Duane Arnold Energy Center

After Action Report / Improvement Plan

Exercise Date – May 15, 2018

Radiological Emergency Preparedness (REP) Program

FEMA

FINAL- August 15, 2018

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Duane Arnold Energy Center

After Action Report/Improvement Plan

FINAL - August 15, 2018

Contents

Executive Summary 3
Section 1: Exercise Overview 5
1.1 Exercise Details 5
1.2 Exercise Planning Team Leadership 5
1.3 Participating Organizations 7
Section 2: Exercise Design Summary 9
2.1 Exercise Purpose and Design 9
2.2 Exercise Objectives, Capabilities and Activities 10
2.3 Scenario Summary 11
Section 3: Analysis of Capabilities 16
3.1 Exercise Evaluation and Results 16
3.2 Summary Results of Exercise Evaluation 18
3.3 Criteria Evaluation Summaries 20
3.3.1 Iowa Jurisdictions 20
3.3.1.1 Iowa State Emergency Operations Center 20
3.3.1.2 Iowa Dose Assessment 20
3.3.1.3 Iowa Field Team Coordination 21
3.3.1.4 Iowa Radiological Monitoring Team # 1 (Blue) - EPZ 21
3.3.1.5 Iowa Radiological Monitoring Team # 2 (Green) - EPZ 22
3.3.1.6 Duane Arnold Joint Information Center 22
3.3.1.7 Iowa Forward Command Post 23
3.3.1.8 211 Call Center – Public Inquiry 23
3.3.1.9 National Weather Service – Davenport, Iowa 24

3.3.2 Risk Jurisdictions 24
3.3.2.1 Linn County Emergency Operations Center 24
3.3.2.2 WMT EAS Station 24
3.3.2.3 Benton County Emergency Operations Center 25
3.3.3 Support Jurisdictions 25
3.3.3.1 Cedar Rapids School District 25
3.3.3.2 Alburnett School District 26
3.3.3.3 Vinton-Shellsburg School District 26
3.3.3.4 Marshall County Reception and Decontamination Center 27
3.3.3.5 Mercy Medical Center 27
3.3.3.6 Hiawatha Fire and Rescue 28
Section 4: Conclusion 29
Appendix A: Exercise Timeline 30
Appendix B: Exercise Evaluators and Team Leaders 33
Appendix C: Acronyms and Abbreviations 34

EXECUTIVE SUMMARY

On May 15, 2018, the Department of Homeland Security (DHS)/Federal Emergency Management Agency (FEMA) Region VII conducted a biennial Plume exercise for the Duane Arnold Energy Center (DAEC).

In addition to the May 15th Plume Exercise, several out-of-sequence (OOS) evaluations were conducted on April 3rd, April 5th, May 3rd, and a Medical Services (MS-1) Drill was conducted on June 27, 2018. The purpose of the exercise, the OOS evaluations and the MS-1 Drill, was to assess the level of State and local preparedness in responding to a radiological emergency. The exercise and drills were held in accordance with FEMA's policies and guidance concerning the exercise of State and local radiological emergency response plans and procedures.

The previous biennial DAEC exercise was conducted on May 17-18, 2016. The qualifying emergency preparedness exercise was conducted on October 31 - November 1, 1990.

FEMA wishes to acknowledge the efforts of all who participated in and supported the exercise and drills. The State of Iowa, Benton County and Linn County participated along with the various State and local organizations. NextEra Energy staff should also be commended for their contribution to the training, scenario development and exercise preparation.

Protecting the public health and safety is the full-time job of some exercise participants and an additionally assigned responsibility for others. Numerous individuals have willingly sought this responsibility by volunteering to provide vital emergency services to their community. The cooperation and teamwork of all participants were evident during this exercise. We appreciate all who participated in this community service.

The State and local organizations demonstrated the required knowledge and adequately implemented their emergency response plans and procedures. There were no Level 1 or Level 2 findings identified during this exercises and out-of-sequence drills.

Due to the unique nature of this (simulated) Plume Scenario, the following precautionary actions were taken during the exercise:

- dairy animals were placed on stored feed and covered water
- airspace was restricted

- area state parks and recreation areas were closed
- schools were closed
- schools and special populations from care facilities were moved to relocation centers
- the public was instructed to use area phonebooks and Emergency Action Plans
- the 211 Call Center Rumor Control phone number was widely disseminated to the public

The final protective action decision during the emergency plume phase was the simulated evacuation of portions of Benton and Linn counties, in Iowa. Sub-areas 1, 2, 3, and 8 were evacuated. An estimated 2,835 persons were projected to have been affected by these decisions.

SECTION 1: EXERCISE OVERVIEW

1.1 Exercise Details

Exercise Name
Duane Arnold Energy Center

Type of Exercise
Plume

Exercise Date
May 15, 2018

Program
Department of Homeland Security/FEMA Radiological Emergency Preparedness Program

Scenario Type
Radiological Emergency Plume Pathway

1.2 Exercise Planning Team Leadership

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1.3 Participating Organizations

Agencies and organizations of the following jurisdictions participated in the Duane Arnold Energy Center exercise:

Iowa Jurisdictions

Iowa Army National Guard
Iowa Department of Aging
Iowa Department of Agriculture and Land Stewardship
Iowa Department of Corrections
Iowa Department of Homeland Security and Emergency Management
Iowa Department of Human Services
Iowa Department of Inspections and Appeals
Iowa Department of Natural Resources
Iowa Department of Public Health
Iowa Department of Public Safety
Iowa Department of Transportation
Iowa Governor's Office
Iowa State University - Environmental Health and Safety
Iowa State University Extension Service
Iowa Utilities Board
University of Iowa - State Hygienic Lab

Risk Jurisdictions

Atkins Fire Department
Benton County Board of Supervisors
Benton County Dispatch
Benton County Emergency Management Agency
Benton County Public Health
Benton County Sheriff
Benton County Transportation
Cedar Rapids Fire Department
Cedar Rapids Mayor
Cedar Rapids Police Department
Center Point Fire/EMS Department
City of Cedar Rapids
Linn County Board of Supervisors
Linn County Community Services
Linn County Emergency Management Agency
Linn County Hazardous Materials Response Team
Linn County Public Health
Linn County Schools

Risk Jurisdictions (continued)

