Palo Verde Generating Station
Biennial Plume Phase Exercise
After Action Report
Rumor Control
and
Redemonstration of L2 Findings

Initial Exercise Date: March 7 and 16, 2023
Rumor Control and Redemonstration
Exercise Date: September 19, 2023

Radiological Emergency Preparedness Program

Publication Date: 8 November 2023

Contents

Executive Summary 3

Section 1: Exercise Overview 4

Section 2: Analysis of Assessment Areas 5

2.1 Summary Results of Exercise Evaluation 5

2.1.1 Summary of Assessment areas evaluated. 6

2.2 Detailed Results of Exercise Evaluation 7

2.2.1 State Emergency Operations Center/ Technical Operations Center 7

2.2.2 Radiological Emergency Assistance Team-Forward (REAT-F) 7

2.2.3 Field Monitoring Teams 8

2.3 Previous Level 2 Findings from March 7, 2023 8

A. Criterion 2.a.1- Technical Operations Center (TOC) 8

B. Criterion 2.b.1-Technical Operations Center (TOC) 10

C. Criterion 1.a.1-Field Monitoring Teams 12

D. Criterion 3.a.1- Radiological Emergency Assistance Team at REAT-FWD. 13

E. Criterion 4.a.2- Radiological Emergency Assistance Team at REAT-FWD. 14

F. Criterion 6.b.1- Radiological Emergency Assistance Team at REAT-FWD. 15

Section 3 Conclusion 17

Appendix A: Exercise Timeline 18

Appendix B: Additional Information 19

Participating Organizations 19

Appendix C: Acronyms and Abbreviations 20

EXECUTIVE SUMMARY

The United States (U.S.) Department of Homeland Security's (DHS) Federal Emergency Management Agency (FEMA) evaluated a redemonstration of several exercise evaluation criterion from a March 7, 2023 biennial Plume Phase Exercise (PPX) for the Emergency Planning Zone (EPZ) surrounding the Palo Verde Generating Station (PVGS). Additionally, an out of sequence evaluation was conducted with the Joint Information Center (JIC) Call Center regarding rumor control on September 19, 2023.

Evaluations were conducted at the Arizona National Guard Papago Park Military Reservation.

A redemonstration evaluation was conducted of six previous Level 2 findings of the Radiological Emergency Preparedness Program from the March 7, 2023 evaluation.

During the PVGS Rumor Control and Redemonstration exercise, FEMA assessed the ability of state and local offsite response organizations (ORO) to implement plans and procedures to protect the public, in the event of a radiological incident at PVGS.

This exercise is part of the FEMA Radiological Emergency Preparedness Program (REPP) to ensure that adequate capabilities exist to prevent, protect against, mitigate the effects of, respond to, and recover from incidents involving commercial nuclear power plants. The Rumor Control and Redemonstration exercise and evaluation were held in accordance with FEMA's policies and guidance for the implementation of state and local ORO radiological emergency response plans and procedures. The exercise was evaluated using NUREG 0654/FEMA REP 1 Rev 1 document and the REPP Manual (January 2016).

The Extent of Play (EOP) agreements were reviewed and approved by the FEMA Region 9 acting Regional Assistance Committee (RAC) Chair on August 30, 2023. The EOP agreements were based on the assessment areas and sub-elements 1.a.1, 2.a.1, 2.b.1, 3.a.1, 4.a.2, 5.b.1, 6.b.1, outlined in the REPP Manual (January 2016).

There was no continuation of the previously identified Level 2 findings and there were no findings from the Rumor Control evaluation. No Planning Issues were identified.

In summary, the OROs adequately re-demonstrated their capability to implement plans and procedures during the exercise.

