

NRC Regional Inspector Presentations 2024 ISOE ALARA Symposium

January 4, 2024
ML24008A007

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NRC Region 1

ALARA Presentation

Harry Anagnostopoulos
Ronald Rolph
Senior Health Physicists

Decommissioning, ISFSI, and Operating Reactors
Branch

Findings

- Findings across Region 1
 - In 2021
 - 4 findings related to high radiation areas
 - In 2022
 - Green – Failure to use Proper Engineering Controls (10 CFR 20.1701) results in unplanned exposure of 49 millirem committed effective dose equivalent
 - In 2023
 - No findings

Industry Trends

- Industry-Wide Staffing Reductions
 - Vacancies not being filled
 - Knowledge transfer from retiring staff
 - Contractor resistance
- Radiation Monitoring Equipment
 - Lack of ownership
 - Run to failure vs maintain equipment
 - Equipment age
 - Lack of vendor support

Industry Trends (continued)

- Environmental Reports
 - Inadequate management review
 - Dosimetry results inconsistent
- Part 37 controls
 - Part 37 vs Part 49
 - Aggregate quantities
 - LLEA

NRC Region 2 ALARA Presentation

Jack Bell

Jonathan Rivera

Health Physicists, NRC RII

Alpha Program

- 10 CFR 20 inadequate survey violation for alpha program
- EPRI guidance and fleet procedures provide guidance for alpha programs
- Main issue was licensee was not counting the hottest smears for alpha
- Note that if you have an MDA of 20 for alpha, you need to count a smear of greater than 600,000 b-g to definitively say you're alpha 1
- An area may be alpha 1 without meeting MDA, but only if you're counting hottest b-g smears

High Radiation Area

- TS HRA violation
- 2 workers went into containment briefed for HRA entry with 250 mrem/hr dose rate alarm
- Went into an area they hadn't mentioned in brief to grab tools. Dose rates in the area were as high as 600 mrem/hr and they got unanticipated alarms
- TS and procedures require that workers entering an HRA be knowledgeable of dose rates in the work area

Core Barrel Lift Using Polar Crane

- TS procedure violation
- During core barrel lift, polar crane in containment was misoriented 180 degrees out putting crane operator unexpectedly close to source
- Crane operator got both dose and dose rate alarms
- Procedure as written had weaknesses, but ultimately was mis-performed

High Radiation Area

- Self-revealing, Green, NCV of TS 5.7.1
- Worker improperly entered a posted HRA
- Worker entered the HRA without being logged onto an appropriate RWP
- Worker not knowledgeable of dose rates in the area prior to entry

Locked High Radiation Area

- NRC-identified Green NCV of TS 5.4.1(a)
- Licensee failed to implement controls for a LHRA as required by site procedure
- NRC inspectors found access door to U3 spent fuel demineralizer/filter room unlocked and unguarded
- The area exhibited accessible dose rates of at least 1.4 rem/hr at 30 cm from the radiation source

High Radiation Area

- Self-revealing Green NCV of TS 5.4.1(a)
- Worker failed to comply with RWP requirements for entry into a HRA
- Worker entered the U2 fuel pool cooling cage area, a posted HRA with dose rates exceeding 100 mrem/hr at 30 cm, but less than 1,000 mrem/hr at 30cm
- Worker did not receive required briefing from RP

NRC Region 3 ALARA Presentation

John Cassidy

Sr. Health Physicist, NRC RIII

Failure to Perform Radiation Surveys During HEPA Pre-Filter Exchange Which Resulted in Unintended and Unnecessary Radiation Dose

- Self-revealing Green NCV of 10 CFR 20.1501
- S/G HEPA prefilter unit was contributing to increased dose rates in work area.
- RP Supervisor assumed the TEDE ALARA evaluation did not include prefilter changeout and assumed could be performed without respiratory protection
- General area continuous air monitors, not located near the HEPA unit, increased at multiple areas of containment.
- 2 RPTs involved in the filter changeout alarmed personnel contamination monitors with internal exposures greater than 10 mrem

Failure to Secure Mobile Device Containing Category 2 Quantities of RAM

- Self-revealing Green NCV of TS 10 CFR 37.53)
- The locking mechanism intended to immobilize device was deficient
- Specifically, a chain was wrapped around the frame of the calibrator, so it appeared secure, but the padlock necessary for securing the chain was found unlocked by a technician supporting the annual calibration.

