



DEPARTMENT OF THE NAVY
NAVAL SEA SYSTEMS COMMAND
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From: Commander, Naval Sea Systems Command (SEA 04X)
Subj: 2022 NAVSEA NONDESTRUCTIVE TESTING WORKING GROUP MEETING
Encl: (1) Nondestructive Testing Working Group Meeting Report

1. Norfolk Naval Shipyard (NNSY) hosted the 2022 Naval Sea Systems Command (NAVSEA) Nondestructive Testing (NDT) Working Group meeting during the period 17-19 May 2022. The working group objectives are to resolve common NDT quality issues, revise NAVSEA NDT standards, and focus on NDT improvements. The participation of NAVSEA, naval shipyards, Supervisors of Shipbuilding, Regional Maintenance Centers, Naval Warfare Centers, Fleet Maintenance Activities, and private industry representatives was integral to the meeting's success.

2. The working group meeting report, enclosure (1), is forwarded for information. Distribution of the report to those who were not in attendance is encouraged. The report and other NAVSEA NDT Working Group information is also located on the Ameer Bay, LLC web site [www.ameebay.com].

3. The 2023 NAVSEA NDT Working Group will be announced in separate correspondence.

4. The NAVSEA NDT Working Group meeting report addresses the shipbuilding and ship repair community as a whole. Information, positions, and policies from the meeting should not be considered determinate of specific questions, issues, or cases; and shall not be considered to authorize any change in Government contracts.

5. The NAVSEA NDT Working Group Chairperson is Mr. Jason F. Hence, NAVSEA NDT and Welding Programs Manager, (360) 476-4244, Jason.Hence@navy.mil.


P. T. COLAHAN
By direction

Subj: 2022 NAVSEA NONDESTRUCTIVE TESTING WORKING GROUP MEETING

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NAVSEA NDT WORKING GROUP

MEETING REPORT

17-19 May 2022

Norfolk Naval Shipyard



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The 2022 NAVSEA NDT Working Group meeting hosted by Norfolk Naval Shipyard

1. NDT WORKING GROUP CHARTER

a. Foreword. Nondestructive Testing (NDT) is integral to quality assurance in procurement, construction, overhaul, and maintenance of United States Navy ships. The Naval Sea Systems Command (NAVSEA) recognizes the value of an NDT Working Group dedicated to improving NDT processes as they apply to Navy ships' systems and components, and the Working Group is essential to the following NAVSEA Commander's Mission Priorities:

Mission Priority #1 - Deliver Combat Power: On-Time Delivery of Ships, Submarines, and Systems

Mission Priority #2 - Transform Digital Capability

Mission Priority #3 - Build a Team to Compete and Win

b. Vision. The NAVSEA NDT Working Group will drive innovation to be the instrument for improving NDT processes specified in NAVSEA technical publications, standards or specifications associated with NDT.

c. Purpose. The NAVSEA NDT Working Group will:

(1) Address and recommend resolution to the proper technical authority those NDT issues associated with constructing, maintaining, and operating Navy ships.

(2) Work as a team sharing ideas, information, successes, best practices, and failures.

(3) Pursue improvements, effectively integrating all stakeholders.

(4) Receive guidance, approval, support, and/or limitations from NAVSEA Industrial Operations Directorate (NAVSEA 04).

(5) Determine applicable action items from inputs received from stakeholders and/or NAVSEA 04.

(6) Address improvement of NDT processes from an industry-wide perspective, soliciting participation by all stakeholders.

d. Membership

(1) NDT Working Group Chairperson: NAVSEA NDT & Welding Programs Manager

(2) NAVSEA NDT Technical Representative: NAVSEA NDT&E Technical Warrant Holder

(3) NDT Working Group Host: Rotational among stakeholders

(4) Members/Stakeholders:

(a) NAVSEA

- (b) Naval Shipyards
- (c) Regional Maintenance Centers
- (d) Supervisors of Shipbuilding, Conversion, and Repair
- (e) Warfare Centers
- (f) Contractors who perform NAVSEA-specified NDT
- (g) Type Commanders / Fleet activities
- (h) Defense Contract Management Agency (DCMA)

e. Coordination

(1) NAVSEA NDT Working Group members, through cooperation and support of their respective activities, are responsible for maintaining working group continuity.

(2) The Chairperson is responsible for identification, execution and tracking status of current action items to ensure their timely completion through communications with break-out session teams.

(3) The NAVSEA NDT Working Group will strive to arrive at decisions by consensus of its members.

(4) The NAVSEA NDT Working Group will normally convene annually.

(5) This charter may be modified by NAVSEA 04.

f. Objectives

(1) Identify and implement, or recommend to proper authority the implementation of improvements in NDT processes. (Mission Priority #1)

(2) Improve quality and reduce costs of NDT. (Mission Priority #1)

(3) Remove institutional barriers that obstruct the sharing of information and knowledge. (High Velocity Learning (HVL))

(4) Promote NDT education and development. (Mission Priority #3)

(5) Pursue NDT innovation and new technologies with cybersecurity in mind. (Mission Priority #2)

g. Focus

(1) NDT qualification process (i.e., formal classroom training, work-time-experience and examination [written & practical exams]) to obtain certification.

(2) NDT oversight.

(3) State-of-the-art NDT processes and equipment.

(4) Standardization of NDT processes.

(5) Lessons learned.

(6) NDT technical issues.

(7) Action items as assigned by NAVSEA 04.

h. Timetable

(1) This charter will be updated as necessary.

(2) The NAVSEA NDT Working Group chairperson will update NDT Working Group action items.

(3) Membership will determine agenda items including break-out sessions.

(4) All action items will be subject to milestones/completion as designated by the NAVSEA NDT Working Group.

(5) The NAVSEA NDT Working Group will be disbanded upon consensus of the Working Group by NAVSEA 04.

(6) The chairperson will determine location and date of the next NAVSEA NDT Working Group meeting and normally announce the location during the last day of the meeting.

2. EXECUTIVE SUMMARY

Norfolk Naval Shipyard (NNSY) hosted the 17th NAVSEA NDT Working Group meeting 17-19 May 2022 at the Chesapeake Conference Center in Chesapeake, Virginia. Mr. Matthew G. Liverman, the NNSY Welding Engineering and NDT Examiner Division Head, hosted the meeting; and Mr. Jason F. Hence, the NAVSEA NDT & Welding Programs Manager chaired the meeting.

Mr. Liverman opened the Working Group meeting. He welcomed the attendees back after four years of no Working Group meetings, and he thanked them for attending this year.

Ms. Mary P. Williams, the NNSY Quality Assurance (QA) Director, addressed the Working Group attendees. Ms. Williams noted how refreshing it was to hold a meeting like this after the last two years of Novel Coronavirus 2019 (COVID-19) restrictions. Ms. Williams emphasized the need for alignment in the NDT field especially with the impending implementation of new NDT technologies.

Mr. Hence welcomed the group back after four years because of travel restrictions imposed due to COVID-19 and budget reductions. Mr. Hence thanked Mr. Liverman and the NNSY personnel who worked hard to make the meeting happen. Mr. Hence also thanked Ms. Karen Bruer of Ameer Bay, LLC for her assistance providing the online registration for the meeting. Mr. Hence then invited the attendees to introduce themselves, state what activity they represented, and how long they have been working in NDT. He also noted that the commonality among all the attendees is the underlying duty to ensure that the men and women who serve aboard our Navy ships make it back home safely to their families. Mr. Hence then showed the group some photos of ship damage over the past 25 years to emphasize the importance of giving our sailors the best possible ships to perform their duty of defending our freedom. Examples included damage from a terrorist attack and from US Navy ships colliding with other vessels and undersea mountains.

Mr. Paul T. Colahan, the NAVSEA Director of Oversight and Assessment, addressed the group and reiterated the sentiments of the previous speakers, and stated that this meeting is a good example of how the NAVSEA NDT community incorporates HVL principles into improvement and problem solving.

Dr. Pranaam Haldipur then presented the “Current State of NAVSEA NDT” to the group. Mr. Hence presented an update on the open NAVSEA NDT Working Group action items and provided more details about the working group formed to improve NDT program trends in the vendor base. Mr. Hence presented some significant audit findings from the past four years. Section III contains summaries of all presentations.

Mr. Liverman and Mr. Hence announced some of the planned break-out sessions, including but not limited to Eddy Current Testing (ET), Phased Array Ultrasonic Testing (PAUT), and Computed Radiography (CR). Attendees spent the rest of the meeting time working together in the break-out sessions. Section IV details the break-out sessions and associated action items.

The NAVSEA NDT Working Group meeting concluded with the assembly having successfully established a Plan of Actions and Milestones for each of several break-out sessions.

