RWP 35 ALARA Plan 108

RVI (Baffle Bolts, Thermal Shield Bolts and Flexure Inspections / Repairs)

Tasks: 116,117,118, 119,120,121,122,123

1.0 RWP Job Description

*This ALARA Plan is for all 1R27 Baffle bolts, Thermal Shield Bolts, Flexures and associated work for the Inspection/Repair and includes the following tasks. Additional scope information for each task is provided in section **4.0**.*

- 116 -- Baffle Bolt Set-up/Support/Demob Activities
- 117 – Baffle Bolt inspection
- 118 – Baffle Bolt Repair
- 119 – Baffle Bolt RP Support
- 120 -- Thermal Shield bolting Inspections
- 121 -- Thermal Shield Bolting Repairs
- 122 -- Flexure Inspections
- 123 -- Flexure Repairs

2.0 RWP Dose Estimate and Goal

The following is the dose estimate for 1R27 Baffle bolts, thermal shield bolts, flexures and associated work for the Inspection/Repair Activities based on historical data, dose rates for this work, and input from individuals involved in the planning of this work.

- Dose Estimate = ***39.700 person-Rem.***

The Station ALARA Committee has approved the following challenge goal for this work:

- Challenge Goal = ***35.254 person-Rem***

Table 1 – Dose Estimate Breakdown by Task

Task #	Task Description	Dose Estimate (person-rem)	Goal (person-rem)
116	Baffle Bolt Set-up/Support/ Demob	12.997	11.542
117	Baffle Bolt Inspection	1.730	1.536
118	Baffle Bolt Repairs	10.680	9.484
119	Baffle Bolt RP Support	6.250	5.550
120	Thermal Shield Bolting Inspections	0.658	0.584
121	Thermal Shield Bolting Repairs	1.042	0.925
122	Flexure Inspections	0.593	0.527
123	Flexure Repairs	5.750	5.106
	Total	39.700	35.254

3.0 Briefing Requirements

- **RP/ALARA PERFORM** an initial briefing for all personnel using this RWP and AP.
  - **COVER** RWP requirements during initial ALARA Plan Briefing
  - **BRIEF** personnel on the **Common Task Requirements** of the ALARA plan and the information specific to the task they will be performing (i.e.; personnel do NOT require briefing on the specifics of tasks that do not involve them).
  - **COVER** the following at the discretion of the RP/ALARA individual performing the briefing (i.e.; if it is applicable and will help the worker, brief the information.)
    - **Job Specific RP Coverage Requirements**
    - **Site Historical Information Regarding Work**

- **RP PERFORM** summary "refresher" briefings prior to any significant evolution at the discretion of the coverage RPT or RPS. Place particular emphasis on exposure control requirements and stop work criteria during these refresher briefings.
- A High Radiation briefing is to be performed in accordance with RP-AA-460 for access into all High Radiation and Locked High Radiation Areas.
- An ALARA briefing is required for all tasks under this RWP.

- An ALARA Access Control List is **REQUIRED** for all tasks under this RWP.
- **BRIEF** workers to anticipated dose rate alarms IAW RP-AA-401-1002.
    - This ALARA Plan authorizes use of "an anticipated dose rate alarm for the work", in accordance with RP-AA-401-1002.
    - The workers must be briefed on current radiological conditions prior to each entry."
    - When briefed to an anticipated dose rate alarm; if dose rate alarm continues after passing through a higher dose rate field, when repositioning body during work activities does not stop the alarm place work in safe configuration, notify co-workers, exit the area and contact RP.

4.0 Task Scope Summary

- 116 – Baffle Bolt Set-up/Support/Demob Activities
    - This task applies to personnel involved in Setup, Support and Demob activities.
- 117 – Baffle Bolt inspections
    - This task applies to personnel involved in Inspection of Baffle Bolts.
- 118 – Baffle Bolt Repairs
    - This task applies to personnel involved in Baffle Bolt repairs.
- 119 – Baffle Bolt RP Support
    - This task applies to RP Support Activities.
- 120 – Thermal Shield Bolt Inspections
    - This task applies to personnel involved in Thermal Shield Bolt Inspections.
- 121 – Thermal Shield Bolt Repairs
    - This task applies to personnel involved in Thermal Shield Bolt Repairs.
- 122 – Flexure Inspections
    - This task applies to personnel involved in Flexure Inspections.
- 123 – Flexure Repairs
    - This task applies to personnel involved in Flexure Repairs.

