



**UNITED STATES
NUCLEAR REGULATORY COMMISSION**

REGION III
2443 WARRENVILLE ROAD, SUITE 210
LISLE, ILLINOIS 60532-4352

November 6, 2020

Mr. Dean Curtland
Director of Site Operations
NextEra Energy Duane Arnold, LLC
3277 DAEC Road
Palo, IA 52324-9785

SUBJECT: DUANE ARNOLD ENERGY CENTER – INTEGRATED INSPECTION REPORT
05000331/2020003 AND 07200032/2020001

Dear Mr. Curtland:

On September 30, 2020, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at Duane Arnold Energy Center. On October 1, 2020, the NRC inspectors discussed the results of this inspection with you and other members of your staff. The results of this inspection are documented in the enclosed report.

No findings or violations of more than minor significance were identified during this inspection.

This letter, its enclosure, and your response (if any) will be made available for public inspection and copying at <http://www.nrc.gov/reading-rm/adams.html> and at the NRC Public Document Room in accordance with Title 10 of the *Code of Federal Regulations* 2.390, "Public Inspections, Exemptions, Requests for Withholding."

Sincerely,

/RA/

Billy C. Dickson, Jr., Chief
Branch 2
Division of Reactor Projects

Docket No. 05000331 and 07200032
License No. DPR-49

Enclosure:
As stated

cc w/ encl: Distribution via LISTSERV®

Letter to Dean Curtland from Billy C. Dickson, Jr., dated November 6, 2020.

SUBJECT: DUANE ARNOLD ENERGY CENTER – INTEGRATED INSPECTION REPORT
05000331/2020003 AND 07200032/2020001

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**U.S. NUCLEAR REGULATORY COMMISSION
Inspection Report**

Docket Number: 05000331 and 07200032

License Number: DPR-49

Report Number: 05000331/2020003 and 07200032/2020001

Enterprise Identifier: I-2020-003-0027 and I-2020-001-0144

Licensee: NextEra Energy Duane Arnold, LLC

Facility: Duane Arnold Energy Center

Location: Palo, IA

Inspection Dates: July 01, 2020 to September 30, 2020

Inspectors: J. Beavers, Senior Resident Inspector
D. Childs, Resident Inspector
J. Corujo-Sandin, Senior Reactor Inspector
J. Dalzell, Health Physicist
R. Edwards, Senior Health Physicist
G. Hansen, Sr. Emergency Preparedness Inspector
C. Norton, Senior Resident Inspector
G. Roach, Senior Operations Engineer
D. Tesar, Resident Inspector

Approved By: Billy C. Dickson, Jr., Chief
Branch 2
Division of Reactor Projects

Enclosure

SUMMARY

The U.S. Nuclear Regulatory Commission (NRC) continued monitoring the licensee's performance by conducting an integrated inspection at Duane Arnold Energy Center, in accordance with the Reactor Oversight Process. The Reactor Oversight Process is the NRC's program for overseeing the safe operation of commercial nuclear power reactors. Refer to <https://www.nrc.gov/reactors/operating/oversight.html> for more information.

List of Findings and Violations

No findings or violations of more than minor significance were identified.

Additional Tracking Items

None.

PLANT STATUS

The Unit began the inspection period at 84 percent of rated thermal power. Power was limited to prevent turbine control valve oscillations. On July 8, 2020, the licensee lowered power to 77 percent to perform a control rod line adjustment. The licensee then slowly raised power, achieving 82 percent on July 10, 2020. On July 15, 2020, the licensee lowered power to 70 percent to perform a control rod line adjustment. The licensee slowly raised power, achieving 84 percent on July 17, 2020. On July 23, 2020, the licensee lowered reactor power to 74 percent in response to a moisture separator drain tank high level. The licensee returned the plant to 84 percent on July 25, 2020. On August 10, 2020, at 12:49 p.m., the plant experienced a weather-related loss of offsite power. The turbine tripped, and the reactor automatically shut down by design. The licensee placed the plant in cold shutdown on August 11, 2020. The plant remained in cold shutdown until the end of the inspection period. For a more detailed description of this weather-related event, see section 71153 of this report.

INSPECTION SCOPES

Inspections were conducted using the appropriate portions of the inspection procedures (IPs) in effect at the beginning of the inspection unless otherwise noted. Currently approved IPs with their attached revision histories are located on the public website at <http://www.nrc.gov/reading-rm/doc-collections/insp-manual/inspection-procedure/index.html>. Samples were declared complete when the IP requirements most appropriate to the inspection activity were met consistent with Inspection Manual Chapter (IMC) 2515, "Light-Water Reactor Inspection Program - Operations Phase." The inspectors reviewed selected procedures and records, observed activities, and interviewed personnel to assess licensee performance and compliance with Commission rules and regulations, license conditions, site procedures, and standards.

