

NUCLEAR REGULATORY COMMISSION

Docket Nos. 50-003, 50-247, and 50-286

Holtec Decommissioning International, LLC,

Holtec Indian Point 2, LLC, and Holtec Indian Point 3, LLC

Indian Point Nuclear Generating Unit Nos. 1, 2, and 3

Exemption

I. Background

Indian Point Nuclear Generating Unit No. 1 (IP1) permanently ceased generation on October 31, 1974, and all fuel was removed from the IP1 reactor vessel by January 1976. In 1996, the U.S. Nuclear Regulatory Commission (NRC, the Commission) issued an order approving the safe-storage condition of IP1. In 2003, the NRC issued Amendment No. 52 to IP1's provisional operating license, which changed the expiration date of the provisional license to be consistent with that of the Indian Point Nuclear Generating Unit No. 2 (IP2) facility license at that time. Pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.82(a)(2), the IP1 license no longer authorizes operation of the reactor or emplacement or retention of fuel into the reactor vessel. There is no IP1 spent fuel in wet storage at the Indian Point Energy Center (IPEC) site; IP1 spent fuel is stored onsite in dry cask storage at the independent spent fuel storage installation (ISFSI).

By letter dated February 8, 2017 (Agencywide Documents Access and Management System Accession No. ML17044A004), Entergy Nuclear Indian Point 2, LLC, and Entergy Nuclear Indian Point 3, LLC (the IPEC licensees at that time, collectively, Entergy) certified to the NRC that they planned to permanently cease power operations at IP2 and Indian Point Nuclear Generating Unit No. 3 (IP3) by April 30, 2020, and April 30, 2021, respectively. By letters dated May 12, 2020, and May 11, 2021 (ML20133J902 and ML21131A157), Entergy certified to the NRC that power operations permanently ceased at IP2 and IP3 on April 30,

2020, and April 30, 2021, respectively. In the same letters, Entergy certified to the NRC that the fuel was permanently removed from the IP2 and IP3 reactor vessels and placed in the IP2 and IP3 spent fuel pools (SFPs) as of May 12, 2020, and May 11, 2021, respectively.

Based on the docketing of these certifications for permanent cessation of operations and permanent removal of fuel from the reactor vessels, as specified in 10 CFR 50.82(a)(2), the 10 CFR Part 50 renewed facility licenses for IP2 and IP3 (Nos. DPR-26 and DPR-64, respectively) no longer authorize operation of the reactors or emplacement or retention of fuel in the reactor vessels. The facility is still authorized to possess and store irradiated (i.e., spent) nuclear fuel. At the time of the exemption request described below, spent fuel was stored onsite at the IP2 and IP3 facilities in the SFPs and in a dry cask ISFSI.

II. Request/Action

By letter dated March 18, 2022 (ML22077A132), Holtec Decommissioning International, LLC (HDI), one of the licensees of IPEC and an indirect wholly owned subsidiary of Holtec International (Holtec), requested an exemption on behalf of Holtec Indian Point 2, LLC (a licensee of IP1 and IP2, referred to as Holtec IP2) and Holtec Indian Point 3, LLC (a licensee of IP3, and referred to as Holtec IP3), from the requirements of 10 CFR 50.54(w)(1) concerning onsite liability insurance. HDI, Holtec IP2, and Holtec IP3 are hereafter collectively referred to as the licensee. The exemption from 10 CFR 50.54(w)(1) would permit the licensee to reduce the required level of onsite property damage insurance from \$1.06 billion to \$50 million for IPEC.

The regulation at 10 CFR 50.54(w)(1) requires licensees to have and maintain onsite property damage insurance to stabilize and decontaminate the reactor(s) and reactor site in the event of an accident. The onsite insurance coverage must be either \$1.06 billion or whatever amount of insurance is generally available from private sources (whichever is less).

The licensee states that the risk of an incident at a permanently shutdown and defueled reactor is much less than the risk from an operating power reactor. In addition, since reactor operation is no longer authorized at IPEC, there are no events that would require the

stabilization of reactor conditions after an accident. Similarly, the risk of an accident that would result in significant onsite contamination at IPEC is also much lower than the risk of such an event at operating reactors. Therefore, the licensee requested an exemption from 10 CFR 50.54(w)(1) to reduce its onsite property damage insurance from \$1.06 billion to \$50 million, commensurate with the reduced risk of an incident at the permanently shutdown and defueled IPEC site.