5.0 Electronic Alarming Dosimeter Set Points

Summary Table

Task #	Task Description	Default ED Set points (mR/hr)	
		Dose Alarm	Rate Alarm
		mR	mR/hr
116	Baffle Bolt Set-up/Support/Demob	40	500
117	Baffle Bolt Inspection	40	500
118	Baffle Bolt Repairs	40	500
119	Baffle Bolt RP Support	40	500
120	Thermal Shield Bolt Inspections	40	500
121	Thermal Shield Bolt Repairs	40	500
122	Flexure Inspections	40	500
123	Flexure Repairs	40	500

If field radiological conditions warrant, ADJUST EAD alarm settings IAW with RP-AA-401-1002

6.0 Anticipated Radiological Conditions

See RP for briefing on specific job site radiological conditions PRIOR to start of work.

Notes:

1. *Skin and extremity dose expected to be same as whole body.*
2. *No neutron dose expected.*

Location	General Area Radiation mR/hr (β,γ)	Max Dose Rate Expected mR/hr (β,γ)	Contamination β,γ a dpm/100cm2	Airborne Radioactivity
CTMT 130'	<1- 25	25	1K-10K <20	<0.3 DAC
Manheim Tooling Bridge	2-500	500	1K-50K <20	<0.3 DAC
Manheim & Flexure Bridge During Tool Removal	100-500	500	50K->500K <50	<0.3 DAC
Flexure Bridge	2-500	500	1K->50K <20	<0.3 DAC

7.0 Significant Risk Activities

Tooling Removal from Cavity for Repairs/Calibration

8.0 Common Task Requirements - Apply to All RWP Tasks

8.1 Exposure Control measures:

- Pre-job briefings are expected to identify work activity, component and expected radiological conditions. With the use of human performance tools and sound radiological practices, job will be maintained ALARA
- Ensure proper tools and equipment are on hand prior to entry.
- Know your expected work area dose rates and check your accumulated dose every 15 minutes in High Radiation / Locked High Radiation Areas and every 30 minutes in a Radiation Area.
- All work parties assigned to use of this ALARA Plan (AP) to consist of experienced nuclear workers to assist and direct lesser experienced nuclear craft personnel.
- NO shielding to be removed or adjusted without prior approval from RP.
- During the occurrence of any type of alarms (containment evacuation, radiation monitors, etc.) listen for page instructions, place work in a safe configuration, leave area and then contact RP.
- All personnel will have a dose goal established for each entry based on activities to be performed.
- Vice Grips are **NOT** to be stored in any storage container in the cavity but are to be hung either on the side of the bridge or the side of the cavity. No Exceptions without specific approval by RPM.
- **DO NOT** HANDLE ANY Foreign Material without Radiation Protection Authorization.
- Life jackets are required on bridge and around cavity when filled with water. Life jackets are surveyed on a regular basis ensure life jacket being used has been surveyed by RP prior to donning.
- Minimize workers on bridge to extent possible.
- Limit time around Rx Cavity handrails, Rx Head Stand when Rx Head is on the stand, Manipulator Bridge, Manheim Bridge, Aux Bridge (Flexures), decon tent and any area where equipment is stored with higher dose rates.
- Ensure tooling that has been removed from the cavity is transported to the repair tent ASAP to minimize GA dose-rates on the bridge.
- RP Techs assigned to RVI Activities are required to read the associated Baffle Bolt RPJGs.
- Prior to accessing a scaffold, ensure a "RP Scaffold Tag" is in place. If there is no tag, contact RP for scaffold survey information prior to using scaffold.
- Control hot trash to ensure used rags and trash do not become a source for the workers. Remove rags that are $\geq$ 80 mR/hr at 30cm.
- Coordinate with SRW and notify affected Control Rm prior to removal of Hot Trash from CTMT. See your lead tech for "Hot Trash Run"