Starting on March 20, 2020, in response to the National Emergency declared by the President of the United States on the public health risks of the coronavirus (COVID-19), resident inspectors were directed to begin telework and to remotely access licensee information using available technology. During this time the resident inspectors performed periodic site visits each week and during that time conducted plant status activities as described in IMC 2515, Appendix D; observed risk significant activities, and completed on-site portions of IPs. In addition, resident and regional baseline inspections were evaluated to determine if all or a portion of the objectives and requirements stated in the IP could be performed remotely. If the inspections could be performed remotely, they were conducted per the applicable IP. In some cases, portions of an IP were completed remotely and on-site. The inspections documented below met the objectives and requirements for completion of the IP.

REACTOR SAFETY

71111.01 - Adverse Weather Protection

Seasonal Extreme Weather Sample (IP Section 03.01) (1 Sample)

- (1) The inspectors evaluated planned preparations for seasonal extreme weather conditions prior to the onset of cold weather for the following:

[turbine building, reactor building, intake structure and pump house]

Impending Severe Weather Sample (IP Section 03.02) (1 Sample)

- (1) The inspectors evaluated the adequacy of the overall preparations to protect risk-significant systems from impending severe weather from a storm with potential damaging high winds on August 28, 2020

71111.04 - Equipment Alignment

Partial Walkdown Sample (IP Section 03.01) (2 Samples)

The inspectors evaluated system configurations during partial walkdowns of the following systems/trains:

- (1) 'A' and 'B' standby diesel generators starting air sub systems on July 7, 2020
- (2) Emergency service water on August 15, 2020

Complete Walkdown Sample (IP Section 03.02) (1 Sample)

- (1) The inspectors evaluated system configurations during a complete walkdown of the offsite power supply to the electrical safety buses on August 15, 2020

71111.05 - Fire Protection

Fire Area Walkdown and Inspection Sample (IP Section 03.01) (4 Samples)

The inspectors evaluated the implementation of the fire protection program by conducting a walkdown and performing a review to verify program compliance, equipment functionality, material condition, and operational readiness of the following fire areas:

- (1) Reactor Building 833 zone 5-C on July 21, 2020
- (2) Turbine Building Elevation 780 on July 22, 2020
- (3) Control Building Elevation 786 on July 24, 2020
- (4) Reactor Building Elevation 786 on September 2, 2020

71111.06 - Flood Protection Measures

Inspection Activities - Internal Flooding (IP Section 03.01) (1 Sample)

The inspectors evaluated internal flooding mitigation protections in the:

- (1) Southeast corner room ['A' core spray and 'A' residual heat removal subsystem] on July 28, 2020

71111.07A - Heat Sink Performance

Annual Review (IP Section 03.01) (1 Sample)

The inspectors evaluated readiness and performance of:

- (1) The 'B' emergency service water system on September 21, 2020

71111.11Q - Licensed Operator Regualification Program and Licensed Operator Performance

Licensed Operator Performance in the Actual Plant/Main Control Room (IP Section 03.01) (1 Sample)

- (1) The inspectors observed and evaluated licensed operator performance in the Control Room during a minor reactor water level transient on July 7, 2020

Licensed Operator Regualification Training/Examinations (IP Section 03.02) (1 Sample)

- (1) The inspectors observed and evaluated requalification of a reactor operator on July 24, 2020

71111.12 - Maintenance Effectiveness

Maintenance Effectiveness (IP Section 03.01) (3 Samples)

The inspectors evaluated the effectiveness of maintenance to ensure the following structures, systems, and components (SSCs) remain capable of performing their intended function:

- (1) Availability of the 'C' well water sub-system on July 2, 2020
- (2) Availability of the electric fire pump on July 8, 2020
- (3) Recirculation system inboard sample valve on September 30, 2020

Quality Control (IP Section 03.02) (1 Sample)

The inspectors evaluated the effectiveness of maintenance and quality control activities to ensure the following SSC remains capable of performing its intended function:

- (1) Quality control of the activities associated with the welding of the lid on to the independent spent fuel storage installation dry storage container on July 14, 2020

71111.13 - Maintenance Risk Assessments and Emergent Work Control

Risk Assessment and Management Sample (IP Section 03.01) (1 Sample)

The inspectors evaluated the accuracy and completeness of risk assessments for the following planned and emergent work activities to ensure configuration changes and appropriate work controls were addressed:

- (1) Emergent work and elevated risk associated with replacing the diaphragm on the 'B' moisture separator normal drain valve on July 30, 2020

71111.15 - Operability Determinations and Functionality Assessments

Operability Determination or Functionality Assessment (IP Section 03.01) (2 Samples)

The inspectors evaluated the licensee's justifications and actions associated with the following operability determinations and functionality assessments:

- (1) CR 02364570, Unexpected Alarm on Core Spray Sparger Low Differential Pressure on August 6, 2020
- (2) CR 02365031, 'B' Emergency Service Water Strainer Plugged Requiring to be Bypassed on August 11, 2020

71111.18 - Plant Modifications

Temporary Modifications and/or Permanent Modifications (IP Section 03.01 and/or 03.02) (1 Sample)

The inspectors evaluated the following temporary or permanent modifications:

- (1) Throttling the 'A' drywell cooling supply valve to reduce drywell leakage on July 9, 2020

71111.19 - Post-Maintenance Testing

Post-Maintenance Test Sample (IP Section 03.01) (2 Samples)

The inspectors evaluated the following post maintenance test activities to verify system operability and functionality:

- (1) Proper operation and no air leakage following maintenance on the 'B' instrument air dryer, on July 29, 2020
- (2) Proper operation of emergency service water system following troubleshooting of the 'B' emergency service water heat exchanger on August 18, 2020

71111.22 - Surveillance Testing

The inspectors evaluated the following surveillance tests:

Surveillance Tests (other) (IP Section 03.01) (2 Samples)

- (1) 'B' River Water Supply and Screen Wash System Vibration Measurement and Operability Test on July 15, 2020
- (2) 'B' Reactor Water Level and Pressure Instrument Calibration on July 21, 2020

FLEX Testing (IP Section 03.02) (1 Sample)

- (1) 'A' 480 VAC FLEX Diesel functional test on July 1, 2020

71114.06 - Drill Evaluation

Drill/Training Evolution Observation (IP Section 03.02) (1 Sample)

The inspectors evaluated:

- (1) Unusual Event declaration on August 10, 2020

OTHER ACTIVITIES – BASELINE

71152 - Problem Identification and Resolution

Annual Follow-up of Selected Issues (IP Section 02.03) (2 Samples)

The inspectors reviewed the licensee's implementation of its corrective action program related to the following issues:

- (1) Corrective actions associated with bypassing emergency service water strainers
- (2) Effectiveness of licensee's corrective actions for loss of offsite power event

71153 - Follow-up of Events and Notices of Enforcement Discretion

Event Follow-up (IP Section 03.01) (1 Sample)

- (1) The inspectors evaluated the weather-related loss of offsite power (LOOP) event and Notice of Unusual Event (NOUE) declaration on August 10, 2020, as well as the licensee's immediate follow-up response.

On August 10, 2020, a widespread, long-lived, straight-line windstorm associated with a band of rapidly moving thunderstorms (derecho) moved through Iowa and other parts of the Midwest. The National Weather Service later estimated 80 to 100 miles per hour (mph) wind speeds for more than 30 minutes with gusts of up to 130 mph. During the derecho, Duane Arnold Energy Center (DAEC) experienced a LOOP. The licensee declared a NOUE (an emergency classification defined by the NRC as one which indicates that a potential degradation in the level of safety of the plant is in progress or has occurred). After approximately 24 hours, with the restoration of one of six offsite power lines, the site exited the LOOP and NOUE. The inspectors evaluated the event to verify that it resulted in no radiological consequences.

During this event follow-up inspection, the inspectors assessed the immediate actions and short-term considerations regarding potential challenges to plant stability, verified the safety barriers' integrity, and evaluated potential radiological impacts. In addition to the above considerations, the inspectors assessed the events' sequence, including equipment performance, procedure adherence, and personnel performance, for potential challenges to plant stability. The loss of offsite power event was the dominant nuclear safety risk-contributor at the DAEC. Inspectors independently reviewed event response records, site Emergency Plan, site emergency preparedness implementing procedures, and interviewed site emergency preparedness staff to evaluate the site's compliance with regulatory requirements and implementation of the site's emergency plan to protect the health and safety of the public during NOUE. Additionally, the NRC inspectors reviewed the licensee's post-event evaluation report in which the licensee identified areas for improvement and entered those items into the site's corrective action program. Based on the independent review, the site demonstrated, with reasonable assurance, the ability to effectively implement the site's emergency plan to protect the public's health and safety during the NOUE that they declared on August 10, 2020.

The overall integrated inspection effort for this event included the conduct of multiple baseline inspection samples documented throughout this report under the following

inspection procedure: 71111.01, 71111.04, 71111.07, 71111.15, 71152, and 71153. See the Inspection Results section of this report for any inspection-related observations and assessments made during this inspection.

