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Protecting People and the Environment

FY 2011
Events at RTRs

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Experiment Event #1

- An SRO withdrew irradiated oil samples from the reactor pool and received an estimated 12.5 Rem to his hands.
- Radiation levels in the area exceeded 50R/hr.
- The SRO grabbed the sample holder with his hands for approximately 15 seconds
- The SRO was not wearing extremity dosimetry.

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Experiment Event #1

Root cause

- Procedures did not
  - require operator to estimate radiation levels prior to sample removal,
  - possess hold points to verify radiation levels,
  - possess dose rate limits above which samples should not be removed from the pool.
- Procedures routinely allowed operators to handle irradiated samples with bare hands and did not require extremity dosimetry.

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Experiment Event #1 Violation Description

- Licensee did not implement a radiation protection program to ensure compliance with 10 CFR 20
  - 10 CFR 20.1501 requires surveys to determine the magnitude of radiation levels
  - 10 CFR 20.1201(a) requires the use of extremity monitoring devices for dose in excess of 10% of limits
  - Inadequate procedures

Severity Level III violation

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Experiment Event #2

- A technician entered a beam cave with the beam port shutter stuck open. The technician exited 18 seconds later.
- The technician traversed the beam when entering and leaving the cave.
- The opened shutter created a beam of radiation at 30 rem/hr.
- The technician had failed to wear his dosimeter.

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Experiment Event #2

Root Cause

- Failure mode of stuck open shutter not considered in design of door open interlock.
  - Shutter hung-up on end-stop bolt and failed to close.
- Inadequate controls on personnel entry into beam cave

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Experiment Event #2 Violation Description

- Failure to implement control access to a high radiation area per 10 CFR 20.1601(a)

- Failure to monitor exposure to radiation and radioactive material to comply with dose limits of 10 CFR 20.1502

Two level IV Non-Cited violations

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Experiment Event #3

- A radioactive material spill occurred as graphite samples were being removed from a heater apparatus following irradiation in the reactor.
- A polyethylene tie broke causing a small quantity of gray powder to become airborne.
- Potential for degradation of the polyethylene tie and the presence of the powder was not anticipated by the individuals involved.

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Experiment Event #3

Root Cause

- Licensee considered experiment Routine Experiment since a similar experiment had been performed around 1997
  - No access to safety review conducted in 1997
  - Important differences between the 2 experiments

- Licensee failed to identify this experiment as a Modified Routine Experiment.

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Experiment Event #3 Violation Description

- Modified Routine Experiments (TS) shall be reviewed and approved in writing by the Facility Director, or designated alternate. The review of modified routine experiments shall consider its effect on reactor operation and the possibility and consequences of its failure…

Severity Level IV violation

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Human Error Events

- Reactor operated for 50 min w/o a TS required equipment.
  - During testing of off-site alarm, RO reached for wrong dial and caused the loss of a required equipment and failed to notice.

- Reactor S/U and operated up to 1.5 MW with only one operable safety channel scram
  - Following maintenance, detector signal cable placed on wrong channel

- Operations with fewer than T.S. required Safety Channel Alarms
  - Period scram channel cable found disconnected