III. Discussion

Under 10 CFR 50.12, "Specific exemptions," the Commission may, upon application by any interested person or upon its own initiative, grant exemptions from the requirements of 10 CFR Part 50 when (1) the exemptions are authorized by law, will not present an undue risk to public health or safety, and are consistent with the common defense and security; and (2) any of the special circumstances listed in 10 CFR 50.12(a)(2) are present.

The financial protection limits of 10 CFR 50.54(w)(1) were established after the Three Mile Island Nuclear Station, Unit 2 accident out of concern that licensees may be unable to financially cover onsite cleanup costs in the event of a major nuclear accident. The specified \$1.06 billion coverage amount requirement was developed based on an analysis of an accident at a nuclear reactor operating at power, resulting in a large fission product release and requiring significant resource expenditures to stabilize the reactor and ultimately decontaminate and cleanup the site.

These cost estimates were developed based on the spectrum of postulated accidents for an operating nuclear reactor. Those costs were derived from the consequences of a release of radioactive material from the reactor. Although the risk of an accident at an operating reactor is very low, the consequences onsite and offsite can be significant. In an operating plant, the high temperature and pressure of the reactor coolant system (RCS), as well as the inventory of relatively short-lived radionuclides, contribute to both the risk and consequences of an accident. With the permanent cessation of reactor operations at IPEC and the permanent removal of the

fuel from the reactor vessels, such accidents are no longer possible. As a result, the reactor vessels, 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 reactors, RCS, or supporting systems are no longer applicable.

During reactor decommissioning, the largest radiological risks are associated with the storage of spent fuel onsite. In the exemption request dated March 18, 2022, the licensee discussed both design-basis and beyond design-basis events involving irradiated fuel stored in the SFPs. The licensee determined that there are no possible design-basis events at IPEC that could result in an offsite radiological release exceeding the limits established by the U.S. Environmental Protection Agency's (EPA) early phase Protective Action Guides (PAGs) of 1 roentgen equivalent man (rem) at the exclusion area boundary, as a way to demonstrate that any possible radiological releases would be minimal and would not require precautionary protective actions (e.g., sheltering in place or evacuation). The NRC staff evaluated the radiological consequences associated with various decommissioning activities and the design basis accidents at IPEC, in consideration of the permanently shutdown and defueled condition. The possible design-basis accident scenarios at IPEC have greatly reduced radiological consequences. Based on its review, the NRC staff concluded that no reasonably conceivable design-basis accident exists that could cause an offsite release greater than the EPA PAGs.

The only incident that has the potential to lead to a significant radiological release at a decommissioning reactor is a zirconium fire in the SFP. 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 since IPEC has been permanently shut down.

The Commission has previously authorized a lesser amount of onsite financial protection, based on this analysis of the zirconium fire risk. In SECY-96-256, “Changes to Financial Protection Requirements for Permanently Shutdown Nuclear Power Reactors, 10 CFR 50.54(w) and 10 CFR 140.11,” dated December 17, 1996 (ML15062A483), the NRC staff recommended changes to the power reactor financial protection regulations that would allow licensees to lower onsite insurance levels to \$50 million upon demonstration that the fuel stored in the SFP can be air-cooled. In its Staff Requirements Memorandum to SECY-96-256, dated January 28, 1997 (ML15062A454), the Commission supported the NRC staff’s recommendation that, among other things, would allow permanently shutdown power reactor licensees to reduce commercial onsite property damage insurance coverage to \$50 million when the licensee was able to demonstrate the technical criterion that the spent fuel could be air-cooled if the SFP was drained of water.

The NRC staff has used this technical criterion to grant similar exemptions to other decommissioning reactors (e.g., Maine Yankee Atomic Power Station, published in the *Federal Register* (FR) on January 19, 1999 (64 FR 2920); Zion Nuclear Power Station, published in the FR on December 28, 1999 (64 FR 72700); Kewaunee Power Station, published in the FR on March 24, 2015 (80 FR 15638); Crystal River Unit 3 Nuclear Generation Plant, published in the FR on May 6, 2015 (80 FR 26100); Oyster Creek Nuclear Generating Station, published in the FR on December 28, 2018 (83 FR 67365); Pilgrim Nuclear Power Station, published in the FR on January 14, 2020 (85 FR 2153); Three Mile Island Nuclear Station, Unit 1, published in the FR on March 26, 2021 (86 FR 16241); and the Duane Arnold Energy Center, published in the FR on May 18, 2021 (86 FR 26946)). These prior exemptions were based on these licensees demonstrating that the SFP could be air-cooled, consistent with the technical criterion discussed above.

