



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D.C. 20555-0001

December 21, 2021

Mr. Matt Ellis  
Quality Assurance Manager  
Hayward-Tyler, Inc.  
46 Roosevelt Hwy.  
Colchester, VT 05446

SUBJECT: NUCLEAR REGULATORY COMMISSION VENDOR INSPECTION REPORT OF  
HAYWARD-TYLER, INC., NO. 99900345/2021-201

Dear Mr. Ellis:

From November 15 through November 19, 2021, the U.S. Nuclear Regulatory Commission (NRC) staff conducted an inspection at the Hayward-Tyler Inc. (HTI) facility in Colchester, VT. The purpose of this limited-scope inspection was to assess HTI's compliance with the provisions of Title 10 of the *Code of Federal Regulations* (10 CFR) Part 21, "Reporting of Defects and Noncompliance," and selected portions of Appendix B, "Quality Assurance Program Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," to 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities."

This technically-focused inspection specifically evaluated HTI's implementation of the quality activities associated with design, fabrication and testing of safety-related components being supplied to the U.S. operating nuclear power plants. The enclosed report presents the results of the inspection. This NRC inspection report does not constitute NRC endorsement of HTI's overall quality assurance (QA) or 10 CFR Part 21 programs.

Based on the results of this inspection, the NRC inspection team found the implementation of your QA program met the applicable technical and regulatory requirements imposed on you by your customers or NRC licensees. No findings of significance were identified.

In accordance with 10 CFR 2.390, "Public inspections, exemptions, requests for withholding," of the NRC's "Rules of Practice," a copy of this letter, and its enclosure(s), will be made available electronically for public inspection in the NRC Public Document Room and from the NRC's Agencywide Documents Access and Management System (ADAMS), accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html>.

M. Ellis

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If you have any questions concerning this matter, please contact Mr. Aaron Armstrong of my staff at (301) 415-8396.

Sincerely,

Kerri A. Kavanagh, Chief  
Quality Assurance and Vendor Inspection Branch  
Division of Reactor Oversight  
Office of Nuclear Reactor Regulation



Signed by Zhang, Deanna  
on 12/21/21

Docket No.: 99900345

EPID No.: I-2021-201-0064

Enclosures:

1. Inspection Report No. 99900345/2021-201  
and Attachment

SUBJECT: NUCLEAR REGULATORY COMMISSION VENDOR INSPECTION REPORT OF  
 HAYWARD-TYLER, INC., NO. 99900345/2021-201  
 DATED: December 21, 2021

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<b>DATE</b>	12/20/2021	12/21/2021	

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**U.S. NUCLEAR REGULATORY COMMISSION  
OFFICE OF NUCLEAR REACTOR REGULATION  
DIVISION OF REACTOR OVERSIGHT  
QUALITY ASSURANCE AND VENDOR INSPECTION REPORT**

Docket No.: 99900345

Report No.: 99900345/2021-201

Vendor: Hayward-Tyler, Inc.  
46 Roosevelt Hwy.  
Colchester, VT 05446

Vendor Contact: Mr. Matt Ellis  
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Nuclear Industry Activity: The Hayward-Tyler, Inc. facility is located in Colchester, VT. This facility provides safety-related pumps for U.S. nuclear power plants.

Inspection Dates: November 15 - 19, 2021

Inspection Team Leader Aaron Armstrong NRR/DRO/IQVB Team Lead

Inspectors: Dong Park NRR/DRO/IQVB  
Andrea Keim NRR/DRO/IQVB  
Yiu Law NRR/DRO/IQVB Lead in Training

Approved by: Kerri A. Kavanagh, Chief  
Quality Assurance and Vendor Inspection Branch  
Division of Reactor Oversight  
Office of Nuclear Reactor Regulation

Enclosure

## EXECUTIVE SUMMARY

Hayward-Tyler, Inc.

99900345/2021-201

The U.S. Nuclear Regulatory Commission (NRC) staff conducted a vendor inspection at the Hayward-Tyler, Inc. (HTI) facility in Colchester, VT to verify that it had implemented an adequate quality assurance (QA) program that complies with the requirements of Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," to Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, "Domestic Licensing of Production and Utilization Facilities" and 10 CFR Part 21, "Reporting of Defects and Noncompliance." This was the fourth NRC vendor inspection at HTI.

This technically-focused inspection specifically evaluated HTI's implementation of the quality activities associated with the design, fabrication and testing of safety-related pumps being supplied to U.S. nuclear power plants.

These regulations served as the bases for the NRC inspection:

- Appendix B to 10 CFR Part 50
- 10 CFR Part 21

During the course of this inspection, the NRC inspection team implemented Inspection Procedure (IP) 43002, "Routine Inspections of Nuclear Vendors," dated January 27, 2017; IP 43004, "Inspection of Commercial-Grade Dedication Programs," dated January 27, 2017; and IP 36100, "Inspection of 10 CFR Part 21 and Programs for Reporting of Defects and Noncompliance," dated May 16, 2019.

The NRC inspection team observed the following specific activities:

- Shop area walkdown and work practices of HTI's implementation for identification of parts and materials, including area of nonconforming materials
- Gas tungsten arc welding on a high-pressure service water discharge head fabrication per Work Traveler UG11156-2-1
- Magnetic particle examination of a High-Pressure Service Water Lower Column Assembly per Work Traveler UG11156-1-8

The NRC inspection team concluded that HTI's QA policies and procedures comply with the applicable requirements of Appendix B to 10 CFR Part 50 and 10 CFR Part 21, and that HTI's personnel are implementing these policies and procedures effectively. The results of this inspection are summarized below.

### 10 CFR Part 21 Program

The NRC inspection team reviewed HTI's policies and implementing procedures that govern the implementation of its 10 CFR Part 21 program to verify compliance with the requirements of 10 CFR Part 21. The NRC inspection team: 1) reviewed the 10 CFR Part 21 postings; 2) reviewed

a sample of safety-related purchase orders to ensure 10 CFR Part 21 was specified; 3) verified that HTI's nonconformance and correction action programs provide a link to the 10 CFR Part 21 program; and 4) reviewed HTI's process for Part 21 evaluations. No findings of significance were identified.

