UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION I
475 ALLENDALE ROAD, SUITE 102
KING OF PRUSSIA, PA 19406-1415

May 22, 2023

Kelly Trice
President - HDI
Holtec Decommissioning International, LLC
Krishna P. Singh Technology Campus
1 Holtec Boulevard
Camden, NJ 08104

SUBJECT: HOLTEC DECOMMISSIONING INTERNATIONAL, LLC, INDIAN POINT ENERGY CENTER UNITS 1, 2 AND 3 - NRC INSPECTION REPORT NOS. 05000003/2023001, 05000247/2023001, 05000286/2023001, AND 07200051/2023001

Dear Kelly Trice:

On March 31, 2023, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection under Inspection Manual Chapter 2561, "Decommissioning Power Reactor Inspection Program," at the permanently shutdown Indian Point Nuclear Generating Station Units 1, 2 and 3. The inspection examined activities conducted under your licenses as they relate to safety and compliance with the Commission's rules and regulations, and the conditions of your licenses. The inspection consisted of observations by the inspectors, interviews with site personnel, a review of procedures and records and plant walkdowns. The results of the inspection were discussed with Richard Burroni, Site Vice President, and other members of your staff on April 12, 2023, and are described in the enclosed inspection report.

Based on the results of this inspection, one NRC-identified violation of NRC requirements of no or relatively inappreciable (very low) safety significance (Severity Level IV) is documented in this report. Because of the significance and because the issue was entered into your corrective action program, the NRC is treating the violation as a Non-Cited Violation (NCV), consistent with Section 2.3.2.a of the Enforcement Policy. If you contest the subject or severity the NCV, you should provide a response within 30 days of the date of this letter, with the basis for your denial, to the Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington DC 20555-0001; with copies to the Regional Administrator, Region I; and the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, Washington, DC 20555-001.

In accordance with Title 10 of the *Code of Federal Regulations* (10 CFR) 2.390 of the NRC's "Rules of Practice," a copy of this letter, its enclosure, and your response, if any, will be made available electronically for public inspection in the NRC Public Document Room or from the NRC document system (ADAMS), accessible from the NRC Website at http://www.nrc.gov/reading-rm/adams.html. To the extent possible, your response should not include any personal privacy, proprietary, or safeguards information so that it can be made available to the Public without redaction.

Current NRC regulations and guidance are included on the NRC's website at www.nrc.gov; select **Radioactive Waste**; **Decommissioning of Nuclear Facilities**; then **Regulations, Guidance and Communications**. The current Enforcement Policy is included on the NRC's Website at www.nrc.gov; select **About NRC**, **Organizations & Functions**; **Office of Enforcement**; **Enforcement documents**; then **Enforcement Policy** (Under 'Related Information'). You may also obtain these documents by contacting the Government Printing Office (GPO) toll-free at 1-866-512-1800. The GPO is open from 8:00 a.m. to 5:30 p.m. EST, Monday through Friday (except Federal holidays).

No reply to this letter is required. Please contact Katherine Warner, CHP of my staff at (610) 337-5389 if you have any questions regarding this matter.

Sincerely,

Anthony M. Dimitriadis

Digitally signed by Anthony M. Dimitriadis
Date: 2023.05.22 09:17:22 -04'00'

Anthony Dimitriadis, Chief
Decommissioning, ISFSI, and Reactor Health Physics Branch
Division of Radiological Safety and Security

Docket Nos.: 05000003, 05000247, 05000286, and 07200051
License Nos.: DPR-5, DPR-26, and DPR-64

cc w/encl: Distribution via ListServ

Enclosure: Inspection Report Nos. 05000003/2023001, 05000247/2023001, 05000286/2023001, and 07200051/2023001 w/Attachment

SUBJECT: HOLTEC DECOMMISSIONING INTERNATIONAL, LLC, INDIAN POINT ENERGY CENTER UNITS 1, 2 AND 3 - NRC INSPECTION REPORT NOS. 05000003/2023001, 05000247/2023001, 05000286/2023001, AND 07200051/2023001 DATED MAY 22, 2023

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REGION I

INSPECTION REPORT

Docket Nos.:	05000003, 05000247, 05000286, and 07200051
License Nos.:	DPR-5, DPR-26, and DPR-64
Report Nos.:	05000003/2023001, 05000247/2023001, 05000286/2023001, and 07200051/2023001
Licensee:	Holtec Decommissioning International, LLC (HDI)
Facility:	Indian Point Energy Center, Units 1, 2 and 3
Location:	Buchanan, NY
Inspection Dates:	January 1 – March 31, 2023
Inspectors:	K. Warner, CHP, Senior Health Physicist Decommissioning, ISFSI and Reactor Health Physics Branch Division of Radiological Safety and Security
	S. Veunephachan, Health Physicist Decommissioning, ISFSI and Reactor Health Physics Branch Division of Radiological Safety and Security
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	J. Schoppy, Senior Reactor Inspector Engineering Branch 1 Division of Operating Reactor Safety
	K. Mangan, Senior Reactor Inspector Engineering Branch 1 Division of Operating Reactor Safety

Enclosure

Accompanied By:	K. Barnes, Health Physicist Decommissioning, ISFSI and Reactor Health Physics Branch Division of Radiological Safety and Security
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Approved By:	Anthony Dimitriadis, Chief Decommissioning, ISFSI and Reactor Health Physics Branch Division of Radiological Safety and Security

EXECUTIVE SUMMARY

Holtec Decommissioning International, LLC (HDI)
Indian Point Energy Center Units 1, 2, and 3 (IP-1, IP-2, and IP-3)
NRC Inspection Report Nos. 05000003/2023001, 05000247/2023001, 05000286/2023001, and 07200051/2023001

An announced decommissioning inspection was completed on March 31, 2023, at Indian Point Units 1, 2, and 3. A combination of on-site and remote inspection activities were performed over this period. The inspection included a review of design changes and modifications, problem identification and resolution, spent fuel pool (SFP) activities, decommissioning performance and status, occupational radiation exposure, radioactive waste treatment, effluent and environmental monitoring, solid radioactive waste management, and transportation. The inspection consisted of observations by the inspectors, interviews with site personnel, a review of procedures and records, and plant walk-downs. The U.S. Nuclear Regulatory Commission's (NRC's) program for overseeing the safe decommissioning of a shutdown nuclear power reactor is described in Inspection Manual Chapter (IMC) 2561, "Decommissioning Power Reactor Inspection Program."

