National Nuclear Security Administration

United States
Department of Energy
National Nuclear Security Administration

International Nuclear Security

M7: IAEA Guidance for Coordination of Security Response and Emergency Response at Research Reactors

Research Reactor Sabotage Protection Workshop

SAND2025-02023O

INS International Nuclear Security
Reducing Risk of Nuclear Terrorism

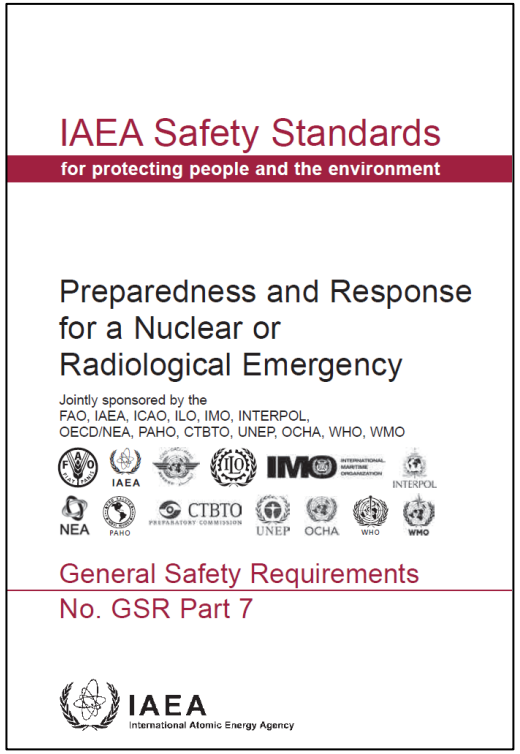
Learning Objectives

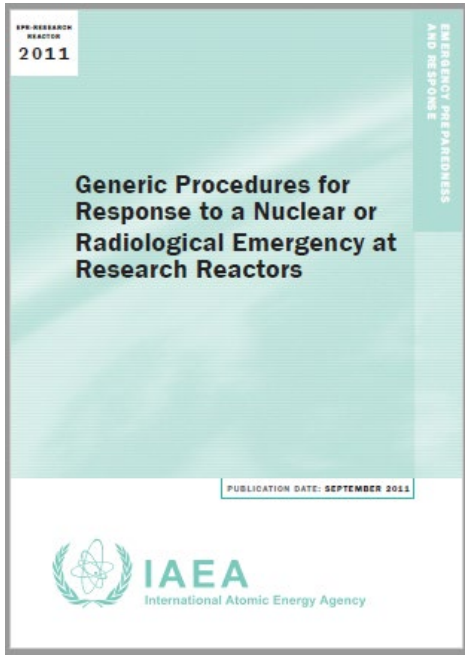
Objectives:

- Become familiar with IAEA guidance on emergency response at a research reactor facility
- Understand the roles and responsibilities of security response forces and emergency response organizations
- Discuss good practices for coordination of emergency response and security response

IAEA Guidance for Emergency Response at a Research Reactor (1)

- IAEA Safety Standards for Preparedness and Response for a Nuclear or Radiological Emergency are presented in General Safety Requirements - GSR Part 7 (2015)
  - Applies to nuclear or radiological emergencies irrespective of the cause (including a nuclear security event)
  - Establishes emergency response requirements
  - Is intended to be consistent with IAEA NSS guidance
- Specific guidance for research reactors is provided in EPR-RESEARCH REACTOR (2011)





IAEA Guidance for Emergency Response at a Research Reactor (2)

- Low power research reactors are Threat Category III facilities
  - Fuel failure is unlikely
  - An emergency threatening members of the public beyond the site boundary is unlikely and PAZ/UPZ are withing the site boundary
- High-power reactors are Threat Category II facilities
  - Emergencies can be more severe
  - PAZ is normally within the site boundary, and UPZ may extend a few km outward
- An MTR facility is likely a Threat Category II facility

UPZ - urgent protective action planning zone
PAZ - precautionary action zone

IAEA Guidance for Emergency Response at a Research Reactor (3)

- Emergency response process and objectives
  - Early Phase
    - Stabilize the reactor condition
    - Assess the emergency and initiate mitigative actions
    - Minimize radiation exposure to on-site personnel and off-site responders
  - Middle Phase
    - Request appropriate off-site assistance
    - Determine the need for off-site protective action
    - Keep the public informed
  - Late Phase
    - Return the facility to a normal operations

IAEA Guidance for Emergency Response at a Research Reactor (4)

- Emergency classification for Threat Cat II facilities
- The level of classification dictates the scope and timing of response actions
- Security event results in an activation of the Emergency Plan