#### Nonconforming Materials, Parts, or Components and Corrective Action

The NRC inspection team reviewed HTI's policies and implementing procedures that govern the nonconforming materials, parts, or components and corrective action program to verify compliance with the requirements of Criterion XV, "Nonconforming Materials, Parts, or Components," and Criterion XVI, "Corrective Action," of Appendix B to 10 CFR Part 50. The NRC inspection team verified that the procedures contained sufficient guidance for evaluating non-conforming conditions and the procedures ensure that conditions are evaluated for possible corrective action and for 10 CFR Part 21 applicability. The NRC inspection team reviewed a sample of non-conformance reports (NCRs), corrective action reports (CARs) and supplier corrective actions to verify that they demonstrate compliance with regulatory requirements and adherence to HTI's procedures.

In addition, the NRC inspection team reviewed the implementation and closure of the corrective actions opened to address the Notice of Nonconformances documented in the NRC's inspection report No. 99900345/2018-201, dated September 11, 2018.

No findings of significance were identified.

#### Commercial-Grade Dedication

The NRC inspection team reviewed HTI's policies and implementing procedures that govern the commercial-grade dedication (CGD) program to verify compliance with the requirements of Criterion VII "Control of Purchased Material, Equipment, and Services," of Appendix B to 10 CFR Part 50. The NRC inspection team reviewed a sample of HTI's surveys, procurement documents and CGD packages. No findings of significance were identified.

#### Identification and Control of Materials, Parts, and Components

The NRC inspection team reviewed HTI's policies and implementing procedures that govern the implementation of its materials, parts, and components control program to verify compliance with the requirements of Criterion VIII, "Identification and Control of Materials, Parts, and Components," of Appendix B to 10 CFR Part 50. The NRC inspection team observed receipt, fabrication, and storage activities associated with on-going production orders and reviewed a sample of completed shop work orders to confirm HTI's personnel were performing material control activities in accordance with the policies and procedures established for those activities. No findings of significance were identified.

#### Control of Special Processes

The NRC inspection team reviewed HTI's policies and implementing procedures that govern the implementation of its control of special processes program to verify compliance with the requirements of Criterion IX, "Control of Special Processes," of Appendix B to 10 CFR Part 50 as well as Section V, "Nondestructive Examination," and Section IX, "Welding, Brazing, and Fusing Qualification," of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel (B&PV) Code. The NRC inspection team observed the gas tungsten arc

welding on a discharge head fabrication per Job Traveler, UG11156-2-1, and the magnetic particle examination of a lower column assembly per Job Traveler, UG11156-1-8, for the high-pressure service water system associated with Purchase Order (PO) 00688189.

In addition, the NRC inspection team reviewed HTI's certification and qualification records of welding and nondestructive testing (NDT) personnel and confirmed they were qualified in accordance with regulatory requirements. No findings of significance were identified.

#### Control of Measuring and Test Equipment (M&TE)

The NRC inspection team reviewed HTI's policies and implementing procedures that govern the implementation of its control of M&TE program to verify compliance with the requirements of Criterion XII, "Control of Measuring and Test Equipment," of Appendix B to 10 CFR Part 50. The NRC inspection team observed that M&TE was calibrated, labeled, tagged, handled, stored, or otherwise controlled to indicate the calibration status and its traceability to nationally recognized standards. In addition, the NRC inspection team confirmed that when M&TE is lost or found to be out of calibration, HTI initiated a nonconformance report and performed an evaluation to determine the extent of condition. No findings of significance were identified.

## REPORT DETAILS

### 1. 10 CFR Part 21 Program

#### a. Inspection Scope

The U.S. Nuclear Regulatory Commission (NRC) inspection team reviewed Hayward-Tyler, Inc.'s (HTI's) policies and implementing procedures that govern the implementation of its Title 10 of the *Code of Federal Regulations* (10 CFR) Part 21, "Reporting of Defects and Noncompliance," program to verify compliance with the regulatory requirements. The NRC inspection team also evaluated the 10 CFR Part 21 postings and a sample of HTI's purchase orders (POs) for compliance with the requirements of 10 CFR 21.21, "Notification of Failure to Comply or Existence of a Defect and its Evaluation," and 10 CFR 21.31, "Procurement Documents." The NRC inspection team verified that HTI's nonconformance and corrective action procedures provided a link to the 10 CFR Part 21 program. The NRC inspection team verified that the guidance for notifications were in accordance with the requirements of 10 CFR 21.21, as applicable.

The NRC inspection team discussed the 10 CFR Part 21 program with HTI's management and technical staff. The attachment to this inspection report lists the documents reviewed and personnel interviewed by the NRC inspection team.

#### b. Observations and Findings

No findings of significance were identified.

#### c. Conclusion

The NRC inspection team concluded that HTI was implementing its 10 CFR Part 21 program in accordance with the regulatory requirements of 10 CFR Part 21. Based on the limited sample of documents reviewed, the NRC inspection team determined that HTI was implementing its policies and procedures associated with the 10 CFR Part 21 program. No findings of significance were identified.

### 2. Nonconforming Materials, Parts, or Components and Corrective Action

#### a. Inspection Scope

The NRC inspection team reviewed HTI's policies and implementing procedures that govern the control of nonconformances and corrective actions to verify compliance with the requirements of Criterion XV, "Nonconforming Materials, Parts, or Components," and Criterion XVI, "Corrective Action," of Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," to 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities," respectively. Additionally, the NRC inspection team interviewed HTI's personnel to verify there were designated areas to segregate and control nonconforming materials, parts or components. HTI uses discrepant material reports (DMRs) to document and control non-conforming material, parts or components and supplier deviation disposition requests (SDDR).



