



JENSEN HUGHES

Advancing the Science of Safety

CENTRALIZATION OF SURVEILLANCE FREQUENCY CONTROL PROGRAM FOR ENHANCED EFFICIENCY

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CENTRALIZATION OF SFCP FOR ENHANCED EFFICIENCY

KEY INPUTS & INSIGHTS

- Factors driving the utilization of the SFCP
- Centralization of SFCP efforts to improve efficiency
- PRA evaluations conducted in parallel with engineering assessments
- Efficiency gains and process improvements
- Conclusion & Questions



FACTORS DRIVING SFCP UTILIZATION

- The SFCP and Delivering the Nuclear Promise
- Finding economies of scale within the SFCP
- NEI EB 17-11: Maximize Implementation of the Surveillance Frequency Control Program



BENEFITING FROM THE SFCP

- The ability to fully realize benefits of a previously approved risk-informed program
- Efficient alignment of plant resources
- Decreased equipment challenges
- Improved economic performance
- Reduced probability of plant transients
- Improved equipment reliability



CENTRALIZATION TO IMPROVE EFFICIENCY

- Exelon first centralized SFCP resources to support their **Divisionalized Outage Project**
 - Outages in which multi-train or divisional systems are tested on a staggered basis
- Initial scope of Divisionalize Outage Project presented resource challenges
 - Challenges affected both Engineering and PRA engineers
- Corporate engineering team was established
 - Reduced burden on site engineers
- Exelon RM Team organized a project team to support this initiative



CENTRALIZATION APPROACH

- Perform Engineering and PRA evaluations in parallel
- Identify critical interfaces between the Engineering and PRA groups were and standardized
 - Formalization of analysis scope
 - Standardized **component data spreadsheet**
 - Analysis scope Handoff Meeting
- Maintaining close alignment is key
 - Alignment meetings used to communicate obstacles



SAMPLE STANDARD COMPONENT DATA SPREADSHEET

Component Description	Equipment Description	Function	Component Type	Manufacturer	Model	SR	Verifying Procedures	Additional Procedures that routinely exercises the components. Drawing References	Unique to R00 test?
2SWP*MOV93A	BUTTERFLY VALVE - MOTOR	Motor Operator	Valve	Limatorque			N2-OSP-ESG-R003	ESK-6SWP10	N
2SWP*MOV93B	BUTTERFLY VALVE - MOTOR	Motor Operator	Valve	Limatorque			N2-OSP-ESG-R003	ESK-6SWP10	N
3-1-2ENSX04	INTERLOCKING RELAY 9SWGR 2ENS*SWG101 CONTROL BUS UV & LOAD SEQUENCING)	Blocks manual start of SWP*P1A, PIC, P1E and SFC*P1A	Relay	GENERAL ELECTRIC	HGA111J2		N2-OSP-ESG-R002 N2-OSP-EGS-R004	ESK-5ENS021 (SH2)	Y
3-1-2ENSY04	INTERLOCKING RELAY (SWGR 2ENS*SWG103 CONTROL BUS UV & LOAD SEQUENCING)	Blocks manual start of SWP*P1A, PIC, P1E and SFC*P1A	Relay	GENERAL ELECTRIC	HGA111J2		N2-OSP-ESG-R002 N2-OSP-EGS-R004	ESK-5ENS022 (SH2)	Y
3-1-2SWPA44	CONTROL RELAY, TYPE GPD (CONTROL OF 2SWP*MOV3A AND 2SWP*MOV19A)	LOOP logic relay	Relay	Agastat	GPD		N2-OSP-ESG-R003	ESK-6SWP01, ESK-6SWP08, ESK-7SWP17	N
3-1-2SWPB44	CONTROL RELAY, TYPE GPD (CONTROL OF 2SWP*MOV3B AND 2SWP*MOV19B)	LOOP logic relay	Relay	Agastat	GPD		N2-OSP-ESG-R003	ESK-6SWP01, ESK-6SWP08	N
3-2-2SWPA44	CONTROL RELAY, TYPE GPD (CONTROL OF 2SWP*MOV93A AND 2SWP*MOV599)	CONTROL OF 2SWP*MOV93A AND 2SWP*MOV599	Relay	AGASTAT RELAY CO	EGP		N2-OSP-ESG-R003	ESK-6SWP09, ESK-6SWP10, ESK-7SWP17	N
3-2-2SWPB44	CONTROL RELAY, TYPE GPD (CONTROL OF 2SWP*MOV93B)	CONTROL OF 2SWP*MOV93B	Relay	AGASTAT RELAY CO	EGP		N2-OSP-ESG-R003	ESK-6SWP10, ESK-7SWP17	N
3-2SFC01	CONTROL RELAY - (CONTROL FOR 2SFC*P1A)	Pump Control	Relay	GENERAL ELECTRIC	HFA		N2-OSP-ESG-R003 N2-OSP-ESG-R005	ESK-05SFC001	Y
3-2SFC01	CONTROL RELAY - (CONTROL FOR 2SFC*P1B)	Pump Control	Relay	GENERAL ELECTRIC	HFA		N2-OSP-ESG-R003 N2-OSP-ESG-R005	ESK-05SFC002	Y
3-2SWPC01	CONTROL RELAY, TYPE HFA (CONTROL OF 2SWP*P1C	Trip and Block Close of Bkr 2ENS*SWG101-6(2SWP-P1C) on LOOP	Relay	GENERAL ELECTRIC	HFA		N2-OSP-ESG-R003 N2-OSP-ESG-R005	ESK-5SWP03 (SH2), ESK-5SWP09 (SH1)	N