Mr. Hence again thanked NNSY and Ms. Bruer for their work in support of and leading up to the meeting and announced that he and Ms. Bruer are brainstorming plans for next year's NAVSEA NDT Working Group meeting. More details will be communicated in the coming months.

Copies of presentations may be obtained by contacting Mr. Hence.

3. PRESENTATIONS

a. The State of NAVSEA NDT – Dr. Pranaam Haldipur, NAVSEA NDT & E Technical Warrant Holder

(1) Reimagined NDT Qualification Process: Dr. Haldipur noted that advanced NDT implementation needs to take precedence throughout our programs, but current requirements make it difficult to progress advancement. ET, UT, and radiographic testing (RT) advancements have been ongoing for over 10 years. There is an increased need to approve and implement advanced NDT applications which supports reducing ship maintenance schedules. This requires more NDT personnel certified to perform inspections in these advanced methods. The traditional qualification path must be reimagined to expedite certification. One potential solution is similar to the American Society of Mechanical Engineers (ASME) Nondestructive Examination (NDE) qualification process (ANDE). ANDE is a performance demonstration-based process to qualification using a form of job task analysis in combination with the necessary training and written certification examinations.

(2) Additive Manufacturing (AM): The Navy is implementing AM. How do we provide QA for these new products? A NAVSEA guidance letter discussed the NAVSEA requirements for AM and use of the two approved technical publications (powder bed fusion and direct energy deposition). American Society for the Testing of Metals (ASTM) E3166 describes the flaw types associated with AM to help determine the NDT requirements based on how flaws form, present themselves, and propagate. Research and development for AM is happening at Naval Surface Warfare Center-Carderock Division.

(3) MIL-STD-2035 Revision: The MIL-STD-2035 revision is still not issued. Funding issues continue to stall the revision.

(4) NDT in the Vendor Base: There has been a negative trend related to NDT and contractor vendor audits. The Navy, DCMA, and the nuclear shipbuilders have formed a supplier based NDT Working Group to help improve the negative trends. There is a need to clarify guidance to contractors related to NDT examiner roles and responsibilities, and NAVSEA has issued a letter with a white paper for guidance to contracting groups.

b. Previous NAVSEA NDT Working Group Action Items Update – Mr. Jason Hence, NAVSEA NDT & Welding Programs Manager

(1) Regional Maintenance Center (RMC) NDT Written Practice Standardization: Representatives from each of the six RMCs and Mr. Hence met at Naval Submarine Base, Point

Loma in 2019, and the RMCs developed a standardized NDT Written Practice that all the RMCs are currently using.

(2) Implementation of Questionmark Examination Generator Software: Questionmark is being utilized by some shipyards and some SUPSHIPS, but Information Technology (IT) roadblocks prevent full implementation across the NAVSEA enterprise.

(3) Active Duty NDT Staffing: Staffing is still a concern. As of November 2021, 22 of 38 NDT examiner billets in the Fleet were filled. In March 2022, Mr. Hence and HTC John R. Rodriguez, the HT NDT C School Director engaged the SURFLANT Self-Sufficiency group and presented the staffing situation. There have been no results from this engagement yet.

(4) NDT Examiner Development Tool. Previous NAVSEA NDT Working Group meetings produced a list of knowledge, skills, and abilities needed to be an effective NDT examiner. The 2018 meeting produced a qualification card to accompany the list. Puget Sound Naval Shipyard and Intermediate Maintenance Facility (PSNS & IMF) has best implemented the tool.

(5) CR Requirements. NAVSEA issued draft CR requirements in 2018, but IT continues to be the roadblock for implementation. Bechtel Plant Machinery, Inc. has established a CR Level III certification examination process (currently only for nuclear CR).

(6) PAUT/Time of Flight Diffraction (ToFD): In 2018, NAVSEA approved PAUT for structural applications, except for Unrestricted Operations Maintenance Requirement Card (URO-MRC) inspections. Cumbersome Work Practice (CWP) 396 was established for exploring PAUT in lieu of RT for piping welds inspected from one side. CWP-435 was established for pursuing approval to use PAUT for URO MRC inspections. Other current PAUT approvals include for use in lieu of RT for carbon steel and copper-nickel piping welds of specific sizes, wall thicknesses, and configurations.

(7) ET of Heat Exchanger Tubing Issues: ET Array was mandated with the issuance of NAVSEAINST N9254.1G in April 2020. In May 2022, NAVSEA circulated a draft revision of NAVSEA Technical Publication 2032 to adjudicate previous comments. The Eddy Current Inspectors Meeting (ECIM) was reinvigorated after the 2018 NAVSEA NDT Working Group meeting and they continue to meet monthly.

(8) 2012 NDT Working Group Action – Blue Light for Fluorescent Magnetic Particle Testing (MT): NAVSEA 05P will consider including the use of blue lights for fluorescent MT in NAVSEA Technical Publication 271, Revision 2. In the meantime, anyone wishing to use blue lights for fluorescent MT is encouraged to submit a request for approval along with supporting technical rationale to NAVSEA (Dr. Haldipur). The NDT Working Group will continue to track this action until NAVSEA Tech Pub 271 is revised.

(9) 2011 NDT Working Group Action – Use of Quantitative Quality Indicators (QQI) for MT: Similar to the use of blue lights for fluorescent MT, NAVSEA 05P will evaluate including QQI requirements into NAVSEA Tech Pub 271, Revision 2. In the meantime, anyone wishing to use QQIs is encouraged to submit a request for approval along with supporting technical rationale to SEA 05P2 (Dr. Haldipur). The NDT Working Group will continue to track this action until approval is granted (or denied) or NAVSEA Tech Pub 271 is revised, whichever occurs first.

c. NDT Audit Lessons Learned (2017 – 2018) – Mr. Jason Hence, NAVSEA NDT & Welding Programs Manager

(1) This presentation is intended to be a knowledge sharing opportunity with some of the more interesting items Mr. Hence has documented over the last four years during NDT audits of several activities including naval shipyards, nuclear shipbuilders, RMCs, Supervisors of Shipbuilding, Trident Refit Facilities, and Ship Repair Facility-Japan Regional Maintenance Center.

(2) None of the activities is named in this presentation.

(3) Program management findings:

(a) NDT personnel certification records missing the required information. Examples include but are not limited to the following:

1. Certification expiration date
2. Certification limitations
3. Vision test objective quality evidence (OQE)
4. Formal training OQE

(b) Annual vision test lapses which ranged from days in some cases to months in other cases. Ensuring all vision tests are accomplished on time as required mitigates the risk associated with NDT personnel performing inspections in an unqualified status.

(c) No written procedure covering all aspects of the weld workmanship training and associated responsibilities as required in NAVSEA Technical Publication 248, Revision 1, paragraph 5-2.3.1.a.

(4) NDT certification examination findings:

(a) Examination questions taken verbatim from the American Society for Nondestructive Testing (ASNT) question and answer supplements. This is contrary to ASNT Recommended Practice SNT-TC-1A (2020 edition), paragraph 8.6 and Appendix A.

(b) No examination approval by the current examiner. This is contrary to ASNT Recommended Practice SNT-TC-1A (2020 edition), paragraph 8.1.1, which states, “All qualification examination questions shall be approved by the NDT Level III responsible for the applicable method.” Most of the findings were related to examinations being approved by an individual who was at one time delegated as the examiner but who was no longer the examiner. When an activity designates a new examiner, that examiner is required to approve the examinations in the methods over which they are responsible. Once an examiner is no longer the delegated examiner (e.g., due to leaving the activity’s employment), that individual is no longer the “NDT Level III responsible for the applicable method”. The same requirement applies to any other portions of the NDT program required to be approved by the examiner.

(c) Examination questions and answers not referenced. This is contrary to ASNT Recommended Practice SNT-TC-1A (2020 edition), Appendix A (Note).

(d) Excessive examination time limit. Examples include the following:

1. A 32-question open-book examination with a time limit of 3 ½ hours

2. A 35-question open-book examination with a time limit of 3 hours when another open-book examination consisted of 40 questions with a 90-minute time limit. *A Guide for Developing NDT Certification Examinations* (ASNT, 2nd edition) states “The time allowed for the examination must be adequate for the slower but competent performers to pass it. However, the time must not be so great as to allow the clearly incompetent to unduly delay completion of the examination. This is a best practice for all NDT programs, but it is a requirement for government-employed NDT examiners. NAVSEAINST 4355.7, revision D, requires using *A Guide for Developing NDT Certification Examinations* when developing NDT certification examinations.

(5) Inadequate radiograph storage. There are no NAVSEA standard requirements for the storage of non-nuclear radiographs other than the general record maintenance requirements. American Society for the Testing Metals (ASTM) standard E1254, paragraph 5.1, states “Storage conditions can be designed for archival preservation, normally considered to be for more than 100 years...by using the guidelines in this standard.” Following the guidelines in ASTM E1254 would satisfy the NAVSEA standard record maintenance requirements. ASTM E1254 includes guidelines for minimizing residual thiosulfate, enclosure materials for radiographs, storage area conditions (i.e., air impurities, temperature, and humidity), and fire resistance.