The NRC inspection team determined that HTI's processes and procedures provide for the identification, documentation, segregation, evaluation, and disposition of nonconforming items. These processes also apply the principles of rework/repair, scrap, return to vendor (RTV), or "use as-is." The NRC inspection team also reviewed that HTI's nonconformance process provides a link to evaluate nonconformances for reportability under HTI's 10 CFR Part 21 program. The nonconformance process is also linked to the corrective action program.

The NRC inspection team observed HTI's assembly floor and verified that nonconforming materials, parts or components were properly identified, marked, and segregated, when practical, to ensure that they were not reintroduced into the production processes.

The NRC inspection team reviewed a sample of nonconforming reports (NCRs) associated with the production of safety-related parts and confirmed that HTI: (1) dispositioned the DMRs in accordance with the applicable procedures; (2) documented an appropriate technical justification for the dispositions; and (3) took adequate corrective action regarding the nonconforming items to prevent recurrence, as appropriate. The NRC inspection team also reviewed a sample of corrective action reports (CARs) and confirmed: (1) there was adequate documentation and a description of conditions adverse to quality; (2) an appropriate analysis of the cause of these conditions and the corrective actions taken to prevent recurrence; (3) direction for review and approval by the responsible authority; (4) a description of the current status of the corrective actions; and (5) the follow-up actions taken were verified to be timely and that effective implementation of the corrective actions had been implemented.

The NRC inspection team also reviewed HTI's corrective actions in response to the inspection findings identified in NRC Inspection Report (IR) No. 99900345/2018-201 dated September 11, 2018 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML18250A302).

The NRC inspection team discussed the nonconforming materials, parts, or components and corrective action programs with HTI's management and technical personnel. The attachment to this inspection report lists the documents reviewed and personnel interviewed by the NRC inspection team.

b. Observations and Findings

b.1. Corrective Action Associated with Notice of Nonconformance No. 99900345/2018-201-01

Following the July 2018 inspection at HTI, the NRC issued Notice of Nonconformance (NON) No. 99900345/2018-201-01 for failure to establish adequate measures for source evaluation and selection of contractors and subcontractors to ensure that purchased material, equipment, and services conformed to procurement documents. Specifically, HTI failed to adequately qualify a material organization (MO) (i.e., castings) as an approved supplier in accordance with the requirements of NCA-3842.2 of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel (B&PV) Code. The NRC inspection team identified several instances in which the audit checklist did not provide sufficient objective evidence to support the conclusion that the MO had met the controls and applicable requirements of subsection NCA-3850,

“Quality System Program Requirements.” Furthermore, the NRC inspection team reviewed the quality manual of the MO to independently verify whether it met the applicable requirements of NCA-3800. The quality manual did not contain additional attachments or appendices to address the gaps between a Quality Systems Program based on the International Organization for Standardization (ISO) 9001:2008, “Quality Management System – Requirements” and an ASME B&PV NCA-3800 Quality Systems Program.

In response to NON 99900345/2018-201-01, HTI issued CAR P1101. The NRC’s evaluation of HTI’s response dated January 9, 2019, stated “While we agree that there is no specific NRC requirement for a supplier of safety-related materials to have a quality manual that specifically addresses any such gaps, the basis of the NON was not so much based upon the gaps in the subject manual but more upon the lack of objective evidence associated with HTI’s audit of the subject supplier and the inability of the NRC inspectors to obtain auditable information regarding the scope and depth of the audit that was performed.” The NRC inspection team reviewed the documentation that provided the objective evidence for the completion of the corrective actions, including the review of CAR P1101.

The NRC inspection team verified that HTI’s implementing procedures for commercial-grade dedication (CGD) were revised to provide sufficient objective evidence in the supplier audit checklist when performing a supplier audit. Specifically, Quality Implementing Procedure (QIP)-29, “Commercial Grade Survey,” was revised to include: (1) controls for engineering and quality assurance (QA) documented selection, review and approval of critical characteristics (CCs); (2) time frames to establish an audit plan, checklist and report; (3) process for completing the CGD plan to verify that CCs identified on the CGD plans requiring Method 2 (CGD survey) acceptance correlate with CCs identified on the survey; (4) process for performing documented review of previously performed surveys to ensure CCs were properly captured and verified; (5) avenues to collect other relevant vendor information; and (6) examples of survey plan, checklist and report. QIP-32, “Commercial Grade Dedication Program,” was revised to include machining services, heat treating services and plating services. HTI also performed an evaluation of all of the existing CGD supplier surveys from its Approved Supplier List (ASL) for impact to the revised requirements in QIP-29. Any existing surveys found to be noncompliant resulted in a supplier being removed from the ASL until resurveyed when production needs arise. As a result, HTI identified and removed four suppliers on its ASL.

The NRC inspection team determined that HTI’s corrective actions were adequate to address the NON. Based on the review of the corrective actions, the NRC inspection team closed NON 99900345/2018-201-01.

b.2. Corrective Action Associated with Nonconformance No. 99900345/2018-201-02

The NRC issued NON 99900345/2018-201-02 for failure to include the applicable regulatory requirements in its safety-related procurement documents for material and services procured as basic components to safety-related equipment, which is necessary to ensure that adequate quality assurance is suitably included or referenced. Specifically, HTI did not impose the requirements of Appendix B to 10 CFR Part 50 in its safety-related procurement documents for materials and services procured as basic components. Procurement documents should specify compliance

with the requirements of Appendix B to 10 CFR Part 50 to ensure that adequate quality assurance is applied and passed down to the sub-suppliers.

