

NRC Regional Panel

Tuesday, January 5, 2021

1:30 pm EST to 4:00 pm EST

Moderator: Steve Garry, NRR Sr. HP

Region 1 – Scott Wilson and Elizabeth Andrews

Region 2 – Steve Garry (for Rg 2)

Region 3 – Valerie Myers and Steve Bell

Region 4 – Natasha Greene and John O'Donnell



Inspection Procedure Updates Pandemic Challenges



Inspection procedure updates for 2020 include:

- Changes to the number of samples, resource hours, and frequencies
- Attempt to standardize radiation protection IP's with other IP's
- Allows for greater ability to track completion of IP's
- Improved communications / more user-friendly format
- No increase in scope or on-site inspection activities

Licensee impact:

- More focused, objective-based effort
- Three year average inspection hours reduced
- Additional number of inspection “samples”
documented in reports

Inspection Procedure Updates Pandemic Challenges



Inspection challenges/successes during the pandemic:

- On-site observations reduced based on local/site conditions
- Inspections adjusted, delayed, postponed or canceled
- Remote inspection activities increased
- Meetings and interviews conducted remotely

Inspection Procedure Updates Pandemic Challenges



Inspection challenges/successes during the pandemic (cont.):

- Largely successful as a short-term emergency measure
- Infrastructure was available for virtual meetings, not virtual observations (with some exceptions)
- Communications were more difficult but a crucial aspect to success
- There is no replacement for being there!

Inspection Procedure Updates Pandemic Challenges



- What does the future hold?
 - Expect more of the same until pandemic is effectively managed
 - Expect an inspection-heavy Q3 & Q4 for some sites
 - Risk-informed and targeted approach to on-site inspection observations

Inspection Procedure Updates Pandemic Challenges



How can licensees help?

- Remote inspections rely on the licensee's abilities, resources and cooperation
- With the expectation of limited on-site inspections in the near term, licensee flexibility will be key
- Possible on-site inspection date revisions in order to allow for more RP risk sensitive activity observations

Inspection Procedure Updates Pandemic Challenges



- Continued support for remote inspection activities and meetings
- Lessons from 2020 should be captured for future planning
- New processes will likely come from the lessons learned
- Thanks to the licensees who have been diligent regarding virus safety measures and who have been helpful and flexible during the public health emergency!

Summary of Findings

- 16 HRA findings
- 14 Survey findings
- 5 Radiation Monitor Calibration findings
- 3 Respiratory findings
- 2 ALARA findings
- 3 Rad Material Control findings
- 1 Decon finding
- 1 Diving, 1 Spill, 1 CAP observation

Region 1 - Findings & Violations

Failure to Complete ALARA Work-in Progress (WIP) Review

(ML19225B240)



- Outage valve maintenance
- FME induced failure identified – scope expanded
- WIP required at >50% dose estimate and >5 rem
- No WIP conducted
- Dose accrued nearly double original estimate
- Performance deficiency - procedure adherence
- WIP may have identified any issues or prompted additional measures, processes or oversight to reduce overall dose

Site ALARA Committee (SAC)

(ML19312A053)



- Valve repairs during RFO and 80% WIP review identified increased scope
- Revised dose estimate triggered a SAC review and approval: not performed
- Dose estimate >50% and > 5 person-rem
- SAC review may have challenged the new dose estimates, identified issues or prompted additional measures, processes or oversight to reduce overall dose

HRA Violation

(ML18221A500)

- 5 workers; 3 inside high radiation area (HRA), 2 support workers outside HRA
- 2 outside workers were not on the RWP for the HRA and were not briefed on HRA dose rates
- In order to leave the RCA, the 2 outside workers traversed the HRA to the egress point on the opposite side and one received an SRD dose rate alarm
- Entry into the HRA on the wrong RWP and without a briefing was a violation of Technical Specifications for High Radiation Area controls

HRA Violation

(ML18039A899)

- Operator had been briefed on conditions in HRA
- The next day the operator went back to the same HRA without a briefing
- Operator thought he had been briefed
- Worker received SRD alarm at 103 mrem/hr
 - ED setpoint 80 mrem/hr
 - Alarm at 103 mrem/hr

