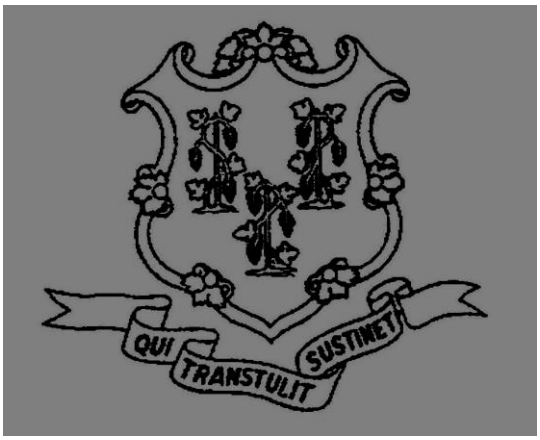
STATE OF CONNECTICUT



THE
NUCLEAR ENERGY ADVISORY COUNCIL
REPORT

2017

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2017 Nuclear Energy Advisory Council (NEAC) Report

CHARGE TO THE COUNCIL

Section 17 of Public Act 96-245 (now CGS16-11a as amended) created the Nuclear Energy Advisory Council (NEAC) and requires it to:

1. Hold regular public meetings to discuss issues relating to the safety and operations of nuclear power plants and to advise the governor, legislature, and municipalities within a five-mile radius of the plants on these issues;

2. Work with federal, state, and local agencies and the companies operating such plants to ensure public health and safety;

3. Discuss proposed changes in, or problems arising from, the operation of the plants;

4. Communicate, through reports and presentations, with the plants' operators about safety or operational concerns at the plants, and

5. Review the current status of the plants with the Nuclear Regulatory Commission.

COUNCIL MEMBERS

The Council consisted of twelve (12) members appointed by the Governor, legislative leadership, and the executive bodies in the towns in or near which the state's nuclear power plants are located (Appendix 1). Eleven of the twelve statutory Council member positions have sitting representation. The position appointed by the President Pro Tem of the Connecticut senate was vacant for 2017 and remains so.

Executive Summary

This is the twentieth annual report presented by the Nuclear Energy Advisory Council (NEAC). During calendar year (CY) 2017, the NEAC met five times and received reports from representatives of the Nuclear Regulatory Commission (NRC), Connecticut Department of Energy and Environmental Protection (DEEP), and Dominion Nuclear Connecticut as well as a written status report from Connecticut Yankee Independent Spent Fuel Storage Installation (ISFSI). Routine and Special NRC Millstone Power Station (MPS) inspection and performance assessment reports were also received and reviewed.
The NEAC continues to examine issues relating to the safety and operations of nuclear power plants and advise the governor, legislature, municipalities, and residents within a five-mile radius of the plants on these issues.

Highlighted Findings

Millstone Operations: The NRC has not identified any immediate safety concerns; deviations from standards were minor, rectified, and appropriately assessed. -Both Millstone Units 2 and 3 remain in the Licensee Response column of the NRC's Regulatory Oversight Process (ROP). This represents baseline regulatory oversight by the NRC and reflects good safety performance. The Environmental Qualification (EQ) Program inspection report, for example, identified One (1) Green (very low safety significance) violation for a failure to replace two feedwater control solenoids. DEEP and CSP determined that security issues had been addressed and corrected and that security of Millstone remains prepared to properly protect the site. Dominion declared two emergency events in 2017. Both were Unusual Events (UE's), the lowest of the four NRC emergency notification levels:

- On August 15, 2017, operators at Millstone Unit 2 declared an UE due to a fire alarm in the reactor containment building. Upon investigation, Dominion verified that there was no fire and determined that a detector had failed. Unit 2 remained on-line. There was no release of radiation due to this event.
- On October 9, 2017, operators at Millstone Unit 3 declared an UE when concentrations on non-radioactive hydrogen in excess of the explosive limit were identified in a panel that monitors the main electrical generator. Dominion ventilated the area and repaired the leak. Unit 3 remained on-line. There was no release of radiation due to this event.

Decommissioning:

Millstone - No significant activities were conducted at the unit during the past calendar year.
Connecticut Yankee – Normal operations, no Lost Time Accidents nor OSHA Recordable Injuries/first aid cases. Shae Hemingway was promoted from acting to Manager on October 22. A Fuel Storage Advisory Committee meeting was held in Haddam, CT on May 9.

High Level Nuclear Waste:

Congressional - FY 2018 Energy and Water Development Appropriations bill (HR 3266) to the House to move forward with Yucca Mountain license application totaling $150 million. Senate Energy and Water Development FY '18 funding bill instructs DOE to create an agency and private party contract process for interim storage services. On July 27, the House passed the "Make America Secure Appropriations Act" (H.R. 3219) that combined four separate Appropriations measures with the Department of Defense Appropriations Act programs and policies of all agencies and departments through FY 2018.

NRC - Three congressional nominees awaiting approval this fall, two new republicans and one returning democrat. Two Private Consolidated Interim Storage License Applications have been filed: Waste Control Specialists (Texas) and Holtec International and the Eddy Lea Alliance (New Mexico) with no NRC selections at this time.

NEAC Recommended Actions

State:

- Facilitate and encourage the DESPP/DHS/DEPP nuclear emergency preparedness collaboration and continue executing current responsibilities and duties in kind.
- The Governor/General Assembly/DEEP should endorse a nuclear waste strategy that includes consent based consolidated interim storage.

NEAC:

- The NEAC will continue to discharge its duties as specified by Section 17 of Public Act 96-245 (now CGS16-11a as amended). The Council acknowledges Dominion Energy's proactive actions in conducting non-destructive testing and analysis of manufacturing irregularities, demonstrating a strong plant and corporate management safety culture.
- The Council requests the Legislature clarify NEAC's responsibilities for nuclear power plant decommissioning in the state.

Conclusions

All oversite entities and stakeholders must continue vigilant oversight of Connecticut Yankee and Millstone Power Station sites for as long as high-level nuclear waste remains on site. Each must encourage the federal government to develop a consolidated interim storage solution to the spent fuel storage problem that prioritizes removal of Spent Nuclear Fuel (SNF) and Greater Than Class C (GTCC) waste from permanently shut down reactor sites and includes transfer of the SNF title to DOE upon receipt.

COUNCIL ACTIVITIES IN 2017

MEETINGS:

As required by CGS16-11a (PA 96-245) as amended, the NEAC held four public meetings as follows: (1) March 22, 2017; (2) June 22, 2017; (3) September 14, 2017; and, (4) December 11, 2017 in Waterford, CT. The purpose of these meetings was to provide a venue for discussion of issues relating to the safe operation of the state's nuclear power plants. Meeting minutes are included in Appendix 2. A summary of the meetings follows:

March 22, 2017 (Waterford Public Library):

Representatives from the US Nuclear Regulatory Commission (NRC) staff briefed the Council in conjunction with their annual public meeting to discuss their assessment of Millstone Power Station Annual. NRC staff briefing NEAC included Mr. Michael Scott, Director, Division of Reactor Projects NRC Region 1; Mr. T. Setzer, Acting Branch Chief, Projects Branch 2, Division of Reactor Projects, Ms. J. Ambrosini, Senior Resident Inspector, Millstone Power Station, Ms. K. Kavanagh, Branch Chief, Quality Assurance Vendor Inspections and Mr. D. Rudland, Branch Chief, Vessels and Internals Integration. Other NRC personnel present to support answers to questions included Mr. C. Hughley NRC Resident Inspector, Millstone Power Station, Mr. L. McKeon, NRC Resident Inspector, Millstone Power Station, Mr. R. Guzman, Sr. PM, Division Operator Reactor Licensing Office of Nuclear Reactor Regulation, and Mr. John Grieves, Regional State Liaison Officer, Region 1. The presentation included:

- **Status of actions taken in response the disaster in Japan and impact to Fukushima Dai-Ichi facility**. In response to the accident at Fukushima the NRC issued orders to licensees to provide additional mitigating equipment and strategies. Millstone has implemented the required modifications and has the additional equipment on site. The NRC conducted inspections of Dominion's implementation in July and November 2016 and identified no findings or discrepancies. Millstone completed additional seismic high frequency and spent nuclear fuel analyses in December 2016. NRC completed its review this re-analysis in February 2017 and concluded that it was appropriate. NRC is reviewing the probabilistic storm surge flooding analyses submitted by Dominion and is performing a focused evaluation of Dominion's flooding mitigating strategies assessment by December 2017. 2016. Based upon analyses and actions completed by Dominion, the NRC has confidence that Millstone is in compliance with the NRC orders.
- **Summary of Spent Nuclear Fuel (SNF) storage and disposal issues as they relate to Millstone Power Station.** Dominion completed moving some Millstone Unit No. 3 SNF to dry storage on the Independent Spent Fuel Storage Installation (ISFSI) located on the Millstone site in 2016 with no issues. Several canisters of SNF from Millstone Unit No. 2 are currently stored at the ISFSI. All SNF from Millstone Unit No. 1 is in wet storage in the Spent Fuel Pool, but that due to the age of the SNF, the heat load is quite low.
- **Dominion's progress in completed actions committed to under confirmatory action letter (CAL) that resulted from Alternative Dispute Resolution (ADR) between Dominion and the NRC**. ADR was entered into to seek actions to ensure that changes made to the power station by Dominion would be properly reviewed to determine if prior NRC approval is required per 10CFR50.59. An NRC inspection verified that Dominion

had completed all actions required by the CAL except for one action to conduct refresher training that would be completed in the future.

- **NRC's assessment of performance for Dominion's operation of Millstone. M**illstone continues to operate safely, protect public health and safety, and protect the environment. Millstone Units 2 and 3 are both in the Licensee Response column of the Regulatory Response Matrix and will therefore remain under baseline inspection. Inspections conducted by the NRC included those conducted by resident inspectors as well as focused inspections performed by teams of NRC experts in areas such as fire protection, design modifications, and security. The NRC identified 17 inspection findings of very low safety significance (green) and no cross cutting issues exceeded NRC thresholds for significance. The NRC All performance indicators are green at both units.
- **Emergency Event Declarations at Millstone Power Station in 2016.** Dominion made an Unusual Event emergency declaration at Millstone Unit No. 3 in May of 2016 due to a hydrogen leak from the main electrical generator. The NRC monitored Dominion's classification and response to the event and identified no findings of significance.
- **Safety Culture at Millstone**. The NRC's assessment concluded that safety culture is healthy at Millstone based upon interviews with station staff, inspections of problem identification and resolution, a review of station employee concerns program files and a review of allegations.
- **Millstone emergency response performance during FEMA evaluated exercise.** Inspectors from the NRC evaluated licensee performance and other NRC staff also participated in the exercise as a responding agency. No findings of significance were noted.
- **Millstone 3 Turbine Driven Auxiliary Feedwater (TDAFW) pump performance**. The M3 TDAFW pump experienced a failure in February of 2016. NRC had no operability concerns with the operation of the pump and continues to monitor reliability based upon the number of failures. The NRC has issued Dominion a Notice of Violation (NOV) for a previous failure. The Dominion docketed their response and corrective actions.
- **Licensing exam failures of licensed operator candidates for Millstone Unit No. 2**. Six of nine candidates passed the initial license examination, a relatively high failure rate. Two of the candidates have been subsequently re-examined and have passed their exams. The Lead NRC Examiner verified there were no changes to the examination process and determined that there was no specific common cause for the failures.
- **Status of aging management**. Millstone Unit No 2 entered its period of extended operations (that period in current license beyond the original end of license date) in 2015. The NRC has not identified any significant aging management issues at Millstone or in the industry.
- **Carbon macrosegregation issues associated with Le Creusot Forge and potential impact on the pressurizer at Millstone Unit No. 2.** The NRC's review of documentation irregularities identified for components fabricated at Creusot forge determined that the Millstone Unit No. 2 Pressurizer was subject to an additional stress relieving heat treatment that was not specified in purchase order. ASME code does not put an upper limit on the number of heat treatments a component may have; so, this additional

heat treatment does not adversely affect compliance with code.

June 22, 2017 (Millstone Training Center):
Dominion Energy engineering and technical experts (Mr. William Watson, Engineering Supervisor, Primary Systems; Mr. Ken Holt, Manager of Communications; Mr. Scott Getman, Senior Instructor, Nuclear Training; Mr. Sonny Stanley, Director, Nuclear Safety and Licensing; Mr. Craig Olson, Plant Manager; Mr. Ethan Treptow, Manager, Systems Engineering; Mr. Thomas Cleary, Nuclear Licensing; and, Mr. Robert Garver, Director, Engineering) provided the Council with:

- **Tour of Millstone Unit 3 Turbine Driven Auxiliary Feedwater (TDAFW) Pump training mockup.** In advance of the meeting, the Council was provided a hands-on opportunity to explore details of pump design, technical specifics and operation.
- **Presentation on Millstone Unit 3 TDAFW pump performance and corrective action plan.** The Council has noted several performance issues with the Unit 3 TDAFW pump over the last several years and requested that Dominion provide an update on the status of root cause analyses, corrective actions and performance. Dominion technical experts discussed critical design features, failure modes effects and analyses from past performance

Jeff Semancik, CT DEEP, provided a summary presentation of 2017 changes to the EPA Protective Action Guidelines (PAGs) and a new radiation hazard communication tool from the CDC. Mr. Semancik discussed the bases for PAGs, significant changes and implementation plan.

September 14, 2017 (Waterford Town Hall):
Presentation by Mr. Robert Capstick, Director of Government and Public Affairs for Director of Yankee Atomic Electric Company, on spent nuclear fuel (SNF) policy changes under the Trump administration. Mr. Capstick discussed the status of SNF ay Connecticut Yankee (CY), a historical overview of the Nuclear Waste Policy Act (NWPA), and the status of national spent nuclear fuel policy issues including both Yucca Mountain and interim SNF storage options.

CT DEEP follow-up observations of Dominion Energy's actions, testing and analysis completed in response to potential manufacturing irregularities at Creusot Forge. Mr. Semancik, CT DEEP, provided background on the concern for components fabricated at Creusot Forge (in particular the pressurizer at Millstone 2), the technical basis of concern, DEEP's statutory authority and recommendations to the NRC, Dominion Energy's actions, and observations conducted by DEEP staff. DEEP concluded that the voluntary testing and analysis effectively demonstrated the safety of the component of interest with substantial margins of safety and that no further recommendations to the NRC were necessary.

Millstone Unusual Event declaration on August 15, 2017. Mr. Semancik, CT DEEP, presented information on the failed fire detector that caused the declaration and Dominion's actions. There was no release of radiation due to the event.

Discussion of the formation of shutdown committee for Millstone – Mr. Sheehan indicated that Dominion management has publically stated that they are reviewing the viability of

continued operation of Millstone. In light of the potential that Dominion may choose to retire the Millstone units prior to end of their operating licenses and the special and different activities associated with decommissioning, he proposed that the Council consider the best mechanism to provide state oversight during decommissioning.

December 11, 2016 (Waterford Town Hall):
CY2016 Annual Report The CY2016 Annual Report was discussed, reviewed, and will be electronically voted upon. NRC Correspondence and Inspection Results received since the last meeting was discussed. The meeting schedule for CY2017 was approved and possible topics for the meetings were discussed.

Millstone Unusual Event declaration on October 9, 2017. Millstone had declared an Unusual Event (emergency classification) on October 9, 2017 due to a leak of non-radioactive hydrogen from a monitoring panel for the main generator. A Dominion engineer noted a deficiency tag on a gauge in the panel and ensured that the work scope team checked for hydrogen leakage. When tested it was above the lower explosive limit and they declared the emergency. Dominion secured the area, ventilated and repaired the leak. At that point they exited the emergency event. There was no release of radiation due to the event.

Proposed legislative change to NEAC statute. Mr. Semancik presented proposed changes to the NEAC statute (CGS 16-11a) based upon NEAC's recommendation to incorporate decommissioning oversight into its charter as discussed in the September 17. 2017 meeting.

Millstone 1 Decommissioning Advisory Committee (M1DAC): Since Millstone 1 remains in Safe Storage (SAFSTORE) and no significant activities were conducted at the Unit during the past calendar year, M1DAC did not meet in CY2017.

REPORT ON ISSUES

MILLSTONE OPERATIONS

The NRC continues to assess the safety impact at Millstone. The NRC has not identified any immediate safety concerns, but continues to assess information provided by both Dominion and Areva. They are keeping DEEP informed and addressing any of our questions and concerns. Note that the current information with respect to Millstone is that Areva did not properly document of all of the metallurgical treatments applied to the Unit 2 pressurizer. Initial engineering assessment is that this does not adversely impact integrity of the component. Moreover, Dominion has performed and continues to perform various non-destructive engineering examinations of the component and has not detected any adverse structural indications. DEEP continues to monitor and review the engineering assessments being conducted.

On January 24, 2018 the Council received two amendments

- Use of a new computer code for LOCA (Loss of Coolant Analysis) – DEEP had no comments on this amendment. Changes to computer modelling code to show safety limits were maintained. This was also a commitment of Dominion in the Alternate Dispute Resolution (ADR) Confirmatory Action Letter to ensure they got NRC approval of new analysis that removed credit for charging pumps.
- Amendment to use Ultrasonic Testing (UT) vice Radiographic testing (RT) to perform volumetric scans of welds during periodic inspection. DEEP had no comments on this amendment. In my experience, recorded UT provides as good coverage with less radiation dose to inspection personnel.

On February 7, 2017 the Council received and reviewed a license amendment to exclude one control rod at Millstone 2 from one monthly test prior to shutting down in April for refueling when the issue with the rod drive will be fixed. Dominion believes that the issue with the Control Element Assembly (CEA = rod drive) was due to having a cooling fan wired backwards and overheating the electrical coil for this one rod. Dominion also analyzed impact if the rod failed to function and determined there was adequate safety margin.

On February 13, 2017 the Council received and reviewed an NRC letter accepting Millstone's evaluation of high frequency seismic evaluation. A post-Fukushima follow-up was also received and reviewed that documents NRC review of Dominion's verification that the Spent Fuel Pools are adequate to prevent inadvertent draining during a seismic event.

On March 1, 2017 the Council received and reviewed Millstone End of cycle report from NRC which concluded "The NRC determined the performance at Millstone Units 2 and 3 during the most recent quarter was within the Licensee Response Column, the highest performance category of the NRC's Reactor Oversight Process (ROP) Action Matrix in Inspection Manual Chapter 0305, "Operating Reactor Assessment Program," because all inspection findings had very low safety significance (i.e., Green), and all PIs were within the expected range (i.e., green). Therefore, the NRC plans to conduct ROP baseline inspections at your facility."

The Council received and reviewed of a summary of NRC assessment of SG Tube in-service inspections. NRC concluded that Dominion submittal meets requirements. These inspections are

considered important as the tubes in the Steam Generators (SG) represent the largest surface area of material containing the radioactive primary coolant. Each SG at unit 2 has 8,523 tubes (outer diameter 0.75"). During the 2015 refueling outage, Dominion inspected all in service tubes in SG #1 by eddy current test probe. If any tubes indicate wall thinning, they are plugged and removed from service in order to prevent leakage of radioactive fluid. Currently there are 19 of 8,523 tubes plugged (0.3%). Of the 8,504 operational tubes tested the worst degradation was 14% tube wear at one location on 2 tubes. Dominion tests each SG on a fixed frequency. This indicates good performance and means that water chemistry has been maintained well with few contaminants.

On March 8, 2017 the Council received and reviewed notice of successful re-examination of two of the licensed operator candidates for Millstone 2.

On March 24, 2017 the Council received and reviewed the NRC review of the Millstone Unit No. 3 Steam Generator (SG) inspections conducted last spring during their refueling and maintenance outage. As the SG's represent the majority of the surface area containing the radioactive primary coolant, this is an important program. NRC found Dominion inspection program in compliance with license and regulatory requirements. Dominion conducted SG chemical cleaning to remove significant secondary (non-radioactive) side corrosion deposits. These deposits can disrupt flow channels and cause flow induced vibration wear; so this was very positive. Dominion did 100% eddy current testing of 2 of the 4 SGs this last outage. No tubes were required to be plugged due to excessive wear. There was zero operational leakage through the SGs last cycle. Summary of current tube plugging (each SG has 5,626 tubes) shows that the numbers are good, especially the fact that no more were plugged this outage.

On April 24, 2017 the Council received and reviewed a letter related to recent security inspection. DEEP reviews findings with NRC in detail showing no findings greater than green. It can be noted that 2 green findings is not out of industry norm.

With respect to the Millstone Unit 2 pressurizer discussion from our last meeting NRC's inspection of AREVA and Creusot Forge stated in a letter dated May 10, 2017 describes its basis for the conclusion that there is no safety concern.

The Council received and reviewed Dominion's Radiological Environmental Operating Report for 2016. In the report, Dominion concludes that Millstone contributes 0.22 mrem per year to an individual offsite; well below federal EPA limit of 45 mrem.

On May 25, 2017 the Council received and reviewed an NRC letter of approval granting Dominion an exemption to parts of 10CFR related to cladding material was noted in documents. The CFR only specifies specific types of cladding. Dominion is using new cladding material subject to same performance criteria. NRC reviewed and noted it is acceptable.

On September 13, 2017 the Council received and reviewed

- NRC report on the Millstone Unit 1 SAFSTOR inspection of spent fuel safety with no findings of safety significance. Inspector noted electrical transformer had been replaced to enhance reliability of decay heat removal systems.