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Component Description	Equipment Description	Function
2SWP*MOV93A	BUTTERFLY VALVE - MOTOR	Motor Operator
2SWP*MOV93B	BUTTERFLY VALVE - MOTOR	Motor Operator
3-1-2ENSX04	INTERLOCKING RELAY 9SWGR 2ENS*SWG101 CONTROL BUS UV & LOAD SEQUENCING)	Blocks manual start of SWP*P1A, PiC, P1E and SFC*P1A
3-1-2ENSY04	INTERLOCKING RELAY (SWGR 2ENS*SWG103 CONTROL BUS UV & LOAD SEQUENCING)	Blocks manual start of SWP*P1A, PiC, P1E and SFC*P1A
3-1-2SWPA44	CONTROL RELAY, TYPE GPD (CONTROL OF 2SWP*MOV3A AND 2SWP*MOV19A)	LOOP logic relay
3-1-2SWPB44	CONTROL RELAY, TYPE GPD (CONTROL OF 2SWP*MOV3B AND 2SWP*MOV19B)	LOOP logic relay
3-2-2SWPA44	CONTROL RELAY, TYPE GPD (CONTROL OF 2SWP*MOV93A AND 2SWP*MOV599)	CONTROL OF 2SWP*MOV93A AND 2SWP*MOV599
3-2-2SWPB44	CONTROL RELAY, TYPE GPD (CONTROL OF 2SWP*MOV93B)	CONTROL OF 2SWP*MOV93B
3-2SFC A01	CONTROL RELAY - (CONTROL FOR 2SFC*P1A)	Pump Control
3-2SFC B01	CONTROL RELAY - (CONTROL FOR 2SFC*P1B)	Pump Control
3-2SWPC01	CONTROL RELAY, TYPE HFA(CONTROL OF 2SWP*P1C	Trip and Block Close of Bkr 2ENS*SWG101-6(2SWP-P1C) on LOOP



SAMPLE STANDARD COMPONENT DATA SPREADSHEET

Component Type	Manufacturer	Model	SR	Verifying Procedures	Additional Procedures that routinely exercises the components. Drawing References	Unique to R00 test?
Valve	Limitorque			N2-OSP-ESG-R003	ESK-6SWP10	N
Valve	Limitorque			N2-OSP-ESG-R003	ESK-6SWP10	N
Relay	GENERAL ELECTRIC	HGA111J2		N2-OSP-ESG-R002 N2-OSP-EGS-R004	ESK-5ENS021 (SH2)	Y
Relay	GENERAL ELECTRIC	HGA111J2		N2-OSP-ESG-R002 N2-OSP-EGS-R004	ESK-5ENS022 (SH2)	Y
Relay	Agastat	GPD		N2-OSP-ESG-R003	ESK-6SWP01, ESK-6SWP08, ESK-7SWP17	N
Relay	Agastat	GPD		N2-OSP-ESG-R003	ESK-6SWP01, ESK-6SWP08	N
Relay	AGASTAT RELAY CO	EGP		N2-OSP-ESG-R003	ESK-6SWP09, ESK-6SWP10, ESK-7SWP17	N
Relay	AGASTAT RELAY CO	EGP		N2-OSP-ESG-R003	ESK-6SWP10, ESK-7SWP17	N
Relay	GENERAL ELECTRIC	HFA		N2-OSP-ESG-R003 N2-OSP-ESG-R005	ESK-05SFC001	Y
Relay	GENERAL ELECTRIC	HFA		N2-OSP-ESG-R003 N2-OSP-ESG-R005	ESK-05SFC002	Y
Relay	GENERAL ELECTRIC	HFA		N2-OSP-ESG-R003 N2-OSP-ESG-R005	ESK-5SWP03 (SH2), ESK-5SWP09 (SH1)	N



CENTRALIZATION APPROACH - CONTINUED

- Perform Engineering and PRA evaluations in parallel
- Identify critical interfaces between the Engineering and PRA groups were and standardized
 - Formalization of analysis scope
 - Standardized **component data spreadsheet**
 - Analysis scope Handoff Meeting
- Maintaining close alignment is key
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EFFICIENCY GAINS & PROCESS IMPROVEMENTS

