines and Assumptions

Event #5 Reactor Coolant Pump Shaft Break

Initial Conditions:

Time: Friday @ 2045

Unit @ 100% Power

RCS @ maximum steady-state temperature and pressure

Sequence of Events:

2050:00 C RCP rotor seizes

Rx Trip initiated on low RCS flow signal

T-G Trip
Loss of Offsite Power occurs; EDGs start and load to essential buses

2050:05 RCS pressure increases peaks and begins to decrease

PRZR Spray fails to initiate
PORV/PRZR safeties setpoint reached; however, PORVs fail to open

This event has same consequences/response actions as Event #4, RCP Shaft Seizure (Locked Rotor). Therefore, no further analysis performed.

Interim Report

Callaway Plant On-Shift Staffing Analysis
APPENDIX A.1
Event Timelines and Assumptions

Event #6 RCCA Ejection

Initial Conditions:

Time: Monday @ 0430

Unit @ 100% Power @ BOL; Control Bank D inserted to its insertion limit

RCS @ normal operating temperature and pressure

Sequence of Events:

0430 RCCA H5 is ejected due to unidentified SCC around the housing (circumferential crack)

Rx trips on high neutron flux
One control rod, adjacent to ejected rod, sticks (does not fully insert)

SB LOCA conditions exist

LOOP occurs coincident with Rx trip
EDGs start and load to ESF buses

0435 Emergency Plan initiated

Interim Report

Callaway Plant On-Shift Staffing Analysis
APPENDIX A.1
Event Timelines and Assumptions

Event #7 Steam Generator Tube Rupture

Initial Conditions:

Time: Wednesday @ 2100

Unit @ 100% Power
RCS @ normal operating temperature and pressure

Sequence of Events:

2105	SGTR occurs – double ended guillotine break of one hot leg SG tube in D SG
	AB-RE-0016D, N16 monitor
	GE-RE-92, Condenser off Gas
2111	Rx trip on overtemperature ΔT or manual trip by RO Highest worth control rod stuck in fully withdrawn position
	SI initiated
	Loss of offsite power occurs; EDG startup and provide power to necessary engineered safeguards equipment
	D ASD fails open
	AB-RE-114, D Main Steam Line ASD Monitor, in alarm
	Emergency Plan initiated
2131	Operators manually close D ASD block valve

Interim Report

Callaway Plant On-Shift Staffing Analysis
APPENDIX A.1
Event Timelines and Assumptions

Event #8 Loss of Coolant Accident (LB LOCA) with release exceeding PAGs and resulting PARs

Initial Conditions:

Time: Monday @ 2200

Unit @100% Power
RCS @ normal operating temperature and pressure

Sequence of Events:

2200 LB LOCA (guillotine break on A cold leg) initiated
RCS leak rate > charging pump capacity

Rx trip on low pressurizer pressure
T-G trip
Loss of offsite power; EDGs start and supply power to respective ESF buses

SI initiated
B train fails
A train pumps on and supplying flow (high head charging pump/safety injection pump/low head injection pump) trips

2201 Operators enter OTO/EOPs

2202 Emergency Plan initiated

2215 RVLIS level 42% with RCP off
Initial Emergency Classification determined

2230 Initial notification to offsite agencies initiated

2235 Conditions degrade
CSFST indicates Core Cooling Red
CSFST indicates Containment Red
Containment Press > 47 psig
RCS Subcooling Margin < 0 ˚F

General Emergency Conditions exist
Release occurs
PARs required

Interim Report

Callaway Plant On-Shift Staffing Analysis
APPENDIX A.1
Event Timelines and Assumptions

Event #9 Fuel Handling Accident

Initial Conditions:

Time: Sunday @ 0100

Unit in Mode 6; Day 7 of refueling outage

Rx Vessel head is removed; fuel canal is full, fuel movement in progress

Sequence of Events:

0105 Fuel handling crew in the process of moving fuel from RxV to SFP

0106 While moving a fuel bundle to the up ender in the fuel transfer canal, the fuel assembly grappler catastrophically fails and the fuel assembly drops to the bottom of the fuel transfer canal floor

All fuel rods in the assembly are damaged, releasing the gap inventory in the assembly

0110 Valid alarms received on Containment Monitors

HP evacuates personnel from containment

Personnel hatch fails open

0111 Fuel Handling SRO notifies control room of event

Emergency Plan initiated

This event occurs during a refueling outage and is therefore not analyzed with on-shift staff. Additional shift staffing is available to support the refueling outage.

Interim Report

Callaway Plant On-Shift Staffing Analysis
APPENDIX A.1
Event Timelines and Assumptions

Event #10 ATWS

Initial Conditions:

Time: Saturday @ 1400

Unit @ 100% Power

RCS @ normal operating temperature and pressure

Sequence of Events:

1400	Turbine trip occurs due to loss of main condenser vacuum without RPS initiated Rx Trip signal
	Manual Rx trip by RO in control room is successful
1405	Control Room Supervisor informs Shift Manager of initiating conditions and event
	Emergency Plan initiated

Interim Report
Callaway Plant On-Shift Staffing Analysis
APPENDIX A.1
Event Timelines and Assumptions

Event #11 Aircraft Probable Threat

Initial Conditions:

Time: Wednesday @ 0300

Unit @ 100% Power

RCS @ normal operating temperature and pressure

Sequence of Events:

0300 NRC notifies Callaway control room of confirmed aircraft threat

Probable Threat - > 5 minutes < 30 minutes

0301 CR personnel initiate Security Event response AOP

On-site actions initiated

Emergency Plan initiated

Interim Report

Callaway Plant On-Shift Staffing Analysis
APPENDIX A.1
Event Timelines and Assumptions

Event #12 Control Room Fire with evacuation and remote shutdown

Initial Conditions:

Time: Friday @ 2100

Unit @ 100% Power

RCS @ normal operating temperature and pressure

Sequence of Events:

2105 Operators observe smoke coming from behind control board

2106 Smoke in CR becomes thicker/flames observed

FB activated

2107 Operators attempt to extinguish flames without success

Decision is made to evacuate control room

Emergency Plan initiated

Interim Report

Callaway Plant On-Shift Staffing Analysis
APPENDIX A.1
Event Timelines and Assumptions

Event #13 Station Blackout

Initial Conditions:

Time: Sunday @ 0100

Weather: Thunderstorms with heavy rain; .5" recorded in last 15 minutes

Unit @ 100% Power; EOC

RCS @ normal operating temperature and pressure

Sequence of Events:

0110	Lightning strike affects offsite power grid resulting in loss of Off-site power
	Unit Main Turbine trips resulting in Rx Trip
0110:35	Unit EDGs fail to start and load to essential buses – no AC power is available
	Operators initiate OTOs/EOPs in response
	None safety diesel fails to start (Alternate Emergency Power Supply)
	Emergency Plan initiated

Interim Report

Callaway Plant On-Shift Staffing Analysis
APPENDIX A.1
Event Timelines and Assumptions

Event #14 Appendix R fire –

Initial Conditions:

Time: Friday @ 2100

Unit @ 100% Power

RCS @ normal operating temperature and pressure

Sequence of Events:

2105 Operators receive numerous Fire Detector alarms indicating fire in an Appendix R designated area

Fire pumps auto start
Sprinkler system activates

2106 FB activated

2107 Control Room personnel smell smoke and observe erratic indications on control panels

Emergency Plan initiated

No analysis required for this event. Callaway Plant personnel have determined that the limiting resource response event is Event #12. Therefore this event response is bounded by the Control Room Fire with evacuation and remote shutdown response

Interim Report

Callaway Plant On-Shift Staffing Analysis
APPENDIX A.1
Event Timelines and Assumptions

Event #15 SAMG Response Actions

Initial Conditions:

Time: Monday @ 2250

Unit @ 0% Power – General Emergency conditions exist (follow up to Event #8, 50 minutes after LB LOCA initiating event)

Sequence of Events:

2250 Loss of SI Trains occur – no ECCS equipment available

2300 >5 CETs reading 1200 °F and trending higher

SAMG entry conditions met

Interim Report

Callaway Plant On-Shift Staffing Analysis
APPENDIX B
Event Scenario Analysis Tables

Analysis (Scenario Number)	FSAR DBA/ ISG Event # (Appendix A)	Title	Source	Page Number
1	1	Design Basis Threat	ISG	137
2	2	Steam System Piping Failure (MSLB)	FSAR Condition IV	142
3	3	Major Rupture of a Main Feedwater Line (MFLB)	FSAR Condition IV	147
4	4	Reactor Coolant Pump Shaft Seizure (Locked Rotor) Including Loss Of Offsite Power	FSAR Condition IV	152
5	6	Spectrum of Rod Cluster Control Assembly (RCCA) Ejection Accidents	FSAR Condition IV	157
6	7	Steam Generator Tube Rupture (Stuck ADV)	FSAR Condition IV	162
7	8	Loss of Coolant Accident (LB LOCA) with release and resulting PARs	FSAR Condition IV	167
8	10	ATWS	ISG	172
9	11	Response actions for an “aircraft probable threat” in accordance with 10 CFR 50.54(hh)(1) and as discussed in RG 1.214	ISG	177
10	12	Control room fire leading to evacuation and remote shutdown, as referenced in IN 95-48.	ISG	182
11	13	Station Blackout (Current Licensing Basis)	ISG	187
12	15	SAMG	ISG	192

Interim Report

Callaway Plant On-Shift Staffing Analysis
Appendix B

Analysis #1: DBA/ISG Event #1 - DBT **ECL: Site Area Emergency**

TABLE 1 – On-shift Positions

Line	On-shift Position	Emergency Plan Reference	Augmentation Elapsed Time (min)	Role in Table#/Line#	Unanalyzed Task?	TMS Required?
8.	Shift Manager	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L1 T5/L1 T5/L3 T5/L7 T5/L8 T5/L9 T5/L10 T5/L13	No	Yes
9.	Operating Supervisor – CR (SRO #1)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L2	No	No
10.	Operating Supervisor - FS (SRO #2) [1]	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L3 T5/L11	No	No
11.	Reactor Operator (RO #1)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L4	No	No
12.	Reactor Operator (RO #2)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L5 T5/L5	No	No
13.	Security Shift Supervisor	CP RERP, Figure 5-1, Table 5-1	75	T2/L7	No	No
14.	SAS Operator	CP RERP, Figure 5-1, Table 5-1	N/A	T5/L6	No	No

Notes: [1] STA is a function and not a position. STA is a collateral duty of the Operating Supervisors (CR or FS).

Interim Report

Callaway Plant On-Shift Staffing Analysis

TABLE 2 - Plant Operations & Safe Shutdown Analysis # 1

One Unit - One Control Room

Minimum Operations Crew Necessary to Implement

OTOs and EOPs, or SAMGs if applicable

Line	Generic Title/Role	On-Shift Position	Task Performance Validation
6.	Shift Manager	Shift Manager	Operator Training
7.	Shift Supervisor	Operating Supervisor – CR (SRO #1)	Operator Training
8.	Shift Supervisor	Operating Supervisor – FS (SRO #2) [1]	Operator Training
9.	Reactor Operator (OATC)	Reactor Operator (RO #1)	Operator Training
10.	Reactor Operator (BOP)	Plant Operator (RO #2)	Operator Training

Notes: See Table 2A for OTO/EOP actions

[1] STA function is a collateral duty of the Operating Supervisor.

Other (non-Operations) Personnel Necessary to Implement

OTOs and EOPs, or SAMGs if applicable

Line	Generic Title/Role	On-Shift Position	Task Performance Validation
7.	Security Shift Supervisor	Security Shift Supervisor	Security Training

Notes: Notify and remain available to Shift Manager

Interim Report

Callaway Plant On-Shift Staffing Analysis

TABLE 3 – Firefighting Analysis #1

Line	Performed By	Task Analysis Controlling Method
6.	N/A	N/A
7.	N/A	N/A
8.	N/A	N/A
9.	N/A	N/A
10.	N/A	N/A

Notes: N/A no Fire Brigade response required

Interim Report

Callaway Plant On-Shift Staffing Analysis

TABLE 4 – Radiation Protection & Chemistry Analysis #1

Line	Position Performing Function/Task	Performance Time Period After Emergency Declaration (minutes)																	
		0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75	75-80	80-85	85-90
9.	In-Plant Survey On-Shift Position: HP #1																		
10.	Out of Plant Survey On-Shift Position: HP #1																		
11.	Personnel Monitoring On-Shift Position:																		
12.	Job Coverage On-Shift Position:																		
13.	Offsite Radiological Assessment On-Shift Position: HP #2																		
14.	Other Site-Specific RP – Describe: On-Shift Position:																		
15.	Chemistry function/task #1 – Describe: On-Shift Position: CT #1																		
16.	Chemistry function/task #2 – Describe: On-Shift Position: CT #1																		

Notes: No response – Chemistry and HP in duck and cover

Interim Report

Callaway Plant On-Shift Staffing Analysis

TABLE 5 – Emergency Plan Implementation Analysis #1

Line	Function/Task	On-Shift Position	Task Analysis Controlling Method
16.	Declare the Emergency Classification Level (ECL)	Shift Manager	EP/Ops Training and EP Drill Program
17.	Approve Offsite Protective Action Recommendations	N/A	N/A
18.	Approve content of State/local notifications	Shift Manager	EP/Ops Training and EP Drill Program
19.	Approve extension to allowable dose limits	N/A	N/A
20.	Notification and direction to on-shift staff (e.g., to assemble, evacuate, etc.)	RO#2	EP/Ops Training and EP Drill Program
21.	ERO notification	SAS Operator	EP/Security Training and EP Drill Program
22.	Abbreviated NRC notification for DBT event	Shift Manager	EP/Ops Training and EP Drill Program
23.	Complete State/local notification form	Shift Manager	EP/Ops Training and EP Drill Program
24.	Perform State/local notifications	Shift Manager	EP Training and EP Drill Program
25.	Complete NRC event notification form	Shift Manager	EP/Ops Training and EP Drill Program
26.	Activate ERDS	SRO#2	EP/Ops Training and EP Drill Program
27.	Offsite radiological assessment	N/A	N/A
28.	Perform NRC notifications	Shift Manager	EP/Ops Training and EP Drill Program
29.	Perform other site-specific event notifications (e.g., INPO, ANI, etc.)	N/A	N/A
30.	Personnel accountability	N/A – after ERO augmentation	N/A

Notes: Site Area Emergency, EAL HS4.1
EIP-ZZ-00101, Classification of Emergencies
EIP-ZZ-00102, Emergency Implementing Actions
EIP-ZZ-00200, Augmentation of the Emergency Organization
EIP-ZZ-00201, Notifications
EIP-ZZ-00217, Emergency Data System Activation

Interim Report

Callaway Plant On-Shift Staffing Analysis
Appendix B

Analysis #2: DBA/ISG Event #2 - Steam Line Break **ECL: Unusual Event**

TABLE 1 – On-shift Positions

Line	On-shift Position	Emergency Plan Reference	Augmentation Elapsed Time (min)	Role in Table#/Line#	Unanalyzed Task?	TMS Required?
13.	Shift Manager	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L1 T5/L1 T5/L3 T5/L5	No	No
14.	Operating Supervisor – CR (SRO #1)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L2	No	No
15.	Operating Supervisor - FS (SRO #2) [1]	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L3	No	No
16.	Reactor Operator (RO #1)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L4	No	No
17.	Reactor Operator (RO #2)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L5	No	No
18.	Ops/Asst Ops Technician (NLO #1)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L6	No	No
19.	Ops/Asst Ops Technician (NLO #3)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L7	No	No
20.	Offsite Communicator (NLO #5)	CP RERP, Figure 5-1, Table 5-1	75	T5/L8 T5/L9 T5/L10 T5/L13	No	No
21.	Ops Technician (NLO #6)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L8	No	No
22.	HP Technician (HP #1)	CP RERP, Figure 5-1, Table 5-1	75	T4/L1	No	No
23.	HP Technician (HP #2)	CP RERP, Figure 5-1, Table 5-1	75	T4/L5	No	No
24.	Chemistry Technician (CT #1)	CP RERP, Figure 5-1, Table 5-1	75	T4/L7	No	No

Notes: [1] STA is a function and not a position. STA is a collateral duty of the Operating Supervisors (CR or FS).