Inadequate Survey

(ML18221A483)

- Highly contaminated overhead was not surveyed or deconned prior to work
- Work required use of support structure in the overhead
- Workers needed to move a light fixture during work
- The light fixture had not been surveyed or deconned
- Loose contamination observed falling from light fixture
- Workers exposed to airborne & intakes occurred

Failed to Survey

(ML18130A878)

- Used a new in-core detector storage location
- 25 in-core detectors were stored against the refueling cavity wall
- Adjacent cavity wall concrete had construction joints that were adjacent to the RCP bay
- Surveys in RCP bay were not performed
- Workers in pump bay got SRD alarm
- Follow-up survey found 2 R/hr

Region 2



Steve Garry, NRR
Sr. Health Physicist

Unanticipated Dose Rates

ML20132A012

- Temporary pump was installed in sump to support draining of RB Closed Cooling Water system
- RP did not anticipate increasing radiation levels
- Remote coverage tech observed unanticipated dose rates and removed workers
- New survey found up to 100 mR/hr
- Workers re-entered area and received 166 mR/hr SRD alarm
- Follow-up survey found 1,510 mR/hr

Inadequate Survey

ML20132A012

- 10 year inspection of Moisture Separator Reheater (MSR)
- Dose rates were measured from outside the entry port at 43 mR/hr
- Worker entered MSR entry port on an RWP which did not allow entry into a HRA
- Follow-up survey found 360 mR/hr in the 40 foot length of MSR

Improper entry into HRA

ML20133K026

- Maintenance work supervisor reviewed work order which required use of RWP and contacting RP before work start
- RWP included hold point requiring an RP survey before removing or installing insulation
- Contract insulators signed in on RWP that did not authorize HRA entry
- Insulators entered HRA and removed highly contaminated insulation without dose rate briefing
- Alarmed exit contamination monitors
- Received unplanned internal dose

Discontinued RMS Calibration

ML19221B744



- 10 CFR 20.1501(c) requires dose rate and effluent Radiation Monitor System (RMS) calibrations
- FSAR describes RMS and their functions
- Licensee removed 52 RMS from the calibration schedule (without RP input) and placed the calibrations on a run-to-failure schedule

Calibration of Instruments

(ML18220B011)



- A high range GM instrument was not calibrated above 300 R/hr
- The Cs-137 source not strong enough
- The use of GM instruments was limited to less than 300 R/hr
 - Underwater surveys were performed above 500 R/hr
 - Also used for core barrel pulls (but did not exceed 300 R/hr)

Argon gas activation (WGDT)

(ML17205A234)



- During outage, argon purge gas had been used during welding on primary system piping
- Upon Rx startup, argon gas became activated in the RCS
- Chemistry samples indicated unusually high concentrations of Ar-41 in the RCS
- RCS was degassed to the WGDT
- Remote monitoring showed small increase in dose rates near WGDT
- Worker in WGDT area received dose rate alarm greater than the SRD 35 mrem/hr setpoints
- Follow-up survey found 110 mrem/hr

Unposted LHRA in Drywell

(ML18124A072)

- Work in BWR drywell subpile room
- Bottom head drain valve 72 R/hr contact, 3.9 R/hr at 30 cm
- Unposted for 4 hours
- Licensee identified LHRA violation

Diving Event

(ML19129A276 & ML19023A539)

- Diving event to cut up steam dryer in BWR refueling equipment pit
- Filter storage rack was moved from normal location to new location for filter change
- Boilermakers changed Tri-Nuke filters and stored filters in the underwater filter storage rack. There was no survey of used filters in storage rack.
- Boilermakers moved filter rack back to original location

Diving Event (continued)

(ML19129A276 & ML19023A539)

- Dive supervisor tells divers to work in new area near filter track without telling HP
- Diver received ED dose rate alarms at 71.7 Rem/hr and received 209 mrem to left leg
- HP immediately surveyed the area and found Tri-Nuke filter rack readings
 - 228 Rem/hr on contact, 25 Rem/hr at 30 cm, and
 - 1.5 Rem/hr at 1m (as measured underwater)
- Follow-up surveys found 2 Tri-Nuke filters readings
 - 400 and 450 Rem/hr on contact, and
 - 20 and 21 Rem/hr at 30 cm respectively