SECTION 1: EXERCISE OVERVIEW

Exercise Name	2023 Palo Verde Generating Station Biennial Plume Phase Exercise
Exercise Dates	September 19, 2023
Scope	This exercise is an out of sequence exercise for Rumor Control and a re-demonstration exercise of previous Level 2 findings.
Assessment Areas Area(s)	Emergency Operations Management Precautionary and/or Protective Action Decision-Making Protective Action Implementation Field Measurements and Analysis Emergency Notification and Public Information Support Operation Facilities
Sub-Elements	Mobilization Emergency Worker Exposure Control Radiological Assessment, Protective Action Recommendations, and Precautionary and/or Protective Action Decisions for the Plume Phase of the Emergency. Implementation of Precautionary and/or Protective Actions for Persons with Plume Phase Field Measurements and Analyses. Subsequent Emergency Information and Instructions for the Public and the Media. Monitoring and Decontamination of Emergency Workers and their Equipment and Vehicles.
Objectives	N/A
Threat or Hazard	Release of radiological materials from a licensed commercial nuclear power plant
Scenario	This exercise required offsite response organizations (OROs) to coordinate their decisions on how to address a radiological hazard from an emergency at Palo Verde Generating Station. OROs demonstrated the implementation of protective actions to preserve health and safety of the public due to a potential or actual offsite release of radioactive materials from Palo Verde Generation Station.
Sponsor	Arizona Department of Emergency and Military Affairs Palo Verde Generating Station
Participating Organizations	Local, county, state, and federal governmental agencies and non-governmental organizations. A complete list of participating agencies and organizations is attached in Appendix B.

SECTION 2: ANALYSIS OF ASSESSMENT AREAS

2.1 Summary Results of Exercise Evaluation

Table 1 below includes the exercise objectives, assessment areas, and the status of each assessment area and related sub-elements evaluated during the 2023 Palo Verde Generating Station Biennial Plume Phase Exercise evaluation.

Each jurisdiction and functional entity were evaluated based on their demonstrated ability to execute core capabilities and meet associated capability targets using the following terms:

- **Met (M):** The jurisdiction or functional entity performed all activities under the objective/capability target to the level required per the work plan and/or the extent-of-play agreement, with no Level 1 or Level 2 Findings evaluated under that objective/capability target during the current activity and no unresolved prior Level 2 Finding(s).
- **Level 1 Finding (L1):** An observed or identified inadequacy of organizational performance during an assessment activity 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 an NPP.
- **Level 2 Finding (L2):** An observed or identified inadequacy of organizational performance during an assessment activity that is not considered, by itself, to adversely impact public health and safety.
- **Plan Issue (P):** An observed or identified inadequacy in the ORO's emergency plan/implementing procedures, rather than in that of the ORO's performance.
- **Not Demonstrated (N):** For a justifiable reason, the jurisdiction or functional entity did not perform assessment activities under the objective/capability target as specified in the extent-of-play agreement.
- **Not Applicable (N/A):** The objective/capability target does not apply to the jurisdiction.

2.1.1 Summary of Assessment areas evaluated.

Location	Criteria	Assessment Areas	Status
State EOC, TOC	2.a.1 2.b.1	Precautionary and/or Protective Action Decision-Making	**M**
Radiological Emergency Assistance Team-Forward (REAT-F)	3.a.1 4.a.2 6.b.1	Protective Action Implementation Field Measurements and Analyses Support Operations/Facilities	**M**
Field Monitoring Teams	1.a.1	Emergency Operations Management	**M**
Joint Information Center	5.b.1	Emergency Notification and Public Information	**M**

2.2 Detailed Results of Exercise Evaluation

2.2.1 State Emergency Operations Center/ Technical Operations Center

Assessment Area 2: Precautionary and/or Protective Action Decision-Making
Sub-Elements 2a. and 2b. – Emergency Worker Exposure Control and Radiological Assessment, Protective Action Recommendations, and Precautionary and/or Protective Action Decisions for the Plume Phase of the Emergency.

Criterion: 2.a.1 OROs use a decision-making process, considering relevant factors and appropriate coordination, to ensure that an exposure control system, including the use of potassium iodide (KI), is in place for emergency workers, including provisions to authorize radiation exposure in excess of administrative limits or protective action guides. (NUREG-0654/FEMA-REP-1, C.6; f; K.3.a; K.4)

Criterion: 2.b.1 Appropriate protective action recommendations (PARs) are based on available information on plant conditions, field monitoring data, and licensee and ORO dose projections, as well as knowledge of onsite and offsite environmental conditions. (NUREG-0654/FEMA-REP-1, I.10 and Supplement 3)

All relevant critical tasks were adequately demonstrated.

2.2.2 Radiological Emergency Assistance Team-Forward (REAT-F)

Assessment Area 3: Protective Action Implementation
Sub-element 3.a – Implementation of Emergency Worker Exposure Control.

Criterion: 3.a.1 The OROs issue appropriate dosimetry, KI, and procedures, and manage radiological exposure to emergency workers in accordance with the plans/procedures. Emergency workers periodically and at the end of each mission read their dosimeters and record the readings on the appropriate exposure record or chart. OROs maintain appropriate record-keeping of the administration of KI to emergency workers. (NUREG-0654/FEMA-REP-1, K.3.a, b; K.4)

All relevant critical tasks were adequately demonstrated.