In response to NON 99900345/2018-201-02, HTI issued CARs A1102 and A1106. The NRC's evaluation of HTI's response dated January 9, 2019, stated "The NRC's position with regard to procurement documents are addressed in NRC Regulatory Guide 1.234, "Evaluating Deviations and Reporting of Defects and Noncompliance Under 10 CFR Part 21." This regulatory guide endorses Nuclear Energy Institute (NEI) 14-09, "Guidelines for Implementation of 10 CFR Part 21 Reporting of Defects and Noncompliance," Revision 1, dated February 2016 (ADAMS Accession No. ML 16054A825). Specifically, paragraph 6.5 of NEI 14-09 states, "For nuclear power plants, the applicable quality assurance requirements for procuring basic components are specified in 10 CFR Part 50, Appendix B. Specifically, Criterion IV, 'Procurement Document Control' of Appendix B requires that purchasers contractually impose Appendix B quality assurance requirements on suppliers supplying safety-related materials, parts, and services. Thus, for procurement of basic components, which impose 10 CFR Part 21 requirements on suppliers, the procurement documents should also impose the applicable Appendix B quality assurance requirements on the suppliers." The NRC inspection team reviewed the documentation that provided the objective evidence for the completion of the corrective actions, including the review of CARs A1102 and A1106.

The NRC inspection team verified that HTI's implementing procedure for quality assurance requirements for safety-related items have both 10 CFR Part 21 and Appendix B to 10 CFR Part 50 as applicable requirements. The NRC inspection team reviewed a sample of POs for safety-related items and verified that these POs contained both 10 CFR Part 21 and Appendix B to 10 CFR Part 50 as applicable requirements. The NRC inspection team also verified that the proper personnel have been trained to include both 10 CFR Part 21 and Appendix B to 10 CFR Part 50 as applicable requirements in POs for safety-related items.

The NRC inspection team determined that HTI's corrective actions were adequate to address the NON. Based on the review of the corrective action implementation, the NRC inspection team closed NON 99900345/2018-201-02.

b.3. Corrective Action Associated with Nonconformance 99900345/2018-201-03

The NRC issued NON 99900345/2018-201-03 for failure to establish measures to assure that services, whether purchased directly or through contractors or subcontractors, conform to the procurement documents. Specifically, the NRC inspectors determined that:

1. HTI performed limited-scope audits of its commercial supplier's QA program rather than commercial-grade surveys, to verify how the identified CCs were controlled, specific to the service procured (i.e., machining services).
2. HTI procured welding material from a commercial supplier, in October 2017 and used the commercial welding material in safety-related applications without reviewing the suitability of the material or assuring that the material conformed to the purchase requirements of the customer.

In response to NON 99900345/2018-201-03, HTI issued CARs A1101 and P1104. HTI revised the QA Manual and implementing procedures to provide the required clarity and specificity as noted in the NON. HTI revised QIP-32.0 and added "10 CFR 50, Domestic Licensing of Production and Utilization Facilities" to the Scope and revised the wording of QIP-32.0, providing clarity on the requirements of CCs and their acceptance. HTI also revised QIP-32.1 to include the clarification that, "Critical Characteristics are both identifiable and measurable" and revised QIP-32.2 to include "10 CFR 50, Domestic Licensing of Production and Utilization Facilities" to the Scope of the document. HTI revised the QA Manual to include the most recent ISO-17025 certified testing and calibration laboratories guidance. The NRC reviewed a sample of CGD packages and POs to verify purchased material and services conformed to the procurement documents through source evaluation and selection, objective evidence of quality furnished by the contractor or subcontractor, inspection at the contractor or subcontractor source, or examination of products upon delivery for the items or services provided. The NRC inspection team also verified that the proper personnel were trained to the revised version on HTI's CGD dedication procedures. The NRC inspection team reviewed the documentation which provided objective evidence for the acceptable completion of the corrective actions in CARs A1101 and P1104.

Also in response to NON 99900345/2018-201-03, HTI issued CAR A1103. The NRC inspection team reviewed HTI's revised documents, material test reports, and supplier nonconformance reports provided to HTI's customer to verify the suitability of the material and assure the material conforms to the purchase document requirements. HTI performed commercial grade surveys of both wire manufactures and determined both were complying with the material supplier PO requirements. This included the use of single heat numbers of material and that no different heat numbers would be spliced together on different spools. HTI obtained samples of the weld wire that were sent to an HTI approved supplier for independent testing. HTI's material testing laboratory verified conformance to the PO requirements for the specified materials. The NRC inspection team reviewed the CGD plan 10518-001 which was created to document the dedication of welding materials by HTI. The NRC inspection team also verified that the proper personnel were trained to the new HTI's CGD dedication procedures. The NRC inspection team reviewed the documentation which provided objective evidence for the acceptable completion of the corrective actions in CAR A1103.

The NRC inspection team determined that HTI's corrective actions were adequate to address the NON. Based on the review of the corrective action implementation, the NRC inspection team closed NON 99900345/2018-201-03.

#### b.4. Corrective Action Associated with Nonconformance 99900345/2018-201-04

Following the July 2018 inspection of HTI, the NRC issued NON 99900345/2018-201-04 for HTI's failure to establish adequate controls to ensure that the pressure gauges used in hydrostatic testing of safety-related components affecting quality were properly calibrated and adjusted at specific periods to maintain their accuracy within necessary limits using a written calibration procedure. Specifically, the NRC inspection team determined that a pressure gauge used during hydrostatic testing of three ASME Section III safety-related diffusers were not calibrated within the tolerance range of 0-400 pounds per square inch gauge (PSIG) using a standard dead weight tester and calibration procedure. HTI had been calibrating this pressure gauge with a standard

dead weight tester and calibrated tolerance range of 1000 to 10,000 PSIG. The pressure gauge was used for hydrostatic testing of safety-related components since September 2015.

In its response to NON 99900345/2018-201-04, HTI issued CAR P1111. The NRC's evaluation of HTI's response dated January 9, 2019, stated, "While we agree that the weights themselves need no further calibration since they themselves are traceable standards, the weights need to work in conjunction with the rest of the system, and the system calibration should be such that it verifies the operation and accuracy of the system over the complete operating range." The NRC inspection team reviewed the documentation that provided the objective evidence for the completion of the corrective actions, including the review of CAR P1111.