Event Report (IP Section 03.02) (1 Sample)

- (1) LER 05000-331/2020-0001, Notice of Unusual Event and Unit Trip Due to Loss of Offsite Power Due to High Winds, submitted on September 14, 2020. The inspectors determined that it was not reasonable to foresee or correct the weather-related cause discussed in the LER, therefore, no performance deficiency associated with the event was identified and the inspectors did not identify a violation of NRC requirements. On September 30, 2020 the licensee submitted LER 05000-331/2020-0001-01 which revised the LER to report that a small cut in secondary containment caused by the high winds had rendered secondary containment inoperable while in a mode of applicability, that is, from the time of the reactor scram until the unit was placed into cold shutdown. All required actions for the inoperable secondary containment were met within their required completion times. While preparing the LER revision, the licensee corrected verbal information provided to the NRC in the first 24 hours following the event, that secondary containment was not made inoperable by the wind event. As the secondary containment function was maintained, the inaccurate information concerning operability would not have changed the NRC's response to the event.

Personnel Performance (IP Section 03.03) (1 Sample)

- (1) The inspectors evaluated the licensee's performance during and following the 'A' moisture separator drain tank high level occurrence on July 23, 2020.

OTHER ACTIVITIES – TEMPORARY INSTRUCTIONS, INFREQUENT AND ABNORMAL

60855.1 - Operation of an Independent Spent Fuel Storage Installation at Operating Plants

Operation of an Independent Spent Fuel Storage Installation at Operating Plants (1 Sample)

- (1) The inspectors evaluated the licensee's independent spent fuel storage installation cask loading from August 31 - September 3, 2020. Specifically, the inspectors observed the following activities:
 - Fuel selection and fuel loading
 - Heavy load movements of a loaded transfer cask out of the spent fuel pool, and movement of the transfer cask from the processing area to the transfer trailer
 - Drying and backfill evolutions
 - Closure welding and non-destructive weld evaluations including helium leak testing
 - Transfer and transport evolutions
 - Radiological field surveys

The inspectors evaluated the following change reviews:

- Program changes associated with loading to Certificate of Compliance 1004, Amendment 15

INSPECTION RESULTS

Assessment	71152
<u>Assessment of Licensee Corrective Actions for Loss of Offsite Power Event:</u>	
<p>The inspectors evaluated the licensee's overall corrective actions and response to the loss of off-site power (LOOP) and Notification of Unusual Event (NOUE) emergency classification on August 10, 2020 (described in more detail in section 71153 of this report). In particular, this section describes the inspectors' observations and assessment related to the performance attributes discussed in Section 03.06 of NRC inspection procedure 71152.</p>	
<p>Plant initial conditions on August 10, 2020, before the event, included the following: DAEC was operating at 80 percent of rated thermal power due to degraded drywell cooling capacity. Major equipment out of service prior included the 'B' train of the low-pressure coolant injection (LPCI) system, which was inoperable for surveillance testing but available for injection, and the diesel fire pump, which was unavailable due to planned maintenance. A leaking fuel element in the southeast core quadrant was also actively under power suppression at the time. Finally, spent fuel handling was in progress for a dry cask storage campaign with a loss of cooling time to boil in the spent fuel pool at 64 hours. The station probabilistic risk assessment (PRA) status was green for both core damage frequency and large early release frequency.</p>	
<u>Event Narrative:</u>	
<p>At 11:38 a.m. (all times in Central Daylight Time), the National Weather Service declared a severe thunderstorm watch. The licensee entered the abnormal operating procedure for severed weather.</p>	
<p>At 12:02 p.m., the severe thunderstorm watch was upgraded to a warning. The severe weather risk option was selected in the plant risk model. Plant risk incurred a fractional change, but overall risk remained green. The senior responsible manager directed fuel handling operations to be placed in a safe condition and secured.</p>	
<p>At 12:35 p.m., as the storm approached, an electrical grid perturbation occurred, which initiated the logic for the auto start feature of the two emergency diesel generators (EDG); however, the logic was not met to close the diesel output breakers to their respective safety buses and the diesels remained running but unloaded.</p>	
<p>At 12:49 p.m., the site lost offsite power from the electrical grid. The LOOP initiated an automatic main turbine trip due to load reject and an automatic reactor scram. Since the EDGs were already running, immediately following the LOOP, the diesel output breakers closed to maintain power to the plant's two electrical safety buses. The flywheels on the 120-volt alternating current reactor protection system (RPS) motor-generators held RPS voltage and frequency during the power transfer. The unit did not lose the RPS system. Since RPS is the power supply to the main steam isolation valve (MSIV) solenoids, the MSIVs remained open following the LOOP. At 12:58 p.m., the licensee declared an NOUE due to all offsite AC power lost to both safety buses for greater than 15 minutes (SU1.1).</p>	
<p>Emergency Operating Procedure (EOP)-1, RPV [reactor pressure vessel] Control, was entered on low water level and high pressure. The reactor water level initially lowered rapidly to level 2 (lo-lo) due to the loss of feedwater. Reactor core isolation cooling (RCIC) and high-</p>	

pressure coolant injection (HPCI) systems automatically initiated and restored the reactor water level until it reached Level 8 (hi trip). Both systems automatically tripped, per design. The operators placed both systems in manual control, and they maintained the reactor water level with RCIC injecting. Operators bypassed both RCIC and HPCI Level 8 trips to keep the reactor water level above Level 8 and below the main steam lines to promote natural core circulation.

