Corporate Radiation Protection Dose Excellence Plan

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Exelon Generation

Agenda

- Radiation Protection Excellence Plan
- Radiation Protection 5 Year Dose Excellence Plan
- Radiation Protection 5 Year Dose Excellence Action List
- Radiation Protection 5 Year Waterfall
- Dose Excellence Best Practices Matrix

Exelon Nuclear – Background

- Largest Nuclear Generator in the United States
- Comprised of 23 operating units over 13 sites
  - Braidwood – Illinois, Two Unit PWR
  - Byron – Illinois, Two Unit PWR
  - Calvert Cliffs – Maryland, Two Unit PWR
  - Clinton – Illinois, Single Unit BWR
  - Dresden – Illinois, Two Unit BWR
  - Fort Calhoun – Nebraska, Single Unit PWR
  - Ginna – New York, Single Unit PWR
  - LaSalle – Illinois, Two Unit BWR
  - Limerick – Pennsylvania, Two Unit BWR
  - Nine Mile Point – Pennsylvania, Two Unit BWR
  - Oyster Creek – New Jersey, Single Unit BWR
  - Peach Bottom – Pennsylvania, Two Unit BWR
  - Quad Cites – Illinois, Two Unit BWR
  - TMI – Pennsylvania, Single Unit PWR

Radiation Protection Excellence

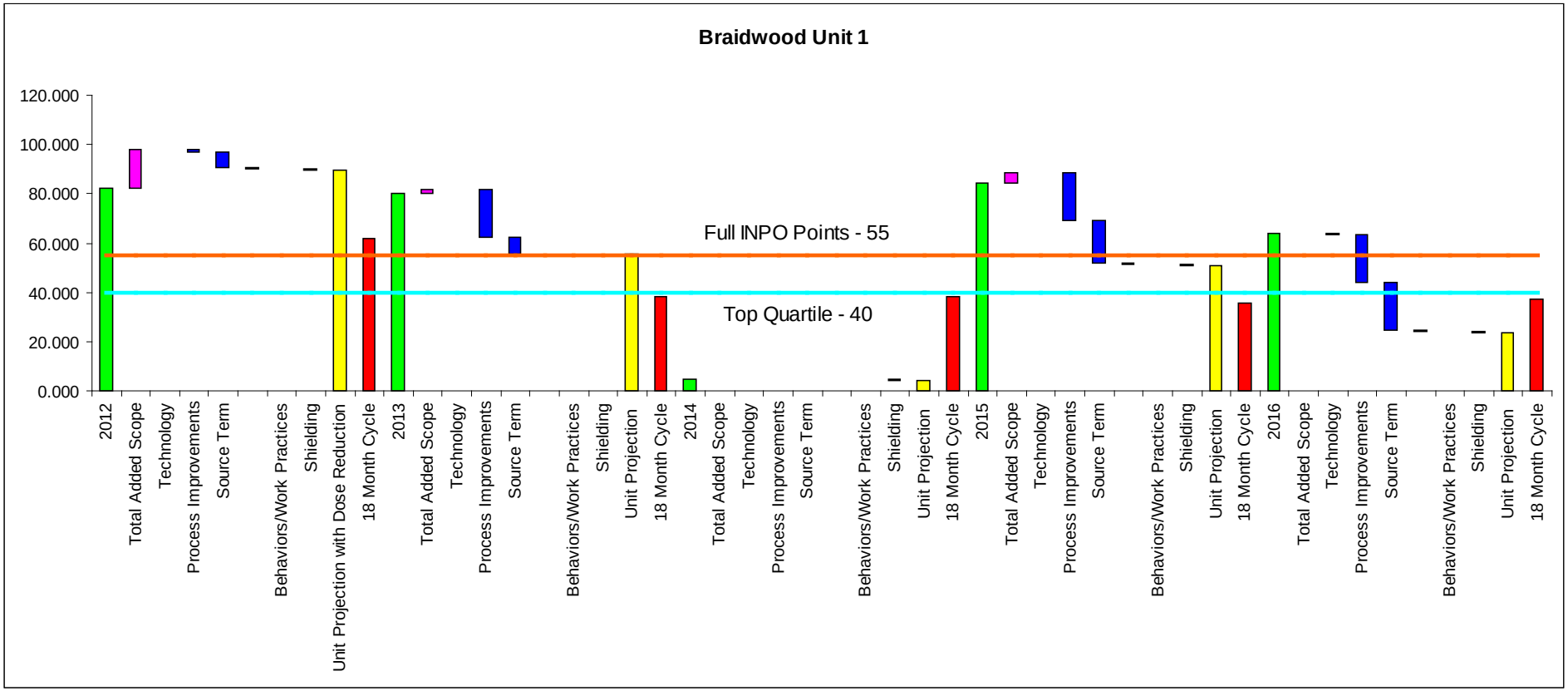
- Through procedures and governance, four documents work together to create the RP excellence plan.
  - Site 5 year Dose Excellence Plan (Word Document)
  - Site 5 year Dose Excellence Plan (Action item –spreadsheet)
  - Best Practices Chart (BINGO chart)
  - Waterfall Charts
- Business Plan alignment initiative: **Implement Fleet RP Excellence Plan (AI)**
  - This is a multi-functional initiative supported by Corporate, Site functional areas and key vendors.
  - The purpose is to drive excellence in radiation protection through the identification, implementation and standardization of best practices
- Dose Excellence Plan
  - Composed of corporate and site actions
  - Focused on multi-site actions to drive consistent dose reduction
  - Senior executive sponsorship driven by the site leadership teams and RP
  - Projects identified are put into the budgeting process

3

Site 5 Year Dose Excellence Plan

- Each site creates their 5 year dose excellence plan document by procedure.
- The plan is broken down into following key parts
  - Analysis
  - Business Plan Goals
  - INPO Point Prediction
  - GAP Analysis
  - Action Plan
    - Source Term Reduction
    - Shielding
    - Technological Improvement
    - Process Improvement
    - Behaviors
- The plans are reviewed and approved by both site senior management and Corporate RP personnel.
- Once the plan is approved, actions are created to track implementation of the dose savings initiatives on the site's Dose Excellence Plan spreadsheet

Waterfall Chart (Example)



Site DEP Action Items Spreadsheet

- Dose Excellence Plan spread sheet is a tracking list of the action items created for dose savings initiatives.
- Fleet initiatives based upon best in industry practices are identified and compared to individual plant source term reduction plans.