8.2 Contamination Control measures:

- WEAR protective clothing in accordance with RWP requirements and as directed by RP. The job coverage RPT or RPS makes all final decisions on worker dress-out requirements.
- RP should be notified prior to any kneeling, sitting or lying within a Contaminated Area. RP will evaluate the use of a second set of PC's or the use of tarps/knee pads as a barrier between personnel and surface.
    - Single PC's for contamination areas
    - Double PC's for high contamination areas
    - Single PC's and outer layer of plastics or "Rain Cats" when working in or around water. Water resistant aprons and sleeves may replace full outer plastics, etc. WHEN authorized by RPS.
    - Face shield WHEN face is subject to potential contamination
- Engineering controls of decontamination, wrapping or wetting shall be utilized for components exhibiting higher levels of contamination than general contamination levels of work area.
- Rags/wipes can become a source of radiation. Dispose of them promptly.
- Perform decon of gloves or change out gloves frequently when handling highly contaminated equipment.
- Practice good housekeeping to control the spread of contamination.

8.3 Airborne Radioactivity Control:

- WHEN practicable and as directed by RP, PERFORM the following to mitigate potential generation of airborne radioactivity prior to working on highly contaminated items:
  - WIPE DOWN/DECON items
  - WET or SPRAY surfaces of items with demin water or other Chemistry approved wetting agent
- AVOID working on or moving highly contaminated items in front of plant ventilation duct openings or behind the exhaust of portable HEPA ventilation units when units are operating.
- The AMS's on 130' should be checked and count-rate baselines established prior to the start of activities. An increase of ≥1000 cpm in 15 minutes is approximately equal to 0.1 DAC. If this occurs, contact RP Supervision, reset alarm set-point 1000ccpm higher, note time, obtain confirmatory air-samples and continue monitoring IAW RP-AA-301.
- INFORM RP PRIOR to using any solvents.
- USE portable HEPA ventilation units as directed by RP for any machining, welding, grinding, flapping or any other mechanical work that could physically agitate an item with loose surface contamination.

NOTE
The HEPA ventilation requirement may be waived based on job specific considerations with concurrence of RPS. RP WILL DOCUMENT decision and basis on RP Survey Map.

8.4 Stop Work Criteria/Conditions:

- **STOP Work** if any foreign material is discovered.
- **STOP Work** for any unanticipated ED alarms.
- **STOP Work** for any significant degradation of radiological controls (i.e. HEPA failure)
- **STOP Work** if Dose Rates are ≥ **500mR/hr general area**
- **STOP Work** for unanticipated airborne radioactivity ≥ **0.3 DAC**
- **STOP Work** for widespread loose surface contamination levels ≥**100,000 dpm/100 cm2 β,Y**
- **STOP Work** Criteria/Conditions for HCA/DRP areas
- **STOP Work** for widespread loose surface contamination levels ≥**500,000 dpm/100 cm2 β,Y**

8.5 Plans for Transport of High Dose Rate Components:

- A detailed plan will be developed if there is a need to transport High dose rate components.

- **PLACE** high dose rate components in a temporary HRA storage area established and designated by RP.

8.6 RP Hold Points:

Use wand to underwater rinse FS3 and FS5 prior to survey

Use pressure washer on all other tools/components prior to survey

Anything removed with Vice Grips must go to the Tool Pool to allow for a survey with the Vice Grips open

<2R/hr Contact – Tool/Component can be removed to 1 foot above water, and surveyed with a small diameter probe. If the Tool/Component creates General Area Dose Rates ≥ 500 mR/hr place the item back under water for further decon. If the Tool/Component is <2 R/hr contact and < 500 mR/hr@ 30 cm it can be placed in water bucket on bridge and transported to decon tent.

NOTE:

Anything >2R/hr Contact needs RPS approval to remove from water

- >2R/hr Contact - 50R/hr Contact – Tool/Component must be removed under water, placed in underwater pail and transported to Tool Pool for further pressure washing.
- >50R/hr Contact – Leave Tool/Component submerged and contact RPS for further guidance.
- Ensure measures and controls are in place to restrict inadvertent removal of items from flooded Rx Cavity. Items could create LHRA / VHRA when removed from water must be made inaccessible by placing item on RX Cavity floor with any attached tether lying on the floor. If said item must be tied off an access control guard, locking mechanism/control to prevent unauthorized removal or continuous job coverage by a Sr RP Technician is required.
- Rx Cavity water level to be maintained at maximum during this evolution.
- Manheim tool requires a detailed survey of each section prior to assembly. Surveys to include Beta (β),Gamma (Y) and Alpha(α) along a Hot Particle checks.
- Prior to stowing or attempting to move across the core barrel wall a tool (e.g. vice grips, etc.) used to handle irradiated components (e.g. baffle bolt heads, shanks, tabs, etc.), **SURVEY** the tool at a minimum of 3 feet below the surface of the water.
- Prior to transferring tools and equipment across the core barrel wall in the direction of the tool pool, **ENSURE** only those personnel directly involved with the transfer are in close proximity to the cavity edge. Example: Decon Support personnel, performing decontamination activities, should be directed to step back from the cavity edge until the transfer to the tool pool is complete.

8.7 Contingency Plans:

- Task specific contingency plans will be implemented as needed.

8.8 Site Historical Information Regarding Work:

S1R26 Outage performance **Dose**

Containment Activities	Est (Rem)	Actual Dose(Rem)
116 – Setup & Support	4.785	9.141
117 – Inspection	2.721	1.279
118 – Repair	17.001	12.830
119 – RP Support	7.530	6.234
120 – Core Barrel Moves	0.527	0.164
121 – Thermal Bolt Repairs	5.040	3.122
TOTAL	**37.604**	**32.770**

No History at this station for Flexure Inspections and Repairs

9.0 Tasks 116,117,118, 119 – Baffle Bolt Set-up, Support, Inspection, Repair, Demob and RP Support Activities.

Tasks 120,121,122,123 -Thermal Shield Bolts, Flexure Inspection and Repair

Task Specific Requirements

These tasks apply to personnel performing work or support for work involving Baffle Bolts, Thermal Shield Bolts, and Flexures Inspection and Repair.

9.1 Area Access Allowed under These Tasks

- CA, HCA, DRP, ARA, RA, HRA, LHRA
- No access to PZR, Regen Rm.

9.2 **REFER TO** RWP and Common Task Requirements for:

- Exposure Control

  - Tasks **116**, **117,120,122** -- Inspection
    - A Sr RP Techs presence and explicit approval is required for removal of any equipment or Foreign Material from the Rx Cavity

  - **Task 118,121,123** – Repair
    - All underwater tools shall be surveyed 3 feet underwater before removal.
    - Tools should also be rinsed with DM water prior to placement or removal from Reactor Cavity as needed.
    - Bucket of water to be used to transfer tooling components to ultrasonic sink or CO^2 blaster for contamination control and to reduce dose-rates.
    - Old irradiated bolts and lock ties are retained in "trash basket" and sent via fuel transfer system to SFP.
      - Ensure any items secured or suspended in Reactor Cavity or SFP that could create a HRA, LHRA or VHRA cannot be inadvertently raised above, or brought near the surface of the water. These items must be made inaccessible by either placing the tether (CABLE, WIRE, ROPE) under water. If that is not feasible the item must be posted and locked (or guarded) to ensure inadvertent removal is not possible.
    - SR RPT presence required for disassembly / repair of any tooling used in Reactor cavity
    - Radiation monitoring device with alarm capabilities required on Fuel handling bridge during repairs. ALARM set point of **250mR/hr** will be utilized.
    - Use Tri Nuke basket strainer during vacuuming of base plate.
    - Closely monitor dose rates on filtration system used during project. Tri-Nuke Filters must be changed out prior to reaching **25R/hr** contact on housing.

  - **Task 119**
    - RP to ensure placement of a remote monitoring devices on bridge and vacuum return line.
    - An AMP-100/200 to be placed on Tri-nuke filters and In-pool demineralizer vessels. Monitor dose-rates and documented in RP Log once per shift. Tri-Nuke Filters must be changed out prior to reaching **25R/hr** contact on housing.
    - EDM process produces fine particulate matter. Survey tools and

equipment carefully used to handle irradiated components as water and the tool itself can shield small pieces of irradiated material.