Reactor pressure initially rose rapidly due to the turbine trip. Two safety relief valves lifted for approximately 10 seconds each and lowered pressure. Coincidentally, the initial reactor coolant injection from Level 2 to Level 8 added a significant mass of colder water and provided a short-term reduction in reactor pressure. After reactor pressure stabilized between 800 and 1155 psi, the operators maintained reactor pressure primarily with main steam line drains and the use of RCIC as a steam load. The operators slowly lowered the pressure band over the day until they placed shutdown cooling in service on August 10, 2020. At 10:30 p.m., HPCI was used in pressure control mode to reduce pressure below the final shutdown cooling pressure interlock reset. On August 11, 2020, at 2:30 a.m., the operators established cold shutdown. A reactor coolant temperature band of 150 to 212 degrees was set.

During the 14-hour cooldown, the heat-up/cooldown rates exceeded the 100 degrees per hour limit (delineated in Technical Specification 3.4.9 and EOP-1) on three separate occasions. At 3:05 p.m. on August 10, 2020, the reactor pressure vessel experienced a 140 degree per hour cooldown rate on the bottom head drain due to stratification. At that time, the recirculation pumps were unavailable. At 4:00 p.m. on August 10, 2020, the reactor pressure vessel experienced a 112 degrees per hour cooldown rate due to added cooling from the control rod drive mini purge to the recirculation pump seals. At 9:15 p.m. on August 10, 2020, the reactor pressure vessel experienced a 162 degree per hour heat-up rate on the bottom head drain due to mixing caused by starting HPCI in the pressure control mode to facilitate starting shutdown cooling. Despite the cooldown rate exceeding technical specifications limits, the inspectors concluded that no violation occurred since the required actions for exceeding the limits were for the licensee to determine that the RCS was acceptable for operation before starting up.

On August 10, 2020, at 12:53 p.m., the licensee entered EOP 3, Secondary Containment Control, on a high steam tunnel temperature of 160 degrees. The licensee exited EOP-3 upon confirmation that high temperatures were due to loss of ventilation and not a steam leak. At 3:00 p.m., with a 60-hour spent fuel pool time to boil, the licensee re-entered EOP 3 on low spent fuel pool level because the 'B' fuel pool cooling pump tripped. Although the 'B' pump tripped and failed to restart due to a blown fuse caused by the grid disturbance and LOOP, operators started the standby 'A' fuel pool cooling pump without issue and exited EOP-3 after the level returned to normal.

On August 10, 2020, at 7:45 p.m., EOP 2, Primary Containment Control, was entered on torus water level greater than 10.4 feet due to safety relief valve and RCIC system operation. At 9:54 p.m., the licensee re-entered EOP 2 on torus water temperature greater than 95 degrees F. These EOP entries were not unexpected. The licensee took appropriate actions.

On August 10, 2020, at 10:40 p.m., the 'B' emergency service water pump discharge strainer developed a high differential pressure, and the operators placed the strainer in bypass. Emergency service water cools the diesel generators and other safety-related equipment—

the inspectors' observations concerning this occurrence are in the following 71152 Observation section of this report.

In coordination with the grid operator, the licensee took steps to clear debris and lineup breakers in the switchyard to facilitate the return of the 161kv Vinton line. The licensee repaired damaged transformers to ensure they were ready to receive offsite power when it became available. On August 11, 2020, at 11:26 a.m., the grid operator restored the Vinton line to the switchyard, and the licensee lined up offsite power to essential and non-essential electrical busses. The licensee terminated the NOUE at 4:00 p.m. on August 11, 2020. The grid operator restored all six offsite power lines by August 17, 2020.

On August 12, 2020, the licensee identified a 0.75 square inch gap in the Northwest corner of the 5th-floor reactor building secondary containment. At 11:12 p.m., the licensee performed the secondary containment integrity test and demonstrated that it could perform its safety function of preventing a ground-level release. This test bounded both identified and unidentified secondary containment gaps that may have resulted from the storm.

The licensee noted additional building damage. Specifically, the storm damaged the roof of the North FLEX building. The licensee declared the North FLEX building and the FLEX equipment inside inoperable. The FLEX function was maintained by the South FLEX building and the equipment inside. Additionally, there was damage to non-credited structures, including the collapse of the non-safety-related cooling towers and the loss of large turbine building siding sections.