Interim Report

Callaway Plant On-Shift Staffing Analysis

TABLE 2 - Plant Operations & Safe Shutdown Analysis # 2

One Unit - One Control Room

Minimum Operations Crew Necessary to Implement

OTOs and EOPs, or SAMGs if applicable

Line	Generic Title/Role	On-Shift Position	Task Performance Validation
9.	Shift Manager	Shift Manager	Operator Training
10.	Shift Supervisor	Operating Supervisor – CR (SRO #1)	Operator Training
11.	Shift Supervisor	Operating Supervisor – FS (SRO #2) [1]	Operator Training
12.	Reactor Operator (OATC)	Reactor Operator (RO #1)	Operator Training
13.	Reactor Operator (BOP)	Plant Operator (RO #2)	Operator Training
14.	Auxiliary Operator	Ops/Asst Ops Technician (NLO #1)	Operator Training
15.	Auxiliary Operator	Ops/Asst Ops Technician (NLO #3)	Operator Training
16.	Auxiliary Operator	Ops Technician (NLO #6)	Operator Training

Notes: See Table 2A for OTO/EOP actions

[1] STA function is a collateral duty of the Operating Supervisor.

Interim Report

Callaway Plant On-Shift Staffing Analysis

TABLE 3 – Firefighting Analysis # 2

Line	Performed By	Task Analysis Controlling Method
6.	N/A	N/A
7.	N/A	N/A
8.	N/A	N/A
9.	N/A	N/A
10.	N/A	N/A

Notes: No Fire Brigade response for this event.

Interim Report

Callaway Plant On-Shift Staffing Analysis

TABLE 4 – Radiation Protection & Chemistry Analysis # 2

Line	Position Performing Function/Task	Performance Time Period After Emergency Declaration (minutes)																	
		0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75	75-80	80-85	85-90
9.	In-Plant Survey On-Shift Position: HP #1	X	X	X	X														
10.	Out of Plant Survey On-Shift Position: HP #1																		
11.	Personnel Monitoring On-Shift Position:																		
12.	Job Coverage On-Shift Position:																		
13.	Offsite Radiological Assessment On-Shift Position: HP #2	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X			
14.	Other Site-Specific RP – Describe: On-Shift Position:																		
15.	Chemistry function/task #1 – Describe: SG sampling and analysis On-Shift Position: CT #1	X	X	X	X	X	X	X	X	X									
16.	Chemistry function/task #2 – Describe: On-Shift Position: CT #1																		

Notes: EIP-ZZ-01211, Accident Dose Assessment
CTP-ZZ-02590, Primary to Secondary Leak Rate Determination

Interim Report

Callaway Plant On-Shift Staffing Analysis

TABLE 5 – Emergency Plan Implementation Analysis # 2

Line	Function/Task	On-Shift Position	Task Analysis Controlling Method
16.	Declare the Emergency Classification Level (ECL)	Shift Manager	EP/Ops Training and EP Drill Program
17.	Approve Offsite Protective Action Recommendations	N/A	N/A
18.	Approve content of State/local notifications	Shift Manager	EP/Ops Training and EP Drill Program
19.	Approve extension to allowable dose limits	N/A	N/A
20.	Notification and direction to on-shift staff (e.g., to assemble, evacuate, etc.)	Shift Manager	EP/Ops Training and EP Drill Program
21.	ERO notification	N/A	N/A
22.	Abbreviated NRC notification for DBT event	N/A	N/A
23.	Complete State/local notification form	NLO #5	EP/Ops Training and EP Drill Program
24.	Perform State/local notifications	NLO #5	EP Training and EP Drill Program
25.	Complete NRC event notification form	NLO #5	EP/Ops Training and EP Drill Program
26.	Activate ERDS	N/A	N/A
27.	Offsite radiological assessment	N/A	N/A
28.	Perform NRC notifications	NLO #5	EP/Ops Training and EP Drill Program
29.	Perform other site-specific event notifications (e.g., INPO, ANI, etc.)	N/A	N/A
30.	Personnel accountability	N/A	N/A

Notes: NUE, EAL SU1.1
EIP-ZZ-00101, Classification of Emergencies
EIP-ZZ-00102, Emergency Implementing Actions
EIP-ZZ-00200, Augmentation of the Emergency Organization
EIP-ZZ-00201, Notifications
EIP-ZZ-00212, Protective Action Recommendations
EIP-ZZ-00217, Emergency Data System Activation
EIP-ZZ-00230, Accountability

Interim Report

Callaway Plant On-Shift Staffing Analysis
Appendix B

Analysis #3: DBA/ISG Event #3 - Main Feedwater Line Break **ECL Unusual Event**

TABLE 1 – On-shift Positions

Line	On-shift Position	Emergency Plan Reference	Augmentation Elapsed Time (min)	Role in Table#/Line#	Unanalyzed Task?	TMS Required?
13.	Shift Manager	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L1 T5/L1 T5/L3 T5/L5	No	No
14.	Operating Supervisor – CR (SRO #1)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L2	No	No
15.	Operating Supervisor - FS (SRO #2) [1]	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L3	No	No
16.	Reactor Operator (RO #1)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L4	No	No
17.	Reactor Operator (RO #2)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L5	No	No
18.	Ops/Asst Ops Technician (NLO #1)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L6	No	No
19.	Ops/Asst Ops Technician (NLO #3)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L7	No	No
20.	Offsite Communicator (NLO #5)	CP RERP, Figure 5-1, Table 5-1	75	T5/L8 T5/L9 T5/L10 T5/L13	No	No
21.	Ops Technician (NLO #6)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L8	No	No
22.	HP Technician (HP #1)	CP RERP, Figure 5-1, Table 5-1	75	T4/L1	No	No
23.	HP Technician (HP #2)	CP RERP, Figure 5-1, Table 5-1	75	T4/L5	No	No
24.	Chemistry Technician (CT #1)	CP RERP, Figure 5-1, Table 5-1	75	T4/L7	No	No

Notes: [1] STA is a function and not a position. STA is a collateral duty of the Operating Supervisors (CR or FS).

Interim Report

Callaway Plant On-Shift Staffing Analysis

TABLE 2 - Plant Operations & Safe Shutdown Analysis # 3

One Unit - One Control Room
Minimum Operations Crew Necessary to Implement
OTOs and EOPs, or SAMGs if applicable

Line	Generic Title/Role	On-Shift Position	Task Performance Validation
9.	Shift Manager	Shift Manager	Operator Training
10.	Shift Supervisor	Operating Supervisor – CR (SRO #1)	Operator Training
11.	Shift Supervisor	Operating Supervisor – FS (SRO #2) [1]	Operator Training
12.	Reactor Operator (OATC)	Reactor Operator (RO #1)	Operator Training
13.	Reactor Operator (BOP)	Plant Operator (RO #2)	Operator Training
14.	Auxiliary Operator	Ops/Asst Ops Technician (NLO #1)	Operator Training
15.	Auxiliary Operator	Ops/Asst Ops Technician (NLO #3)	Operator Training
16.	Auxiliary Operator	Ops Technician (NLO #6)	Operator Training

Notes: See Table 2A for OTO/EOP actions

[1] STA function is a collateral duty of the Operating Supervisor.

Interim Report

Callaway Plant On-Shift Staffing Analysis

TABLE 3 – Firefighting Analysis # 3

Line	Performed By	Task Analysis Controlling Method
6.	N/A	N/A
7.	N/A	N/A
8.	N/A	N/A
9.	N/A	N/A
10.	N/A	N/A

Notes: No Fire Brigade response required for this event.

Interim Report

Callaway Plant On-Shift Staffing Analysis

TABLE 4 – Radiation Protection & Chemistry Analysis # 3

Line	Position Performing Function/Task	Performance Time Period After Emergency Declaration (minutes)																
		0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75	75-80	80-85	85-90
9.	In-Plant Survey On-Shift Position: HP #1	X	X	X	X														
10.	Out of Plant Survey On-Shift Position: HP #1																		
11.	Personnel Monitoring On-Shift Position:																		
12.	Job Coverage On-Shift Position:																		
13.	Offsite Radiological Assessment On-Shift Position: HP #2	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X			
14.	Other Site-Specific RP – Describe: On-Shift Position:																		
15.	Chemistry function/task #1 – Describe: SG sampling and analysis On-Shift Position: CT #1	X	X	X	X	X	X	X	X	X									
16.	Chemistry function/task #2 – Describe: On-Shift Position: CT #1																		

Notes: EIP-ZZ-01211, Accident Dose Assessment
CTP-ZZ-02590, Primary to Secondary Leak Rate Determination

Interim Report

Callaway Plant On-Shift Staffing Analysis

TABLE 5 – Emergency Plan Implementation Analysis # 3

Line	Function/Task	On-Shift Position	Task Analysis Controlling Method
16.	Declare the Emergency Classification Level (ECL)	Shift Manager	EP/Ops Training and EP Drill Program
17.	Approve Offsite Protective Action Recommendations	N/A	N/A
18.	Approve content of State/local notifications	Shift Manager	EP/Ops Training and EP Drill Program
19.	Approve extension to allowable dose limits	N/A	N/A
20.	Notification and direction to on-shift staff (e.g., to assemble, evacuate, etc.)	Shift Manager	EP/Ops Training and EP Drill Program
21.	ERO notification	N/A	N/A
22.	Abbreviated NRC notification for DBT event	N/A	N/A
23.	Complete State/local notification form	NLO #5	EP/Ops Training and EP Drill Program
24.	Perform State/local notifications	NLO #5	EP Training and EP Drill Program
25.	Complete NRC event notification form	NLO #5	EP/Ops Training and EP Drill Program
26.	Activate ERDS	N/A	N/A
27.	Offsite radiological assessment	N/A	N/A
28.	Perform NRC notifications	NLO #5	EP/Ops Training and EP Drill Program
29.	Perform other site-specific event notifications (e.g., INPO, ANI, etc.)	N/A	N/A
30.	Personnel accountability	N/A	N/A

Notes: NUE, EAL SU1.1
EIP-ZZ-00101, Classification of Emergencies
EIP-ZZ-00102, Emergency Implementing Actions
EIP-ZZ-00200, Augmentation of the Emergency Organization
EIP-ZZ-00201, Notifications
EIP-ZZ-00212, Protective Action Recommendations
EIP-ZZ-00217, Emergency Data System Activation
EIP-ZZ-00230, Accountability

Interim Report

Callaway Plant On-Shift Staffing Analysis
Appendix B

Analysis #4: DBA/ISG Event #4 - RCP Locked Rotor **ECL: Unusual Event**

TABLE 1 – On-shift Positions

Line	On-shift Position	Emergency Plan Reference	Augmentation Elapsed Time (min)	Role in Table#/Line#	Unanalyzed Task?	TMS Required?
11.	Shift Manager	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L1 T5/L1 T5/L3 T5/L5	No	No
12.	Operating Supervisor – CR (SRO #1)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L2	No	No
13.	Operating Supervisor - FS (SRO #2) [1]	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L3	No	No
14.	Reactor Operator (RO #1)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L4	No	No
15.	Reactor Operator (RO #2)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L5	No	No
16.	Ops/Asst Ops Technician (NLO #1)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L6	No	No
17.	Ops/Asst Ops Technician (NLO #3)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L7	No	No
18.	Offsite Communicator (NLO #5)	CP RERP, Figure 5-1, Table 5-1	75	T5/L8 T5/L9 T5/L10 T5/L13	No	No
19.	Ops Technician (NLO #6)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L8	No	No
20.	HP Technician (HP #2)	CP RERP, Figure 5-1, Table 5-1	75	T4/L5	No	No

Notes: [1] STA is a function and not a position. STA is a collateral duty of the Operating Supervisors (CR or FS).

Interim Report

Callaway Plant On-Shift Staffing Analysis

TABLE 2 - Plant Operations & Safe Shutdown Analysis # 4

One Unit - One Control Room

Minimum Operations Crew Necessary to Implement

OTOs and EOPs, or SAMGs if applicable

Line	Generic Title/Role	On-Shift Position	Task Performance Validation
9.	Shift Manager	Shift Manager	Operator Training
10.	Shift Supervisor	Operating Supervisor – CR (SRO #1)	Operator Training
11.	Shift Supervisor	Operating Supervisor – FS (SRO #2) [1]	Operator Training
12.	Reactor Operator (OATC)	Reactor Operator (RO #1)	Operator Training
13.	Reactor Operator (BOP)	Plant Operator (RO #2)	Operator Training
14.	Auxiliary Operator	Ops/Asst Ops Technician (NLO #1)	Operator Training
15.	Auxiliary Operator	Ops/Asst Ops Technician (NLO #3)	Operator Training
16.	Auxiliary Operator	Ops Technician (NLO #6)	Operator Training

Notes: See Table 2A for OTO/EOP actions

[1] STA function is a collateral duty of the Operating Supervisor.