Linn County Secondary Roads
Linn County Sheriff's Department
Marion Police

Support/Volunteer Jurisdictions

Amateur Radio Emergency Services
American Red Cross
Buchanan County Emergency Management Agency
Civil Air Patrol
WMT EAS Radio Station
Hiawatha Fire Department
Independence Fire Department
Iowa Mental Health Institute Fire Department
Jesup Fire Department
Kirkwood Community College
Mercy Medical Center (Private)
NextEra Energy
Radio Amateur Civil Emergency Services
2-1-1 Call Center – Public Inquiry

Federal Jurisdictions

Environmental Protection Agency
Federal Emergency Management Agency
National Weather Service
US Department of Homeland Security
US Nuclear Regulatory Commission

SECTION 2: EXERCISE DESIGN SUMMARY

2.1 Exercise Purpose and Design

Duane Arnold Energy Center's (DAEC) Emergency Plan describes DAEC's capability to respond effectively to a radiological emergency at the site, and provides a detailed description of DAEC's interaction with Federal, State, and local government agencies as well as private organizations. The Emergency Plan provides for continuous emergency preparedness including the conduct of an annual exercise and preparatory drills.

The purpose of the May 15, 2018, exercise was to activate and evaluate portions of the Iowa State Emergency Plan, the Benton and Linn County emergency plans, and associated implementing procedures, in accordance with 44 CFR 350. Further, these exercises and drills tested the DAEC emergency response community's ability to assess and respond to emergency conditions and coordinate efforts with other agencies for protection of the health and safety of the public. The conduct and evaluation of this exercise provided additional training for emergency response organization personnel and a means to further enhance DAEC's emergency response capability.

The scenario was designed to provide the basis for a simulated radiological accident initiated by a Radiological Plume event at DAEC in Palo, Iowa, through which the capabilities and effectiveness of the emergency response plans can be evaluated. The scenario was used by the exercise controllers and evaluators as the control mechanism for the conduct of the exercise.

DAEC Emergency Planning personnel developed the scenario. It was reviewed by FEMA Headquarters, prior to the final review and approval by FEMA Region VII.

The scenario, as driven by the DAEC Control Room Simulator and injects, depicted a simulated sequence of events which resulted in escalating conditions of sufficient magnitude to warrant mobilization of State and local agencies to respond to the simulated emergency.

Whenever practical, the exercise incorporated provisions for "free play" on the part of the participants.

2.2 Exercise Objectives, Capabilities and Activities

Duane Arnold Energy Center (DAEC) exercises and drills are conducted to test and provide the opportunity to evaluate emergency plans, associated implementing procedures, facilities, and equipment. This exercise tested the DAEC offsite response organizations' ability to assess and respond to emergency conditions as well as coordinate efforts with other agencies for protection of the health and safety of the public.

The DAEC Emergency Preparedness Exercise & Drill Program objectives are based on the Federal requirements delineated in 44 CFR 350, as well as on the priorities and procedures detailed in the emergency preparedness plans for the State of Iowa as well as Benton and Linn Counties. Additional guidance provided in NUREG-0654, NUREG-0696, and NUREG-0737, was used in developing these objectives.

The overall objective of the exercise was to evaluate the integrated capability of a major portion of the basic elements existing within the onsite emergency plans and emergency response organizations. The exercise tested the implementation of the plans and procedures of participating agencies, along with the capability of these agencies to conduct operations in accordance with these plans. This objective is further defined by the criteria evaluated for each participating location.

The exercise included full participation by the State of Iowa, Benton County, Linn County, and other associated offsite response organizations. A summary of the specific criteria evaluated for each of the participating organizations is listed in Table 3.1.

2.3 Scenario Summary

The following is the scenario summary provided by Duane Arnold Energy Center Emergency Preparedness personnel and approved by Department of Homeland Security/FEMA for use during the exercise on May 15, 2018.

Initial Conditions:
The DAEC 2018 Exercise being conducted on May 15, 2018, will be a test of the capabilities of the DAEC Emergency Response Organization.

Meteorological Conditions on May 17:

Today:	*Cool, overcast day, early morning winds out of the Southeast at 3-5 mph, changing to out of the South by mid-morning. Highs in the mid-50's; lows in the upper 40's.*
Tonight:	*Temperatures in the 40's with winds out of the south at 0 to 5 mph.*
Tomorrow:	*Mostly sunny with highs in the low 60s. Winds expected from the south and southeast.*

3-Day Forecast: Temperatures are expected in the upper 60s; clear skies forecast until Friday.

The conditions at the Duane Arnold Energy Center as of 0530, Tuesday, May 15, 2018:

The day begins with the Duane Arnold Energy Center operating at 100% power; the unit is at middle of core life.

Plant Risk Status

- *'B' Work Week, 'A' Systems are protected.*
  - *CDF- 1.97 E-6 Yellow @ 2/3/2020*
  - *LERF- 6.08 E-7 Yellow @ 7/12/2018*
  - *Color- Green*
- *Existing LCOs, date of next surveillance*
  - *3.5.1.B, day 2 of 7 for "B" Core Spray*
- *STPs in progress or major maintenance*
  - *"B" Core Spray pump upper motor bearing replacement in progress. The upper motor bearing has been removed and the new part is in the warehouse. There is a parts issue problem that is being resolved at this time by the site.*
- *Equipment to be taken out of or returned to service this shift/maintenance on major plant equipment: None*
- *Comments, evolutions, problems, etc.: None*

- ***Road Conditions:***
  - *Yesterday afternoon, the bridge south of Oliphant Road on Center Point Road was inspected. Significant cracks were found in the under-deck of the bridge. Bridge repairs have closed the north bound lane on Center Point Road.*

- ***Schools:***
  - *All schools are in session.*
  - *Arthur Elementary School is having a field trip on the Cedar Valley Nature Trail this morning. They will arrive at the Center Point Depot around 0900 and will be walking south on the trail towards Lafayette.*

- ***Other:***
  - *Due to a bus and four car accident, Hiawatha and Cedar Rapids Police departments are re- routing traffic at the intersection of Blairs Ferry Road and Center Point Road.*
  - *Governor Kim Reynolds is in Washington D.C. on business.*

*At **0800** - The Diesel Driven Fire Pump 1P-49 auto-starts due to PS-3300 leak at the "T" fitting next to Control Panel 1C-116. Leak was caused by a helpers mop handle striking the sensing line.*

The RCIC Room fire main leak is due to the water hammer from the fire pump start on a previously unidentified drained section of piping upstream of the RCIC Deluge Isolation valve V33-0084 DELUGE SYSTEM 1 SHUTOFF.