Assessment:

Although this event did cause multiple failures to offsite power availability (all six offsite power sources were lost to the site) with damage to area power lines and the on-site switchyard, the inspectors determined that offsite power is not assumed to be available in any design basis analyses and is not safety-related. The EDGs, the system designed to mitigate this actual event's consequences, functioned satisfactorily, thereby maintaining this safety function until the licensee restored offsite power approximately 24 hours later. Concerning damaged cooling towers, they are not safety-related, nor a part of the safety-related ultimate heat sink. The cooling towers were not required to mitigate the consequences of an accident, nor were they needed for the reactor to shut down, cool down, or remain shut down. For the loss of the 'B' fuel pool cooling pump, the time to boil on the spent fuel pool was 60 hours, and operators restored the system to service within 8 hours. The licensee restored redundancy to the system when they identified and replaced a blown fuse in the 'B' pump control power circuit.

In summary, the inspectors evaluated the licensee's immediate and follow-up corrective actions to this event. The inspectors' evaluation considered equipment, processes, personnel performance issues, and the risk-significant post-initiator human error probabilities in the probabilistic risk assessment and bases. The assessment did not identify any loss of the plant's three fission product barriers (the fuel cladding, the reactor coolant system, and the containment system) or the key safety functions supporting them. Inspectors verified that no radiological impact resulted from this event. The inspectors determined that all equipment responded as expected with the exceptions noted above, and operators followed appropriate response procedures. The inspectors determined that the licensee's corrective actions to address this complex event were appropriate to the circumstances and commensurate with the potential safety significance.

Observation: Corrective Actions Associated with Bypassing Emergency Service Water Strainers	71152
<p>On August 10, 2020 at 12:49 p.m., Duane Arnold experienced a derecho and a Loss of Off-site Power (LOOP). During the LOOP event, both emergency diesel generators (EDGs) started automatically to provide power to essential loads. The emergency service water (ESW) pumps auto started to provide cooling to the EDG's and other essential loads.</p> <p>At 10:40 p.m., the licensee bypassed the 'B' ESW strainer due to high strainer differential pressure and declared 'B' ESW and 'B' EDG inoperable but available. The strainer remained bypassed until the plant was no longer in a mode of applicability for ESW (Mode 4, cold shutdown). After the operators bypassed the strainer, the licensee increased the monitoring of the 'B' EDG. The licensee identified no adverse effects on the 'B' EDG during this monitoring activity. The inspectors observed that the licensee took no action to minimize the time they bypassed the ESW strainer. The inspectors, concerned over potential fouling of safety-related equipment with the ESW strainer bypassed, reviewed previous licensee corrective actions associated with bypassing the ESW strainers.</p> <p>The inspectors reviewed action request (AR) 295476, initiated on September 21, 2002, to re-evaluate acceptability of operating ESW with the strainer bypassed. The inspectors referenced an evaluation for operating the residual heat removal service water system (RHRSW) with its strainer bypassed for consideration. The Duane Arnold AR Review Committee recommended that ESW operation not be allowed with the strainer bypassed without performing a further evaluation, discussed below.</p> <ul style="list-style-type: none"> <li>• The inspectors reviewed OTH025491; an engineering evaluation completed March 20, 2003, which identified several design basis requirements for the ESW System to supply debris-free water to prevent equipment or system fouling or plugging. In this evaluation, the licensee determined that because of the differences in heat exchanger tube diameters between the RHRSW system and the ESW system, the analysis that permits operating RHRSW with the strainer bypassed cannot be applied to all equipment cooled by ESW without additional actions. <li>• The inspectors reviewed OTH027041, completed May 07, 2003, to determine appropriate compensatory measures after bypassing the ESW strainer. The evaluation concluded that the operators should consider some of the components cooled by ESW inoperable when they bypass the ESW strainer. <li>• Evaluation OTH029100, completed on December 10, 2003, re-evaluated the acceptability of operating ESW with the strainer bypass valve open. This engineering evaluation concluded that declaring the ESW subsystem inoperable when running with the strainer bypass valve open was an adequate compensatory measure because ESW subsystem inoperability cascades to supported subsystems. <p>Based on these three engineering evaluations' conclusions, the licensee showed that they could not justify the operability of an ESW subsystem with its strainer bypassed. Hence, on August 10, 2020, per station procedures and the current design basis, the licensee declared the 'B' ESW subsystem and the 'B' EDG inoperable when operators bypassed the strainer due to high strainer differential pressure. Although inoperable, the licensee left the 'B' ESW subsystem in operation as the subsystem and supported subsystems still functioned. Had 'B' ESW or any of the supported subsystems failed to perform, the operable 'A' ESW subsystem</p>	

was in operation to maintain ESW and supported system functions. Therefore, the inspectors observed that licensee actions were in accordance with the current design and licensing basis of the plant.

EXIT MEETINGS AND DEBRIEFS

The inspectors verified no proprietary information was retained or documented in this report.