Interim Report

Callaway Plant On-Shift Staffing Analysis

TABLE 3 – Firefighting Analysis # 4

Line	Performed By	Task Analysis Controlling Method
6.	N/A	N/A
7.	N/A	N/A
8.	N/A	N/A
9.	N/A	N/A
10.	N/A	N/A

Notes: No Fire Brigade response required for this event

Interim Report

Callaway Plant On-Shift Staffing Analysis

TABLE 4 – Radiation Protection & Chemistry Analysis #4

Line	Position Performing Function/Task	Performance Time Period After Emergency Declaration (minutes)																	
		0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75	75-80	80-85	85-90
9.	In-Plant Survey On-Shift Position: HP #1																		
10.	Out of Plant Survey On-Shift Position: HP #1																		
11.	Personnel Monitoring On-Shift Position:																		
12.	Job Coverage On-Shift Position:																		
13.	Offsite Radiological Assessment On-Shift Position: HP #2	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X			
14.	Other Site-Specific RP – Describe: On-Shift Position:																		
15.	Chemistry function/task #1 – Describe: Sample and analyze SG. On-Shift Position: CT #1																		
16.	Chemistry function/task #2 – Describe: On-Shift Position: CT #1																		

Notes: EIP-ZZ-01211, Accident Dose Assessment

Interim Report

Callaway Plant On-Shift Staffing Analysis

TABLE 5 – Emergency Plan Implementation Analysis # 4

Line	Function/Task	On-Shift Position	Task Analysis Controlling Method
16.	Declare the Emergency Classification Level (ECL)	Shift Manager	EP/Ops Training and EP Drill Program
17.	Approve Offsite Protective Action Recommendations	N/A	N/A
18.	Approve content of State/local notifications	Shift Manager	EP/Ops Training and EP Drill Program
19.	Approve extension to allowable dose limits	N/A	N/A
20.	Notification and direction to on-shift staff (e.g., to assemble, evacuate, etc.)	Shift Manager	EP/Ops Training and EP Drill Program
21.	ERO notification	N/A	N/A
22.	Abbreviated NRC notification for DBT event	N/A	N/A
23.	Complete State/local notification form	NLO #5	EP/Ops Training and EP Drill Program
24.	Perform State/local notifications	NLO #5	EP Training and EP Drill Program
25.	Complete NRC event notification form	NLO #5	EP/Ops Training and EP Drill Program
26.	Activate ERDS	N/A	N/A
27.	Offsite radiological assessment	N/A	N/A
28.	Perform NRC notifications	NLO #5	EP/Ops Training and EP Drill Program
29.	Perform other site-specific event notifications (e.g., INPO, ANI, etc.)	N/A	N/A
30.	Personnel accountability	N/A	N/A

Notes: Unusual Event, EAL SU1.1
EIP-ZZ-00101, Classification of Emergencies
EIP-ZZ-00102, Emergency Implementing Actions
EIP-ZZ-00200, Augmentation of the Emergency Organization
EIP-ZZ-00201, Notifications
EIP-ZZ-00217, Emergency Data System Activation

Interim Report

Callaway Plant On-Shift Staffing Analysis
Appendix B

Analysis #5: DBA/ISG Event #6 - RCCA assembly ejection **ECL: Alert**

TABLE 1 – On-shift Positions

Line	On-shift Position	Emergency Plan Reference	Augmentation Elapsed Time (min)	Role in Table#/Line#	Unanalyzed Task?	TMS Required?
14.	Shift Manager	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L1 T5/L1 T5/L3 T5/L5	No	No
15.	Operating Supervisor – CR (SRO #1)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L2	No	No
16.	Operating Supervisor - FS (SRO #2) [1]	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L3 T5/L11	No	No
17.	Reactor Operator (RO #1)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L4	No	No
18.	Reactor Operator (RO #2)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L5	No	No
19.	Ops/Asst Ops Technician (NLO #1)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L6	No	No
20.	Ops/Asst Ops Technician (NLO #3)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L7	No	No
21.	Offsite Communicator (NLO #5)	CP RERP, Figure 5-1, Table 5-1	75	T5/L8 T5/L9 T5/L10 T5/L13	No	No
22.	Ops Technician (NLO #6)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L8	No	No
23.	HP Technician (HP #1)	CP RERP, Figure 5-1, Table 5-1	75	T4/L1	No	No
24.	HP Technician (HP #2)	CP RERP, Figure 5-1, Table 5-1	75	T4/L5	No	No
25.	Chemistry Technician (CT #1)	CP RERP, Figure 5-1, Table 5-1	75	T4/L7 T4/L8 T4/L9	No	No
26.	SAS Operator	CP RERP, Figure 5-1, Table 5-1	N/A	T5/L6	No	No

Notes: [1] STA is a function and not a position. STA is a collateral duty of the Operating Supervisors (CR or FS).

Interim Report

Callaway Plant On-Shift Staffing Analysis

TABLE 2 - Plant Operations & Safe Shutdown Analysis # 5

One Unit - One Control Room

Minimum Operations Crew Necessary to Implement

OTOs and EOPs, or SAMGs if applicable

Line	Generic Title/Role	On-Shift Position	Task Performance Validation
9.	Shift Manager	Shift Manager	Operator Training
10.	Shift Supervisor	Operating Supervisor – CR (SRO #1)	Operator Training
11.	Shift Supervisor	Operating Supervisor – FS (SRO #2) [1]	Operator Training
12.	Reactor Operator (OATC)	Reactor Operator (RO #1)	Operator Training
13.	Reactor Operator (BOP)	Plant Operator (RO #2)	Operator Training
14.	Auxiliary Operator	Ops/Asst Ops Technician (NLO #1)	Operator Training
15.	Auxiliary Operator	Ops/Asst Ops Technician (NLO #3)	Operator Training
16.	Auxiliary Operator	Ops Technician (NLO #6)	Operator Training

Notes: See Table 2A for OTO/EOP actions

[1] STA function is a collateral duty of the Operating Supervisor.

Interim Report

Callaway Plant On-Shift Staffing Analysis

TABLE 3 – Firefighting Analysis #5

Line	Performed By	Task Analysis Controlling Method
6.	N/A	N/A
7.	N/A	N/A
8.	N/A	N/A
9.	N/A	N/A
10.	N/A	N/A

Notes: No Fire Brigade response for this event

Interim Report

Callaway Plant On-Shift Staffing Analysis

TABLE 4 – Radiation Protection & Chemistry Analysis #5

Line	Position Performing Function/Task	Performance Time Period After Emergency Declaration (minutes)																
		0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75	75-80	80-85	85-90
10.	In-Plant Survey On-Shift Position: HP #1	X	X	X	X														
11.	Out of Plant Survey On-Shift Position: HP #1																		
12.	Personnel Monitoring On-Shift Position:																		
13.	Job Coverage On-Shift Position:																		
14.	Offsite Radiological Assessment On-Shift Position: HP #2	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X			
15.	Other Site-Specific RP – Describe: On-Shift Position:																		
16.	Chemistry function/task #1 – Describe: Steam Generator Sampling and analysis On-Shift Position: CT #1	X	X	X	X	X	X	X	X	X									
17.	Chemistry function/task #2 – Describe: RCS Sampling On-Shift Position: CT #1										X	X	X	X					
18.	Chemistry function/task #3 – Describe: RCS Analysis On-Shift Position: CT #1														X	X			

Notes: EIP-ZZ-01211, Accident Dose Assessment
In Plant surveys of Main Steam Line per EOP
Chemistry sampling per EOP
CTP-ZZ-02590, Primary to Secondary Leak Rate Determination
Chemistry directed by EOP to sample containment atmosphere however, no procedure guidance exist (CAR 201201251).

Interim Report

Callaway Plant On-Shift Staffing Analysis

TABLE 5 – Emergency Plan Implementation Analysis # 5

Line	Function/Task	On-Shift Position	Task Analysis Controlling Method
16.	Declare the Emergency Classification Level (ECL)	Shift Manager	EP/Ops Training and EP Drill Program
17.	Approve Offsite Protective Action Recommendations	N/A	N/A
18.	Approve content of State/local notifications	Shift Manager	EP/Ops Training and EP Drill Program
19.	Approve extension to allowable dose limits	N/A	N/A
20.	Notification and direction to on-shift staff (e.g., to assemble, evacuate, etc.)	Shift Manager	EP/Ops Training and EP Drill Program
21.	ERO notification	SAS Operator	EP/Security Training and EP Drill Program
22.	Abbreviated NRC notification for DBT event	N/A	N/A
23.	Complete State/local notification form	NLO #5	EP/Ops Training and EP Drill Program
24.	Perform State/local notifications	NLO #5	EP Training and EP Drill Program
25.	Complete NRC event notification form	NLO #5	EP/Ops Training and EP Drill Program
26.	Activate ERDS	SRO #2	EP/Ops Training and EP Drill Program
27.	Offsite radiological assessment	N/A	N/A
28.	Perform NRC notifications	NLO #5	EP/Ops Training and EP Drill Program
29.	Perform other site-specific event notifications (e.g., INPO, ANI, etc.)	N/A	N/A
30.	Personnel accountability	N/A	N/A

Notes: Alert EAL FA1.1
EIP-ZZ-00101, Classification of Emergencies
EIP-ZZ-00102, Emergency Implementing Actions
EIP-ZZ-00200, Augmentation of the Emergency Organization
EIP-ZZ-00201, Notifications
EIP-ZZ-00217, Emergency Data System Activation

Interim Report

Callaway Plant On-Shift Staffing Analysis
Appendix B

Analysis #6: DBA/ISG Event #7 - Steam Generator Tube Rupture (Stuck ADV) **ECL: Alert**

TABLE 1 – On-shift Positions

Line	On-shift Position	Emergency Plan Reference	Augmentation Elapsed Time (min)	Role in Table#/Line#	Unanalyzed Task?	TMS Required?
16.	Shift Manager	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L1 T5/L1 T5/L3 T5/L5	No	No
17.	Operating Supervisor – CR (SRO #1)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L2	No	No
18.	Operating Supervisor - FS (SRO #2) [1]	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L3 T5/L11	No	No
19.	Reactor Operator (RO #1)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L4	No	No
20.	Reactor Operator (RO #2)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L5	No	No
21.	Ops/Asst Ops Technician (NLO #1)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L6	No	No
22.	Ops/Asst Ops Technician (NLO #2)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L7	No	No
23.	Ops/Asst Ops Technician (NLO #3)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L8	No	No
24.	Ops/Asst Ops Technician (NLO #4)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L9	No	No
25.	Offsite Communicator (NLO #5)	CP RERP, Figure 5-1, Table 5-1	75	T5/L8 T5/L9 T5/L10 T5/L13	No	No
26.	Ops Technician (NLO #6)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L10	No	No
27.	HP Technician (HP #1)	CP RERP, Figure 5-1, Table 5-1	75	T4/L1	No	No
28.	HP Technician (HP #2)	CP RERP, Figure 5-1, Table 5-1	75	T4/L5	No	No
29.	Chemistry Technician (CT #1)	CP RERP, Figure 5-1, Table 5-1	75	T4/L7 T4/L8 T4/L9	No	No
30.	SAS Operator	CP RERP, Figure 5-1, Table 5-1	N/A	T5/L6	No	No

Notes: [1] STA is a function and not a position. STA is a collateral duty of the Operating Supervisors (CR or FS).

Interim Report

Callaway Plant On-Shift Staffing Analysis

TABLE 2 - Plant Operations & Safe Shutdown Analysis # 6

One Unit - One Control Room

Minimum Operations Crew Necessary to Implement

OTOs and EOPs, or SAMGs if applicable

Line	Generic Title/Role	On-Shift Position	Task Performance Validation
11.	Shift Manager	Shift Manager	Operator Training
12.	Shift Supervisor	Operating Supervisor – CR (SRO #1)	Operator Training
13.	Shift Supervisor	Operating Supervisor – FS (SRO #2) [1]	Operator Training
14.	Reactor Operator (OATC)	Reactor Operator (RO #1)	Operator Training
15.	Reactor Operator (BOP)	Plant Operator (RO #2)	Operator Training
16.	Auxiliary Operator	Ops/Asst Ops Technician (NLO #1)	Operator Training
17.	Auxiliary Operator	Ops/Asst Ops Technician (NLO #2)	Operator Training
18.	Auxiliary Operator	Ops/Asst Ops Technician (NLO #3)	Operator Training
19.	Auxiliary Operator	Ops/Asst Ops Technician (NLO #4)	Operator Training
20.	Auxiliary Operator	Ops Technician (NLO #6)	Operator Training

Notes: See Table 2A for OTO/EOP actions

[1] STA function is a collateral duty of the Operating Supervisor.