Failure to Survey Annulus during Moisture Separator Move

- Self-revealing Green NCV of 10 CFR 20.1501
- Failed to perform adequate surveys to demonstrate compliance with High Radiation Area (HRA) posting and controls required by 10 CFR 20.1902 and 10 CFR 20.1601 during moisture separator lifts
- Maximum dose rates seen on EADs were 224 mrem/hr and 366 mrem/hr, with alarm setpoints of 75 mrem/hr
- Post event calculation evaluation estimated radiation levels of approximately 400 mrem/hr in the location of the workers, which generally aligned with the dose rates seen on the EADs

Failure to Survey Worker After Alarming a Portal Monitor

- Self-revealing Green NCV of 10 CFR 20.1501
- Worker received multiple alarms at the contamination monitors at the main access facility
- Contamination was identified on the worker at the subsequent power plant.

Failure to Make an Individual Knowledgeable of Dose Rates Prior to Entry Into a High Radiation Area

- Self-revealing Green NCV of TS 5.7.1
- Worker was briefed to work area dose rates of 55 mrem per hour and was on an RWP that allowed access to HRAs. The worker received an alarm at 150 mrem per hour
- Condition caused by miscommunication resulting from multiple levels depicted on 2D survey map

Failure to Implement the Alpha Monitoring Program

- NRC identified Green NCV of 10CFR20.1501
- The licensee failed to assess loose contamination and/or airborne radioactivity for alpha emitting radionuclides even in systems and areas that the licensee determined the contamination contained significant contributions of alpha emitting radionuclides.
- Analysis performed to address the inspectors' issue of concern identified areas that should have been posted as airborne radioactivity areas but were not.

Region IV

Findings & Violations

Radiological Controls and ALARA

Rad Monitors, RAM Control,
Shipping, Effluents, Etc.

ALARA and Radiological Controls

- **3 ALARA Planning/Controls**
- **2 Internal Dose**
- **3 Radiation Work Permit**
- **2 Respirator**
- **5 Surveys**
- **5 HRA Entry/Controls**

ALARA Plans and Controls

(ML22201A046)

- Failure to implement ALARA plans and controls
 - Temporary shielding not implemented per plan (coded as a contingency)
 - Two different activities
 1. Est. 2.383 rem – Act. 5.660 rem
 2. Est. 41.5 rem – Act. 65.7 rem
 - TS 5.4.1(a)

ALARA Plans and Controls

(ML22305A517)

- Failure to adequately plan and control worker exposures ALARA resulting in worker uptakes
 - Pressurizer Heater Removal
 - 4 workers with uptakes
 - Internal dose up to 13 mrem (unplanned)
 - TS 6.8.1(a)

ALARA Plans and RWP Controls

(ML21347A988)

- Failure to follow procedures results in an airborne contamination event with multiple uptakes
 - Reactor water cleanup heat exchanger
 - Significant uptakes >700 millirem CEDE
 - Preliminary White finding
 - Substantial potential for overexposure
 - Three apparent violations
 - 10 CFR 20.1701 (engineering controls)
 - TS 5.7.2(b) (LHRA controls)
 - 10 CFR 20.1501(a)(2) (surveys)

ALARA Plans and RWP Controls

(ML23111A237)

- Final significance determination
 - Reactor water cleanup event
- Notice of Violation issued
 - Three violations categorized as a problem
 - Final assessment - White significance
 - 10 CFR 20.1701
 - TS 5.7.2.b
 - 10 CFR 20.1501(a)(2)