- On October 1, 2020, the inspectors presented the integrated inspection results to Mr. D. Curtland, Director of Site Operations, and other members of the licensee staff.
- On September 4, 2020, the inspectors presented the Independent Spent Fuel Storage Installation cask loading inspection results to Mr. D. Curtland, Director of Site Operations, and other members of the licensee staff.

DOCUMENTS REVIEWED

Inspection Procedure	Type	Designation	Description or Title	Revision or Date	
60855.1	ALARA Plans		2020 Dry Fuel Storage Campaign #3 ALARA Plan	0	
	Calculations	CAL-F19-002	Fuel Selection for DAEC ISFSI Campaign III	0	
	Corrective Action Documents		Selected Corrective Action Documents Created Since 2017		
	Engineering Changes	72.48 Screen EC 292428		EAL Radiation Monitoring Setpoint Change	0
		72.48 Screen EC290544		DAEC ISFSI Loading Campaign III	1
		72.48 Screen PCR2228558		Revision to ACP 1412.2 for Removal of Combustibles in ISFSI Area	1
		EC 289927		Update DBD-F16-001 to Reflect Revision 1 of CoC 1004 Amendments 8 and 9 and Associated Tech Specs	0
		EC 289927		Adopt Revision 1 of CoC 1004 Amendments 8 and 9	0
		EC 290544		DAEC ISFSI Loading Campaign III	5
		EC 292428		EAL Radiation Monitoring Setpoint Change	0
		EC-290544		DAEC Haul Path Engineering Evaluation and Haul Path Repair Recommendations	5
	Miscellaneous			Response for FME Question	09/01/2020
				Selected 10 CFR 72.48 Screenings and Evaluations	
				Duane Arnold Energy Center Design Basis Document for the Dry Spent Fuel Storage Program	19
				DAEC ISFSI Campaign III Fuel Selection - October 16(1)	
				2019 Annual Radiological Environmental Monitoring Report	
		DBD-F16-001		Duane Arnold Energy Center Design Basis Document for the Dry Spent Fuel Storage Program	19
		E-56554		2020 DAEC P2P - Training Matrix	07/14/2020
		E-56559		Haul Path Repair Recommendations	05/15/2020
		E-56576		2020 DAEC P2P - Welders Documentation	05/27/2020
E-56592			2020 DAEC P2P - OS197-1 Yoke Equipment Use Certificate	04/15/2020	
E-56621		2020 DAEC P2P - NDE Certifications	04/21/2020		
E-56994		DAEC Haul Path Evaluation (New Trailer Weight)	06/17/2020		

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		MTF Plan No. 20-016	ISFSI Campaign III Dry Storage Canister #6	06/09/2020
		NUH-06-106.62 R1 OS197-1	Yoke Maintenance Package	02/20/2020
	NDE Reports	Report No. 6007-19-167A1-0478	Non-Destructive Examination Reports for Canister No. 22	09/01/2020
		Report No. BOP-MT-19-009	Magnetic Particle Examination Reactor Building Crane Hook	01/20/2020
	Procedures	Crane-H046-02	Harnischfeger Reactor Building Crane & Ederer Trolley Inspections	55
		DFS 201A	Dry Shielded Canister / Transfer Cask Preparation for Fuel Loading Operations	5
		DFS 203A	Dry Shielded Canister Sealing Operations	3
		DFS 301A	Loaded Dry Shielded Canister / Transfer Cask from Refueling Floor to ISFSI Operations	4
		DFS 302A	Dry Shielded Canister from Transfer Cask to Horizontal Storage Module Transfer Operations	4
		HPP 3104.13	Dry Cask Storage Job Coverage and Decontamination	20
	Radiation Surveys	PDA-M-20200826-10	DFS3 Post DSC29 Insertion Inside of Transfer Cask	08/26/2020
	Self-Assessments		Level 1 Assessment for LICA 02338906-01 2020 NRC ISFSI Pre-Inspection Self-Assessment	05/26/2020
		PDA 19-003	Duane Arnold Nuclear Assurance Report	05/29/2019
	Work Orders	PM Task 02	Reactor Building Crane Inspection	04/24/2020
71111.01	Procedures	AOP 903	Severe Weather	61
		NG 270K	Plant Winterization Checklist	23
71111.04	Drawings	BECH-M 132 <1>	P. & I.D. Diesel Generator System	21
		BECH-M 132 <2>	P. & I.D. 1G031 Standby Diesel Generator	16
71111.05	Drawings	PFP-RB-786	Reactor Building Elevation 786	8
	Fire Plans	PFP-CB-786	Pre-Fire Plan Control Building El. 786	3
		PFP-TB-780	Turbine Building Elevation 780	7
	Procedures	PFP-RB-833	Pre-Fire Plan Reactor Building El. 833	4
71111.07A	Work Orders	WO 40736544	Flow Test 'B' ESW Cooled Components	08/18/2020