Additionally, the inspection period included a review and observation of the Independent Spent Fuel Storage Installation (ISFSI) HI-LIFT construction and installation activities, inspection of Unit 2's dry cask loading campaign, and dry run activities for Unit 3's dry cask loading campaign. The NRC's program for overseeing the operation of dry storage of spent fuel at an ISFSI is described in IMC 2690, "Inspection Program for Storage of Spent Reactor Fuel at Independent Spent Fuel Storage Installations and for Title 10 of the *Code of Federal Regulations* (10 CFR) Part 71 Transportation Packagings."

List of Violations

One NRC identified Severity Level IV non-cited violation (NCV) of Title 10 CFR 72.146 is documented in design control because measures did not provide for verifying the adequacy of design. Specifically, Holtec did not review the suitability of the HI-LIFT crane hydraulic system and crane structure to affirm single failure design capability in the event of a postulated strand jack counterbalance failure. Holtec Decommissioning International (HDI) entered the issue into its corrective action program (CAP) as IR-IP3-01175 and completed analyses to support crane design single failure capability.

REPORT DETAILS

1.0 Background

IP-1 was a pressurized water reactor that was granted a 40-year Operating License in 1962 and was permanently shut down in 1974. Pursuant to the June 19, 1980 "Commission Order Revoking Authority to Operate Facility" and the "Decommissioning Plan for Indian Point Unit No. 1," approved by the NRC in an Order, dated January 31, 1996, the reactor remains in a defueled status.

On February 8, 2017, Entergy Nuclear Operations, Inc. (Entergy) notified the NRC of its intent to permanently cease power operations at IP-2 and IP-3 by April 30, 2020, and April 30, 2022, respectively subject to operating extensions through, but not beyond 2024 and 2025 (Agencywide Documents and Access Management System (ADAMS) Accession Number: ML17044A004). On May 12, 2020, Entergy certified cessation of power operations and the permanent removal of fuel from the IP-2 reactor vessel (ADAMS Accession Number: ML20133J902). On May 11, 2021, Entergy certified cessation of power operations and permanent removal of fuel from the IP-3 reactor vessel (ADAMS Accession Number: ML21131A157). On May 13, 2021, the NRC notified Indian Point that the NRC would no longer perform its oversight activities in accordance with the Operating Reactor Assessment Program and that oversight would be conducted under the provisions outlined in IMC 2561 "Decommissioning Power Reactor Inspection Program" (ADAMS Accession Number: ML21132A069). On May 28, 2021, Entergy Nuclear Operations, Inc. informed the NRC of the successful purchase and sale transaction closing of the Indian Point facilities to Holtec Decommissioning International, LLC (ADAMS Accession No. ML21147A553). On May 28, 2021, the NRC issued license amendments transferring Indian Point Unit Nos. 1, 2, and 3 facility licenses from Entergy Nuclear Operations, Inc. to Holtec Indian Point 2, LLC; Holtec Indian Point 3, LLC; and Holtec Decommissioning International, LLC (ADAMS Accession No. ML21126A004).

IP-1 and IP-2 are physically contiguous and share systems, such as the integrated liquid waste system and the air handling system; and facilities, such as the chemistry and health physics laboratories. Liquid waste from IP-3 will be transported to and processed at IP-1. Radiological effluent limits are met on an overall site basis and specific operating limits and surveillance requirements for effluent monitoring instrumentation, including stack noble gas monitoring, are discussed in the Offsite Dose Calculation Manual (ODCM).

IP-1 was inspected under the "Actively Decommissioning (DECON), No Fuel in the Spent Fuel Pool" category. IP-2 transitioned from the "Actively Decommissioning (DECON), Fuel in the Spent Fuel Pool" category to the "Active Decommissioning (DECON), No Fuel in the Spent Fuel Pool" category during this inspection period. IP-3 was inspected under the "Active Decommissioning (DECON), Fuel in the Spent Fuel Pool" category. The categories of decommissioning are described in IMC 2561.

2.0 Active Decommissioning Performance and Status Review

2.1 Inspection Procedures 37801, 40801, 60801, 71801, 83750, 84750, and 86750

a. Inspection Scope

The inspectors performed on-site decommissioning inspections on January 10 - 12, February 13 - 16, and March 6 - 8, 2023, supplemented by in-office reviews and periodic phone calls. The inspection consisted of observations by the inspectors, interviews with site personnel, a review of procedures and records, and plant walk-downs.

The inspectors conducted document reviews and interviews with site personnel to determine if Indian Point Energy Center (IPEC) procedures and processes, including training and qualifications, were adequate and in accordance with the regulations and guidance associated with 10 CFR 50.59. The inspectors reviewed a sampling of changes to determine if changes made by IPEC under 10 CFR 50.59 required prior NRC approval.

The inspectors assessed the implementation and effectiveness of IPEC's CAP through review of a sampling of issues, non-conformances, and conditions adverse to quality into the CAP and by observation of several management review committee meetings.