- Each item is placed into one of five categories
  - Behaviors/Work Practices
  - Process
  - Shielding
  - Source Term
  - Technology

Site DEP Spreadsheet (Example)

Rank	Facility	Impact	Functional Area	Annual Projected Dose Savings	Projected Cost	Funded	Action	Owner	ATI	Assign Due Date	Status	Actual Dose Saved	Comment
1	BRW	Process	Engineering	18 Rem/non S/G outage	LOE	N/A	Unit 1 implement steam generator inspection every 3rd outage.	M. Sears	871261-23	08/27/12			Steam Generator inspections are scheduled during A1R16 (April 2012). Until the A1R16 inspection results are available and the Conditioning Monitoring / Operation Assessment are complete, the frequency of steam generator inspections can not be determined. The Conditioning Monitoring / Operation Assessment is not finalized until 90 days after completion of A1R16. Therefore, the due date for this action is being moved to 8/27/12.
2	BRW	Process	Engineering	13 Rem/non S/G outage	500K	N	Unit 2 implement steam generator inspection every other outage.	M. Sears	871261-24	10/01/12			A2R17 / 2014
3	BRW	Source Term	RP / Chemistry	7.5Rem outage	325K	Y	Unit 1 PRC-01M and Alternate shutdown	J. Rappeport	01164094-09	11/01/12			A1R16 / 2012
4	BRW	Source Term	RP / Chemistry	5.5 Rem outage	325K	Y	Unit 2 PRC-01M and alternate shutdown	J. Rappeport	01164094-10	05/15/12	Complete		Braidwood station is using PRC-01M resin in the appropriate demineralizers. The PRC-01M resin is loaded in the 1FC01D, 2FC01D, used for outage shutdown cleanup demins, and is loaded as a 5 ft3 cap in 1CV01DA for cycle 17. PRC-01M resin use is implemented. Braidwood station is not authorized to use the alternate shutdown template, however, if allowed, chemistry has procedures and processes in place to support alternate shutdown.
7	BRW	Process	Engineering	350 mrem / unit / fuel cycle	LOE	N/A	Permanent Scaffold in Containment Unit 1	D.Gustafson	980777-01	10/15/10	Complete		A1R16 ATI closed. ATI 1316939-08 perm scaffold around S/G secondary side completed.
9	BRW	Process	Engineering	350 mrem / unit / fuel cycle	LOE	N/A	Permanent Scaffold in Containment Unit 2	D.Gustafson	980777-02	04/01/11	Complete		A2R16 ATI open. ATI 1316939-09 perm scaffold around S/G secondary side is due 8/31/12.
10	BRW	Process	Engineering	200 mrem/outage	75K	N	Unit 1 Install shielding frames in all 4 loops	D.Gustafson	871261-21	05/31/12	Complete		Permanent Scaffolds have been installed at the four loops to provide frames to safely hang shielding blankets at the beginning of each refueling outage as needed. These permanent scaffolds were installed under WO # 01450312, Task 01, 02, 03 and 04. Scaffold Tag Number S-1238 is installed at 1RC02AA-31"; Number S-1239 at 1RC02AB-31"; Number S-1240 at 1RC02AC-31"; and Number S-1241 at 1RC02AD-31".
11	BRW	Process	Engineering	200 mrem/outage	75K	N	Unit 2 Install shielding frames in all 4 loops	D.Gustafson	871261-22	10/30/12			A2R16
12	BRW	Process	RP	300 mrem / unit / outage	250K	Y	Cavity Stairway (elevator) Unit 1	P. Daly	EC 371070	05/30/12	Complete		Installed during MSIP
14	BRW	Shielding	Projects	500 mrem/outage	70K	N	Unit 1 Reactor head shielding	M. Mayfield	871261-15	05/30/12	Complete		MSIP shielding
15	BRW	Shielding	Projects	500 mrem/outage	70K	N	Unit 2 Reactor head shielding	M. Mayfield	871261-16	11/30/12			NPO on-sight 1/27/12 to provide preliminary analysis for Cono-Seals. This Item may need re-assigned to Rx Services (Nate Neal). We are also doing the analysis for Byron.
16	BRW	Source Term	Nuclear Fuels	250 mrem/outage	LOE	N/A	Implement EOC boron concentration > 20 ppm	TBD	IR 01319522 generated	TBD	Complete		A1R16 EOC Boron was 37ppm
17	BRW	Shielding	S/G	144 mrem/outage	100K	N	Unit 1 Form-fit shielding for S/G bowl drains	B. McDonough	1335480-03	03/01/13			Measurements to be obtained 2010 under 871261-11
18	BRW	Shielding	S/G	127 mrem/outage	50K	N	Unit 2 Form-fit shielding for S/G bowl drains	B. McDonough	871261-12	10/30/12			Measurements to be obtained 2011
20	BRW	Source Term	RP	3-5 Rem	LOE	N/A	Evaluate Byron data (ATI# 838706-24) on RCS/CV system decontamantions	Mike Sharum	871261-05	07/27/12			Needs reassigned once Byron completes their evaluation
21	BRW	Technology	Maintenace	120 mrem/yr	LOE	N/A	Utilize Lasalle Version of Safe Shut downs Battery packs and Lights	Tim Kirman	907184-53-01 changed to 907184-76 changed to 1094748-11	09/28/12			Evaluation complete - need new assignment to take to site PRC. Scheduled for PRC September 2011. ATI 907184-76. AR 1094748 Assignment Numbers 6 thru 12 Implement 2011. THIS ATI HAS BEEN VERY DIFFICULT TO TRACK. ITEM 12 WAS CLOSED TO ANOTHER ATI BUT NO SUBTASK NUMBER WAS GIVEN AND I DIDN'T HAVE TIME TO SEARCH THROUGH ALL 85 ITEMS TO FIND IT. WHAT A MESS! 01067585-18 was tracked but also closed to 01181706-26 which was cancelled without any reason. 01094748-11 is currently tracking - due 6-29-12. Due date extended to 9/28/12.