The NRC inspection team confirmed that the pressure gage, HTS 21-057 (0 to 400 PSI), was tested by an Appendix B to 10 CFR 50 calibration laboratory on July 26, 2018. The calibration laboratory found the pressure gage to be within the gage accuracy stated by the manufacturer and the pressure gage, HTS 21-057, was determined to have been used for hydro tests where the required pressure range was below 1000 PSI. HTI determined that there were no negative impacts to the accuracy of the pressure gages calibrated by the deadweight tester in the range calibrated by the calibration laboratory, and therefore, there were no orders affected by accuracy of the pressure gages.

PO 148765 was issued to the calibration laboratory to calibrate HTI's analog gages and to recalibrate the tester with the new low-pressure piston installed. The deadweight tester calibration with the new low-pressure piston installed was found in tolerance for the range of 5 to 2000 PSI. Deadweight tester calibration with the high-pressure piston installed was found to be in tolerance for the range of 250 to 10000 PSI.

The NRC inspection team determined that HTI's corrective actions were adequate to address the NON. Based on the review of the corrective actions, the NRC inspection team closed NON 99900345/2018-201-04.

#### b.5. Corrective Action Associated with Nonconformance 99900345/2018-201-05

The NRC issued NON 99900345/2018-201-05 for failure to promptly identify and correct conditions adverse to quality. Specifically, the corrective actions that were implemented by HTI to address the findings in the 2001 NRC Inspection Report 99900345/2001-201 were ineffective. As a result of the ineffective corrective actions, the NRC inspection team identified the following similar example:

HTI did not ensure that verification of the suitability of material to be used in a safety-related application was verified. Specifically, HTI procured welding material (weld wire) from a commercial supplier in October 2017 and used the commercial material in safety-related applications without reviewing the suitability of the material or assuring that the material conformed to the purchase requirements of the customer. While HTI obtained certified material test reports (CMTRs) for the material taken from each of two spools of wire, HTI did not provide sufficient documented evidence to demonstrate that the weld wire spools contained wire that originated from homogeneous source material.

In response to NON 99900345/2018-201-05, HTI issued CAR A1103. The NRC inspection team reviewed the objective evidence, including the review of CAR P1101. The NRC inspection team verified that surveys were performed for the source material suppliers and secondary weld wire processor. The NRC inspection team also verified and reviewed the CGD plan for HTI's dedication of weld materials. The NRC inspection team found that the development and use of HTI's CGD plan for weld materials in conjunction with its oversight of supplier process provide reasonable assurance to verify the suitability of the commercial materials for nuclear use.

Therefore, the NRC inspection team determined that HTI's corrective actions were adequate to address the NON. Based on the review of the corrective actions, the NRC inspection team closed NON 99900345/2018-201-05.

c. Conclusion

The NRC inspection team concluded that HTI is implementing its nonconforming materials, parts, or components and corrective action program activities in accordance with the regulatory requirements of Criterion XV and Criterion XVI of Appendix B to 10 CFR Part 50. Based on the limited sample of documents reviewed and activities observed, the NRC inspection team determined that HTI is implementing its policies and procedures associated with nonconforming materials, parts, or components and corrective action program activities. No findings of significance were identified.

3. Commercial-Grade Dedication

a. Inspection Scope

The NRC inspection team reviewed HTI's policies and implementing procedures that govern the implementation of its CGD to verify compliance with the requirements of Criterion VII "Control of Purchased Material, Equipment, and Services," of Appendix B to 10 CFR Part 50. The NRC inspection team also reviewed HTI's policies and implementing procedures that govern oversight of contracted commercial items and services to verify compliance with the requirements of Criterion IV, "Procurement Document Control," and Criterion VII of Appendix B to 10 CFR Part 50. The NRC inspection team discussed the CGD process with HTI's management. The attachment to this inspection report lists the documents reviewed and personnel interviewed by the NRC inspection team.

The NRC inspection team reviewed the CGD methodology for items and services for safety-related components and services, including the development of CCs, technical evaluations, failure mode and effects analysis, acceptance criteria methods, sampling methodology, checklists, survey reports, and associated POs. The NRC inspection team reviewed the CGD process for various product types such as machining services and plating services. The NRC inspection team evaluated a sample of technical evaluations and concluded that the technical evaluations in the dedication methodology appropriately identified the CCs necessary to provide reasonable assurance that the item would perform its intended safety function.

The NRC inspection team reviewed HTI's ASL and selected a sample of suppliers to review the methodology of conducting and documenting surveys. The NRC inspection team reviewed HTI's process of selecting and approving commercial suppliers and

service providers. The NRC inspection team verified that HTI had prepared and approved plans that identify the scope and applicable CCs to be verified before initiation of the survey.

The NRC inspection team discussed the CGD program with HTI's management and technical personnel. The attachment to this inspection report lists the documents reviewed and the personnel interviewed by the NRC inspection team.

b. Observation and Findings

No findings of significance were identified.

c. Conclusion

The NRC inspection team concluded that HTI is implementing its CGD program activities in accordance with the regulatory requirements of Criterion VII of Appendix B to 10 CFR Part 50. Based on the limited sample of documents reviewed and activities observed, the NRC inspection team determined that HTI is implementing its policies and procedures associated with CGD program and oversight of contracted activities. No findings of significance were identified.

4. Identification and Control of Materials, Parts, and Components

a. Inspection Scope

The NRC inspection team reviewed HTI's policies and implementing procedures that govern the implementation of its material control program to verify compliance with the regulatory requirements of Criterion VIII, "Identification and Control of Materials, Parts, and Components," of Appendix B to 10 CFR Part 50.