The inspectors reviewed IPEC's programs for the safe wet storage of spent fuel. The inspectors performed walk-downs of the SFP and associated support systems to assess material condition, configuration control, and system operation. The inspectors toured the control room and interviewed certified fuel handlers (CFHs) to determine if SFP system instrumentation, alarms and leakage detection monitoring was adequate to assure the safe storage of spent fuel. The inspectors reviewed a sampling of CFH training documentation and qualification records to review whether IPEC was adequately implementing the CFH program. The inspectors reviewed a sampling of requirements and descriptions related to the SFP in the technical specifications, technical requirements manual, and decommissioning safety activities report to determine whether they had been adequately implemented. The inspectors reviewed select SFP chemistry sample activities and documentation for Unit 3 to determine if chemistry parameters were within the limits of IPEC's license commitments. The inspectors reviewed the implementation of the maintenance rule, including a review of any changes made to determine if they were appropriate.

The inspectors attended select management and staff level meetings, including daily management meetings, two Unit 2 SFP rack removal readiness meetings, a Unit 3 fuel readiness meeting, and various vessel segmentation morning meetings to determine the level of engagement. The inspectors discussed planned 2023 work activities with HDI management and performed several plant walkdowns to assess material conditions and housekeeping, including the Unit 1 sphere, Units 2 and 3 vapor containments (VCs), auxiliary buildings, and fuel storage buildings. The inspectors observed several pre-job briefings and associated work activities, including observations of Unit 3 upper internals segmentation, Unit 3 reactor vessel head segmentation in the Unit 2 VC, Unit 2 SFP diving operations, and radioactive waste movement activities.

The inspectors conducted plant walk-downs, including radiologically controlled areas, to examine radiological postings, airborne and contamination controls, and locked high

radiation controls. The inspectors reviewed radiation work permits (RWP's), As Low As Reasonably Achievable (ALARA) work plans to determine if radiation work activities were pre-planned effectively to limit worker exposure, ALARA briefs discussing rad safety during work activities, and Total Effective Dose Equivalent (TEDE) ALARA evaluations to determine if a respirator was needed for work activities. The inspectors interviewed personnel, reviewed procedures and documentation, performed observations of respirator fit testing activities, and evaluated internal dosimetry, including a sampling of bioassay results for the 2022 SFP divers for Unit 3. The inspectors observed radiation protection (RP) technicians performing radiological work coverage, calibrations, and surveys to determine if implementation of radiological work controls, training and skill level were sufficient for the activities being performed. The inspectors observed various radiological work activities, including diving operations in the Unit 3 SFP to determine if radiological workers and RP personnel had performed work in accordance with procedures and utilized appropriate RP practices. The inspectors reviewed RP supervisor qualifications to determine if individuals were adequately qualified for their job responsibilities. The inspectors attended various RP meetings, including daily RP technician briefings, daily RP supervisor meetings, and ALARA meetings. The inspectors reviewed documentation and interviewed RP personnel regarding a dose rate alarm that occurred on January 27, 2023 (IR-IP2-00791).

The inspectors reviewed procedures and the flow path associated with plans to drain down and release of the first six feet of water of the Unit 2 SFP to evaluate the existing plant systems should they be utilized.

The inspectors observed activities, interviewed personnel, and reviewed documentation to determine the effectiveness of IPEC's programs for handling, storage, and transportation of radioactive material. The inspectors observed portions of radioactive waste handling and radiological surveys for shipment and reviewed select work packages for a shipment of radioactive waste. The review included records of shipment packaging, surveying, labeling, marking, placarding, vehicle checks, and emergency instructions to determine compliance with NRC and Department of Transportation regulations. The inspectors reviewed the Part 37 security plan and reviewed IPEC's implementation of the requirements. The inspectors reviewed calibration and source check documentation, associated procedures, and performed observations of the truck monitor during a source check and movement of a radioactive waste through the monitor. The inspectors reviewed the available 10 CFR Part 61 analyses for IPEC waste streams, including dry active wastes and resins.

b. Observations

The inspectors determined that the reviewed process applicability screenings and 10 CFR 50.59 screenings and evaluations had been performed with no issues of more than minor significance. The inspectors noted that PAD IPC-2022-078 evaluated the installation of a new, larger roll-up door at the Unit 3 Containment Access Facility (CAF) to accommodate movement of larger equipment. The inspectors reviewed post-modification airflow tests and determined that the results demonstrated adequate negative/inward airflow into the Annex to meet site requirements.

The inspectors determined that issues had been identified, entered into the CAP, and evaluated commensurate with their safety significance through document review and discussion. The inspectors noted adequate management engagement during management review committee meetings.

The inspectors noted that IPEC finished the Unit 2 continuous pool to pad dry cask campaign prior to the SFP safety inspection on February 13 -16, 2023. Therefore, the inspection efforts focused on the safe storage of the fuel in the Unit 3 SFP. The inspectors observed adequate material condition of the Unit 3 SFP and its supporting cooling and electrical systems. The inspectors observed the collection and analysis of Unit 3 SFP cooling water for boron and total activity analysis. The inspectors determined that site staff performing this activity had adequate training and knowledge to perform the task, that the procedures were adequately followed, and results were within site requirements. The inspectors determined that the requirements reviewed in the Unit 3 technical specifications and technical requirements manual associated with spent fuel were met. These included spent fuel pit water level requirements specified in technical specifications (TS) section 3.7.14 via direct observation and spent fuel assembly storage in TS section 3.7.16 via document review and discussions regarding spent fuel movements since the last inspection. The inspectors also verified training programs, qualifications, and staffing were adequate and satisfied the associated technical specification requirements. The inspectors determined that the maintenance rule was adequately implemented since the last inspection. The inspectors determined that IPEC had safely stored spent fuel in wet storage.