Interim Report

Callaway Plant On-Shift Staffing Analysis

TABLE 3 – Firefighting Analysis #6

Line	Performed By	Task Analysis Controlling Method
6.	N/A	N/A
7.	N/A	N/A
8.	N/A	N/A
9.	N/A	N/A
10.	N/A	N/A

Notes: No Fire Brigade response for this event

Interim Report

Callaway Plant On-Shift Staffing Analysis

TABLE 4 – Radiation Protection & Chemistry Analysis #6

Line	Position Performing Function/Task	Performance Time Period After Emergency Declaration (minutes)																
		0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75	75-80	80-85	85-90
10.	In-Plant Survey On-Shift Position: HP #1	X	X	X	X														
11.	Out of Plant Survey On-Shift Position: HP #1																		
12.	Personnel Monitoring On-Shift Position:																		
13.	Job Coverage On-Shift Position:																		
14.	Offsite Radiological Assessment On-Shift Position: HP #2	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X			
15.	Other Site-Specific RP – Describe: On-Shift Position:																		
16.	Chemistry function/task #1 – Describe: Steam Generator Sampling and analysis On-Shift Position: CT #1	X	X	X	X	X	X	X	X	X									
17.	Chemistry function/task #2 – Describe: RCS Sampling On-Shift Position: CT #1										X	X	X	X					
18.	Chemistry function/task #3 – Describe: RCS Analysis On-Shift Position: CT #1														X	X			

Notes: EIP-ZZ-01211, Accident Dose Assessment
In Plant surveys of Main Steam Line per EOP
Chemistry sampling per EOP
CTP-ZZ-02590, Primary to Secondary Leak Rate Determination

Interim Report

Callaway Plant On-Shift Staffing Analysis

TABLE 5 – Emergency Plan Implementation Analysis # 6

Line	Function/Task	On-Shift Position	Task Analysis Controlling Method
16.	Declare the Emergency Classification Level (ECL)	Shift Manager	EP/Ops Training and EP Drill Program
17.	Approve Offsite Protective Action Recommendations	N/A	N/A
18.	Approve content of State/local notifications	Shift Manager	EP/Ops Training and EP Drill Program
19.	Approve extension to allowable dose limits	N/A	N/A
20.	Notification and direction to on-shift staff (e.g., to assemble, evacuate, etc.)	Shift Manager	EP/Ops Training and EP Drill Program
21.	ERO notification	SAS Operator	EP/Security Training and EP Drill Program
22.	Abbreviated NRC notification for DBT event	N/A	N/A
23.	Complete State/local notification form	NLO #5	EP/Ops Training and EP Drill Program
24.	Perform State/local notifications	NLO #5	EP Training and EP Drill Program
25.	Complete NRC event notification form	NLO #5	EP/Ops Training and EP Drill Program
26.	Activate ERDS	SRO #2	EP/Ops Training and EP Drill Program
27.	Offsite radiological assessment	N/A	N/A
28.	Perform NRC notifications	NLO #5	EP/Ops Training and EP Drill Program
29.	Perform other site-specific event notifications (e.g., INPO, ANI, etc.)	N/A	N/A
30.	Personnel accountability	N/A	N/A

Notes: Alert, EAL FA1.1
EIP-ZZ-00101, Classification of Emergencies
EIP-ZZ-00102, Emergency Implementing Actions
EIP-ZZ-00200, Augmentation of the Emergency Organization
EIP-ZZ-00201, Notifications
EIP-ZZ-00217, Emergency Data System Activation

Interim Report

Callaway Plant On-Shift Staffing Analysis
Appendix B

Analysis #7: DBA/ISG Event #8 - LOCA, with release and PARS **ECL: Site Area Emergency- General Emergency**

TABLE 1 – On-shift Positions

Line	On-shift Position	Emergency Plan Reference	Augmentation Elapsed Time (min)	Role in Table#/Line#	Unanalyzed Task?	TMS Required?
15.	Shift Manager	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L1 T5/L1 T5/L2 T5/L3 T5/L4 T5/L5	No	No
16.	Operating Supervisor – CR (SRO #1)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L2	No	No
17.	Operating Supervisor - FS (SRO #2) [1]	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L3 T5/L11	No	No
18.	Reactor Operator (RO #1)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L4	No	No
19.	Reactor Operator (RO #2)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L5	No	No
20.	Ops/Asst Ops Technician (NLO #1)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L6	No	No
21.	Ops/Asst Ops Technician (NLO #3)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L7	No	No
22.	Offsite Communicator (NLO #5)	CP RERP, Figure 5-1, Table 5-1	75	T5/L8 T5/L9 T5/L10 T5/L13	No	No
23.	Ops Technician (NLO #6)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L8	No	No
24.	HP Technician (HP #1)	CP RERP, Figure 5-1, Table 5-1	75	T4/L1	No	No
25.	HP Technician (HP #2)	CP RERP, Figure 5-1, Table 5-1	75	T4/L5	No	No
26.	Chemistry Technician (CT #1)	CP RERP, Figure 5-1, Table 5-1	75	T4/L7	No	No
27.	SAS Operator	CP RERP, Figure 5-1, Table 5-1	N/A	T5/L6	No	No
28.	CAS Operator	CP RERP, Figure 5-1, Table 5-1	N/A	T5/L15	No	No

Notes: [1] STA is a function and not a position. STA is a collateral duty of the Operating Supervisors (CR or FS).

Interim Report

Callaway Plant On-Shift Staffing Analysis

TABLE 2 - Plant Operations & Safe Shutdown Analysis # 7

One Unit - One Control Room

Minimum Operations Crew Necessary to Implement

OTOs and EOPs, or SAMGs if applicable

Line	Generic Title/Role	On-Shift Position	Task Performance Validation
9.	Shift Manager	Shift Manager	Operator Training
10.	Shift Supervisor	Operating Supervisor – CR (SRO #1)	Operator Training
11.	Shift Supervisor	Operating Supervisor – FS (SRO #2) [1]	Operator Training
12.	Reactor Operator (OATC)	Reactor Operator (RO #1)	Operator Training
13.	Reactor Operator (BOP)	Plant Operator (RO #2)	Operator Training
14.	Auxiliary Operator	Ops/Asst Ops Technician (NLO #1)	Operator Training
15.	Auxiliary Operator	Ops/Asst Ops Technician (NLO #3)	Operator Training
16.	Auxiliary Operator	Ops Technician (NLO #6)	Operator Training

Notes: See Table 2A for OTO/EOP actions

[1] STA function is a collateral duty of the Operating Supervisor.

Interim Report

Callaway Plant On-Shift Staffing Analysis

TABLE 3 – Firefighting Analysis #7

Line	Performed By	Task Analysis Controlling Method
6.	N/A	N/A
7.	N/A	N/A
8.	N/A	N/A
9.	N/A	N/A
10.	N/A	N/A

Notes: No Fire Brigade response for this event

Interim Report

Callaway Plant On-Shift Staffing Analysis

TABLE 4 – Radiation Protection & Chemistry Analysis #7

Line	Position Performing Function/Task	Performance Time Period After Emergency Declaration (minutes)																	
		0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75	75-80	80-85	85-90
8.	In-Plant Survey On-Shift Position: HP #1	X	X	X	X														
9.	Out of Plant Survey On-Shift Position: HP #1																		
10.	Personnel Monitoring On-Shift Position:																		
11.	Job Coverage On-Shift Position:																		
12.	Offsite Radiological Assessment On-Shift Position: HP #2	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X			
13.	Other Site-Specific RP – Describe: On-Shift Position:																		
14.	Chemistry function/task #1 – Describe: Steam Generator Sampling and analysis On-Shift Position: CT #1	X	X	X	X	X	X	X											

Notes: EIP-ZZ-01211, Accident Dose Assessment
In Plant surveys of Main Steam Line per EOP
Chemistry sampling per EOP
CTP-ZZ-02590, Primary to Secondary Leak Rate Determination
Chemistry directed by EOP to sample containment atmosphere however, no procedure guidance exist (CAR 201201251).

Interim Report

Callaway Plant On-Shift Staffing Analysis

TABLE 5 – Emergency Plan Implementation Analysis # 7

Line	Function/Task	On-Shift Position	Task Analysis Controlling Method
31.	Declare the Emergency Classification Level (ECL)	Shift Manager	EP/Ops Training and EP Drill Program
32.	Approve Offsite Protective Action Recommendations	Shift Manager (GE)	EP/Ops Training and EP Drill Program
33.	Approve content of State/local notifications	Shift Manager	EP/Ops Training and EP Drill Program
34.	Approve extension to allowable dose limits	Shift Manager (GE)	EP/Ops Training and EP Drill Program
35.	Notification and direction to on-shift staff (e.g., to assemble, evacuate, etc.)	Shift Manager	EP/Ops Training and EP Drill Program
36.	ERO notification	SAS Operator	EP/Security Training and EP Drill Program
37.	Abbreviated NRC notification for DBT event	N/A	N/A
38.	Complete State/local notification form	NLO #5	EP/Ops Training and EP Drill Program
39.	Perform State/local notifications	NLO #5	EP Training and EP Drill Program
40.	Complete NRC event notification form	NLO #5	EP/Ops Training and EP Drill Program
41.	Activate ERDS	SRO #2	EP/Ops Training and EP Drill Program
42.	Offsite radiological assessment	N/A	N/A
43.	Perform NRC notifications	NLO #5	EP/Ops Training and EP Drill Program
44.	Perform other site-specific event notifications (e.g., INPO, ANI, etc.)	N/A	N/A
45.	Personnel accountability	CAS Operator	EP/Security Training and EP Drill Program

Notes: Site Area Emergency – General Emergency EAL FS1.1 and FG1.1
EIP-ZZ-00101, Classification of Emergencies
EIP-ZZ-00102, Emergency Implementing Actions
EIP-ZZ-00200, Augmentation of the Emergency Organization
EIP-ZZ-00201, Notifications
EIP-ZZ-00212, Protective Action Recommendations
EIP-ZZ-00217, Emergency Data System Activation
EIP-ZZ-00230, Accountability
State and local notifications communicated electronically (Sentry). NLO #5 is able to maintain NRC communication during GE.

Interim Report

Callaway Plant On-Shift Staffing Analysis
Appendix B

Analysis #8: DBA/ISG – Event #10 - ATWS **ECL: Alert**

TABLE 1 – On-shift Positions

Line	On-shift Position	Emergency Plan Reference	Augmentation Elapsed Time (min)	Role in Table#/Line#	Unanalyzed Task?	TMS Required?
9.	Shift Manager	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L1 T5/L1 T5/L3 T5/L5	No	No
10.	Operating Supervisor – CR (SRO #1)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L2	No	No
11.	Operating Supervisor - FS (SRO #2) [1]	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L3 T5/L11	No	No
12.	Reactor Operator (RO #1)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L4	No	No
13.	Reactor Operator (RO #2)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L5	No	No
14.	Offsite Communicator (NLO #5)	CP RERP, Figure 5-1, Table 5-1	75	T5/L8 T5/L9 T5/L10 T5/L13	No	No
15.	HP Technician (HP #2)	CP RERP, Figure 5-1, Table 5-1	75	T4/L5	No	No
16.	SAS Operator	CP RERP, Figure 5-1, Table 5-1	N/A	T5/L6	No	No

Notes: [1] STA is a function and not a position. STA is a collateral duty of the Operating Supervisors (CR or FS).

Interim Report

Callaway Plant On-Shift Staffing Analysis

TABLE 2 - Plant Operations & Safe Shutdown Analysis # 8

One Unit - One Control Room
Minimum Operations Crew Necessary to Implement
OTOs and EOPs, or SAMGs if applicable

Line	Generic Title/Role	On-Shift Position	Task Performance Validation
6.	Shift Manager	Shift Manager	Operator Training
7.	Shift Supervisor	Operating Supervisor – CR (SRO #1)	Operator Training
8.	Shift Supervisor	Operating Supervisor – FS (SRO #2) [1]	Operator Training
9.	Reactor Operator (OATC)	Reactor Operator (RO #1)	Operator Training
10.	Reactor Operator (BOP)	Plant Operator (RO #2)	Operator Training

Notes: See Table 2A for OTO/EOP actions

[1] STA function is a collateral duty of the Operating Supervisor.

Interim Report

Callaway Plant On-Shift Staffing Analysis

TABLE 3 – Firefighting Analysis # 8

Line	Performed By	Task Analysis Controlling Method
6.	N/A	N/A
7.	N/A	N/A
8.	N/A	N/A
9.	N/A	N/A
10.	N/A	N/A

Notes: No Fire Brigade response for this event.

Interim Report

Callaway Plant On-Shift Staffing Analysis

TABLE 4 – Radiation Protection & Chemistry Analysis #8

Line	Position Performing Function/Task	Performance Time Period After Emergency Declaration (minutes)																	
		0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75	75-80	80-85	85-90
9.	In-Plant Survey On-Shift Position: HP #1																		
10.	Out of Plant Survey On-Shift Position: HP #1																		
11.	Personnel Monitoring On-Shift Position:																		
12.	Job Coverage On-Shift Position:																		
13.	Offsite Radiological Assessment On-Shift Position: HP #2	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X			
14.	Other Site-Specific RP – Describe: On-Shift Position:																		
15.	Chemistry function/task #1 – Describe: On-Shift Position: CT #1																		
16.	Chemistry function/task #2 – Describe: On-Shift Position: CT #1																		

Notes: EIP-ZZ-01211, Accident Dose Assessment
Chemistry post trip sampling after augmentation

Interim Report

Callaway Plant On-Shift Staffing Analysis

TABLE 5 – Emergency Plan Implementation Analysis # 8

Line	Function/Task	On-Shift Position	Task Analysis Controlling Method
16.	Declare the Emergency Classification Level (ECL)	Shift Manager	EP/Ops Training and EP Drill Program
17.	Approve Offsite Protective Action Recommendations	N/A	N/A
18.	Approve content of State/local notifications	Shift Manager	EP/Ops Training and EP Drill Program
19.	Approve extension to allowable dose limits	N/A	N/A
20.	Notification and direction to on-shift staff (e.g., to assemble, evacuate, etc.)	Shift Manager	EP/Ops Training and EP Drill Program
21.	ERO notification	SAS Operator	EP/Security Training and EP Drill Program
22.	Abbreviated NRC notification for DBT event	N/A	N/A
23.	Complete State/local notification form	NLO #5	EP/Ops Training and EP Drill Program
24.	Perform State/local notifications	NLO #5	EP Training and EP Drill Program
25.	Complete NRC event notification form	NLO #5	EP/Ops Training and EP Drill Program
26.	Activate ERDS	SRO #2	EP/Ops Training and EP Drill Program
27.	Offsite radiological assessment	N/A	N/A
28.	Perform NRC notifications	NLO #5	EP/Ops Training and EP Drill Program
29.	Perform other site-specific event notifications (e.g., INPO, ANI, etc.)	N/A	N/A
30.	Personnel accountability	N/A	N/A

Notes: Alert**,** EAL SA2.1
EIP-ZZ-00101, Classification of Emergencies
EIP-ZZ-00102, Emergency Implementing Actions
EIP-ZZ-00200, Augmentation of the Emergency Organization
EIP-ZZ-00201, Notifications
EIP-ZZ-00217, Emergency Data System Activation

Interim Report

Callaway Plant On-Shift Staffing Analysis
Appendix B

Analysis #9: DBA/ISG Event #11 - Aircraft Probable Threat **ECL: Alert**

TABLE 1 – On-shift Positions

Line	On-shift Position	Emergency Plan Reference	Augmentation Elapsed Time (min)	Role in Table#/Line#	Unanalyzed Task?	TMS Required?
14.	Shift Manager	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L1 T5/L1 T5/L3 T5/L8	No	No
15.	Operating Supervisor – CR (SRO #1)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L2	No	No
16.	Operating Supervisor - FS (SRO #2) [1]	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L3 T5/L11	No	No
17.	Reactor Operator (RO #1)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L4	No	No
18.	Reactor Operator (RO #2)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L5 T5/L5	No	No
19.	Ops/Asst Ops Technician (NLO #1)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L6	No	No
20.	Ops/Asst Ops Technician (NLO #2)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L7	No	No
21.	Ops/Asst Ops Technician (NLO #3)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L8	No	No
22.	Ops/Asst Ops Technician (NLO #4)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L9	No	No
23.	Offsite Communicator (NLO #5)	CP RERP, Figure 5-1, Table 5-1	75	T5/L9 T5/L10 T5/L13	No	No
24.	Ops Technician (NLO #6)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L10	No	No
25.	Security Shift Supervisor	CP RERP, Figure 5-1, Table 5-1	75	T2/L11	No	No
26.	SAS Operator	CP RERP, Figure 5-1, Table 5-1	N/A	T5/L6	No	No

Notes: [1] STA is a function and not a position. STA is a collateral duty of the Operating Supervisors (CR or FS).