Assessment Area 4: Field Measurements and Analyses
Sub-element 4.a – Plume Phase Field Measurements and Analyses.

Criterion: 4.a.2: Field teams (two or more) are managed to obtain sufficient information to help characterize the release and to control radiation exposure. (NUREG-0654/FEMA-REP-1, C.1; H.12; I.7, 8, 11; J.10.a)

All relevant critical tasks were adequately demonstrated.

Assessment Area 6: Support Operations/Facilities
Sub-element 6.b – Monitoring, Decontamination, and Registration of Evacuees.

Criterion: 6.b.1 The facility/ORO has adequate procedures and resources to accomplish monitoring and decontamination of emergency workers and their equipment and vehicles. (NUREG-0654/FEMA-REP-1, K.5.a, b)

All relevant critical tasks were adequately demonstrated.

2.2.3 Field Monitoring Teams

Assessment Area 1: Emergency Operations Management
Sub-element 1.a– Mobilization, Communications Equipment, Equipment and Supplies to Support Operations.

Criterion: 1.a.1 OROs use effective procedures to alert, notify, and mobilize emergency personnel and activate facilities in a timely manner. (NUREG-0654/FEMA-REP-1, A.1.a, e; A.3, 4; C.1,4, 6; D.4; E.1, 2; G.3.a; H.3, 4)

All relevant critical tasks were adequately demonstrated.

2.2.4 Joint Information Center

Assessment Area 5: Emergency Notification and Public Information
Sub-element 5.b – Activation of the Prompt Alert and Notification System, Subsequent Emergency Information and Instructions for the Public and the Media, Subsequent Emergency Information and Instructions for the Public and the Media.

Criterion: 5.b.1: OROs provide accurate subsequent emergency information and instructions to the public and the news media in a timely manner. (NUREG-0654/FEMA-REP-1, E.5, 7; G.3.a, G.4.a, c).

All relevant critical tasks were adequately demonstrated.

2.3 Previous Level 2 Findings from March 7, 2023

A. Criterion 2.a.1- Technical Operations Center (TOC) in the State Emergency Operations Center (SEOC), Assessment Area 2; Precautionary and/or Protective Action Decision-Making, Sub-Element; 2.a; Emergency Worker Exposure Control.

Issue Number: 45-23-2.a.1-L2-01; Precautionary and/or Protective Action Decision-Making
ISSUE: The required inject as stated within the approved extent of play agreement for a state emergency worker to exceed administrative does limits and seek approval was not demonstrated. Additionally, the Field Monitoring Civil Support Teams (CST) Liaison did not

demonstrate the capability to sufficiently understand emergency worker exposure control to make decisions that would protect workers. Emergency worker doses were reported to the CST Liaison approximately every 15 minutes; however, the "doses" were actually dose rates (in units of microGray per hour) and not actual doses. The CST Liaison did not realize that worker cumulative doses were the important parameter, and they were unfamiliar with the use of a correction factor that would allow an estimate of the Total Effective Dose Equivalent from these measurements.	
RECOMMENDATION: Additional radiation protection training and experience should help considerably. Additional planning considerations for adding usable dose rates and accumulative doses should also be included in the Controller Package for scenario development.	
CORRECTIVE ACTION DESCRIPTION: Retrain selected staff to fully understand differences between dose and dose rates. Additionally, ensure the selected staff have foundation for understanding basic radiation principles which include emergency worker does limits, exposure control, and the differences and capability to convert between International System of Units (SI) units and traditional radiation units. The Radiological Core Concepts (RCCC) course and its pre-requisite classes may help provide a better foundation of the REP program requirements.	
PRIMARY RESPONSIBLE AGENCY:	
AZDEMA	START DATE:
AGENCY POC: Carpena, Sonia	ESTIMATED COMPLETION DATE:09/30/23

DEMONSTRATION CRITERION

Criterion 2.a.1 – "Emergency Worker Exposure Control" – OROs use a decision-making process, considering relevant factors and appropriate coordination, to ensure that an exposure control system, including the use of KI, is in place for emergency workers including provisions to authorize radiation exposure in excess of administrative limits or protective action guides.