In its March 18, 2022, request, the licensee compared the IPEC fuel storage parameters with those used in NRC generic evaluations of fuel cooling included in NUREG/CR-6451, “A

Safety and Regulatory Assessment of Generic BWR [Boiling-Water Reactor] and PWR [Pressurized-Water Reactor] Permanently Shutdown Nuclear Power Plants,” dated August 1997 (ML082260098). The analysis described in NUREG/CR-6451 determined that natural air circulation would adequately cool fuel in the representative PWR.

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 (ML003721626 and ML011450420, respectively), the NRC staff discussed additional information concerning SFP zirconium fire risks at decommissioning reactors and associated implications for onsite property damage insurance. Providing an analysis of when the spent fuel stored in the SFP is capable of air-cooling is one measure that can be used to demonstrate that the probability of a zirconium fire is exceedingly low.

In their letter dated March 18, 2022, HDI stated, and the NRC staff confirmed, that the bounding analyses for the IP2 and IP3 SFPs for beyond design basis events demonstrate that 15 months after shutdown of IP3 a minimum of 10 hours is available before the fuel cladding temperature of the hottest fuel assembly in either SFP reaches 900°C with a complete loss of SFP water inventory. This analysis, “Holtec Spent Fuel Pool Heat Up Calculation Methodology Topical Report, Revision 2,” dated December 22, 2021 (ML21357A005 [non-public]), was submitted by HDI in support of a request for exemptions from certain emergency planning requirements, dated December 22, 2021 (ML21356B693). HDI provided further information in Enclosure 1, “Indian Point Unit Nos. 2 and 3 Spent Fuel Pool Heat Up Calculations,” to HDI’s supplemental letter dated February 1, 2022 (ML22032A117).

As stated in NUREG-1738, “Technical Study of Spent Fuel Pool Accident Risk at Decommissioning Nuclear Power Plants,” dated February 2001 (ML010430066), 900°C is an acceptable temperature to use for assessing the onset of fission product release, where the

SFP is drained and air cooling is not possible; at least 10 hours would be available from the time spent fuel cooling is lost until the hottest fuel assembly reaches a temperature of 900°C. The 10-hour criterion, conservatively, does not consider the time to uncover the fuel and assumes instantaneous loss of cooling to the fuel. The 10-hour time period is also not intended to represent the time that it would take to repair all key safety systems or to repair a large SFP breach. The 10-hour criterion is a conservative period of time in which pre-planned mitigation measures to provide makeup water or spray to the SFP can be reliably implemented before the onset of a zirconium cladding ignition. In addition, in the unlikely event that a release is projected to occur, 10 hours would provide sufficient time for offsite agencies, if deemed warranted, to take appropriate action to protect the health and safety of the public.

In the NRC staff's evaluation contained in SECY-22-0102, the NRC staff assessed the HDI accident analyses associated with the radiological risks from a zirconium fire at a permanently shutdown and defueled IPEC after 15 months of fuel decay. For the highly 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, the NRC staff found that 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 NRC 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. As a result, the likelihood that such a scenario would progress to a zirconium fire is deemed not credible.

Based on the evaluation in SECY-96-256, as well as analysis done by HDI and verified by the NRC staff, the NRC staff determined \$50 million to be an adequate level of onsite property damage insurance for a decommissioning reactor once the spent fuel in the SFP is no longer susceptible to a zirconium fire. However, the NRC staff has postulated that there is still a potential for other radiological incidents at a decommissioning reactor that could result in

significant onsite contamination besides a zirconium fire. In SECY-96-256, the NRC staff cited the rupture of a large, contaminated liquid storage tank (~450,000 gallons) causing soil contamination and potential groundwater contamination as the costliest postulated event to decontaminate and remediate (other than an SFP zirconium fire). The postulated large liquid radiological waste storage tank rupture event was determined to have a bounding onsite cleanup cost of approximately \$50 million. Therefore, the NRC staff determined that the licensee's proposal to reduce onsite insurance to a level of \$50 million would be consistent with the bounding cleanup and decontamination cost, as discussed in SECY-96-256, to account for the postulated rupture of a large liquid radiological waste tank at the IPEC site, should such an event occur.