- Millstone Environmental Qualification (EQ) Program inspection report. The EQ program ensures equipment required for safety can operate in extreme conditions of temperature, humidity, and radiation if required. One (1) Green (very low safety significance) violation was noted which was the failure to perform a preventative maintenance task to replace two feedwater control solenoids

The Council reviewed a confirmatory order signed by NRC and Dominion Energy regarding the apparent security violations previously identified at Millstone. The NRC has maintained communications with respect to these issues. When the apparent violations were identified by the NRC in August of this year, CT DEEP and Connecticut State Police (CSP) personnel met with Security Management at Millstone. The team reviewed Dominion's corrective actions, met with the armorer, and reviewed procedures for weapons maintenance. DEEP also reviewed the root cause report associated with this issue. DEEP and CSP determined that issues had been addressed and corrected and that security of Millstone remains prepared to properly protect the site. The actions in this confirmatory order are consistent with those Dominion briefed.

The Council received and reviewed a Dominion Special Report for an RCS overpressure transient during the fall 2017 refueling outage at Millstone 3. While work processes resulted in overpressure transient, operators mitigated transient and engineering determined no structural integrity adverse effects.

DECOMMISSIONING

MILLSTONE 1

In July of 1998, it was announced that Millstone Unit 1 would undergo decommissioning. A modified Safe Storage (SAFSTOR) decommissioning option was selected and remains in effect. This involved some decontamination and dismantlement early in the process. After these initial activities were completed, the unit was then placed in safe storage until the other two units at the Millstone site undergo decommissioning. After reviewing Unit 1 requirements, in conjunction with the operational and outage requirements of Millstone Units 2 and 3, it was strategically decided to place Unit 1 in 'Cold and Dark' storage in April 2001. This allowed the safe and efficient separation (from Units 2 and 3) projects as well as the decommissioning projects. All separation projects were completed by April 1, 2001.

The annual inspection of Millstone 1 operations was conducted between August 11 and August 13, 2015. There were "No findings of safety significance" according to the NRC reporting letter dated September 3, 2015.

Millstone 1 Decommissioning Advisory Committee (M1DAC): Since Millstone 1 remains in Safe Storage (SAFSTORE) and no significant activities were conducted at the Unit during the past calendar year, M1DAC did not meet in CY 2016.

CONNECTICUT YANKEE

The Connecticut Yankee Atomic Power Company (CYAPCO) plant began commercial operation in 1968 and produced more than 110 billion kilowatt-hours of electricity during its 28-year operating history. In 1996, the CYAPCO Board of Directors voted to permanently close and decommission the power plant. After two years of planning and preparation, actual decommissioning began in 1998 and was completed in 2007. CYAPCO has operated the NRC licensed Independent Spent Fuel Storage Installation (ISFSI) at the Haddam Neck site since 2004. The spent nuclear fuel and GTCC waste at the ISFSI facility is stored in 43 dry casks containing dual purpose canisters licensed by the NRC for both storage and transportation. The generic storage license for the dry cask storage system expires in 2020 and CYAPCO plans to submit a license renewal request to extend the license for another 40 years. The U.S. Department of Energy is obligated under the Nuclear Waste Policy Act and by contract with CYAPCO to remove and dispose of this waste.

CY Site Update: CY ISFSI operations continued to be normal in 2017 and there were no Lost Time Accidents, OSHA Recordable Injuries or first aid cases since the last report.

New CY ISFSI Manager: Shae Hemingway, acting CY ISFSI Manager since August 2017, was promoted to CY ISFSI Manager on October 22, 2017. Shae has nearly 26 years of commercial

nuclear experience at CY in various roles including Radiation Protection, Waste Management and most notably ISFSI Operations Specialist for the past eight years.
Site Upgrades: The site's Cask Temperature Monitoring System replacement was completed this year. The system was returned to service and is operating as designed. Planning for the replacement of the Uninterruptible Power Supplies (UPSs) is underway. Replacement of the SAS (Security Alarm Station) and EEE (Electrical Equipment Enclosure) UPSs will take place in early 2018.

Biennial Emergency Dill: The next NRC biennial inspection is scheduled for the spring of 2018.

FSAC Meeting: A CY Fuel Storage Advisory Committee meeting was held in Haddam, CT on May 9, 2017. The FSAC next meeting is scheduled for May 15, 2018.

HIGH LEVEL NUCLEAR WASTE

Status of National Spent Nuclear Fuel Policy Issues

Administration

FY 2018 Budget Proposal

- The President's FY 2018 budget document was released in May and the DOE budget request for Yucca Mountain and Interim Storage programs proposed a total of $120 million ($30 million in defense funding and $90 million from the Nuclear Waste Fund). The NRC's budget request included $30 million to support a restart of the review of DOE's Yucca Mountain license application.

DOE Shutdown Site Evaluation Reports

- In June the DOE posted its "Initial Site-Specific De-Inventory Report for Connecticut Yankee". The CY report is similar to the one previously released at the end of March for Maine Yankee, as well as the Trojan and Big Rock sites - other shutdown site reports will be developed and issued in the future. These reports address the tasks, equipment, and interfaces necessary for the complete de-inventory of the spent fuel and GTCC waste from the ISFSI sites --- including an analysis of potential transportation routes and modes of transport including heavy haul truck, rail and barge from the sites. There was a webinar held by the DOE on the CY de-inventory report on July 26th. The DOE is also in the process of updating their current *Preliminary Evaluation for Removing Used Nuclear Fuel from Shutdown Sites Report*. These reports are available at https://curie.ornl.gov/

Congress

FY 2018 Energy and Water Development Appropriations Legislation

- In July the House Appropriations Committee favorably reported their FY 2018 Energy and Water Development Appropriations bill (HR 3266) to the House on a voice vote. The bill fully supported the Administration's position to move forward with Yucca Mountain and provides funding to restart the adjudication of the Yucca Mountain license application at $90,000,000 from the Nuclear Waste Disposal, $30,000,000 from Defense Nuclear Waste Disposal, and $30,000,000 from the NRC.

- The Senate Appropriations Committee completed consideration of their Energy and Water Development FY '18 funding bill in July. As in years past, the bill calls for the Department to initiate a pilot interim storage facility with priority for shutdown sites and provides money for the DOE to begin the process leading to a contract between the agency and a private party for interim storage services. Also as in the past, the bill contains no money to continue the Yucca Mountain licensing effort.

- On July 27th, the House passed a combination appropriations package called the "Make America Secure Appropriations Act" (H.R. 3219) that combined four separate Appropriations measures with the Department of Defense Appropriations Act as its base. Included in the bill was the Energy and Water Development Appropriations bill. This "mini-bus" (so-called for being a shorter version of a 12-bill omnibus appropriations bill) would fund the programs and policies of all agencies and departments under the four-bill package through all of fiscal year 2018.

House Nuclear Waste Policy Amendments Act of 2017

- The House Energy and Commerce Committee voted on June 28th to favorably report the "Nuclear Waste Policy Amendments Act of 2017". The vote of 49-4 was large and bi-partisan. The bill (HR 3053) was initiated by Chairman Shimkus in his Subcommittee on Energy and Environment to amend the NWPA to move the Yucca Mountain licensing process forward and address issues such as needed land withdrawals in Nevada. Following amendments during markup in the full Committee, the bill would also authorize the Secretary to begin to develop a single interim storage facility and using the framework of the existing law is called a monitored retrievable storage (MRS) facility. There are a series of steps the DOE Secretary is required to take and to examine whether such a facility makes programmatic sense by 2019. At that point, the DOE may begin to develop a cooperative agreement with one private facility for storage services that must include a preference for the movement of fuel from shutdown plants.

- The bill also contains a linkage provision stating that fuel may not be moved to the MRS facility until there is a final NRC decision on the Yucca Mountain construction authorization; however, it does grant the Secretary the discretion to start the movement of stranded fuel to the MRS facility upon a finding that a final decision is imminent. Congressman Courtney is a co-sponsor of the bill.

Senate Legislation:

- The Senate Energy Committee and Energy & Water Development Committee leaders are still expected to re-introduce at some point this session the bi-partisan comprehensive nuclear waste reform bill they have introduced in the past two sessions that is aimed at implementing several of the recommendations of the Blue Ribbon Commission, including the establishment of a pilot consolidate interim storage facility for shutdown plant site material.

<u>Nuclear Regulatory Commission</u>

NRC Commissioners

The three Republicans nominated to be NRC Commissioners [Commissioner Kristine L. Svinicki; David Wright and Annie Caputo] had hearings before the Senate Environment and Public Works Committee this summer. Because Commissioner Svinicki's term was to expire on June 30th, her nomination was taken up on June 13th and voted on by the Committee and then by the Senate prior to the end of June. The vote on the other two nominees was held by the

Committee on July 12th and both were approved to go to the Senate for confirmation. The Democrats pressed for those nominations to be paired with the current Democratic Commissioner (Jeff Baran) whose term expires at the end of June 2018. President Trump recently nominated Commissioner Baran for another five year term and the Senate is likely to vote on all three nominees this fall.

Yucca Mountain License Application Review

The NRC issued a press release on August 8th announcing that the Commissioners had approved funding to move forward with the preparing to resume review of the Yucca Mountain license application. The Commission limited expenditures for the information-gathering activities to $110,000 from the Nuclear Waste Fund. As of June 30th, the agency had approximately $634,000 in remaining unobligated Nuclear Waste Fund appropriations.

Private Consolidated Interim Storage (CIS) License Applications*:*

- Texas Proposal: The Waste Control Specialists license application for a proposed CIS facility in Andrews County Texas to the NRC was formally docketed on January 26th. On April 18th, WCS sent a letter to NRC requesting the Commission suspend review of the license application pending completion of the proposed sale to Energy Solutions that was expected to occur late this summer. However, in June the Judge in the trial of the US government's lawsuit to enjoin the proposed sale of WCS to Energy Solutions on antitrust grounds, ruled in favor of the government and denied the sale. The owners of WCS are currently soliciting additional bids for the company and NRC has suspended review of the license application at WCS's request.

- New Mexico Proposal: The Holtec International and the Eddy Lea Alliance license application to the NRC to site a CIS facility in the communities of Carlsbad and Hobbs New Mexico was submitted to the NRC on March 31, 2017 has been reviewed by the NRC staff. The staff subsequently requested supplemental information, so the application is not yet considered docketed.

RECOMMENDATIONS

STATE

1. Department of Emergency Services and Public Protection, Division of Emergency Management and Department of Homeland Security and the Department of Energy and Environmental Protection should continue to work together to address any emergency preparedness issues at Connecticut's nuclear sites.
2. The Department of Energy and Environmental Protection should, in cooperation with the Connecticut State Police, continue to study and monitor security at Connecticut's nuclear sites to assure the dangers of terrorism and sabotage are minimized.
3. Department of Energy and Environmental Protection should continue radiological and environmental monitoring of Connecticut's nuclear sites.
4. Department of Energy and Environmental Protection shall continue to make recommendations to the US Nuclear Regulatory Commission in matters related to safety, environmental impact and security of current and former commercial nuclear power facilities in the state.
5. The Governor, General Assembly, Department of Energy and Environmental Protection, and NEAC should continue to insist that the NRC continue vigilant oversight of Connecticut Yankee and Millstone Power Station sites for as long as high-level nuclear waste remains on site.
6. The Governor, General Assembly, and DEEP should encourage the federal government to develop a solution to the spent fuel storage problem. Specifically, The Governor, General Assembly and DEEP should endorse a nuclear waste strategy that includes consent based consolidated interim storage that: Gives priority to removal of Spent Nuclear Fuel (SNF) and Greater Than Class C (GTCC) waste from permanently shut down reactor sites and transfers title of SNF to Department of Energy (DOE) upon receipt.

NEAC

1. Continue to monitor the stability of the Employee Concern Program and Safety Conscious Work Environment and Corrective Action Program at Millstone Power Station.
2. Continue to monitor operations and activities at Millstone Power Station and Connecticut Yankee Site, including the dry cask storage programs.
3. Determine status of the Low Level Waste Compact and its impact on Connecticut.
4. Legislative changes should be considered to clarify the Council's responsibilities for decommissioning of nuclear power plants in the state.
5. The Council acknowledges that Dominion Energy took voluntary actions, not required by the NRC, to demonstrate that the structural integrity of the Millstone Unit No. 2 pressurizer was not compromised by any potential manufacturing irregularities resulting from fabrication at the Creusot Forge. The actions including conducting non-destructive testing in addition to analysis. The Council believes this initiative by Dominion Energy demonstrates a strong safety culture by plant and corporate management.
6. The Council acknowledges that Dominion Energy has completed re-analyses and implemented actions to provide additional defense in depth in response to the seismic event and reactor accidents at the Fukushima D'iachi site.

Appendix 1
NUCLEAR ENERGY ADVISORY COUNCIL MEMBERSHIP

Rep. Kevin Ryan, Chair (Oakdale). OD, Pennsylvania College of Optometry; Legislator, Adjunct Faculty, University of New Haven.

Mr. Jeffrey Semancik, Vice-Chair (Groton) BS Physics, US Naval Academy; MS, Electrical Engineering, Rensselaer Polytechnic Institute; MBA, UCONN. Former qualified engineer, nuclear powered aircraft carrier. Former Senior Reactor Operator at Millstone Unit 3. Director, Radiation Division, Department of Energy and Environmental Protection.

Gregg W. Dixon (Niantic). Ph.D., Mechanical Engineering (Nuclear) Stanford University. Retired Professor, Mechanical Engineering, US Coast Guard Academy.

CDR Royce W. James, (New London) Ph.D., Physics, Stevens Institute of Technology; MS, Applied Physics, Columbia University; BS, Physics, New Mexico State University. Physics Professor, U. S. Coast Guard Academy

Arnold "Skip" Jordan. (Noank) BSME, Maine Maritime Academy; MBA, Boston University. Retired, Vice President Dominion Support Services former Site Vice President Millstone Station. Former Reactor Operator at Millstone Unit 2.

Robert J. Klancko (Woodbridge) BSE Chemical/Nuclear Engineering, UCONN. PE, Engineering Consultant.

Edward Munster (Haddam) Bachelor of Science (Mathematics) 1962 from University of Southwestern Louisiana (Lafayette, LA),Master's degree in Statistics 1968 from UCONN Taught Biostatistics and Epidemiology at University of Connecticut Medical and Dental School in Farmington 1972-79.Employed in various research positions at Pfizer Corporation primarily in Groton CT 1979- 2005. Retired 2005

Thomas A. Nebel (Niantic) BS Industrial Engineering New York Polytechnic University; Retired Monsanto/Solutia - former First Responder & NE HAZMAT Coordinator for company; C.E.R.T. Member Missouri & Connecticut.

John W. (Bill) Sheehan (Waterford) BS, Naval Science, US Naval Academy; MBA, Rensselaer Polytechnic Institute; former Commanding Officer, nuclear powered submarine.; retired Navy Captain.

James Sherrard (Mystic) Ph.D., Nuclear & Mechanical Eng. MIT/UCONN. Chairman, Nuclear Engineering Technology Department, TRCTC.

Raymond D. Woolrich (Waterford): BS, Nuclear Science, US Naval Academy; MS Computer Systems and Financial Management, US Naval Postgraduate School; former Commanding Officer, nuclear powered submarine; retired Navy Captain; Naval Analyst, Sonalysts, Inc.

Appendix 2

2017 NEAC MEETING MINUTES

NUCLEAR ENERGY ADVISORY COUNCIL
March 22, 2017 6:00 PM
Waterford Public Library
49 Rope Ferry Road
Waterford, CT 06385

MINUTES

Members Present

Rep Kevin Ryan, Chair	Mr. Bill Sheehan
Mr. Edward Munster	Mr. James Sherrard
Mr. Tom Nebel	Mr. Robert Klancko
Mr. Ray Woolrich	Mr. Jeffrey Semancik representing DEEP Commissioner Klee

1. **Call to Order of Meeting**
   NEAC Alternate Chair Semancik called the meeting to order at 6:01 PM at Waterford Public Library, Waterford, CT.
   a. Mr. Semancik noted that Chairman Ryan was en route and directed the meeting start on time. Representative Ryan arrived at 6:09 PM and assumed the chair from Mr. Semancik.
   b. Mr. Sheehan noted to the Council, that he had other commitments and had to leave the meeting by 6:45 PM. NEAC quorum was maintained.

2. **Program – Briefing on Millstone Power Station Annual Assessment by Mr. Michael Scott, Director, Division of Reactor Projects NRC Region 1; Mr. T. Setzer, Acting Branch Chief, Projects Branch 2, Division of Reactor Projects, Ms. J. Ambrosini, Senior Resident Inspector, Millstone Power Station, Ms. K. Kavanagh, Branch Chief, Quality Assurance Vendor Inspections and Mr. D. Rudland, Branch Chief, Vessels and Internals Integration. Other NRC personnel present to support answers to questions included Mr. C. Hughley NRC Resident Inspector, Millstone Power Station, Mr. L. McKeon, NRC Resident Inspector, Millstone Power Station, Mr. R. Guzman, Sr. PM, Division Operator Reactor Licensing Office of Nuclear Reactor Regulation, and Mr. John Grieves, Regional State Liaison Officer, Region 1.**
   a. Mr. Scott briefed NEAC on status of actions taken in response the disaster in Japan and impact to Fukushima Dai-Ichi facility. In response to the accident at Fukushima the NRC issued orders to licensees to provide additional mitigating equipment and strategies. The industry has implemented these in the form of a Flex strategy that involves additional portable water pumps and electrical generating equipment at the sites and in regional response centers (Memphis and Phoenix). Millstone has implemented the required modifications and has the additional equipment on site. The NRC conducted inspections of Dominion's implementation in July and November 2016 and identified no findings or discrepancies. The NRC also required re-evaluation of seismic and flooding hazards by licensees. Millstone completed additional seismic high frequency and spent nuclear fuel analyses in December 2016. NRC completed its review this re-analysis in February 2017 and concluded that it was appropriate. NRC is reviewing the probabilistic storm surge flooding analyses submitted by Dominion and is performing a focused

evaluation of Dominion's flooding mitigating strategies assessment by December 2017. 2016. Based upon analyses and actions completed by Dominion, the NRC has confidence that Millstone is in compliance with the NRC orders.

i. Mr. Klancko expressed his desire for more specific and quantitative information with regard to Fukushima as opposed to general conclusions such a "substantial damage." Mr. Scott acknowledged Mr. Klancko's request and stated NRC would provide a copy of the report assessing impacts of Fukushima to NEAC.
ii. Mr. Semancik asked if Dominion had to make any physical plant modifications as a result of the seismic re-evaluation. Mr. Scott did not know but committed to provide the answer to NEAC.

b. Mr. Scott provided a brief summary of Spent Nuclear Fuel (SNF) storage and disposal issues as they relate to Millstone Power Station. Mr. Scott noted that Dominion completed moving some Millstone Unit No. 3 SNF to dry storage on the Independent Spent Fuel Storage Installation (ISFSI) located on the Millstone site in 2016 with no issues. Several canisters of SNF from Millstone Unit No. 2 are currently stored at the ISFSI. Mr. Scott stated that all SNF from Millstone Unit No. 1 is in wet storage in the Spent Fuel Pool, but that due to the age of the SNF, the heat load is quite low.
    i. Mr. Klancko asked to define "quite low." He also stated that he expects the NRC to have specific information for topics it discusses. Mr. Scott acknowledged Mr. Klancko's comments and stated that the NRC would provide the specific heat load analysis to NEAC.
c. Mr. Scott provided an update on Dominion's progress in completed actions committed to under confirmatory action letter (CAL) that resulted from Alternative Dispute Resolution (ADR) between Dominion and the NRC. ADR was entered into to seek actions to ensure that changes made to the power station by Dominion would be properly reviewed to determine if prior NRC approval is required per 10CFR50.59. Mr. Scott noted that this was a result of several apparent violations and that the ADR process if effective in that it resulted in more robust commitments than through traditional enforcement actions. Mr. Scott noted that an NRC inspection verified that Dominion had completed all actions required by the CAL except for one action to conduct refresher training that would be completed in the future.
    i. Mr. Sheehan asked if there would be a follow-up inspection to verify the remaining action was properly completed. Mr. Scott stated that the NRC would confirm all actions required by the CAL were complete.
    ii. Mr. Klancko asked what the topic of the refresher training is. Mr. Scott stated that the refresher training was on compliance with NRC requirements of 10CFR50.59.
    iii. Mr. Semancik asked the NRC to discuss how they would ensure proper implementation of 10CFR50.59 requirements in the future. Ms. Ambrosini stated that both routine resident inspector inspections and special design modification inspections are conducted.
d. Mr. Setzer briefed NEAC on performance of Dominion's operation of Millstone. Mr. Dentel stated that Millstone continues to operate safely, protect public health and safety, and protect the environment. Millstone Units 2 and 3 are both in the Licensee Response column of the Regulatory Response Matrix and will therefore remain under baseline inspection. The NRC identified 17 inspection findings of very low safety

significance (green) and no cross cutting issues exceeded NRC thresholds for significance. The NRC All performance indicators are green at both units.