The approximately 50 gpm leak is spraying down the RCIC Turbine and areas under Deluge 1 and water level is rising quickly in the room. Spraying water has shorted out most of the fluorescent light fixtures in the room making identification of severity of the leak tedious and hazardous.

This event creates the conditions necessary for the Operations crew to declare an:
***ALERT** (HA1.4) Internal flooding in ANY Safe Shutdown/Vital Area that results in: an electrical shock hazard that precludes access to operate or monitor safety equipment – or – Control Room indication of degraded performance of a System of Concern.*

*At **0806**, annunciation for Area Water Levels greater than Max Normal. 1C-14A, B-4 (**Unusual Event**) **to (Alert)***

*At **0808,** annunciation for Area Water Levels greater than **Max Safe**.*

*At **0812,** there is an annunciation for RB Sumps High Leakage 1C-04C, B-2.*

*At **0853**, during operation of the HPCI Turbine/Pump, an oil leak develops at pressure gage PI-2287B, Governor Oil Pressure. The HPCI Turbine Control Valve, HV2200 closes on loss of oil, causing HPCI to become inoperable. Attempted operation of the gage isolation valve, V22-0119 is not successful at isolating the leak. The replacement / repair of oil line will take some time (maybe 1 to 2 hours) to locate, plan and install.*

*At **0916**, there was a wind direction shift, Winds will be from the South Southeast at **146 degrees**. No PAR change occurs, since the site is not in a General Emergency, but the State and Counties need to be aware of this change.*

*At **0940**, a through-wall failure has occurred in the "A" SJAE steam supply piping at the first elbow from the "A" Main Steam line. This event occurs during plant conditions that require isolation of the reactor with "A" Inboard & Outboard MSIVs (CV4412 & CV4413) having failed to close. The failure of the "A" SJAE steam supply piping is due to steam erosion at the elbow. The steam leakage is spreading throughout the Heater Bay area and ultimately throughout the Turbine Building.*

*This situation provides a method to **establish an uncontrolled leakage path for steam flow to the Heater Bay** area of the Turbine Building. The leaking steam is radioactively contaminated with gaseous content from failed fuel element.*

*Steam leakage at this location is necessary in support of a steam leakage/radioactive gaseous release to atmosphere of sufficient quantity to warrant declaration of a **SITE AREA EMERGENCY (SAE)** and eventually a **GENERAL EMERGENCY (GE).***

This situation is intended to provide Mechanic/Planner/Engineering involvement as a part of a Repair Team task.

*At **0945**, there is an Initial Release.*

*At **0948,** plant conditions that require isolation of the reactor, "A" Inboard MSIV (CV4412) fails to close. MSIV does not move. Valve is inoperable and stuck in this position.*

The failure is based on OE17191 (Main Steam Isolation Valve Failed to Close Up on Receipt of an Isolation Signal) and OE17319 (Scram Valves Fail To Operate Due to Faulty Scram Solenoid Pilot Valve (SSPV)). The cause of the failure is due to a manufactures defect. Specifically, the coil plungers were dimensionally out of specification, too long. The out of spec plunger, when combined with heat and pressure, created a condition where the plunger was simultaneously in contact with the upper and lower internal ports of the solenoid coil stem chamber. Therefore the plunger could not move to vent air when the coil was de-energized. The SSPV vendor failed to identify the defective part prior to assembling the solenoid valve.

This same component was identified to be used in MSIV AVCO solenoid valve manifolds. This specifically is the AVCO solenoid valve manifold (SV4412A, SV4412B, SV4412C). The failure results in SV4412A remaining open and SV4412C to remaining closed. This maintains nitrogen to the actuator. Since this is a failure of the plunger to shift mechanically, de- energizing the solenoid valves will not alter this condition.

- *This situation provides a method to sustain steam flow to the Main Steam piping in the Turbine Building. Steam leakage past the valve seat is necessary in support of a steam leakage scenario as a part of the overall drill scenario.*
- *This situation is intended to setup the conditions for a **Site Area Emergency, FS 1.0,** and eventually a **GENERAL EMERGENCY.***
- *This situation is intended to provide Mechanical-Electrical/Planner/Engineering involvement as a part of a Repair Team task.*

*At **1115**, there is an escalated release, which rates to a **General Emergency (GE)** in the Simulator, Turbine Building, Standby Gas Treatment System. A release of radioactivity occurs when 'A' Inboard and Outboard MSIVs fail to close while responding to a failure of the Steam Jet Air Ejector steam supply line. This release also would be moving from the Heater Bay to the Main Plant Exhaust Room and out to the environment. Some of this release goes from the Heater Bay, to the Op Deck and through the TB Exhaust to the environment. Some of this release goes through the Condenser Bay, to the SJAE Room, through the Off Gas Stack to the environment.*

- *When the **Group 3 Isolation** occurs, the path ("C" above) from the SJAE room to the Off Gas Stack has its 1VEF13A/B fans secured.*
- *When the **Main Plant Exhaust Kamans** receive a **HI-HI rad alarm**, the operators will secure the Main Plant Exhaust fans.*

- *The escalation of the release of radioactivity to the environment is of sufficient quantity to warrant declaration of a **RG1.1,** Dose assessment results using actual meteorology indicates doses GREATER THAN 1000 mrem TEDE or 5000 millirem thyroid CEDE at or beyond the site boundary.(Preferred Method)*
- *Personnel performing duties in response to the emergency situation will be exposed to significant radioiodine concentrations and have potential for significant internal radiation dose from this exposure. Administration of potassium iodine (KI) to these personnel will minimize this dose.*
- *To ensure the recommendation for and the administration of potassium iodide (KI) for emergency workers exposed to significant airborne radioiodine is conducted in accordance with EPIP 4.5.*
- *The release continues as the reactor depressurizes, until reactor pressure is atmospheric, at about **1330.***
- *The release will decrease when the plant is in cold shutdown*

SECTION 3: ANALYSIS OF CAPABILITIES

3.1 Exercise Evaluation and Results

Contained in this section are the results and findings of the evaluation of all jurisdictions and functional entities that participated in the May 15, 2018, exercise, as well as the out-of-sequence drills held on April 3rd, April 5th, May 3rd, and the MS-1 Drill held on June 27, 2018. The drills and exercise tested the offsite emergency response capabilities of the state and local governments in the 10-mile emergency planning zone and sub-areas surrounding the Duane Arnold Energy Center.