Interim Report

Callaway Plant On-Shift Staffing Analysis

TABLE 2 - Plant Operations & Safe Shutdown Analysis # 9

One Unit - One Control Room
Minimum Operations Crew Necessary to Implement
OTOs and EOPs, or SAMGs if applicable

Line	Generic Title/Role	On-Shift Position	Task Performance Validation
12.	Shift Manager	Shift Manager	Operator Training
13.	Shift Supervisor	Operating Supervisor – CR (SRO #1)	Operator Training
14.	Shift Supervisor	Operating Supervisor – FS (SRO #2) [1]	Operator Training
15.	Reactor Operator (OATC)	Reactor Operator (RO #1)	Operator Training
16.	Reactor Operator (BOP)	Plant Operator (RO #2)	Operator Training
17.	Auxiliary Operator	Ops/Asst Ops Technician (NLO #1)	Operator Training
18.	Auxiliary Operator	Ops/Asst Ops Technician (NLO #2)	Operator Training
19.	Auxiliary Operator	Ops/Asst Ops Technician (NLO #3)	Operator Training
20.	Auxiliary Operator	Ops/Asst Ops Technician (NLO #4)	Operator Training
21.	Auxiliary Operator	Ops/Asst Ops Technician (NLO #6)	Operator Training

Notes: See Table 2A for OTO/EOP actions

[1] STA function is a collateral duty of the Operating Supervisor.

Other (non-Operations) Personnel Necessary to Implement
OTOs and EOPs, or SAMGs if applicable

Line	Generic Title/Role	On-Shift Position	Task Performance Validation
22.	Security Shift Supervisor (SSS)	Security Shift Supervisor	Security Training

Notes: SSS remains available for contact with Shift Manager and directs closure of main gate.

Interim Report

Callaway Plant On-Shift Staffing Analysis

TABLE 3 – Firefighting Analysis # 9

Line	Performed By	Task Analysis Controlling Method
6.	Operating Supervisor (IC-SRO#2)	Ops/Fire Brigade Training
7.	Ops/Asst Ops Technician (NLO #1)	Ops/Fire Brigade Training
8.	Ops/Asst Ops Technician (NLO #2)	Ops/Fire Brigade Training
9.	Ops/Asst Ops Technician (NLO #3)	Ops/Fire Brigade Training
10.	Ops/Asst Ops Technician (NLO #4)	Ops/Fire Brigade Training

Notes: No Fire Brigade response required for this event. FB personnel dispersed per OTO-SK-0002 (see Table 2A)

Interim Report

Callaway Plant On-Shift Staffing Analysis

TABLE 4 – Radiation Protection & Chemistry Analysis #9

Line	Position Performing Function/Task	Performance Time Period After Emergency Declaration (minutes)																
		0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75	75-80	80-85	85-90
9.	In-Plant Survey On-Shift Position: HP #1																		
10.	Out of Plant Survey On-Shift Position: HP #1																		
11.	Personnel Monitoring On-Shift Position:																		
12.	Job Coverage On-Shift Position:																		
13.	Offsite Radiological Assessment On-Shift Position: HP #2																		
14.	Other Site-Specific RP – Describe: On-Shift Position:																		
15.	Chemistry function/task #1 – Describe: On-Shift Position: CT #1																		
16.	Chemistry function/task #2 – Describe: On-Shift Position: CT #1																		

Notes: No required actions for this event.

Interim Report

Callaway Plant On-Shift Staffing Analysis

TABLE 5 – Emergency Plan Implementation Analysis # 9

Line	Function/Task	On-Shift Position	Task Analysis Controlling Method
16.	Declare the Emergency Classification Level (ECL)	Shift Manager	EP/Ops Training and EP Drill Program
17.	Approve Offsite Protective Action Recommendations	N/A	N/A
18.	Approve content of State/local notifications	Shift Manager	EP/Ops Training and EP Drill Program
19.	Approve extension to allowable dose limits	N/A	N/A
20.	Notification and direction to on-shift staff (e.g., to assemble, evacuate, etc.)	RO#2	EP/Ops Training and EP Drill Program
21.	ERO notification	SAS Operator	EP/Security Training and EP Drill Program
22.	Abbreviated NRC notification for DBT event	N/A	N/A
23.	Complete State/local notification form	Shift Manager	EP/Ops Training and EP Drill Program
24.	Perform State/local notifications	NLO #5	EP Training and EP Drill Program
25.	Complete NRC event notification form	NLO #5	EP/Ops Training and EP Drill Program
26.	Activate ERDS	SRO #2	EP/Ops Training and EP Drill Program
27.	Offsite radiological assessment	N/A	N/A
28.	Perform NRC notifications	NLO #5	EP/Ops Training and EP Drill Program
29.	Perform other site-specific event notifications (e.g., INPO, ANI, etc.)	N/A	N/A
30.	Personnel accountability	N/A	N/A

Notes: Alert, EAL HA4.1
EIP-ZZ-00101, Classification of Emergencies
EIP-ZZ-00102, Emergency Implementing Actions
EIP-ZZ-00200, Augmentation of the Emergency Organization
EIP-ZZ-00201, Notifications
EIP-ZZ-00217, Emergency Data System Activation

Interim Report

Callaway Plant On-Shift Staffing Analysis
Appendix B

Analysis #10: DBA/ISG Event #12 - Control Room Fire with Evacuation and Remote Shutdown **ECL: Alert**

TABLE 1 – On-shift Positions

Line	On-shift Position	Emergency Plan Reference	Augmentation Elapsed Time (min)	Role in Table#/Line#	Unanalyzed Task?	TMS Required?
18.	Shift Manager	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L1 T5/L1	No	No
19.	Operating Supervisor – CR (SRO #1) [1]	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L2 T5/L5	No	No
20.	Operating Supervisor - FS (SRO #2) [2]	CP RERP, Figure 5-1, Table 5-1	N/A	T3/L1	No	No
21.	Reactor Operator (RO #1)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L3	No	No
22.	Reactor Operator (RO #2)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L4	No	No
23.	Ops/Asst Ops Technician (NLO #1)[3]	CP RERP, Figure 5-1, Table 5-1	N/A	T3/L2	No	No
24.	Ops/Asst Ops Technician (NLO #2) [3]	CP RERP, Figure 5-1, Table 5-1	N/A	T3/L3	No	No
25.	Ops/Asst Ops Technician (NLO #3) [3]	CP RERP, Figure 5-1, Table 5-1	N/A	T3/L4	No	No
26.	Ops/Asst Ops Technician (NLO #4) [3]	CP RERP, Figure 5-1, Table 5-1	N/A	T3/L5	No	No
27.	Offsite Communicator (NLO #5)	CP RERP, Figure 5-1, Table 5-1	75	T5/L9 T5/L10 T5/L13	No	No
28.	Ops Technician (NLO #6)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L5	No	No
29.	HP Technician (HP #1)	CP RERP, Figure 5-1, Table 5-1	75	T3/L9	No	No
30.	Chemistry Technician (CT #1)	CP RERP, Figure 5-1, Table 5-1	75	T3/L8	No	No
31.	Security Officer #1	CP RERP, Figure 5-1, Table 5-1	N/A	T3/L6	No	No
32.	Security Officer #2	CP RERP, Figure 5-1, Table 5-1	N/A	T3/L7	No	No
33.	CAS Operator	CP RERP, Figure 5-1, Table 5-1	N/A	T5/L6	No	No
34.	SAS Operator	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L6	No	No

Notes:
[1] STA is a function and not a position. STA is a collateral duty of the Operating Supervisors (CR or FS).
[2] Incident Command is a collateral duty of the Operating Supervisors (CR or FS).
[3] Fire Brigade response is a collateral duty of assigned Ops/Asst Ops Technicians

Interim Report

Callaway Plant On-Shift Staffing Analysis

TABLE 2 - Plant Operations & Safe Shutdown Analysis # 10

One Unit - One Control Room
Minimum Operations Crew Necessary to Implement
OTOs and EOPs, or SAMGs if applicable

Line	Generic Title/Role	On-Shift Position	Task Performance Validation
8.	Shift Manager	Shift Manager	Operator Training
9.	Shift Supervisor	Operating Supervisor – CR (SRO #1) [1]	Operator Training
10.	Reactor Operator (OATC)	Reactor Operator (RO #1)	Operator Training
11.	Reactor Operator (BOP)	Plant Operator (RO #2)	Operator Training
12.	Auxiliary Operator	Ops Technician (NLO #6)	Operator Training

Notes: See Table 2A for OTO/EOP actions

[1] STA function is a collateral duty of the Operating Supervisor.

Other (non-Operations) Personnel Necessary to Implement
OTOs and EOPs, or SAMGs if applicable

Line	Generic Title/Role	On-Shift Position	Task Performance Validation
13.	SAS Operator	SAS Operator	Security Training

Notes: SAS Operator reports to Auxiliary Shutdown Panel with Shift Manager at evacuation.

Interim Report

Callaway Plant On-Shift Staffing Analysis

TABLE 3 – Firefighting Analysis # 10

Line	Performed By	Task Analysis Controlling Method
9.	Operating Supervisor (IC-SRO#2)	Ops/Fire Brigade Training
10.	Ops/Asst Ops Technician (NLO #1)	Ops/Fire Brigade Training
11.	Ops/Asst Ops Technician (NLO #2)	Ops/Fire Brigade Training
12.	Ops/Asst Ops Technician (NLO #3)	Ops/Fire Brigade Training
13.	Ops/Asst Ops Technician (NLO #4)	Ops/Fire Brigade Training
14.	Security Officer #1	Security Training
15.	Security Officer #2	Security Training
16.	Chemistry Technician (CT #1)	Chemistry Training
17.	Radiation Protection Technician (HP #1)	Radiation Protection Training

Notes:
Security Officer #1 supports IC with security related duties such as access controls.
Security Officer #2 provides MERT (medical supports as an EMT)
Chemistry Technician provides non-radiological air sampling
Radiation Protection Technician provides respiratory protection support i.e. SCBA bottle refill

Interim Report

Callaway Plant On-Shift Staffing Analysis

TABLE 4 – Radiation Protection & Chemistry Analysis #10

Line	Position Performing Function/Task	Performance Time Period After Emergency Declaration (minutes)																	
		0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75	75-80	80-85	85-90
9.	In-Plant Survey On-Shift Position: HP #1																		
10.	Out of Plant Survey On-Shift Position: HP #1																		
11.	Personnel Monitoring On-Shift Position:																		
12.	Job Coverage On-Shift Position:																		
13.	Offsite Radiological Assessment On-Shift Position: HP #2																		
14.	Other Site-Specific RP – Describe: On-Shift Position:																		
15.	Chemistry function/task #1 – Describe: On-Shift Position: CT #1																		
16.	Chemistry function/task #2 – Describe: On-Shift Position: CT #1																		

Notes: See Table 3
Post trip sampling after ERO augmentation.

Interim Report

Callaway Plant On-Shift Staffing Analysis

TABLE 5 – Emergency Plan Implementation Analysis # 10

Line	Function/Task	On-Shift Position	Task Analysis Controlling Method
16.	Declare the Emergency Classification Level (ECL)	Shift Manager	EP/Ops Training and EP Drill Program
17.	Approve Offsite Protective Action Recommendations	N/A	N/A
18.	Approve content of State/local notifications	N/A [1]	EP/Ops Training and EP Drill Program
19.	Approve extension to allowable dose limits	N/A	N/A
20.	Notification and direction to on-shift staff (e.g., to assemble, evacuate, etc.)	SRO #1	EP/Ops Training and EP Drill Program
21.	ERO notification	CAS Operator	EP/Security Training and EP Drill Program
22.	Abbreviated NRC notification for DBT event	N/A	N/A
23.	Complete State/local notification form	N/A [1]	EP/Ops Training and EP Drill Program
24.	Perform State/local notifications	NLO #5	EP Training and EP Drill Program
25.	Complete NRC event notification form	NLO #5	EP/Ops Training and EP Drill Program
26.	Activate ERDS	No procedure guidance for this event	N/A
27.	Offsite radiological assessment	N/A	N/A
28.	Perform NRC notifications	NLO #5	EP/Ops Training and EP Drill Program
29.	Perform other site-specific event notifications (e.g., INPO, ANI, etc.)	N/A	N/A
30.	Personnel accountability	N/A	N/A

Notes: Alert, EAL HA5.1
EIP-ZZ-00101, Classification of Emergencies
EIP-ZZ-00102, Emergency Implementing Actions
EIP-ZZ-00200, Augmentation of the Emergency Organization
EIP-ZZ-00201, Notifications
EIP-ZZ-00217, Emergency Data System Activation

[1] For this event, there is a preapproved notification form, with procedure guidance in EIP-ZZ-00201. NO direct SM actions are required.

Interim Report

Callaway Plant On-Shift Staffing Analysis
Appendix B

Analysis #11: DBA/ISG Event #13 - SBO **ECL: Site Area Emergency**

TABLE 1 – On-shift Positions

Line	On-shift Position	Emergency Plan Reference	Augmentation Elapsed Time (min)	Role in Table#/Line#	Unanalyzed Task?	TMS Required?
16.	Shift Manager	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L1 T5/L1 T5/L3 T5/L5	No	No
17.	Operating Supervisor – CR (SRO #1)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L2	No	No
18.	Operating Supervisor - FS (SRO #2) [1]	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L3 T5/L11	No	No
19.	Reactor Operator (RO #1)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L4	No	No
20.	Reactor Operator (RO #2)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L5	No	No
21.	Ops/Asst Ops Technician (NLO #1)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L6	No	No
22.	Ops/Asst Ops Technician (NLO #2)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L7	No	No
23.	Ops/Asst Ops Technician (NLO #3)	CP RERP, Figure 5-1, Table 5-1	N/A	T2.L8	No	No
24.	Ops/Asst Ops Technician (NLO #4)	CP RERP, Figure 5-1, Table 5-1	N/A	T2.L9	No	No
25.	Offsite Communicator (NLO #5)	CP RERP, Figure 5-1, Table 5-1	75	T5/L8 T5/L9 T5/L10 T5/L13	No	No
26.	Ops Technician (NLO #6)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L10	No	No
27.	HP Technician (HP #1)	CP RERP, Figure 5-1, Table 5-1	75	T4/L1 T4/L3	No	No
28.	HP Technician (HP #2)	CP RERP, Figure 5-1, Table 5-1	75	T4/L5	No	No
29.	CAS Operator	CP RERP, Figure 5-1, Table 5-1	N/A	T5/L15	No	No
30.	SAS Operator	CP RERP, Figure 5-1, Table 5-1	N/A	T5/L6	No	No

Notes: [1] STA is a function and not a position. STA is a collateral duty of the Operating Supervisors (CR or FS).