- Ensure Beta (β) dose-rates are taken along with Gamma (Y) readings.
- Ensure vice-grips are surveyed in open position underwater prior to removal.
- RP to perform and document shiftly surveys of work areas. Documentation to include survey results for hot particles and Alpha contamination.
- When FS-1 tool is used it will be necessary for the workers to use air operated vice grips to retrieve the guide pin as it is backed out after the boring process is complete. The pin will be taken to the tool pool where the gripper will be released, pin surveyed deconned as necessary, then re-gripped in the tool pool prior to being put in the transfer bucket and going to the decon tent to be put in the UT tub or CO^2 blaster..
- Tool (Auger FS-3) used for the milling process shall be deconned as per levels in section 8.6 "RP Holdpoints" in this ALARA Plan. This tool is the most difficult tool to decon and at Indian Point was reading 650 mR/hr contact and 60 mR/hr at 30cm after decon. In addition to the milling head any item suspect of movable parts will be deconned to the same limits as stated above.
- Tool heads will be removed from Mannheim tool and deconned as per the levels in section 8.6 "RP Holdpoints" in this ALARA Plan. The tool will be put in a bucket of water to be transferred to the decon tent. In the tent we will soak the tool in the UT tub or CO^2 blaster and repeat the process until the dose is low enough for the tool to be worked.
- Lead blankets available for use (up to 100 lbs).
- Establish a bullpen laydown area with a HEPA available and operational if repairs are required for PCI Extraction Tool / EDM.
- Temporary shielding SP # 1213016 Manipulator Bridge, 1213016B Baffle Bolt Tooling, 1213016C Aux Bridge, and 1213016D Manheim Bridge will be added as necessary to work area to aid in reducing worker exposure.

- **ADDITIONALLY:**
  - Due to the high potential for highly irradiated components to exit the core some items (Items noted in tool list in definitions as per Baffle bolt RPJG)

involved with inspection and repair of the baffle bolts will be checked at 3 feet below water surface with an underwater survey instrument

- Industry Operating Experience (OE) and lessons learned have shown the EDM process has the potential to increase activity in Rx cavity and Spent Fuel Pool water without adequate filtration and demineralizer clean up. High Radiation Areas have been produced at the water level and sides of the pool and cavity. Increased dose rate monitoring is required.
- Contamination Control
  - Ensure bridge rails are routinely deconned each shift to control contamination. Change rags often and ensure monitoring for Hot Particles is performed to reduce worker exposure.
  - Ensure small bags are used for disposal of rags and removed to a specified storage area.
  - Do not allow trash to accumulate on bridge, tent or lay-down areas

- **ADDITIONALLY:**

  - **Task 117,120,122 – Inspections**
    - Equipment removed from cavity for maintenance or repair for an extended period of time shall be covered, bagged or decontaminated.
    - Establish a bullpen laydown area with a HEPA available as needed for repairs to underwater tooling.

  - **Task 118,121,123 – Repairs**
    - Routinely change gloves when adjusting repair tools.
    - Equipment removed from cavity for maintenance or repair for an extended period of time shall be covered, bagged or decontaminated.
    - Establish a bullpen laydown area with a HEPA available as needed for repairs to underwater tooling.

9.3 Special Dosimetry

REFER TO RP-AA-210 and **EVALUATE** need to relocate dosimetry or obtain special dosimetry.
Tele-dosimetry required for Baffle, Thermal Shield Bolts or Flexure Activities. Tele-Dosimetry can be waived by RPS for setup and demob based on radiological conditions. Waiver should be documented in the Containment 130' RP log or RP Desk Log.

9.4 Respiratory Protection Requirements

No respiratory protection is anticipated for this work.

9.5 Site Historical Information Regarding Work

S1R26 Baffle Bolt Repairs	Dose Estimate (person-rem)	Goal (person-rem)	Actual (person-rem)
116 – Setup & Support	4.785	4.421	9.141
117 - Baffle Bolt Inspections	2.721	2.514	1.279
118 - Baffle Bolt Repairs	17.001	15.709	12.830
119 - Baffle Bolt RP Support	7.530	6.961	6.234
			29.484
S1R25 - 1213001 - Baffle Bolt Inspections	0.625	0.563	0.513
S1R24 – In-Service Inspections			
1213019 Baffle Bolt UTs	1.380	1.275	1.814
(Baffle Bolts Dose Rate 3000-9000R/hr CT)			
1213020 Baffle Bolt Retrieval	0.824	0.762	0.471
1213021 Baffle Bolt Repair	11.599	10.721	10.863
1213018 Baffle Bolt FOSAR / Demob	1.064	0.983	3.190
			14.524
S1R24 - RP Support			
91 Baffle Bolt RP Support	6.000	5.546	**5.020**
S1R26 Thermal Shield Bolts (4)			
121 Thermal Bolt Repairs	5.040	4.657	**3.122**