(6) NDT procedure deficiencies. Several examples were presented, including a PT procedure that specified the incorrect minimum black light intensity. The procedure specified a minimum of 800 microwatts per square centimeter ($\mu\text{W}/\text{cm}^2$) on the inspection surface per NAVSEA Technical Publication 271, paragraph 5.6.8. The light meter was calibrated to an accuracy of $\pm 15\%$. The procedure should have specified a minimum of $942 \mu\text{W}/\text{cm}^2$ because $942 \mu\text{W}/\text{cm}^2 - 15\% = 800.7 \mu\text{W}/\text{cm}^2$. Questions arose from the NDT Working Group meeting attendees about this and how it would potentially apply to other NDT methods, and Mr. Hence told the attendees that he would get back to them with an answer.

UPDATE: Mr. Subash Jayaraman (Naval Surface Warfare Center – Philadelphia Division) identified guidance found in ASTM E709 (“Standard Guide for Magnetic Particle Testing”). ASTM E709, paragraph 20.2.3, states “Equipment that meets an accuracy requirement specified by the contractually specified...procedure...should be considered adequate, with no additional accuracy or uncertainty determination needed.” Stated differently, a light meter calibrated to the required accuracy is sufficient, and no additional accounting for the accuracy tolerance needs to be specified in the procedure to ensure the minimum light intensity (or any other requirement) is met. It is satisfactory to state in the PT procedure that a minimum of $800 \mu\text{W}/\text{cm}^2$ of black light intensity on the inspection surface is required and to measure that intensity using a light meter calibrated to the standard accuracy of $\pm 15\%$. The light meter calibration to the 15% uncertainty value is based on a standard used by the metrology and calibration laboratory.

4. BREAK-OUT SESSIONS (*NOTE: Each team leader is responsible to drive POA&M to completion or transfer lead to another activity.*)

a. **EDDY CURRENT TESTING (ET).**

(1) **Team Leader**: Jeremy Johnson (Norfolk Naval Shipyard)

(2) **Team Members**:

NAME	ACTIVITY
Michael Sullivan	EB Corp.
Scott Darling	HII-Newport News Shipbuilding
Kimberly Rose	MARMC
Nate Livesey	NAVSEA 05P
Bob Gould	NNL
Ken Burke	NNSY
Bryan Ciaccio	NNSY
Landon Hill	NNSY
Matt Liverman	NNSY
Caleb Angle	NSWC-Philadelphia Division
Taylor Bethmann	NSWC-Philadelphia Division
Subash Jayaraman	NSWC-Philadelphia Division
Jason Mayo	NSWC-Philadelphia Division
Rick Journell	Oceaneering International Inc.
Chip Andrade	PHNSY & IMF
Cody Gantan-Tai See	PHNSY & IMF
Sean Adjutant	PNS
Tom Bennett	PSNS & IMF
Travis Hileman	PSNS & IMF
Matthew Moyer	PSNS & IMF
Anthony Perez	PSNS & IMF
Rick Sheridan	PSNS & IMF
Alexander Lee	TRF-Bangor
Chris Perrine	TRF-Kings Bay
Scott Hower	Zetec/EddyFi

(3) **Purpose/Objective**: To review major NAVSEA Tech Pub 2032 ACN-1 draft changes. To align the enterprise on analysis techniques, long-term data storage, data management and sharing, aircraft carrier elevator inspection, surface array applications, and the downgrade of ET data from NNPI.

(4) **Breakout Synopsis**:

(a) NAVSEA Technical Publication Draft Change Review

1. Profilometry. Used to capture profiles of defects. Trying to phase out the use of tubing replications within the next couple of years. NAVSEA is writing profilometry into

NAVSEA Tech Pub 2032 which will allow the corporation to begin using it once lasers are approved. Replications are performed differently throughout the shipyards. ASNT Recommended Practice SNT-TC-1A included profilometry in the 2020 edition. Tube samples with inside array voltage (IAV) indications sent to Navy Nuclear Laboratory (NNL) for laser profilometry; the initial data looks promising. The order of operations as outlined in NAVSEA Tech Pub 2032 ACN-1, paragraphs C.5.3.2 and C.5.3.2.1 may need some reorganization. The group discussed how these steps should and could flow depending on certain circumstances. The flow of the paragraphs also contradicts NAVSEAINST N9254 requirements which could be a problem. The group recommended to add more flexibility in the process to allow for other instrumentation/processes to be used in different situations.

2. Determining the best size to use for the VOL ID requirement in paragraph C.5.2.3.1. Should the definition of “Inspection Zone” be “the entire tube”? It was written as it is now to capture separate zones if the need arises.

3. The terms linear vs. crack should be aligned throughout.

4. The picture of a deposit was included to document what a deposit looks like and what ET signal it responds to for reference. These flaws can be thrown out/not reported as defects. Document as a DEP but not required as a reporting element. The group suggested adding the lissajous curve to these images for further clarification.

5. Activities should be probing raw tubes prior to making standards to verify the quality of the material prior to machining the tubes.

6. The group discussed if there should be a procedure for purchasing/acquiring tubes for standards. The group suggested ordering a set amount of extra tubing from the same bulk purchase for use as standards. There has typically been a shortage of the specific tubing materials for previous availabilities when attempting to make standards after bulk purchases for a project. Nate Livesey took an action to investigate USS FORD class condensers titanium tubing vendors. The group took a collective action to review MIL-T-15005 and MIL-T-16420 prior to the next ET meeting. All activities are to send Mr. Livesey a dollar amount for what we are spending on tubing and extra tubing to get acceptable tubing to track corporate dollars wasted.

7. The EDM notched standard drawings in the draft NAVSEA Tech Pub 2032 change are inaccurate, and the required flaws of the drawing would cause work stoppages at some activities if not changed. The group suggested a slotted standard could be used vice EDM, and then an EDM could be used for verification if needed.

8. The current standards manufactured to ASME standards may need to have certain flaws induced into them to meet the new NAVSEA Tech Pub 2032 change standards.

9. The group suggested these “standards” changes may need to wait to be incorporated into the final release of the new revision rather than including them in the advance change notice to allow the activities extra time to meet the new requirements. Another alternative would be to release the requirements in the advance change notice, and the activities would plan implementation to align with updated standards.

10. Reboiler standards. Zetec, NSWC-Philadelphia Division, and NSWC-Carderock Division are performing research and development for re-boiler standards. An update on this R&D will be provided during the next ET meeting. New probes other than those specified in NAVSEA Tech Pub 2032 need to be tested and proofed.

11. Personnel certification. Level 1 acquisition personnel certification is not mentioned in the new change to NAVSEA Tech Pub 2032. The group asked what the certification requirements are for ET Array Level 1. The new change is also silent on certification requirements for data collectors, and the Level 1 requirements need to be captured. The NAVSEA perspective is that this does not prevent an activity from including Level 1 qualification and certification requirements in their NDT Written Practice. The clarification was made to the group that ET (Bobbin) is not a prerequisite for ET Array qualification. The change to NAVSEA Tech Pub 2032 specifies the minimum requirements, but the activities are free to exceed the minimum. The group suggested that a NAVSEA Tech Pub 271 clarification may be needed for ET Tubing because NAVSEA Tech Pub 271 should direct the reader to ASNT Recommended Practice SNT-TC-1A for the minimum requirements. The group asked for a NAVSEA letter clarifying how an ET (Bobbin) Level III can become certified Level III in ET Array. The group discussed whether it was necessary to specify a minimum of 5 reinspections for a newly certified ET Array analyst's first calibration groups. The sample should be representative of the majority of the work being performed. The group decided to decrease to a minimum of 3 reinspections, but adjusted at the discretion of the examiner.

12. Flaw reporting. The group discussed the proper coil to give the best response. The draft change to NAVSEA Tech Pub 2032, paragraph C.5.2.2 specifies trending data, but the direction in the paragraph is opposite of how it should be used. Flaws should go in an upward direction but not 90 degrees. The group asked about the best channel to use to get the best presentation of flaws with adequate rotation. There is no guidance on this. Should this be included in the corporate procedure? All reported VOL calls should be reported in which channel? The group asked for guidance on all these parameters to align the corporation on the data being submitted to NAVSEA for trending. The group suggested that rather than having an analyst performing trend analysis on the deck plate while performing analysis of critical path work, it could be performed in parallel by others or after initial reporting.

13. Array prime frequency. The group discussed the need to investigate/re-evaluate the ET Array prime frequency for calling flaws. Scott Hower (Zetec) took an action to query the Zetec engineering group to evaluate the array prime frequency for calling flaws and then to report back to the ET group. NAVSEA currently has an action to investigate the prime frequency for calling flaws.

