

**NUCLEAR REGULATORY COMMISSION**

**[Docket No. 50-302; NRC-2015-0115]**

**Duke Energy Florida, Inc.**

**Crystal River Nuclear Generating Plant, Unit 3**

**AGENCY:** Nuclear Regulatory Commission.

**ACTION:** Exemption; issuance.

**SUMMARY:** The U.S. Nuclear Regulatory Commission (NRC) is issuing an exemption from certain power reactor liability insurance requirements in response to a request from Duke Energy Florida, Inc. (DEF or the licensee) dated February 25, 2014, as supplemented by letter dated May 7, 2014. This exemption would permit the licensee to reduce its primary offsite liability insurance and withdraw from participation in the secondary retrospective rating pool for deferred premium charges.

**DATE:** [INSERT DATE OF PUBLICATION IN THE *FEDERAL REGISTER*].

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**FOR FURTHER INFORMATION CONTACT:** Michael D. Orenak, Office of Nuclear Reactor Regulation, telephone: 301-415-3229, e-mail: [Michael.Orenak@nrc.gov](mailto:Michael.Orenak@nrc.gov), U.S. Nuclear Regulatory Commission, Washington DC 20555-0001.

**SUPPLEMENTARY INFORMATION:**

**I. Background.**

The Crystal River Nuclear Generating Plant, Unit 3 (CR-3), is a decommissioning power reactor located at Red Level, Florida in Citrus County, about 5 miles south of Levy County. The site is 7.5 miles northwest of Crystal River, Florida, and 90 miles north of St. Petersburg,

Florida. The CR-3 is situated on the Gulf of Mexico within the Crystal River Energy Complex. The DEF is the holder of the CR-3 Facility Operating License No. DPR-72. The license provides, among other things, that the facility is subject to all rules, regulations, and orders of the NRC now or hereafter in effect.

The CR-3 has been shut down since September 26, 2009, and the final removal of fuel from its reactor vessel was completed on May 28, 2011. By letter dated February 20, 2013 (ADAMS Accession No. ML13056A005), DEF submitted a certification to the NRC of permanent cessation of power operations and permanent removal of fuel from the reactor vessel. As a permanently shutdown and defueled facility, and in accordance with section 50.82(a)(2) of Title 10 of the *Code of Federal Regulations* (10 CFR), CR-3 is no longer authorized to operate the reactor or emplace nuclear fuel into the reactor vessel. The licensee is still authorized to possess and store irradiated nuclear fuel. Irradiated fuel is currently being stored onsite in a spent fuel pool (SFP).

## **II. Request/Action.**

Pursuant to 10 CFR 140.8, "Specific exemptions," DEF has requested an exemption from 10 CFR 140.11(a)(4) by letter dated February 25, 2014 (ADAMS Accession No. ML14063A502), as supplemented by letter dated May 7, 2014 (ADAMS Accession No. ML14139A007). The May 7, 2014, exemption request submittal superseded, in its entirety, the request dated February 25, 2014. The exemption from 10 CFR 140.11(a)(4) would permit the licensee to reduce the required level of primary offsite liability insurance from \$375 million to \$100 million, and would allow DEF to withdraw from participation in the secondary financial protection (also known as the secondary retrospective rating pool for deferred premium charges).

The regulation in 10 CFR 140.11(a)(4) requires each licensee to have and maintain financial protection. For a single unit reactor site, which has a rated capacity of 100,000 kilowatts electric or more, 10 CFR 140.11(a)(4) requires the licensee to maintain \$375 million in primary financial protection. In addition, the licensee is required to participate in a secondary retrospective rating pool (secondary financial protection) that commits each licensee to additional indemnification for damages that may exceed primary insurance coverage. Participation in the secondary retrospective rating pool could potentially subject DEF to deferred premium charges up to a maximum total deferred premium of \$121,255,000 with respect to any nuclear incident at any operating nuclear power plant, and up to a maximum annual deferred premium of \$18,963,000 per incident.

The licensee states that the risk of an offsite radiological release is significantly lower at a nuclear power reactor that has permanently shut down and defueled, when compared to an operating power reactor. Similarly, the associated risk of offsite liability damages that require insurance indemnification is commensurately lower. Therefore, DEF is requesting an exemption from 10 CFR 140.11(a)(4), to permit a reduction in primary offsite liability insurance and to withdraw from participation in the secondary financial protection pool.

### **III. Discussion.**

Pursuant to 10 CFR 140.8, the Commission may, upon application by any interested person or upon its own initiative, grant exemptions from the requirements of 10 CFR part 140, when the exemptions are authorized by law and are otherwise in the public interest.

