

UNITED STATES
NUCLEAR REGULATORY COMMISSION
OFFICE OF NUCLEAR MATERIAL SAFETY AND SAFEGUARDS
OFFICE OF NUCLEAR REACTOR REGULATION

WASHINGTON, DC 20555-0001

September 13, 2023

NRC INFORMATION NOTICE 2023-04: OPERATING EXPERIENCE RELATED TO FIRE
EVENTS AT DECOMMISSIONING NUCLEAR
POWER PLANTS IN THE UNITED STATES

ADDRESSEES

All holders of and applicants for an operating license or construction permit for a nuclear power reactor issued under Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, "Domestic licensing of production and utilization facilities," including those that have permanently ceased operations and certified that fuel has been permanently removed from the reactor vessel.

All holders of and applicants for a power reactor combined license, standard design approval, or manufacturing license under 10 CFR Part 52, "Licenses, certifications, and approvals for nuclear power plants." All applicants for a standard design certification, including such applicants after initial issuance of a design certification rule.

PURPOSE

The U.S. Nuclear Regulatory Commission (NRC) is issuing this information notice (IN) to inform addressees of fire events in radiologically controlled areas; posted radiologically contaminated areas; instances of failure to control combustible material and/or perform adequate fire watches; or implement other fire protection activities at decommissioning power reactor sites. These fire events have been documented in NRC decommissioning reactor inspection reports from 2018 to 2023. While the focus of this IN is based on fire incidents at, and the regulations for, decommissioning reactors; the root causes are not reactor-specific activities, and this operational experience can be applicable to any operating or decommissioning nuclear power plant. The significance of these events is the potential for the release of radionuclides, in and outside of controlled areas of the site (outside of a restricted area but inside the site boundary) and potentially to publicly accessible areas, occupational radiation exposure, and the impact on industrial safety. The NRC expects that recipients of this IN will review this information for applicability to their facilities and consider actions, as appropriate. The INs may not impose new requirements, and nothing in this IN should be interpreted to require specific action.

BACKGROUND

In accordance with 10 CFR 50.48(f)(1), "licensees that have submitted the certifications required under 10 CFR 50.82(a)(1) shall maintain a fire protection program to address the potential for

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fires that could cause the release or spread of radioactive materials (i.e., that could result in a radiological hazard).”

Fire protection for nuclear power plants uses the concept of defense-in-depth to achieve the required degree of reactor safety by using echelons of administrative controls, fire prevention, fire detection, and suppression systems. These systems are relied upon by licensees to achieve compliance with NRC fire protection requirements in 10 CFR 50.48, “Fire protection,” to protect safety-related and important to safety structures, systems, and components (SSCs) that are needed to achieve safe shutdown of the reactor in the event of a fire and to minimize radioactive release to the environment in the event of a fire.

In accordance with 10 CFR 50.48, each operating nuclear power plant is required to have a fire protection plan. The plan should establish the fire protection policy for the protection of SSCs at each plant and the procedures, equipment, and personnel required to implement the program at the plant site. The primary fire protection concern for permanently shutdown plants is protecting the integrity of the remaining spent nuclear fuel in the spent fuel pool and preventing or minimizing the release of radioactive material, resulting from fires involving contaminated plant SSCs or radioactive waste.

The fire protection program for an operating reactor provides the basis for developing the fire protection program for the decommissioning phase. The goal of the fire protection program during decommissioning of nuclear power plants is to provide an appropriate level of defense-in-depth protection against the threat of fires. Defense-in-depth for fire protection involves a comprehensive program of administrative controls, physical fire protection features, emergency response capabilities, and protection of SSCs necessary to prevent or mitigate the potential of an unacceptable release of radioactive materials. This combination of elements reduces both the probability and consequences of fire events, and it ensures that the failure of any one element within the fire protection program is adequately compensated for by the others, thereby minimizing the risk to the public, environment, and plant personnel.

For those plants that are permanently shut down, are undergoing decommissioning, or both, the licensing basis changes must be in accordance with the requirements in 10 CFR 50.82, “Termination of License.” For permanently shutdown reactors, 10 CFR 50.48(f) and Regulatory Guide 1.191, Revision 1, “Fire Protection Program for Nuclear Power Plants During Decommissioning” (Agencywide Documents Access and Management System (ADAMS) at Accession No. ML20287A199), relate to fire protection.

The objectives of the fire protection program listed in 10 CFR 50.48(f)(1) are to: (1) reasonably prevent fires from occurring, (2) rapidly detect, control, and extinguish those fires that do occur and that could result in a radiological hazard, and (3) ensure that the risk of fire-induced radiological hazards to the public, environment, and plant personnel is minimized. In addition, a fire protection program that complies with 10 CFR 50.48(c), “*National Fire Protection Association Standard NFPA 805*,” incorporates by reference, with exceptions, modifications, and supplementation, National Fire Protection Association (NFPA) Standard 805, “Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants.” The 2001 Edition is deemed to be acceptable for complying with the requirements of 10 CFR 50.48(f).