CONDITION

During the March 7, 2023, biennial exercise for PVGS, the CST Liaison was able to control the movement of CST teams through their counterpart that was located at the REAT-Forward. However, they demonstrated little knowledge of radiation protection principles which could be used to direct Field Monitoring Team activities. Specifically, emergency worker doses were reported to the CST Liaison approximately every 15 minutes; however, the "doses" were dose rates (in units of microGray per hour). During an interview, it was learned that the CST Liaison did not realize that worker cumulative doses were the important parameter, they did not know how to convert the results to more conventional dose units (e.g., mrem/hr), and they were unfamiliar with the use of a correction factor that would allow an estimate of the Total Effective Dose Equivalent from these measurements.

PLANNING REFERENCES

The FEMA RPM (2016), Criterion K.3.a, requires that "Each organization shall make provision for 24-hour-per-day capability to determine the doses received by emergency personnel involved in any nuclear accident, including volunteers. Each organization shall make provisions for distribution of dosimeters, both self-reading and permanent record devices." The RPM also

requires a "process for reading PRDs and any early reading of PRDs (e.g., when an emergency worker's task assignment is completed or as otherwise specified)."

EFFECT
Due to the lack of radiation exposure knowledge by the CST Liaison, the field monitoring teams could have received doses exceeding administrative limits or protective action guidelines.

B. Criterion 2.b.1-Technical Operations Center (TOC) in the State Emergency Operations Center (SEOC): Assessment Area 2; Precautionary and/or Protective Action Decision-Making, Sub-element 2.b; Radiological Assessment, Protective Action Recommendations, and Precautionary and/or Protective Action Decisions for the Plume Phase of the Emergency.

Issue Number: 45-23-2.b.1-L2-02; Precautionary and/or Protective Action Decision-Making, Sub-element 2.b; Radiological Assessment, Protective Action Recommendations, and Precautionary and/or Protective Action Decisions for the Plume Phase of the Emergency.	
ISSUE: During the March 7, 2023, biennial exercise for the Palo Verde Generating Station (PVGS), the TOC did not utilize approved plans and procedures to conduct dose assessments using the Radiological Assessment System for Consequence Analysis for Radiological Emergencies (RASCAL) software, nor develop and document Protective Action Recommendations (PARs) to support the SEOC Policy Group.	
RECOMMENDATION: TOC staff should receive additional training on base dose assessment activities and use of RASCAL, including a reinforced expectation related to the use of approved plans and procedures. Following the training, the TOC should redemonstrate the dose assessment and PAR development capabilities to support SEOC Policy Group decision making during a subsequent drill/exercise.	
CORRECTIVE ACTION DESCRIPTION: Selected staff will receive standard FEMA training; RAAC (Radiological Accident Assessment Concepts) course and its pre-requisite classes, if not previously taken. Selected staff will receive a RASCAL academic and hands on training course prior to a scheduled re-demonstration. The redemonstration of this finding is scheduled for September 19, 2023.	
PRIMARY RESPONSIBLE AGENCY:	
AZDEMA	START DATE:
AGENCY POC: Carpena, Sonia	ESTIMATED COMPLETION DATE:09/30/23

DEMONSTRATION CRITERION
Criterion 2.b.1 – Appropriate PARs are based on available information on plant condition, field monitoring data, and licensee and ORO dose projections, as well as knowledge of onsite and offsite environmental conditions.

CONDITION
During the March 7, 2023, biennial exercise for PVGS, the TOC did not utilize approved plans and procedures to conduct dose assessments using the RASCAL software, nor develop and document PARs to support the SEOC Policy Group. Specifically, the TOC Dose Assessor

struggled with the technical development of appropriate source term and release path modeling using the RASCAL software in consideration of the available radiological data from the plant and field monitoring teams. As such, the TOC was unable to consistently compare and analyze TOC dose assessment data results with PVGS dose assessments (to be within a factor of 10 between the two [PVGS and TOC]). This was exacerbated by the fact that they were never observed reviewing the approved procedures/job action sheets for conduct of dose assessment by the TOC. Additionally, because of the challenges the Dose Assessor experienced in completing assessments using RASCAL, the TOC did not produce any PARs for the Policy Group, using the associated form described in the approved plan. Any recommendations provided to the Policy Group via the TOC Director were completed verbally during discussions in developing the State Protective Action Decisions (PADs).

PLANNING REFERENCES

The FEMA RPM, Part II, NUREG Criterion I.10 requires in part that "Each organization shall establish means for relating the various measured parameters (e.g., contamination levels, water, and air activity levels) to dose rates for key isotopes and gross radioactivity measurements. Provisions shall be made for estimating integrated dose from the projected and actual dose rates and for comparing these estimates with the protective action guides. The detailed provisions shall be described in separate procedures."