Each jurisdiction and functional entity was evaluated on the basis of its demonstration of the criteria delineated in FEMA's Radiological Emergency Preparedness Program Manual, dated January 2016.

3.2 Summary Results of Exercise Evaluation

The matrix presented in Table 3.1 presents the status of all exercise criteria, which were scheduled for demonstration during this exercise, at all participating jurisdictions and functional entities. Exercise criteria are listed by number and the demonstration status of those criteria is indicated by the use of the following notation:

- **M: Met**
  An observed action, behavior, procedure, and/or practice that met the exercise criteria.
- **1: Level 1 Finding**
  An observed or identified inadequacy of organizational performance in an exercise that could cause a determination that offsite emergency preparedness is not adequate to provide reasonable assurance that appropriate protective measures can be taken in the event of a radiological emergency to protect the health and safety of the public living in the vicinity of a Nuclear Power Plant (NPP).
- **2: Level 2 Finding**
  An observed or identified inadequacy of organizational performance in an exercise that is not considered, by itself, to adversely impact public health and safety.

- **P: Plan Issue**
  An observed or identified inadequacy in the offsite response organizations' (ORO's) emergency plan/implementing procedures, rather than that of the ORO's performance.

- **N: Not Demonstrated**

Table 3.1 - Summary of Exercise Evaluation (1/2)

DATE: 2018-05-15 SITE: Duane Arnold Energy Center, IA M: Met, 1: Level 1, 2: Level 2, P: Plan Issue, N: Not Demonstrated		Iowa State EOC	IA Dose Assess,	Iowa FTC	IA Rad Tm # 1 (Blue)	IA Rad Tm # 2 (Green)	211 Call Center	DAEC JIC	Iowa FCP	Linn County EOC
Emergency Operations Management										
Mobilization	1a1	M	M	M	M	M	M	M	M	M
Facilities	1b1									
Direction & Control	1c1	M							M	M
Communications Equipment	1d1	M	M	M	M	M	M	M	M	M
Equipment and Supplies	1e1	M	M	M	M	M	M	M	M	M
Protective Action Decision Making										
EW Exp. Control Decisions	2a1		M	M					M	M
PARs	2b1		M	M						
PADs	2b2	M	M							M
PADs for Disabled/Functional Needs	2c1									M
Ingestion PADs	2d1									
RRR Decisions	2e1									
Protective Action Implementation										
EW Exp. Control Implementation	3a1			M	M	M	M	M	M	M
KI Public/Institutionalized	3b1									M
PAD Imp. Disabled/Functional Needs	3c1									
PAD Imp. Schools	3c2									
TACP Establishment	3d1	M							M	M
Impediments to Evacuation	3d2	M							M	M
Implementation of Ingestion PADs	3e1									
Ingestion Strategies and Information	3e2									
Imp. of RRR Decisions	3f1									
Field Measurement and Analysis										
RESERVED	4a1									
Field Team Management	4a2									
Field Team Operations	4a3				M	M				
Field Team Sampling	4b1									
Laboratory Operations	4c1									
Emergency Notification and Public Info										
Initial Alert & Notification	5a1									M
RESERVED	5a2									
Backup Alert & Notification	5a3									
Exception Area Alerting	5a4									
Subsequent Public Information	5b1	M					M	M		M
Support Operations/Facilities										
Reception Center Operations	6a1									
EW Monitoring & Decon	6b1									
Congregate Care	6c1									
Contaminated Injured Transport & Care	6d1									

Table 3.1 - Summary of Exercise Evaluation (Continued. page 2/2)

DATE: 2018-05-15 SITE: Duane Arnold Energy Center, IA M: Met, 1: Level 1, 2: Level 2, P: Plan Issue, N: Not Demonstrated		NWS – Davenport, IA	WMT EAS Radio Station	Marshall County Recept & Decon Ctr	Hiawatha fire & Rescue	Mercy Medical Ctr	Benton County EOC	Cedar Rapids School Dist	Alburnett School Dist	Vinton-Shellsburg School Dist
Emergency Operations Management										
Mobilization	1a1			M			M			
Facilities	1b1									
Direction & Control	1c1			M			M			
Communications Equipment	1d1			M			M			
Equipment and Supplies	1e1		M	M	M	M	M	M	M	M
Protective Action Decision Making										
EW Exp. Control Decisions	2a1						M			
PARs	2b1									
PADs	2b2						M			
PADs for Disabled/Functional Needs	2c1						M			
Ingestion PADs	2d1									
RRR Decisions	2e1									
Protective Action Implementation										
EW Exp. Control Implementation	3a1		M	M	M	M	M	M	M	M
KI Public/Institutionalized	3b1						M			
PAD Imp. Disabled/Functional Needs	3c1									
PAD Imp. Schools	3c2							M	M	M
TACP Establishment	3d1						M			
Impediments to Evacuation	3d2						M			
Implementation of Ingestion PADs	3e1									
Ingestion Strategies and Information	3e2									
Imp. of RRR Decisions	3f1									
Field Measurement and Analysis										
RESERVED	4a1									
Field Team Management	4a2									
Field Team Operations	4a3									
Field Team Sampling	4b1									
Laboratory Operations	4c1									
Emergency Notification and Public Info										
Initial Alert & Notification	5a1	N	M				M			
RESERVED	5a2									
Backup Alert & Notification	5a3									
Exception Area Alerting	5a4									
Subsequent Public Information	5b1	N	M				M			
Support Operations/Facilities										
Reception Center Operations	6a1			M						
EW Monitoring & Decon	6b1									
Congregate Care	6c1									
Contaminated Injured Transport & Care	6d1				M	M				

3.3 Criteria Evaluation Summaries

3.3.1 Iowa Jurisdictions

3.3.1.1 Iowa State Emergency Operations Center

The Iowa State Emergency Operations Center (SEOC), located in Johnston, IA, included representatives from 17 State agencies participating in the exercise on May 15. The Iowa SEOC demonstrated excellent leadership and utilized very organized procedures and checklists. There was very good coordination among all State agencies and demonstration of protective action recommendation (PAR) clarification. All communication methods were demonstrated adequately without undue delays.