Interim Report

Callaway Plant On-Shift Staffing Analysis

TABLE 2 - Plant Operations & Safe Shutdown Analysis # 11

One Unit - One Control Room
Minimum Operations Crew Necessary to Implement
OTOs and EOPs, or SAMGs if applicable

Line	Generic Title/Role	On-Shift Position	Task Performance Validation
11.	Shift Manager	Shift Manager	Operator Training
12.	Shift Supervisor	Operating Supervisor – CR (SRO #1)	Operator Training
13.	Shift Supervisor	Operating Supervisor – FS (SRO #2) [1]	Operator Training
14.	Reactor Operator (OATC)	Reactor Operator (RO #1)	Operator Training
15.	Reactor Operator (BOP)	Plant Operator (RO #2)	Operator Training
16.	Auxiliary Operator	Ops/Asst Ops Technician (NLO #1)	Operator Training
17.	Auxiliary Operator	Ops/Asst Ops Technician (NLO #2)	Operator Training
18.	Auxiliary Operator	Ops/Asst Ops Technician (NLO #3)	Operator Training
19.	Auxiliary Operator	Ops/Asst Ops Technician (NLO #4)	Operator Training
20.	Auxiliary Operator	Ops Technician (NLO #6)	Operator Training

Notes: See Table 2A for OTO/EOP actions

[1] STA function is a collateral duty of the Operating Supervisor.

Interim Report

Callaway Plant On-Shift Staffing Analysis

TABLE 3 – Firefighting Analysis # 11

Line	Performed By	Task Analysis Controlling Method
6.	N/A	N/A
7.	N/A	N/A
8.	N/A	N/A
9.	N/A	N/A
10.	N/A	N/A

Notes: No Fire Brigade response required for this event.

Interim Report

Callaway Plant On-Shift Staffing Analysis

TABLE 4 – Radiation Protection & Chemistry Analysis #11

Line	Position Performing Function/Task	Performance Time Period After Emergency Declaration (minutes)																
		0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75	75-80	80-85	85-90
9.	In-Plant Survey On-Shift Position: HP #1				X	X	X	X	X	X									
10.	Out of Plant Survey On-Shift Position: HP #1																		
11.	Personnel Monitoring On-Shift Position: HP #1			X															
12.	Job Coverage On-Shift Position:																		
13.	Offsite Radiological Assessment On-Shift Position: HP #2	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X			
14.	Other Site-Specific RP – Describe: On-Shift Position:																		
15.	Chemistry function/task #1 – Describe: On-Shift Position: CT #1																		
16.	Chemistry function/task #2 – Describe: On-Shift Position: CT #1																		

Notes: EIP-ZZ-01211, Accident Dose Assessment
Chemistry Post trip Sample after augmentation
HP#1 surveys of Main Steam Lines after personnel monitoring of NLO #6 (RCP seal isolation)

Interim Report

Callaway Plant On-Shift Staffing Analysis

TABLE 5 – Emergency Plan Implementation Analysis # 11

Line	Function/Task	On-Shift Position	Task Analysis Controlling Method
16.	Declare the Emergency Classification Level (ECL)	Shift Manager	EP/Ops Training and EP Drill Program
17.	Approve Offsite Protective Action Recommendations	N/A	N/A
18.	Approve content of State/local notifications	Shift Manager	EP/Ops Training and EP Drill Program
19.	Approve extension to allowable dose limits	N/A	N/A
20.	Notification and direction to on-shift staff (e.g., to assemble, evacuate, etc.)	Shift Manager	EP/Ops Training and EP Drill Program
21.	ERO notification	SAS Operator	EP/Security Training and EP Drill Program
22.	Abbreviated NRC notification for DBT event	N/A	N/A
23.	Complete State/local notification form	NLO #5	EP/Ops Training and EP Drill Program
24.	Perform State/local notifications	NLO #5	EP Training and EP Drill Program
25.	Complete NRC event notification form	NLO #5	EP/Ops Training and EP Drill Program
26.	Activate ERDS	SRO #2	EP/Ops Training and EP Drill Program
27.	Offsite radiological assessment	N/A	N/A
28.	Perform NRC notifications	NLO #5	EP/Ops Training and EP Drill Program
29.	Perform other site-specific event notifications (e.g., INPO, ANI, etc.)	N/A	N/A
30.	Personnel accountability	CAS Operator	EP/Security Training and EP Drill Program

Notes: Site Area Emergency, EAL SS1.1
EIP-ZZ-00101, Classification of Emergencies
EIP-ZZ-00102, Emergency Implementing Actions
EIP-ZZ-00200, Augmentation of the Emergency Organization
EIP-ZZ-00201, Notifications
EIP-ZZ-00217, Emergency Data System Activation
EIP-ZZ-00230, Accountability

Interim Report

Callaway Plant On-Shift Staffing Analysis
Appendix B

Analysis #12: DBA/ISG Event #15 - SAMG **ECL: General Emergency conditions existed (see Analysis #7)**

TABLE 1 – On-shift Positions

Line	On-shift Position	Emergency Plan Reference	Augmentation Elapsed Time (min)	Role in Table#/Line#	Unanalyzed Task?	TMS Required?
6.	Shift Manager	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L1 T5/L4	No	No
7.	Operating Supervisor – CR (SRO #1)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L2	No	No
8.	Reactor Operator (RO #1)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L3	No	No
9.	Reactor Operator (RO #2)	CP RERP, Figure 5-1, Table 5-1	N/A	T2/L4	No	No
10.	Offsite Communicator (NLO #5)	CP RERP, Figure 5-1, Table 5-1	75	T5/L13	No	No

Notes:

Interim Report

Callaway Plant On-Shift Staffing Analysis

TABLE 2 - Plant Operations & Safe Shutdown Analysis # 12

One Unit - One Control Room

Minimum Operations Crew Necessary to Implement

OTOs and EOPs, or SAMGs if applicable

Line	Generic Title/Role	On-Shift Position	Task Performance Validation
5.	Shift Manager	Shift Manager	Operator Training
6.	Shift Supervisor	Operating Supervisor – CR (SRO #1)	Operator Training
7.	Reactor Operator (OATC)	Reactor Operator (RO #1)	Operator Training
8.	Reactor Operator (BOP)	Plant Operator (RO #2)	Operator Training

Notes: See Table 2A for OTO/EOP actions

Interim Report

Callaway Plant On-Shift Staffing Analysis

TABLE 3 – Firefighting Analysis # 12

Line	Performed By	Task Analysis Controlling Method
6.	N/A	N/A
7.	N/A	N/A
8.	N/A	N/A
9.	N/A	N/A
10.	N/A	N/A

Notes: No Fire Brigade response for this event

Interim Report

Callaway Plant On-Shift Staffing Analysis

TABLE 4 – Radiation Protection & Chemistry Analysis #12

Line	Position Performing Function/Task	Performance Time Period After Emergency Declaration (minutes)																	
		0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75	75-80	80-85	85-90
9.	In-Plant Survey On-Shift Position: HP #1																		
10.	Out of Plant Survey On-Shift Position: HP #1																		
11.	Personnel Monitoring On-Shift Position:																		
12.	Job Coverage On-Shift Position:																		
13.	Offsite Radiological Assessment On-Shift Position: HP #2	See Analysis #7																	
14.	Other Site-Specific RP – Describe: On-Shift Position:																		
15.	Chemistry function/task #1 – Describe: On-Shift Position: CT #1																		
16.	Chemistry function/task #2 – Describe: On-Shift Position: CT #1																		

Notes: EIP-ZZ-01211, Accident Dose Assessment

Interim Report

Callaway Plant On-Shift Staffing Analysis

TABLE 5 – Emergency Plan Implementation Analysis # 12

Line	Function/Task	On-Shift Position	Task Analysis Controlling Method
16.	Declare the Emergency Classification Level (ECL)	N/A	N/A
17.	Approve Offsite Protective Action Recommendations	N/A	N/A
18.	Approve content of State/local notifications	N/A	N/A
19.	Approve extension to allowable dose limits	Shift Manager	EP/Ops Training and EP Drill Program
20.	Notification and direction to on-shift staff (e.g., to assemble, evacuate, etc.)	N/A	N/A
21.	ERO notification	N/A	N/A
22.	Abbreviated NRC notification for DBT event	N/A	N/A
23.	Complete State/local notification form	N/A	N/A
24.	Perform State/local notifications	N/A	N/A
25.	Complete NRC event notification form	N/A	N/A
26.	Activate ERDS	N/A	N/A
27.	Offsite radiological assessment	N/A	N/A
28.	Perform NRC notifications [1]	NLO #5	EP/Ops Training and EP Drill Program
29.	Perform other site-specific event notifications (e.g., INPO, ANI, etc.)	N/A	N/A
30.	Personnel accountability	N/A	N/A

Notes: EAL (GE conditions already existed – see Analysis #7)
Emergency Plan functions completed during Analysis #7
[1] 10 CFR 50.54x notification

Interim Report

Callaway Plant On-Shift Staffing Analysis
ATTACHMENTS

Interim Report

Callaway Plant On-Shift Staffing Analysis
Attachment 1

Callaway Plant Condition IV Events

CALLAWAY - SP

15.0.1.4 ConditionIV-Limiting Faults

Condition IV occurrences are faults which are not expected to take place, but are postulated because their consequences would include the potential for the release of significant amounts of radioactive material. They are the most drastic which must be designed against and represent limiting design cases. Condition IV faults are not to cause a fission product release to the environment resulting in an undue risk to public health and safety in excess of guideline values of 10 CFR 100. A single Condition IV fault is not to cause a consequential loss of required functions of systems needed to cope with the fault, including those of the emergency core cooling system and the containment. For the purposes of this report the following faults have been classified in this category:

a. Steam system pipe break.

b. Feedwater system pipe break.

c. Reactor coolant pump shaft seizure (locked rotor).

d. Reactor coolant pump shaft break.

e. Spectrum of rod cluster control assembly ejection accidents.

f. Steam generator tube rupture.

g. Loss-of-coolant accidents, resulting from a spectrum of postulated piping breaks within the reactor coolant pressure boundary (large break).

h. Design basis fuel handling accidents.

Interim Report

Callaway Plant On-Shift Staffing Analysis
Attachment 2

E-Mail From Callaway Fire System, Supervising Engineer

From: Eitel, Lee E
Sent: Monday, September 24, 2012 10:39 AM
To: Turner, Nicholas D
Cc: Fletcher, Michael K; Cantrell, Samuel G
Subject: FW: Callaway Simulator validation for Staffing Study

Nick,

I would say that the Control Room evacuation event is the bounding event from the standpoint of the large number of actions and the time critical nature of those actions. It should be noted the other fire events do invoke some different operator actions that are not required during the Control Room evacuation event.

LEE EITEL
Supervising Engineer
Nuclear Engineering Systems - Balance of Plant
C 314-225-1550
E Leitel@ameren.com

Ameren Missouri
Callaway Plant
P.O. Box 620
Fulton, MO 65251
AmerenMissouri.com

Interim Report

Callaway Plant On-Shift Staffing Analysis
Attachment 3
On-Shift Personnel Assignments Used During Analysis

Position	Designation	Assignment
Shift Manager	Shift Manager	Shift Manager/Emergency Coordinator
Control Room Supervisor	SRO #1	Control Room Supervisor/STA/IC
Field Supervisor	SRO #2	Field Supervisor/IC/STA
Reactor Operator	RO #1	Reactor Operator
Reactor Operator	RO #2	Balance of Plant (BOP) Operator
Ops/Assistant Ops Technician	NLO #1	Secondary NLO/Fire Brigade Member
Ops/Assistant Ops Technician	NLO #2	Inside NLO/Fire Brigade Member
Ops/Assistant Ops Technician	NLO #3	Polisher NLO/Fire Brigade Member
Ops/Assistant Ops Technician	NLO #4	Radwaste NLO/Fire Brigade Member
Other Operations Personnel	NLO #5	Offsite Communicator
Other Operations personnel	NLO #6	Primary NLO
Reactor Operator	RO #3	WPA RO/CSF Monitor
Other Operations Personnel	NLO #7	Outside NLO (25 minute response outside OCA)

Other On-Shift Assignments Used During Analysis

Position	Designation	Assignment
HP Technician	HP #1	HP Operations
HP Technician	HP #2	Offsite Dose Assessment
Chemistry Technician	CT #1	Chemistry Sampling/Count Room

Interim Report
Callaway Plant On-Shift Staffing Analysis
Attachment 4
Analysis #1, Table 2A – OTO/EOP Actions

Design Basis Threat

Procedure Step/Actions			Performance Time (mins) After Procedure Implementation														
Proc/Step	Task	Assigned Resource	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75
OTO-SK-00001, Attachment A	Close CR Doors, Plant Announcement	SRO1 RO2	x														
OTO-SK-00001, Step 9-12	Trip the Reactor, Actuate CRVIS, Start Both Diesels	SRO1 RO1 RO2	x														
E-0, Steps 1-4	Verify Reactor Trip	SRO1 RO1	x														
CSF-0.1	Perform CSF Status Tree Monitoring	SRO2	x														
NA	STA Functions	SRO2		x													
ES-0.1, Steps 1-7	Verify Reactor Trip Response	SRO1 RO1 RO2	x														
ES-0.1, Steps 8	Transfer Pressure Control to Steam Pressure Mode	SRO1 RO2		x													
ES-0.1, Steps 9-10	Verify Reactor Trip Response	SRO1 RO1 RO2		x													
ES-0.1, Steps 11	EOP Addendum 10, Secure Unnecessary Equipment	SRO1 RO1		x													
ES-0.1, Steps 12	Throttle Auxiliary Feedwater	SRO1 RO2		x													
ES-0.1, Steps 13	Transition to OTG-ZZ-00005: Hot Standby Procedure	SRO1 RO1 RO2			x												
OTO-SK-00001, Step 19	Initiate RCS Cooldown using Steam Dumps	SRO1 RO1 RO2			x												