e. Mr. Setzer noted that Dominion made an Unusual Event emergency declaration at Millstone Unit No. 3 in May of 2016 due to a hydrogen leak from the main electrical generator. The NRC monitored Dominion's classification and response to the event and identified no findings of significance.
    i. Mr. Klancko asked how much hydrogen leaked and what the level of atmospheric hydrogen concentration was. Mr. Setzer stated that the level was not quantified as the licensee made the declaration based upon a known leak and conservatively assumed that there was potential for an explosive mixture. Mr. Scott stated they would provide additional details to NEAC.
f. Mr. Setzer also provided a summary of the NRC's assessment that safety culture is healthy at Millstone. This assessment is based upon interviews with station staff, inspections of problem identification and resolution, a review of station employee concerns program files and a review of allegations. Mr. Setzer stated that station personnel are willing to raise issues and use the safety concerns program.
    i. Mr. Sheehan noted that in past years the number of NRC allegations at Millstone exceeded industry averages and asked how the numbers compared in 2016. Mr. Setzer responded that the number of allegations at Millstone decreased in 2016 and was below the industry mean. Mr. Scott cautioned that assessment of safety culture only by allegation numbers can be misleading and that the NRC conducts a holistic review of safety culture.
g. Mr. Setzer briefed that Millstone conducted a FEMA evaluated exercise in 2016. Inspectors from the NRC evaluated licensee performance and other NRC staff also participated in the exercise as a responding agency. No findings of significance were noted.
h. Ms. Ambrosini provided a brief on inspections conducted by the NRC including those conducted by resident inspectors as well as focused inspections performed by teams of NRC experts in areas such as fire protection, design modifications, and security.
    i. Mr. Nebel asked if local fire departments are brought on site and trained. Ms. Ambrosini noted that Millstone has an onsite fire brigade trained to respond to fires initially and that local fire departments are called in. Mr. McKeon noted that he has observed fire drills conducted with local fire departments who have an opportunity to participate with station fire responders.
i. Ms. Ambrosini also briefed NEAC on the performance of the Unit No 3 Turbine Driven Auxliary Feedwatrer (TDAFW) pump that experienced another failure in February of 2016. She stated that the NRC has no operability concerns with the operation of the pump but is still concerned about reliability based upon the number of failures. She noted that the NRC issues Dominion a Notice of Violation (NOV) for the last failure and that Dominion had to reply with corrective actions on the docket.
    i. Mr. Klancko asked what the major constraint was. Ms. Ambrosini responded that the initial problems resulted from not properly lubricating a bearing in the control linkage but the more general problem was not reviewing operating margins more broadly.
    ii. Mr. Sheehan noted that he has observed past testing of this pump and still does not know what they do not replace the older technology with something newer. Ms. Ambrosini stated the NRC does not mandate specific designs and that

industry experience shows that if they maintain the pump properly that it is capable of reliable performance.

iii. Mr. Nebel asked how many times has it been run lately and are the runs challenging the reliability of the pump. Mr. McKeon stated it is tested quarterly and also runs for outage testing and in response to plant shutdowns. He stated the pump has been run six to eight times in last year, all satisfactorily. Mr. Semancik noted that they pump could be subject to packing spacer wear and axial thrust. Mr. McKeon stated that the pump in subject to performance monitoring (vibration, flow, temperature, etc) during testing and this would identify any degradation.

iv. Mr. Klancko asked what the recovery time is if the pump trips on overspeed. Mr. McKeon stated it was less than 30 minutes and the operators are trained to perform the recovery.

v. Mr. Munster asked how the NRC measures reliability. Mr. Scott stated that there is a performance indicator that evaluates how often the pump fails compared to demanded starts. The indicator is and remains in the Green band. Mr. Scott noted that it was one of three pumps required for this safety function any one of the three is adequate for safety.

vi. Mr. Semancik noted that of the three auxiliary feedwater pumps, this is the only one that does not require electrical power. He asked how Fukushima actions addressed this. Ms. Ambrosini noted that the mitigating strategies include portable pumps stored on site that could be used if this pump fails during a loss of all power event.

j. Mr. Setzer briefed on the recent exam failures of licensed operator candidates for Millstone Unit No. 2. He stated that only six of nine candidates passed the initial license examination and that this was a relatively high failure rate. Two of the candidates have been subsequently re-examined and have passed their exams. Mr. Setzer said that the Lead NRC Examiner stated there were no changes to the examination process and there was no specific common cause for the failures.

i. Mr. Semancik asked what the licensee found in corrective action space and what level of cause evaluation (Root Cause Evaluation, etc) did they conduct. Ms. Ambrosini stated that she wasn't sure and said she would provide that answer to NEAC.

ii. Mr. Klancko asked in the examination standard had changed. Mr. Setzer stated it had not and remains NUREG-1021.

k. Ms. Ambrosini discussed status of aging management. She noted that Millstone Unit No 2 entered its period of extended operations (that period in current license beyond the original end of license date) in 2015. She stated there were no significant again management issues identified at Millstone or in the industry.

l. Mr. Rudland briefed NEAC on the Carbon macrosegragation issues associated with Le Creusot Forge and potential impact on the pressurizer at Millstone Unit No. 2 which was forged at the facility.

i. Mr. Klancko stated that the material he reviewed lacked specifics with respect to the metallurgy involved with the issue and asked several questions related to what the material was. Mr. Rudland stated that the Millstone Unit No. 2 pressurizer was a hot forged component made from A508 grade 2 steel.

ii. Mr. Klancko asked why the only concern was carbon content and not any others. Mr. Rudland stated that samples from French plants and review of records from all other reviews indicates that of all the elements in the alloy were within the design and code specifications. Only carbon was outside of specifications. This testing involved ladle samples of mix, samples drawn during cooling process and in situ testing of some components. He noted that when tested components forged at le Creusot had localized carbon content above ASME code levels.

iii. Mr. Klancko asked what pressure the pressurizer experiences and what safety factor was applied. Mr. Rudland stated the pressurizer typically operates at 2250 psia and is tested to `130% of this pressure. He could not recall the exact number but stated that the component pressure capability included a safety factor specified in the ASME code.

m. Ms. Kavanagh provided a summary documentation irregularities identified for components fabricated at Creusot forge. In particular, she stated that the Millstone Unit No. 2 Pressurizer was subject to an additional stress relieving heat treatment than specified in purchase order. She noted that ASME code does not put an upper limit on the number of heat treatments a component may have; so, this additional heat treatment does not adversely affect compliance with code. She stated that Areva had identified 4000 files for components potentially shipped worldwide. These documents have now been shipped to Areva's facility in VA and the NRC will start a document review and inspection next week. The NRC is still reviewing the issue to determine if a part 21 (notice of defect to industry) notification is required.

n. Mr. Semancik asked in light of documentation irregularities, the potential adverse consequences of a rapid failure of the pressurizer, and the French regulatory decision to require shutdown and testing of the material in some of their units, why the NRC is not requiring some sort of verification testing. Ms. Kavanagh stated that the documentation issues and the carbon macrosegregation issues are two distinct issues and, as explained before, the documentation issue has no impact on safety. Mr. Rudland answered that the potential for carbon macrosegregation is small for the Millstone Unit No. 2 pressurizer because the forgings are relatively small (better cooling with lest carbon segregation) and that testing done at overseas plants indicated that the localized carbon content was not excessively high to cause an immediate concern. He stated that of the components tested, those forged a le Creusot forge had lower localized carbon content than the components forged in Japan. The required shutdown affected units with Japanese forgings. As a result, the analyses completed by EDF provide bounding calculations and analyses to provide assurance of safety in US plants with Creusot forged components including Millstone Unit No. 2. Mr Rudland stated that the NRC expected to complete its detailed safety report by end of 2017.

o. Mr. Sherrard asked if the NRC had a significant number of political appointee positions that are unfilled and affecting conduct of business. Mr. Scott answered that the NRC has only five appointed positions in the agency – the five commissioners. Currently three commissioner positions are filled, and two remain open.

3. NRC Correspondence Received since past meeting.

The list of NRC Correspondence was reviewed. There were no additional questions from NEAC members other than those addressed during the NRC presentation.

a. Millstone Power Station, Unit Nos. 2 and 3 –Alternative Requests RR-04-23 and IR-3-28 for The Use Of Encoded Phased Array Ultrasonic Examination Techniques In Lieu Of Radiography (CAC NOS. MF7595 AND MF7596) dated January 23, 2017.
b. Millstone Power Station, Unit No. 2 – Issuance of Amendment Re: Realistic Large Break Loss-Of-Coolant Accident Analysis (CAC NO. MF7761) dated January 24, 2017.
c. Millstone Power Station – Integrated Inspection Report 05000336/2016004 AND 05000423/2016004 dated February 1, 2017.
d. Millstone Power Station, Unit No. 2 - Correction To Safety Evaluation For License Amendment No. 331 Re: Revision To Emergency Core Cooling System Technical Specifications and Final Safety Analysis Report, Chapter 14, To Remove Charging Pump Flow (CAC NO. MF7297) dated February 3, 2017.
e. Millstone Power Station, Unit No. 2 - Issuance of Amendment Re: Technical Specification Surveillance Requirement 4.1.3.1.2 for Control Element Assembly 39 (CAC NO. MF8935) dated February 7, 2017.
f. Millstone Nuclear Power Station, Units 2 and 3 - Staff Review of High Frequency Confirmation Associated with Reevaluated Seismic Hazard Implementing Near-Term Task Force Recommendation 2.1 dated February 13, 2017.
g. Millstone Nuclear Power Station, Units 2 and 3 - Staff Review of Spent Fuel Pool Evaluation Associated with Reevaluated Seismic Hazard Implementing Near-Term Task Force Recommendation 2.1 and Staff Closure of Activities Associated with Recommendation 2.1 (CAC NOS. MF3968 and MF3969) dated February 21, 2017.
h. Millstone Power Station, Unit No. 2 - Summary of the U.S. Nuclear Regulatory Commission's Staff's Review of the Spring 2015 Steam Generator Tube Inservice Inspections (CAC NO. MF8507) dated February 27, 2017.
    i. Dominion Nuclear Connecticut. Inc. Millstone Power Station Unit 2 End of Cycle 23 Steam Generator Tube Inspection Report dated December 14, 2015.
    ii. Dominion Nuclear Connecticut, Inc. Millstone Power Station Units 2 and 3 Response to Request for Additional Information Regarding End of Cycle 23 and End of Cycle 17 Steam Generator Tube Inspection Reports (CAC NOS. MF8507 & MF8506) dated January 31, 2017
i. Annual Assessment Letter For Millstone Power Station, Units 2 and 3 (Report 05000336/2016006 and 05000423/2016006) dated March 1, 2017
j. Millstone Power Station, Unit 2 – Initial Re-Take Operator Licensing Examination Report 05000336/2017302 dated March 8, 2017.
k. Letter from DEEP Deputy Commissioner Sullivan to NRC Regional Administrator Dorman dated February 23, 2017.

l. Letter from NRC Regional Administrator Dorman to DEEP Deputy Commissioner for Environmental Quality Kaliszewski to dated March 17, 2017.

4. **Other material reviewed since past meeting.**

NEAC reviewed the following information related to nuclear industry and trends.

a. Autorité de Sureté Nucléaire (ASN) (French Nuclear Safety Authority) Report to the Advisory Committee of Experts for Nuclear Pressure Equipment CODEP-DEP-2015-037971 IRSN Report /2015-00010, "Analysis of the procedure proposed by AREVA to prove adequate toughness of the domes of the Flamanville 3 EPR reactor pressure vessel (RPV) lower head and closure head," (English Translation) dated June 16, 2015.

5. Public Comment

a. Fourteen members of the public were in attendance. There were {no} questions from the public.

i. Ms. Nancy Burton of Redding, CT and the Connecticut Coalition Against Millstone asked several questions of the NRC representatives. Ms. Burton stated that she was a co-petitioner to the 10 CFR2.206 petition filed by Beyond Nuclear with respect to Creusot Forge components. Ms. Burton requested clarification with regard to size of the Millstone Unit No. 2 pressurizer and why the NRC considered relatively small compared to reactor vessels. Mr. Rudland replied that a pressurizer is about 1/3 the size of a reactor vessel – approximately 3" thick and 8 to 10 feet in diameter. Ms. Burton noted that Millstone Unit No. 2 was going into a spring refueling outage and asked why the NRC was not requiring and inspection during this opportunity. Ms. Kavanagh stated that Dominion was performing some voluntary testing during this outage. Mr. Rudland described the testing Dominion was pursuing and why testing that there were no flaws through nondestructive methods would provide additional assurance of safety. Ms. Burton noted that CT DEEP had recommended to the NRC that testing be performed by someone independent of Areva and asked Mr. Scott if the NRC would commit to observe the testing. Mr. Scott stated that NRC inspects many activities during refueling outages but would not commit to observe any particular evolution. Ms. Burton reminded the NRC that this is a significant public confidence issue.

ii. Mr. Thomas McCormick of West Hartford, CT made several statements and asked several questions of the NRC representatives. Mr. McCormick inquired into the status of the reactor head inspections and replacement schedules, the status of the steam generators at both units, and the current science supporting a 10-mile emergency planning zone. Mr. Scott provide specific summary of inspection results and intervals and noted that the numbers were within regulatory limits. With respect to the emergency planning, Mr. McCormick asked Mr. Semancik of DEEP if the

state would ever run an evacuation exercise in the middle of the night during a snowstorm instead of during daytime. Mr. Semancik said they the state does not plan to run any evacuation drills involving population due to inherent risks but stated that current exercises include simulated challenges to evacuation such as road closures, crashes and infrastructure damage. Mr. McCormick asked whether the Severe Line Outage Detection (SLOD) system whose failure resulted in a station loss of power event has been put back in service. Ms. Ambrosini replied that Dominion had changed how it operated the Millstone units with any lines out of service to longer need the system and has completed the appropriate reviews and license changes such that the system is no longer required and ins not in service. Mr. McCormick asked question related to the Waste Isolation Pilot Project (WIPP). Mr. Scott said he could not comment at safety at WIPP as the NRC does not have regulatory authority. Mr. McCormick made several statements regarding spent fuel pool liner cracks, cancer incident rates downwind of Millstone, underfunded decommissioning trust fund for Millstone, and genetic mutations resulting from radiation. Mr. Scott committed to follow-up on any specific allegations from Mr. McCormick and provided him instructions for filing allegations.

6. **Council Business**
   a. The CY FSAB will meet from 1700 to 1900 on May 9th at the Riverhouse at Goodspeed Station.
   b. The remaining NEAC meetings for 2017 will be held on June 15, Sep 14, and Dec 14.
   c. The council discussed the status of the two vacant positions. Rep Ryan has contacted the appointing authorities for both positions.

7. **Adjournment**

Motion was made by Mr. Sherrard and seconded by Mr. Klancko to adjourn; no objections; unanimous vote in favor; meeting adjourned at 8:30 PM.

NUCLEAR ENERGY ADVISORY COUNCIL
June 22, 2017 6:00 PM
Millstone Training Center
Rope Ferry Road
Waterford, CT

MINUTES

Members Present

Rep Kevin Ryan, Chair	
Mr. Edward Munster	Mr. James Sherrard
Mr. Tom Nebel	Mr. Jeffrey Semancik representing DEEP Commissioner Klee

Members not present:

Mr. Gregg Dixon	Mr. Robert Klancko
LCDR Royce James	Mr. A. Jordan
Mr. Bill Sheehan	Mr. R. Woolrich

1. **Call to Order of Meeting**
   NEAC Chair Ryan called the meeting to order at 6:30 PM at Millstone Training Center, Waterford, CT.

2. **Approval of Minutes of the March 22, 2017 NEAC meeting.**
   A motion was made to approve the minutes by Mr. Nebel and seconded by Mr. Sherrard. Minutes were approved without any corrections or objections.

3. **Program**
   a. **Tour of Millstone Unit 3 Turbine Driven Auxiliary Feedwater (TDAFW) Pump training mockup by Dominion Energy** – Dominion Energy engineering and technical experts (Mr. William Watson, Engineering Supervisor, Primary Systems; Mr. Scott Getman, Senior Instructor, Nuclear Training; Mr. Sonny Stanley, Director, Nuclear Safety and Licensing; and, Mr. Robert Garver, Director, Engineering provided the Council a tour of Millstone Unit 3 TDAFW pump training mockup in advance of the meeting in order to provide hands-on back ground of pump design and technical details for members of the Council.
   b. **Briefing on Millstone Unit 3 TDAFW pump performance and corrective action plan by Dominion Energy -** Mr. William Watson, Engineering Supervisor, Primary Systems; Mr. Sonny Stanley, Director, Nuclear Safety and Licensing; Mr. Craig Olson, Plant Manager; Mr. Robert Garver, Director, Engineering; Mr. Ethan Treptow, Manager, Systems Engineering; Mr. Thomas Cleary, Nuclear Licensing; Mr. Scott Getman, Senior Instructor, Nuclear Training; and, Mr. Ken Holt, Manager of Communications. The Council has noted several performance issues with the Unit 3 TDAFW pump over the last several years and requested that Dominion provide an update on the status of root cause analyses, corrective actions and performance. Dominion technical experts discussed critical design features, failure modes effects and analyses from past performance

issues, corrective actions (including improvements in the maintenance and design to ensure future reliable performance), and current performance of the pump. Specific items addressed included:

i. Dominion Energy's docketed response to NRC Notice of Violation and NRC closure inspection expected in 4Q17.
ii. History of Unit 3 TDFAW trips and corrective actions
    1. Bearing issues
    2. Impact of water in steam supply lines
    3. Impact on force of standby governor settings
    4. Stop valve stem leakage impacting control mechanism
iii. Special monitoring equipment (instrumentation and strain gauges) added to monitoring turbine performance. Data and graphs of these measurements were presented to demonstrate current performance compared to past performance as a measure of reliability

c. **Overview of Changes to EPA Protective Action Guidelines.** Jeff Semancik, CT DEEP, provided a summary presentation of 2017 changes to the EPA Protective Action Guidelines (PAGs) and a new radiation hazard communication tool from the CDC. Mr. Semancik discussed the bases for PAGs, significant changes and implementation plan.

d. Comments by Council members

i. Mr. Semancik asked if lessons learned on the Unit 3 TDAFW pump had been applied to the Unit 2 TDAFW pump. Mr. Watson stated that Dominion Energy has reviewed and applied lessons learned to Unit 2 even though the design and start requirements are different. Mr. Garver added that Dominion Energy has also shared the findings with their Virginia sites – North Anna and Surry Power Stations, - as well as the industry.
ii. Mr. Nebel asked if expertise from other Dominion sites was used to evaluate Millstone's TDAFW pump. Mr. Garver answered that fleet expertise was used. In addition, he stated that their process requires other sites review root cause evaluations for common learning.
iii. Mr. Semancik asked if Dominion Energy was sill planning on installing a full flow recirculation test line for the TDAFW pumps to reduce axial distress. Mr. Garver stated that full flow recirculation test lines for both units were approved projects.
iv. Mr. Nebel asked if the root cause evaluation was reviewed by an independent outside expert whether they added anything, and what did that tell Dominion as a process. Mr. Garver stated that the root cause evaluation as reviewed by an third party independent engineering firm and that they had added some minor items. With respect to process, Mr. Garver stated that Dominion Energy requires independent outside reviews of projects, and that they were making programmatic changes to ensure that independent outside reviews were required for evaluation of problems on the front end (during troubleshooting) not just the back end (Root cause evaluation). They also now require a holistic review be done for higher order cause evaluations within their corrective action program to ensure all changes are reviewed for impact.

v. Mr. Nebel asked if the vendor audit process has been changed as a result of this event. Mr. Garver noted there were issues with receipt inspection and that Dominion Energy had embedded some process improvements in other audits of vendors as well as engaged with industry vendor quality improvements.

4. NRC Correspondence Reviewed since past meeting.

The list of NRC Correspondence was reviewed. There were no additional questions from NEAC members other than those addressed during the NRC presentation.

a. Millstone Power Station Unit No. 3 – Summary of the U.S. Nuclear Regulatory Commission Staff's Review Of The Spring 2016 Steam Generator Tube Inservice Inspections (CAC No. MF8506) dated March 24, 2017
   i. Dominion Nuclear Connecticut, Inc. Millstone Power Station Unit 3 End of Cycle 17 Steam Generator Tube Inspection Report; EA-16-222 dated August 2, 2016
   ii. Dominion Nuclear Connecticut, Inc. Millstone Power Station Units 2 and 3 Response to Request for Additional Information Regarding End of Cycle 23 and End of Cycle 17 Steam Generator Tube Inspection Reports (CAC Nos. MF8507 and MF8506); EA-17-010 dated January 31, 2017.
b. Senior Reactor And Reactor Operator Initial License Examinations - Millstone Power Station, Unit 3 dated April 12, 2017
c. Millstone Power Station – Security Inspection Report 05000336/2017403 and 05000423/2017403 dated April 24, 2017.
d. Nuclear Regulatory Commission Inspection of Areva Inc. Report No. 99901359/2017-201 dated May 10, 2017.
e. Millstone Power Station, Unit No. 3 - Exemption from the Requirements of 10 CFR 50.46 and Appendix K of 10 CFR Part 50, to Allow the Use of Axiom Cladding Material in Lead Test Assemblies (CAC NO. MF8210) dated May 10, 2017.
f. Millstone Power Station, Unit Nos. 2 and 3-Alternative Requests RR-04-24 and IR-3-30 for Elimination of the Reactor Pressure Vessel Threads in Flange Examination (CAC NOS. MF8468 AND MF8469) dated May 25, 2017.
g. Millstone Power Station, Unit No. 2 -Alternative Relief Request RR-04-25 Re: Boric Acid Pump P-19B Stuffing Box Cover (CAC NO. MF9497) dated May 25, 2017.