HRA Violation

(ML18128A153)

- Electrician signed in on wrong RWP that did not allow entry into HRA
- Bypassed HP control point
- Dressed out and entered a posted HRA (300 mrem/hr) and a contaminated area
- ED setpoints were 60 mrem/hr
- Received an 82 mrem/hr dose rate alarm

LHRA violation in drywell

(ML18128A153)

- RP coordinator instructed carpenter to install ladder to upper drywell
- RP did not survey or post a LHRA area after ladder was installed
- Carpenter climbed ladder and received a 458 mrem/hr ED alarm (setpoint of 400 mrem/hr)

LHRA violation

(ML19220A875)

- Seven tri-nuke filters put on cart and moved to HRA
- Each filter was 642 – 950 mrem/hr
- No follow-up dose rate survey had been performed
- Combined filters created an unposted LHRA condition
- Operator entered area and received dose rate alarm

PAPR respirator modified

(ML18143B309)

- PAPR was inadvertently shutoff by bumping on/off switch
- HP Supervision deliberately directed RP technician to tape petri dish cover over power switch
- User still bumped petri dish, which shut off PAPR, and user was unable to turn it back on
- HPT cut hood open to allow breathing
- Office of Investigations evaluated and determined willfulness

HRA briefing

(ML19130A209)

- An old survey was used to brief workers based on Drywell N2NG nozzle piping shield doors being closed (60 mrem/hr)
- Shield doors were opened for work
- Worker received dose rate alarm
- New survey performed found 385 mrem/hr

HEPA not used properly

(ML19130A209)

- Rx head vent was being opened
- Area was an alpha Level II area for internal components
- Steam discharge from venting was outside effective range of HEPA unit
- Lead RPT and RPT observing work did not correct the problem

Spill not reported to RP

(ML18131A020)

- On the aux building roof, non-licensed operators were lining up the demin resin fill isolation valve
- Removed valve enclosure cover
- Spilled ½ gallon of highly contaminated water
- Workers tried to decon by using water hose without notifying RP
- Spread contamination onto roof and into storm drains

Inadequate Survey & HRA

(ML19225B957)

- Area radiation monitor alarm received in Control Room for Radwaste Packaging area
- Control Room notified HP
- HP responded, surveyed, and reported elevated dose rates due to water processing (no surveys recorded and the area posting was not updated)
- NRC investigated elevated dose rates
- NRC found HRA dose rates > 110 mrem/hr