(b) Data Storage and Management. The group discussed what the architecture of the ET data storage would look like and the need to get the IT folks involved. NNL sent historical data to Zetec for storage and file retrieval. The group suggested the need to downgrade the classification of data from "NOFORN" for ease of data storage and ease of sending data among activities. NSWC-Philadelphia Division is the central location for activities to send data. NSWC-PD solicited info from the activities via e-mail about this, and this was worked through during the meeting. The group discussed the potential of livestreaming data rather than one big data dump could save significant time when sending files. NSWC-PD took an action to confirm whether they have access to the RPCO/BPMI network for ease of data transfer.

(c) Data sharing. The group discussed the need for a flaw library which could be hosted on a SharePoint site. The group also discussed the need to be able to quickly transfer data between activity subject matter experts to better develop and align the ET program. The DoD SAFE file sharing site was discussed for sharing of smaller files, but the file drops would need to be encrypted.

(d) Data Management. The group suggested using a senior analyst as a data manager for a project. NSWC-PD took an action to start assembling data. The group also discussed how to maintain consistency through data management personnel and operations. Puget Sound Naval Shipyard and Intermediate Maintenance Facility has a template and a desk guide to walk inspectors through ensuring the final report is complete and accurate. PSNS&IMF took an action to share their guides with the other activities. The group discussed the need to corporately align what is captured in data management.

(e) Tube cleaning. The group discussed how tubes are prepared and cleaned differently at each activity. Portsmouth Naval Shipyard (PNS) has developed a 3D printed probe head to attach to the water lance to streamline the process. NAVSEA has seen the trend of poor tube cleaning and recommends educating the shops and codes involved why it is vital to clean tubes properly.

(f) Measuring techniques. There are no requirements or guidance for certain mixes. When reviewing the change to NAVSEA Tech Pub 2032, consider what should be added to aid measurements.

(5) **Plan of Action & Milestones:**

(a) Hold a call to discuss comments to NAVSEA Tech Pub 2032 change during the June ET meeting.

ASSIGNED TO:	ET Meeting reps at each activity	SCD:	28 June 2022
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(b) Provide comments to NAVSEA Tech Pub 2032 change.

ASSIGNED TO:	All activities	SCD:	24 June 2022
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(c) Designate a Staff Examiner in ET Array concurrent with the release of the NAVSEA Tech Pub 2032 change.

ASSIGNED TO:	Jason Hence (SEA 04)	SCD:	TBD 2022
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(d) Provide justification for revising NAVSEA Tech Pub 2032, paragraph C.5.2.3.1 to reflect best practices for using bobbin to verify/adjudicate VOLs in the ½” to 1” range.

ASSIGNED TO:	Jeremy Johnson (NNSY)	SCD:	24 June 2022
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(e) Investigate how we ensure proper inventory of ET tubing material for standards for upcoming availabilities and sourcing of tubing. Report results through ET meeting.

ASSIGNED TO:	NSWC-Philadelphia Division	SCD:	28 June 2022
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(f) Query the Zetec engineering group to evaluate the array prime frequency for calling flaws, then report back to NAVSEA.

ASSIGNED TO:	Nate Livesey (SEA 05P)	SCD:	3 June 2022
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(g) Provide schedule for revospect.

ASSIGNED TO:	Matt Moyer (PSNS&IMF)	SCD:	31 May 2022
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(h) Provide a white paper to the group on the best frequencies to use for calling flaws.

ASSIGNED TO:	Robert Gould (NNL)	SCD:	30 June 2022
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(i) Review MIL-T-15005 and MIL-T-16420 to comment on and define inspection requirements and evaluate effects of maximum wall thickness or nominal wall thickness.

ASSIGNED TO:	All activities	SCD:	29 May 2022
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(j) Send Nate Livesey a dollar amount for what we are spending on tubing and extra tubing to get acceptable tubing to track corporate waste.

ASSIGNED TO:	All Activities' NDT Technical and Training Branches	SCD:	26 August 2022
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(k) Provide NSWC-PD and NSWC-CD network attached storage (NAS) specs for a temporary solution for transferring data among the activities.

ASSIGNED TO:	Matt Moyer and Tom Bennett (PSNS&IMF)	SCD:	28 June 2022
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(l) Write a letter requesting a change to NAVSEAINST N9254.1 for declassification of ET data.

ASSIGNED TO:	Matt Moyer (PSNS&IMF)	SCD:	29 July 2022
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(m) Share data management desk guide/template with all activities and warfare centers for possible implementation/guidance.

ASSIGNED TO:	Matt Moyer (PSNS&IMF)	SCD:	28 June 2022
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(n) Provide screen shots including lissajous response to insert into the deposit screen shots for NAVSEA Tech Pub 2032 change.

ASSIGNED TO:	Jeremey Johnson (NNSY)	SCD:	TBD
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(o) Provide the other activities the design of the Additive Manufactured (AM) probe head attachment to a water lance for better tube cleaning.

ASSIGNED TO:	Sean Adjutant (PNS)	SCD:	28 June 2022
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(p) Schedule a call for the activities to discuss open R&D on surface array.

ASSIGNED TO:	Daniel Hardison and LaTonya Rawlings (NNSY)	SCD:	29 July 2022
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b. PHASED ARRAY ULTRASONIC TESTING (PAUT)

(1) **Team Leader:** Kevin Hornberger (Portsmouth Naval Shipyard)

(2) **Team Members:**

NAME	ACTIVITY
Amanda Chaves	BPMI
Justin DelleDonne	BPMI
Jason Slonaker	Dynamic NDT
David Bigelow	EB Corp.
Rob Luko	EB Corp.
William Betz	EddyFi
Chris Arnold	HII-Newport News Shipbuilding
Helen Gault	HII-Newport News Shipbuilding
Paul Colahan	NAVSEA 04X
Larry Mullins	NAVSEA 05P (Serco)
Russel Jones	NIC LLC
Drew Bonner	NNSY
Daniel Edsall	NNSY
Chris Renfrew	NNSY
Tom Metger	NNSY (retired)
Charles Nguyen	NSWC-Carderock Division
Nathan Neises	NSWC-Corona
Subash Jayaraman	NSWC-Philadelphia Division
Chip Andrade	PHNSY & IMF
Joey Benton	PMS397 (Serco)
Evan Myers	PNS
Andrea Buckel	PSNS & IMF
Derek Johnson	PSNS & IMF
Rick Sheridan	PSNS & IMF
Edward Reed	SUPSHIP Groton
Joseph Moser	SUPSHIP Newport News
David Kilpela	SWRMC
Dale Fosdyck	TRF-Bangor
Jeffrey Bragg	TRF-Kings Bay

(3) **Purpose/Objective:**

(a) Purpose. To align the attendees and discuss improvements in various PAUT areas, and to explore potential additional PAUT applications.

(b) Objectives. To explore potential performance based qualification, IT roadblocks, and new PAUT applications.

(4) **Breakout Synopsis:** The group discussed several PAUT topics including the following: PAUT prop attributes (i.e., dimensions, defects, material type, amplitude, how to order), work time experience (WTE) acquisition and potential travel, the EB Corp. research and development of PAUT in lieu of RT for piping welds, PAUT for UT Characterization & Sizing, establishment of in-house training and training topics, potential PAUT procedure updates, records, IT issues.

(5) **Plan of Action & Milestones:**

(a) Develop a plan and SOP for achieving performance-based “qualified” status of personnel without reaching full WTE hours per ASNT SNT-TC-1A.

ASSIGNED TO:	PSNS & IMF	SCD:	30 November 2022
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(b) Continue Cumbersome Work Practice 396 required tasks to progress the single-sided inspection capability.

ASSIGNED TO:	Charlie Nguyen (NSWC-CD)	SCD:	30 November 2022
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(c) Determine if the existing PAUT procedures need revision or are satisfactory as is.

ASSIGNED TO:	Brodbent/Addis/Hasegawa (PSNS)	SCD:	30 November 2022
	Hornberger (PNS)		

(d) Determine what information is required and desired in PAUT reports included in TWDs as well as what is retained for historical records.

ASSIGNED TO:	Scott Reed (SUPSHIP Groton)	SCD:	30 November 2022
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(e) Determine whether the new versions of the Olympus OmniPC software create any issues for data acquired with earlier versions of the software.

ASSIGNED TO:	Subash Jayaraman (NSWC-PD)	SCD:	30 November 2022
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(f) Continue Cumbersome Work Practice 435 required tasks per CWP POA&M and NAVSEA direction.