9.6 RP Coverage Requirements

- **PERFORM** intermittent RP Coverage **UNLESS** worker(s) handling high dose rate or potentially high dose rate components **(>800 mR/hr) THEN PERFORM** continuous coverage.
- Ensure placement of a remote radiation monitors on bridge and vacuum return line.
- **A Sr RP Techs presence and explicit approval is required for removal of any equipment or Foreign Material from the Rx Cavity**

10.0 OE/Lessons Learned

10.1 Salem Internal OE – Lifting Tooling

RWP 35 ALARA Plan 108

RVI (Baffle Bolts, Thermal Shield Bolts and Flexure Inspections / Repairs)

Tasks: 116,117,118, 119,120,121,122,123

WGE Title: Dose Rate Alarm During U-1 Baffle Bolt Repairs
Order: 70207422/120
Event Date: 05/09/2019
Station: Salem
Evaluator: Shane Howe
Significance Level: N-CAP

Problem Statement:

An electronic dosimeter (ED) dose rate alarm occurred when a previously discarded baffle former bolt (BFB) was unintentionally brought close to the surface of the water during movement of a set of pneumatic grippers within the baffle bolt replacement work area.

Event Description:

At approximately 2200hrs on 05/09/2019, a vendor decon technician received a dose rate alarm at 648 mR/hr versus an alarm setpoint of 500 mR/hr while working on the S1R26 baffle bolt replacement project. The duration of the alarm was less than one second and no unitended exposure occurred as a result. The worker was briefed to a potential alarm as part of the ALARA plan (64) for this activity.

The alarm occurred while moving a set of pneumatic vise grips from inside the core barrel to the tool pool outside the core barrel used for underwater deconning of irratiated hardware. While tranitioning over the lip of the core barrel and radiation shield ring, the RP technician providing direct coverage noted a sharp increase of dose rates just above the surface of the water concurrent with a dose rate alarm being activated on the decon technician's ED. The RP technician directed the vendor moving the vice grips to immediately return the grips to deeper water, which was already in progress as the grips had reached the apex of the move over the core barrel and was decending to the tool pool on the other side.

Subsequesnt investigation revealed that the vice grips contained baffle bolt #A71, which had been extracted from the baffle plate on the previous shift and was thought to be in the trash tray of discarded baffle bolts at the bottom of the core barrel.

Direct Cause:

Gaps in vendor procedures relating to quality control (QC) verification and positive control of pneumatic grippers allowed irratiated hardware to unknowingly be brought near the surface of the water during tool moves.

10.2 Salem Internal OE – Draining Transfer Canal

Salem Unit 2 **2014-05-08 12:00 PM** **#311080**

Elevated Dose Rates Observed During Fuel Transfer Canal Draining

RWP 35 ALARA Plan 108

RVI (Baffle Bolts, Thermal Shield Bolts and Flexure Inspections / Repairs)

Tasks: 116,117,118, 119,120,121,122,123

Status: OE - No Equipment Involved - Event Final Complete Last Updated: 2014-08-07 7:31 AM

Significance: Noteworthy - Nonconsequential
Noteworthy because the Radiation Protection Department did not fully consider the risk for streaming events from irradiated items which could be deposited on the transfer canal floor resulting in unexpected increasing radiation levels during drain down. This event is Nonconsequential because the high radiation postings for the upper and lower cavity were not challenged during the event.