The financial protection limits of 10 CFR 140.11(a)(4) were established to require a licensee to maintain sufficient insurance to satisfy liability claims by members of the public for personal injury, property damage, or the legal cost associated with lawsuits as the result of a

nuclear accident. The insurance levels established by this regulation were derived from the risks and potential consequences of an accident at an operating reactor with a rated capacity of 100,000 kilowatts electric (or greater). During normal power reactor operations, the forced flow of water through the reactor coolant system (RCS) removes heat generated by the reactor. The RCS, operating at high temperatures and pressures, transfers this heat through the steam generator tubes converting non-radioactive feedwater to steam, which then flows to the main turbine generator to produce electricity. Many of the accident scenarios postulated for operating power reactors involve failures or malfunctions of systems that could affect the fuel in the reactor core, which in the most severe postulated accidents, would involve the release of large quantities of fission products. With the permanent cessation of reactor operations at CR-3, and the permanent removal of the fuel from the reactor core, such accidents are no longer possible. The reactor, RCS, and supporting systems no longer operate and have no function related to the storage of the irradiated fuel. Therefore, postulated accidents involving failure or malfunction of the reactor, RCS, or supporting systems are no longer applicable.

During reactor decommissioning, the principal radiological risks are associated with the storage of spent fuel onsite. In its September 26, 2013, exemption request regarding offsite emergency plans (ADAMS Accession No. ML13274A584), DEF discusses both design-basis and beyond design-basis events involving irradiated fuel stored in the SFP. The licensee states that there are no possible design-basis events at CR-3 that could result in an offsite radiological release exceeding the limits established by the U.S. Environmental Protection Agency's early-phase Protective Action Guidelines of 1 rem (roentgen equivalent man) at the exclusion area boundary. The only accident that might lead to a significant radiological release at a decommissioning reactor is a zirconium fire. The zirconium fire scenario is a postulated, but highly unlikely, beyond design-basis accident scenario that involves loss of water inventory from the SFP, resulting in a significant heat-up of the spent fuel, and culminating in substantial

zirconium cladding oxidation and fuel damage. The probability of a zirconium fire scenario is related to the decay heat of the irradiated fuel stored in the SFP. Therefore, the risks from a zirconium fire scenario continue to decrease as a function of the time that CR-3 has been permanently shut down.

The licensee provided a detailed analysis of the events that could result in an offsite radiological release at CR-3 in its September 26, 2013, submittal. One of these beyond design-basis accidents involves a complete loss of SFP water inventory, where cooling of the spent fuel would be primarily accomplished by natural circulation of air through the uncovered spent fuel assemblies. The licensee's analysis of this accident shows that as of September 26, 2013, air-cooling of the spent fuel assemblies is sufficient to keep the fuel within a safe temperature range indefinitely without fuel damage or offsite radiological release. This is important because the Commission has previously authorized a lesser amount of liability insurance coverage, based on an analysis of the zirconium fire risk. In SECY-93-127, "Financial Protection Required of Licensees of Large Nuclear Power Plants During Decommissioning," dated May 10, 1993 (ADAMS Accession No. ML12257A628), the staff outlined a policy for reducing required liability insurance coverage for decommissioning reactors. The discussions in SECY-93-127 centered primarily on the public health and safety risks associated with storing fuel in spent fuel pools. In its Staff Requirements Memorandum dated July 13, 1993 (ADAMS Accession No. ML003760936), the Commission approved a policy that would permit reductions in commercial liability insurance coverage when a licensee was able to demonstrate that the spent fuel could be air-cooled if the SFP was drained of water. Upon demonstration of this technical criterion, the Commission policy allowed decommissioning licensees to withdraw from participation in the secondary insurance protection layer, and permitted reductions in the required amount of commercial liability insurance coverage to \$100 million. The staff has used this technical criterion to grant similar exemptions to other decommissioning reactor licensees (e.g., Maine

Yankee Atomic Power Station, published in the *Federal Register* on January 19, 1999 (64 FR 2920); Zion Nuclear Power Station, published in the *Federal Register* on December 28, 1999 (64 FR 72700), and Kewaunee Power Station, published in the *Federal Register* on March 24, 2015 (80 FR 15638)). Additional discussions of other decommissioning reactor licensees that have received exemptions to reduce their primary insurance level to \$100 million are provided in SECY-96-256, "Changes to the Financial Protection Requirements for Permanently Shutdown Nuclear Power Reactors, 10 CFR 50.54(W) and 10 CFR 140.11," dated December 17, 1996 (ADAMS Accession No. ML15062A483). These prior exemptions were based on the licensee demonstrating that the SFP could be air-cooled, consistent with the technical criterion discussed above.