The inspectors noted that during this inspection period, IPEC continued upper reactor vessel internals segmentation activities at Unit 3, continued preparations for reactor vessel internals segmentations at Unit 2, continued Unit 3 reactor vessel head segmentation activities in the Unit 2 VC, continued preparations for Unit 2 SFP clean out, including residual waste and fuel rack removal, and demolished the Unit 2 condensate storage tank. The inspectors noted that for the areas of the plant toured, the material condition was adequate, and housekeeping improved during the inspection period.

The inspectors determined that RWPs and ALARA plans for Unit 3 reactor upper internals and reactor head segmentation projects were implemented effectively to limit worker exposure at the time of the inspection. The inspectors observed respirator fit testing, a Telepole (telescopic survey meter) calibration and a source check and a demonstration of a calibration of a neutron survey meter and determined that the technicians were knowledgeable and adequately followed their procedures. One inspector obtained site qualification to wear a powered air purifying respirator and through the process, reviewed the training material, passed the exam, and participated in the medical requirements. The inspectors determined that the qualification process was adequate. The inspectors determined that the observed pre-job briefings and radiological work associated with the February 2023 Unit 3 SFP diving operations were adequate and performed in accordance with site procedures. The inspectors reviewed Technical Support Document No. 23-013, Neutron Dosimetry Evaluation at Indian Point Center dated February 17, 2023. The inspectors determined after further discussion with IPEC personnel and review of additional documentation that the site implemented an adequate neutron correction factor where appropriate.

The inspectors determined that IPEC's internal dosimetry program was, in general, adequately implemented for the portions reviewed. The inspectors noted that the doses to the workers were several orders of magnitude below any regulatory limit and were only minorly affected by the correction.

The inspectors reviewed a dose rate alarm that occurred on January 27, 2023, in the Unit 2 fuel storage building (FSB), which was posted as a Locked High Radiation Area (LHRA). The worker was briefed by RP personnel, did not receive any unanticipated dose, and no radiological anomalies in the field were identified. In their initial review of the incident, IPEC determined that the worker mistakenly selected the incorrect radiation work permit task with lower set points on the access control terminal touch screen during the log-in process and did not perform the required self-check of the dose set points. This issue was documented as IR-IP2-00791 and initial corrective actions included distribution of a memo to the site for awareness of the issue, reinforcement of expectations, a standdown to the Dry Fuel team during their morning brief, and RP personnel coached the individual. The inspectors interviewed RP personnel on the circumstances surrounding the issue and reviewed RP procedures describing LHRA controls, corrective action documentation, and RP documents, including radiological surveys and briefing sheets. The inspectors determined that the initial corrective actions appeared to be adequate in addressing the human performance error. However, the inspectors identified that IP-EN-RP-101, "Access Control for Radiologically Controlled Areas" Attachment 8 required RP personnel to "validate that the worker is on an RWP that allows entry into the area being briefed for including the proper dosimetry." The correct RWP task and setpoints were not verified for this worker and, through interviews, the inspectors determined that this check was not consistently done by RP across the site. IPEC documented this issue as IR-IP2-00791 and as an immediate corrective action, implemented RP-STD-46, "RP to Verify Correct RWP, Task, and EAD Setpoints Before All HRA and LHRA Entries," Revision 0.

The inspectors reviewed RP supervisor qualification requirements compared to IPEC records and determined there were inconsistencies in the documentation used to demonstrate compliance with ANSI/ANS 3.1-1978 as required by Unit 2 and 3 TS Section 5.3.1. This was documented as IR-IP3-01067 and the inspectors noted that it is similar to the issue (IR-IP2-00408) documented in the November 17, 2022, inspection report (ML22306A065). The inspectors noted through observation and interviews that RP supervisors were adequately performing their job functions.

The inspectors verified that selected radioactive waste shipping paperwork was properly completed, and site personnel were knowledgeable of their duties and responsibilities as required. The inspectors determined that radioactive waste shipped for disposal to land disposal facilities was properly classified, described, packaged, marked, labeled and was in proper condition for transportation for the sample reviewed. The inspectors noted that the truck monitor was properly calibrated, and procedures appeared adequate for the intended purpose of a qualitative check prior to release of shipments intended for non-radiological disposal sites.

c. Conclusions

No violations of more than minor safety significance were identified.

3.0 Independent Spent Fuel Storage Installation (ISFSI)

3.1 Preoperational Testing of an Independent Spent Fuel Storage Installation (Inspection Procedure 60854)

a. Inspection Scope

The inspectors evaluated HDI's performance during NRC observed preoperational dry run activities. These activities were performed in order to fulfill requirements in the NRC-issued Certificate of Compliance (CoC) No. 1014, Amendment 15. The inspectors observed HDI's dry run activities at IPEC related to dry cask transportation operations.

The inspectors attended select HDI pre-job briefings to assess HDI's ability to identify critical steps of the evolution, potential failure scenarios, and human performance tools to prevent errors. The inspectors reviewed the training program and training records of personnel assigned to ISFSI activities. The inspectors reviewed multipurpose canister (MPC) transfer procedures to determine if they contained commitments and requirements specified in the CoC, TSs, UFSAR, and Title 10 of the CFR Part 72.