5. **Other material reviewed** – NEAC reviewed the following information related to nuclear industry and trends.

a. Dominion Nuclear Connecticut, Inc. Millstone Power Station Reply to a Notice of Violation; EA-16-090 dated June 3, 2016.
b. Dominion Nuclear Connecticut, Inc. Millstone Power Station Follow-up Reply to a Notice of Violation; EA-16-204A dated September 29, 2016.
c. Letter from Rep. Walden, Chairman House Committee on Energy and Commerce and Rep Shimkus, Chairman House Subcommittee on Environment to Department of Energy Secretary Perry concerning nation's challenges related to nuclear waste policy dated March 20, 2017.

d. Dominion Nuclear Connecticut, Inc. – Millstone Power Station Units 1, 2, and 3 - 2016 Annual Radiological Environmental Operating Report (Serial 17-155) dated April 29, 2017.
e. Dominion Nuclear Connecticut, Inc. – Millstone Power Station Units 1, 2, and 3 - 2016 Radioactive Effluent Release Report (Serial 17-156) dated April 29, 2016

6. Public Comment

a. No members of the public were in attendance. There were no questions from the public.

7. Other Business

a. The Council agreed on the following topics to be presented and discussed at the next meeting scheduled for September 14, 2017:
    i. DEEP presentation on follow-up observations of Creusot Forge testing and analysis completed by Dominion.
    ii. Presentation by CY (Bob Capstick) or DEEP on SNF policy changes under Trump administration.

8. **Adjournment**

Motion was made Mr. Sherrard and seconded by Mr. Nebel to adjourn; no objections; unanimous vote in favor; meeting adjourned at 7:48 PM.

June 22, 2017 NEAC Meeting

Millstone Unit 3

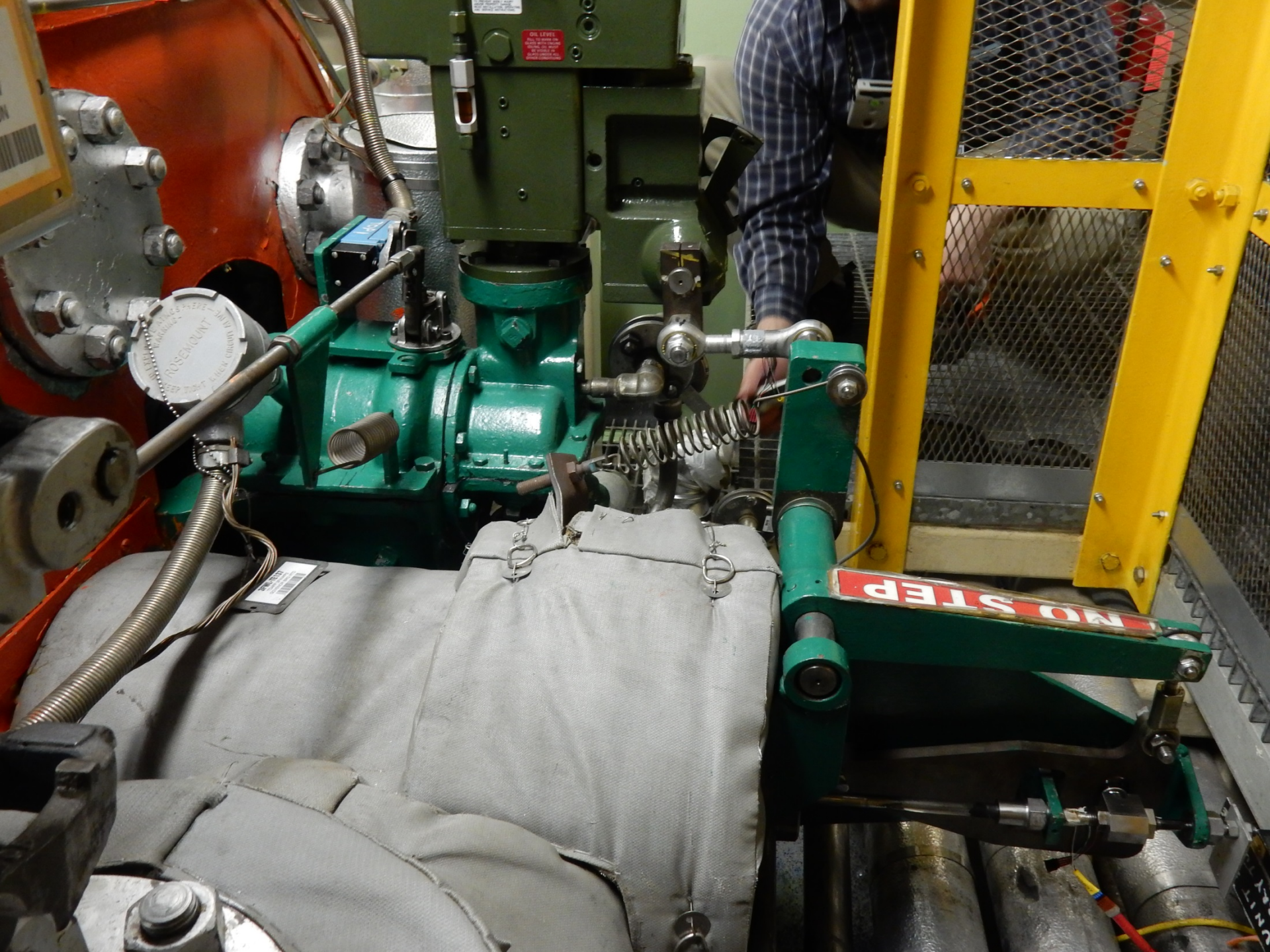
Turbine Driven Auxiliary Feedwater Pump

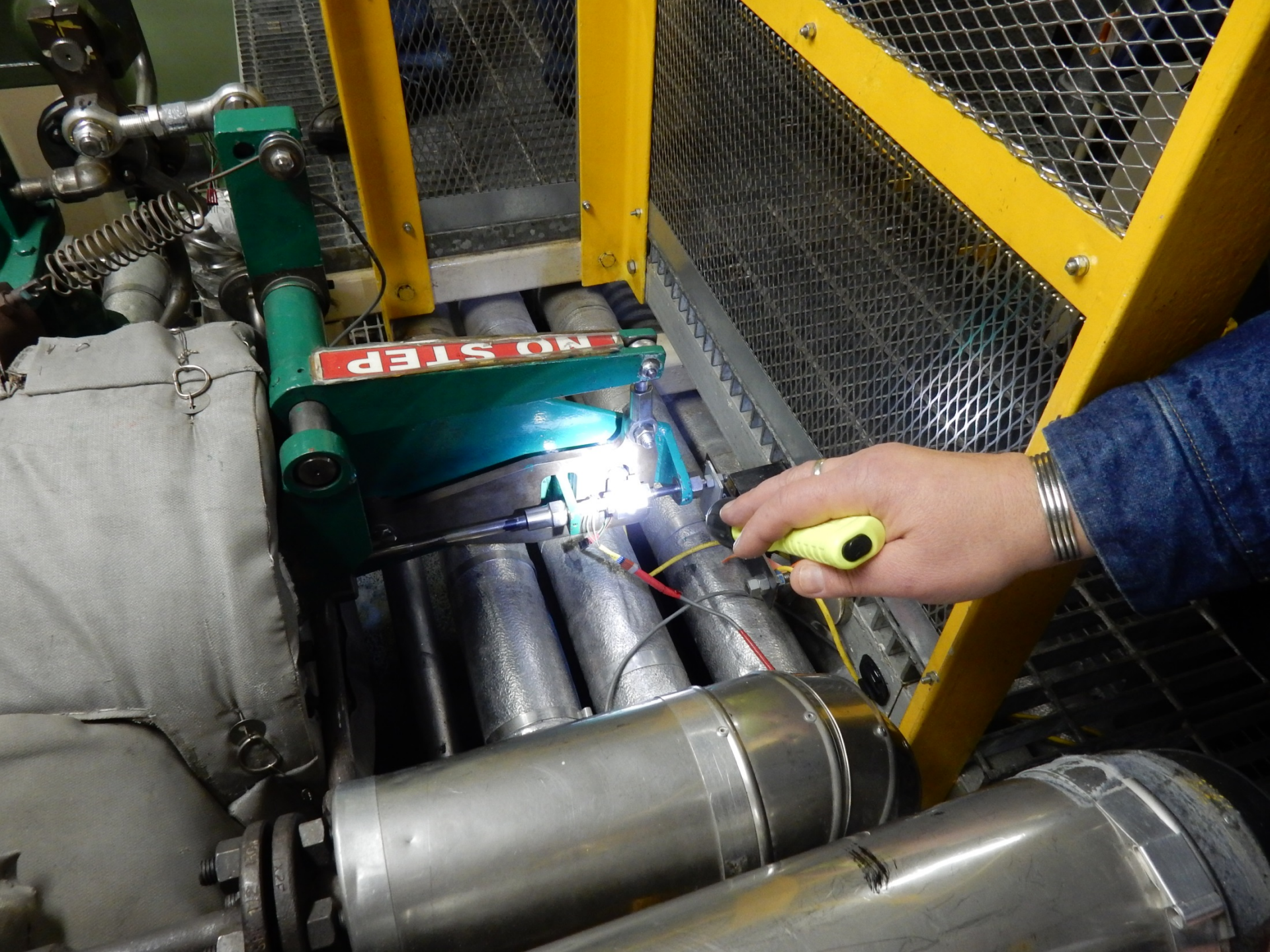
June 22, 2017 NEAC Meeting

- Purpose:

  The purpose of the Turbine Driven Auxiliary Feedwater Pump is to supply the steam generators with water upon a loss of all feedwater event, for reactor decay heat removal down to Shutdown Cooling entry conditions.


CAUTION
LOW HEAD
ROOM
TERRY


OIL LEVEL
ROSEMOUNT
NO STEP


NO STEP

June 22, 2017 NEAC Meeting

- TDAFW Pump Characteristics:
  - Application
    - Used throughout the Nuclear Industry, as well as other industries.
    - Operates on either high quality or low quality steam.
    - Does not require electricity to operate.
  - Governor Design/Performance
    - Uses hydraulics for control.
    - Motive Force is Terry Turbine RPM

- HISTORY:
  - 2013 =
    - 3R15, replaced packing spacers & washers, replaced cam roller (later discovered to be the incorrect bearing)
    - 05/13 & 08/13 = Governor hunting reported (adjusted compensating needle)
    - 11/13 & 12/13 – Overspeed trips = water in steam lines - steam plume and moisture coming from valve stem area
      - Corrective Actions:
        - Drain the steam lines and keep them drained
        - Replace faulty traps
  - 2014 – 2016 = Overspeed trips attributed to:
    - Heim Joint installed upside down (fixed, installed special instrumentation)
    - Faulty governor – not enough force applied (governor replaced, increased testing frequency)
    - Incorrect spherical bearing (bearing replaced, linkage overhauled and "blueprinted")
    - Condensate in the lines (replaced steam traps with orifice traps)

June 22, 2017 NEAC Meeting

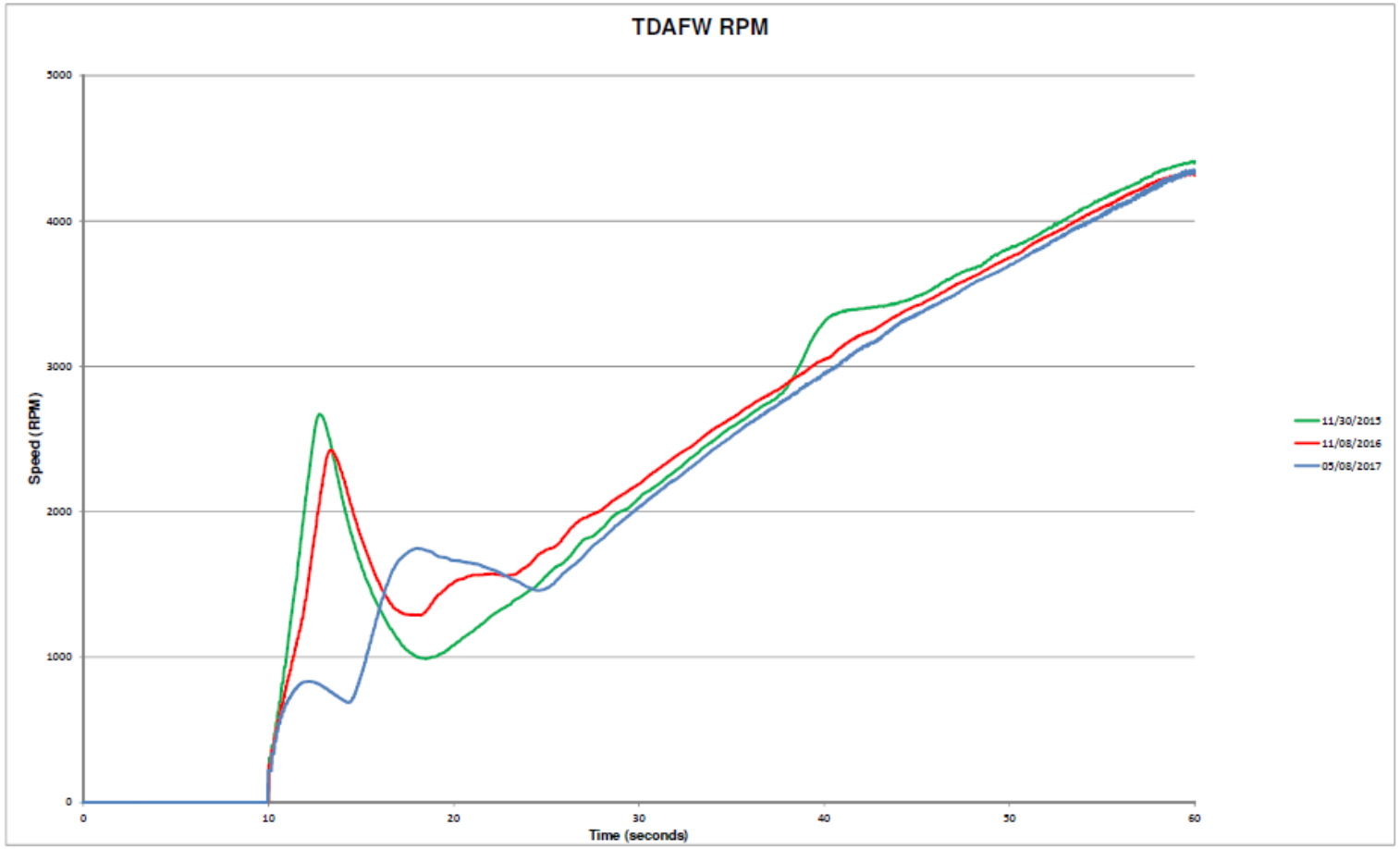
- History: (Continued)
  - 2016 = February 22 – Overspeed Trip
    - Complex troubleshooting team established – Cause = seized spherical bearing
    - Root cause team established – Re-zeroed the clock and conducted a full investigation from startup to present
    - Received NOV (Green) from the NRC for ineffective corrective action

JUNE 22, 2017 NEAC MEETING

- HISTORY: (CONTINUED)
  - 2016 = February 22 – Overspeed Trip
    - Corrective actions:
      - Benchmarked top performing plants
      - Commissioned a third (independent) party to:
        - Assess all possible failure modes and effects
        - Conduct margin analysis
      - Lubricated linkage and spherical bearing
      - Established 1R PM to lubricate linkage and replace valve packing
      - Established optimal governor rack setting
      - Initiated design change to address control valve stem leakage (new packing/bonnet configuration) – due 11/30/17

June 22, 2017 NEAC Meeting

- Current Performance:



Questions?

Connecticut Department of Energy and Environmental Protection

Connecticut Department of
ENERGY & ENVIRONMENTAL PROTECTION

EPA Protective Action Guidance Changes

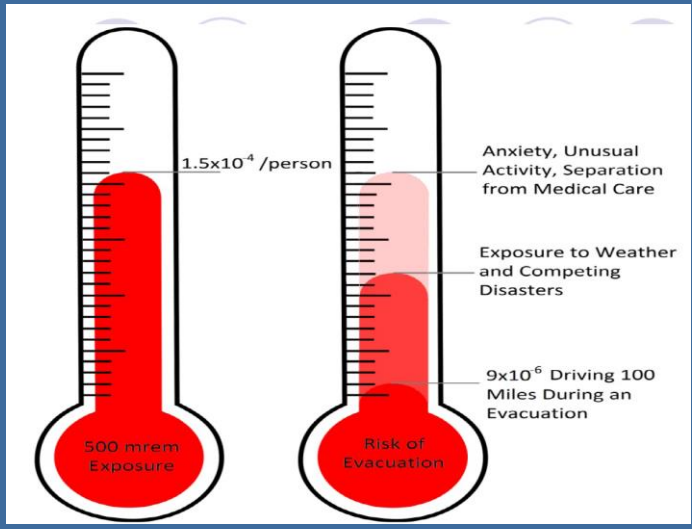
6/22/17
Jeff Semancik
NEAC 2Q17 Meeting

Why do we have PAGs?

- Protective Action Guidance = PAG = dose guideline that triggers public safety measures
- Guides/educates decision-makers on public protective actions
  - How do public officials respond to public concerns during a radiological incident?
  - Where do officials draw the line?
- Based upon potential public radiological threats
  - Nuclear Power
    - TMI (1979)
    - Chernobyl (1986)
    - Fukushima (2011)
  - Terrorism
    - RDD/dirty bomb
    - Non-state improvised nuclear detonation (IND)

Basis for Protective Actions

- Basics of protective actions
  - No immediate health risks (radiation sickness)
  - Minimize long term health risks (cancer)
  - More benefit than harm (evacuation can have consequences)
- We expect to save about ½ dose if we evacuate
- Avoided dose



Protective Action Guidelines

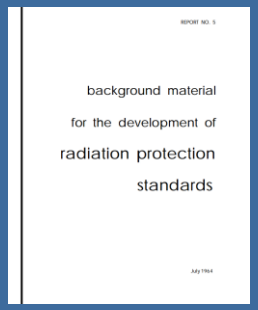
What PAGS **are**:

- Represent a projected dose to individuals that triggers protective action.
- General guidance to officials to make safety decisions.
- Used to minimize risk from an ongoing, radiological incident or an incident that has already occurred.

What PAGS **are NOT**:

- Legally binding regulations or standards.
- Able to supersede any environmental laws.
- Imply an acceptable level of exposure.
- Strict numeric criteria.
- Not related to CERCLA or Superfund.

Evolution of PAGs

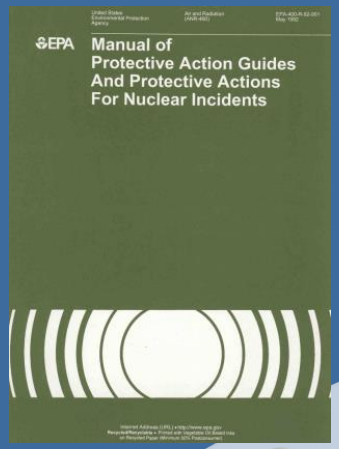


Federal Radiation Council Reports No. 5 and 7

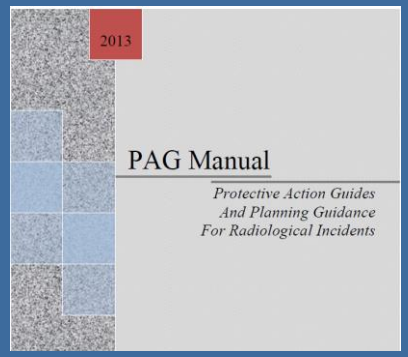
(1964)

FRC Fallout Guidance

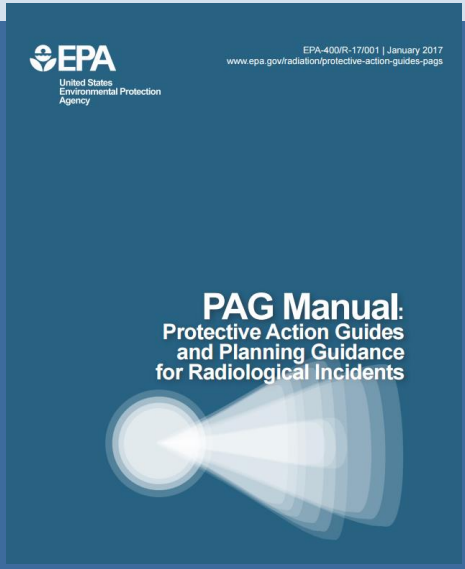
(1975 and 1980)



1992 PAG Manual



2013 Interim PAG manual



2017 PAG Manual

How do we use PAGs?