Best Practices (BINGO Chart)

- The Bingo chart provides a matrix of initiatives with a visually easy means to view status of implementation at each site.
- Items identified as best practices by the industry are added to the BINGO chart.
- An associated word document describes each item on the chart and criteria for obtaining a green status (implemented).
- Each item is color coded as follows:
  - Green: fully implemented best practice
  - White: planned/funded/on track for implementation
  - Yellow: planned/unfunded/on track for implementation
  - Red: off track
  - Blue: evaluated and will be not implemented
  - Grey: not applicable to the site

BINGO Chart (Example)

Focus Area		BRW	BYR	CPS	DRE	LAS	LIM	OYS	PEA	QDC	TMI	Green Status
Section 1: Source Term												
Eliminating In-Core Cobalt Sources												
1.1	Elimination of OEM Blades	Not Applicable	Not Applicable	No OEM Blades Changed out last two outages. CPS has 64 remaining in Dose Excellence Plan	Based on cobalt # no need to accelerate	DEP 4.0-4.6 / AT 1006294-07-11, U-1 COMPLETE, U-2: 43 of 185 OEMs left.	Unit 1 ;89 blades; remove 12 in 1R14; 2012. 77 remain. (Ref 1279974-01)	1 OEM blade to be replace 1R24. No other OEM blades planned to be changed before S/D in 2019	IR 911324-17 This project is in strategic process	4 left to be removed Q1R22-569183-06-03.	Not Applicable	no OEM blades that contain stellite
1.2	Elimination of Jet Pump Wedges that contain stellite	Not Applicable	Not Applicable	No jet pump wedge wear seen, will replace as needed		No jet pump wedge wear seen, will replace as needed	Unit 2; 8 wedges remain. Remove 4 in 2013 and 4 in 2015 (Ref 1279975-01)	Not Applicable	No jet pump wedge wear seen, will replace as needed		Not Applicable	no Jet Pump Wedges that contain stellite
1.3	Elimination of turbine buckets contain stellite	Not Applicable	Not Applicable		Unit 2 complete Unit 3 scheduled 2012 AR # 1040420-16	Deep bed demin plant- No plans to change out, minimal cobalt contribution per Chemistry evaluation			IR-911324-03 U-2 has a LP Turbine scheduled to be replaced during P2R19 U-3 had replaced		Not Applicable	no turbine buckets containing stellite. Blue if deep bed demins are installed
1.4	Conduct Cobalt transport study										1160108-29 New transport study	Transport study completed during the recent fuel cycle. Complete documentation reviewed by SAC
1.5	Soft Shutdown institutionalized for Refueling Outages	Perform modified soft shutdown, rod dropped testing is performed at <5%.	Perform modified soft shutdown, rod dropped testing is performed at <5%.						PB Operation procedures have the plant scram at less 5% power			Soft Shutdown methodology integrated into procedures and implemented every refueling outage. Blue if use modified form

Oversight

Dose Excellence Plan

- Sites that are exhibiting good Collective Radiation Exposure performance:
  - Quarterly with the Corporate RP team
  - Once a cycle during the monthly peer group meeting
- In addition to those challenges, sites that are struggling with Collective Radiation Exposure performance are challenged monthly by the Corporate RP team, along with Corporate Senior Leadership.

BINGO Chart

- Reviews are conducted in three ways:
  - Monthly by the Radiological Engineering Managers peer group
  - Quarterly during the RP Excellence plan challenge calls with Corporate RP
  - Quarterly during the Radiation Protection Managers peer group meeting
  - Monthly for sites who have the executive challenge meetings

Summary/Results

- Improvement shown in key indicators
  - Fleet exposure set fleet low in 2012 and 2013 (sans PB)
  - BWR – currently have 8 of top 12 units in INPO rankings
  - PWR – Braidwood and Byron – top decile

- Continued focus is required. Fleet is challenged by:
  - Implementation of high dose projects (PB EPU)
  - Emergent high dose work and equipment issues
  - Increased source term at several sites

- Fleet continues to implement improvements
  - Resin evaluation and strategies
  - Removal of cobalt containing components (OEM blades)
  - Shielding and worker behavours

Appendix

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Section 1: Source Term												
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1.1	Elimination of OEM Blades	Not Applicable	Not Applicable	No OEM Blades Changed out last two outages. CPS has 64 remaining in Dose Excellence Plan	Based on cobalt # no need to accelerate	DEP 4.0-4.6 / AT 1006294-07-11, U-1 COMPLETE, U-2: 43 of 185 OEMs left.	Unit 1 ;89 blades; remove 12 in 1R14; 2012. 77 remain. (Ref 1279974-01)	1 OEM blade to be replace 1R24. No other OEM blades planned to be changed before S/D in 2019	IR 911324-17 This project is in strategic process	4 left to be removed Q1R22-569183-06-03.	Not Applicable	no OEM blades that contain stellite
1.2	Elimination of Jet Pump Wedges that contain stellite	Not Applicable	Not Applicable	No jet pump wedge wear seen, will replace as needed		No jet pump wedge wear seen, will replace as needed	Unit 2; 8 wedges remain. Remove 4 in 2013 and 4 in 2015 (Ref 1279975-01)	Not Applicable	No jet pump wedge wear seen, will replace as needed		Not Applicable	no Jet Pump Wedges that contain stellite
1.3	Elimination of turbine buckets contain stellite	Not Applicable	Not Applicable		Unit 2 complete Unit 3 scheduled 2012 AR # 1040420-16	Deep bed demin plant- No plans to change out, minimal cobalt contribution per Chemistry evaluation			IR-911324-03 U-2 has a LP Turbine scheduled to be replaced during P2R19 U-3 had replaced		Not Applicable	no turbine buckets containing stellite. Blue if deep bed demins are installed
1.4	Conduct Cobalt transport study										1160108-29 New transport study	Transport study completed during the recent fuel cycle. Complete documentation reviewed by SAC
1.5	Soft Shutdown institutionalized for Refueling Outages	Perform modified soft shutdown, rod dropped testing is performed at <5%.	Perform modified soft shutdown, rod dropped testing is performed at <5%.						PB Operation procedures have the plant scram at less 5% power			Soft Shutdown methodology integrated into procedures and implemented every refueling outage. Blue if use modified form