The Arizona Department of Emergency and Military Affairs (ADEMA) Technical Operations Center Annex, dated July 2021, Section "Emergency Facilities and Equipment (Direction, Control, and Coordination) – NUREG Standard H," states in part that:
"Dose assessment tools used to complete modeling and assessments are the RASCAL (Radiology Assessment System for Consequence Analysis) and Turbo-FRMAC software programs. Consistently compare and analyze PVGS dose assessment with TOC dose assessment data result must be within a factor of 10 between the two (PVGS and TOC)."

Appendix J of the TOC Annex, dated July 2021, states in part that, "the TOC Dose Assessor shall: Follow instructions if needed from the RASCAL workbook and/or from the DEMA Dose Assessment SOP, review RASCAL Dose Assessment results with the TOC Director or [subject matter expert], and compare with the Palo Verde Dose Assessment Team (Rad Dose results-Results should be within 10X times of the PVGS Dose results."

The TOC Annex dated July 2021, Section "Emergency Facilities and Equipment (Direction, Control, and Coordination) – NUREG Standard H," also states in part that "the TOC Director manages overall TOC Operations, including the management of PAR creation/review (with other State, County, and subject matter experts), in analyzing available data, and providing recommendations. Additionally, the same part of the TOC Annex states that the PAR decision maker is the DEMA Director or Designee, but the TOC Director is responsible for timely PAR development and delivery as requested by the SEOC Policy Group."

EFFECT

Because of the challenges the TOC Dose Assessor experienced in completing assessments using RASCAL in accordance with approved plan and procedures, the TOC did not produce any PARs for the Policy Group, using the associated form described in the approved plan. These challenges further resulted in extended SEOC Policy Group discussion in developing Protective Action

Decisions, which could have delayed appropriate protection for emergency workers and the general public in the areas affected by the radiological plume.

C. Criterion 1.a.1 - Field Monitoring Teams at Radiological Emergency Assistance Team (REAT) Forward. OROs use effective procedures to alert, notify, and mobilize emergency personnel and activate facilities in a timely manner. Assessment Area 1; Emergency Operations Management, Sub-element 1.a; Mobilization.

Issue Number: 45-23-1.a.1-L2-03; Emergency Operations Management, Mobilization	
ISSUE: During the March 7, 2023, biennial exercise for PVGS, the Field Monitoring CST did not activate and respond in a timely manner.	
RECOMMENDATION: Additional radiation protection training including FEMA standard REP classes and experience should help considerably. A redemonstration of Field Team Mobilization, use of the Arizona State approved procedures with the TOC dose assessment. Activate FMTs in accordance with the extent of play agreement and or activate in accordance with the plans and procedures.	
CORRECTIVE ACTION DESCRIPTION: Selected staff will receive standard FEMA REP program training courses to include the Radiological Core Concepts (RCCC) course and its pre-req classes prior to the redemonstration scheduled for September 19, 2023.	
PRIMARY RESPONSIBLE AGENCY:	
AZDEMA, Civil Support Teams	START DATE:
AGENCY POC: Carpena, Sonia	ESTIMATED COMPLETION DATE:09/30/23

DEMONSTRATION CRITERION
Criterion 1.a.1 – OROs use effective procedures to alert, notify, and mobilize emergency personnel and activate facilities in a timely manner.

CONDITION
During the March 7, 2023, biennial exercise for PVGS, the Field Monitoring CST did not demonstrate effective procedures to alert, notify, and mobilize emergency personnel and activate facilities in a timely manner. During the observations, deficiencies were noted which could have impeded response operations and protective actions by other OROs

Field Monitoring Teams and the Field Monitoring Team coordinator (CST Captain did not arrive at the Buckeye airport REAT-FWD location until 1050 hours. In accordance with the Arizona Department of Emergency and Military Affairs Radiological Emergency Assistance Team Annex, dated July 2021, the Field Monitoring Teams are directed to mobilize at the Alert Emergency Classification Level (ECL), which occurred at approximately 0900 hours. Due to the late arrival at 1050 hours to the REAT Forward facility their performance in the PVGS Plume Phase Exercise was degraded. Additionally, prior to Field Monitoring Teams being dispatched, their leadership directed the team members to eat lunch, which further delayed their deployment to the field for conducting radiological surveys and sample collection. In an actual radiological release from the PVGS, this performance could have resulted in degraded protection of the public health and safety due to the Field Monitoring Teams not providing critical radiological data to decision-

makers within the Arizona Department of Emergency Management and Military Affairs. The Arizona Department of Emergency and Military Affairs CST Radiological Emergency Assistance Team - Forward (REAT-F) did not successfully demonstrate field teams were managed to obtain sufficient information to help characterize the release and to control radiation exposure.