Internal Dose Assessment

(ML23139A121)

- Failure to adequately determine internal dose of pipefitters post RWCU contamination event
 - Alpha component of airborne exposure
 - Inability to properly assess dose without sufficient sampling
 - Apparent violation – preliminary White
 - 10 CFR 20.1204(a)
 - 10 CFR 1502(b)(1)

Internal Dose Assessment

(ML23276B477)

- Final significance determination
 - Reactor water cleanup event
- Notice of Violation – 2nd
 - Final assessment - White significance
 - 10 CFR 20.1204(a)
 - 10 CFR 20.1502(b)(1)

Internal Dose Assessment

(ML23202A186)

- Failure to follow procedures in performing internal dose assessments
 - Pipefitters had begun disassembling a valve
 - Observed 4 workers unable to pass the PCMs or portal monitors at the RCA exit
 - Alarmed for face, but face not frisked for contamination
 - Multiple attempts to decon, one WBC
 - 20.5 millirem CEDE assessed
 - TS 5.4.1.a

Radiation Work Permit

(ML22019A304)

- Failure to follow a radiological work permit requirement
 - Requirement to exit the HRA if a dose alarm is received
 - Worker was in alarm for 16 minutes prior to being told to exit the area by RP
 - TS 5.4.1.a

Radiation Work Permit

(ML22305A517)

- Failure to follow a radiological work permit requirement
 - Contamination event – PZR Heater
 - Workers inside – PAPRs; outside – std. PCs
 - CAM required inside area during work
 - CAM setup outside PZR cubicle
 - Not representative and can't alert on airborne
 - TS 6.8.1(a)

Radiation Work Permit

(ML23031A093)

- Failure to follow a radiological work permit requirement
 - PAPR required to enter lower internals storage area
 - Working on blind flange
 - Both worker and RP missed PAPR requirement
 - Skin contamination - 283 millirem (skin dose)
 - TS 6.8.1(a)

Respirator Use

(ML22305A517)

- Inadequate radiological work permit procedure to address respirator controls during work activities.
 - RWP required PAPRs for weld cutting
 - Respiratory controls for job removed with field change, not RWP revision
 - Bypassed TEDE ALARA evaluation process
 - TS 6.8.1(a)

Respirator Storage

(ML23202A186)

- Failure to follow procedure for proper storage of SCBA respirator facepieces
 - SCBA facepieces in several areas staged for use were not stored face down, but on the rubber seal side
 - Proper storage prevents deformation of facepiece
 - TS 5.4.1.a

Survey – Air Samples

(ML22305A517)

- Failure to follow procedures regarding the use of lapel air sample results
 - Lapel > 4 DAC-hr
 - RWP Stop Work criteria
 - Area not posted ARA
 - 12.78 and 13.94 mrem CEDE
 - TS 6.8.1(a)

Survey – Airborne

(ML22305A517)

- Failure to survey for an airborne radioactivity area
 - Air sample taken not evaluated timely
 - Air sample count corrected for radon (0.8 DAC), re-counted at 7.3 (0.7 DAC) and 17.3 hrs. (0.5 DAC)
 - Resulted in a failure to post/control ARA
 - 10 CFR 20.1501(a)

Survey – Airborne

(ML23031A228)

- Failure to follow procedures to assess airborne radiological conditions
 - Contaminated insulation removed from leaking valve (HCA) by insulators with PAPRs
 - Air sampling required when respiratory protection worn
 - Workers below had uptakes
 - Highest internal dose - 22 millirem CEDE
 - TS 5.4.1.a

Survey – Airborne

(ML23221A301)

- Failure to perform air sampling analysis resulting in two uptakes
 - CVCS filter changeout of dried filters
 - Air samples taken, but not analyzed prior to filter changes
 - Controls not changed
 - Uptakes for both workers
 - TS 6.4.1

Surveys – Area Radiation Monitors

(ML23310A032)