- Protective actions generally apply to incidents involving significant releases of radionuclides.
- Emergency Planners divide radiological incidents into 3 phases
  - Early
  - Intermediate
  - Late
- PAGs are used to determine when to initiate Protective Actions such as…
  - Evacuation
  - Sheltering
  - Water, milk and food interdiction
  - Relocation

Major Changes in 2017 PAGs

- ✓ Clarified use of PAGs for all radiological incidents including terrorism
- ✓ Referred to FDA for KI and food interdiction guidance
- ✓ Changing the technical basis for performing dose assessment
- ✓ Eliminating the evacuation PAG based on thyroid dose
- ✓ Adding a KI administration PAG based upon child thyroid dose
- ✓ Eliminating the 50-year objective for relocation
- ✓ Adding a drinking water PAG
- ✓ Providing re-entry guidelines
- ✓ Late phase planning and decision making considerations including cleanup, waste disposal, and Reoccupancy
- ✓ Federal integration (FRMAC)

New PAG Summary

Table 1-1. Summary Table for PAGs, Guidelines, and Planning Guidance for Radiological Incidents[a]

Phase	Protective Action Recommendation	PAG, Guideline, or Planning Guidance
Early Phase	Sheltering-in-place or evacuation of the public[b]	**PAG**: 1 to 5 rem (10 to 50 mSv) projected dose over four days[c]
	Supplementary administration of prophylactic drugs – KI[d]	**PAG**: 5 rem (50 mSv) projected child thyroid dose[e] from exposure to radioactive iodine
	Limit emergency worker exposure (total dose incurred over entire response)	**Guideline**: 5 rem (50 mSv)/year (or greater under exceptional circumstances)[f]
Intermediate Phase	Relocation of the public	**PAG**: ≥ 2 rem (20 mSv) projected dose[c] in the first year, 0.5 rem (5 mSv)/year projected dose in the second and subsequent years
	Apply simple dose reduction techniques	**Guideline**: < 2 rem (20 mSv) projected dose[c] in the first year
	Food interdiction[g]	**PAG**: 0.5 rem (5 mSv)/year projected whole body dose, or 5 rem (50 mSv)/year to any individual organ or tissue, whichever is limiting
	Drinking water	**PAG:** 100 mrem (1 mSv or 0.1 rem) projected dose, for one year, to the most sensitive populations (e.g., infants, children, pregnant women and nursing women); 500 mrem (5 mSv or 0.5 rem) projected dose, for one year, to the general population.
	Limit emergency worker exposure (total dose incurred over entire response)	**Guideline**: 5 rem (50 mSv)/year
	Reentry	**Guideline**: Operational Guidelines[h] (stay times and concentrations) for specific reentry activities (see Section 4.5)
Late Phase	Cleanup[i]	**Planning Guidance**: Brief description of planning process (see Section 5.1)
	Waste Disposal	**Planning Guidance**: Brief description of planning process (see Section 5.2)

The fine print matters…

[a] This guidance does not address or impact site cleanups occurring under other statutory authorities such as the United States Environmental Protection Agency's (EPA) Superfund program, the Nuclear Regulatory Commission's (NRC) decommissioning program, or other federal or state cleanup programs.

[b] Should begin at 1 rem (10 mSv); take whichever action (or combination of actions) that results in the lowest exposure for the majority of the population. Sheltering may begin at lower levels if advantageous.

[c] Projected dose is the sum of the effective dose from external radiation exposure (e.g., groundshine and plume submersion) and the committed effective dose from inhaled radioactive material.

[d] Provides thyroid protection from radioactive iodines only. See the complete 2001 FDA guidance, "Potassium Iodide as a Thyroid Blocking Agent in Radiation Emergencies." Further information is also available in "KI in Radiation Emergencies, 2001 – Questions and Answers" 2002, and "Frequently Asked Questions on Potassium Iodide (KI)."

[e] Thyroid dose. See Section 1.4.2. For information on radiological prophylactics and treatment other than KI, refer to http://www.fda.gov/Drugs/EmergencyPreparedness/BioterrorismandDrugPreparedness/ucm063807.htm, https://www.emergency.cdc.gov/radiation, and www.orau.gov/reacts.

[f] When radiation control options are not available, or, due to the magnitude of the incident, are not sufficient, doses to emergency workers above 5 rem (50 mSv) may be unavoidable and are generally approved by competent authority. For further discussion see Chapter 3, Section 3.1.2. Each emergency worker should be fully informed of the risks of exposure they may experience and trained, to the extent feasible, on actions to be taken. Each emergency worker should make an informed decision as to how much radiation risk they are willing to accept to save lives.

[g] For more information on food and animal feeds guidance, the complete FDA guidance may be found at http://www.fda.gov/downloads/MedicalDevices/DeviceRegulationandGuidance/GuidanceDocuments/UCM094513.pdf.

[h] For extensive technical and practical implementation information please see "Preliminary Report on Operational Guidelines Developed for Use in Emergency Preparedness and Response to a Radiological Dispersal Device Incident" (DOE 2009).

[i] This cleanup process does not rely on and does not affect any authority, including the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), 42 U.S.C. 9601 et seq. and the National Contingency Plan (NCP), 40 CFR Part 300. This document expresses no view as to the availability of legal authority to implement this process in any particular situation.

Improved decision making tools

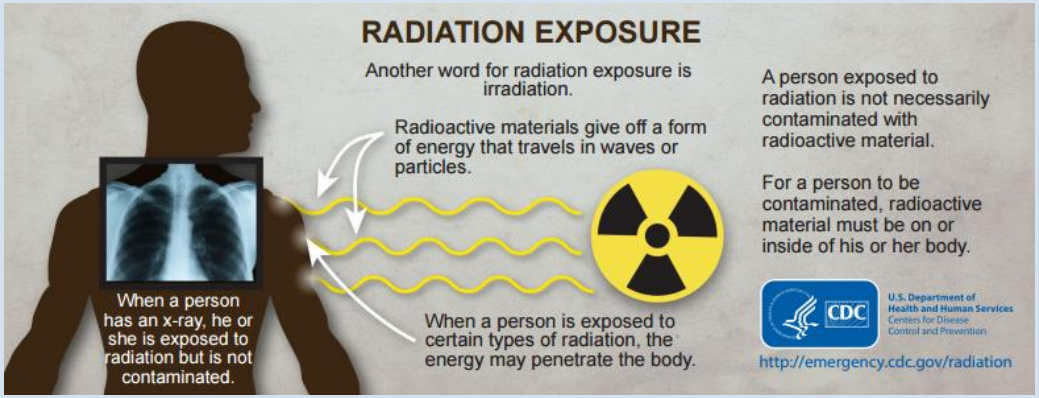
Table 4-2. Reentry Matrix: Quick Reference to Operational Guidelines[a]

PHASE	ACTIVITY	SUGGESTED LEVELS	CLEANUP ACTIONS[b]
Inter-mediate Phase	**Reentry For Use of Critical Infra-structure**	**Public**: 2 rem (20 mSv) in first year (Preliminary Report on Operational Guidelines Developed for Use in Emergency Preparedness and Response to a Radiological Dispersal Device Incident,[c] *Operational Guidelines Group C*). Dosimeters could be considered for the public.	Having addressed the removable part of the contamination, later efforts can focus on fixed contamination. ▪ Paved surface removal is very effective, but requires specialized equipment and trained operators. ▪ Surface sealing is easier, but leaves the contamination in place, making it viable only in locations where the dose rates are low enough for occupation, or in low-occupancy areas. ▪ Repaving roads, lots and other paved surfaces is easy to implement, but can generate significant waste volumes. ▪ Unpaved areas can be further remediated by soil skimming (surface removal), deep plowing (turning the top foot or so of soil over), and appropriate chemical soil amendment methods like liming or chelating. As the intermediate phase progresses, knowledge and experience increases and these methods can be re-applied, refined or customized for problem areas. Decisions about more difficult areas will benefit from professional judgment, additional analyses, and application of more sophisticated technologies.
	Emergency Worker Protection	**Emergency Worker Protection**: (dose not to exceed) 5 rem (50 mSv) per year (*Radiation Protection Guidance to Federal Agencies for Occupational Exposure*, EPA 1987). Emergency workers have knowledge of the risks associated with radiation exposure, training to protect themselves, and dosimeters to track their doses (see Chapter 3). During an incident response, workers (police, waste handlers) needed in contaminated areas could be trained and given dosimeters. The guidance for emergency workers applies throughout the response.	

Implementation

- Final PAG Manual Approved Jan 2017
- Implementation period – 1 year
- Local Implementation Decisions acceptable
  - With appropriate basis
- FEMA expectations
- Millstone Graded Exercise March 2017

Communicating Radiation Risk



Simple is Effective

Trail Difficulty Rating System

	Easiest White Circle	Easy Green Circle	More Difficult Blue Square	Very Difficult Black Diamond	Extremely Difficult Dbl. Black Diamond
Trail Width	72" or more	36" or more	24" or more	12" or more	6" or more
Tread Surface	Hardened or surfaced	Firm and stable	Mostly stable with some variability	Widely variable	Widely variable and unpredictable
Average Trail Grade	Less than 5%	5% or less	10% or less	15% or less	20% or more
Maximum Trail Grade	Max 10%	Max 15%	Max 15% or greater	Max 15% or greater	Max 15% or greater
Natural Obstacles and Technical Trail Features (TTF)	None	Unavoidable obstacles 2" tall or less Avoidable obstacles may be present Unavoidable bridges 36" or wider	Unavoidable obstacles 8" tall or less Avoidable obstacles may be present Unavoidable bridges 24" or wider TTF's 2' high or less, width of deck is greater than 1/2 the height	Unavoidable obstacles 15" tall or less Avoidable obstacles may be present May include loose rocks Unavoidable bridges 24" or wider TTF's 4' high or less, width of deck is less than 1/2 the height Short sections may exceed criteria	Unavoidable obstacles 15" tall or greater Avoidable obstacles may be present May include loose rocks Unavoidable bridges 24" or narrower TTF's 4' high or greater, width of deck is unpredictable Many sections may exceed criteria

Risk in Emergencies

Saffir-Simpson Hurricane Scale

Category	Wind Speed	Pressure (millibars)	Storm Surge	Damage
1	74-95 mph	>979	4-5 feet	minimal
2	96-110 mph	979-965	6-8 feet	moderate
3	111-130 mph	964-945	9-12 feet	extensive
4	131-155 mph	944-920	13-18 feet	extreme
5	>155 mph	<920	>18 feet	catastrophic

Scale	Wind speed mph	Wind speed km/h	Relative frequency	Potential damage	
EF0	65–85	105–137	53.5%	Minor damage. Peels surface off some roofs; some damage to gutters or siding; branches broken off trees; shallow-rooted trees pushed over. Confirmed tornadoes with no reported damage (i.e., those that remain in open fields) are always rated EF0.	
EF1	86–110	138–178	31.6%	Moderate damage. Roofs severely stripped; mobile homes overturned or badly damaged; loss of exterior doors; windows and other glass broken.	
EF2	111–135	179–218	10.7%	Considerable damage. Roofs torn off well-constructed houses; foundations of frame homes shifted; mobile homes completely destroyed; large trees snapped or uprooted; light-object missiles generated; cars lifted off ground.	
EF3	136–165	219–266	3.4%	Severe damage. Entire stories of well-constructed houses destroyed; severe damage to large buildings such as shopping malls; trains overturned; trees debarked; heavy cars lifted off the ground and thrown; structures with weak foundations blown away some distance.	
EF4	166–200	267–322	0.7%	Extreme damage to near-total destruction. Well-constructed houses and whole frame houses completely leveled; cars thrown and small missiles generated.	
EF5	>200	>322	<0.1%	Massive Damage. Strong frame houses leveled off foundations and swept away; steel-reinforced concrete structures critically damaged; high-rise buildings have severe structural deformation. Incredible phenomena will occur.	

Connecticut Department of Energy and Environmental Protection

We have resisted simple with radiation

You are safe because the release of radiation was all low level noble gas. It doesn't react with other material and is only a low energy beta emitter tha
eliminated from the body relativ
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t the dose to the
public

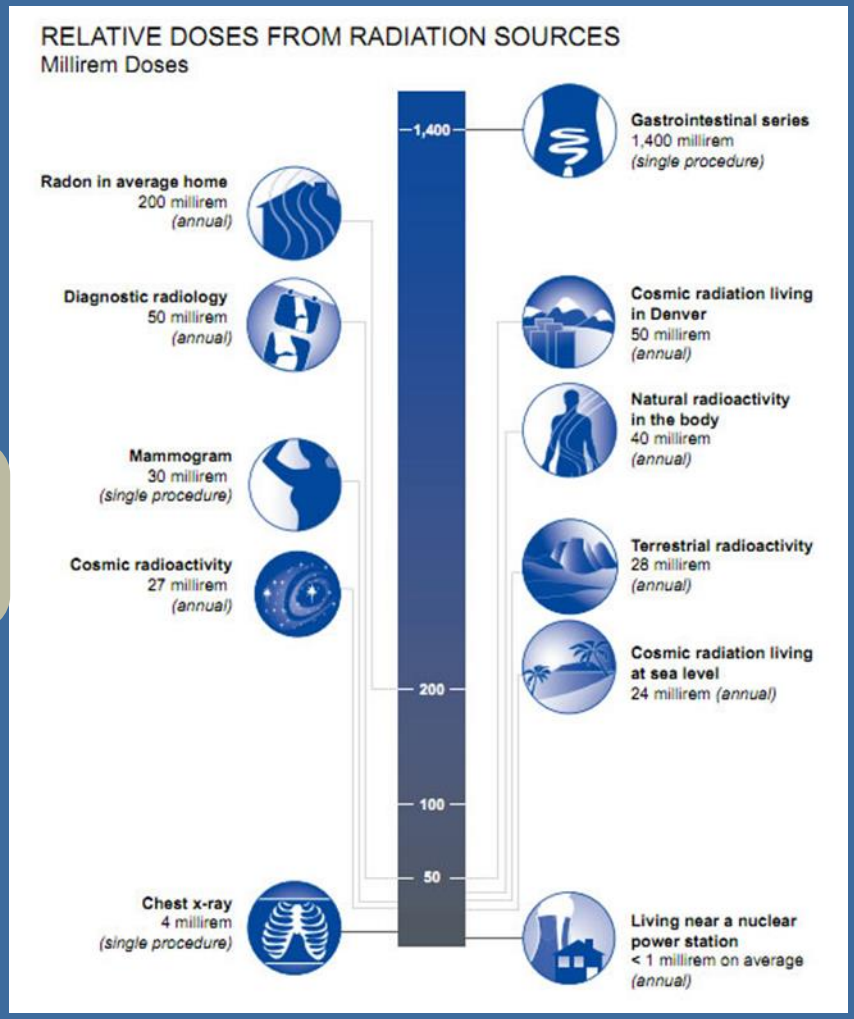
Mega Bequerels

µSv/hr

R/hr

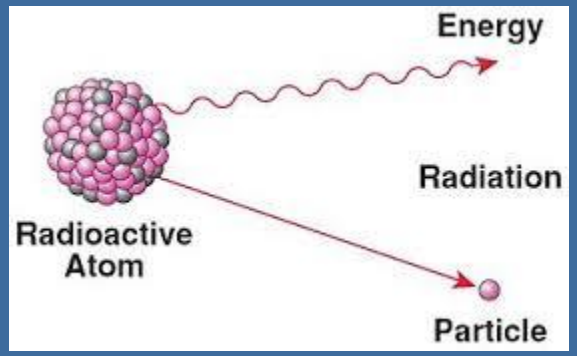
mrem

picoCuries

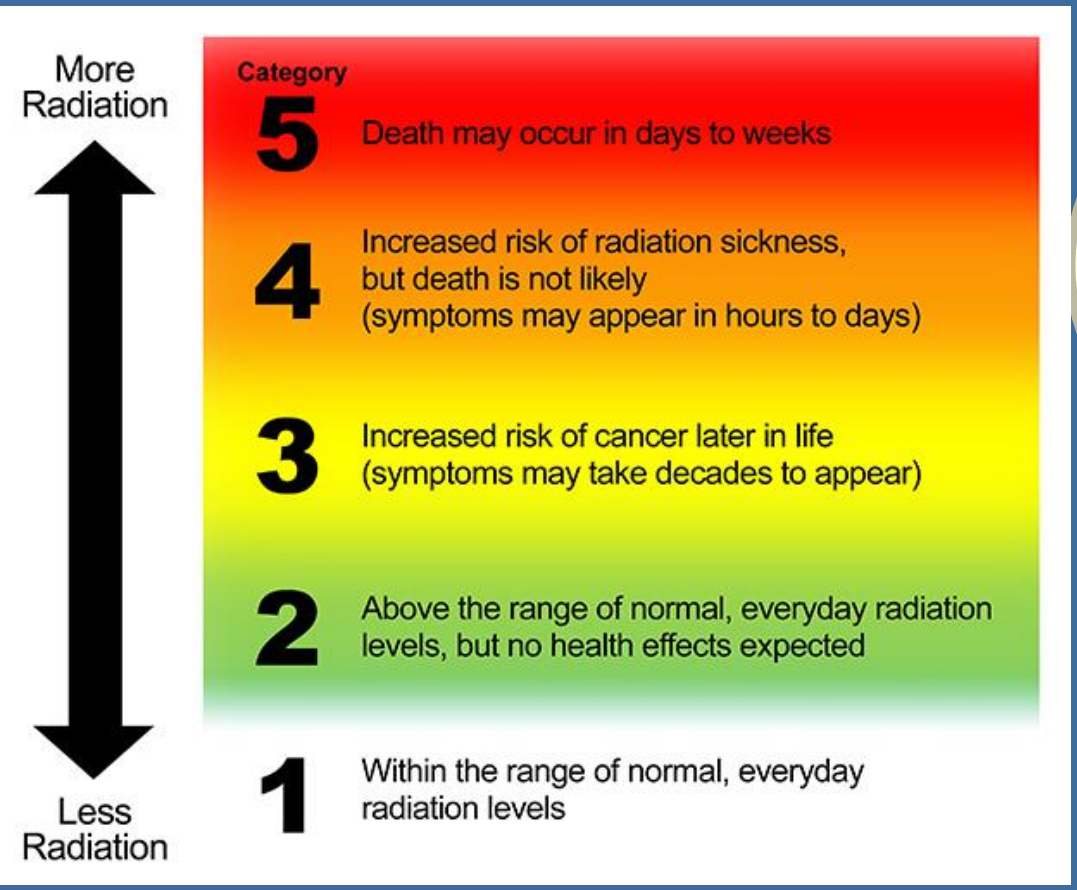


The problems with radiation…

- There is no consensus dose threshold
- If we define a “safe dose,” the public perceives anything else as “unsafe”
- Radiation terms and units…



A new (simpler)approach from CDC

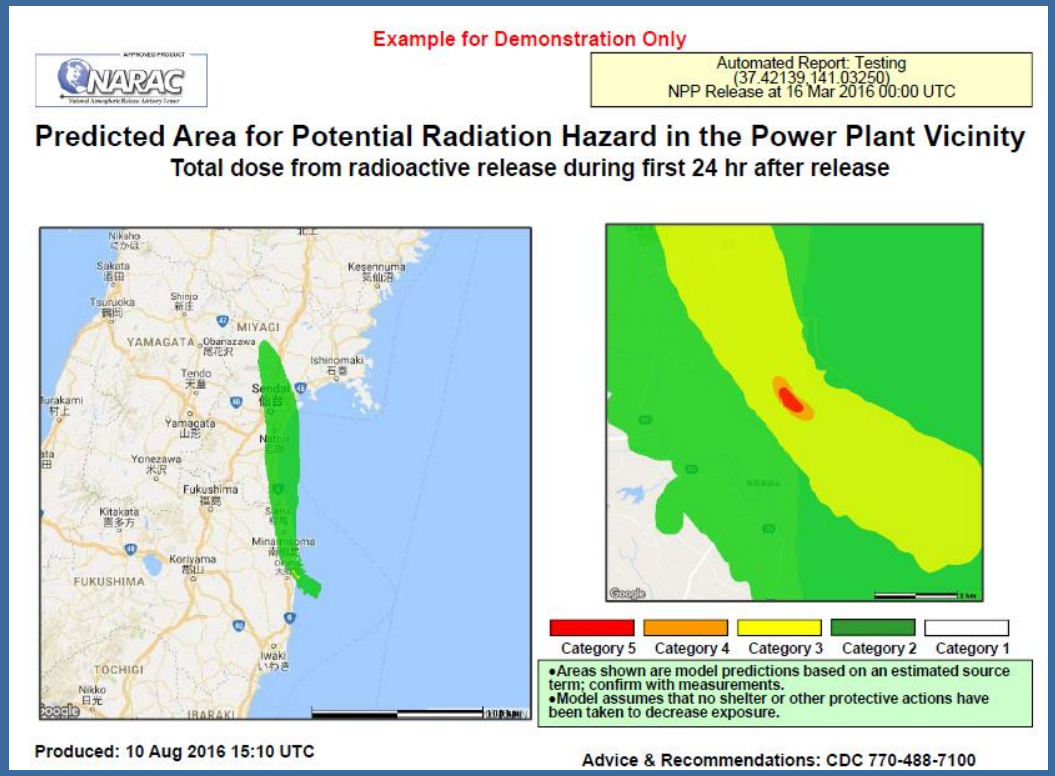


The radiation measured offsite is within radiation hazard category 2 and no adverse health effects are expected.