The NRC inspection team witnessed on-going shop activities related to product receipt and acceptance and verified that HTI staff adequately performed intake activities including, material identification, assignment of unique certification numbers to orders, and determining additional routing of materials necessary for formal receipt inspection, material certification, and entry into inventory.

The NRC inspection team also reviewed in-process activities in accordance with shop work orders and reviewed both material staging areas and nonconforming material segregation areas to verify material identification control methods including stamping, tagging, and pen markings. The NRC inspection team reviewed a sample of in-process and completed discrete job router documentation and confirmed material identification for each process step was adequately documented in accordance with procedures governing those activities.

The NRC inspection team discussed material identification methods with quality control inspectors, quality assurance personnel, and fabrication/craft personnel and confirmed understanding of identification and control of materials. The attachment to this inspection report lists the documents reviewed and personnel interviewed by the NRC inspection team.

b. Observation and Findings

No findings of significance were identified.

c. Conclusion

The NRC inspection team concluded that HTI is implementing its materials, parts, and components control program in accordance with the regulatory requirements of Criterion VIII of Appendix B to 10 CFR Part 50. Based on the limited sample of documents reviewed, the NRC inspection team also determined that HTI is implementing its policies and procedures associated with the materials, parts, and components control program. No findings of significance were identified.

5. Control of Special Processes

a. Inspection Scope

The NRC inspection team reviewed HTI's policies and implementing procedures that govern the implementation of its manufacturing control program to verify compliance with the regulatory requirements of Criterion IX, "Control of Special Processes," of Appendix B to 10 CFR Part 50, the applicable requirements of Section III, "Rules for Construction of Nuclear Facility Components," Section V, "Nondestructive Examination," and Section IX, "Welding, Brazing, and Fusing Qualifications," of the ASME B&PV Code, and of the American Society for Nondestructive Testing (ASNT) Recommended Practice SNT-TC-1A, "Personnel Qualification and Certification in Nondestructive Testing."

The NRC inspection team observed the gas tungsten arc welding on a discharge head fabrication per Job Traveler, UG11156-2-1, and the magnetic particle examination of a lower column assembly per Job Traveler, UG11156-1-8, for the high-pressure service water system associated with PO 00688189. The NRC inspection team confirmed that the welding and the nondestructive examination (NDE) were performed in accordance with the applicable HTI procedures and the requirements of Section IX and V of the ASME B&PV Code.

In addition, the NRC inspection team reviewed HTI's NDE and welding personnel training and qualification records and confirmed that the personnel had completed the required training and had maintained their qualifications in accordance with HTI procedures and the requirements of ASNT SNT-TC-1A.

The NRC inspection team discussed the control of special processes and nondestructive examination program with HTI's management and technical staff. The attachment to this inspection report lists the documents reviewed by the NRC inspection team.

b. Observation and Findings

No findings of significance were identified.

c. Conclusion

The NRC inspection team concluded that HTI is implementing its special processes program in accordance with the regulatory requirements of Criterion V and Criterion IX of



Appendix B to 10 CFR Part 50. Based on the limited sample of documents reviewed and activities observed, the NRC inspection team determined that HTI is implementing its policies and procedures associated with the control of special processes. No findings of significance were identified.

## 6. Control of Measuring and Test Equipment (M&TE)

### a. Inspection Scope

The NRC inspection team reviewed HTI's policies and implementing procedures that govern the implementation of its control of the M&TE program to verify compliance with the regulatory requirements of Criterion XII, "Control of Measuring and Test Equipment," of Appendix B to 10 CFR Part 50.

The NRC inspection team verified that the M&TE had the appropriate calibration stickers and current calibration dates, including the calibration due date. The NRC inspection team also verified that M&TE had been calibrated, adjusted, and maintained at prescribed intervals prior to use. The calibration records associated with the M&TE indicated the as-found or as-left conditions, accuracy required, calibration results, calibration dates, and due dates for recalibration. Furthermore, the NRC inspection team verified that the selected M&TE was calibrated using procedures traceable to known industry standards. The NRC inspection team also verified that when M&TE is found to be out of tolerance when being calibrated or when the M&TE is lost, HTI initiates a nonconformance report to identify items that have been accepted using this equipment since the last valid calibration date and to perform an extent of condition evaluation. The NRC inspection team observed the calibration of an internal caliper and confirmed that the calibration was performed in accordance with HTI's procedures.

The NRC inspection team discussed the control of M&TE program with HTI's management and technical staff. The attachment to this inspection report lists the documents reviewed and personnel interviewed by the NRC inspection team.

### b. Observation and Findings

No findings of significance were identified.

### c. Conclusion

The NRC inspection team concluded that HTI is implementing its control of the M&TE program in accordance with the regulatory requirements of Criterion XII of Appendix B to 10 CFR Part 50. Based on the limited sample of documents reviewed and activities observed, the NRC inspection team determined that HTI is implementing its policies and procedures associated with the control of M&TE. No findings of significance were identified.

## 7. Entrance and Exit Meetings

On November 15, 2021, the NRC inspection team discussed the scope of the inspection with Mr. Matt Ellis, Quality Assurance Manager, and HTI's management. On November 19, 2021, the NRC inspection team presented the inspection results and observations during an exit meeting with Mr. Matt Ellis and HTI's management. The attachment to

this report lists the attendees of the entrance and exit meetings, as well as those individuals whom the NRC inspection team interviewed.