ASSIGNED TO:	CWP Team Members	SCD:	31 December 2022
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c. **COMPUTED RADIOGRAPHY**

(1) **Team Leader:** Greg Mohr (Naval Nuclear Laboratory)

(2) **Team Members:**

NAME	ACTIVITY
Karen Bruer	Amee Bay
Bill Plumstead	ATS
Raul Gonzalez	Baker Hughes
Dan Wysnewski	Baker Hughes
Justin DelleDonne	BPMI
John Webster	BPMI
Charles Menken	BWXT
Bobby Durning	Carestream NDT
Bobby Taylor	Dynamic NDT
David Bigelow	EB Corp.
Richard Tennison	Fincantieri Marine Repair
JJ Bosco	HII-NNS
Randall Hall	HII-NNS
Dean Lavinder	HII-NNS
Jim Booher	MARMC
Hank Rowe	Newco Inc.
Tennille Carpenter	NNSY
Rob Hansen	NNSY
Daniel Hardison	NNSY
David May	NNSY
Kelly Sawyer	NNSY
Dillon Sinotte	NNSY
Tiffany Trykowski	NNSY
Michael Foch	NSWC-Carderock Division
Nathan Neises	NSWC-Corona
Tom Jergenson	OII
Christopher Cook	ORBIS
Russ Kok	ORBIS
Jarrett Sano	PHNSY & IMF
Lindsay Miller	PMS397
Allyson Winters	PMS397
Jason Bolerjack	PSNS & IMF
Nathan Qualls	PSNS & IMF
Stephen Brault	SUPSHIP Groton
Kelvin Howard	SUPSHIP Gulf Coast
Jason Greer	SUPSHIP Newport News
Patrick Roberts	TRF-Bangor
Jeffrey Bragg	TRF-Kings Bay

(3) **Purpose/Objective**

(a) Purpose. To update the group on progress made in the way of technology, requirements, and specifications over the past 4 years.

(b) Objectives. To describe various paths forward for activities to implement CR.

(4) **Breakout Synopsis**

(a) Greg Mohr gave a presentation on CR vs. conventional RT. The presentation included bit depth, matching monitors with system and software, time savings of CR, technique development, ensuring lead screens do not come into contact with image plates, NAVSEA 250-1500-1 inclusion of CR requirements, and NAVSEA 392-0775 inclusion of an adjudication checklist for CR submission.

(b) The group discussed digital imaging format (i.e., DICONDE). Not all metatags are transferable between different manufacturer software. HII-NNS created tags with the corporation in 2017.

(c) The group engaged in a general discussion that included the following: ASTM standards for written examinations, WTE hours for non-nuclear qualification, indication appearance comparison between conventional RT and digital images, CR has the potential for inspectors to “over-inspect”, techniques need to include very specific allowable filter settings.

(d) The group discussed the NAVSEA 05P letter and draft CR requirements. Welder qualifications should be shot in the beginning of a CR program prior to production welds due to the low risk associated with them. An activity may need to submit many images because welder qualifications may not exhibit all defects usable for comparison. The question was asked whether changing critical attributes would require new technique submission, and the answer is maybe; it depends.

(e) Re-shoots of CR vs. conventional RT

1. Not many re-shoots are necessary once you have a technique that is close.

2. Do not leave image plates (IP) out in direct light or sunlight.

3. In production, the examiner sets the quality level for technique, pixel value (PV)/dose rate 40%, re-shoots based on quality level. IPs are pretty flexible as long as the technique is close because latitude can be much wider for CR when compared to film techniques. Re-shoots should be fewer because filtering in software can assist in adjusting the image. Most IPs equal the cost of 1 box of film. Establishing techniques with CR is better and more cost effective than performing several film shots, and activities can use old IPs for technique development.

4. NAVSEA requires using linear PV and establishment of minimum PV by doing ASTM E2445 tests. NAVAIR T.0.33B-1-2 standard establishes charts with energy levels/dose rates. Double exposure = double PV. Start with a super low exposure to establish technique,

then double or triple the exposure to get adequate PV. Minimum PV required in the procedure or in the technique as proven by signal-to-noise ratio tests and other baseline characterizations.

5. Are the penetrometer requirements the same for CR as for film? Navy requirements is 15% linear PV darker maximum.

6. The dose rate can be less and you still see the required sensitivity and features needed for evaluation.

7. When auditing CR images, what is required to determine satisfactory technique? More than just penetrometer features, it includes all the necessary procedure parameters. The more dose on the IP the better until saturation occurs. Essentially you audit CR images similar to film images.

8. CR of castings requires NAVSEA approval.

9. Reference radiographs exist for software. There are at least a dozen sets for different materials and thicknesses.

(f) CR equipment options. Systems and options have changed and improved over the years.

1. Different vendors cater to different applications. Now there is a better understanding of different systems and we need to communicate so every activity purchases the appropriate equipment.

2. NAVSEA requirements for IP need to be met when purchasing different IPs. Two main vendors make approximately 3 different types of plates for use.

(g) IT Roadblocks

1. Each activity needs to get a local IT manager to work with if possible. Each activity also needs to get management engagement with IT management if support is not provided.

2. Public shipyards may need to start with stand-alone systems, using external hard drives to transfer images to legacy network. If the system is on the network, issues exist with Windows updates and security pushes that tend to freeze CR software.

3. Be sure to actually use archiving software after installation, both uploading into and downloading from the software to ensure everything works properly.

4. Each activity needs to determine whether CR software will be on the network. If so, computers will likely need to be purchased from the activity so it can be vetted by IT. The other option is to buy the computer/system from the vendor and create a stand-alone system. Ideally, it would be best for everyone to be on the network and be able to access the internet to share images, for training and for software support from the vendor.

(h) Ghosting

1. Exposing IPs stores energy proportional to dose. PSL process: image stored as latent, then is converted to blue light which is read by scanner. Ghosting happens when efficiency of image transfer changes in some areas of IP. IP degradation causes ghosting (residual) of images. Equal energy applied to IP can help with ghosting. Trapped ghost images in plates cannot be dispersed by erasing the plate. Shooting isotope after x-ray can trap images in plates but not vice versa. May have to mark plates to keep them separate for isotope vs. x-ray. The gain of a plate (how many PV come out of a given dose) is best preserved with uniform exposure. Masking or beam filtering can help with keeping plate uniform. Using smaller IPs can help with saturation too. Longer wavelength radiation causes burning in of plates (less ghosting of plates) with isotopes as radiation is more homogeneous. NAVSEA requirement to serialize IPs can help with removing saturated/burned in plates from use.

2. Erasing trapped images can sometimes happen by dosing the plate with 3 times the saturation dose then erasing it three times.

3. Using beam filters can improve scatter control. Wood or plastic in the exposure room will cause significant scatter onto IPs. Using an absorber block of steel next to an IP can help to absorb some of the scatter.

(i) CR Initial Submission Format and Process

1. Letter to Dr. Haldipur (SEA 05P) or Mr. Novotny (SEA 08S) with specifications and request for approval.

2. Attach three elements either together or separately.

3. CR images can be sent via any removable media - CD, external hard drive, thumb drive. They will be in DICONDE format already so they should be able to be opened for viewing. Vendors may be able to use drop box to transfer files. The goal will be able to transfer everything electronically via network.

(j) Film Obsolescence

1. Film prices are rising as oil and silver prices increase.

2. Film sales have dropped 15% - 20% from 5 years ago and can be somewhat attributed to digital imaging and CR.

3. The global medical film market is crashing except in China and India.

4. Film is not going away at present in industry, but supply may be an issue now and into the future.

(k) Digitizer

1. Array is the most used and probably the best option. It is the quick option to digitize film for sharing results.

2. Interpreting from images that have been digitized is not recommended.

3. Record requirements. NAVSEA 250-1500-1 requirement is to maintain for 7 years after the contract and then ask permission to destroy. Older images should be able to be digitized for long-term storage. Digitized images can be pulled back up and used for comparison, and they should not need to be re-evaluated.

(5) **Plan of Action & Milestones:**

(a) Establish a shareable library that includes CR techniques, example images, and standard specimens.

ASSIGNED TO:	Kelly Sawyer (NNSY)	SCD:	31 March 2023
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(b) Define critical attributes that trigger technique re-submission if changed.

ASSIGNED TO:	John Webster (BPMI)	SCD:	31 October 2022
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(c) Request digitization instruction from NAVSEA (related to digital record retention).

ASSIGNED TO:	Mike Foch (NSWC-CD)	SCD:	31 August 2022
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(d) Package ONR/NNS CR report and data for distribution to all.

ASSIGNED TO:	Mike Foch (NSWC-CD)	SCD:	29 July 2022
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(e) Create a social media Team for questions/discussion.

ASSIGNED TO:	Kelly Sawyer (NNSY)	SCD:	27 May 2022
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(f) Submit CR data package and comments to SEA 05P2 to support finalizing the non-nuclear draft CR requirements.