All eight criteria at this location were adequately demonstrated in accordance with the plans, procedures, and extent of play agreement.

In summary, the status of DHS/FEMA criteria for this location is as follows:

a. MET: 1.a.1, 1.c.1, 1.d.1, 1.e.1, 2.b.2, 3.d.1, 3.d.2, 5.b.1.
b. LEVEL ONE: None
c. LEVEL TWO: None
d. PLAN ISSUES: None
e. NOT DEMONSTRATED: None
f. PRIOR ISSUES - RESOLVED: None
g. PRIOR ISSUES - UNRESOLVED: None

3.3.1.2 Iowa Dose Assessment

The Iowa Dose assessment was conducted by the Iowa Department of Public Health (IDPH), located in Johnston, Iowa. IDPH demonstrated innovative thinking using the Radiological Operations Support Specialist at the county emergency operation centers (EOC) and implementation of the RAD Responder program. The Iowa Dose Assessment team worked very well together and with other organizations within the SEOC.

All six criteria in this area were adequately demonstrated in accordance with the plans, procedures, and extent of play agreement.

In summary, the status of DHS/FEMA criteria for this location is as follows:

a. MET: 1.a.1, 1.d.1, 1.e.1, 2.a.1, 2.b.1, 2.b.2.
b. LEVEL ONE: None
c. LEVEL TWO: None
d. PLAN ISSUES: None
e. NOT DEMONSTRATED: None
f. PRIOR ISSUES - RESOLVED: None
g. PRIOR ISSUES - UNRESOLVED: None

3.3.1.3 Iowa Field Team Coordination

Field team coordination is conducted out of the Alliant Tower in Cedar Rapids, IA. The Iowa Department of Public Health (IDPH) has the primary technical responsibility for determining the extent of the impact of the radiological incident and with assistance from Iowa State Hygienic Laboratory (SHL) and other state and federal agencies worked to monitor and coordinate the activities of the state radiological teams in the field. They used effective procedures to alert, notify and mobilize emergency personnel in a timely manner. They demonstrated excellent communication and direction and control of the state monitoring teams, resulting in fast and accurate communication of readings with the Rad-Responder program.

All six criteria at this location were successfully demonstrated in accordance with the plans, procedures, and extent of play agreement.

In summary, the status of DHS/FEMA criteria for this location is as follows:

a. MET: 1.a.1, 1.d.1, 1.e.1, 2.a.1, 2.b.1, 3.a.1.
b. LEVEL ONE: None
c. LEVEL TWO: None
d. PLAN ISSUES: None
e. NOT DEMONSTRATED: None
f. PRIOR ISSUES - RESOLVED: None
g. PRIOR ISSUES - UNRESOLVED: None

3.3.1.4 Iowa Radiological Monitoring Team # 1 (Blue) – EPZ

For exercises and emergencies at DAEC, the radiological monitoring teams deploy out of the Emergency Operations Facility (EOF) in Cedar Rapids, Iowa. The Blue Team displayed excellent teamwork and use of procedures, extensively utilizing Rad Responder, and showing continuous improvements and increased efficiency for transmitting survey readings and locations.

All five criteria at this location were adequately demonstrated in accordance with the plans, procedures, and extent of play agreement.

In summary, the status of DHS/FEMA criteria for this location is as follows:

a. MET: 1.a.1, 1.d.1, 1.e.1, 3.a.1, 4.a.3.
b. LEVEL ONE: None
c. LEVEL TWO: None
d. PLAN ISSUES: None
e. NOT DEMONSTRATED: None
f. PRIOR ISSUES - RESOLVED: None
g. PRIOR ISSUES - UNRESOLVED: None

3.3.1.5 Iowa Radiological Monitoring Team # 2 (Green) - EPZ

For exercises and emergencies at DAEC, the radiological monitoring teams deploy out of the Emergency Operations Facility (EOF) in Cedar Rapids, Iowa. The Green Team was very knowledgeable of their equipment and procedures, which led to a successful demonstration of their capabilities. The team consisted of very professional staff members from the University Iowa State Hygienic Lab and Iowa State University.

All five criteria at this location were adequately demonstrated in accordance with the plans, procedures, and extent of play agreement.

In summary, the status of DHS/FEMA criteria for this location is as follows:

a. MET: 1.a.1, 1.d.1, 1.e.1, 3.a.1, 4.a.3.
b. LEVEL ONE: None
c. LEVEL TWO: None
d. PLAN ISSUES: None
e. NOT DEMONSTRATED: None
f. PRIOR ISSUES - RESOLVED: None
g. PRIOR ISSUES - UNRESOLVED: None

3.3.1.6 Duane Arnold Joint Information Center

The Iowa Joint Information Center (JIC) for DAEC was co-located with the DAEC JIC at the Alliant Towers in Cedar Rapids, Iowa. The public inquiry hotline(s) were staffed with operators located at the 2-1-1 Call Center in Cedar Rapids as well as in the Iowa SEOC in Johnston, Iowa.

All of the offsite response organizations (OROs) Public Information Officers (PIOs) were experienced. Coordination between the OROs went well. There was good communication between the Utility JIC Manager, the Iowa State JIC, and Benton and Linn Counties.

All five criteria at this location were adequately demonstrated in accordance with the plans, procedures, and extent of play agreement.

In summary, the status of DHS/FEMA criteria for this location is as follows:

a. MET: 1.a.1, 1.d.1, 1.e.1, 3.a.1, 5.b.1.
b. LEVEL ONE: None
c. LEVEL TWO: None
d. PLAN ISSUES: None
e. NOT DEMONSTRATED: None
f. PRIOR ISSUES - RESOLVED: None
g. PRIOR ISSUES - UNRESOLVED: None

3.3.1.7 Iowa Forward Command Post

The Iowa Forward Command Post (FCP) was established in the conference room of the Iowa State Patrol District 11 Headquarters. The representatives from each of the agencies participating at the FCP demonstrated a thorough knowledge of their procedures and required actions. Several state agencies reported to the FCP to coordinate state activities in response to an event at DAEC. Excellent briefings were conducted throughout the day.

All eight criteria at this location were adequately demonstrated in accordance with the plans, procedures, and extent of play agreement.