PLANNING REFERENCES
This sub-element is derived from NUREG-0654/FEMAREP-1, which requires that OROs have the capability to alert, notify, and mobilize emergency personnel, and activate and staff emergency facilities. (NUREG-0654/FEMA-REP-1, A.1.a, e; A.3, 4; C.1,4, 6; D.4; E.1, 2; G.3.a; H.3, 4)

EFFECT
Field Monitoring Team data was not available for use by the TOC in dose assessment due to the late deployment of Field Monitoring Teams. Additionally different turn back values and threshold doses could have resulted in exceeding state administrative exposures. Field Monitoring Team radiological data was not obtained soon enough to help characterize the release and to control radiation exposure.

D. Criterion 3.a.1- Radiological Emergency Assistance Team at REAT-FWD

The OROs issue appropriate dosimetry, KI, and procedures, and manage radiological exposure to emergency workers in accordance with the plans/procedures.
Assessment Area 3; Protective Action Implementation, Sub-element 3.a; Implementation of Emergency Worker Exposure Control.

Issue Number: 45-23-3.a.1-L2-04; Protective Action Implementation	
ISSUE: The REAT-F Captain did not conduct a situational briefing. SI units were used and not converted to traditional units. There was a lack of awareness on how to convert or a need to convert. The REAT Forward Captain did not have a good understanding or knowledge of the turn back values or administrative limits and did not effectively provide this information.	
RECOMMENDATION: Additional radiation protection training including FEMA standard REP classes and experience should help considerably. A redemonstration of Field Team mobilization, use of the Arizona state approved procedures with the TOC dose assessment.	
CORRECTIVE ACTION DESCRIPTION: Have the Arizona Department of Emergency and Military Affairs (DEMA) Weapons of Mass Destruction CST Radiological Emergency Assistance Team -Forward (REAT-F) staff follow Radiological Emergency Assistance Team Annex, dated July 2021 or CST Procedures. Identify which procedures will be used and ensure FEMA Region 9 has reviewed and approved the procedures.	
PRIMARY RESPONSIBLE AGENCY:	
AZDEMA, Civil Support Teams	START DATE:
AGENCY POC: Carpena, Sonia	ESTIMATED COMPLETION DATE:09/30/23

DEMONSTRATION CRITERION
Criterion: 3.a.1 – The OROs issue appropriate dosimetry, KI, and procedures, and manage radiological exposure to emergency workers in accordance with the plans/procedures. Emergency workers periodically and at the end of each mission read their dosimeters and record the readings

on the appropriate exposure record or chart. OROs maintain appropriate record-keeping of the administration of KI to emergency workers.

CONDITION
The REAT-F Captain did not conduct a situational briefing of events indicating that: the Palo Verde Nuclear Generating Station (PVNGS) declared a GENERAL EMERGENCY Classification Level (ECL) with an associated radiological release. There was not a briefing from the REAT-F Captain involving checking the direct-reading dosimeters periodically during an emergency response, (e.g., every 15 to 30 minutes), recording the readings of the direct-reading dosimeters on exposure record(s), reporting radiation exposure limits and turn-back values, workers undertaking life-saving missions or protecting valuable property or large populations may face increased risk from radiation, proper use of permanent record dosimeters, dosing and documentation of KI ingestion, why KI is administered and any adverse effects, where to report for monitoring and decontamination, and where and to whom to return their dosimetry at the conclusion of the emergency or mission. Field Monitoring Teams had different turnback values regarding dose rates and accumulated dose.

The Arizona Department of Emergency and Military Affairs has a 1000 mR/h turnback value, reporting value of 200mR and administrative dose limit of 500mR. The Direct Reading dosimeters (DRDs), RADIAC Model RGU-100-GO, were labeled with dose rate limit of 1cGy/h (PV) 5cGy/h (CST) and a dose limit of 2.5cGy. (5cGy/h= 5R/h, 2.5cGy=2.5R). During briefings prior to deployment to the field for measurements, the Survey Team Leader did not address the administrative dose limits, turn-back limit, or instruct the field monitoring teams to check their dosimetry readings every 15 minutes. The DRD displays dose and dose rates in Grays (Gy) and Grays per hour (GY/hr) however the dose limits for emergency workers in the DEMA REAT Annex are detailed in rem and millirem/hr.