- Consistent approach to quantitative analyses implemented
 - Uniquely Tested Component spreadsheet maintains PRA-specific information
 - Basic events added which correspond to modeled components
- Basic event mapping easily transmitted for verification
- Validation of BE mapping an established decision point
- These processes are utilized by multiple teams in parallel



PROCESS IMPROVEMENTS

- Operate RM Teams in parallel ***and*** maintain consistency and quality
- **A Senior 5b Advisory Group** was established
 - Monitor performance of risk assessments across the fleet
 - Leverage senior, deeply experienced RM Team engineers
 - Challenge methods and strategies
 - To facilitate reviews, a site-specific **SFCP status form** was created
 - Insights passed to all technical leads



SFCP STATUS FORM

EXELON SFCP STATUS FORM

SITE:
 DATE:
 SITE TECHNICAL LEAD:
 SITE TECHNICAL TEAM:

EXELON ENGINEERING CONTACT(S):
 ADDITIONAL RESOURCE NEEDS:
 LOCATION OF ELECTRONIC PROJECT FILES:

CURRENT WORK SCOPE SUMMARY										
DOC REF. #	SCOPE ADD?	SCOPE IDENTIFIER	DESCRIPTION	STATUS	ANALYSIS METHODOLOGY	PREPARER / CO-PREPARER	REVIEWER	START DATE	DUE DATE	EST. COMP. DATE
	<input type="checkbox"/> YES <input type="checkbox"/> NO	<input type="checkbox"/> CORP – OUTAGE <input type="checkbox"/> CORP – ONLINE <input type="checkbox"/> SITE-SPECIFIC		<input type="checkbox"/> All inputs received <input type="checkbox"/> In progress <input type="checkbox"/> Complete COMMENTS:	FPIE Choose an item. FIRE Choose an item. SEISMIC Choose an item.	Click here to enter text. <input type="checkbox"/> RM02 Complete <input type="checkbox"/> RM07 Complete <input type="checkbox"/> RM09 Complete Click here to enter text. <input type="checkbox"/> RM02 Complete <input type="checkbox"/> RM07 Complete <input type="checkbox"/> RM09 Complete	Click here to enter text. <input type="checkbox"/> RM02 Complete <input type="checkbox"/> RM07 Complete <input type="checkbox"/> RM09 Complete	Click here to enter a date.	Click here to enter a date.	Click here to enter a date.
	<input type="checkbox"/> YES <input type="checkbox"/> NO	<input type="checkbox"/> CORP – OUTAGE <input type="checkbox"/> CORP – ONLINE <input type="checkbox"/> SITE-SPECIFIC		<input type="checkbox"/> All inputs received <input type="checkbox"/> In progress <input type="checkbox"/> Complete COMMENTS:	FPIE Choose an item. FIRE Choose an item. SEISMIC Choose an item.	Click here to enter text. <input type="checkbox"/> RM02 Complete <input type="checkbox"/> RM07 Complete <input type="checkbox"/> RM09 Complete Click here to enter text. <input type="checkbox"/> RM02 Complete <input type="checkbox"/> RM07 Complete <input type="checkbox"/> RM09 Complete	Click here to enter text. <input type="checkbox"/> RM02 Complete <input type="checkbox"/> RM07 Complete <input type="checkbox"/> RM09 Complete	Click here to enter a date.	Click here to enter a date.	Click here to enter a date.
	<input type="checkbox"/> YES <input type="checkbox"/> NO	<input type="checkbox"/> CORP – OUTAGE <input type="checkbox"/> CORP – ONLINE <input type="checkbox"/> SITE-SPECIFIC		<input type="checkbox"/> All inputs received <input type="checkbox"/> In progress <input type="checkbox"/> Complete COMMENTS:	FPIE Choose an item. FIRE Choose an item. SEISMIC Choose an item.	Click here to enter text. <input type="checkbox"/> RM02 Complete <input type="checkbox"/> RM07 Complete <input type="checkbox"/> RM09 Complete Click here to enter text. <input type="checkbox"/> RM02 Complete <input type="checkbox"/> RM07 Complete <input type="checkbox"/> RM09 Complete	Click here to enter text. <input type="checkbox"/> RM02 Complete <input type="checkbox"/> RM07 Complete <input type="checkbox"/> RM09 Complete	Click here to enter a date.	Click here to enter a date.	Click here to enter a date.



CONCLUSIONS

- Efficiency gains are compounded
- Forms, tools, and information sharing vehicles are constantly improving
- Identification of critical communications has enhanced the fidelity between engineering and PRA efforts
- Using the 5b Senior Advisory Group, real-time operating experience, guidance, and mentorship is delivered
 - Establish a self-improving project culture
- Through the use of the developed tools and process improvements, efficiencies of scale have been realized
 - > 80 analyses completed or planned in 2017
 - > **160 analyses planned for 2018**



QUESTIONS?

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