In summary, the status of DHS/FEMA criteria for this location is as follows:

a. MET: 1.a.1, 1.c.1, 1.d.1, 1.e.1, 2.a.1, 3.a.1, 3.d.1, 3.d.2.
b. LEVEL ONE: None
c. LEVEL TWO: None
d. PLAN ISSUES: None
e. NOT DEMONSTRATED: None
f. PRIOR ISSUES - RESOLVED: None
g. PRIOR ISSUES - UNRESOLVED: None

3.3.1.8 211 Call Center - Public Inquiry

The 2-1-1 Call Center is operated by the United Way in Cedar Rapids, Iowa in order to assist in the public inquiry portion of the DAEC response. The 2-1-1 Call Center demonstrated excellent teamwork and the staff is well trained in the use of all facility plans and procedures.

The staff showed excellent attention to detail and coordination with the Joint Information Center (JIC) as part of the process to provide the public accurate and timely information.

Five criteria were adequately demonstrated in accordance with plans, procedures, and the extent of play agreement.

In summary, the status of DHS/FEMA criteria for this location is as follows:

a. MET: 1.a.1, 1.d.1, 1.e.1, 3.a.1, 5.b.1.
b. LEVEL ONE: None
c. LEVEL TWO: None
d. PLAN ISSUES: None
e. NOT DEMONSTRATED: None
f. PRIOR ISSUES - RESOLVED: None
g. PRIOR ISSUES - UNRESOLVED: None

3.3.1.9 National Weather Service – Davenport, Iowa

Was not demonstrated during this exercise due to weather delays for the scheduled evaluators. The evaluation will be made up during the Quad Cities Exercise in December 2018.

3.3.2 Risk Jurisdictions

3.3.2.1 Linn County Emergency Operations Center

The Linn County Emergency Operations Center (EOC) is located in Cedar Rapids, IA. Numerous County Agencies worked in the EOC during the exercise.

The Linn County EOC staff demonstrated outstanding communication and information sharing both within the EOC, and with other offsite response organization (ORO) partners. The staff demonstrated an excellent ability to ensure the safety of the public, by following their specific checklists and procedures.

Thirteen criteria were adequately demonstrated in accordance with plans, procedures, and the extent of play agreement.

In summary, the status of DHS/FEMA criteria for this location is as follows:

a. MET: 1.a.1, 1.c.1, 1.d.1, 1.e.1, 2.a.1, 2.b.2, 2.c.1, 3.a.1, 3.b.1, 3.d.1, 3.d.2, 5.a.1, 5.b.1.
b. LEVEL ONE: None
c. LEVEL TWO: None
d. PLAN ISSUES: None
e. NOT DEMONSTRATED: None
f. PRIOR ISSUES - RESOLVED: None
g. PRIOR ISSUES - UNRESOLVED: None

3.3.2.2 WMT EAS Radio Station

The WMT EAS Station is located in Cedar Rapids, Iowa. The exercise participants included the Chief Engineer and Operations Director. Both individuals were very knowledgeable of the stations responsibilities in regards to the response to an emergency at the Duane Arnold Energy Center. They executed their responsibilities in a highly professional and timely manner throughout the exercise. The WMT EAS Station has the capability to receive and broadcast EAS messages 24 hours a day, seven days a week, if needed.

Four criteria for this location were adequately demonstrated in accordance with the plans, procedures, and extent of play agreement.

In summary, the status of DHS/FEMA criteria for this location is as follows:

a. MET: 1.e.1, 3.a.1, 5.a.1, 5.b.1.
b. LEVEL ONE: None
c. LEVEL TWO: None
d. PLAN ISSUES: None
e. NOT DEMONSTRATED: None
f. PRIOR ISSUES - RESOLVED: None
g. PRIOR ISSUES - UNRESOLVED: None

3.3.2.3 Benton County Emergency Operations Center

The Benton County Emergency Operations Center (BCEOC) is located in Vinton, Iowa. The Benton County Board of Supervisors, in close consultation with the Emergency Management Coordinator (EMC), served as the Direction and Control officials responsible for making protective action decisions (PADs) for the public within Benton County. The EMC and Health Representative gave excellent briefings. All of the staff were very knowledgeable of their city and county plans when it came time to demonstrate their assigned duties and use their Standard Operating Guides (SOG's).

The Benton County staff functioned well as a team and were proactive in discussing upcoming situations and possible changes in plant conditions.

Thirteen criteria were successfully demonstrated in accordance with the plans, procedures, and extent of play agreement.

All messaging and subsequent messaging was developed and distributed in a timely manner.

a. MET: 1.a.1, 1.c.1, 1.d.1, 1.e.1, 2.a.1, 2.b.2, 2.c.1, 3.a.1, 3.b.1, 3.d.1, 3.d.2, 5.a.1, 5.b.1.
b. LEVEL ONE: None
c. LEVEL TWO: None
d. PLAN ISSUES: None
e. NOT DEMONSTRATED: None
f. PRIOR ISSUES - RESOLVED: None
g. PRIOR ISSUES - UNRESOLVED: None

3.3.3 Support Jurisdictions

3.3.3.1 Cedar Rapids School District

Cedar Rapids School District staff demonstrated their knowledge of the procedures, equipment, and supplies required for evacuation of the schools, if needed at Site Area Emergency (SAE). An adequate number of buses with bus drivers and dosimetry equipment were available. Present for the interview was a School District Official, the Transportation Director, and a Bus Driver, and all were very knowledgeable of the procedures and their duties during an emergency evacuation.

Three criteria were successfully demonstrated in accordance with the plans, procedures, and extent of play agreement.

In summary, the status of DHS/FEMA criteria for this location is as follows:

a. MET: 1.e.1, 3.a.1, 3.c.2.
b. LEVEL ONE: None
c. LEVEL TWO: None
d. PLAN ISSUES: None
e. NOT DEMONSTRATED: None
f. RIOR ISSUES - RESOLVED: None
g. PRIOR ISSUES - UNRESOLVED: None

3.3.3.2 Alburnett School District

Alburnett School District staff demonstrated their knowledge of the procedures, equipment, and supplies required for evacuation of the schools if needed at Site Area Emergency (SAE). There was an adequate number of buses with bus drivers and dosimetry equipment available if needed.

Present for the interview was a School District Official, the Transportation Director, and a Bus Driver; all were very knowledgeable of the procedures and their duties during an emergency evacuation.