PLANNING REFERENCE
(NUREG-0654/FEMA-REP-1, J.10.e; K.3.a, b; K.4) and Radiological Emergency Assistance Team Annex, dated July 2021.

EFFECT
Not providing a complete radiological and situational brief could cause emergency workers (EWs) to be at greater risk of excessive exposure, KI allergic reactions, and other safety hazards.

E. Criterion 4.a.2 - Radiological Emergency Assistance Team at REAT-FWD.

Field Teams (two or more) are managed to obtain sufficient information to help characterize the release and to control radiation exposure. Assessment Area 4; Field Measurements and Analyses, Sub-element 4.a; Plume Phase Field Measurements and Analyses.

Issue Number: 45-23-4.a.2-L2-05; Field Measurements and Analyses
ISSUE: The REAT-F Captain did not provide effective direction to the Field Monitoring Teams (FMTs) regarding updates of the plant status for PVGS. The Field Monitoring Teams were not notified of the declared a GENERAL EMERGENCY Classification Level (ECL) with an associated radiological release in a timely manner and were not directed to collect exposure rates, samples and other field data in a timely and effective manner.

RECOMMENDATION: Additional radiation protection training including FEMA standard REP classes and experience should help considerably. A redemonstration of Field Team Mobilization, use of the Arizona state approved procedures with the TOC dose assessment. Training RAAC (Radiological Accident Assessment) course and its pre-requisite classes and Radiological Core Concepts (RCCC) course and its pre-req classes prior to a scheduled re-demonstration.	
CORRECTIVE ACTION DESCRIPTION: Selected staff should attend standard FEMA REP program training courses and receive additional hands-on training.	
PRIMARY RESPONSIBLE AGENCY:	
AZDEMA, Civil Support Teams	START DATE:
AGENCY POC: Carpena, Sonia	ESTIMATED COMPLETION DATE:09/30/23

DEMONSTRATION CRITERION
Criterion: 4.a.2: Field Teams (two or more) are managed to obtain sufficient information to help characterize the release and to control radiation exposure.

CONDITION
The REAT-F Captain did not conduct a situational briefing of events indicating that: PVNGS declared a GENERAL EMERGENCY Classification Level (ECL) with an associated radiological release. There was not a briefing from the REAT-F Captain involving checking the direct-reading dosimeters periodically during an emergency response, (e.g., every 15 to 30 minutes), recording the readings of the direct-reading dosimeters on exposure record(s), reporting radiation exposure limits and turn-back values, workers undertaking life-saving missions or protecting valuable property or large populations may face increased risk from radiation, proper use of permanent record dosimeters, dosing and documentation of KI ingestion, why KI is administered and any adverse effects, where to report for monitoring and decontamination, and where and to whom to return their dosimetry at the conclusion of the emergency or mission.

PLANNING REFERENCE
(NUREG-0654/FEMA-REP-1, C.1; H.12; I.7, 8, 11; J.10.a) and Radiological Emergency Assistance Team Annex, dated July 2021.

EFFECT
Not providing a complete radiological and situational brief could cause EWs to be at greater risk of excessive exposure, KI allergic reactions, and other safety hazards.

F. Criterion 6.b.1- Radiological Emergency Assistance Team at REAT-FWD. Assessment Area 6; Support Operations/Facilities, Sub-element 6.b; Monitoring and Decontamination of Emergency Workers and their Equipment and Vehicles.

Issue Number: 45-23-6.b.1-L2-06; Support Operations/Facilities
ISSUE: REAT Forward staff did not demonstrate the ability to decontaminate equipment and vehicles per the extent of play agreement or approved plans and procedures.
RECOMMENDATION: Have the Arizona Department of Emergency and Military Affairs Weapons of Mass Destruction CST Radiological Emergency Assistance Team -Forward

(REAT-F) staff follow Radiological Emergency Assistance Team Annex, dated July 2021 or CST Procedures. Identify which procedures will be used and ensure FEMA Region 9 has reviewed and approved the procedures.	
CORRECTIVE ACTION DESCRIPTION: Selected staff should attend standard FEMA REP program training courses when possible and receive additional hands-on training. Arizona Department of Emergency and Military Affairs and CST will review Arizona Department of Emergency and Military Affairs procedures and brief CST personnel on Arizona Department of Emergency and Military Affairs procedures and their use when responding to PVGS tasks.	
PRIMARY RESPONSIBLE AGENCY:	
AZDEMA, Civil Support Teams	START DATE:
AGENCY POC: Carpena, Sonia	ESTIMATED COMPLETION DATE:09/30/23

DEMONSTRATION CRITERIA
Criterion: 6.b.1: The facility/ORO has adequate procedures and resources to accomplish monitoring and decontamination of emergency workers and their equipment and vehicles.