The inspectors reviewed RP procedures and RWP's associated with the proposed ISFSI loading campaign. The inspectors also reviewed the radiological controls which would be established during an MPC loading campaign and also reviewed corrective action reports associated with preparations for the ISFSI loading campaign to ensure that issues were properly identified, prioritized, and evaluated commensurate with their safety significance.

b. Observations and Findings:

On March 20 - 22, 2023, the inspectors observed cask movement activities to determine whether the licensee had developed the capability to properly move the MPC to be used in storage of spent fuel at IPEC. The inspectors observed: (1) transport of the MPC/HI-TRAC on the low profile transporter (LPT) to outside the FSB; (2) movement of MPC/HI-TRAC on vertical cask transporter (VCT) from the FSB to the cask transfer pit (CTP); (3) simulated radiological field survey activities; (4) stack-up and transfer of the MPC from the HI-TRAC to the HI-STORM; (5) retrieval of the MPC from the HI-STORM and movement back into the HI-STORM; (6) installation of the HI-STORM lid; (7) transport of the HI-STORM on the VCT from the CTP to the ISFSI pad storage location; and (8) simulated radiological field survey activities. Through direct observations and independent evaluation, the inspectors verified the licensee's development, implementation, and preoperational testing activities to safely transfer the loaded dry cask storage system to the ISFSI pad.

c. Conclusions:

No violations of more than minor safety significance were identified.

3.2 Operation of an Independent Spent Fuel Storage Installation (Inspection Procedure 60855)

a. Inspection Scope:

The inspectors conducted direct observations and performed independent evaluations to determine if the licensee was operating the ISFSI program in conformance with its commitments and requirements. The inspectors reviewed changes to the program and procedures since the last inspection, evaluated the effectiveness of the licensee's plans for controlling radiological activities, reviewed selected records, and observed selected licensee activities for loading fuel. The inspectors evaluated the effectiveness of the licensee's management oversight and quality assurance assessments of ISFSI activities.

The inspectors observed and evaluated Indian Point's ISFSI activities associated with dry cask operations. In addition to the ISFSI activities, the inspectors also reviewed the licensee's activities associated with long-term operation and monitoring of the ISFSI. The inspectors verified conformance with the CoC, TSs, and station procedures.

b. Observations and Findings:

On January 23 – 26, 2023, the inspectors observed dry cask operations for the 26th canister (MPC s/n 894 HI-STORM s/n 1796 loaded during the Unit 2 continuous offload campaign. The activities observed included: (1) MPC/HI-TRAC heavy lift out of SFP; (2) decontamination of the HI-TRAC; (3) installation of shield ring; (4) MPC lid welding and non-destructive examinations; (5) forced helium dehydration; (6) stack-up and MPC transfer; (7) HI-STORM lid installation; (8) HI-STORM movement and placement on ISFSI pad; and (9) survey activities. During performance of these activities, the inspectors verified that procedure use, communication, and coordination of ISFSI activities met established regulatory requirements and IPEC approved site procedures. The inspectors also observed pre-job briefings and determined that the licensee's ability to identify critical steps of the evolution, potential failure scenarios, and human performance tools to prevent errors were effective to ensure procedural adherence and a safe work environment.

The inspectors observed RP technicians as they provided job coverage for the cask loading workers. The inspectors reviewed survey data maps and radiological records from the MPC loadings to date and confirmed that radiation survey levels measured were within limits specified by the TS and consistent with values specified in the final safety analysis report.

The pool to pad ISFSI campaign for Unit 2 consisted of 28 casks. The final cask was placed into storage on the ISFSI pad on February 1, 2023.

c. Conclusions:

No violations of more than minor safety significance were identified.

3.3 On-site Fabrication of Components and Construction of an ISFSI (Inspection Procedure 60853)

a. Inspection Scope

During the period inspectors continued to perform reviews of activities associated with the HI-LIFT crane being installed in the IP-3 FSB. The crane is to be used to remove transfer canisters loaded with spent fuel bundles from the IP-3 SFP to the truck bay. The canisters will be subsequently moved to the on-site dry cask storage facility. The HI-LIFT crane is designed to have a 100-ton capacity and single failure proof. The licensee requested NRC approval of the HI-LIFT crane in a License Amendment Request dated March 24, 2020, which described among other topics, the crane design, crane and building structural analyses, crane load test requirements, applicable regulatory requirements, and quality assurance standards. The NRC staff approved the incorporation of the HI-LIFT crane into the IP-3 current licensing basis in IP-3 License Amendment 272 dated February 28, 2022 (ML21091A305). An NRC Safety Evaluation was also provided.

The inspectors interviewed licensee personnel and contractors, reviewed work orders, procedures, testing plans, fabrication procedures, electrical drawings, design calculations, and observed test activities. Specifically, on a sampling basis:

- Inspectors reviewed revisions to the crane structural calculations to determine whether the revisions reflected the as built anchor installation configuration on the south IP-3 spent fuel pool wall. Additionally, the inspectors reviewed revised calculations that evaluated the final as built through-wall stud and plate washer configuration in the truck bay wall.
- Inspectors reviewed test procedures and observed SFP anchor bolt pullout testing to determine whether the testing was in accordance with applicable standards and the test results met design requirements.
- Inspectors reviewed as built electrical drawings and interviewed design engineers to determine whether the Swing Arm Detection System (SADS) and the seismic detection systems met design and licensing basis requirements.
- Inspectors verified design inputs credited in the HI-LIFT crane Failure Modes and Effects Evaluation (FMEA) to determine whether the results were adequately supported by the as built configuration and documentation.