In more detail

Category	Description
5	**Category 5** means that radiation doses are dangerously high and potentially lethal (≥200 rem). High doses of radiation can cause massive damage to organs of the body and kill the person. The exposed person loses white blood cells and the ability to fight infections. Diarrhea and vomiting are likely. Medical treatment can help, but the condition may still be fatal in spite of treatment. At extremely high doses of radiation, the person may lose consciousness and die within hours. For more information, see www.remm.nlm.gov/ars_summary.htm#whatisars
4	**Category 4** means that radiation doses are dangerously high and can make people seriously ill. Radiation doses are not high enough to cause death, but one or more symptoms of radiation sickness may appear (≥100 rem and <200 rem). Radiation sickness, also known as Acute Radiation Syndrome (ARS), is caused by a high dose of radiation. The severity of illness depends on the amount (or dose) of radiation. The earliest symptoms may include nausea, fatigue, vomiting, and diarrhea. Symptoms such as hair loss or skin burns may appear in weeks. For more information about the health effects of radiation, see http://emergency.cdc.gov/radiation/healtheffects.asp For more information about medical treatment of radiation exposure, see http://emergency.cdc.gov/radiation/countermeasures.asp
3	**Category 3** means that radiation doses are becoming high enough where we may expect increased risk of cancer in the years ahead for people who are exposed. Leukemia and thyroid cancers can appear in as few as 5 years after exposure. Other types of cancer can take decades to develop (≥2 rem and <100 rem). Studies have shown that radiation exposure can increase the risk of people developing cancer. This increased risk of cancer is typically a fraction of one percent. The lifetime risk of cancer for the population due to natural causes is approximately 40%. The increase in risk of cancer from radiation depends on the amount (or dose) of radiation, and it becomes vanishingly small and near zero at low doses of radiation. For more information, see http://emergency.cdc.gov/radiation/cancer.asp
2	**Category 2** means that radiation levels in the environment are higher than the natural background radiation for that geographic area. However, these radiation levels are still too low to observe any health effects (≥0.001 rem and <2 rem). When radiation levels are higher than what we normally have in our natural environment, it does not necessarily mean that it will cause us harm. For more information about health effects of radiation, see http://www.cdc.gov/nceh/radiation/health.html
1	**Category 1** means that radiation levels in the environment are within the range of natural background radiation for that geographic area (<0.001 rem). Low amounts of radioactive materials exist naturally in our environment, food, air, water, and consequently in our bodies. We are also exposed to radiation from space that reaches the surface of the Earth. These conditions are natural, and this radiation is called the natural background radiation. For more information about radiation and radioactivity in everyday life and how it can vary by location, see http://www.cdc.gov/nceh/radiation/sources.html

Using the CDC Rad Hazard Scale



Following evacuation instructions will reduce your Radiation Hazard from Category 3 to Category 1.

When using the Rad Hazard Scale

- Different from the IAEA Radiation Event Severity Scale
- Best when paired with protective actions
- Not for medical triage
- Public tested
  - No pre-education required

More info at

https://emergency.cdc.gov/radiation/radiationhazardscale.asp

NUCLEAR ENERGY ADVISORY COUNCIL
September 14, 2017 6:30 PM
Waterford Town Hall
Leigh Appleby room
Waterford, CT

MINUTES

Members Present

Alternate Chair Mr. Jeffrey Semancik representing DEEP Commissioner Klee

Mr. James Sherrard	Mr. Bill Sheehan
Mr. Tom Nebel	CDR Royce W. James, Ph.D.
Mr. A. Jordan	Mr. Robert Klancko

Members not present:

Mr. Gregg Dixon	Rep Kevin Ryan, Chair
Mr. Edward Munster	Mr. R. Woolrich

1. **Call to Order of Meeting**
   NEAC Alternate Chair Semancik called the meeting to order at 6:30 PM at Waterford Town Hall, Waterford, CT. Chair Representative Ryan was in session with the CT General Assembly and unable to attend.

2. **Approval of Minutes of the March 22, 2017 NEAC meeting.**
   A motion was made to approve the minutes by Mr. Nebel and seconded by Mr. Sherrard. Mr. Klancko and Mr. Sheehan abstained. Minutes were approved without any corrections or objections.

3. **Program**
   a. **Presentation by Mr. Robert Capstick, Director of Government and Public Affairs for Director of Yankee Atomic Electric Company, on spent nuclear fuel (SNF) policy changes under the Trump administration.** Mr. Capstick discussed the status of SNF ay Connecticut Yankee (CY), a historical overview of the Nuclear Waste Policy Act (NWPA), and the status of national spent nuclear fuel policy issues including both Yucca Mountain and interim SNF storage options. The presentation of this material is provided as Attachment 1.
      i. Mr. Klancko asked if there has been any discussion of reprocessing. Mr. Capstick stated that the age of the fuel for Yankee atomic doesn't support reprocessing. He noted that reprocessing was shut down under the Carter administration and he is not aware of any initiative to restart reprocessing.
      ii. Mr. Sheehan noted the challenge will ultimately be in transporting the SNF. Mr. Capstick noted that if Yucca Mountain is ever opened, it will be the most massive movement of hazardous substance of all time. He noted that CY safely and successfully shipped several very large components (such as the reactor vessel) during decommissioning. He also noted that the US Department of

Energy (DOE) has completed the de-inventory analysis report for CY. He stated that they considered multiple methods including barge and concluded that rail shipment was the preferred method. Mr. Semancik noted that the de-inventory analysis was provided to Council members for review.

iii. Mr. Sherrad asked what the earliest that Yucca Mountain would be available. Mr. Capstick stated that he wasn't sure that anyone really knows that time frame. Given that there are over 3,000 contentions to the site, the time to resolve the legal issues is uncertain. He stated that Yucca Mountain was designed to store 70,000 metric tons of SNF, but that there is currently 75,000 metric tons with more being added every year. Mr. Capstick stated that industry experts believe that a consolidated interim storage facility could be operational within 4 years.

iv. Mr. Semancik asked the status of the Stranded Nuclear Waste Act. Mr. Capstick stated that this was a bill proposed by former Representative Dole to compensate communities with stranded SNF. However, Mr. Dole was not re-elected and there has been no further action with respect to this proposal.

v. Mr. Nebel asked what basis Senator Reid has used to block completion of Yucca Mountain. Mr. Capstick replied that he has used multiple methods including designating portions of the land as a national monument site.

vi. CDR James asked what the actual cost of SNF storage has been. Mr. Capstick replied that the NWPA authorized collection of a SNF waste fee (1 mil for every kWe generated by nuclear power) from ratepayers. The government collected $750M annually through this fund until the Supreme Court ruled that the DOE could no longer collect this fee without making progress on their obligation to take title to the fuel. There is currently greater than $30B in the Nuclear Waste Fund and increasing by $1.5B in interest annually.

b. Mr. Semancik provided a presentation on follow-up CT DEEP observations of Creusot Forge testing and analysis completed by Dominion. Mr. Semancik provided background on the concern for components fabricated at Creusot Forge (in particular the pressurizer at Millstone 2), the technical basis of concern, DEEP's statutory authority and recommendations to the NRC, Dominion's actions, and observations conducted by DEEP staff. DEEP concluded that the voluntary testing and analysis effectively demonstrated the safety of the component of interest with substantial margins of safety and that no further recommendations to the NRC were necessary. The presentation is provided as Attachment 2.

i. Mr. Klancko asked who provided the third party independent testing and analysis. Mr. Semancik stated that Curtis Wright Engineering conducted the ultrasonic testing and Structural Integrity Associates conducted the independent technical analysis.

ii. Mr. Jordan asked if any other nuclear utilities had conducted similar testing that could be compared to the Dominion testing. Mr. Semancik stated that he was not aware of any other utilities conducting physical testing.

iii. Mr. Jordan asked if other testing methods were considered such as in situ carbon content measurements. Mr. Semancik stated that Dominion had considered other testing methods but did not pursue them for two reasons: (1) concern for localized changes to material properties; and (2) lack of clear Code

acceptable criteria.

c. **Mr. Semancik presented information on Millstone Unusual Event declaration on August 15, 2017.** Mr. Semancik presented information on the failed fire detector that caused the declaration and Dominion's actions. He noted there was no release of radiation due to the event. The information presented is included in Attachment 2.
    i. Mr. Klancko asked specifically what the "compensatory actions" for the failed fire detector involved. Mr. Semancik stated that operators must verify the other fire detectors remain operable and that other indications such as temperature do not show any adverse indications.

4. NRC Correspondence Reviewed since past meeting.

The list of NRC Correspondence was reviewed. One comment from NEAC was related to NRC environmental qualification inspection.

a. Millstone Power Station – NRC Investigation Report No. 1-2016-019 dated July 20, 2017 (Public Version)
b. Millstone Power Station, Units 2 and 3 – Material Control and Accounting Program Inspection Report 05000336/2017404 and 05000423/2017404 dated June 29, 2017 (Public Version)
c. Millstone Power Station – Security Inspection Report 05000336/2017403 and 05000423/2017403 dated April 24, 2017.
d. Millstone Power Station – Integrated Inspection Report 05000336/2017002 and 05000423/2017002 dated August 9, 2017.
e. Millstone Power Station – Design Bases Assurance (Environmental Qualification Program) Inspection Report 05000336/2017007 and 05000423/2017007 dated September 13, 2017.
    i. Mr. Sheehan noted that the violation involved the Auxiliary Feedwater system and this system has been identified historically in several other NRC violations and findings.
f. Millstone Power Station Unit 1 – Safe Storage Inspection Report No. 05000245/2017008 dated September 13, 2017.

5. **Other material reviewed** – NEAC reviewed the following information related to nuclear industry and trends.

a. Docket No. 265 - Dominion Nuclear Connecticut, Inc. Millstone Power Station, Waterford, Connecticut Independent Spent Fuel Storage Installation Twelfth Annual Report (Serial No. NSF-MPS-17-002) dated April 3, 2017.
b. US DOE Report: Initial Site-Specific De-inventory Report for Connecticut Yankee RPT – 3014538-002 dated May 5, 2017.

c. US DOE Presentation: Initial De-Inventory Analyses –Highlights from the Connecticut Yankee and Big Rock Point Site Studies, Matt Feldman Integrated Waste Management (IWM) Control Account Manager for Transportation, Oak Ridge National Laboratory NTSF webinar July 26, 2017.

6. Public Comment

a. Two members of the public were in attendance. There were no questions from the public.

7. Other Business

a. The Council agreed on the annual NEAC report to the legislature to be presented and discussed at the next meeting scheduled for December 14, 2017.
b. Formation of shutdown committee for Millstone – Mr. Sheehan indicated that Dominion management has publically stated that they are reviewing the viability of continued operation of Millstone. In light of the potential that Dominion may choose to retire the Millstone units prior to end of their operating licenses and the special and different activities associated with decommissioning, he proposed that the Council consider the best mechanism to provide state oversight during decommissioning.
    i. Mr. Sheehan indicated that when Northeast Utilities shut down Millstone Unit 1, NEAC created a subcommittee (Millstone 1 Decommissioning Advisory Council, MIDAC).
    ii. Mr. Sheehan indicated that for sites providing oversight committees for decommissioning, it has proven to be effective in broadening the stakeholders involved in the oversight. In particular, he noted that it often involves financial and opponent stakeholders.
    iii. Mr. Jordan indicated that from his past experience with Dominion decommissioning Kewaunee Power Station in Wisconsin, that Dominion would be looking to setup a citizen's advisory decommissioning panel of some sort.
    iv. Mr. Semancik suggested that NEAC provides the right forum, but that its authority is defined by Connecticut General Statutes. He stated that he would review the NEAC statute and recommend any potential changes for this legislative session.
        1. Mr. Sheehan agreed that NEAC would be a proper mechanism for oversight but may need to establish some specific subcommittees with expanded membership.
        2. Mr. Jordan cautioned that the size of any oversight mechanism must be properly established to get the right level of participation, but not to expand to a point that adversely affects the ability of the committee to effectively provide oversight.

8. **Adjournment**
   Motion was made by Mr. Klancko and seconded by Mr. Sherrard to adjourn; no objections; unanimous vote in favor; meeting adjourned at 8:05 PM.

SPENT NUCLEAR FUEL POLICY UPDATE

CONNECTICUT NUCLEAR ENERGY ADVISORY COUNCIL

SEPTEMBER 14, 2017 MEETING

BOB CAPSTICK

DIRECTOR OF GOVERNMENT, PUBLIC & REGUATORY AFFAIRS

CONNECTICUT YANKEE ATOMIC POWER COMPANY

SPENT NUCLEAR FUEL POLICY UPDATE - SEPTEMBER 14, 2017

Status of National Spent Nuclear Fuel Policy Issues

Administration

FY 2018 Budget Proposal

- The President's FY 2018 budget document was released in May and the DOE budget request for Yucca Mountain and Interim Storage programs proposed a total of $120 million ($30 million in defense funding and $90 million from the Nuclear Waste Fund). The NRC's budget request included $30 million to support a restart of the review of DOE's Yucca Mountain license application.

DOE Shutdown Site Evaluation Reports

- In June the DOE posted its "*Initial Site-Specific De-Inventory Report for Connecticut Yankee*". The CY report is similar to the one previously released at the end of March for Maine Yankee, as well as the Trojan and Big Rock sites - other shutdown site reports will be developed and issued in the future. These reports address the tasks, equipment, and interfaces necessary for the complete de-inventory of the spent fuel and GTCC waste from the ISFSI sites --- including an analysis of potential transportation routes and modes of transport including heavy haul truck, rail and barge from the sites. There was a webinar held by the DOE on the CY de-inventory report on July 26th. The DOE is also in the process of updating their current *Preliminary Evaluation for Removing Used Nuclear Fuel from Shutdown Sites Report*. These reports are available at https://curie.ornl.gov/

Congress

FY 2018 Energy and Water Development Appropriations Legislation

- In July the House Appropriations Committee favorably reported their FY 2018 Energy and Water Development Appropriations bill (HR 3266) to the House on a voice vote. The bill fully supported the Administration's position to move forward with Yucca Mountain and provides funding to restart the adjudication of the Yucca Mountain license application at $90,000,000 from the Nuclear Waste Disposal, $30,000,000 from Defense Nuclear Waste Disposal, and $30,000,000 from the NRC.

- The Senate Appropriations Committee completed consideration of their Energy and Water Development FY '18 funding bill in July. As in years past, the bill calls for the Department to initiate a pilot interim storage facility with priority for shutdown sites and provides money for the DOE to begin the process leading to a contract between the agency and a private party for interim storage services. Also as in the past, the bill contains no money to continue the Yucca Mountain licensing effort.

- On July 27th, the House passed a combination appropriations package called the "Make America Secure Appropriations Act" (H.R. 3219) that combined four separate Appropriations measures with the Department of Defense Appropriations Act as its base. Included in the bill was the Energy and Water Development Appropriations bill. This "mini-bus" (so-called for being a shorter version of a 12-bill omnibus appropriations bill) would fund the programs and policies of all agencies and departments under the four-bill package through all of fiscal year 2018.

House Nuclear Waste Policy Amendments Act of 2017

- The House Energy and Commerce Committee voted on June 28th to favorably report the "Nuclear Waste Policy Amendments Act of 2017". The vote of 49-4 was large and bi-partisan. The bill (HR 3053) was initiated by Chairman Shimkus in his Subcommittee on Energy and Environment to amend the NWPA to move the Yucca Mountain licensing process forward and address issues such as needed land withdrawals in Nevada. Following amendments during markup in the full Committee, the bill would also authorize the Secretary to begin to develop a single interim storage facility and using the framework of the existing law is called a monitored retrievable storage (MRS) facility. There are a series of steps the DOE Secretary is required to take and to examine whether such a facility makes programmatic sense by 2019. At that point, the DOE may begin to develop a cooperative agreement with one private facility for storage services that must include a preference for the movement of fuel from shutdown plants.

- The bill also contains a linkage provision stating that fuel may not be moved to the MRS facility until there is a final NRC decision on the Yucca Mountain construction authorization; however, it does grant the Secretary the discretion to start the movement of stranded fuel to the MRS facility upon a finding that a final decision is imminent. Congressman Courtney is a co-sponsor of the bill.

Senate Legislation:

- The Senate Energy Committee and Energy & Water Development Committee leaders are still expected to re-introduce at some point this session the bi-partisan comprehensive nuclear waste reform bill they have introduced in the past two sessions that is aimed at implementing several of the recommendations of the Blue Ribbon Commission, including the establishment of a pilot consolidate interim storage facility for shutdown plant site material.

Nuclear Regulatory Commission

NRC Commissioners

The three Republicans nominated to be NRC Commissioners [Commissioner Kristine L. Svinicki; David Wright and Annie Caputo] had hearings before the Senate Environment and Public Works Committee this summer. Because Commissioner Svinicki's term was to expire on June 30th, her nomination was taken up on June 13th and voted on by the Committee and then by the Senate prior to the end of June. The vote on the other two nominees was held by the

Committee on July 12th and both were approved to go to the Senate for confirmation. The Democrats pressed for those nominations to be paired with the current Democratic Commissioner (Jeff Baran) whose term expires at the end of June 2018. President Trump recently nominated Commissioner Baran for another five year term and the Senate is likely to vote on all three nominees this fall.

Yucca Mountain License Application Review

The NRC issued a press release on August 8th announcing that the Commissioners had approved funding to move forward with the preparing to resume review of the Yucca Mountain license application. The Commission limited expenditures for the information-gathering activities to $110,000 from the Nuclear Waste Fund. As of June 30th, the agency had approximately $634,000 in remaining unobligated Nuclear Waste Fund appropriations.

Private Consolidated Interim Storage (CIS) License Applications:

- Texas Proposal: The Waste Control Specialists license application for a proposed CIS facility in Andrews County Texas to the NRC was formally docketed on January 26th. On April 18th, WCS sent a letter to NRC requesting the Commission suspend review of the license application pending completion of the proposed sale to Energy Solutions that was expected to occur late this summer. However, in June the Judge in the trial of the US government's lawsuit to enjoin the proposed sale of WCS to Energy Solutions on antitrust grounds, ruled in favor of the government and denied the sale. The owners of WCS are currently soliciting additional bids for the company and NRC has suspended review of the license application at WCS's request.

- New Mexico Proposal: The Holtec International and the Eddy Lea Alliance license application to the NRC to site a CIS facility in the communities of Carlsbad and Hobbs New Mexico was submitted to the NRC on March 31, 2017 has been reviewed by the NRC staff. The staff subsequently requested supplemental information, so the application is not yet considered docketed.

SNF Policy in US – NWPA

- **Nuclear Waste Policy Act (NWPA) of 1982**
  - Called for repository site search to result in 2 sites (1 in East & 1 in West assumed)
  - Limited 1st repository to 70,000 metric tons until 2nd repository open
  - Created office in DOE to focus on waste (OCRWM)
  - Authorized DOE to contract with utilities for DOE removal of SNF starting in 1998 in return for fees
  - Directed DOE to propose site & design for MRS
  - Assigned licensing to NRC using EPA standards

NWSC
Nuclear Waste Strategy Coalition

SNF Policy in US – NWPA *(cont.)*

- **1987 NWPA Amendments**
  - Named Yucca Mountain (YM) as sole repository site; eliminated 2nd repository program
  - Rescinded MRS site selection and tied future operation to repository progress
  - Offered incentives to host states & tribes
  - Established Nuclear Waste Negotiator to find voluntary repository or MRS sites *(expired)*
  - Established Nuclear Waste Technical Review Board to increase oversight of OCRWM
  - If YM found unsuitable, studies to be stopped, site restored, and DOE to report to Congress in 6 mos. on course of action

NWSC
Nuclear Waste Strategy Coalition

NWPA Implementation

- **Milestones Achieved**
  - 2002 –
    - Sec. of Energy recommended Yucca Mountain (YM) for the only repository & Pres. Bush approved
    - Nevada exercised state veto in April
    - Veto overridden by Congress by mid-July
  - 2008 –
    - DOE submitted license application for YM repository to NRC

NWSC
Nuclear Waste Strategy Coalition

NWPA Implementation *(cont.)*

- **Political Intervention Sidetracks Program**
  - 2010 –
    - Administration zeroed out YM funding
    - DOE moved to withdraw YM license app
    - President created Blue Ribbon Commission (BRC) to "recommend a new strategy" because YM "unworkable"
    - DOE's OCRWM closed
  - 2011 –
    - NRC discontinued technical review of YM license app
  - 2012
    - BRC on America's Nuclear Future Report to DOE