Region 3

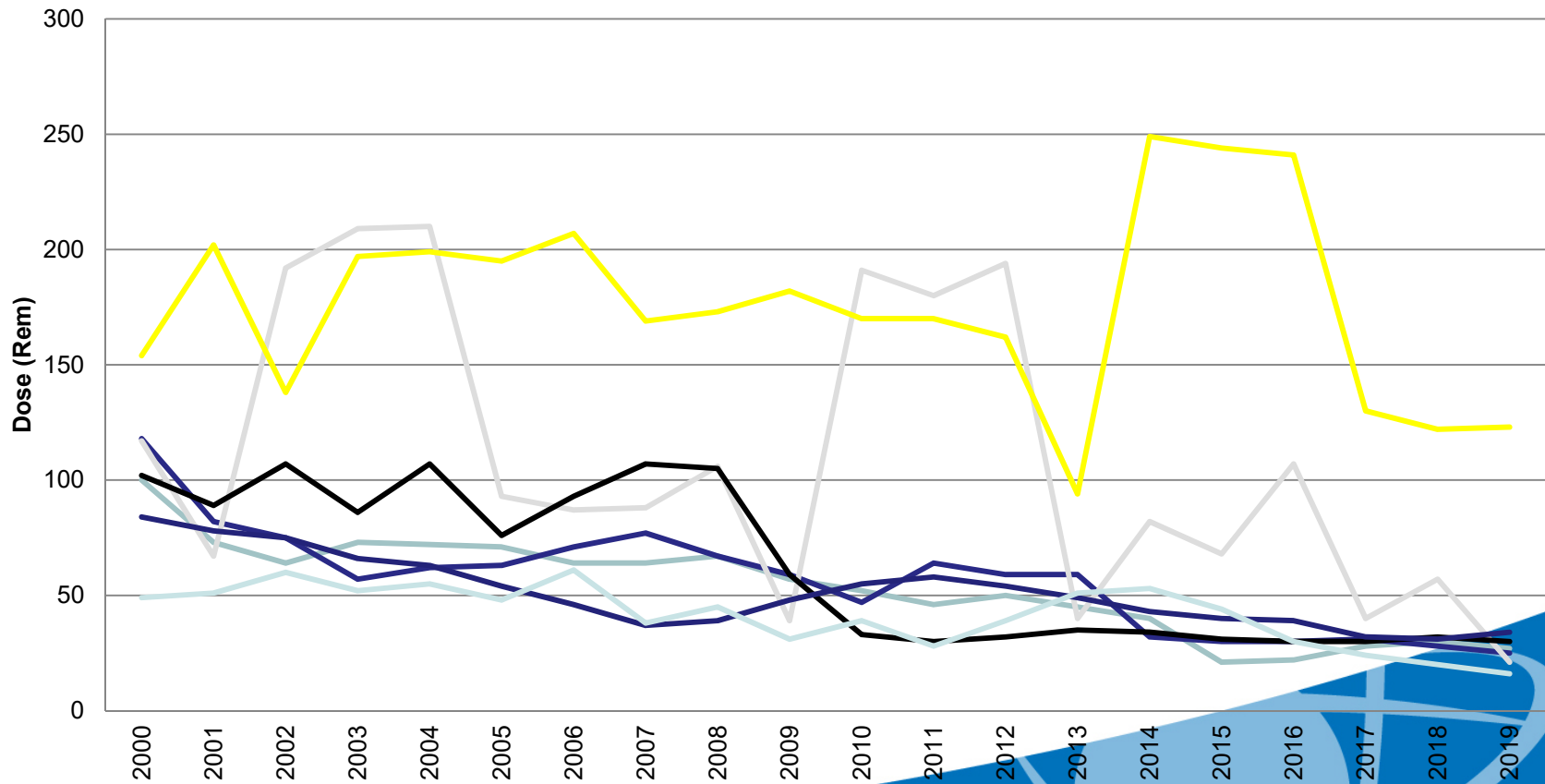


Valerie Myers, Sr. Health Physicist

General Observations

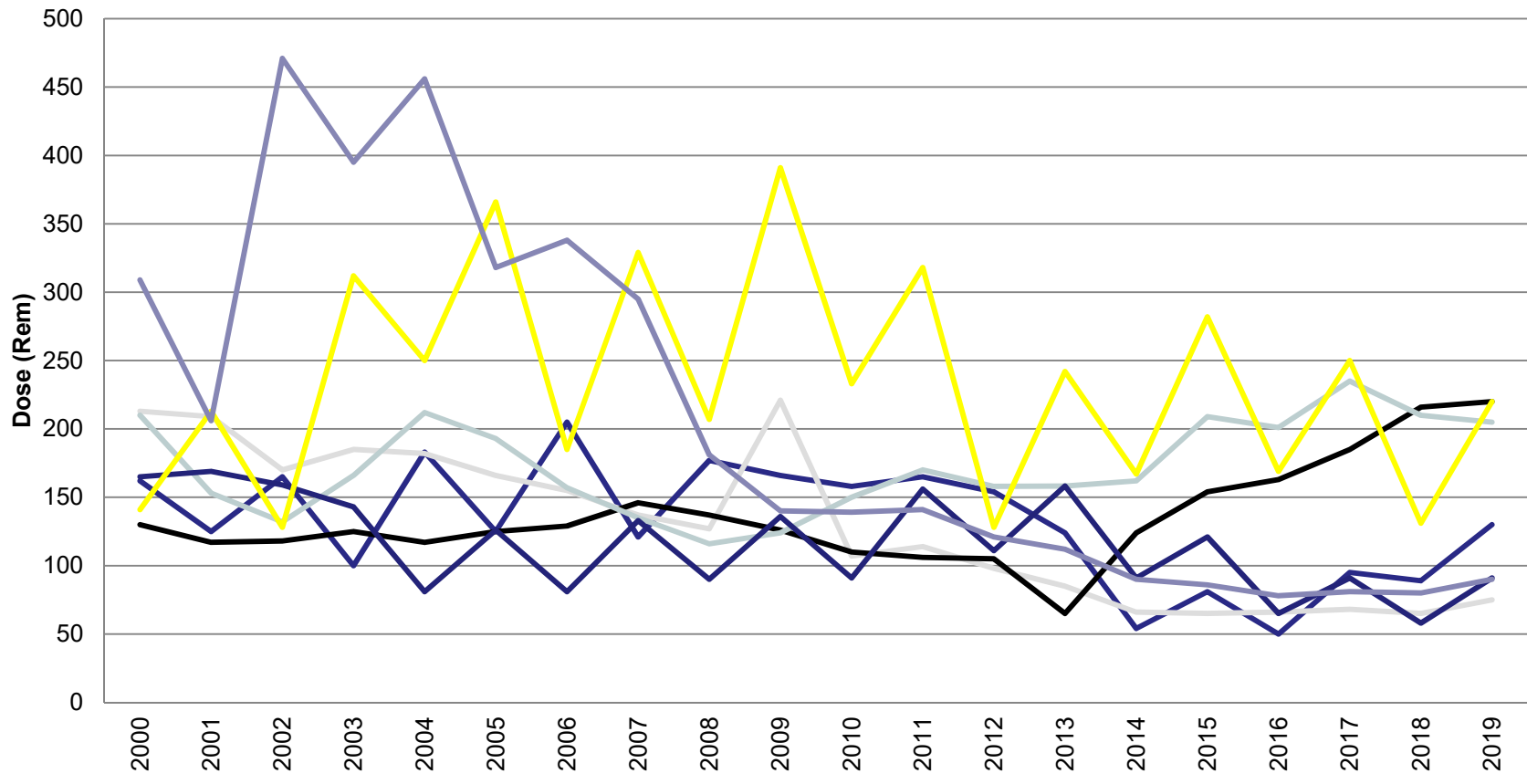


Rg 3 PWR TYRAs



General Observations

Rg 3 BWR TYRAs



General Observations

– Source Term Reduction

- Uncertainty in industry future makes long term strategy more difficult
- Cost (both monetary and dose) is usually immediate, and the benefits (dose reduction) are usually long term

– Region III BWR ALARA Collective Radiation Exposure

- A number of BWRs have seen an increase in collective radiation exposure recently

Improper LHRA entry

ML20115E528

- Pre-outage containment inspections/walk-downs
- Engineers were briefed to not enter un-surveyed areas beyond the unlocked and unposted turnstile
- Engineer entered area beyond turnstile
- SRD alarm setpoints were 30 mrem and 75 mR/hr
- Engineer received dose rate alarm at 2,510 mR/hr
- Engineer received a dose alarm at 78.8 mrem

Worker entered un-surveyed area

ML20030A139



- Pre-job surveys in radwaste basement were completed for work area
- Worker heard noise in area outside of briefed work area and took several steps away from work area to investigate
- Received a SRD dose rate alarm at 567 mrem/hr
- Follow-up survey found up to 2,500 mrem/hr at 30 cm from a resin transfer line that had not been surveyed since the last resin transfer

LHRA door left unlocked

ML20030A139

- LHRA conditions were 3 R/hr at 30 cm
- Work crew exited LHRA work area
- RP Technician left door unlocked and failed to have independent verification that the door was locked
- New crew approached LHRA door and noticed it was unlocked
- RP Tech verified no one was in the room and re-surveyed the area

Respirator Fit Testing

(ML19317E555)

- Licensee identified violation
- Daily calibration not performed, and
- Fit testing protocol was not selected for a fit factor of 1000
- Some individuals fit tested during this time did not meet fit factor of 1000

Check Source Failures

(ML19317E555)