The inspectors noted that crane operating and test procedures remained under development by Holtec staff. Additionally, Holtec staff was finalizing their commercial grade dedication documentation. At the end of this inspection period, the inspectors review continued regarding HI-LIFT crane design and component acceptance activities associated with control and hydraulic system components.

b. Observations

The inspectors observed a sample of anchor pull out tests performed under Holtec Work Order LA 222114-R-001, “Tension Testing of Concrete Anchors Associated with HI-LIFT at IPEC Unit 3.” The inspectors noted that Holtec staff used a pressure conversion

constant to convert pressure applied to the hydraulic test cylinder to determine the pullout load imparted on the anchor bolts. The inspectors questioned if the use of this constant, supplied by the vendor, was consistent with the calibration standard referenced in the procedure (ASTM E3121/E3121M – 17, Standard Test Methods for Field Testing of Anchors in Concrete or Masonry). Following inspector questions regarding overall system calibration, Holtec staff performed testing of the complete hydraulic cylinder and hydraulic system at a test facility to calibrate the configuration as a system. The issue was determined to be of minor safety significance because, although the revised calibration determined that the measured pullout loads were approximately 1% less than calculated during the test, the recalculated tensile load applied to the bolts met the work order acceptance criteria.

Violation

The inspectors identified one Severity Level IV NCV of 10 CFR 72.146, Design Control, because design control measures did not provide for verifying the adequacy of design in the event of a postulated strand jack counterbalance failure. Specifically, Holtec staff did not review the suitability of the HI-LIFT crane hydraulic system and crane structure to affirm single failure design capability. The inspectors noted that Holtec staff credited design features to ensure that the load impact resulting from a postulated loss of strand jack hydraulic pressure and failure of the associated single counterbalance valve would not result in the crane exceeding structural limits. In questioning how this assumption was verified, the inspectors identified that Holtec staff did not have supporting calculations or design analyses to confirm adequate design features.

The inspectors reviewed HI-2210873 Revision 0, Failure Modes and Effects Analysis (FMEA) for IP3 HI-LIFT Mechanical and Control Systems to determine the features of the crane design that were needed to meet design basis requirements. Holtec staff performed the FMEA to verify that single failure proof design criteria were met and to identify critical characteristics. For each credible failure mode, Holtec staff identified a mitigation strategy to address potential consequences of the failure mechanism. The FMEA was submitted to the NRC to support License Amendment Request (LAR) (ML20084U773).

The inspectors reviewed the design of the strand jack system. The inspectors noted that the strand jack, used to vertically raise and lower the crane load, was commercially dedicated to meet design requirements, and was credited to be single failure proof. The review included the strand jack counterbalance valve, which repositions as needed to port pressurized hydraulic fluid to and from the top and bottom of the strand jack hydraulic cylinder. The inspectors noted that the valve active safety function was not single failure proof and reviewed Holtec's FMEA for the evaluation of a potential failure of the valve. Inspectors noted that the failure of the counterbalance valve to reposition following loss of hydraulic fluid pressure would cause the load to lower until it was arrested by the hydraulic cylinder end stop. Holtec staff credited the crane and strand jack design features to ensure the resulting load imparted on the hydraulic cylinder and crane structure was within design limits. Holtec staff stated that design features would limit impact loads resulting from the failure such that they would be below normal load design limits.

The inspectors requested the supporting engineering evaluation that determined the magnitude of the impact and the cranes capability to maintain the load. Holtec staff

determined that an evaluation had not been performed and took corrective action to perform an engineering evaluation to assess the impact to the crane. As a result of inspector questions, the evaluation was performed and incorporated into the FMEA as Appendix B, Analysis of Strand Jack Lowering Following Counterbalance Valve Failure. Holtec staff analysis concluded that the impact load would increase total load on the crane structure, however, the resulting load was less than design loads that had been previously evaluated. The inspectors, with support from technical experts in the NRC Office of Nuclear Reactor Regulation (NRR), determined the analysis was technically adequate.

10 CFR 72.146, Design Control, requires, in part, that measures must be established for the selection and review for suitability of application of materials, parts, equipment, and processes that are essential to the functions of the structures, systems, and components which are important to safety and that design control measures must provide for verifying or checking the adequacy of design by methods such as design reviews, alternate or simplified calculational methods, or by a suitable testing program.

Contrary to the above, prior to March 28, 2023, Holtec did not have design control measures to ensure the suitability of application of materials, parts, equipment, and processes that are essential to the functions of the structures, systems, and components which are important to safety. Specifically, Holtec did not ensure that the strand jack design features and the crane structural capacity would adequately mitigate a design basis event.

The inspectors informed their decision making in the evaluation of the safety significance of this violation by utilizing IMC -0613 Power Reactor Construction Inspection Reports, Appendix E, “Examples of Minor Construction Issues,” dated November 4, 2020. Example 11 characterized an issue as not minor if “failing to meet the acceptance limit could have rendered the SSC unacceptable or indeterminate and required substantive engineering evaluation to verify the installed configuration was acceptable.” Based on this example the inspectors concluded the violation was of more than minor safety significance. The inspectors further determined the violation to be of very low safety significance because, the suitability calculation when completed showed the crane design requirements continued to be met and, therefore, the issue involved a design deficiency that did not result in modifications to the crane.

This violation was evaluated using Section 6.5.d of the NRC Enforcement Policy, dated January 13, 2023, to be a Severity Level IV NCV.

Because this violation was determined to be of relatively inappreciable potential safety consequences, was entered into the licensee’s CAP as IR-IP3-01175, and was not willful or repetitive, the violation was treated as a non-cited violation, consistent with Section 2.3.2.a of the Enforcement Policy **(NCV 05000247/2023001-01, Failure to Verify HI-LIFT Crane Assumptions)**.

c. Conclusions

One Severity Level IV, NCV of 10 CFR 72.146, “Design Control,” was identified.

4.0 Exit Meeting Summary

On April 12, 2023, the inspectors presented the inspection results to Richard Burroni, Site Vice President, and other members of the IPEC organization. No proprietary information was retained by the inspectors or documented in this report.