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Focus Area		BRW	BYR	CPS	DRE	LAS	LIM	OYS	PEA	QDC	TMI	Green Status
1.6	Minimize Control Rod Testing				Base on scope and need for Ops. Dresden has poor drive performance AR # 1171907-36						1160108-30 Need CRD changeout (2013) and Tech Spec change	No testing done within 3 months of refueling outage
1.7	Limiting Impurity Levels of Cobalt in Structural Alloys											No addition of any Cobalt containing components to the unit
Cobalt Contribution from Valve Maintenance Activities												
1.8	Cobalt Reduction program					DEP 65 / AT 1312943-54, Develop plan to change out Level 1 contributors						All Level 1 and 2 valves are identified, eliminated or scheduled and funded to be replaced. If no level 1 or 2 valves, then consider replacing level 3 valves.
1.9	XRF/Post valve maintenance implemented									Per Site VP at the last CAC, expenditure of ~$50k is not approved for purchase. AT1123226-18		Site has XRF instrumentation, and smears on components are analyzed per RP-AA-551-1004 for new and existing components
1.10	Maintenance Activity Preparations to ensure cleanliness											Maintenance activities are in the work order planning process
1.11	Post-Maintenance Cleaning											Work order process is institutionalized and used for every outage

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Focus Area		BRW	BYR	CPS	DRE	LAS	LIM	OYS	PEA	QDC	TMI	Green Status
Cobalt in Reactor Water												
1.12	Pre-fill Main Steam Lines with low/no activity water institutionalized	Not Applicable	Not Applicable		Fill with RCS, drain and control level with contaminated demin 1296689-91					C/S used for floodup based on good water Chemistry - water clarity and activity remain "best in fleet".	Not Applicable	Pre-fill Main Steam Lines with a low activity water source
1.13	Rx Cavity /Spent Fuel Pool Portable Demins	We use PRC-01M in FC Demins. Have evaluated portable demins to compliment in plant system and beginning to put into process. ATI 01164094-02	Utilized orthoporis resin	Limited floor space on Mark III containment, developing plan for use in SF Pool	Use 600 tri-nuc with .1 micron filters evaluating resin matrixed filters / Use unfilterd tri nuc from vessel to fuel pool skimer / surge to go through the fuel pool demin AR # 129689-14	DEP 94.0 / AT 1391108-12, Develop plan for use during L1R15	Utilized specialty resin in FPC during 2R11. Great success	Not Applicable OC C/U capacity is 5x higher than others. Currently using specialty resins in SFP C/U.		Evaluated and determined not to be implememnted based on cavity dose rates		Have and use portable demins in the Rx cavity/spent fuel pool
1.14	Specialty resin used during Outage Shutdown				Not Applicable							Use of specialty resin in RWCU/RCS systems prior to and during outage shutdown
1.15	Specialty resin used on-line		Quality Control issue with resin (chlorides) delayted implementation. #838706-83&84								1160108-31 use speciality resins in make up demin	Use of specialty resin in RWCU/RCS systems during online operation
1.17	0.05 micron filters in Reactor Cavity			IR 01323717 driving resolution		DEP #93.0 / AT 1391108-11, Evaluste Dresden OPEX for potential use during L2R14	Currently use 0.1 micron filters. Evaluating 0.05 micron filters for 2R12.		Currently use 0.1 micron filters. Evaluating 0.05 micron filters for 2R19.			Install 0.05 micron filters in underwater vacuum systems used to clean-up the reactor cavity (changed from 0.1 at 8/17/12 peer group)
1.18	Cleanup RCS to 0.02 uci/mL prior to cavity flood-up			Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	1160108-32 Stretch target of 0.02 uCi/ml established	RCS is at 0.02 µci/mL prior to cavity flood-up for PWRs

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1.19	Increase RCS pH from 7 to 7.4			Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable		RCS pH is 7.4 for PWRs
1.20	Implement EOC boron concentration > 20 ppm	Evaluated each cycle. Based on unit operating history, baseline is 10 ppm. Nuc Fuels is currently evaluating A2R16 EOC Boron. IR 1389723		Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	1160108-33 Evaluated each cycle. Based on unit operating history.	EOC boron concentration is maintained > 20 ppm prior to shutdown for PWRs. > 10 = white, > 20 = green
Preconditioning Surfaces of Replacement Components												
1.21	Electro-polish new valves and RWCU piping	Will be evaluated on a case by case basis.	Currently no plan to electro-polish	10ft of RWCU piping complete 2 of 8 valves complete	No opportunities	Proposed for 1/2REL9A piping rplc.- Strategic dose reduction project	Currently no plan to electro-polish	Not implemented or currently budgeted at OC. 2019 S/D	Currently no plan to electro-polish	Currently no plan to electro-polish	No opportunities	All new valves, pumps, and equipment that contribute to cobalt production/ source term are electro-polished prior to installation
Decontamination & Flushing												
1.23	RHR Head Hydrogen Peroxide Flush	Not cost effective(dose savings vs. avail.) addit. industry OPEX damages demins.	Not cost effective(dose savings vs. avail.) addit. industry OPEX damages demins.	Concern due to micro induced corrosion and inability to UT inner tube bundles	Not Applicable	Site will not approve based on OPEX; damages demins	Hydrogen peroxide use not allowed at LGS (Ref 616911- 36)	Not Applicable	IR 911324-26 This being reviewed for use this year	Chemistry does not recommend due to impace on RW demins and high sulphate issues unles processed through V or evap.	Not Applicable	Hydrogen peroxide is utilized for system decontamination
1.24	Hydrogen Peroxide Flush Hot Spots on Equipment Lines	No opportunities			No opportunities	Site will not approve based on OPEX; damages demins	Hydrogen peroxide use not allowed at LGS (Ref 616911- 36)	Not implemented or currently budgeted at OC. 2019 S/D	IR 911324-26 This being reviewed for use this year	Chemistry does not recommend due to impace on RW demins and high sulphate issues unles processed through V or evap.		Hydrogen peroxide is utilized for system decontamination
1.25	Periodic decontamination of primary sample sinks and drain lines											Reoccurring work order activity is utilized for periodic decontamination of primary sinks and drain lines