ASSIGNED TO:	Mike Foch (NSWC-CD)	SCD:	27 May 2022 (bi-monthly telecons) 31 July 2022 (comments on draft) 30 September 2022 (data package)
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d. INFORMATION TECHNOLOGY (IT) CONCERNS AND ROADBLOCKS FOR NEW NONDESTRUCTIVE TESTING (NDT) TECHNOLOGIES

(1) **Team Leader:** Matt Liverman - Norfolk Naval Shipyard (NNSY)

(2) **Team Members:** Several representatives from each of the Phased Array Ultrasonic Testing, Eddy Current Testing, and Computed Radiography break-out sessions

(3) **Purpose/Objective:**

(a) Purpose. To identify either universally or locally imposed IT measures that create inefficiencies and prevent maximizing new NDT technology capabilities (e.g., data sharing and data storage).

(b) Objectives. Determine a path forward to address IT roadblocks for new and existing NDT technologies.

(4) **Breakout Synopsis:**

(a) The group discussed the current impact of IT restrictions and any locally devised workarounds to utilize the new NDT technologies, however hampered. The impacts and workarounds include:

1. There is a cumbersome work practice (CWP) to implement any new technology involving IT and resistance from local IT organizations with no recognition of NAVSEA requirements/initiatives including cybersecurity.

2. Puget Sound Naval Shipyard & Intermediate Maintenance Facility (PSNS & IMF) has a semi-dedicated IT branch. PSNS & IMF utilizes a local (i.e., not connected to the Navy-Marine Corps Intranet (NMCI)) network in conjunction with a platform IT (PIT) system for new NDT technologies. PIT systems do not communicate with other IT systems. PIT systems are not networked with the NMCI, and external activities (e.g., other shipyards) cannot access the PIT systems.

3. Norfolk Naval Shipyard (NNSY) uses a PIT system for new NDT technologies.

4. Current digital storage capacity is limited. PSNS & IMF is allowed to have a network attached storage (NAS). NNSY is denied NAS and provided with a shared drive which is not accessible by the software in order to view historical data.

5. Some IT requests are denied without communicating back to the requesting code (e.g., equipment and software purchases (not solely IT related)).

6. Administrative controls required by the software to function properly causes denial by IT organizations. At some activities, the ET software was originally installed on a legacy network, but the IT organization would regularly require on-site visits to enter an administrative password, and then IT subsequently moved the software to an offline network. Even on an offline network, activities do not have administrative access.

7. Administrative controls are required for hardware (e.g., encrypted external media).

8. Activities commonly purchase hardware specific to requirements needed to run the software, and upon receipt of the hardware, the local IT organization wipes the hard drive and installs Navy-provided disk image to include cumbersome cyber-security controls. IT removes the vendor software and may or may not assist in reinstallation.

9. There are concerns with the classification of the data and how to handle the classification.

10. Inspection personnel are required to be IT experts by default, troubleshooting issues ranging from software errors to networking. IT organizations are not willing to embed personnel on the deck plate when new technologies are implemented.

11. It has proved quite cumbersome to transfer data from any system to a network attached workstation.

(b) Attributes of the optimal IT situation as it relates to new NDT technologies include:

1. The ability to utilize NMCI network and workstations to install software and transfer data between activities, public or private.

2. A universal Department of the Navy Applications and Database Management System (DADMS) approval to accept already-vetted software.

3. User-updated software (i.e., not forced by NMCI), pre-notification when a security or other patch/update will be installed, allowance for specific workstations to be used as a beta test to ensure no NDT system crashes, and easy validation of updates.

4. Potential requirement for multiple software versions to be installed and maintained on older workstations/equipment due to data compatibility issues (i.e., Digital Imaging and Communication in Nondestructive Evaluation (DICONDE)) or pay for historical data to be converted.

5. Allowed use of external memory cards.

6. Approved storage and retrieval (perhaps in the cloud) accessible by each software package for quick review of data. Centralized storage needs to accommodate history dumps and expandable. Storage needs to accept data classification up to and including "NNPI". Storage needs to be accessible by all enterprise activities, including non-NMCI activities.

7. Improved bandwidth for data transfer within and outside of activities.

8. Ability to work on the network when not physically at your activity (e.g., via virtual private network).

(5) **Conclusion:** All activities participating in the NAVSEA NDT Working Group meeting have IT support problems as it relates to the NDT program and new NDT technologies.

Effectively implementing new NDT technologies will require a change in the current IT structure and work-arounds used at the various activities which will require NAVSEA headquarters support.

(6) **Plan of Action & Milestones:**

(a) Identify IT lead at each activity.

ASSIGNED TO:	Matt Moyer (PSNS & IMF) Courtney Amadon (PNS) Dan Hardison (NNSY) Gail Albright/Chip Andrade (PHNSY & IMF) Alexander Lee (TRFB) Jeff Bragg (TRFKB) Subash Jayaraman (NSWC-PD)	SCD:	COMPLETE
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(b) Provide current state of IT including work-arounds and limitations.

ASSIGNED TO:	Matt Moyer (PSNS & IMF) Courtney Amadon (PNS) Dan Hardison (NNSY) Gail Albright/Chip Andrade (PHNSY & IMF) Alexander Lee (TRFB) Jeff Bragg (TRFKB) Subash Jayaraman (NSWC-PD)	SCD:	31 July 2022
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(c) Summarize the benefit of future state to support NAVSEA 05 letter, including cost and schedule savings, technical improvements, quality of life (i.e., remote analysis, tiger team, etc.), etc.

ASSIGNED TO:	Matt Moyer (PSNS & IMF) Courtney Amadon (PNS) Dan Hardison (NNSY) Gail Albright/Chip Andrade (PHNSY & IMF) Alexander Lee (TRFB) Jeff Bragg (TRFKB) Subash Jayaraman (NSWC-PD)	SCD:	31 July 2022
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(d) Research vendor ability and willingness to move software to a DICONDE format.

ASSIGNED TO:	Michael Foch (NSWC-CD)	SCD:	31 October 2022
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(e) Submit letter to NAVSEA 03 identifying concerns and requesting support to address the problems summarized. Include all activities (including shipbuilders) on the distribution to provide a corporate-wide solution.

ASSIGNED TO:	Dr. Pranaam Haldipur (SEA 05P)	SCD:	30 June 2022
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e. EUROPEAN UNION NONDESTRUCTIVE TESTING SPECIFICATIONS AS AN ALTERNATE QUALIFICATION SYSTEM

(1) **Team Leader:** Julieann Storm (FDRMC)

(2) **Team Members:**

NAME	ACTIVITY
Jason Hence	NAVSEA 04X

(3) **Purpose/Objective:**

(a) Purpose. To explore the potential approval of European Union NDT specifications as an alternate qualification system per NAVSEA Technical Publication 271.

(b) Objectives. Evaluate equivalence and request approval of European Union NDT specifications per NAVSEA Tech Pub 271.

(4) **Breakout Synopsis:** A need exists at Forward Deployed Regional Maintenance Center to allow European Union NDT specifications for overseas contractor qualification. US Navy ship repair typically represents a very small portion of the overall business for contractors under FDRMC cognizance. SEA 05P granted approval for US Naval Ship Repair Facility and Japan RMC to allow the use of Japanese NDT qualification standards. Jason Hence (SEA 04X) provided Ms. Storm information relating to the approval for SRF-JRMC.

(5) **Plan of Action & Milestones:** Compare NAVSEA Technical Publication 271 qualification requirements to the standard for NDT qualification used in the European Union. Generate a request with required information to the NAVSEA Tech Pub 271 Technical Warrant Holder (Dr. Haldipur) to request approval for EU contractors to perform NDT on US Navy ships using EU NDT qualification specifications.

ASSIGNED TO:	Julieann Storm (FDRMC)	SCD:	30 September 2022
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f. ACTIVE DUTY NDT EXAMINER/INSPECTOR STAFFING

(1) **Team Leader:** HTC John Rodriguez (Surface Warfare Engineering School Command, Great Lakes)

(2) **Team Members:**

NAME	ACTIVITY
HT1 Richard Young	ASSAULT CRAFT UNIT 4
HTCS Josh Taylor	ASSAULT CRAFT UNIT 4
HTC David Beal	RTC Great Lakes
HTC Brandon Link	USS GEORGE WASHINGTON (CVN 73)
HTC Joel Nevins	USS WASP (LHD 1)

(3) **Purpose/Objective:**

(a) Purpose. To continue exploring ways to increase active duty Navy NDT staffing.

(b) Objectives. Generate actions intended to help increase active duty NDT staffing.

(4) **Breakout Synopsis:** The group discussed several potential avenues for increasing active duty NDT staffing including: splitting the Examiner NEC into U51A, U51B, U51C, etc.; ensuring certified examiners are filling examiner billets; implementing NDT examiner development strategies; incentive pay for examiner personnel; discussing options with the Engineering Community Manager, Fleet Forces, and the Navy Manpower Analysis Center; generating an examiner contact list; establishing a TYCOM examiner billet; and standardizing fleet NDT procedures.