## ATTACHMENT

### 1. Entrance/Exit Meeting Attendees and Persons Interviewed

Name	Title	Affiliation	Entrance	Exit	Interviewed
Aaron Armstrong	Inspection Team Leader	NRC	X	X	
Dong Park	Inspector	NRC	X	X	
Andrea Keim	Inspector	NRC	X	X	
Yiu Law	Inspector	NRC	X	X	
Kerri Kavanagh	Branch Chief	NRC		X*	
Camden DiMicco	Engineering Manager	HTI	X	X	
Anne Provencher	Quality Administrator	HTI	X	X	
Tiffany Lee	Quality Engineer	HTI	X	X	
Matthew Ellis	Quality Assurance Manager	HTI	X	X	X
Drew Van Norman	General Manger	HTI	X	X	
Benjamin Hardy	President	HTI	X	X	
Tom Parent	Vice President of HR & IT	HTI	X		
Jeremy Francis	Director of Continuous Improvement	HTI	X*	X*	
Nathan Howard	Operations Manager	HTI	X*		
Stephanie Fregeau	Human Resources and Business Support Lead	HTI	X*		
Scott Riley	Service/Aftermarket Value Stream Manager	HTI	X*	X*	
John Katon	Quality Control Inspector	HTI	X*	X*	
Paul Petty	Senior Quality Control Inspector	HTI	X*		X
Shawn McCarthy	Quality Specialist	HTI	X*	X*	
Joseph Cogley	Supply Chain Manager	HTI	X*	X*	
Samuel Simpson	Materials Processor	HTI			X
Miles Sweeney	Senior Welder	HTI			X
James Martin	Quality Engineer	HTI		X*	
Robert Fleming	Principal Engineer	HTI		X*	
George Kevorkian	Quality Inspector	Mistra Services Division			X

\* Via teleconference

## 2. INSPECTION PROCEDURES USED

- Inspection Procedure (IP) 36100, "Inspection of 10 CFR Part 21 and Programs for Reporting Defects and Noncompliance," dated May 16, 2019
- IP 43002, "Routine Inspections of Nuclear Vendors," dated January 27, 2017
- IP 43004, "Inspection of Commercial-Grade Dedication Programs," dated January 27, 2017

## 3. LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

<b>Item Number</b>	<b>Status</b>	<b>Type</b>	<b>Description</b>
99900345/2018-201-01	Closed	NON	Criterion VII
99900345/2018-201-02	Closed	NON	Criterion IV
99900345/2018-201-03	Closed	NON	Criterion VII
99900345/2018-201-04	Closed	NON	Criterion XII
99900345/2018-201-05	Closed	NON	Criterion XVI

## 4. DOCUMENTS REVIEWED

### Policies and Procedures

- Hayward Tyler Quality Assurance Manual, Edition 7, dated September 13, 2021
- QIP-7, "Qualification and Certification of Liquid Penetrant Ultrasonic & Magnetic Particle Examination Personnel," Revision 12, dated June 26, 2020
- QIP-8, "Hydrostatic Pressure Test of Parts and Components," Revision 8, dated June 24, 2021
- QIP-10, "Control of Measuring and Test Equipment," Revision 10, dated July 2, 2019
- QIP-17, "Control and Disposition of Non-Conforming Items, Revision 14, dated November 15, 2021
- QIP-18, "Corrective and Preventative Action," Revision 8, dated January 7, 2020
- QIP-28, "Qualification of ASME Code Welders," Revision 4, dated June 21, 2019
- QIP-29, "Commercial Grade Survey," Rev. 5, dated May 5, 2017
- QIP-29, "Commercial Grade Survey," Rev. 6, dated June 27, 2019
- QIP-32.0, "Commercial Grade Dedication Program," Rev. 20, dated November 9, 2020
- QIP-32.1, "Commercial Grade Dedication of Parts and Components," dated Rev. B, July 22, 2019
- QIP-32.2, "Commercial Grade Dedication or Raw Material," Rev. B, dated July 22, 2019
- QIP-32.3, "Commercial Grade Dedication of Design Services," Rev. B, dated November 8, 2021
- QIP-32.4, "Commercial Grade Dedication of Calibration and Testing Services," Rev. F, dated August 26, 2021
- QIP-32.5, "Sampling Plans for Commercial Grade Dedication," Rev. B, dated November 8, 2021
- QIP-55, "Sampling Plans for Commercial Grade Dedication," Rev. B, dated September 11, 2021
- QAF-81, "Commercial Grade Checklist," Rev. 1

- QAF-83, "Commercial Grade Survey Plan", Rev. 0
- QAF-84, "Commercial Grade Survey Review," Rev. 0
- 01-019-204, "Quality Assurance Requirements for Safety Related Items," Rev. C, January 19, 2021
- 01-019-409, "Quality Assurance Requirements for ASME Code Items," Rev. C, January 19, 2021
- QAS-9, "Reporting of Defects Per 10 CFR 21," Revision 4, dated October 19, 2017
- QAS-16, "Magnetic Particle Examination (Fluorescent)," Revision 4, dated September 14, 2020
- MFS-2, "Storage & Handling of Welding Electrodes," Revision 2, dated July 3, 2019
- MFI-3, "Hydrostatic Test Instructions," Revision 4, dated April 15, 2019
- ENS-11, "Preparation and NDE Requirements for Seal Welding of Pipe Threaded Connection to Pressure Boundary Components," Revision 4, dated November 16, 2017
- Welding Procedure Specification (WPS)-T8.8-1, "Gas Tungsten Arc Welding (GTAW) P8 to P8," Revision 4, dated March 11, 2020, qualified to ASME Section III and IX
- HTI nuclear job traveler for Job No. UG11156-2-1 for High Pressure Service Water discharge head assembly on HTI contract 11156, Class 1, ASME B&PV Code Section III dated November 15, 2021
- HTI nuclear job traveler for Job No. UG11156-1-8 for High Pressure Service Water lower column assembly on HTI contract 11156, Class 1, ASME B&PV Code Section III dated October 26, 2021