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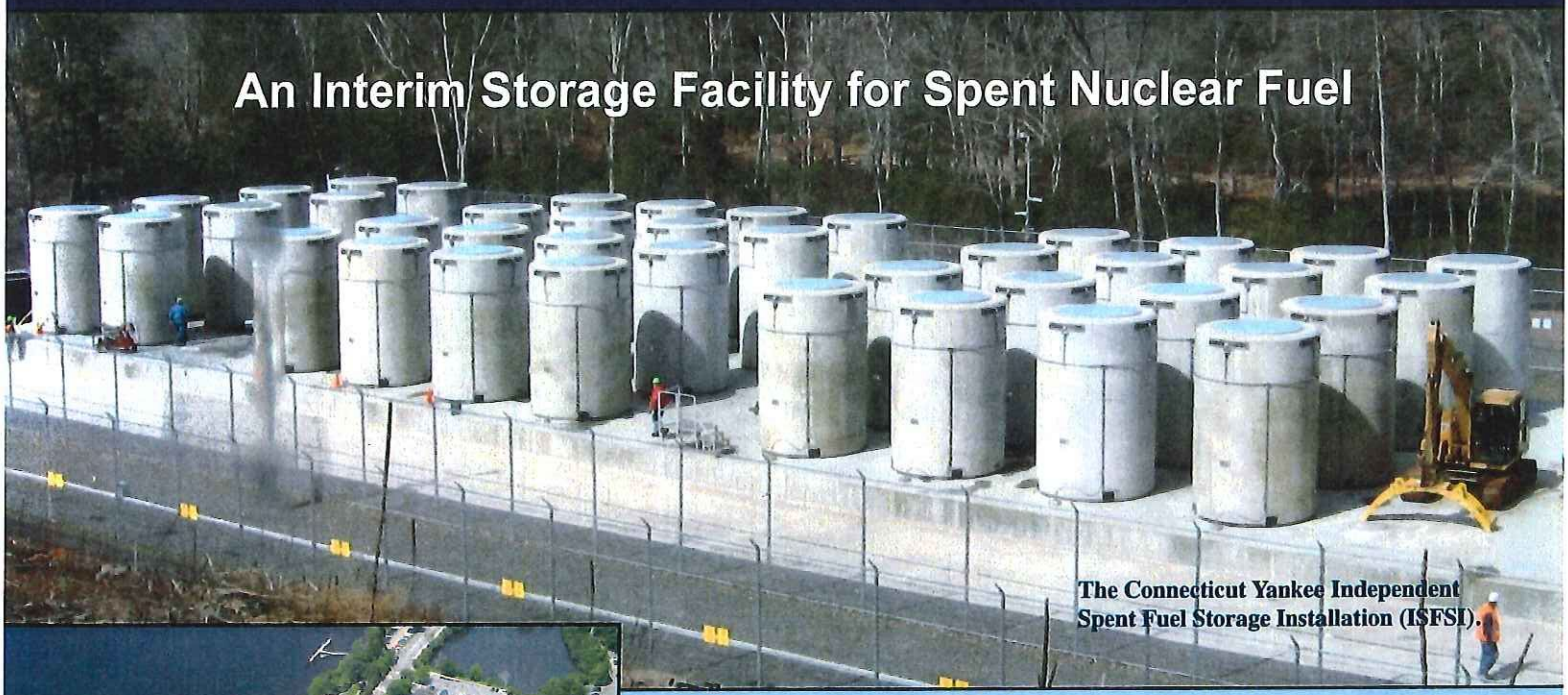
NWPA Implementation *(cont.)*

- **Accomplishments through 2016**
  - 2013 –
    - NRC restarts review of YM license app as directed by USCA-DC writ of mandamus (as long as appropriated funds last)
  - 2015 –
    - NRC completion of Safety Evaluation Report (SER)
  - 2016 –
    - NRC completion of Supplemental EIS
    - Remaining YM license app review work will require additional funding by Congress

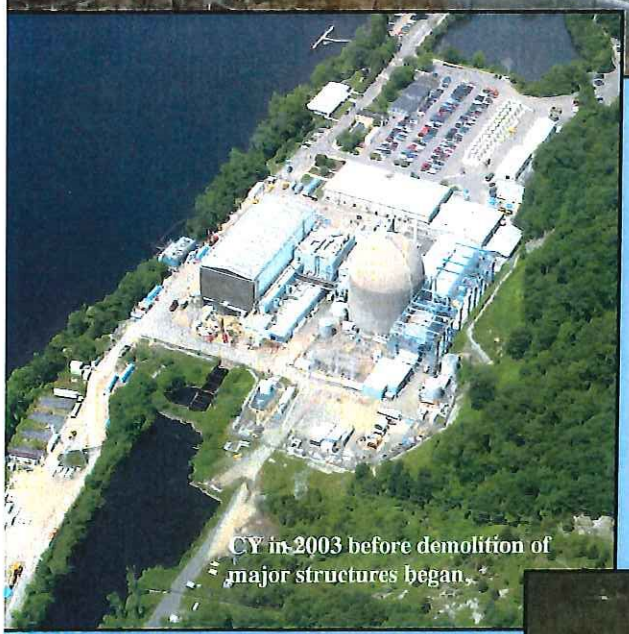
NWSC
Nuclear Waste Strategy Coalition

Connecticut Yankee

An Interim Storage Facility for Spent Nuclear Fuel



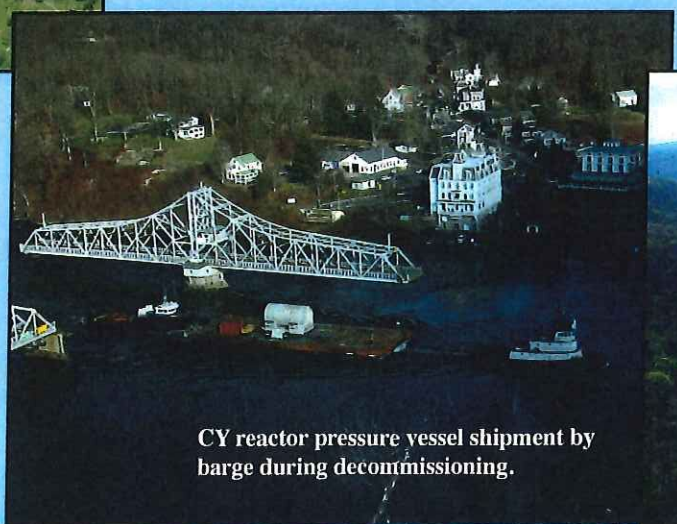
The Connecticut Yankee Independent Spent Fuel Storage Installation (ISFSI).



CY in 2003 before demolition of major structures began.

Connecticut Yankee (CY) operated a 619 megawatt nuclear power plant located in Haddam Neck, CT that produced more than 110 billion kilowatt-hours of electricity from 1968-1996 when it was permanently shut down for economic reasons.

The plant was successfully decommissioned between 1998-2007 with structures removed and the site restored to stringent federal and state remediation standards. In November 2007 the U.S. Nuclear Regulatory Commission (NRC) provided notification that the former plant site had been fully decommissioned in accordance with NRC procedures and regulations.



CY reactor pressure vessel shipment by barge during decommissioning.

Remaining at the CY site is the Independent Spent Fuel Storage Installation (ISFSI) consisting of 40 dry storage casks containing 1019 spent nuclear fuel (SNF) assemblies used during the years of plant operation and 3 casks containing sections of the reactor vessel internals classified as Greater than Class C waste (GTCC waste). CY uses the NAC-MPC dual-purpose dry cask/canister system which is licensed by the NRC for both storage and transport. The ISFSI is located on approximately 5 acres of the 525 acre CY site about ¾ of a mile from the decommissioned reactor location.

The CY site after decommissioning

The transfer of the SNF assemblies and GTCC waste from the plant's spent fuel pool to the stainless steel canisters and then placement of the canisters into the concrete and steel casks began in April 2004 and was completed in March 2005.

Fuel transfer cask stackup for transport to the ISFSI.

Placement of dry fuel storage casks at the ISFSI.

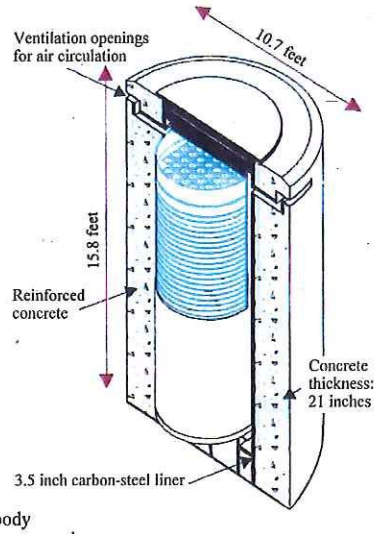
Under the Nuclear Waste Policy Act and contracts with the U.S. Department of Energy (DOE), the Federal Government was required to have begun removing the SNF and GTCC waste from CY by January 1998. The DOE has yet to meet this obligation and it is uncertain when it will. In the meantime, it is CY's responsibility as an NRC licensee to safely store the SNF and GTCC waste in accordance with all applicable federal regulations including programs for security, emergency planning, and cask monitoring. Once the Federal Government fulfills its commitment to remove the SNF and GTCC waste from the site, the ISFSI site will be decommissioned and CY will go out of business.

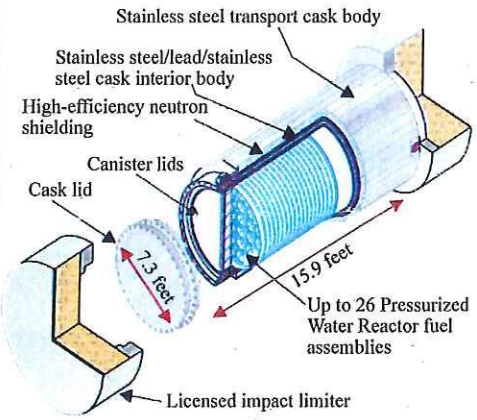
Shipment of the CY pressurizer by rail.

The annual cost to operate the Connecticut Yankee ISFSI is on the order of $10 million per year. For more information about the storage of spent nuclear fuel and decommissioning at Connecticut Yankee, as well as litigation with the DOE seeking to recover the cost of storing this material resulting from the Federal Government's failure to fulfill its obligations ro remove it, go to 3yankees.com.

The 43 dry storage casks stand on a two-foot-thick concrete pad approximately the size of a hockey rink. Each concrete cask is comprised of a three and a half-inch steel liner surrounded by 21 inches of reinforced concrete.

Each cask weighs about 126 tons and contains a sealed stainless steel canister. The cask/canister system is completely passive with vents at the base and top of each cask circulating the air that removes heat from the canisters.

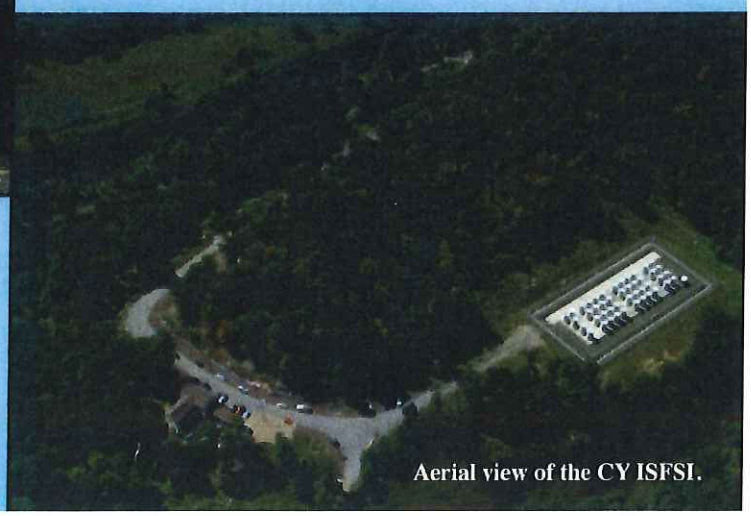




Above: diagram of vertical concrete storage cask with canister.

Left: diagram of transport cask with canister.

As currently planned, when the time comes to remove the SNF and GTCC waste, the dual-purpose canister will be removed from each cask, placed in an NRC licensed shipping cask, and likely transported from the site by barge or heavy haul truck. Both means of transportation were used for shipment of heavy components from the site during decommissioning.



Aerial view of the CY ISFSI.

DEEP Survey of Dominion Actions taken in response to the Creusot Forge Components Concern

9/14/2017

Jeff Semancik

NEAC 3Q17 Meeting

A Review of the Issue

- Flammenville 3 Reactor Vessel
  - Manufacturing issue at Le Creusot Forge
  - Brittle fracture susceptibility
- Extent of Condition with Operating Reactors
  - French
  - US

04/05/2016 11:00 am

AREVA has informed ASN of irregularities concerning components manufactured in its Creusot Forge plant

Following the detection of an anomaly on the Flamanville EPR reactor vessel, and at the instigation of ASN, AREVA initiated in April 2015 a quality review on the manufacturing work carried out in its Creusot Forge plant. Its conclusions were sent to ASN in October 2015.

Read more >

20/04/2016 3:00 pm

Falsification of materials analysis reports: ASN is collaborating with the ongoing judicial inquiry

On 21st January 2016, a metallurgical analysis laboratory informed ASN that it had found out that the inspection reports it had produced for a French mechanical company situated in the Loire département (42), had been falsified.

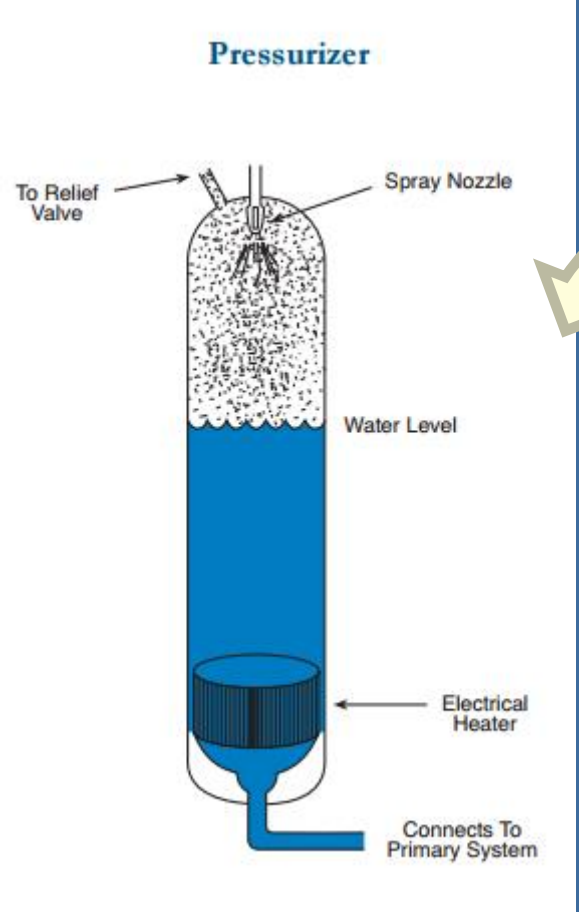
Read more >

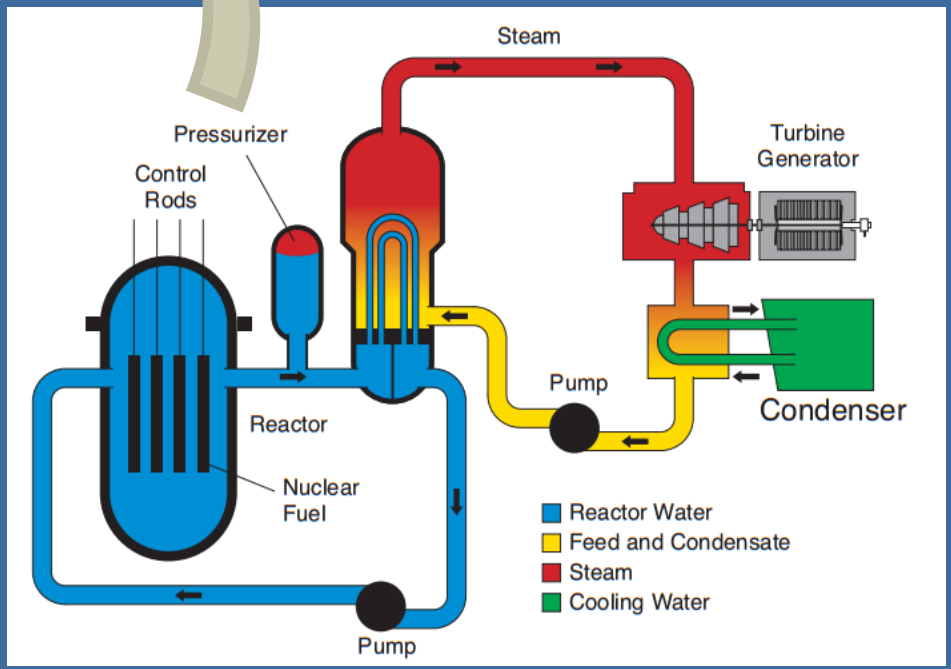
Creusot Forge Forgings in U.S. Components

13-Dec-16

Customer	Site	Prime	Fabricator	Forgings
Steam Generators				
FENOC	Beaver Valley 1	WH	ENSA	3 primary heads, 3 tubesheets, 3 conical shells, 3 elliptical heads
Luminant	Comanche Peak 1	WH	ENSA	3 primary heads, 3 tubesheets, 3 elliptical heads
Scana	VC Summer	WH	WH	4 primary heads, 4 tubesheets
Southern	Farley 1 & 2	WH	ENSA	3 tubesheets, 9 lower shells, 9 upper shells
STP	South Texas 1	WH	ENSA	4 conical shells
STP	South Texas 2	WH	ENSA	4 tubesheets
TVA	Sequoyah 1	WH	Doosan	4 primary heads, 4 conical shells, 6 lower shells, 6 upper shells, 4 elliptical heads
TVA	Watts Bar 1	WH	Doosan	4 primary heads, 4 lower shells, 4 upper shells, 4 elliptical heads
Reactor Vessel Heads				
Entergy	ANO 2	WH	Doosan	1 monoblock
Dominion	North Anna 1	INC	St Marcel	1 RVCH closure head flange
Dominion	North Anna 2	INC	St Marcel	1 RVCH closure head flange
Dominion	Surry1	INC	St Marcel	1 RVCH closure head flange
FENOC	Beaver Valley 1	WH	ENSA	1 monoblock
Pressurizers				
Dominion	Millstone 2	INC	St. Marcel	Upper and lower shells, upper and lower heads (Note 1)
NextEra	St. Lucie 1	INC	St. Marcel	Upper and lower shells, upper and lower heads (Note 1)

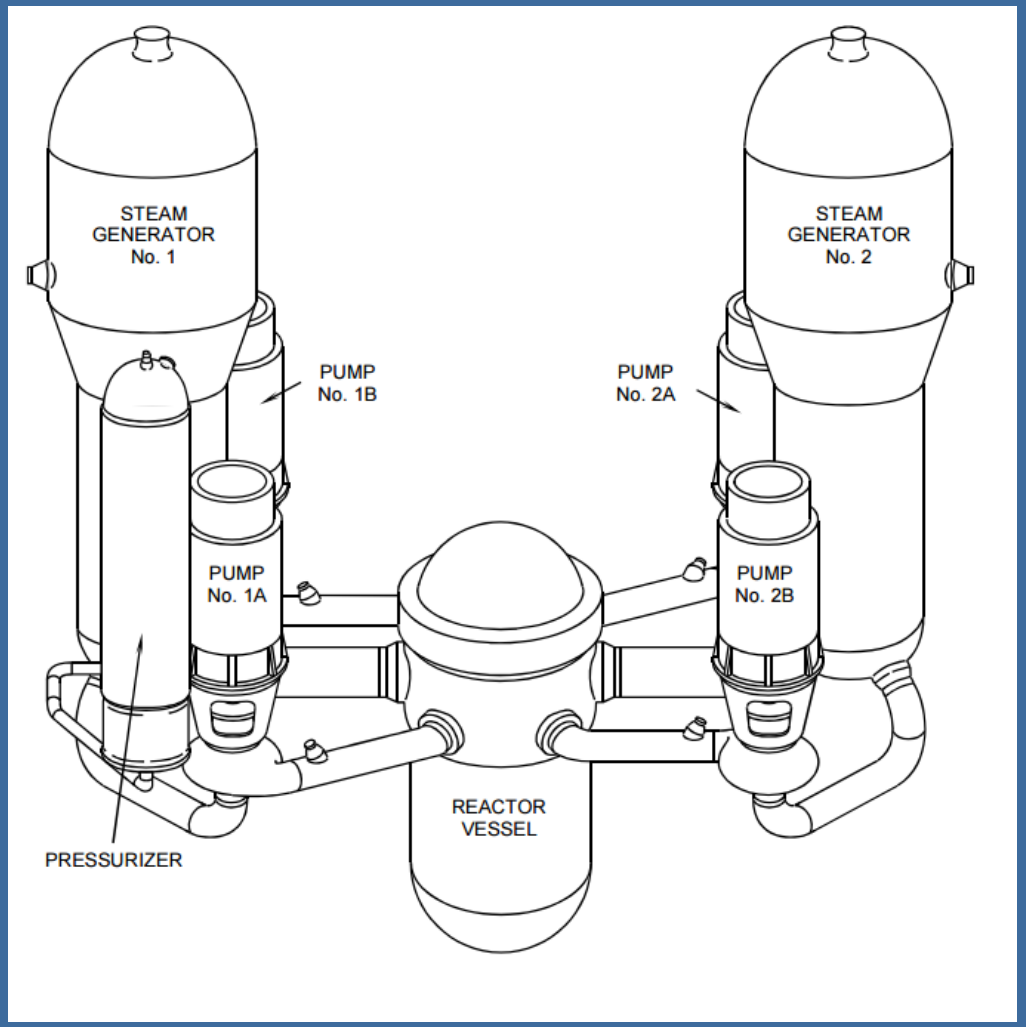
Component of Concern





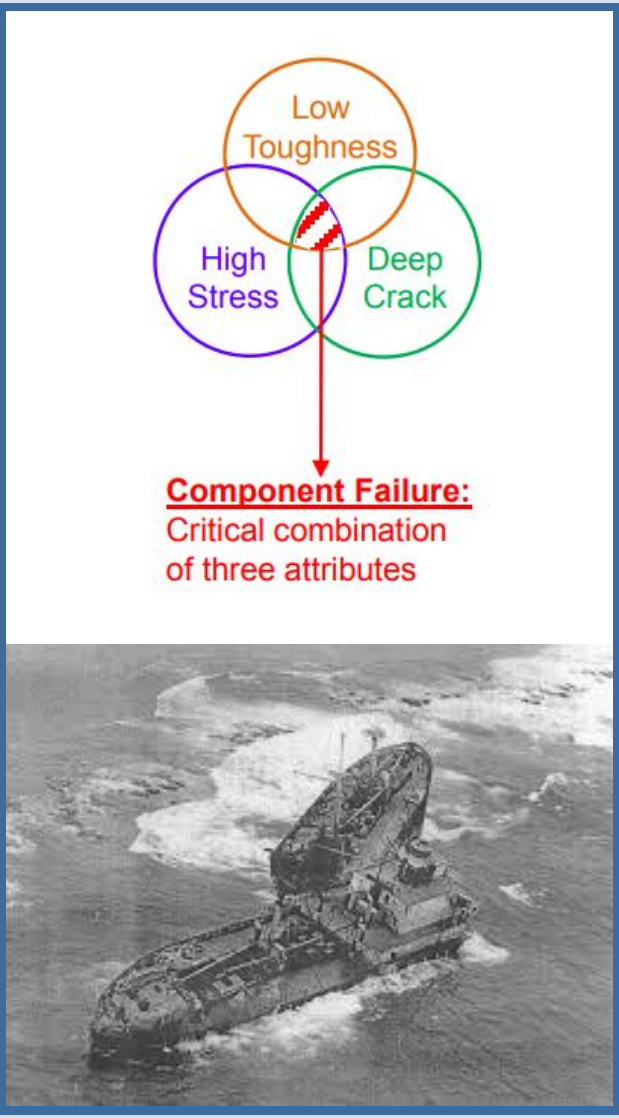
Safety Implications

- Safety Goal - Keep the reactor core covered with water for cooling
- NPP safety analysis assumes large component do *not* brittle fracture