(5) **Plan of Action & Milestones:**

(a) Create an active duty examiner contact list.

ASSIGNED TO:	HTC John Rodriguez	SCD:	31 July 2022
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(b) Contact ECM, Fleet Forces, and NAVMAC about examiner NEC separation and examiner pay incentives.

ASSIGNED TO:	HTC John Rodriguez	SCD:	31 August 2022
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g. COMPUTED RADIOGRAPHY IMPLEMENTATION AT SWRMC AND MARMC

(1) **Team Leader:** Jim Booher (MARMC)

(2) **Team Members:**

NAME	ACTIVITY
Scott Carbullido	SWRMC
David Kilpela	SWRMC

(3) **Purpose/Objective:**

(a) Purpose. To establish a plan for implementing CR at SWRMC and MARMC.

(b) Objectives. To maximize efficiency and minimize cost of supporting welder performance and procedure qualification assembly inspections.

(4) **Breakout Synopsis:**

(a) The new active duty weld school at MARMC and the weld school at SWRMC require NDT services to support successful qualification of welders. Neither MARMC nor SWRMC currently have an active RT program (i.e., no x-ray machine, no RT film, and no RT film processor). Implementing a CR system at each activity would negate the cost of RT film, film processing chemicals, hazardous material disposal, and film processor maintenance. CR programs at MARMC and at SWRMC would also save on the cost of contracts let for RT services.

(b) MARMC will work with NNSY and other enterprise SMEs to determine which equipment meets requirements and best meets needs. MARMC will purchase and install equipment and begin comparisons between CR and film on common test assemblies for submission to NAVSEA. SWRMC will work with their contractor that performs RT of welder qualifications and has CR capability to accumulate experience and perform comparison tests for submission for approval.

(5) **Plan of Action & Milestones:**

(a) Meet with NNSY and determine equipment needs.

ASSIGNED TO:	Jim Booher	SCD:	15 June 2022
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(b) Obtain quotes for equipment, determine power supply needs, and verify command support and funding.

ASSIGNED TO:	Jim Booher	SCD:	31 July 2022
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(c) Purchase equipment, and work towards initial training requirements.

ASSIGNED TO:	Jim Booher	SCD:	30 September 2022
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(d) Start comparison tests, and obtain WTE. Determine certification requirements and avenues.

ASSIGNED TO:	Jim Booher	SCD:	31 December 2022
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h. WAYPOINTS LEARNING MANAGEMENT SYSTEM IMPLEMENTATION

(1) **Team Leader:** Jeffrey Labancz (SERMC)

(2) **Team Members:**

NAME	ACTIVITY
Jim Booher	MARMC
Scott Carbullido	SWRMC
David Kilpela	SWRMC

(3) **Purpose/Objective:** Define an aligned approach for the RMCs to implement the Waypoints learning management system for NDT.

(4) **Plan of Action & Milestones:**

(a) Develop VT oversight and inspection personnel curriculum for VT certification.

ASSIGNED TO: Jeff Labancz	SCD: 31 January 2023
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(b) Develop Waypoints training, testing, and certification path for VT oversight and inspection personnel.

ASSIGNED TO: Jeff Labancz	SCD: 31 January 2023
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(c) Integrate VT oversight and inspector certification curriculum into Waypoints.

ASSIGNED TO: Jeff Labancz	SCD: 31 January 2023
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(d) Complete integration.

ASSIGNED TO: Jeff Labancz	SCD: 31 January 2023
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5. OPEN NDT WORKING GROUP ACTION ITEMS

<p>2018-01</p>	<p><u>ACTIVE DUTY NDT STAFFING</u></p>
<p><u>Team Leader:</u> HTCS(SW) Sean Huston – SWOSU- Great Lakes</p> <p><u>Team Members:</u> HTCM George Rape – ACU 5 HTCS Cory Ervin – LOGSU 3 Jim Booher – MARMC HT1 Skyler Malmstrom – NPTU Ballston Spa Chaz Aranita – PHNSY & IMF John Ricks – PHNSY & IMF HTC Kyle Timm – PSNS & IMF Jason Hence – NAVSEA 04 HTC Brandon Link – SWOSU-GL HTC Joel Nevens – SWOSU-GL HTC Rodney Ellars – SWOSU-GL HT1 Derek Rody – USS Frank Cable HT1 Shawn Lareau – USS George Washington</p>	<p><u>Purpose/Objective:</u> To discuss the status of active duty NDT staffing and the health of the community. To identify training concerns, personnel management, and program administration issues.</p> <p><u>Breakout Synopsis:</u> The group discussed how the active duty NDT examiner shortage is contributing to a lack of knowledge deficiency across Navy NDT. No formal mechanism is in place to feed Fleet program review findings back to certifying agencies. There is a possible work package shortage in the Fleet contributing to proficiency issues.</p> <p><u>Action:</u> 1. NEC tracking and verification to determine true community strength of active duty personnel. HTCM Rape - ACTION COMPLETE</p>
<p>2022 UPDATE: Additional options were explored to help increase active duty NDT staffing.</p>	<p>2. Solicit active duty NDT examiner participation for NDT audits. Mr. Hence - ACTION COMPLETE</p> <p>3. Develop an NDT/Weld Workmanship program audit checklist for submission and inclusion in Fleet assessments. HTCS Ervin - ACTION COMPLETE</p> <p>4. Determine if a post-NDT School intermediate (I) stop at maintenance facilities is feasible. HTC Timm - ACTION COMPLETE</p> <p>5. Request NDT examiner attendance at Fleet audits. HTCS Huston - ACTION COMPLETE</p>

2012-03

Team Leader:

Theresa Lopez (SWRMC)

Team Members:

Roger Ehlers – InspecTesting, Inc.
David Kilpela – InspecTesting, Inc.
Jacob Wilkerson – InspecTesting, Inc.

2015 UPDATE: Not incorporated into TP-271 Rev 1. SWRMC to re-submit change recommendation to Dr. Green for future TP-271 revision.

2016 UPDATE: Will be evaluated for inclusion into NAVSEA Tech Pub 271, Revision 2

VALIDATION OF BLUE LIGHT TECHNOLOGY AS A SUBSTITUTE FOR MERCURY VAPOR BLACK LIGHTS IN FLUORESCENT MAGNETIC PARTICLE TESTING

Purpose/Objective:

Ms. Lopez, SWRMC, provided an update at the 2011 NDT Working Group on what inspection attributes need to be standardized to improve this inspection technique.

The current wording of T9074-AS-GIB-010/271 calls for the use of “black lights”, providing users with a single option for illuminating fluorescent magnetic particles. The development of new inspection light technologies, such as blue light and LED-A lamps, provide NDT communities with secondary options that are safer, more versatile, and highly reliable in comparison to traditional mercury vapor lamps. This study looks at the feasibility of using blue lights as a suitable alternate light source to the currently required black lights.

Breakout Synopsis:

This study compared the performance of a mercury vapor black light against a blue light on the same flawed test specimen. The test specimen selected for this evaluation was a flawed weld sample displaying a ½” linear indication adjacent to the toe of the weld. Basis for comparison was made solely by visual/photographic comparison.

Action: Ms. Lopez, provide recommended lighting evaluation wording to be submitted for the Draft TP-271 Revision.

ACTION COMPLETE

2011-02

Team Leader:

Ron Flaherty (SEA 04XQ5)

Team Members:

NDT Working Group discussion.

2016 UPDATE: Will be evaluated for inclusion into NAVSEA Tech Pub 271, Revision 2

EVALUATION OF QUANTITATIVE QUALITY INDICATORS (QQI)

An informational discussion regarding the use and incorporation of the QQI into TP-271 to determine adequacy of a magnetic field (i.e., allow the use of something other than the traditional field indicator [pie gage])

Action: Dr. Green, NAVSEA 05P24, evaluate the use of QQIs with the intent to incorporate into TP-271.

2011-03

Team Leader:

Ron Flaherty (SEA 04XQ5)

Team Members:

NDT Working Group discussion.

2015 UPDATE: Not incorporated. SWRMC to re-submit change recommendation to TP278 TWH.

2016 UPDATE: SWRMC re-submitted change recommendation during Industry Review of draft NAVSEA Tech Pub 278 revision.

2017 UPDATE: Change was included in current draft. Awaiting approval and issue.

TP-278 SCRIBE LINE TO DETERMINE INSERTION AND WELD SIZE

Discussion took place to determine if TP-278 footnotes that address the applicability of scribe lines as it applies to determining proper pipe insertion and weld size. Are the requirements clear with regard to whether or not scribe lines are required in all cases for the evaluation of end gap and weld size (e.g., how do welders and inspectors prove weld size end gap and weld size without a benchmark?). Dr. Green suggested the Working Group solicit input for Mr. Gene Mitchell the TP-278 TWH.