- Observation identified in IP 71152, Problem Identification and Resolution (Corrective Action Program)
- Several CRs were written on process radiation monitor check source problems
- Work orders generated from these CRs were repeatedly rescheduled
- No meaningful maintenance action taken
- Absence of action undermines the effectiveness of the corrective action program

Contamination Control

(ML19214A109)

- Expanded work scope on MSIV repair
- Poor communication between RP and work group
- Grinding on contaminated MSIV disc
- No contamination surveys and no HEPA used
- 40 mrad/hr beta on MSIV disk
- Resulted in two workers with internal dose and contaminated work area

HRA violation

(ML19044A632)

- Two workers were on an RWP, briefed and working in drywell
- Workers exited drywell and entered the steam tunnel (a separate HRA)
- Received SRD dose rate alarm
- Days earlier, one worker had been briefed for steam tunnel work and believed his briefing was still current while the other worker never received HRA brief for the steam tunnel

LHRA violation

(ML19044A632)

- RWCU heat exchanger room surveys taken prior to shutdown were approximately 600 mrem/hr @ 30 cm
- Surveys were used to perform worker briefing for entry post-shutdown
- Workers entered area and received SRD dose rate alarms
- Follow-up surveys taken in response to SRD alarms showed max of 37 rem/hr at 30 cm from a strainer in the work area

HRA violation

(ML19128A260)

- Survey were taken prior to RHR system transient
- Surveys were used to brief worker for entry to RHR room
- Worker questioned RPT about survey results
- RPT said the surveys were current (based on the most recent record in the Plant Viewer Digital Survey System and was within prescribed survey frequency)
- Radiological conditions had changed
- New dose rates were 210 mrem/hr @ 30 cm

HRA violation

(ML19305D854)

- Cavity decon was scheduled
- RP told Ops they could not immediately support flushing of the cavity drain line
- Ops did not flush the cavity drain line, but went ahead and did valve line-ups
- Water movement occurred, creating hot spots of 9 rem/hr @ 30 cm in overhead, and 300 mrem/hr in accessible area
- Two I&C techs received SRD dose rate alarms

LHRA violation

(ML20220A568)

- RP tech noticed elevated dose rates in the torus (a posted HRA) when performing general area surveys during the torus recoat project in the spring of 2020 (early COVID)
- Source was identified to be collection of torus coating chips with dose rates of up to about 2.5 R/hr at 30 cm
- Torus was subsequently controlled as an LHRA
- Miscommunication between work groups and individuals being re-tasked helped contribute to personnel accumulating highly contaminated torus coating chips without RP presence

Region 4



Natasha Greene, Ph.D.
Sr. Health Physicist

John O'Donnell, CHP
Sr. Health Physicist

Improper HRA Entry

(ML20294A242)



- Pre-job briefing for the intended work area in drywell near snubbers was 20 mR/hr
- One worker climbed into overhead piping area to get serial number on snubber
- SRD dose rate alarm setpoint was 300 mR/hr
- Received dose rate alarm at 802 mR/hr
- Workers left dry-well and reported to RP

High Radiation Area violation

(ML20120A599)



- Worker briefed for HRA entry to inspect snubber and PZR spray line from “above” where dose rates were 12 mR/hr
- SRD alarm set points were 40 mR and 200 mR/hr
- Worker climbed down to next level and entered into 100 to 200 mR/hr area and got 220 mR/hr dose rate alarm
- Worker backed out until alarm cleared, and checked SRD and observed 5 mR dose
- Worker continued taking pictures of snubbers and hangers

Improper HRA Entry

(ML20119A851)



- Contractor performed self-brief for work in a radiation area entry and walked-down smoke detectors in RHR pump room
- Entered a posted HRA without HRA RWP or pre-job briefing
- Received dose rate alarm and continued to work in RCA for one hour before notifying RP

Improper HRA Entry

(ML20044F733)



- RWP specified to contact RP prior to entry into inaccessible areas (Overhead)
- Operator climbed into un-surveyed overhead area in containment to identify two valves
- Operator had not been authorized or briefed on dose rates
- SRD alarm setpoint was 300 mrem/hr, alarm received at 370 mrem/hr
- Follow-up surveyed found up to 600 mrem/hr (general)