In SECY-00-0145, "Integrated Rulemaking Plan for Nuclear Power Plant Decommissioning," dated June 28, 2000, and SECY-01-0100, "Policy Issues Related to Safeguards, Insurance, and Emergency Preparedness Regulations at Decommissioning Nuclear Power Plants Storing Fuel in Spent Fuel Pools," dated June 4, 2001 (ADAMS Accession Nos. ML003721626 and ML011450420, respectively), the staff discussed additional information concerning SFP zirconium fire risks at decommissioning reactors and associated implications for offsite insurance. Analyzing when the spent fuel stored in the SFP is capable of air-cooling is one measure that demonstrates when the probability of a zirconium fire would be exceedingly low. However, the staff has more recently used an additional analysis that would bound an incomplete drain-down of the SFP water inventory or some other catastrophic event, such as a complete drainage of the SFP with rearrangement of spent fuel rack geometry and/or the addition of rubble to the SFP. The analysis postulates that decay heat transfer from the spent fuel via conduction, convection, or radiation would be impeded. This analysis is often referred to as an adiabatic heat-up.

The licensee's analyses referenced in its exemption request demonstrates that under conditions where the SFP water inventory has drained and only air-cooling of the stored irradiated fuel is available, there is reasonable assurance as of September 26, 2013, that the CR-3 spent fuel will remain at temperatures far below those associated with a significant radiological release. In addition, the licensee's adiabatic heat-up analyses demonstrate that as of September 26, 2103, there would be at least 10 hours after the loss of all means of cooling (both air and/or water), before the spent fuel cladding would reach a temperature where the potential for a significant offsite radiological release could occur. The licensee states that for this loss of all cooling scenario, 10 hours is sufficient time for personnel to respond with additional resources, equipment, and capability to restore cooling to the SFP, even after a non-credible, catastrophic event. As provided in a separate DEF letter dated May 7, 2014 (ADAMS Accession No. ML14139A006), the licensee reaffirmed the continuation of its makeup strategies in the event of a loss of SFP coolant inventory. The multiple strategies for providing makeup to the SFP include using existing plant systems for inventory makeup, supplying water through hoses to connections to the existing SFP piping using the diesel-driven fire service pump, and using a diesel-driven portable pump to take suction from CR-3 intake and discharge canals. These strategies will be maintained by a license condition. The licensee also stated that, considering the very low-probability of beyond design-basis accidents affecting the SFP, these diverse strategies provide defense-in-depth and time to mitigate and prevent a zirconium fire, using makeup or spray into the SFP before the onset of zirconium cladding rapid oxidation.

In the NRC safety evaluation of the licensee's request for exemptions from certain emergency planning requirements dated March 30, 2015 (ADAMS Accession No. ML15058A906), the NRC staff assessed the DEF accident analyses associated with the radiological risks from a zirconium fire at the permanently shutdown and defueled CR-3 site. The NRC staff confirmed that under conditions where cooling airflow can develop, suitably



conservative calculations indicate that as of September 2013, the fuel would remain at temperatures where the cladding would be undamaged for an unlimited period. For the very unlikely beyond design-basis accident scenario where the SFP coolant inventory is lost in such a manner that all methods of heat removal from the spent fuel are no longer available, there will be a minimum of 10 hours from the initiation of the accident until the cladding reaches a temperature where offsite radiological release might occur. The staff finds that 10 hours is sufficient time to support deployment of mitigation equipment, consistent with plant conditions, to prevent the zirconium cladding from reaching a point of rapid oxidation.

The staff has determined that the licensee's proposed reduction in primary offsite liability coverage to a level of \$100 million, and the licensee's proposed withdrawal from participation in the secondary insurance pool for offsite financial protection, are consistent with the policy established in SECY-93-127 and subsequent insurance considerations resulting from additional zirconium fire risks, as discussed in SECY-00-0145 and SECY-01-0100. In addition, the NRC staff noted that there is a well-established precedent of granting a similar exemption to other permanently shutdown and defueled power reactors upon demonstration that the criterion of the zirconium fire risks from the irradiated fuel stored in the SFP is of negligible concern.

#### **A. Authorized by Law.**

In accordance with 10 CFR 140.8, the Commission may grant exemptions from the regulations in 10 CFR part 140 as the Commission determines are authorized by law. The NRC staff has determined that granting of the licensee's proposed exemption will not result in a violation of the Atomic Energy Act of 1954, Section 170, or other laws, as amended, which require licensees to maintain adequate financial protection. Therefore, the exemption is authorized by law.

## **B. Is Otherwise in the Public Interest.**

The financial protection limits of 10 CFR 140.11 were established to require licensees to maintain sufficient offsite liability insurance to ensure adequate funding for offsite liability claims, following an accident at an operating reactor. However, the regulation does not consider the reduced potential for and consequence of nuclear incidents at permanently shutdown and decommissioning reactors.