SUPPLEMENTARY INFORMATION

PARTIAL LIST OF PERSONS CONTACTED

R. Burroni, Site Vice President
F. Spagnuolo, Decommissioning Manager
B. Noval, HDI Director Regulatory Affairs
M. Johnson, Regulatory Assurance Manager
W. Wittich, Senior Licensing Specialist
B. Murray, Senior Project Manager
R. Whitley, Decommissioning Project Manager
G. Delfini, Engineering Supervisor
W. O'Brien, Radiation Protection Superintendent
R. Fucheck, Chemistry and Radiation Protection Manager
C. Bohren, Operations Manager
C. Fabricante, ALARA Specialist
M. Masterson, Senior Radiation Protection Technician
D. Quinn, Radiological Supervisor
J. Swart, Security Manager
R. Passalugo, Waste Controls Specialist Representative

ITEMS OPEN, CLOSED, AND DISCUSSED

None

PARTIAL LIST OF DOCUMENTS REVIEWED

Process Applicability Determinations and Engineering Changes
IPC-2022-078, Revision 0
IPC-2022-060, Revision 0
IPC-2022-055, Revision 0
IPC-2022-082, Revision 1
IPC-2022-082, Revision 2
IPC-2022-069, Revision 0
EC 83554, Revision 0

Procedures
IP-EN-LI-100, Process Applicability Determination, Revision 31
IP-EN-RP-151, Radiological Diving, Revision 0
EN-MA-127, Conduct of Diving Operations, Revision 15
0-RP-IU-201, FastTrack-Vehicle Monitor Use Guidance, Revision 0
EN-DC-150-DP, Condition Monitoring of Maintenance Rule Structures, Revision 2
EN-MA-118, Foreign Material Exclusion, Revision 17
HPP-2880-0401, MPC Stack-Up and Transfer using J&R VCT at IPEC Unit 3, Revision 0
HPP-2880-0501, HI-STORM Operations and Transport using J&R VCT at IPEC Unit 3, Revision 0
HPP-2880-0601, Unloading Procedure at IPEC for HI-STORM Version E1 for Unit 3, Revision 0
IP-EN-RP-121, Radioactive Material Control, Revision 0
IP-EN-RP-303 Attachment 9.1 Instrument Source Check Instructions Mirion Fast Track Vehicle Monitor, Revision 0
IP-EN-RP-101, Access Control for Radiologically Controlled Areas, Revision 0

IP-EN-RP-152, Conduct of Radiation Protection, Revision 0
IP-EN-RP-108, Radiation Protection Posting, Revision 0
IP-EN-RP-100, Radiation Worker Expectations, Revision 0
IP-EN-RP-153, Radiation Protection Fundamentals Program, Revision 0
IP-EN-RP-141, Job Coverage, Revision 0
HPP-2880-0200, MPC Loading at IPEC, Revision 26
HPP-2880-0300, MPC Sealing, Drying, and Backfilling at IPEC, Revision 19
HPP-2880-0400, MPC Stack-Up and Transfer at IPEC, Revision 10
RP-STD-46, RP to Verify Correct RWP, Task, and EAD Setpoints Before all HRA and LHRA Entries, March 9, 2023
2-SOP-5.1.8, Unit 2 Liquid Waste Process System Operation, Revision 10
2-SOP-5.1.5, Calculation and Recording of Radioactive Liquid Releases, Revision 45
2-SOP-5.1.3 Waste Distillate Storage Tanks Receiving, Discharge and Transfer Operation, Revision 28

Issue Reports Reviewed
IR-IP2-00292
IR-IP2-00339
IR-IP2-00793
IR-IP3-00506
IR-IP3-00618
IR-IP3-00798
IR-IP2-00791
FCR28801226
IR-IP3-00901
IR-IP3-01083
IR-IP3-01088

Issue Reports Generated from Inspection
IR-IP3-00963
IR-IP3-00962
IR-IP3-00961
IR-IP2-00759
IR-IP2-00824
IR-IP2-00826
IR-IP3-01067
IR-IP2-01041
IR-IP3-01035
IR-IP3-01039
IR-IP3-01040
IR-IP3-01089
IR-IP3-01090
IR-IP3-01091
QI-3366
IR-IP3-01175

Licensing Bases Documents
Indian Point 2 Technical Specifications, May 10, 2021
Indian Point 3 Technical Specifications, May 17, 2021
Indian Point 2 Technical Requirements Manual, September 2022
Indian Point 3 Technical Requirements Manual, May 26, 2021
Indian Point 2 Defueled Safety Analysis Report, Revision 1
Indian Point 3 Defueled Safety Analysis Report, Revision 0
Post Shutdown Decommissioning Activities Report (IPEC 1, 2, and 3 PSDAR), December 19, 2019