Interim Report

Callaway Plant On-Shift Staffing Analysis
Attachment 5

Analysis #2, Table 2A – OTO/EOP Actions

Main Steam Line Break

Procedure Step/Actions			Performance Time (mins) After Procedure Implementation														
Proc/Step	Task	Assigned Resource	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75
E-0 Immediate Actions	Perform Reactor Trip Immediate Actions	SRO1 RO1 RO2	x														
E-0-FOP-2	Isolate AFW to Faulted SG	SRO1 RO2	x														
E-0, Steps 1-4	Verify Reactor Trip/SI	SRO1 RO1	x														
NA	STA Functions	SRO2	x														
E-0, Step 5	Perform Attachment A – Actuation Verification	SRO1 RO2		x													
E-0, Steps 6-12	Verify Equipment Conditions	SRO1 RO1		x													
E-0, Step 13	Throttle AFW to Reduce RCS Cooldown	SRO1 RO2			x												
E-0, Step 14	Transition to E-2 due to Faulted SG	SRO1 RO1			x												
CSF-0.1	Perform CSF Status Tree Monitoring	SRO2			x												
E-2, Steps 1-7	Check Conditions, Verify SG Isolated, Restore Instrument Air	SRO1 RO1 RO2 NLO6			x												
E-2, Step 6	Sample SGs and Survey Steam Lines	CT1 HP1			x												
E-2, Steps 8-9	Reset SI	SRO1 RO1				x											
E-2, Step 9	Transition to ES-1.1 “SI Termination”	SRO1				x											
ES-1.1, Steps 3-4	Reset Containment Isolation Phase A	SRO1 RO1				x											
ES-1.1, Steps 5-8	Isolate Boron Injection Header & Establish Charging	SRO1 RO1					x										
ES-1.1, Steps 9-12	Secure SI, RHR and Containment Spray	SRO1 RO2						x									
ES-1.1, Step 13	Restore Breakers for Boric Acid Pumps	NLO1						x									

Interim Report
Callaway Plant On-Shift Staffing Analysis

Main Steam Line Break

Procedure Step/Actions			Performance Time (mins) After Procedure Implementation													
Proc/Step	Task	Assigned Resource	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75
ES-1.1, Steps 13-15	Restore VCT and Excess Letdown	SRO1 RO1						x									
ES-1.1, Steps 16-18	Check Equipment, Use ASDs for Temperature Control	SRO1 RO2							x								
ES-1.1, Step 19	EOP Addendum 7: Emergency Purge H2 from Main Generator	R02 NLO1								x							
ES-1.1, Step 19	EOP Addendum 8: Load Equipment on AC Buses	RO1 NLO3 NLO6								x							
ES-1.1, Steps 19-20	Continuous Action to Restore Power	RO2								Hold for Power Restoration							
ES-1.1, Steps 21-30	Secure Unnecessary Equipment and Restore Normal Lineups	SRO1 RO2									x						

Interim Report
Callaway Plant On-Shift Staffing Analysis
Attachment 6
Analysis #3, Table 2A – OTO/EOP Actions

Feed Line Break

Procedure Step/Actions			Performance Time (mins) After Procedure Implementation														
Proc/Step	Task	Assigned Resource	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75
E-0 Immediate Actions	Perform Reactor Trip Immediate Actions	SRO1 RO1 RO2	x														
E-0-FOP-2	Isolate AFW to Faulted SG	SRO1 RO2	x														
E-0, Steps 1-4	Verify Reactor Trip/SI	SRO1 RO1	x														
NA	STA Functions	SRO2	x														
E-0, Steps 5	Perform Attachment A – Actuation Verification	SRO1 RO2		x													
E-0, Steps 6-12	Verify Equipment Conditions	SRO1 RO1		x													
E-0, Steps 13	Throttle AFW to Reduce RCS Cooldown	SRO1 RO2			x												
E-0, Steps 14	Transition to E-2 due to Faulted SG	SRO1 RO1			x												
CSF-0.1	Perform CSF Status Tree Monitoring	SRO2			x												
E-2, Steps 1-7	Check Conditions, Verify SG Isolated, Restore Instrument Air	SRO1 RO1 RO2 NLO6			x												
E-2, Step6	Sample SGs and Survey Steam Lines	CT1 HP1			x												
E-2, Steps 8-9	Reset SI	SRO1 RO1				x											
E-2, Step 9	Transition to ES-1.1 “SI Termination”	SRO1				x											
ES-1.1, Steps 3-4	Reset Containment Isolation Phase A	SRO1 RO1				x											
ES-1.1, Steps 5-8	Isolate Boron Injection Header & Establish Charging	SRO1 RO1					x										
ES-1.1, Step 9-12	Secure SI, RHR and Containment Spray Pumps	SRO1 RO2						x									
ES-1.1, Step 13	Restore Breakers for Boric Acid Pumps	NLO1						x									

Interim Report
Callaway Plant On-Shift Staffing Analysis

Feed Line Break

Procedure Step/Actions			Performance Time (mins) After Procedure Implementation													
Proc/Step	Task	Assigned Resource	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75
ES-1.1, Steps 13-15	Restore VCT and Normal Letdown	SRO1 RO1						x									
ES-1.1, Steps 16-18	Check Equipment, Use ASDs for Temperature Control	SRO1 RO2							x								
ES-1.1, Step 19	EOP Addendum 7: Emergency Purge H2 from Main Generator	R02 NLO1								x							
ES-1.1, Step 19	EOP Addendum 8: Load Equipment on AC Buses	RO1 NLO3 NLO6								x							
ES-1.1, Step 19-20	Continuous Action to Restore Power	RO2								Hold for Power Restoration							
ES-1.1, Step 21-30	Secure Unnecessary Equipment and Restore Normal Lineups	SRO1 RO1									x						

Interim Report

Callaway Plant On-Shift Staffing Analysis
Attachment 7

Analysis #4, Table 2A – OTO/EOP Actions

Locked Rotor

Procedure Step/Actions			Performance Time (mins) After Procedure Implementation														
Proc/Step	Task	Assigned Resource	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75
E-0 Immediate Actions	Perform Reactor Trip Immediate Actions	SRO1 RO1 RO2	x														
E-0, Steps 1-4	Verify Reactor Trip	SRO1 RO1	x														
CSF-0.1	Perform CSF Status Tree Monitoring	SRO2	x														
NA	STA Functions	SRO2		x													
ES-0.1, Step 1	Transfer Pressure Control to Steam Pressure Mode	SRO1 RO2	x														
ES-0.1, Step 2	EOP Addendum 7: Emergency Purge H2 from Main Generator or Restore Power to PJ-31	R02 NLO1									x						
ES-0.1, Step 2	EOP Addendum 8: Load Equipment on AC Buses	RO2 NLO3 NLO6		x													
ES-0.1, Step 3	Restore PZR Heaters and Auxiliary Spray (If Needed)	SRO1 RO1		x													
ES-0.1, Steps 4-6	Verify Charging and Letdown Lineup and Feedwater Isolation	SRO1 RO1		x													
ES-0.1, Step 7	Throttle Auxiliary Feedwater Flow	SRO1 RO2		x													
ES-0.1, Step 9	Verify Natural Circulation	SRO1 RO1			x												
ES-0.1, Step 10	Check Source Range Detector Energized	SRO1 RO1			x												
ES-0.1, Step 11	EOP Addendum 10, Secure Unnecessary Equipment	SRO1 RO2			x												
ES-0.1, Steps 12-13	Maintain Stable Conditions & Transition to OTG-ZZ-00005: Hot Standby Procedure	SRO1 RO1 RO2			x												
OTG-ZZ-00005	Hold for Offsite Power Restoration	SRO1			x												

Interim Report
Callaway Plant On-Shift Staffing Analysis
Attachment 8
Analysis #5, Table 2A – OTO/EOP Actions

RCCA Ejection

Procedure Step/Actions			Performance Time (mins) After Procedure Implementation														
Proc/Step	Task	Assigned Resource	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75
E-0 Immediate Actions	Perform Reactor Trip Immediate Actions	SRO1 RO1 RO2	x														
E-0-FOP-1	Trip RCPs	SRO1 RO2	X														
E-0, Steps 1-4	Verify Reactor Trip/SI	SRO1 RO1	X														
NA	STA Functions	SRO2	x														
E-0, Step 5	Perform Attachment A – Actuation Verification	SRO1 RO2		x													
E-0, Steps 6-12	Verify Equipment Conditions	SRO1 RO1		x													
E-0, Step 13	Throttle AFW to Reduce RCS Cooldown	SRO1 RO2			x												
E-0, Step 14	Check for Faulted SG	SRO1 RO1			x												
E-0, Step 15	Check SG Tubes Intact	SRO1 RO1			x												
E-0, Step 16	Check RCS Intact, Transition to E-1	SRO1 RO1			x												
CSF-0.1	Perform CSF Status Tree Monitoring	SRO2			x												
E-1, Step 1-3	Check RCP,SG Faulted, RCS Rupture Criteria	SRO1 RO1 RO2			x												
E-1, Step 4	Check Secondary Radiation Normal	SRO1 RO2 CT1 HP1			x												
E-1, Step 5-7	Check PORV, ECCS, Containment Spray Flow	SRO1 RO1				x											
E-1, Steps 8-9	Secure RHR Pumps, Check Pressure Stable	SRO1 RO1				x											

Interim Report
Callaway Plant On-Shift Staffing Analysis

RCCA Ejection

Procedure Step/Actions			Performance Time (mins) After Procedure Implementation														
Proc/Step	Task	Assigned Resource	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75
E-1, Step 10	EOP Addendum 7: Emergency Purge H2 or Restore PJ-31 Power within 2 hrs.	SRO1 RO2 NLO1								x							
E-1, Step 10	EOP Addendum 8: Load Equipment on AC Buses	RO1 NLO3 NLO6				X											
E-1, Step 11	Check Ultimate Heat Sink Lineup	SRO1 RO2					x										
E-1, Step 12	Check Equipment Availability, Align H2 Analyzers	SRO1 RO1					x										
E-1, Step 12	Check RCS Boron Activity and Containment Atmosphere Sample	RO1 CT1						x									
E-1, Step 12	Evaluate Long-Term Recovery	SM						X									
E-1, Step 13	Transition to ES-1.2 "Cooldown/Depressurization"	SRO1							x								
ES-1.2, Step 1-3	Verify SI Reset, Reset CSI-A/B, Align Instrument Air to Containment	SRO1 RO2							X								
ES-1.2, Step 4-7	Verify PZR Heaters OFF, RHR Pumps OFF, SG Levels	SRO1 RO1								x							
ES-1.2, Step 9	Initiate RCS Cooldown	SRO1 RO2								x							
ES-1.2, Step 10, 23, 24	Check Subcooling, Isolate SI Accumulators	SRO1 NLO6								X							
ES-1.2, FOP-4	Transition to Cold Leg Recirculation ES-1.3	SRO1										X					
ES-1.3, Steps 1-5	Align ECCS Pumps for Cold Leg Recirculation	SRO1 RO1										X					
ES-1.3, Step 6	Align Containment Spray for Recirculation	SRO1 RO2															x
ES-1.3, Steps 7-9	Monitor Spent Fuel, Makeup to CST when Offsite Power Available	SRO1 RO2												x			
ES-1.3, Step 10	Transition to ES-1.2	SRO1												x			
ES-1.2, Step 26	Restore CCW Normal Flowpath to RCPs	SRO1 RO1													x		
ES-1.2, Steps 27-30	Check Source Range Detectors, Secure Unnecessary Equipment	SRO1 RO1														x	

Interim Report
Callaway Plant On-Shift Staffing Analysis

RCCA Ejection

Procedure Step/Actions			Performance Time (mins) After Procedure Implementation														
Proc/Step	Task	Assigned Resource	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75
ES-1.2, Steps 31, 34	Monitor for RHR Start Conditions @ 350F	SRO1 RO2														x	
ES-1.2, Step 36	Loop in Procedure Until <200F	SRO1 RO1															x

Interim Report

Callaway Plant On-Shift Staffing Analysis
Attachment 9

Analysis #6, Table 2A – OTO/EOP Actions

SGTR

Procedure Step/Actions			Performance Time (mins) After Procedure Implementation														
Proc/Step	Task	Assigned Resource	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75
OTO-BB-00001, Step 1	Maximize Charging, Isolate Letdown, Trip Rx, Inject SI Manually, Transition to E-0	SRO1 RO1	x														
E-0 Immediate Actions	Perform Reactor Trip Immediate Actions	SRO1 RO1 RO2	x														
E-0-FOP-3	Isolate Auxiliary Feed to D SG	SRO1 RO2	x														
E-0, Steps 1-4	Verify Reactor Trip/SI	SRO1 RO1	x														
NA	STA Functions	SRO2	x														
E-0, Step 5	Perform Attachment A – Actuation Verification	SRO1 RO2		x													
E-0, Steps 6-12	Verify Equipment Conditions	SRO1 RO1		x													
E-0-FOP-2	Fast Close MSIVs, Dispatch NLO to Manually Isolate D ASD	SRO1 RO2 NLO6		x													
E-0, Step 13	Throttle AFW to Reduce RCS Cooldown	SRO1 RO2			x												
E-0, Step 14	Transition to E-2 due to Faulted SG	SRO1 RO1			x												
CSF-0.1	Perform CSF Status Tree Monitoring	SRO2			x												
E-2, Steps 1-5	Check Conditions, Verify SG Isolated	SRO1 RO1			x												
E-2, Step 6	Check Secondary Radiation EOP Addendum 11, Restore SG Sampling after SI	RO2 NLO4			x												
E-2, Step 6	Chemistry Sampling, Survey Steam Lines	SRO1 RO2 CT1 HP1			x												
E-2, Step 6	Transition to E-3, SGTR	SRO1				x											
E-3, Steps 1-3	Identify & Isolate Ruptured SG (D)	SRO1 RO1				x											