SECY-93-127, SECY-00-0145, and SECY-01-0100 provide a basis for allowing licensees of decommissioning plants to reduce their primary offsite liability insurance and to withdraw from participation in the retrospective rating pool for deferred premium charges. As discussed in these documents, once the zirconium fire concern is determined to be negligible, possible accident scenario risks at permanently shutdown and defueled reactors are greatly reduced when compared to operating reactors, and the associated potential for offsite financial liabilities from an accident are commensurately less. The licensee has analyzed, and the NRC staff has confirmed, that the possible accidents that could result in an offsite radiological risk are minimal, thereby justifying the proposed reductions in offsite liability insurance and withdrawal from participation in the secondary retrospective rating pool for deferred premium charges.

Additionally, participation in the secondary retrospective rating pool could be problematic for DEF because the licensee would incur financial liability if an extraordinary nuclear incident occurred at another nuclear power plant. Because CR-3 is permanently shut down, it does not produce revenue from electricity generation sales to cover such a liability. Therefore, such liability, if incurred, could significantly affect the financial resources available to the facility to conduct and complete radiological decontamination and decommissioning activities. Furthermore, the shared financial risk exposure to DEF is greatly disproportionate to the radiological risk posed by CR-3 when compared to operating reactors.

The reduced overall risk to the public at decommissioning power plants does not warrant DEF to carry full operating reactor insurance coverage after the requisite spent fuel-cooling period has elapsed, following final reactor shutdown. The licensee's proposed financial protection limits will maintain a level of liability insurance coverage commensurate with the risk to the public. These changes are consistent with previous NRC policy and exemptions approved for other decommissioning reactors. Thus, the underlying purpose of the regulations will not be adversely affected by the reductions in insurance coverage.

Accordingly, the NRC staff concludes that granting the exemption from 10 CFR 140.11(a)(4) is in the public interest.

### **C. Environmental Considerations.**

The NRC approval of the exemption to insurance or indemnity requirements belongs to a category of actions that the Commission, by rule or regulation, has declared to be a categorical exclusion, after first finding that the category of actions does not individually or cumulatively have a significant effect on the human environment. Specifically, the exemption is categorically excluded from further analysis in accordance with 10 CFR 51.22(c)(25).

Under 10 CFR 51.22(c)(25), granting of an exemption from the requirements of any regulation of Chapter I to 10 CFR is a categorical exclusion provided that i) there is no significant hazards consideration; ii) there is no significant change in the types or significant increase in the amounts of any effluents that may be released offsite; iii) there is no significant increase in individual or cumulative public or occupational radiation exposure; iv) there is no significant construction impact; v) there is no significant increase in the potential for or consequences from radiological accidents; and vi) the requirements from which an exemption is sought involve surety, insurance, or indemnity requirements.

The Director, Division of Operating Reactor Licensing, Office of Nuclear Reactor Regulation, has determined that approval of the exemption request involves no significant hazards consideration, because reducing a licensee's offsite liability requirements at CR-3 does not 1) involve a significant increase in the probability or consequences of an accident previously evaluated; 2) create the possibility of a new or different kind of accident from any accident previously evaluated; or 3) involve a significant reduction in a margin of safety. The exempted financial protection regulation is unrelated to the operation of CR-3. Accordingly, there is no significant change in the types or significant increase in the amounts of any effluents that may be released offsite, and no significant increase in individual or cumulative public or occupational radiation exposure. The exempted regulation is not associated with construction, so there is no significant construction impact. The exempted regulation does not concern the source term (i.e., potential amount of radiation in an accident) or mitigation. Therefore, there is no significant increase in the potential for, or consequences of, a radiological accident. In addition, there would be no significant impacts to biota, water resources, historic properties, cultural resources, or socioeconomic conditions in the region. The requirement for offsite liability insurance may be viewed as involving surety, insurance, or indemnity matters.

Therefore, pursuant to 10 CFR 51.22(b) and 51.22(c)(25), no environmental impact statement or environmental assessment need be prepared in connection with the approval of this exemption request.

#### **IV. Conclusions.**

Accordingly, the Commission has determined that, pursuant to 10 CFR 140.8, the exemption is authorized by law, and is otherwise in the public interest. Therefore, the Commission hereby grants DEF exemption from the requirements of 10 CFR 140.11(a)(4) to

permit the licensee to reduce primary offsite liability insurance to \$100 million, accompanied by withdrawal from participation in the secondary insurance pool for offsite liability insurance.

The exemption is effective upon issuance.

Dated at Rockville, Maryland, this 27<sup>th</sup> day of April, 2015.

For the Nuclear Regulatory Commission.

***/RA/***

A. Louise Lund, Acting Director,  
Division of Operating Reactor Licensing,  
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