Abstract:
Conventional close out inspection and radiological surveys of the unit 2 fuel transfer canal (FTC) failed to detect five irradiated reactor coolant pump (RCP) turning vane bolts (TVBs). During the drain down process, with approximately 3-4 inches remaining in the transfer canal, dose rates rose by a factor of 200 - 400 times the previous values. RP controlled access to the area around the cavity until high radiation postings were installed. The high radiation postings for the upper and lower cavity were not challenged during the event. The apparant causes of event was technicians' knowledge and experience with streaming of radiation fields and radiation protection departments' not fully considering the risk for streaming events from irradiated items which could be deposited on the transfer canal floor. The total collective accumulated dose resulting from the event was estimated to be less than 20 mrem.

Recommended for Review By:
Operations Staff
Radiological Protection Staff
Supplemental Personnel Coordinators

Lessons Learned Summary:
Knowledge Management - OrganizationAC-1: The RP Technician's knowledge and experience with streaming of radiation fields from highly radioactive items needs improvement. AC-2: The RP Department did not fully consider the risk for streaming events from irradiated items which could be deposited on the transfer canal floor and as a result did not fully prepare detection or mitigating strategies for cavity draindown.
Unspecified or Not Listed - Radiaton Protection The RP Technician's knowledge and experience with streaming of radiation fields from highly radioactive items needs improvement. The RP Department did not fully consider the risk for streaming events from irradiated items which could be deposited on the transfer canal floor and as a result did not fully prepare detection or mitigating strategies for cavity draindown.

Operator Actions Taken1. Recovered bolt heads from FTC floor and disposed. 2. Performed a Needs Analysis on the Transfer Canal streaming event and presented to CRC/TAC.
Administrative Controls Applied or Evaluated Will be implementing a Prevention, Detection, Correction (PDC) Model for cavity draindown using the WC-AA-105 Online Risk Management process as a guide, and will require RP supervisory approval for all cavity entries from the time the reactor head is installed until fuel transfer canal is drained and flushed.

Event Summary:
On Sunday, May 4, 2014, while draining the Fuel Transfer Canal (FTC), elevated dose rates were observed on the ships ladder leading down to the upper cavity, elevation 117, and at the reactor vessel level instrumentation in the upper cavity, elevation 110. Radiation streaming from the FTC, elevation 90, resulted in maximum dose rates of 700 mrem/hour in the affected areas, approximately 37 feet from the source. Access to the FTC is through the lower cavity which was controlled as a Locked High

Radiation area. Access gates and ladders were approximately 30 feet from the source.

When the elevated dose rates were encountered, Radiation Protection Technicians (RPTs) began filling the FTC with demineralized water to increase shielding and lower dose rates while Operations closed the gravity feed drain valve to stop the draining evolution in progress. The lowest amount of water in the FTC at the time of the event was approximately 3-4 inches.

After establishing stable conditions with the FTC refilled with water, underwater surveys were performed of the FTC and lower cavity areas. Lower cavity dose rates were measured to be approximately 90 mR/hour general area. Two RPTs entered the lower cavity to perform more thorough underwater surveys. The RPTs identified dose rates >1000 R/hour under the support steel for the abandoned rod control cluster base plate (RCCBP). THis area is congested with support steel associated with this system, which restricted visual inspection of the area. An underwater camera image identified the source of the dose rates as five RCP turning vane bolts that had been recovered from the reactor vessel earlier in the outage. A high-range underwater detector measured approximately 11,000 R/hour on contact with one of the bolts.

The total collective accumulated dose resulting from the event is estimated to be less than 20 mrem.

Cause Summary:
Apparent Cause 1: The technicians' knowledge and experience with streaming of radiation fields from highly radioactive items needs improvement.

Apparent Cause 2: The RP department did not fully consider the risk for streaming events from irradiated items which could be deposited on the transfer canal floor, and as a result did fully prepare detection or mitigating strategies for cavity drain down.

Corrective Action Summary:
A recovery plan was put in place. All bolts heads and a small piece of flux thimble tube were retrieved from the FTC floor under approximately 6 feet of water and placed in a shielded lead canister (8-inches thick) for storage in the lower cavity area.

A Polaris-H camera was procured and used during the retrieval and recovery process to verify/identify the dose profile in the FTC. After initial recovery of the bolt heads, the camera was beneficial in identifying the small piece of thimble tube which was also retrieved.

RP increased the number of radiation monitors around and in the reactor cavity and controlled all entries around the cavity until the water level was lowered and acceptable dose rates observed.