The NRC staff has determined that the licensee's proposed reduction in onsite property damage insurance coverage to a level of \$50 million is consistent with SECY-96-256 and subsequent insurance considerations resulting from additional zirconium fire risks as discussed in SECY-00-0145 and SECY-01-0100, as well as NUREG/CR-6451 and NUREG-1738. In addition, the NRC staff notes that similar exemptions have been granted 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. The NRC staff concluded that 15 months after the permanent shutdown date of IP3 of April 30, 2021, sufficient irradiated fuel decay time will have elapsed at IPEC to decrease the probability of an onsite radiological release from a postulated zirconium fire accident to negligible levels. In addition, the licensee's proposal to reduce onsite insurance to a level of \$50 million is consistent with the maximum estimated cleanup costs for the recovery from the rupture of a large liquid radwaste storage tank.

The NRC staff also notes that in accordance with letters submitted by HDI on February 15, 2023, and October 16, 2023 (ML23046A102 and ML23289A158), all the spent fuel from the

IP2 and IP3 SFPs has been transferred to dry storage within the ISFSI. As such, an initiating event that would threaten SFP integrity is no longer applicable.

A. The Exemption is Authorized by Law

The requested exemption from 10 CFR 50.54(w)(1) would allow the licensee to reduce the minimum coverage limit for onsite property damage insurance. As stated above, 10 CFR 50.12 allows the NRC to grant exemptions from the requirements of 10 CFR Part 50 when the exemptions are authorized by law.

As explained above, the NRC staff has determined that the licensee's proposed reduction in onsite property damage insurance coverage to a level of \$50 million is consistent with SECY-96-256. Moreover, the NRC staff concluded that 15 months after the permanent cessation of power operations, sufficient irradiated fuel decay time will have elapsed at IPEC to decrease the probability of an onsite and offsite radiological release from a postulated zirconium fire accident to negligible levels. In addition, the licensee's proposal to reduce onsite insurance to a level of \$50 million is consistent with the maximum estimated cleanup costs for the recovery from the rupture of a large liquid radiological waste storage tank.

The NRC staff has determined that granting the licensee's proposed exemption will not result in a violation of the Atomic Energy Act of 1954, as amended, or the Commission's regulations. Therefore, based on its review of the licensee's exemption request as discussed above, and consistent with SECY-96-256, the NRC staff concludes that the exemption is authorized by law.

B. The Exemption Presents No Undue Risk to the Public Health and Safety

The onsite property damage insurance requirements of 10 CFR 50.54(w)(1) were established to provide financial assurance that following a significant nuclear incident, onsite conditions could be stabilized and the site decontaminated. The requirements of 10 CFR 50.54(w)(1) and the existing level of onsite insurance coverage for IPEC are predicated on the assumption that the reactor is operating. However, IPEC permanently ceased power

operations on October 31, 1974, April 30, 2020, and April 30, 2021 (For IP1, IP2, and IP3, respectively), and permanently defueled as of January 1976, May 12, 2020, and May 11, 2021 (For IP1, IP2, and IP3, respectively). The permanent cessation of operations and defueled status of the facility results in a significant reduction in the number and severity of potential accidents and, correspondingly, a significant reduction in the potential for and severity of onsite property damage. The proposed reduction in the amount of onsite insurance coverage does not impact the probability or consequences of potential accidents. The proposed level of insurance coverage is commensurate with the reduced consequences of potential nuclear accidents at IPEC. Therefore, the NRC staff concludes that granting the requested exemption will not present an undue risk to the health and safety of the public.

C. The Exemption Is Consistent with the Common Defense and Security

The proposed exemption would not eliminate any requirements associated with physical protection of the site and would not adversely affect the licensee's ability to physically secure the site or protect special nuclear material. Physical security measures at IPEC are not affected by the requested exemption. Therefore, the proposed exemption is consistent with the common defense and security.

D. Special Circumstances

Special circumstances, in accordance with 10 CFR 50.12(a)(2)(ii), are present whenever application of the regulation in the particular circumstances is not necessary to achieve the underlying purpose of the regulation.