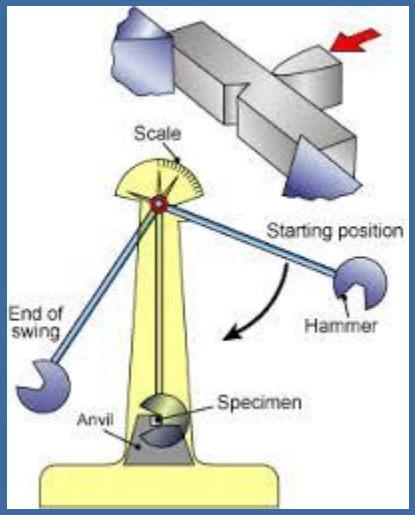


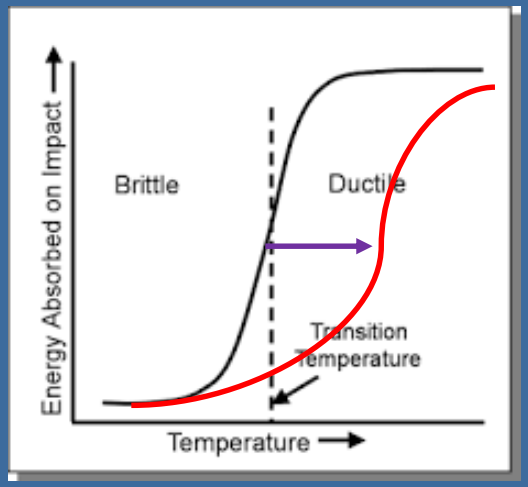
The Specific Concern

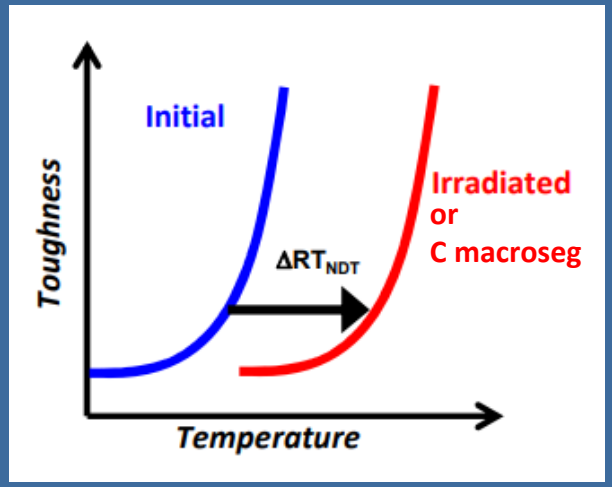
- Brittle Fracture
  - Susceptible material
  - Pre-existing flaw
  - Tensile Stress



Susceptibility to Brittle Fracture







REACTOR COOLANT SYSTEM

OVERPRESSURE PROTECTION SYSTEMS

LIMITING CONDITION FOR OPERATION

3.4.9.3 A Low Temperature Overpressure Protection (LTOP) System, as specified below, shall be OPERABLE.

a. MODE 4, and MODE 5 with all RCS cold leg temperature > 190°F:

1. Maximum of two charging pumps and one HPSI pump may be capable of injecting into the RCS; and
2. Two OPERABLE PORVs with a lift setpoint of ≤ 415 psia.

b. MODE 5 with any RCS cold leg temperature ≤ 190 °F, and MODE 6 either:

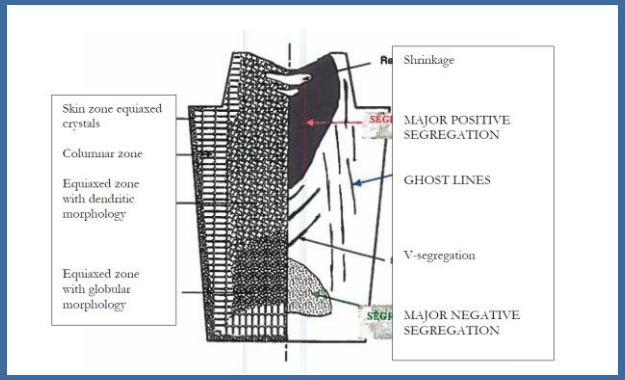
1. Maximum of one charging pump may be capable of injecting into the RCS; and
2. Two OPERABLE PORVs with a lift setpoint of ≤ 415 psia.

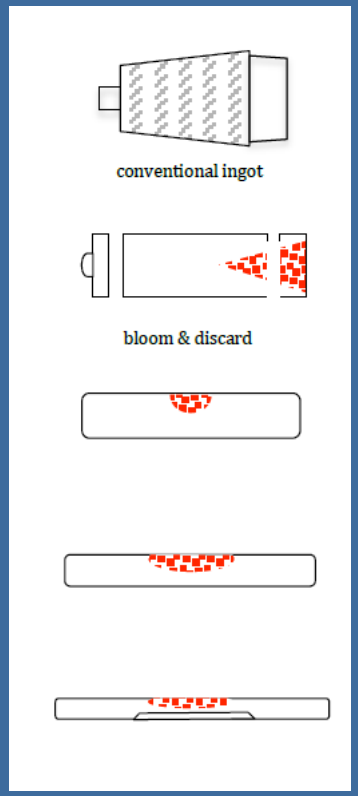
OR

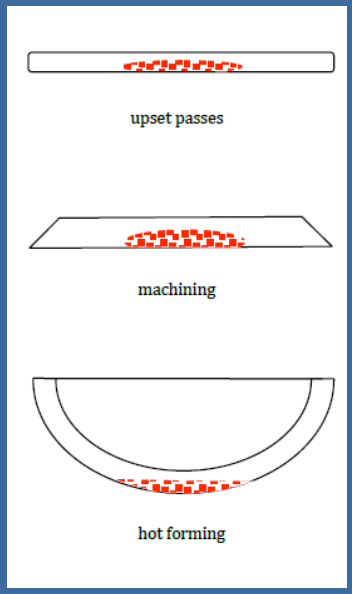
3. Maximum of two charging pumps and one HPSI pump may be capable of injecting into the RCS; and
4. The RCS is depressurized and an RCS vent of ≥ 2.2 sq. inches.

APPLICABILITY: MODE 4 when the temperature of any RCS cold leg is less than or equal to 275°F, MODE 5, and MODE 6 when the head is on the reactor vessel.

Le Creusot Issue: Carbon Macrosegregation







Connecticut Department of Energy and Environmental Protection

NRC Response

- No evidence that US components do not comply with regulatory requirements
- Immediate actions not required
- Monitoring industry analytical evaluation
- Not requiring any additional testing
- Briefed NEAC during 1Q17 meeting
  - potential for carbon macrosegregation is small for the Millstone Unit No. 2 pressurizer
- Beyond Nuclear 2.206 petition response

DEEP Assessment

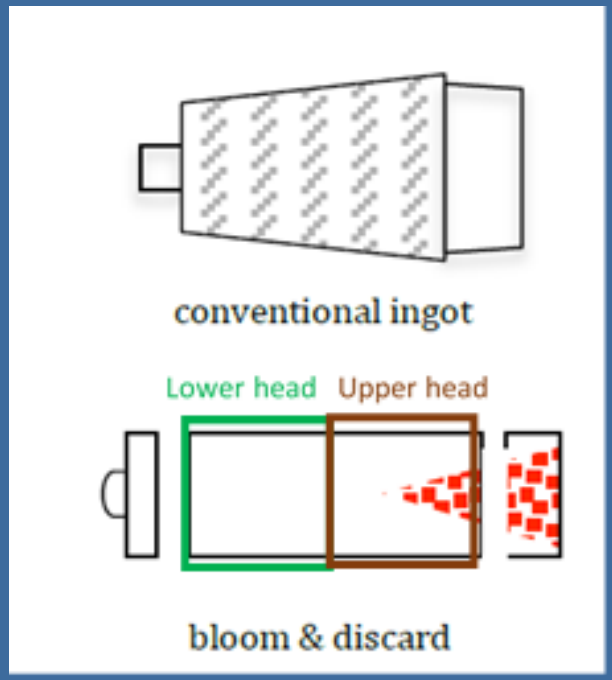
- CGS 22a-135(a)(2) –
  - *DEEP shall…make recommendations to the Nuclear Regulatory Commission concerning third-party inspection of components and construction of nuclear plants for the purpose of improving quality assurance plans and programs*
- Reasonable assurance of safety
  - Thinner forging
  - No neutron embrittlement
  - Low susceptibility to pressurized thermal shock
- Discussed with Dominion technical experts

Dominion Response

- Voluntary NDE coupled with Sensitivity analysis
  - Near term opportunity - April 2017 refueling outage
  - Prudent and reasonable examination
- Additional assurance of safety
  - Regulatory confidence
  - Public confidence
- DEEP recommendations to NRC
  - Support of Dominion testing
  - Review independent of manufacturer
  - NEAC and Agency briefings

Dominion Response

- Test and Analysis
  - NDE (UT) of upper Pressurizer head TDC to 20” radius
  - Carbon sensitivity analysis
- Independent review
- Management safety review
- Industry Modelling and Analysis



DEEP Survey Scope

- Remotely observed conduct of NDE-UT of Pressurizer Head
- Reviewed engineering documents:
  - UT Report
  - “Assessment of Millstone Unit 2 Pressurizer Appendix G Flaw Evaluation” (Dominion Calculation)
  - “Millstone Unit 2 Replacement Pressurizer Appendix G Flaw Evaluations” (Areva Document)
  - “Independent Review of Millstone 2 Pressurizer Appendix G Analysis” (Independent 3rd Party Engineering Firm)
- Interviewed Dominion engineering personnel
  - ASNT certified Level III NDE
  - Materials engineering
  - Engineering management
- Observed Dominion Facility Safety Review Committee

DEEP Survey Conclusions

- Dominion's testing and evaluations for the Millstone 2 pressurizer upper head were
  - Conducted on portions most susceptible to potential Carbon macrosegregation
    - No flaws detected
  - Performed by appropriate technical experts
  - Consistent with standard industry engineering practices and ASME Code Section XI
  - Demonstrated that any potential changes in fracture toughness due to Carbon macro-segregation levels as high as those observed in France would meet ASME code acceptance criteria (including required safety factors)
    - RT_{NDT} – material property that characterizes the transition temperature at which material changes from ductile to brittle behavior and is a means to represent facture toughness
    - RT_{NDT} *margin* available for pressurizer head > 500 F
    - Maximum shift observed in French components < 134 F
  - Independently reviewed by 3rd party engineering experts and station management
- No further recommendations to NRC

Millstone Emergency Event Declaration Aug 15, 2017 - Unusual Event

9/14/2017
Jeff Semancik
NEAC 3Q17 Meeting

Connecticut Department of Energy and Environmental Protection

Unusual Event – Aug 15, 2017

- Least significant of 4 NRC emergency classification levels
  - Potential degradation of safety of plant
- Declared at 0748 based on receiving a remote fire alarm inside the containment building at Millstone 2
  - Not occupied during operations
  - Area which contains the reactor

Unusual Event Response

- Operators including members of the site fire brigade entered containment and visually verified no fire
- Faulty detector
  - Implemented compensatory actions
- Unit remained at 100% power
- No offsite response
- No release of radiation
- Exited emergency event at 1014

Questions?

NUCLEAR ENERGY ADVISORY COUNCIL
December 11, 2017 6:30 PM
Louise Appleby Room
Waterford Town Hall
15 Rope Ferry Road
Waterford, CT 06385

MINUTES

Members Present

Rep Kevin Ryan, Chair	Mr. Bill Sheehan
Mr. James Sherrard	Mr. Tom Nebel
Mr. Robert Klancko	Mr. Ray Woolrich
CDR Royce James, USCG	Mr. Arnold Jordan

Mr. Jeffrey Semancik representing DEEP Commissioner Klee

Members not present

Mr. Edward Munster	Mr. Gregg Dixon

1. **Call to Order of Meeting**
   NEAC Chair Ryan called the meeting to order at 6:30 PM at Waterford Town Hall, Waterford, CT.

2. **Approval of Minutes of the September 17, 2017 NEAC meeting.**
   Rep. Ryan requested the minutes reflect that he was unable to attend the third quarter meeting due to being in legislative session. A motion was made to approve the minutes as so amended by Mr. Klancko and seconded by Mr. Sheehan. Minutes were approved without objection.

3. **Council Business**
   a. Draft Millstone Study
      i. Mr. Semancik reminded the committee members that the state's Public Utilities Regulatory Authority (PURA) was completing its interim report on Millstone economics and that it should be posted this week. He also noted that public meetings for comments on the report were noticed for December 19th at Waterford High School and on December 20th in Hartford DEEP offices. Mr. Sheehan requested that NEAC be notified of the link to the report when available. Mr. Semancik agreed to notify NEAC members when the report was available.
   b. Unusual Event
      i. Mr. Semancik noted that Millstone had declared an Unusual Event (emergency classification) on October 9, 2017 due to a leak of non-radioactive hydrogen from a monitoring panel for the main generator. A Dominion engineer noted a deficiency tag on a gauge in the panel and ensured that the work scope team checked for hydrogen leakage. When tested it was above the lower explosive limit and they declared the emergency. Dominion secured the area, ventilated and repaired the leak. At that point they exited the emergency event.

ii. Mr. Klancko stated that he was interested in the cause of the leak. In particular, he was concerned if the leak was vibration induced.
iii. Mr. Jordan asked how long the deficiency was noted before Dominion tested for hydrogen leakage. Mr. Semancik stated it was less than 24 hours.
iv. Mr. Semancik stated that Dominion will present on declared emergency events during their annual presentation to NEAC.

c. Proposed legislative change to NEAC statute.
i. Mr. Semancik presented proposed changes to the NEAC statute (CGS 16-11a) based upon NEAC's recommendation to incorporate decommissioning oversight into its charter as discussed in the September 17. 2017 meeting. He stated that the proposed changes were drafted after reviewing Decommissioning Oversight panel statutory and regulatory implementation in Vermont and Pilgrim, the most recent examples in New England. Mr. Semancik stated OPM had agreed to proceed with the proposed changes.
ii. CDR James noted that the NEAC statue as proposed included operation and decommissioning of nuclear power plants. He asked the Council if the changes should also include reference to construction in order to be complete. Mr. Sheehan noted that CGS includes a moratorium on construction of nuclear power plants until such time as the federal government fulfills its statutory obligation to accept spent nuclear fuel. Mr. Semancik stated that he felt that any change in language should be included within a broader legislative proposal to address construction and that it would complicate the current proposal.
iii. Mr. Klancko stated that we should consider the potential need for additional administrative support based upon the legislative language. Mr. Sheehan noted that DEEP is responsible for administrative support of the Council. Mr. Semancik noted the suggestion.

4. **Program – Review of annual NEAC Report.** Chairman Ryan discussed the 2017 Annual NEAC report to the General Assembly. Rep Ryan recommended that the report focus on the Council's perspectives and not simply summarize NRC inspections and actions. The Council agreed to a modified version of the report indicating that the NRC information is contained in their correspondence and that more detailed minutes that are included as attachments to the report capture the interactions of the Council and the specific areas of oversight.
a. Rep Ryan reviewed the report recommendations. Based upon discussion, the Council agreed to the following modifications:
i. Delete reference to President Obama's Blue Ribbon Commission 2012 report on spent nuclear fuel (SNF) management.
ii. Remove reference to the CASE report as was recommended in NEAC 2012 report.
iii. Remove reference to NEAC encouraging resolution of SNF problem as redundant to the recommendation to the State by NEAC to advocating for solution to SNF storage.
iv. Added recommendations for implementing statutory changes and forwarding recommendations to the NRC.
b. CDR James stated that the executive summary should be improved upon to provide a more concise summary of Council activities. He agreed to work with Mr. Semancik to write the executive summary.

c. Mr. Semancik noted that the report should acknowledge Dominion's voluntary actions to the test the Unit No. 2 Pressurizer in order to provide additional assurance that the component material properties were not adversely affected by manufacturing issues identified by the French regulator at the Creusot Forge. Mr. Sheehan recommended that the report also acknowledge the actions taken by Dominion in response to Fukushima accident. The Council agreed to acknowledge these aspects of positive safety performance by Dominion.
d. Rep. Ryan noted that he would forward draft report to the Council members with the changes agreed to when complete.

5. NRC Correspondence Received since past meeting.

The list of NRC Correspondence was reviewed. There were no additional questions from NEAC members other than those addressed during the NRC presentation.

a. Millstone Power Station Unit 1 – Safe Storage Inspection Report No. 05000245/2017008 dated September 13, 2017
b. Millstone Power Station – Design Bases Assurance (Environmental Qualification Program) Inspection Report 05000336/2017007 AND 05000423/2017007 dated September 13. 2017.
c. Millstone Power Station – Integrated Inspection Report 05000336/2017003 AND 05000423/2017003 dated October 27, 2017.
d. Millstone Power Station Unit No. 3 - Request For Supplemental Information Regarding Generic Leiter 2016-01, "Monitoring Of Neutron-Absorbing Materials In Spent Fuel Pools" (CAC NO. MF9430; EPID L-2016-LRC-0001) dated October 27, 2017.
e. Confirmatory Order Related to the NRC Office of Investigations Report No. 1-2016-019 dated November 21, 2017.
    i. Mr. Semancik briefed the members on the results of the combined CT DEEP and CT State Police (CSP) on-site review of Dominion Security actions in response to this apparent NRC findings. DEEP and CSP (including a qualified armorer) concluded that the immediate cause of the issues was performance of the armorer. Dominion had taken action including terminating the armorer and disciplinary action with management. A new armorer was assigned and additional armorers have been trained and assigned to each security shift. Mr. Semancik noted that Dominion determined that all in-service weapons were fully functional. CSP independently reviewed armorer procedures and inspected weapons and felt actions were effective.
        1. Mr. Jordan asked if organizational issues contributed and was concerned that termination of the armorer would not effectively address the cultural issues. Mr. Klancko asked why it took so long for Dominion to identify the issues. Mr. Semancik stated that Dominion concluded that cultural and management issues did cause the issues and management failed to take proper actions. These were captured in

the root cause evaluation. The Confirmatory Order actions addressed corrective actions to these issues.

2. Mr. Sheehan asked if there were any consequences for the contracting company providing security services. Mr. Semancik stated that that was information that DEEP did not have access to and would have to be addressed to Dominion.
3. Mr. Semancik recommended that the NRC and Dominion address the Security Confirmatory Order during their 2018 presentations to NEAC and agreed to add to the requested list of topics provided to these presenters.

f. NRC Press Release "NRC Names New Resident Inspector at Millstone Nuclear Power Plant," dated October 2, 2017.
   i. Mr. Klancko asked if there was more information available on the new Senior Resident Inspector's background. Mr. Woolrich suggested that we ask the NRC to have the Senior Resident Inspector introduce himself at their presentation in the first quarter of 2018. Mr. Ryan agreed to make the request.

6. **Other material reviewed** – NEAC reviewed the following information related to nuclear industry and trends.
   a. Dominion Nuclear Connecticut, Inc. Millstone Power Station Unit 3 30-Day Special Report for and RCS Pressure Transient Serial No 17-420 dated November 7, 2017.
      i. Mr. Semancik recommended that Dominion address the overpressure transient during their 2018 presentations to NEAC and agreed to add to the requested list of topics provided to them.

7. Public Comment
   a. One member of the public was in attendance. There were no questions from the public.

8. Other Business
   a. Mr. Sherrard noted that his students had heard rumors of staff reductions, particularly in Engineering, were potentially coming in 2018. No other Council members were aware of any similar information. Mr. Semancik stated he would have his staff monitor while on site.
   b. The Council agreed to the following schedule for Regular Meetings in 2018:
      i. March 8, 2018 – NRC Annual Presentation of Performance
      ii. June 14, 2018 – Tour at Independent System Operator (ISO) – New England to discuss electric grid fuel security and impact of Millstone
      iii. September 13, 2018 – Dominion Annual Presentation
      iv. December 13, 2018 – Annual Report Meeting

9. **Adjournment**

Motion was made by Mr. Sheehan and seconded by Mr. Klancko to adjourn; no objections; unanimous vote in favor; meeting adjourned at 7:58 PM.