Radiation Monitor Calibrations

(ML20044F733)



- 9 examples of improper radiation monitor calibrations per plant procedures
- Plant procedures required 2-point calibration
 - One point was to be near 100 mR/hr, instead, was calibrated at 36 mR/hr
 - One point required at least 4 mR/hr, was calibrated at 0.78 mR/hr
- As a result, improper operating voltage was set for radiation monitors (set lower than optimal as intended by procedures)

Radiation Monitor Calibrations

(ML20022A210)



- FSAR stated calibration frequency as 18 months on rad monitors
- 22 of 34 monitors exceeded the 18-month calibration frequency requirement; one monitor had not been calibrated in 76 months
- Calibration frequencies had been changed by I&C, some multiple times, without RP or licensing review
- No adequate documented evaluation or technical justification or update of FSAR

Radiation Monitor Calibrations

(ML19310G722)



- Some area radiation monitors (ARMs) had not been calibrated since 2009
- Licensee procedures required 18-month calibration frequency
- Maintenance staff changed calibration frequencies without consulting RP
- No adequate evaluation for changing from 18-mos to 3 years, and then to six years and more
- Extended calibration frequency without first verifying the ARMs were calibrated

Rad Material Control

(ML20022A210)



- Procedural violation
- Work was in a clean work area in condenser water box
- Without RP knowledge, a worker obtained purple painted drill from the hot tool crib
- After use, supplemental worker put drill in tool bag for removal from clean area to outside the RCA
- Tool bag alarmed the portal monitor
- Survey found distinguishable dose rates

Improper HRA Entry

(ML19031C939)

- Worker was briefed by supplemental HP Tech for entry into reactor building steam tunnel using 2-year old survey data
 - Old survey data showed 20 – 30 mR/hr general area dose rates
 - SRD dose alarm setpoint was 52 mR
 - Dose received was 55.3 mR
 - Worker left area and reported to RP
 - A follow-up survey by RP showed 560 mR/hr at 30 cm

Inadequate Posting

(ML18304A362)

- Two resin liners were moved to the Turbine Building truck bay area
- An HRA was posted around the trailer with the resin liners
- The Turbine Building was a posted radiation area
- Dose rates outside the Turbine Building truck bay doors were not verified
- Dose rates from resin liners created a radiation area **outside** the truck bay area, which was unposted

LHRA violation

(ML18304A362)

- Supplemental HP tech signed in on RWP
- HP tech entered RCA through HP swing gate instead of RCA entrance point
- SRD was not turned on by access control computer
- HP tech entered LHRA, and when checking his SRD, he noticed it was in pause mode (not operating)
- He had entered the LHRA without a functioning SRD

LHRA violation

(ML18304A362)

- Unshielded filter was moved down crane well to truck bay
- Filter was 84 rem/hr contact, 53 rem/hr @ 30 cm
- Pre-job briefing was not well understood by workers
- Jr. HP tech was serving as LHRA guard at truck bay entrance
- Riggers were allowed to enter truck bay without HP coverage, resulting in a rigger receiving a dose rate alarm of 1.5 rem/hr

Decon of Rx Vessel O-rings

(ML18215A026)

- Without checking with RP Supervision, a Sr. HP tech asked a deconner to decon Rx vessel O-rings
- Procedures required that a decon plan be developed for Rx vessel O-rings
- No decon plan and no pre-job brief was performed
- 3 unsuccessful attempts at deconning O-rings
- Received unnecessary dose
 - External dose from rework
 - Internal dose of 13.5 mrem CEDE

Tri-Nuke Filters Storage

(ML18128A246)



- 30 Tri-Nuke filters were temporarily stored in fuel storage pool
- Filters were moved without completing pool material inventory form
- Failed to implement RAM control procedures for storage and movement of filters
- Resulted in unanticipated dose rates and unplanned worker exposures

(Continued next slide)

Tri-Nuke Filters Storage

(Cont'd) (ML18128A246)

- 3 filters found floating on surface of separator pools
- 1 filter damaged when fell to bottom of incline fuel transfer pool
- Filters left in pool without placement in storage rack
- Lack of RAM filter control per procedures

Questions and Discussion