The Polaris-H camera was used in conjunction with conventional survey techniques to verify that all high-dose-rate materials had been retrieved prior to allowing final work activities in the FTC.

10.3 Seabrook OE – Sluicing

Seabrook Unit 1 **2020-04-28 5:00 PM** **#480617**

Unposted High Radiation Area

RWP 35 ALARA Plan 108

RVI (Baffle Bolts, Thermal Shield Bolts and Flexure Inspections / Repairs)

Tasks: 116,117,118, 119,120,121,122,123

Status: OE - No Equipment Involved - Event Final Complete Last Updated: 2020-08-17 12:16 PM

Significance: Noteworthy - Consequential
(NC)

Abstract:
On April 28, 2020, unposted high radiation areas in the Waste Processing Building were discovered. These areas had been de-posted previously on 4/27/20 at 2100 after successful post-resin sluice flushes. During the time the high radiation areas were unposted, the potential existed for plant personnel to unknowingly enter a high radiation area. The unposted high radiation area was caused by resin filling of a mixed bed demineralizer.

Recommended for Review By:
Radiological Protection Staff

Lessons Learned Summary:

Description:
On April 28, 2020, at approximately 1700 Hrs. unposted high radiation areas (HRA) were identified in the Waste Processing Building. These areas had been de-posted previously on 4/27/20 at 2100 after successful post-resin sluice flushes. The high radiation condition likely existed during the time frame of 0300 on 4/28/20, when a resin fill of CS-DM-2B was performed, until the condition was identified at 1700 on 4/28/20. During the resin fill demineralized water is used to load the resin which is similar to flushing the demineralizer beds post sluicing. The elevated dose in the resin sluice piping resulted in a high radiation area of approximately 157 mrem/hr. During the time the high radiation areas were unposted, the potential existed for plant personnel to unknowingly enter a high radiation area. It was verified that no individuals gained access to the area and entered dose rates greater than 80 mrem/hr.

Cause Summary:
The unposted high radiation area was directly caused by the resin filling of a mixed bed demineralizer, which caused an increase in radiation levels in the resin sluice piping in the area.

Corrective Action Summary:
Upon discovery, the areas were immediately guarded by Senior RP technicians, and subsequently posted as a HRA.
Revised the applicable RP procedure to maintain postings and restrict access until the demin vessels have been refilled.

RWP 35 ALARA Plan 108

RVI (Baffle Bolts, Thermal Shield Bolts and Flexure Inspections / Repairs)

Tasks: 116,117,118, 119,120,121,122,123

Concurrence: (Requires Signature and Printed Name/Badge/Date)

R.McCoy / 04-847		08/10/2020
Originator	*Name/Badge*	*Date*
John Fitzpatrick 05-557		9/17/20
Task Manager (Salem) (Work Group Supervisor/Project Manager/Superintendent)	*Name/Badge*	*Date*
Jeremy L. Webb PM BAFFLE BOLT		9/17/20
Task Manager (Westinghouse) (Work Group Supervisor/Project Manager/Superintendent)	*Name/Badge*	*Date*
Patrick Will PM FLEXURE		9/17/20
Task Manager (PCI) (Work Group Supervisor/Project Manager/Superintendent)	*Name/Badge*	*Date*
Benjamin Gresham 08-950		9/17/20
Task Manager (Framatome) (Work Group Supervisor/Project Manager/Superintendent)	*Name/Badge*	*Date*
B. Acuff /	01-743	9/24/2020
RPS	*Name/Badge*	*Date*
P. Sergent-Dix / 17-478		09/28/2020
REM	*Name/Badge*	*Date*
S. Howe / 17-319		9/28/20
RPM (if required)	*Name/Badge*	*Date*
20-12		
SAC (if required)	*SAC Meeting Number*	*Date*

RWP 35 ALARA Plan 108

RVI (Baffle Bolts, Thermal Shield Bolts and Flexure Inspections / Repairs)

Tasks: 116,117,118, 119,120,121,122,123

RWP# / Task #: **35 /**	Briefing performed by: Badge Number:
ALARA Plan or MAP# : 108	Date:
Task Description: **Baffle, Thermal Bolt, Flexure Inspection/Repair**	

Name (Print)	Craft / Job task assignment	Badge Number	ED Set points