Interim Report
Callaway Plant On-Shift Staffing Analysis

SGTR

Procedure Step/Actions			Performance Time (mins) After Procedure Implementation														
Proc/Step	Task	Assigned Resource	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75
E-3, Steps 4-5	Check Ruptured SG Level/Pressure	SRO1 RO1					x										
E-3, Steps 6-7	Initiate RCS Cooldown	SRO1 RO1 RO2						x									
E-3, Steps 8-12	Check PORVs, Reset SI, Reset CISA, Stop RHR Pumps	SRO1 RO1							x								
E-3, Steps 13-15	Stop Cooldown, Ensure Stable SG Conditions	SRO1 RO1								x							
E-3, Steps 16-17	Depressurize RCS	SRO1 RO1								x							
E-3, Steps 18-21	Terminate ECCS Flow	SRO1 RO1									x						
E-3, Steps 22-24	Establish Normal Charging Flow	SRO1 RO1									x						
E-3, Steps 25-27	Restore VCT & Excess Letdown	SRO1 RO1 NLO6										x					
E-3, Step 28	Manually Isolate Accumulators	SRO1 RO2 NLO4										x					
E-3, Step 29	Balance RCS & SG Pressure to Minimize Leakage	SRO1 RO1											x				
E-3, Step 30	Check Containment Spray Not Running	SRO1 RO1											x				
E-3, Steps 31-32	EOP Addendum 7: Emergency Purge H2 or Restore PJ-31 Power within 2 hrs.	SRO1 RO2 NLO1													x		
E-3, Steps 31-32	EOP Addendum 8: Load Equipment on AC Buses	RO1 NLO3 NLO6												x			
E-3, Step 33	Minimize Secondary System Contamination	RO2 NLO2													x		
E-3, Steps 34-39	Restore PZR Heaters, Normal CCW Lineups, Verify Source Range Energized, EOP Addendum 10 “Shutdown Unnecessary Equipment”	SRO1 RO1														x	
E-3, Step 40	Transition to ES-3.1 “Post SGTR Cooldown”	SRO1															x

Interim Report

Callaway Plant On-Shift Staffing Analysis
Attachment 10

Analysis #7, Table 2A – OTO/EOP Actions

LB LOCA with Release and PARs

Procedure Step/Actions			Performance Time (mins) After Procedure Implementation														
Proc/Step	Task	Assigned Resource	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75
E-0 Immediate Actions	Perform Reactor Trip Immediate Actions	SRO1 RO1 RO2	x														
E-0, Steps 1-4	Verify Reactor Trip/SI	SRO1 RO1	x														
NA	STA Functions	SRO2	x														
E-0, Step 5	Perform Attachment A – Actuation Verification	SRO1 RO2		x													
E-0, Steps 6-12	Verify Equipment Conditions	SRO1 RO1		x													
E-0, Step 13	Throttle AFW	SRO1 RO2			x												
E-0, Step 14	Check for Faulted SG	SRO1 RO1			x												
E-0, FOP-4	Transition to Cold Leg Recirculation ES-1.3	SRO1			x												
ES-1.3, Steps 1-5	Align ECCS Pumps for Cold Leg Recirculation	SRO1 RO1			x												
ES-1.3, Step 6	Align Containment Spray for Recirculation	SRO1 RO2				x											
ES-1.3, Steps 7-9	Monitor Spent Fuel, Makeup to CST when Offsite Power Available	SRO1 RO2				x											
ES-1.3, Step 10	Transition to E-0, Step 15	SRO1					x										
E-0, Step 15	Check SG Tubes Intact	SRO1 RO1					x										
E-0, Step 16	Check RCS Intact, Transition to E-1	SRO1 RO1					x										
CSF-0.1	Perform CSF Status Tree Monitoring	SRO2					x										
E-1, Steps 1-3	Check RCP, SG Faulted, RCS Rupture Criteria	SRO1 RO1 RO2					x										

Interim Report
Callaway Plant On-Shift Staffing Analysis

LB LOCA with Release and PARs

Procedure Step/Actions			Performance Time (mins) After Procedure Implementation													
Proc/Step	Task	Assigned Resource	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75
E-1, Step 4	EOP Addendum 11: Check Secondary Radiation Normal	SRO1 RO2 CT1 HP1					x	x	x	x	x	x	x	x	x		
E-1, Steps 5-7	Check PORV, ECCS, Containment Spray Flow	SRO1 RO1						x									
E-1, Step 8	Check RHR Pumps	SRO1 RO1						x									
E-1, Step 10	EOP Addendum 7: Emergency Purge H2 or Restore PJ-31 Power within 2 hrs.	SRO1 RO2 NLO1								x	x	x	x	x	x	x	x
E-1, Step 10	EOP Addendum 8: Load Equipment on AC Buses	RO1 NLO3 NLO6						x	x								
E-1, Step 11	Check Ultimate Heat Sink Lineup	SRO1 RO2							x								
CSF-ST	Transition to FRC-1 (RED Path on Core Cooling)	SRO1							x								
FRC-1, Steps 1-2	Check ECCS Lineup and Flow	SRO1 RO1							x								
FRC-1, Steps 3-7	Check RCPs, Accumulators Dumped, Conditions Improving (They are not)	SRO1 RO1								x							
FRC-1, Step 8	Align H2 Analyzers and Check H2 Concentration	SRO1 RO1									x	x	x	x	x		
FRC-1, Steps 9-10	Check SG Level and RCS Vent Path	SRO1 RO2									x						
FRC-1, Step 11	Depressurize SGs to 220 psig	SRO1 RO2									x	x	x	x			
(Core Exit Thermocouple Temperature 1200F) - SAMGs																	

Interim Report

Callaway Plant On-Shift Staffing Analysis
Attachment 11

Analysis #8, Table 2A – OTO/EOP Actions

ATWS

Procedure Step/Actions			Performance Time (mins) After Procedure Implementation														
Proc/Step	Task	Assigned Resource	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75
E-0 Immediate Actions	Trip the Reactor and Perform Immediate Actions	SRO1 RO1 RO2	x														
E-0, Steps 1-4	Verify Reactor Trip	SRO1 RO1	x														
CSF-0.1	Perform CSF Status Tree Monitoring	SRO2	x														
NA	STA Functions	SRO2		x													
ES-0.1, Steps 1-7	Verify Reactor Trip Response	SRO1 RO1 RO2	x														
ES-0.1, Step 8	Transfer Pressure Control to Steam Pressure Mode	SRO1 RO2		x													
ES-0.1, Steps 9-10	Verify Reactor Trip Response	SRO1 RO1 RO2		x													
ES-0.1, Step 11	EOP Addendum 10, Secure Unnecessary Equipment	SRO1 RO1			x												
ES-0.1, Step 12	Throttle Auxiliary Feedwater	SRO1 RO2			x												
ES-0.1, Step 13	Transition to OTG-ZZ-00005: Hot Standby Procedure, Maintain Stable Plant Conditions	SRO1 RO1 RO2			x												

Interim Report
Callaway Plant On-Shift Staffing Analysis
Attachment 12
Analysis #9, Table 2A – OTO/EOP Actions

Aircraft Probable Threat

Procedure Step/Actions			Performance Time (mins) After Procedure Implementation														
Proc/Step	Task	Assigned Resource	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75
OTO-SK-00002, Steps 1-4	Document NRC Initial Call/Evaluate	SRO1	x														
OTO-SK-00002, Attachment B	Ensuring at Probable Event	SRO1	x														
OTO-SK-00002, Attachment D (via Attachment B3)	Plant Announcement, Close CR Doors	SRO1 RO2	x														
OTO-SK-00002, Attachment B7	Contact Security, Close Main Gate	SM SEC	x														
OTO-SK-00002, Attachment B9-B13	Check Equipment Status, Actuate CRVIS and FBIS	SRO1 RO1	x														
OTO-SK-00002, Attachment B14-15	Direct OT to Switchyard and NBO2	SRO1 NLO1 NLO3		x													
OTO-SK-00002, Attachment B16-20	Verify Equipment Status	SRO1 RO1		x													
OTO-SK-00002, Attachment B21	Top Off Tanks to Upper Limits	SRO1 RO2 NLO2			x												
OTO-SK-00002, Attachment B23	Secure SFP Cleanup	RO1 NLO6			x												
OTO-SK-00002, Attachment B24	Go to RP Access Control	SRO2 NLO4			x												
OTO-SK-00002, Attachment B25	Contact County Emergency Operations Center	SRO1			x												

Interim Report
Callaway Plant On-Shift Staffing Analysis
Attachment 13
Analysis #10, Table 2A – OTO/EOP Actions

Control Room Fire

Procedure Step/Actions			Performance Time (mins) After Procedure Implementation														
Proc/Step	Task	Assigned Resource	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75
OTO-ZZ-00001, Steps 1-5	Trip Reactor, CCP-B in PTL, Fast Close MSIVs, Trip RCPs, Plant Announcement	SRO1 RO1 RO2	x														
OTO-ZZ-00001, Steps 7-9	Evacuate to ASP w/SAS Officer	SM SEC	x														
OTO-ZZ-00001, Steps 10-25	Transfer Control to ASP, Start B & TDAFW, Isolate Letdown	SM		x													
NA	STA Duties	SRO1											x				
OTO-ZZ-00001, Step 26	Verify Field Actions Complete for CCW & CCP	SM SRO1 RO1 RO2 NLO6	x														
OTO-ZZ-00001, Attachment A, Steps A1-A26	Primary Operator Technician Actions	NLO6	x														
OTO-ZZ-00001, Attachment B, Steps B1-B24	BOP Reactor Operator Actions	RO2	x														
OTO-ZZ-00001, Attachment C, Steps C8-C39	RO Reactor Operator Actions	RO1	x														
OTO-ZZ-00001, Attachment D, D1-D14	CRS Actions	SRO1	x														
OTO-ZZ-00001, Steps 26-30 and Attachment C Steps C40-42	Start CCW and CCP	SM RO1						x									
OTO-ZZ-00001, Steps 31-43	Stabilize Plant, Start A AFW	SM						x									
OTO-ZZ-00001, Attachment C, Steps C43-C44 (via Step 44)	Energize NGO8	SM RO1							x								
OTO-ZZ-00001, Step 46	Inspect ESW Components	SM RO1								x							
OTO-ZZ-00001, Steps 47-48	Initiate RCS Boration	SM NLO6								x							
OTO-ZZ-00001, Attachment A, Steps A27-A31	Locally Monitor Equipment, Adjust Charging Flow as Directed	SM NLO6								x							

Interim Report
Callaway Plant On-Shift Staffing Analysis

Control Room Fire

Procedure Step/Actions			Performance Time (mins) After Procedure Implementation														
Proc/Step	Task	Assigned Resource	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75
OTO-ZZ-00001, Attachment B, Step B25	Proceed to ASP	RO2							x								
OTO-ZZ-00001, Attachment D, Steps D15-D33	ESW/UHS Lineups, Start Containment Coolers	SRO1						x									

Interim Report

Callaway Plant On-Shift Staffing Analysis
Attachment 14

Analysis #11, Table 2A – OTO/EOP Actions

Station Blackout

Procedure Step/Actions			Performance Time (mins) After Procedure Implementation															
Proc/Step	Task	Assigned Resource	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75
E-0 Immediate Actions	Perform Immediate Actions, Transition to ECA-0.0	SRO1 RO1 RO2	x														
ECA-0.0 Immediate Actions	Perform Immediate Actions	SRO1 RO1 RO2	x														
ECA-0.0, Steps 1-2	Verify Immediate Actions	SRO1 RO1 RO2	x														
NA	Perform CSF Status Trees	SRO2	x														
NA	STA Duties	SRO2		x													
ECA-0.0, Steps 3-4	Check RCS Isolated, TDAFWP Running	SRO1 RO2	x														
ECA-0.0, Step 5	Restore Emergency Diesels	SRO1 NLO1	x														
ECA-0.0, Step 5	EOP Addendum 7: Emergency Purge H2 from Main Generator	R02 NLO3								x							
ECA-0.0, Step 5	Open Instrument Panel Doors (Loss of AC)	SRO1 RO2		x													
ECA-0.0, Step 6	Place Pumps in PTL (except ESW)	SRO1 RO1		x													
ECA-0.0, Step 7	Addendum 21, Attempt to Locally Start DGs	SRO1 NLO1		x													
ECA-0.0, Step 7	Addendum 39, Attempt to Restore AEPS	SRO1 RO1 NLO4[2]			x												
ECA-0.0, Step 8	Addendum 22, Locally Isolate RCP Seals	SRO1 NLO6			x												
ECA-0.0, Step 9	Isolate CST to Condenser Makeup	SRO1 RO2 NLO3			x												

[2] Inspect PB-05

Interim Report
Callaway Plant On-Shift Staffing Analysis

Station Blackout

Procedure Step/Actions			Performance Time (mins) After Procedure Implementation														
Proc/Step	Task	Assigned Resource	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75
ECA-0.0, Steps 10-11	Check SG Isolation	SRO1 RO2				x											
ECA-0.0, Step 12	Check SG Tube Leak	SRO1 RO1 HP1				x											
ECA-0.0, Step 13	Check SG Levels	SRO1 RO2				x											
ECA-0.0, Step 14	Check DC Bus Loads (No Engineering Support for Load Shed), Check Security Diesel Running	SRO1 NLO2				x											
ECA-0.0, Step 15	Check TDAFWP Suction Pressure to Ensure CST Available	SRO1 RO2				x											
ECA-0.0, Step 16	Depressurize SGs to 320 psig	SRO1 RO2					x										
ECA-0.0, Step 17-22	Check Actuations, and ,1200 CETC Temperature	SRO1 RO1					x										
ECA-0.0, Step 23	Maintain Plant Conditions, Monitor SFP Temperature	SRO1 RO1 RO2 NLO6						x									

Interim Report

Callaway Plant On-Shift Staffing Analysis
Attachment 15

Analysis #12, Table 2A – OTO/EOP Actions

SAMGs

Procedure Step/Actions			Performance Time (mins) After Procedure Implementation														
Proc/Step	Task	Assigned Resource	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75
FR-C.1, Step 11	Check Hot Leg Temperature after SG Depressurization (Jump to Step 18)	SRO1 RO1											x				
FR-C.1, Step 18	Open All PZR PORVs and Reactor Head Vent Valves	SRO1 RO2											x				
FR-C.1, Step 19	Depressurize SGs to Atmospheric Pressure	SRO1 RO2											x				
FR-C.1, Step 20	Transition to SACRG-1	SRO1												x			
SACRG-1, Step 1	Declare 50.54(x)	SM												x			
SACRG-2, Step 2	Place Non-Operating Equipment in PTL	SRO1 RO1 RO2												x			
SACRG-2, Steps 3-4	Check H2 Analyzers, Stop H2 Recombiners	SRO1 RO1													x		
SACRG-2, Steps 5-9	Reset CIS-B, Establish Instrument Air to Containment	SRO1 RO2														x	
SACRG-2, Step 10	Depressurize RCS	SRO1 RO1														x	
SACRG-2, Steps 11-12	Check ECCS Pumps Available, Stop Containment Coolers	SRO1 RO2															x