Action: Ms. Theresa Lopez (SWRMC) and Mr. Jeff Jacobs (SUPSHIP Bath) agreed to take action to address this issue.

2011-04

Team Leader:

Jeffrey Warren (NSWC-CD)

Team Members:

Joey Benton - SUPSHIP Newport News

Marc Cantara - PNS

Bob Osmond - PSNS&IMF

Dan Kaltenbaugh - BPMI

Russ Kok - K&A, Inc.

Ron Flaherty - NAVSEA 04XQ5

Jason Hence - PHNSY&IMF

Jimmy Sands - NNSY

Pat Shank - SUPSHIP Groton

Karen Bruer - Amee Bay

2015 UPDATE: Final draft reviewed/resolved. Document ready for formatting and final Government/Industry Review.

2016 UPDATE: Draft NAVSEA Tech Pub document in Industry Review.

2017 UPDATE: WG decided to align document with the nuclear requirements which are scheduled to be approved and issued NLT June 2017. WG reps will meet in June 2017 to review final draft document and submit to SEA 05P for Industry Review.

2018 UPDATE: SEA 05P issued letter to the four Naval Shipyards, HII-NNS, and EB Corp. authorizing a trial implementation period for the draft requirements. The document will continue through the SRB process during the trial period.

REVIEW/COMMENT ON THE APRIL 2011 NEWPORT NEWS SHIPBUILDING HOSTED DIGITAL RADIOGRAPHY WORKSHOP PROPOSED COMPUTED RADIOGRAPHY (CR) DOCUMENTS

Actions:

1. Mr. Warren provides Team members the April 2011 Newport News Shipbuilding Hosted Digital Radiography Workshop proposal CR documents by June 2011.
2. Team members review and comment. Review should be focused with the approach that the provide document is what NAVSEA plans to incorporate into TP-271. Initial focus should be CR requirements in the context of weld procedure and weld qualification plates (i.e., the inspection of welds in plate and piping).
3. Comments should be provided to Mr. Warren no later than September 2011, with the intent to begin addressing unresolved items in 2012.
4. Mr. Warren compiles collected comments and recommendations, and present to NAVSEA 05P24, Dr. Green, with copies sent to Breakout Team Members.
5. Report results/status at the 2012 NDT Working Group.

2009-02

Team Leader:

Bob Ossmann (PSNS&IMF)

Team Members:

Barry Steamer - EBC
J. Booher - MARMC
T. Lopez - SWRMC
E.L.K Switzer - Tradewind Group
Jon Stewart - NGMS
Dale Fosdyck - PHNSY&IMF
Greg Selbe - PHNSY&IMF
Alan Valvo - DCMA
Bill Todd - PHNSY&IMF
Pat Shank - SUPSHIP Groton
Karen Bruer - Amee Bay, LLC

2015 UPDATE: Final draft changes resolved. Document ready for formatting and final Government/Industry Review.

2016 UPDATE: Draft document scheduled to be released for Industry Review NLT August 2016.

2017 UPDATE: Key NDT WG changes were omitted in the document sent for Industry Review in September 2016. WG chose representatives to submit to SEA 05P an “essential” change to the draft for removal of Figures 6-23 and Figures 31-48.

2018 UPDATE: SEA 05P removed figures. Final draft comments require adjudication. SEA 05P expects to issue document by the end of 2018.

2022 UPDATE: SEA 05P lack of funding has stalled the final issue of the revision.

MIL-STD 2035 CHANGE PROPOSALS: In

September 2009, Mr. Bob Ossmann, PSNS&IMF, submitted to NAVSEA 05P24 a draft rewrite of MS-2035A (MS-2035), which represented a collective effort of various Naval and Private Sector NDT activities. Recommended changes and proposals were submitted with the objective of making MS-2035 not only easier to navigate but also to provide further detail in areas where the NDT community felt it was needed. The proposals are documented in a Change Proposal Topic List (CPTL) that accompanied the document. The CPTL is a running list of 102 recommendations and/or proposals that has served as an ongoing discussion between the NDT activities involved in this project. The draft rewrite reflects a majority consensus, for the most part, as to how the NDT community would like to see these sections rewritten in the next revision of MS-2035.

Action: Dr. Green, NAVSEA 05P24

6. COMPLETED NDT WORKING GROUP ACTIONS

2018-03 – Regional Maintenance Center (RMC) NDT Written Practice Standardization.

The RMCs collaborated to create a standardized RMC NDT Written Practice in use at all RMCs.

2018-02 – Questionmark Examination Generator Software Implementation. Puget Sound Naval Shipyard & Intermediate Maintenance Facility and SUPSHIP Bath have successfully piloted the software for use in NDT certification examinations at the naval shipyards and SUPSHIPs respectively.

2017-01 – NDT Examiner Development Tool. The Working Group developed a tool to include a list of knowledge, skills, and abilities necessary for seasoned NDT examiners. Puget Sound Naval Shipyard & IMF (PSNS & IMF) developed a “qualification card” system using attributes derived from the NDT examiner development tool. The PSNS & IMF implementation is regarded as a best practice.

2016-05 – NSTM Chapter 074, Vol. 2 Revision Draft. Draft submitted to SEA 05P for Standards Revision Board process.

2016-04 – Hiring from NDT Colleges. Naval Shipyards have identified specific NDT colleges from which to hire graduates based on the quantity and quality of hands-on lab experience in the curriculum. Regular recruiting trips are occurring at each college.

2016-03 – Naval Shipyard Visual Testing (VT) Community of Practice Follow-Up. Naval Shipyards have standardized the VT method.

2015-07 – Pulsed Terahertz (THz) Imaging. Content is business sensitive. NUWC-Newport continues to develop Pulsed THz Imaging.

2015-06 – SUPSHIP NDT Topics. SUPSHIPs have continued discussions to streamline and improve Contract Administration Quality Assurance Program (CAQAP) NDT. Suggestions are forwarded to SEA 04X6 for evaluation.

2015-05 – NDT Examiner Staffing Shortages in Forward Deployed Activities. Forward Deployed Regional Maintenance Center revised the NDT Examiner position description and actively recruits personnel to fill the rotational billet.

2015-04 – Phased Array Ultrasonic Testing (PAUT) / Time of Flight Diffraction (ToFD) for Structural Applications. The NAVSEA Cumbersome Work Practice (CWP) topic 397 tracks completion of this topic.

2015-03 – Corporate Alignment of Naval Shipyard Government Inspector Responsibilities. Uniform Industrial Process Instruction (UIPI) issued to align Naval Shipyard Government Inspectors.

2015-02 – Naval Shipyard Corporate NDT Standardization. The Naval Shipyard Quality Assurance Directors decided during their annual meeting to initiate the NDT Community of Practice to focus on standardization of one NDT method at a time (approximately one method per year).

2015-01 – NDT Division Alignment. NDT Division representatives aligned on a variety of topics. The NDT Division Heads continue to hold monthly conference calls to continue knowledge-sharing and alignment.

2012-05 – NDT Staffing and Recruitment. Naval Shipyards and NAVSEA explored several NDT colleges to evaluate hands-on laboratory time in their curriculum for possible reduction in WTE for graduates hired at Shipyards.

2012-04 – ET Tubing Inspection Evaluation of Indications. The group established a monthly conference call and agreed to meet annually at the NDT Working Group to continue indication evaluation alignment.

2012-02 – Limited Scope UT Thickness Qualifications for Submarine Structural Survey Measurements. The PMS and SEA 07 groups changed the requirement to no longer require UT certification in accordance with NAVSEA Technical Publication 271.

2012-01 – CG-47 Class Aluminum Welding Manual NDT Sequencing. The 5XXX CG-47 7 Class Welding Manual was reviewed and the comments forwarded to the manual change group.

2011-05 – CAQAP Training of Government Personnel Performing Oversight of Contractor-Performed NDT. All SUPSHIPs and SEA 04Z are aware of the PAUT qualification requirements.

2011-01 – Evaluation of Non-Linear Indications in Base Material Heat Affected Zone (HAZ). SEA 05P issued guidance for evaluating rounded indications in the HAZ.

2010-03 – Submarine Retractable Bow Plane – Guide Rail UT Inspection. The Working Group's concern is no longer an issue. Activities have not performed the inspection in several years.

2010-01 – Technical Performance Evaluation of NDT Personnel by Inspection Shops and Codes. Approval letter distributed conditionally allowing Examiner-designated individuals to perform oversight of NDT personnel. The allowance was included in the NAVSEA Technical Publication 271 revision draft.

2005-01 – Clarification and Proposed Change to NAVSEA Tech Pub 271. NAVSEA Tech Pub 271, Rev. 1 issued.

7. NDT WORKING GROUP MEETING ATTENDEES

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