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1.26	Install hydrolaser and drain flush ports		Some ports installed. Pursuit of additional ports in Dose Excellence Plan. #1237122-42		based on need AR # 1296689-44	DEP 83.0 / AT 1312943-75, Some ports installed, need more					Evaluated per process on case-by-case basis 1160108-52	Hydrolaser & drain flush ports installed on system piping w/ elevated dose rates. Reoccurring WO activity to periodically hydrolase/flush system piping.
1.27	Assess the use of ultrasonic or vibration equipment	Under review. IR 01319526 generated	Use of Ultrasonic vibration added to Dose Excellence Plan. #838706-98	EC 353112 awaiting approval		DEP 50 / AT 1312943-29, Review in 2012	System flushing with great success. Not implementing.	This being reviewed for use this year. 817147-90-24	I1374721-02 Equipment to be purchased on Maintenance tool budget 2013	System flushing with great success.	1160108-34 Evaluated per process on case-by-case basis	Ultrasonic or vibration equipment is used to remove hot spots from process piping
1.28	Full system decon	Would destablize zinc layer. Not cost effective (dose savings vs. Critical Path time)	Benchmark scheduled in 2012 to validate cost prohibitive. #838706-24	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	1160108-35 Under evaluation	Full system decontamination is planned, funded, and scheduled for implementation
1.29	Recirc Piping Decon	Not Applicable	Not Applicable		Actions in 5 year plan to evaluate 1296689-87	DEP 14.0, 15.0 / 1159271-05 and SDRI project) EPRI benchmark performed; eliminate source & review after OLNC applications	No indication needed based on BRAC points		IR 911324-11 This is being evaluated to be scheduled after source term removed	No indication needed based on BRAC points	Not Applicable	Recirc piping decontamination is planned, funded, and scheduled for implementation
1.30	Flood-up through demin or with condensate water											Utilize low activity water to flood-up reactor cavity
1.31	Optimize best practices for nozzle flushing during outage	Not Applicable	Not Applicable					Not Applicable			Not Applicable	Nozzle flushes are integrated into outage schedule

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Focus Area		BRW	BYR	CPS	DRE	LAS	LIM	OYS	PEA	QDC	TMI	Green Status
1.32	localized chemical decon (RWCU, Main Steam, RHR)	Not cost effective (dose savings vs. unavailability time).	Benchmark scheduled in 2012 to validate cost prohibitive. #838706-24	Not cost effective (dose savings vs. unavailability time).	use good way machine to clean ht ex tubes, use VORTEX to clean CRD guide tubes	(DEP 14.0 / 15.0, 1159271-05, 1312943-36/37and SDRI project) RHR/RWCU is under review in conjunction w/ RR	Hydrogen peroxide use not allowed at LGS (Ref 616911- 36)		IR 9111324-38 Scheduled for P3R20 after source term removed	Not cost effective (dose savings vs. unavailability time).	No opportunities	Localized system that would benefit from chemical decontamination is identified, funded, and scheduled for implementation
1.33	Fuel Cleaning			Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable		
1.34	Elevated Zinc Injection			Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable		
1.35	Alternate Shutdown			Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable		
Section 2: Shielding												
2.1	Permanent Drywell Shielding – Recirc Risers	Not Applicable	Not Applicable								Not Applicable	Install permanent shielding on Recirc risers
2.2	Permanent Drywell Shielding – Recirc ring header	Not Applicable	Not Applicable		Unit 2 has shielded MRI based on effort for maintenance U-3 will not be done			Not Applicable		Eng Determined Extensive Cost to Install with minimal dose savings.	Not Applicable	Install permanent shielding on Recirc ring header

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2.3	Permanent Drywell Shielding – Recirc nozzles	Not Applicable	Not Applicable	seismic restraints limit permanent shielding	Can not be shielded due to shield doors			Not implemented or currently budgeted at OC. 2019 S/D			Not Applicable	Install permanent shielding on Recirc nozzles
2.4	Temporary Shielding Analysis - Nozzles	Not Applicable	Not Applicable								Not Applicable	Sites have an Engineering analysis allowing use of temporary shielding around nozzles for use during ISI, and implemented
2.5	Permanent Drywell Shielding – RWCU	Not Applicable	Not Applicable	Standard TSP for Outage, Perm Shielding Cost Prohibitive	Standard TSP for outage		Standard TSP for outage	Not implemented or currently budgeted at OC. 2019 S/D		WD Complete. Eng. No Perm. Shielding due to no structural support for piping avail. No Room for Shadow Shield. Using TSP Pkgs.	Not Applicable	Install permanent shielding on RWCU piping
2.6	Permanent Containment Shielding	Permanent Shielding Scaffold install for loops IMB. Evaluating for additional. 871261-2	Permanent Shielding Scaffold install for loops IMB. Evaluating for additional. #1237122-48	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	1160108-36 need funding for 2013 installation	Install permanent shielding in containment
2.7	Permanent Shielding – Aux Bldg			Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable		Install permanent shielding on high dose contributing equipment in Aux building
2.8	Smitty Shielding Device						Borrow from PB Limited use					Use Smitty Shields as a dose reduction tool
2.9	S/G baker shields for undress	Piloting new method for undress in a low dose area		Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable		Use S/G baker shields as a dose reduction tool

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2.10	Shielding - Cavity Handrails	Not Applicable	Not Applicable	Limited to 200lbs per rail section	Not needed based on dose rate	DEP 25.0 / 132943-14- Take to NSAC, part of SDRI project		Weight issue/ not needed based on DR. Not implemented or currently budgeted at OC. 2019 S/D	1293437-02 Take proposed radiation shielding for both units refuel cavity through the PRC/PHC process.	No dose rate issue but reviewed each outage	Not Applicable	Refuel floor cavity handrails are shielding during outages and high work activity periods on the refuel floor
2.11	Permanent Refuel Floor Shielding - Handrails	Not Applicable	Not Applicable	Limited to 200lbs per rail section	Not needed based on dose rate	DEP 25.0 / 132943-14- Take to NSAC, part of SDRI project		Weight issue/ not needed based on DR. Not implemented or currently budgeted at OC. 2019 S/D	IR 1164156-79 U2 SFP Handrail Shielding in 2012 U-3 is complete	No dose rate issue but reviewed each outage	Not Applicable	Install permanent shielding on handrails on the refuel floor
2.12	Shielding - Bridge Handrails/ Floor			Bridge motor HP limitations prevent adequate shielding to be installed	Not needed based on dose rate		No dose rate issue but reviewed each outage	Weight issue/ not needed based on DR. Not implemented or currently budgeted at OC. 2019 S/D	1293437-02 Take proposed radiation shielding for both units refuel l bridge through the PRC/PHC process.	No dose rate issue but reviewed each outage	Not needed based on dose rate - Contingency package ready if needed	Bridge handrails/floor are shielded during outages and high work activity periods on the refuel floor
2.14	Shielding - Reactor Head			Standard TSP used during the outage not Permanent	Standard package shielded preoutage but not permanent	Standard package shielded preoutage but not permanent		Temp Shielding installed. Not implemented or currently budgeted at OC. 2019 S/D	Custom shield stand with O-Ring shelf for Rx. Head. To be created for PB 911324-85	Standard package shielded preoutage but not permanent		Permanent engineered reactor head shield stand is installed during outages
2.15	Shielding - Cavity work platform	Not Applicable	Not Applicable	Not implemented due to platform design not supporting initiative				Weight issue/ not needed based on DR. Not implemented or currently budgeted at OC. 2019 S/D	Lead shielding for cavity Plat form through the PRC/PHC process. 1293437-02		Not Applicable	Cavity work platform is shielded during outages
2.16	Refuel Floor Bridge Mast	Not Applicable	Not Applicable						Lead shielding for refuel bridge mast through the PRC/PHC process. 1293437-02	Evaulate shielding of refuel mast - 1123226-25	Not Applicable	Refuel Mast is shielded to minimize dose to fuel handling personnel