#### Discrepant Material Reports/Corrective Action Report

- List of Corrective Action Reports (CARs) from 2018-2021
- CAR P1101, Survey Checklists, dated July 8, 2018
- CAR P1104, Commercial Grade Dedication, dated July 19, 2018
- CAR A1102, Requirements of 10 CFR Part 50, Appendix B, dated July 17, 2018
- CAR A1103, Incomplete Survey of Weld Wire Supplier, dated July 17, 2018
- CAR A1106, Contract Requirements on Cobalt Content on Whetted Parts, dated July 18, 2019
- CAR A1107, Practices for SMAW Weld Rod," dated July 19, 2018
- CAR P1111, Part No: HTS 21-001 (Dead Weight Tester Ashcroft 1305-B), dated July 19, 2018
- CAR A1117, Order Review and Quality Requirement Translation, dated August 16, 2019
- CAR P1127, Testing of Piping, dated September 15, 2020
- CAR A1109, M&TE and measurements, dated August 14, 2019
- CAR P1131, Rework performed prior to authorization, dated September 7, 2021
- CAR A1127, Calibration issue, dated September 22, 2021
- CAR P1124, Pipe schedule error, dated March 26, 2020
- Discrepant Material Report (DMR) Binders for 2019, 2020 and 2021
- DMR 0109, Verification of weld wire, dated July 17, 2018
- DMR 0112, Item: HTS 21-001, dated September 18, 2018
- DMR 14786, Diffuser Casting – porosity, dated December 23, 2020
- DMR 14792, Upper Column Assembly, dated December 29, 2020
- DMR 14807, Upper Column Fabrication, dated January 7, 2021
- DMR 15345, Socket head set screw markings, dated July 23, 2021
- DMR 15392, Surface finish and length of spigot flange face, dated August 17, 2021
- DMR 15527, Column Assembly, Lower, Item 01-305-021-001-S0000, dated October 22,

2021

- DMR 15556, issued for Rework Other Per DMR #15531, Discharge Head Fabrication, 01-305-021-001-S0000, dated November 15, 2021
- Supplier Non-Conformance Report (SNCR) 4500453041-SNCR – 01, date April 3, 2018
- SNCR 4500453041-SNCR – 02, dated April 5, 2018
- SNCR 4500453041-SNCR – 03, dated April 5, 2019
- SNCR 4500453041-SNCR – 06, dated April 13, 2018
- SNCR 4500453041-SNCR – 010, dated June 20, 2018

#### Procurement Documents

- Purchase Order (PO) 148765 for calibration services, Revision 0, dated July 30, 2018
- PO 148730 for calibration services, Revision 0, dated July 25, 2018
- PO 156765 for calibration services of HTS-71-366, dated October 25, 2021
- PO 00688189 for Pump Assembly, Water, HPSW, dated February 19, 2021
- PO 130271 for Containers, dated December 10, 2012
- PO 132083 for Stick and Tig, dated July 18, 2013
- PO 155133 for Stud, dated February 11, 2021
- PO 156096 for Tee, dated July 7, 2021
- PO 154608 for Unfinished Coupling, dated November 19, 2020
- PO 153985 for Cent. Cstg, dated August 20, 2020
- PO 154805 for Key, Line Shaft Coupling, dated December 28, 2020
- PO 154049 for Pipe, dated September 1, 2020
- PO 156940 for Material testing services, dated November 11, 2021
- PO 156941 for Bar, Pimp Shaft, ASTM A564, dated November 11 2021
- PO 4500453041, Diffuser is item 1402 on HTI: 01-600-074, November 02, 2017
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#### Measuring and Testing Equipment (M&TE) Records

- Certificate of Calibration No. 95902, dated September 29, 2021, for HTI part No. HTS-71-366 Gauss Meter Model No. 25-5 Serial No. 71-366
- Certificate of Calibration No. 0011112691 for HTI HTS 21-001
- 5000 psi, HTS 21-038, Calibrated by ACC on November 12, 2021, next cal due: 2 weeks
- HTI HTS 01-052B, Calibrated by PP on December 26, 2019, next cal due: December 26, 2021
- HTI HTS 01-053, Calibrated by PP on February 18, 2020, next cal due: February 18, 2022
- Caliper HTS 12-152, Calibrated by PP on November 16, 2021, next cal due: November 16, 2022

#### Commercial-Grade Surveys (CGD)/Audit Reports

- CGD-10518-001, CGD Plan for Aluminum Bronze Weld Wire used on HTI Contract 10518, Rev. B dated October 7, 2019
- CGD-11156-005, CGD Package for Couplings Coating Service, PO 154079 dated May 14, 2021
- CGD-11156-017, CGD Package for Split Rings, PO 154781 dated Dec 18, 2020
- CGD-11156-018, CGD Package for Shaft Sleeve and Column Bearing, PO 156524,

- dated September 17, 2021
- CGD-11414-002, CGD Package for Shafts, PO 154876 dated January 13, 2021
- CGD-11705-001, CGD Package for Columns, PO 154874 dated January 12, 2021
- CGD-11919-001, CGD Package for Chrome Plated Sleeves, PO 155652 dated May 4, 2021
- GD-11158-018, CGD plan for Commercial Grade Dedication Plan for Aluminum Bronze Weld Wire, dated October 10, 2019
- CGD-11156-014, CGD Package for Discharge Head Assembly
- CGD-11156-019, CGD plan for ASTM A564 Bar Stock Material, dated October 10, 2019

#### Training Records

- Welder Performance Qualification using WPS T8.8-1 for Employee ID W107, dated 8 March 2005
- Welder Continuity Log, dated 8 November 2021
- Certificate of Inspection and Test Personnel QAF-4 form, qualified as Level I for receipt in-process and final inspection, hydrostatic testing and calibration services, dated on September 19, 2017
- Level III certificate of inspection and test personnel QAF-4 form, qualified as Level III in receipt in-process and final inspection, hydrostatic test, and calibration services, dated May 13, 2004
- Training Profile for Employee ID: 294, dated November 17, 2021
- Training Profile for Employee ID: 233, dated November 17, 2021
- Mistras Certification Summary for EID: 474000, dated April 7, 2020

#### Others

- Audit report for EXC10 performed on September 30, 2021
- Audit of Supplier 1153, performed on June 21, 2021
- Source Material Checklist Weld Wire, performed on October 10, 2017