Three criteria were successfully demonstrated in accordance with the plans, procedures, and extent of play agreement.

In summary, the status of DHS/FEMA criteria for this location is as follows:

a. MET: 1.e.1, 3.a.1, 3.c.2.
b. LEVEL ONE: None
c. LEVEL TWO: None
d. PLAN ISSUES: None
e. NOT DEMONSTRATED: None
f. RIOR ISSUES - RESOLVED: None
g. PRIOR ISSUES - UNRESOLVED: None

3.3.3.3 Vinton-Shellsburg School District

Vinton-Shellsburg School District staff demonstrated their knowledge of the procedures, equipment, and supplies required for evacuation of the schools if needed at Site Area Emergency (SAE). There was an adequate number of buses with bus drivers, and dosimetry equipment, available. Present for the interview was a School District Official, the Transportation Director, and a Bus Driver, and all were very knowledgeable of the procedures and their duties during an emergency evacuation.

Three criteria were successfully demonstrated in accordance with the plans, procedures, and extent of play agreement.

In summary, the status of DHS/FEMA criteria for this location is as follows:

a. MET: 1.e.1, 3.a.1, 3.c.2.
b. LEVEL ONE: None
c. LEVEL TWO: None
d. PLAN ISSUES: None
e. NOT DEMONSTRATED: None
f. RIOR ISSUES - RESOLVED: None
g. PRIOR ISSUES - UNRESOLVED: None

3.3.3.4 Marshall County Reception & Decontamination Center

The Marshall County Reception & Decontamination Center staff demonstrated their knowledge of the plans and procedures, and that adequate equipment and supplies were available during an out-of-sequence demonstration on May 3, 2018, at the Central Iowa Fairground in Marshalltown, Iowa.

The Amateur Radio Emergency Service (ARES) was set up and maintained two on-site radio networks. There were several Salvation Army teams who demonstrated the capability to register individuals upon their completion of a successful monitoring and/or decontamination, as needed. Upon completion of registration, Public Health was there to assist with any medical needs.

Six criteria were successfully demonstrated in accordance with the plans, procedures, and extent of play agreement.

In summary, the status of DHS/FEMA criteria for this location is as follows:

a. MET: 1.a.1, 1.c.1, 1.d.1, 1.e.1, 3.a.1, 6.a.1.
b. LEVEL ONE: None
c. LEVEL TWO: None
d. PLAN ISSUES: None
e. NOT DEMONSTRATED: None
f. RIOR ISSUES - RESOLVED: None
g. PRIOR ISSUES - UNRESOLVED: None

3.3.3.5 Mercy Medical Center

Mercy Medical Center is located in Cedar Rapids, Iowa. On June 27, 2018, the emergency medical staff demonstrated their knowledge of the procedures, equipment, and supplies required for the emergency decontamination bay. The layout of the trauma bay (Room #15) allowed patient information to be accessed via a window and display board and the use of the VOCERA (a Communication System). This minimized the number of staff required to occupy the Radiologically Controlled Area, because they were all online or could be contacted instantly, if needed.

Three criteria were successfully demonstrated in accordance with the plans, procedures, and extent of play agreement.

In summary, the status of DHS/FEMA criteria for this location is as follows:

a. MET: 1.e.1, 3.a.1, 6.d.1.
b. LEVEL ONE: None
c. LEVEL TWO: None
d. PLAN ISSUES: None
e. NOT DEMONSTRATED: None
f. RIOR ISSUES - RESOLVED: None
g. PRIOR ISSUES - UNRESOLVED: None

3.3.3.6 Hiawatha Fire and Rescue

Hiawatha Fire and Rescue, located in Hiawatha, IA, participated in an out-of-sequence Medical Drill (MS-1) on June 27th. The rescue squad demonstrated their knowledge of the procedures, administrative turn-back limits and use of equipment and supplies required to manage radiological exposure to emergency workers and injured persons.

The staff properly demonstrated the ability to don and doff a Tyvek suit prior to surveying and wrapping a simulated injured person, who was working as a State Field Team Emergency Worker. The injured worker was returning to her vehicle from retrieving field samples (river water samples) when she slipped on wet grass and fell to the ground. The staff did a good job of maintaining proper contamination control.

Three criteria were successfully demonstrated in accordance with the plans, procedures, and extent of play agreement.

In summary, the status of DHS/FEMA criteria for this location is as follows:

a. MET: 1.e.1, 3.a.1, 6.d.1.
b. LEVEL ONE: None
c. LEVEL TWO: None
d. PLAN ISSUES: None
e. NOT DEMONSTRATED: None
f. PRIOR ISSUES - RESOLVED: None
g. PRIOR ISSUES - UNRESOLVED: None

SECTION 4: CONCLUSION

Based on the results of this exercise and the out-of-sequence drills, the offsite radiological emergency response plans and preparedness for the State of Iowa and the affected local jurisdictions are deemed adequate to provide reasonable assurance that appropriate measures can be taken to protect the health and safety of the public in the event of a radiological emergency. Therefore, 44 CFR Part 350 approval of the offsite radiological emergency response plans and preparedness for the State of Iowa site-specific to the Duane Arnold Energy Center, will remain in effect.

APPENDIX A: EXERCISE TIMELINE

Table 1 summarizes the times recorded for various activities and decisions at each of the evaluated locations during the Duane Arnold Energy Center exercise held on May 15, 2018. A disparity in times is normal given the need for message transmissions and decision-making at the various locales. The times are recorded as dictated by the scenario.