Appendix

Focus Area		BRW	BYR	CPS	DRE	LAS	LIM	OYS	PEA	QDC	TMI	Green Status
Section 3: Technology												
Remote Monitoring Technology												
3.1	Remote monitoring system	Full implementation of CRE-3 will make this green ATI # 1332398-02 to track status of CRE-3.	Wireless infrastructure installed. Not all LHRA monitored. #1237122-29		Still need fuel pool cooling actions in DEP AR # 1296689-47	DEP 20.0-20.2 / 1151557-35/36, Fiber optic backbone done,full implementation of CRE-3 will make green	Remote Monitoring upgrade being tracked by ATI# 1103487 via Excellence plan			Scheduled for 2014 installation 1123226-19	1160108-38	Implement and integrate RMS including fully integrated fiber backbone, and monitoring of all LHRAs.
3.2	Remote monitoring – system supports on line dose reduction (ESPN/Remote Monitoring Room)	Currently use crash carts, CRE-3 will support wide scale use				DEP 20.0-20.2 / 1151557-35/36, Fiber optic backbone done,full implementation of CRE-3 will make green	Implement 2011-2014 (Ref 616911- 51)			Use remote laptops for specific areas - Fiber backbone scheduled for 2014 1123226-19	1160108-38 System implemented, but permanent installation not until 2015	RMS is used during online entries for Ops rounds, Maintenance activities, Engineering walkdowns, RP coverage, etc
3.3	Remote Monitoring - outage (ESPN/Remote Monitoring Room)						Remote Monitoring upgrade being tracked by ATI# 1103487 via Excellence plan				1160108-38 System implemented, but permanent installation not until 2015	RMS is fully implemented during outages
3.4	Wireless remote monitoring capabilities	Mapping to be performed later this year - need IT project # AC01461AA to track.	Wireless infrastructure installed. Equipment compatability issues with cyber-security. #1237122-29	Implement 2012. In progress		DEP 20.0-20.2 / 1151557-35/36, Fiber optic backbone done,full implementation of CRE-3 will make green	Remote Monitoring upgrade being tracked by ATI# 1103487 via Excellence plan			Funding Removed from 2012 1123226-20	1160108-38 System implemented, but permanent installation not until 2016	Implement wireless technology per the wireless template
3.5	Wireless UT	Engineering evaluated and determined no benefit.	Engineering evaluated and determined no benefit.	Implement 2012. In progress	Wireless NDE UT is not feasable at this time. There are no industry wireless UT applicable to piping, or component NDE inspections. 1057011-51	Wireless NDE UT is not feasable at this time. Details: 1057011-51	actions in place in excellence plan (616911-47)	Wireless NDE UT is not feasable at this time. There are no industry wireless UT applicable to piping, or component NDE inspections. Corporate NDE SME agrees Details:	Currently no economical methods to perform Wire-less UT inspection during outage ISI exams. See IR 1164156-63	Funding Removed from 2012 1123226-20	Technology not available from Olympus NDT or GE	Identify locations for use of wireless UT and implement at those locations

Appendix

Focus Area		BRW	BYR	CPS	DRE	LAS	LIM	OYS	PEA	QDC	TMI	Green Status
Laser Scanning												
3.6	Laser Scan Drywell / Containment	Funding	Funding #1237122-34&35		Actions in dose excellence plan AR # 1296689-46 & AR # 1296689-28	DEP 21.1 & 21.2 / 1312943-10 and 11)Portions of 740' & 777' complete-Funding	Pursuing alternate method per Benchmark (ATI 1138419-13)			SAC voted unanimously - not performing laser mapping due to the cost out weighed benefit.	Partially complete - remaining scope not funded 1160108-53	Complete 3D laser scanning of locations
3.7	Laser Scan LHRA in Reactor Bldg	Not Applicable	Not Applicable	This is Contianment for CPS and would not provide dose benefit for the cost	Actions in dose excellence plan AR # 1296689-46 & AR # 1296689-28	DEP 21.1 & 21.2 / 1312943-10 and 11)Portions of 740' & 777' complete-Funding	Pursuing alternate method per Benchmark (ATI 1138419-13)	Not implemented or currently budgeted at OC. 2019 S/D		SAC voted unanimously - not performing laser mapping due to the cost out weighed benefit.	Not Applicable	Complete 3D laser scanning of locations
3.8	Laser Scan LHRA Areas in Aux Bldg	Funding	Funding #1237122-33		Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not funded for 2016 implementation 1160108-53	Complete 3D laser scanning of locations
3.9	Laser Scan LHRA Areas in Turbine Bldg	Not Applicable	Not Applicable	Funding was not approved at PRC based on cost vs. dose benefit	Actions in dose excellence plan AR # 1296689-46 & AR # 1296689-28	DEP 21.1 & 21.2 / 1312943-10 and 11)Portions of 740' & 777' complete-Funding	Pursuing alternate method per Benchmark (ATI 1138419-13)			SAC voted unanimously - not performing laser mapping due to the cost out weighed benefit.	Not Applicable	Complete 3D laser scanning of locations
Technology - Misc.												
3.10	Lockable turnstiles for HRAs					We use the upgraded gate style	Use lockable swing gates	Use lockable swig gates	Use lockable swing gates	Using lockable swing gates	Use lockable swing gates	Lockable turnstiles are in place for all HRAs that are unable to be locked by a door or gate
3.11	Recurring Scaffold photo data base											Photo data base is created and used