CONDITION
The Arizona Department of Emergency and Military Affairs Weapons of Mass Destruction CST Radiological Emergency Assistance Team -Forward (REAT-F) Staff did not demonstrate all the requirements of Criterion 6.b.1.

PLANNING REFERENCE
(NUREG-0654/FEMA-REP-1, K.5.a, b) and Radiological Emergency Assistance Team Annex, dated July 2021.

EFFECT
The Arizona Department of Emergency and Military Affairs Weapons of Mass Destruction CST Radiological Emergency Assistance Team -Forward (REAT-F) Staff do not meet the requirements of detailed in NUREG-0654/FEMA-REP-1, K.5.a, b and Radiological Emergency Assistance Team Annex, dated July 2021.

SECTION 3 CONCLUSION

FEMA evaluated a redemonstration of some elements of a PPX for the EPZ surrounding PVGS on September 19, 2023. An initial evaluation of the rumor control portion of the Joint Information Center was also conducted. The purpose of the exercise was to assess the readiness of OROs to perform specific functions in response to a simulated radiological incident occurring at or within the vicinity of the PVGS. The exercise and related assessment areas were conducted in accordance with FEMA policies and guidance concerning emergency response plans and procedures. Additionally, one criterion was demonstrated and evaluated out of sequence from the main portion of the biennial exercise.

Copies of the approved EOP agreements are maintained by the Technological Hazards Branch of FEMA Region 9's National Preparedness Division.

Based on the evaluation, the offsite plans, and procedures for jurisdictions site specific to PVGS can be implemented and are adequate to provide continued reasonable assurance that appropriate measures can be taken to protect the health and safety of the public in the event of a radiological incident occurring at or within the vicinity of the PVGS.

There were no new findings and previous findings were re-demonstrated satisfactorily.

Therefore, Title 44 Code of Federal Regulations § 350 (October 2021), approval of the offsite plans and procedures and preparedness for the State of Arizona site-specific to PVGS will remain in effect.

Appendix A: EXERCISE TIMELINE

Palo Verde Generating Station Biennial Exercise Timeline summary September 19, 2023

0600 Exercise start at PVGS
0655 EAC Alert Declared
0817 EOC activated
0822 JIC activated
0940 CST (FMT) activated
1030 EAC GE Declared
1220 End of Exercise

Appendix B: ADDITIONAL INFORMATION

Participating Organizations

STATE
AZ Department of Emergency and Military Affairs, Division of Emergency Management
AZ Department of Public Safety
AZ National Guard Civil Support Team

FEDERAL FAMILY
Federal Emergency Management Agency

INDUSTRY
Palo Verde Generating Station

Appendix C: ACRONYMS AND ABBREVIATIONS

ACRONYM	DESCRIPTION
AAR	**After Action Report**
PVGS	**Palo Verde Generating Station**
DHS	**Department of Homeland Security**
EAS	**Emergency Alert System**
ENDEX	**End Exercise**
EOC	**Emergency Operations Center**
EOP	**Extent of Play**
EPZ	**Emergency Planning Zone**
FEMA	**Federal Emergency Management Agency**
GE	**General Emergency**
IP	**Improvement Plan**
JIC	**Joint Information Center**
KI	**Potassium Iodide**
ORO	**Offsite Response Organization**
L1	**Level 1**
L2	**Level 2**
LE	**Law Enforcement**
M	**Met**
N	**Not Demonstrated**
N/A	**Not Applicable**
NPD	**National Preparedness Division**
NPP	**Nuclear Power Plant**
P	**Plan Issue**
PAD	**Protective Action Decision**
PAG	**Protective Action Guide**
PAR	**Protective Action Recommendation**
PPX	**Plume Phase Exercise**
REPP	**Radiological Emergency Preparedness Program**
SOC	**State Operations Center**
THB	**Technological Hazards Branch**
U.S.	**United States**