Work Orders
WO 533918-FSB-43

Miscellaneous
32 Hot Leg Smear, Report of Analysis, June 3, 2022
Unit 3 DAW 2021, 10 CFR Part 61 Waste Stream Sample Screening and Evaluation, March 17, 2021
Unit 3 SRST Resin, 10 CFR Part 61 Waste Stream Sample Screening and Evaluation, January 11, 2021
U-3 SEG-UI's, Nuclide Distribution Report, October 12, 2022
ALARA Plan and RWP 20223051, Remove Unit 3 Reactor head and prepare for disposal, Revision 1
ALARA Plan and RWP 20233057, Diving Operations and Support in FSB, Revision 0
ALARA Plan and RWP 20222050, Cut and Cap Reactor Coolant System Valve and Piping, February 9, 2023
ALARA Plan and RWP 20222029, Load 28 MPCs and place on the ISFSI pad, Revision 2
ALARA Plan and RWP 20233030, Unit 3 Dry Cask Storage and associated work, Revision 0
EN-LI-100 PAD Qualification Matrix Rad and Sign, January 2023
Reactor Vessel Segmentation Organization Chart, January 3, 2023
Phase 1 IPEC Organization Chart, January 1, 2023
IPEC-RPT-22-011, Free Release of Steam Generator Secondary Side Upper Vessel, January 3, 2023
PAB Annex smoke test results and analysis to implement PRE-EC-22-078, January 18, 2023
EN-MA-127 Attachment 1, Diving Work Permit Form; 533918-FSB-47 Unit 3 Spent Fuel Pool Cask
Pit, February 14 – 16, 2023
EN-LI-104, Self-Assessment and Benchmark Process; Maintenance Rule (a)(3) Assessment, June 14, 2022
3PT-5Y5, Surveillance Examination of Boral Neutron Absorber Material, May 30, 2013
Indian Point Energy Center Supplemental Maintenance Rule Basis Document for Unit 2 Systems Following Permanent Shutdown and Defueled, October 14, 2021
Indian Point Energy Center Supplemental Maintenance Rule Basis Document for Unit 3 Systems Following Permanent Shutdown and Defueled, May 15, 2021
10TPD-OPS-CFH/NCO, Operations SAFSTOR Training Program Description, Revision 4
IPEC CFH Requalification Power point presentation, 2022 Training
Technical Support Document No. 23-013, Neutron Dosimetry Evaluation at Indian Point Energy Center, Revision 00
Email from Wesley O'Brien, NRC Information Request – Neutron Study average Correction Factor Basis, March 8, 2023
IPEC-RPT-23-004 Developmental data
GEL Work Order 580510, June 14, 2022

IP-EN-RP-203, Dose Assessment March 14, 2022, August 2, 2022
2022 Recalibration of the APEX In-Vivo FASTCAN Counting System at the Holtec Indian Point Energy Center Unit 3, January 20, 2022
2022 PCE Log Unit 3
2022 PCE Log Unit 2
RP Supervisor resumes, various
ANSI/ANS-3.1-1978, American National Standard for Selection and Training of Nuclear Power Plant Personnel
Canberra Work Order #107240, Certificate of Calibration
FTV- FAST TRACK-VEHICLE-STANDARD, December 17, 2021
Unit 3 SFP H3 & ACT log, Dated February 23, 2023
EN-MA-118 Attachment 3, Foreign Material Exclusion Logs, Various February 2023
Unit 3 SFP Diving Location Surveys, Various February 2023
Waste Manifest 23-3-012 and associated forms and documentation, February 17, 2023
Unit 2 SFP and Liquid Waste drawings, various
EN-RP-105 Attachment 9, Radiological Work Permits Anticipated Dose Rate Alarms for RWO 2029, January 27, 2023
IP-EN-RP-101 Attachment 11, LHRA/VHRA Brief Log, January 27, 2023
ASTM E3121/E3121M-17, Standard Test Methods for Field Testing of Anchors in Concrete or Masonry
Dwg 13634, Sht 1-8, HI-Lift Electrical Connection, Rev. 0
HI-2210873, Failure Modes and Effects Analysis (FMEA) for IP3 HI-LIFT Mechanical and Control Systems, Rev. 1
HI-2188625, Structural Evaluation of Hi-Lift Device and Spent Fuel Building Walls at Indian Point Unit 3, Rev. 5
Safety Evaluation by the Office of Nuclear Reactor Regulation Related to Amendment No. 272 to Renewed Facility License No. DPR-64 Holtec Decommissioning International, LLC and Holtec Indian Point 3, LLC, dated February 28, 2022
220531-E-01000-001, Indian Point Unit 3 HI-LIFT Protection Control System, Rev. E
LA222114-R-001, Tension Testing of Concrete Anchors Associated with HI-LIFT at IPEC Unit 3, Rev. 1
CR-2880103H-2005-R0

LIST OF ACRONYMS USED

ADAMS	Agencywide Document Access Management System
ALARA	As Low As Reasonably Achievable
CAP	Corrective Action Program
CAF	Containment Access Facility
CFR	*Code of Federal Regulations*
CFH	Certified Fuel Handler
CoC	Certificate of Compliance
CST	Condensate Storage Tank
CTP	Cask Transfer Pit
CVCS	Chemical and Volume Control System
DECON	Actively Decommissioning
DSAR	Defueled Safety Analysis Report
Entergy	Entergy Nuclear Operations, Inc.
EC	Engineering Change
EP	Emergency Plan
FMEA	Failure Modes and Effects Analysis
FSB	Fuel Storage Building
GPO	Government Printing Office
Holtec/HDI	Holtec Decommissioning International, LLC (HDI)
IMC	Inspection Manual Chapter
IP	Inspection Procedure
IPEC	Indian Point Energy Center
IP-1	Indian Point Unit 1
IP-2	Indian Point Unit 2
IP-3	Indian Point Unit 3
ISFSI	Independent Spent Fuel Storage Installation
LAR	License Amendment Request
LHRA	Locked High Radiation Area
LPT	Low Profile Transporter
MPC	Multipurpose canister
NCV	Non-cited Violation
NRC	Nuclear Regulatory Commission
NRR	Nuclear Reactor Regulation
ODCM	Offsite Dose Calculation Manual
PHE	Public Health Emergency
RP	Radiation Protection
RWP	Radiation Work Permits
SADS	Swing Arm Detection System
SAFSTOR	Safe Storage
SSCs	Structures, Systems, and Components
SFP	Spent Fuel Pool
TEDE	Total Effective Dose Equivalent
TS	Technical Specifications
VC	Vapor Containment
VCT	Vertical Cask Transporter