- Failure to perform a radiation survey to ensure occupational doses were controlled within regulatory limits
 - Two area radiation monitors in alert or alarm
 - Greater than 29 days
 - Not reflective of current radiological conditions
 - Comp. surveys were not timely (6 mo. later)
 - Desensitized workers to radiation alarms
 - 10 CFR 20.1501(a)
 - 10 CFR 20.1201

Improper HRA Entry (LHRA)

(ML22201A046)

- Failure to follow procedures with an improper entry into a LHRA
 - DW controlled as LHRA
 - Worker dropped a bolt and went to get it
 - Not briefed for other area
 - D/R Alarm @ 563 mR/hr (setpoint 300 mR/hr)
 - TS 5.4.1(a)

Improper HRA Entry

(ML22305A517)

- Failure to follow procedures with an improper entry into a high radiation area
 - Worker Behavior
 - Not briefed for area (changed elevations)
 - Did not exit the area as instructed
 - D/R alarm of 355 mR/hr (setpoint 302 mR/hr)
 - TS 6.8.1.a

HRA Controls

(ML23031A093)

- Failure to inform workers of current radiological conditions prior to entry into a high radiation area
 - Dry cask storage cannister in cask decon area
 - Welding crew was not appropriately briefed prior to entering the HRA
 - Radiological conditions higher than briefed
 - TS 6.8.1(a)

HRA Controls

(ML23221A327)

- Improper entry into a high radiation area
 - Work was crew briefed appropriately
 - To work identified RHR valve on one elevation
 - But... removed shielding and insulation from a core spray valve on a different elevation
 - Workers entered an HRA not briefed
 - Radiological conditions higher than briefed
 - TS 5.4.1.a

Improper HRA entry

(ML23293A193)

- Inadvertent Entry Into an Overhead High Radiation Area
 - Clearance order removal
 - Worker deviated from briefed work scope and path
 - Accessed valve in overhead (HRA)
 - Failed to contact RP prior to entering the overhead
 - Dose rate alarm received
 - TS 5.4.1.a

Rad Monitors, RAM Control, Shipping, Effluents, & Part 37

- **7 Radiation Monitor Calibration**
- **3 EP (Radiation Monitors)**
- **1 Radioactive Material Control**
- **1 Shipment**
- **3 Effluents**

Rad Monitor Calibration

(ML22294A090)

- Failure to periodically calibrate radiation monitors as required
 - 35 ARMs discontinued calibration or “run to maintenance or failure”
 - 16 process and effluent monitors changed to three-year frequency
 - Calibration not verified prior to changes
 - 10 CFR 20.1501(c)

Rad Monitor Calibration

(ML22028A000)

- Failure to periodically calibrate radiation monitors
 - 29 of 41 still past due for calibration
 - Mis-categorized rad monitors in 2006
 - Changed frequency without justification
 - Process and Effluent at 18 months in FSAR
 - 10 CFR 20.1501(c)

Rad Monitor Corrective Action (SL-IV)

(ML22028A000)

- Failure to adequately characterize and correct the conditions
 - LIV from 2019 NCV for the failure to periodically calibrate emergency plan radiation monitors
 - Calibration frequencies for additional radiation monitors in UFSAR not met or existing frequencies justified
 - 10 CFR 50 Appendix B, Criteria XVI

Radiation Monitor Calibration

(ML23312A183)

- Failure to periodically calibrate radiation monitors
 - Repeat of NCV for failure to calibrate 29 of 41 radiation monitors (ML22028A000)
 - Only calibrated 1 of the 29 rad monitors were calibrated since previous inspection
 - Addressed calibration frequency aspect - LIV
 - NOV for failure to restore compliance
 - 10 CFR 20.1501(c)

Rad Monitor Calibration

(ML23025A098)

- Failure to periodically calibrate radiation monitors within their frequency
 - 11 radiation monitors
 - Beyond “grace” period
 - 10 CFR 20.1501(c)

Rad Monitor Calibration

(ML23026A095)