The underlying purpose of 10 CFR 50.54(w)(1) is to provide reasonable assurance that adequate funds will be available to stabilize reactor conditions and cover onsite cleanup costs associated with site decontamination following an accident that results in the release of a significant amount of radiological material. Since IPEC permanently ceased power operations on October 31, 1974, April 30, 2020, and April 30, 2021 (For IP1, IP2, and IP3, respectively), and permanently defueled as of January 1976, May 12, 2020, and May 11, 2021 (For IP1, IP2,

and IP3, respectively), it is no longer possible for the radiological consequences of design-basis accidents or other credible events at IPEC to exceed the limits of the EPA PAGs at the exclusion area boundary. The licensee has evaluated the consequences of highly unlikely, beyond-design-basis conditions involving a loss of coolant from the SFP. The analyses show that 15 months after the permanent cessation of power operations, the likelihood of such an event leading to a large radiological release is negligible. The NRC staff's evaluation of the licensee's analyses confirms this conclusion.

The NRC staff also finds that the licensee's proposed \$50 million level of onsite insurance is consistent with the bounding cleanup and decontamination cost as discussed in SECY-96-256, to account for the hypothetical rupture of a large liquid radiological waste tank at the IPEC site, should such an event occur. Therefore, the NRC staff concludes that the application of the current requirements in 10 CFR 50.54(w)(1) to maintain \$1.06 billion in onsite insurance coverage is not necessary to achieve the underlying purpose of the rule for the permanently shutdown and defueled IPEC reactors.

Under 10 CFR 50.12(a)(2)(iii), special circumstances are present whenever compliance would result in undue hardship or other costs that are significantly in excess of those contemplated when the regulation was adopted, or that are significantly in excess of those incurred by others similarly situated.

The NRC staff concludes that if the licensee was required to continue to maintain an onsite insurance level of \$1.06 billion, the associated insurance premiums would be in excess of those necessary and commensurate with the radiological contamination risks posed by the site. In addition, such insurance levels would be significantly in excess of other decommissioning reactor facilities that have been granted similar exemptions by the NRC.

The NRC staff finds that compliance with the existing rule would result in an undue hardship or other costs that are significantly in excess of those contemplated when the

regulation was adopted and are significantly in excess of those incurred by others similarly situated.

Therefore, the special circumstances required by 10 CFR 50.12(a)(2)(ii) and 10 CFR 50.12(a)(2)(iii) exist.

E. Environmental Considerations

The NRC's approval of an exemption from 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 the requirement to prepare an environmental assessment or environmental impact statement 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, "Nuclear Regulatory Commission," 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.

As the Director of the Division of Decommissioning, Uranium Recovery, and Waste Programs in the NRC's Office of Nuclear Material Safety and Safeguards, I have determined that approval of the exemption request involves no significant hazards consideration, as defined in 10 CFR 50.92, "Issuance of amendment," because reducing the licensee's onsite property damage insurance for IPEC 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 IPEC or site activities. 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 any activities conducted at the site. 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 resulting from issuance of the requested exemption. The requirement for onsite property damage insurance involves surety, insurance, and indemnity matters only.

Therefore, pursuant to 10 CFR 51.22(b) and 51.22(c)(25), "Criterion for categorical exclusion; identification of licensing and regulatory actions eligible for categorical exclusion or otherwise not requiring environmental review," 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 50.12(a), the exemption is authorized by law, will not present an undue risk to the public health and safety, and is consistent with the common defense and security. Also, special circumstances are present as set forth in 10 CFR 50.12.

Therefore, the Commission hereby grants the licensee an exemption from the requirements of 10 CFR 50.54(w)(1) for IPEC. IPEC permanently ceased power operations on October 31, 1974, April 30, 2020, and April 30, 2021, for IP1, IP2, and IP3, respectively. The exemption from 10 CFR 50.54(w)(1) permits IPEC to reduce the minimum required onsite

property damage insurance from \$1.06 billion to \$50 million 15 months after permanent cessation of power operations, which was August 1, 2022. Because this period has already elapsed, the exemption is effective upon issuance.

Dated: November 14, 2023

For the Nuclear Regulatory Commission



Signed by Marshall, Jane
on 11/14/23

Jane E. Marshall, Director,
Division of Decommissioning, Uranium Recovery,
and Waste Programs
Office of Nuclear Material Safety
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