Appendix

Focus Area		BRW	BYR	CPS	DRE	LAS	LIM	OYS	PEA	QDC	TMI	Green Status
3.12	Recurring Shielding photo data base				Have some pictures of shielding applications if needed leave shilding installed							Photo data base is created and used
3.13	Safe Shut down battery packs and lights	EMD to bring to PRC next month 1094748-11	Phase-in in progress. Item in Dose Excellence Plan. #907184-53-02		Cost prohibitive for the amunt of exposure received				Cost prohibitive for the amunt of exposure received	Installation is based on a phase-in process.	Not implemented due to cost vs. dose evaluation see 907184-53/09	Existing battery packs and lights are replaced with long life/low maintenance battery packs and lights
3.14	Robotic program for high rad area inspections					DEP 22.0 / AT 1312943-13 Obtain and train on Clinton's/equiv.	LGS recently entered into an agreement with Villanova to build a robot (Ref 1279977-01)	No funding for shared robot. Not implemented or currently budgeted at OC. 2019 S/D	IR 1164156-75 Utilize remote camera system when installed vice robot			Robots are used for HRA inspections where applicable
3.15	Long life light bulb technology in HRA and LHRA locations			Benchmark for EMD planned for 2012. ATI 1382376-02 due 10/3/12								Use long life light bulbs in HRAs/LHRAs
Section 4: Process												
4.1	Regulatory Relief for SRVs and Section 11 ISI exams					DEP 71.0 / 1312943-60 generated for Engineering. to evaluate	Not evaluated at Limerick	Application in progress w/ Reg Assurance. AI 817147-90-19 to track	Tracked by AT 1057011-53		1160108-39 Engineering analysis pending	Regulator relief for SRVs and Section 11 ISI exams have been identified and granted
4.2	Force Drain systems for LLRT (use pump to reduce drain time for LLRT volumes)	No dose benefit	No dose benefit				Not able to force drains due to long standing drain issues	Not able to force drains due to long standing drain issues	Tracked by AT 1057011-53	Use forced vent method - Use of a pump considered ineffective and could cause preconditoning		LLRT which will benefit from forced draining have been identified and implemented

Appendix

Focus Area		BRW	BYR	CPS	DRE	LAS	LIM	OYS	PEA	QDC	TMI	Green Status
4.3	Hydra-nuts for MSRV maintenance	Not Applicable	Not Applicable			DEP 46.0-47.1 / AT 1312943-43/44/45 Phase 1 compl. on Unit 1. Installs planned in L1R15, L2R14&L2R15.	Limited success realized at other sites	Eng Evaluated, Not implemented or planned at OC. 2019 S/D	IR-1164156 Review will be performed as part of the power upgrade project.		Not Applicable	Hydra-nuts are installed on MSRVs
4.4	Hydra-nuts for SG Manways and Pressurizer Valves	PRVs complete - S/G still needed IR #1389720	S/G #838706-88 PRVs #1237122-36	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Equivalent on OTSG PVRs 1160108-71	Hydra-nuts are installed on SG Manways and Pressurizer Valves
4.5	Scaffold material is permanently stored in Drywell/Containment			DW Design limits cost effectiviness for design requirements				Not implemented or currently budgeted at OC. 2019 S/D	IR 1244548 Not approved by Engineering	Previously rejected by PRC - need further Eng review 569183-16		Quantities of scaffold materials have been identified, analyzed by Engineering and stored in Drywell/Containment
4.6	Scaffolds are permanently installed in Drywell/Containment			DW Design limits cost effectiviness for design requirements	actions in place in excellence plan 1296689-88		actions in place in excellence plan (616911-52)		IR 1244553 Not approved by Engineering	Previously rejected by PRC - need further Eng review 1123226-21	1160108-40 Not funded for 2013 (scheduled for PRC in 2013)	Permanent scaffolds are identified, analyzed by Engineering and remain in place
4.7	Lead shielding is permanently stored in Drywell/Containment								1164156-59 Not approved by Engineering	Previously rejected by PRC - need further Eng review 569183-16		Quantities of lead shielding are identified, analyzed by Engineering and stored in Drywell/Containment
4.8	On-line Noble Chemistry	Not Applicable	Not Applicable	Budget challenges may delay implementation			Unit 2 complete Unit 1 2013			U2 2012 ED - 385475-Aug 2012 and U1 2013 EC – 385538 - Aug 2013	Not Applicable	Institutionalize on-line noble chemistry application
4.9	Provide dedicated Engineering support to RP for shielding, flushes, etc.	Effectively using the ECR process	Effectively using the ECR process	Currently using the ECR process	Have civil engineer on staff not currently qualified in engineering		Pilot program dedicated engineer for first 5 days of 1R14; will continue for 2R12	Have 4 structrual Engineers on staff and being supported as needed. 817147-90-20	Effectively using the ECR process	Effectively using the ECR process	Effectively using the ECR process	A dedicated Engineer is in place to support RP

Appendix

Focus Area		BRW	BYR	CPS	DRE	LAS	LIM	OYS	PEA	QDC	TMI	Green Status
4.10	HIC trash container inside FHB/Refuel Floor											HIC is staged in area and ready for use during outages
4.11	Use electronic display for basic plant overview. Color code areas based on dose rates						actions in place in excellence plan (1164682-01)	Currently using color coded paper copies of surveys	Being track by IR 911324-25		Current survey maps used for briefings	Electronic display is used to provide plant survey information
4.12	Electronic Surveys	Implement electronic survey documentation system. ATI 01319533-01	Implement electronic survey program. #1237122-54	No actions driving progress. Currently using RP Office	Actions in dose excellence plan 1296689-89	DEP 75.0 / 1312943-64 generated for RP to implement	Action in DEP Ref (IR 01164682)	Action Item 817147 90 21 to track	Implement electronic survey documentation system. IR 911324-19	Action Item 1123226-22	1160108-11	Surveys are created electronically through use of VSDS or other program
4.13	Surrogate tour	Large photo library available, but not catalogued. No Surrogate tour. 01319533-12	Large photo library available, but not catalogued. No Surrogate tour. #1237122-32	Photo Library	Actions in dose excellence plan 1296689-90	DEP 64.0-64.2 / 1312943-51, 52, 53 generated for RP to phase in surrogate tour			Use Laser Imaging no need for Surrogate Tour	Action Item 1123226-23	Operational Surrogate tour & Laser scans completed for D-Rings 1160108-53	Operational Surrogate tour (not a photo library)
4.14	"Bulldog" outage dose challenge											Bulldog challenges are used to reduce dose
4.15	ALARA Suggestion Program											A method has been established for workforce to submit ALARA suggestions, and a method is in place to review and implement the suggestions
4.16	Establish shutdown strategies for minimizing crud bursts								PB Operation procedures have the plant scram at less 5% power			Implement INPO crud burst strategy