- Failure to periodically calibrate radiation monitors
 - Discontinued periodic calibrations for 34 area radiation monitors
 - Frequency changed to “as required”
 - Maintenance strategy, not a frequency
 - 10 CFR 20.1501(c)

Radiation Monitor Calibration

(ML23122A163)

- Failure to calibrate primary drywell and containment high range area radiation monitors
 - Failed sensitivity tolerances (last 2 calibrations cycles)
 - Failed to declare inoperable (EP implications)
 - Preliminary White (10 CFR 50.54(q)(2))
 - Procedure inadequate
 - 10 CFR 20.1501(c)

Radiation Monitor Calibration

(ML23201A252)

- Final significance determination
 - Regulatory Conference
 - Additional calibration data identified
 - Addressed EP aspect of inoperable rad monitors
 - Calibration procedure deficiency remained
 - Final Determination – Green significance
 - 10 CFR 20.1501(c)

Radiation Monitor Calibration - EP

(ML22241A143)

- Failure to maintain accurate EAL thresholds and dose assessment methods
 - Failure to maintain WRGM, mid/high range detectors reliable and accurate
 - Calibration Factor
 - Engineering conversion factor
 - Used readings for EAL classification
 - Potential to over classify emergency up to a GE
 - NOV – White significance
 - 10 CFR 50.54(q)(2)
 - 50.47(b)(4) & (9)

Radiation Monitor Calibration - EP

(ML23201A132)

- Failure to maintain accurate EAL thresholds and dose assessment methods
 - Extent of condition assessment following White finding and 95001 inspection.
 - Effluent monitor errors – engineering conversion factors
 - Affected EAL classification
 - Inaccurate dose assessment
 - Preliminary and Final White - Accepted
 - 10 CFR 50.54(q)(2)

Radiation Monitor Calibration - EP

(ML23025A384)

- Failure to maintain accurate dose assessment methods
 - Preliminary White from ML22348A272
 - Engineering conversion factors in error
 - Used incorrect version of database
 - Affected dose assessment
 - Accepted violation - White significance (NOV)
 - 10 CFR 50.54(q)(2)
 - 10 CFR 50.47(b)(9)

Radioactive Material Control

(ML22201A046)

- Failure to secure materials from unauthorized access
 - LIV during routine survey of postings
 - Container closed, but not locked or sealed
 - 82 mR/hr on contact and 2.5 mR/hr @ 1 m
 - Lock was open and hanging from latch
 - 10 CFR 20.1801

Shipping Package - Documentation

(ML23026A095)

- Failure to comply with the terms of the Certificate of Compliance for a package delivered to a carrier for transport
 - SFP cleanup campaign inaccurate load plans resulted in errors in shipping paperwork
 - 1 of 6 shipments contained > 10 Ci/kg Co-60
 - Exceeded the CoC limit for the package
 - 10 CFR 71.17

Effluent Controls Program

(ML21306A220)

- Failure to control liquid release in accordance with TRM
 - Liquid effluent monitor inoperable
 - Failed to restore instrument within 14 days
 - Failed to suspend releases via this pathway
 - 13 more releases before monitor was restored
 - TS 5.5.4

Effluent Release Report (SL-IV)

(ML21306A220)

- Failure to provide complete and accurate information
 - Failed to report inoperable liquid effluent monitor
 - Report stated liquid effluent monitoring instrumentation was
 - Operable
 - Within Requirements
 - Process used to identify this was circumvented
 - 10 CFR 50.9(a) – SL-IV

Effluent Release Report (SL-IV)

(ML23024A125)

- Failure to Provide Complete and Accurate Information
 - 2021 Annual Radioactive Effluent Release Report
 - Failed to report all inoperable periods for effluent monitor
 - Only one period was reported
 - 10 CFR 50.9(a) – SL-IV

Part 37

- Exempt - minimum security 37.11(c)
 - In Quarterly Reports

Questions and / or Discussion