DESCRIPTION OF CIRCUMSTANCES

Recent fire events at decommissioning power reactor sites provide useful lessons concerning fire protection program implementation. These events are selected and summarized from reports of NRC inspections performed from August 2018 to May 2023. During that period the NRC assessed six reported occurrences of fires in radiologically controlled areas or potentially radiologically contaminated areas at decommissioning power reactor sites. The six incidents are described in the following NRC inspection reports:

- Accelerated Decommissioning Partners (ADP) CR3, LLC, Crystal River Unit 3 – NRC Inspection Report Nos. 05000302/2021004, January 24, 2022, and 05000302/2022001, May 3, 2022 (ADAMS Accession Nos. ML22011A005 and ML22116A183, respectively)
- Holtec Decommissioning International, LLC, Pilgrim Nuclear Power Station – NRC Inspection Report No. 05000293/2022004, February 15, 2023 (ADAMS Accession No. ML23031A208)
- Fort Calhoun Station, NRC Inspection Reports 050-00285/2021-001, February 17, 2021, 050-00285/2022-001, February 25, 2022, and 050-00285/2022-002, April 28, 2022 (ADAMS Accession Nos. ML21048A322, ML22055A979 and ML22112A158, respectively)

The NRC also assessed four instances of failure to properly implement fire protection procedures at decommissioning power reactor sites. The four incidents are described in the following NRC inspection reports:

- Holtec Decommissioning International, LLC, Indian Point Energy Center Units 1, 2 and 3 – NRC Inspection Report Nos. 05000003/2022004, 05000247/2022004, 05000286/2022004, and 07200051/2022002, March 13, 2023 (ADAMS Accession No. ML23047A154)
- San Onofre Nuclear Generating Station, NRC Inspection Reports 05000361/2018-002 and 05000362/2018-002, August 10, 2018, and 05000361/2022-001 and 05000362/2022-001, March 14, 2022 (ADAMS Accession Nos. ML18219B607 and ML22068A233, respectively)
- Fort Calhoun Station – NRC Inspection Report 05000285/2023-003, July 5, 2023 (ADAMS Accession No. ML23177A119)

At Crystal River Unit 3, as described in above NRC inspection reports (ADAMS Accession Nos. ML22011A005 and ML22116A183), NRC inspection staff identified incidents where the licensee did not properly implement fire procedures during hot work activities. For example, an area was left without a fire watch for the required amount of time after the completion of hot work.

At Fort Calhoun Station in September 2020 (ADAMS Accession No. ML21048A322), hot work in containment caused a fire because slag from torch cutting fell through multiple elevations into a high radiation area and ignited combustible material.

Also, at Fort Calhoun Station in January 2022, as described in the above NRC inspection report (ADAMS Accession No. ML22055A979), a fire started when the traveling river water screen was being cut with a torch for removal. The workers thought the screen was constructed of stainless steel. However, the screen was made of a polyethylene-type material, which reacted to the use of a torch resulting in a fire. The fire watch immediately responded, but an offsite fire department was requested to assist the site.

In February 2022 (ADAMS Accession No. ML22068A233) at, at San Onofre Nuclear Generating Station NRC inspectors found Class “A” combustible materials, including non-covered wooden planks, within the licensees’ procedural exclusion area or directly under where hot work was being performed.

In July 2018 (ADAMS Accession No. ML18219B607), also at San Onofre Nuclear Generating Station, NRC inspectors found that combustible materials were not removed from a room that supported active plant equipment after work was completed. Debris, bags of waste, and leftover distribution cables were stored in a cable tray that was located directly below active cable trays without the required vertical separation from combustible materials.

In May 2022 (ADAMS Accession No. ML23031A208), NRC inspectors identified the licensee’s failure to utilize a hot work permit to control the use of a halogen lamp in one room of the radioactive waste facility at Pilgrim Nuclear Power Station. This led to a fire when the lamp ignited combustible material.

In October 2022 (ADAMS Accession No. ML23047A154) at Indian Point Nuclear Generating Station Units 1, 2 and 3, NRC inspectors determined that the licensee had failed to implement a fire protection equipment surveillance procedure. Specifically, the piping associated with the high-pressure fire water system had not been flow tested within the required surveillance interval.

At Fort Calhoun Station in 2023, (ADAMS Accession No. ML23177A119) NRC inspectors found that the licensee failed to perform and/or record all fire watch inspections in parts of the decommissioning area without fire detection.

DISCUSSION

The operating experience events described in this IN highlight the importance of:

- adequate procedures and field practices to ensure that combustible materials were spaced the required minimum distance from hot work;
- appropriate implementation of fire prevention control measures during use of heat, spark or open flame for activities such as cutting, welding, and grinding;
- the proper implementation of fire watch procedures for hot work and fire protection equipment surveillance procedures, and;
- appropriate storage requirements for transient combustible materials near energized plant equipment.

Regulatory Guide 1.191 and, NUREG/BR-0522, Revision 1, “Fire Protection for Operating Nuclear Power Plants and Decommissioning Reactors” (ADAMS Accession No. ML22340A499) provides an overview of the fire protection requirements of 10 CFR 50.48 for decommissioning facilities. The NFPA Standard 51B, “Standard for Fire Prevention During Welding, Cutting, and

Other Hot Work,” as referenced in NRC Regulatory Guide 1.191, and NUREG/CR-7135, “Compensatory and Alternative Regulatory Measures for Nuclear Power Plant FIRE Protection (CARMEN-FIRE)” (ADAMS Accession No. ML15226A446), can also be useful references for fire protection programs for decommissioning facilities.

CONTACT

Please direct any questions about this matter to the technical contact listed below.

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OFFICE	QTE	NMSS/DUWP/RDB	NRR/DRA/APLB	NMSS/DUWP/RDB	OE/EB	NRR/DRA/APLB
NAME	JDoughety	JParrott	Nlqbal	SAndrson	JPeralta	SMehta
DATE	4/10/2023	4/18/2023	8/11/2023	4/27/2023	8/4/2023	4/18/2023
OFFICE	NRR/DRO/IOLB	NRR/DRO/IOEB	NMSS/DUWP	NRR/DRO/IOEB	NMSS/DUWP	NRR/DRO
NAME	IBetts	PClark	MFerdas	LRegner	JMarshall	RFelts
DATE	8/16/2023	7/3/2023	8/4/2023	9/8/2023	9/12/2023	9/13/2023

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