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71111.11Q	Miscellaneous	ESG 2020B-01E	Evaluated Scenario	0
	Procedures	AOP 644	Feedwater / Condensate Malfunction	23
71111.12	Corrective Action Documents	CR 02360701	Good Catch/Use of Fundamentals in Mechanical Maintenance	06/23/2020
		CR 02362459	CV4639 Closed Unexpectedly	07/11/2020
	Engineering Evaluations	EVT-64.01-2020	CV4639 Closed with No Apparent Cause	07/28/2020
	Miscellaneous	Shift Log	08-Jul-2020 0824	0
		Shift Log	08-Jul-2020 0832	0
	Procedures	DFS 203A	Dry Shielded Canister Sealing Operations	1
		HTPT-DSC-ORANO	Duane Arnold	6007-00
		SPM 9.2-1	Services Program Manual, NUHOMS 61BTH Type 1 and 2 DSC Closure Weld Traveler	15
	Work Orders	WO 40684334	1P048 Analyze Upper and Lower Bearing Oil Samples	07/08/2020
		WO 409599461	Well Water Pump 1P58C Discharge Check Valve	06/30/2020
71111.13	Procedures	Valvop M120-01	Masoneilan Camflex II Valve and Operator Repair	2
	Work Orders	WO 40734241	CV 1065B-O, Replace Diaphragm	07/24/2020
71111.15	Corrective Action Documents	CR 02364570	Unexpected Alarm on Core Spray Sparger Low Differential Pressure	08/05/2020
		CR 02365031	'B' Emergency Service Water Strainer Plugged Requiring to be Bypassed	08/11/2020
	Procedures	Annunciator 1C03A C-8	'A' Core Spray Sparger LO D/P	65
71111.18	Procedures	MA-AA-100-1011-F01	Equipment Troubleshooting	7
		OP-001	Operator Challenge and Clearance Audit	71
		OP-AA-100-1000	Clearance and Tagging	28
		OP-AA-100-1000	Conduct of Operations	31
	OP-AA-100-102	Plant Status Control	23	
Work Orders	WO 40720786	High Drywell Leakage	05/11/2020	
71111.19	Procedures	OI 518.1 Instrument	Service and Breathing Air System	107

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		STP NS540002B	'B' Emergency Service Water Operability Test	42
71111.22	Miscellaneous	ML19092A212	Clinton Power Station – Final Significance Determination of White Finding with Assessment Follow-Up and Notice of Violation; NRC Inspection Report No. 05000461, /2018092	04/01/2019
	Procedures	NS100102B	B River Water Supply and Screen Wash System Vibration Measurement and Operability Test	30
		STP 3.3.3.2-09B	Reactor Water Level and Pressure Instrument (Loop B) Calibration	10
		STP NS240502A	FLEX 480VAC Diesel Generator 1G101A Functional Test	7
71152	Corrective Action Documents	AR 295476	019545 Re-Evaluate Acceptability of Operating ESW With Its Strainer Function Bypassed	09/21/2002
	Engineering Evaluations	OTH 025491	Re-Evaluate Acceptability of Operating ESW With Its Strainer Function Bypassed	03/20/2003
		OTH 027041	Re-Evaluate Acceptability of Operating ESW With Its Strainer Function Bypassed	0
		OTH 029100	Re-Evaluate Acceptability of Operating ESW With Its Strainer Function Bypassed	12/12/2003
Procedures	OI-454	Emergency Service Water System	70	
71153	Corrective Action Documents	CR 02365031	1S089B ESW Strainer Plugged Requiring to be Bypassed	08/11/2020
		CR 02365115	Note-05 for Unusual Event was 1 Minute Late	08/11/2020
		CR 02365642	Inaccuracies in Notification Form	08/17/2020
	Drawings	Bech M103<2>	P. & I.D. Main Steam Moisture Separators and Reheaters	18
	Miscellaneous	BECH-MRS-M305-S	Technical Specification for Self-Cleaning Strainers (ASME VIII) Safety Related for the Duane Arnold Energy Center ff the Iowa Electric Light and Power Company Cedar Rapids, Iowa	5
		DBD-E13-001	Emergency Service Water Design Bases Document	11
		SD-454	System Description Emergency Service Water	12
		SD-880	Reactor Vessel Instrumentation System	17
		SD-880	Reactor Level Instrumentation System	17
		Shift Log	22-Jul-2020 2155	0
		UFSAR/DAEC-1 9.2	Water Supply Systems	24
	Procedures	1C07B A-5	MSR Drain Tank 1T-93A Hi level	97

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		IPOI 4	Shutdown (Fast Power Reduction)	141