Appendix

Focus Area		BRW	BYR	CPS	DRE	LAS	LIM	OYS	PEA	QDC	TMI	Green Status
4.17	Optimize RWCU filtration and maintain system in-service	Not Applicable	Not Applicable								Not Applicable	Implement INPO crud burst strategy
4.18	Establish reactor coolant activity thresholds prior to flood-up											Follow requirements in Chemistry procedure for reactor coolant activity thresholds
4.19	Operations to establish and communicate a water management plan											RP is involved in the development of water management plans during outages
4.20	Relocate peripheral bundles for nozzle work	Not Applicable	Not Applicable	ATI 1060686-94 Tracking		DEP 66.0 / 1312943-55 added to DEP to track		IR 817147-90-13 in system for Rx Engineering to Review	IR 1164156-36 Scheduled for P2R19		Not Applicable	Fuel bundles that contribute to worker exposure are moved from the periphery of the core
4.21	ALARA Planning COL summarizing project dose reduction responsibilities											ALARA planning COL is created and used
4.22	Manifold with solenoid activated valve to adjust MSL water level without entering DW.	Not Applicable	Not Applicable					IR 817147-90-12 in system for Operations to Review		No access o/s DW	Not Applicable	MSL water levels are able to be controlled remotely
4.23	"X-Y" Table (CAD Program) Keep workers from standing in front of opening during mechanical tube cleaning.	Not Applicable	Not Applicable	Not Applicable	not in use due to quality concerns	Not Applicable	Not Applicable	IR 817147-90-11 in system for NDE to Review	IR 817147-90-11 in system for NDE to Review	No Plan to eddy current FP or RWCU Heat Exchangers	Not Applicable	X-Y table is developed and utilized during heat exchanger tube cleaning

Appendix

Focus Area		BRW	BYR	CPS	DRE	LAS	LIM	OYS	PEA	QDC	TMI	Green Status
4.24	Limit moisture carry-over prior to refuel outages	Not Applicable	Not Applicable					OC carryover is steady during cycle. Cannot change per enegineering eval.	IR 1295600 Action to control MCO for P2R19 Dryer replacement 2014 &2015		Not Applicable	Maintain moisture carry-over to <0.1%
4.25	Green flashing lights at low dose areas	Use in some Low Dose Waiting Areas not all IR # 1389724						Only utilized in Outage AI 817147-90-22 to track installation.	Use in some Low Dose waiting Areas Not all IR1164156-96			Green flashing lights are installed and used at all low dose areas
4.26	Establish a cool down rate of less than 60 degrees/hour during reactor shutdown	Not Applicable	Not Applicable							Outage Template 3 to4 hrs to cold S.D - currently 85 to 90 degrees/hour	Not Applicable	Implement cool down rates at less than 60 degrees/hour
4.27	Uncouple CRDs from above	Not Applicable	Not Applicable	only done when problem occurs undervessel	Based on outage scope and critical path	Based on outage scope and critical path		817147-90-26 for 1R24 outage		Based on outage scope and critical path	Not Applicable	Uncouple CRDs from above
Section 5: Behaviors												
5.1	Dose Zealot or advocate program											Program is proceduralized and used
5.2	Outage ALARA incentive program											Outage ALARA incentive program is developed and implemented
5.3	Outage Dose Brainstorming											Outage dose brainstorming sessions are utilized

Appendix

Focus Area		BRW	BYR	CPS	DRE	LAS	LIM	OYS	PEA	QDC	TMI	Green Status
5.4	Use Task Specific HIT for outage and non outage work (HIT use based on exposure or task complexity)											Specific HIT are utilized
5.5	ALARA Training for Craft and Engineering		Identify, evaluate & conduct ALARA training for craft and engineering. #1237122-46					FLS RP training conducted 2011, 817147-90-25	IR 1164156-19 Looking at FLS training		1160108-42 present to CRCs for evluation	ALARA training is developed and scheduled for craft and engineering personnel
5.6	Q-Track Dosimeter Simulator	Use with MSIP project. Tracking ATI # 01319533-02	Purchase and Implement Q-Track for Mock-Ups. #1237122-55	Did not make capital budget cut for 2012					1164156-97 generated to implement simulator training	Purchased - in process of being setup for use by Training. 1123226-24	Under evaluation 1160108-54	initial training and other workgroups use the equipment for radworker training to improve dose mitigation to workers.
5.7	Daily and Weekly Dose Estimates - Provided for all departments that contribute greater than 5% of the annual CRE											Daily and week dose estimates are developed and communicated to the station.
5.8	On-line Hot-Spot Reduction HIT Team	No value added	Planned for 2012 with On Line Dose Reduction Team established. #838706-93		No active hot spots					No active hot spots	ALARA Specialist leads / Team based on Eng. system owner	HIT team is assembled and actively working to remove hot-spots

Appendix

Focus Area		BRW	BYR	CPS	DRE	LAS	LIM	OYS	PEA	QDC	TMI	Green Status
5.9	On-line Departmental Dose Reduction Plans											Identified departments dose reduction plans are in place
5.10	Micro-ALARA plans											Created for all jobs greater than 100 mrem
5.11	Require department planners to enter accurate wrench-times	Use PassPort Hours and take a percentage for RCA hours - PassPort does not support wrench times	Action assigned to ensure accurate wrench time. #1237122-56		Use PassPort Hours and take a percentage for RCA hours - PassPort does not support wrench times		Use PIMS Hours and take a percentage for RCA hours - PIMS does not support wrench times	Action Item 817147-90-20 assigned to ensure accurate wrench time.		Use PassPort Hours and take a percentage for RCA hours - PassPort does not support wrench times		Process is established and implemented to identify more accurate time at the work location
5.12	Engage employees											Dose reduction questionnaires are developed and employee feedback is understood and utilized for dose reduction opportunities
5.13	Point of work/Spot Shielding implementation			01323748-02 due 9/12/12	Corporate procedure in development		actions in place in excellence plan (1252930)		IR 1164156-76 Procedure change RP-PB-552 is being reviewed by site Engineering	Corporate procedure in development		Engineering procedure for point of work/spot shielding is developed and implemented