Table 1 - Exercise Timeline

DATE: 2018-05-15 SITE: Duane Arnold Energy Center, IA

		Duane Arnold Energy Center				
		(Time that notification was received or action was taken)				
Emergency Classification Level or Event	**Time Utility Declared**	WMT EAS Radio Station	IA RAD Monitoring Team 1	IA RAD Monitoring Team 2	Iowa FTC	Iowa FCP
Unusual Event (NOUE)						
Alert (ALERT)	0817		0848	0848	0831	0913
Site Area Emergency (SAE)	0952	1021	1021	1021	1107	1006
General Emergency (GE)	1126	1154	1134	1134	1141	1149
Radiation Release Started	0950					1006
Radiation Release Terminated						
Facility Declared Operational		1031			1009	0909
Governor Declared State of Emergency		0945				0942
1st Precautionary and/or Protective Action Decision- Move Schoolchildren to TRC						1020
EAS Message BCC-1		1021				
1st Siren Activation		1030				1030
1st EAS Message BCO-1		1031				
SNB BCO-2		1042				
SNB LCO-2 Subareas 9, 12, 22		1039			1141	
Protective Action Decision Evacuate Subareas 1, 2, 3 & 8		1211				
2nd Siren Activation		1205				1205
2nd EAS Message BCO-3		1207				
SNB (Schools to PRC) BCO-4		1209				
SNB (Evacuate subarea 1, 2, 3, 8) BCO-5		1211				
3rd Siren Activation		1221				
3rd EAS Message & SNB		1221				
KI Administration Decision		1201	1206	1206	1204	1202
Exercise Terminated		1242	1239	1239	1249	1249

Table 1 - Exercise Timeline

DATE: 2018-05-15 SITE: Duane Arnold Energy Center, IA

		Duane Arnold Energy Center					
		(Time that notification was received or action was taken)					
Emergency Classification Level or Event	**Time Utility Declared**	**Iowa State EOC**	**Iowa Dose Assessment**	**211 Call Center**	**DAEC JIC**	**Benton County EOC**	**Linn County EOC**
Unusual Event (NOUE)							
Alert (ALERT)	**817**	**0826**	**0826**	**0953**		**0826**	**0826**
Site Area Emergency (SAE)	**952**	**1007**	**0952**	**1023**	**1011**	**1005**	**1005**
General Emergency (GE)	**1126**	**1139**	**1140**	**1146**	**1137**	**1140**	**1142**
Radiation Release Started	**0950**		**0950**		**1011**		
Radiation Release Terminated							
Facility Declared Operational		**1031**		**0840**	**0925**	**0915**	**0858**
Governor Declared State of Emergency		**0945**			**0938**		**0938**
1st Precautionary and/or Protective Action Decision- Move Urbana School to TRC						**1017**	
EAS Message BCC-1				**0953**			
1st Siren Activation						**1030**	**1030**
1st EAS Message BCO-1						**1031**	**1030**
SNB BCO-2						**1035**	
SNB LCO-2 Subareas 9-12-22							
Protective Action Decision Evacuate Subareas 1, 2, 3 & 8				**1211**		**1203**	
2nd Siren Activation						**1205**	**1205**
2nd EAS Message BCO-3						**1206**	**1207**
						1219	
SNB (Schools to PRC) BCO-4						**1219**	
SNB (Evacuate subarea 1, 2, 3, 8) BCO-5							
KI Administration Decision		**1201**	**1201**		**1203**	**1203**	**1231**
Exercise Terminated		**1245**	**1245**	**1245**	**1255**	**1248**	**1240**

APPENDIX B

EXERCISE EVALUATORS AND TEAM LEADERS

The evaluation team for this exercise and out-of-sequence drill consisted of DHS/FEMA Radiological Emergency Preparedness Program (REPP) personnel, and Regional Assistance Committee (RAC) members from various Federal agencies.

DATE: 05-15-2018 SITE: Duane Arnold Energy Center, IA

LOCATION	EVALUATOR	AGENCY
Iowa State Emergency Operations Center	*Elsa Lopez Lee Torres	FEMA RVI FEMA RIII
Iowa Dose Assessment	*Nan Williams	FEMA RVI
Iowa Field Team Coordination	*Ken Wierman	EFEMA HQ
Iowa Radiological Monitoring Team # 1 (Blue) – EPZ	*Jeff Clark	FEMA RVII
Iowa Radiological Monitoring Team # 2 (Green) – EPZ	*Charles (Chuck) Hooper	EPA
Duane Arnold Joint Information Center	*Todd Gemskie	FEMA RV
Iowa Forward Command Post	*Darren Bates Janet LaPosa-Hlavaty	FEMA HQ FEMA RX
211 Call Center - Public Inquiry	*Greg Voss	FEMA RVII
Linn County Emergency Operations Center	Christopher Nemcheck *Jesse King	FEMA RIII FEMA HQ
WMT EAS Radio Station	*Sharron McDuffie	FEMA RVII
Benton County Emergency Operations Center	*Norman Valentine Lisa Rink	FEMA RVII FEMA HQ
Alburnett School District	*Greg Voss	FEMA RVII
Cedar Rapids School District	*Sharron McDuffie	FEMA RVII
Vinton-Shellsburg School District	*Dennis Branson	FEMA RVII
Marshall County Reception & Decontamination Center	*Dan Kanakares Jeff Clark Andrew Chancellor Greg Voss Sharron McDuffie	FEMA RVII FEMA RVII FEMA RVII FEMA RVII FEMA RVII
Mercy Medical Center	*Ken Wierman	FEMA HQ
Hiawatha Fire & Rescue	*Sharron McDuffie	FEMA RVII
* Team Leader		

APPENDIX C: ACRONYMS AND ABBREVIATIONS

ARES	Amateur Radio Emergency Service
BCEOC	Benton County Emergency Operations Center
DAEC	Duane Arnold Energy Center
DHS	Department of Homeland Security
EAS	Emergency Alert System
EMC	Emergency Management Coordinator
EOC	Emergency Operations Center
EOF	Emergency Operations Facility
EPA	Environmental Protection Agency
EPZ	Emergency Planning Zone
EW	Emergency Worker
FCP	Forward Command Post
FEMA	Federal Emergency Management Agency
FTC	Field Team Coordination
FMT	Field Monitoring Teams
GE	General Emergency
IDPH	Iowa Department of Public Health
JIC	Joint Information Center
KI	Potassium Iodide
MS-1	Medical Services
NOUE	Notification of Unusual Event
NWS	National Weather Service
OOS	Out Of Sequence
ORO	Offsite Response Organization
PAD	Protective Action Decisions
PAR	Protective Action Recommendation
PIO	Public Information Officer
PRD	Permanent Record Dosimeter
RAC	Regional Assistance Committee
RASCAL	Radiological Analysis System for Consequence Analysis
REP	Radiological Emergency Preparedness
SAE	Site Area Emergency
SEOC	State Emergency Operations Center
SHL	State Hygienic Laboratory
SOG	Standard Operating Guide
TACP	Traffic & Access Control Point
TLD	Thermoluminescent Dosimeter

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