Alert

Facility Emergency

Site Area Emergency

General emergency

	Declare a General Emergency if:	Declare a Site Area Emergency if:	Declare a Facility Emergency if:	Declare an Alert if:
Security event (intruder or terrorist attack) *Note that the site Security Plan may require actions in addition to the emergency response procedures.*	Security event causes containment damage and Security event causes core damage	Security event causes containment damage or Security event causes core damage	Security event, actual or threatened, that could result in damage to any safety system operation or the reactor	Credible security threat to the reactor or reactor safety systems

IAEA Guidance for Emergency Response at a Research Reactor (5)

- Emergency response priorities

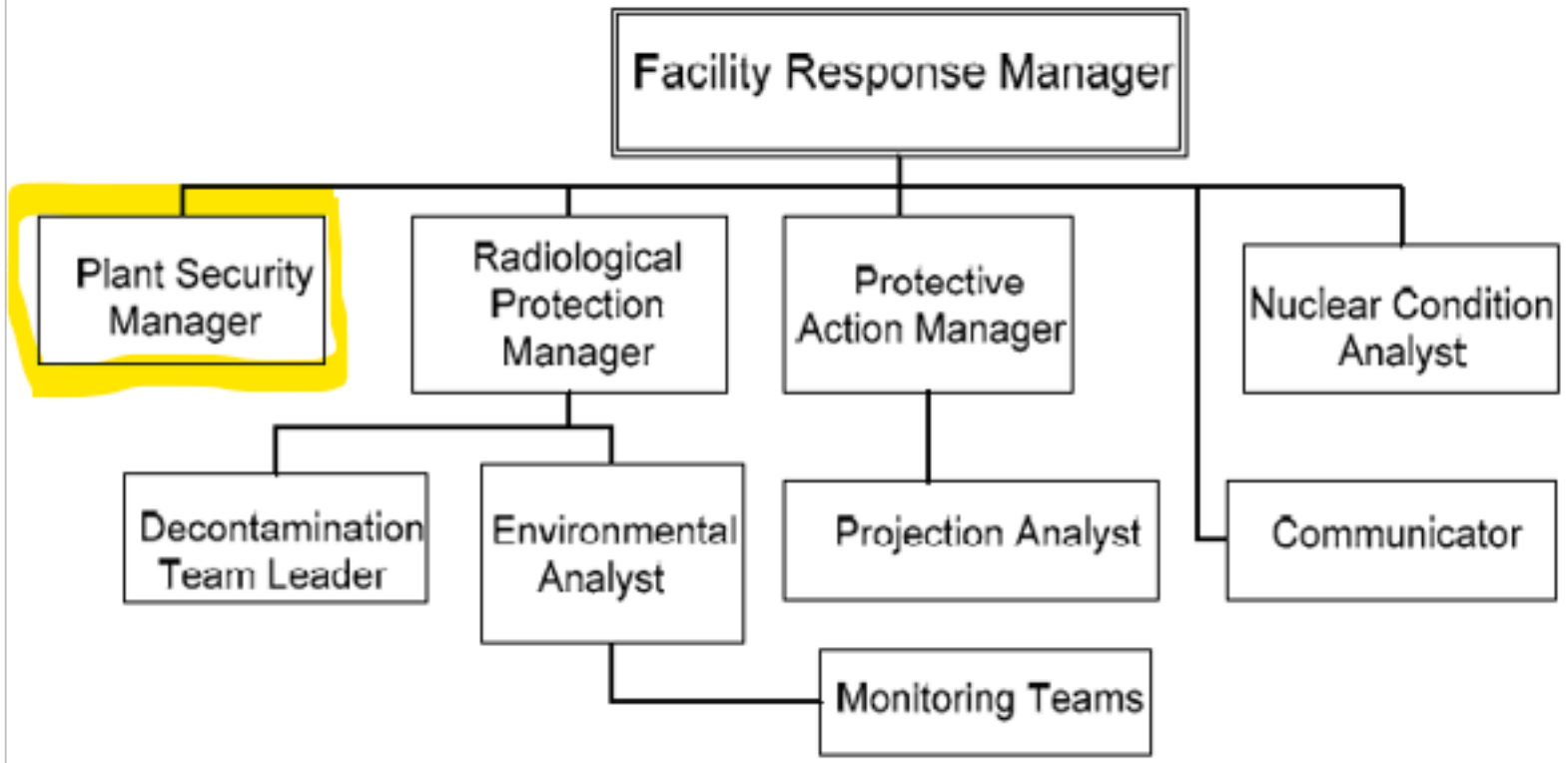
Priority	Action	Response Time Objective for Emergency Class			
		General Emergency	Site Area Emergency	Facility Emergency	Alert
1	Classify event based on reactor and radiological conditions	Initial classification — within 15 minutes of recognizing an emergency condition Subsequent classification — Review periodically and when conditions change or new information is available			
	Notify on-site personnel and facility management	Complete within 15 minutes of classification			
	Notify off-site authorities	Within 15 minutes of classification		Within 1 hour of classification	
	Recommend on-site protective actions	Immediately after classification and after major changes in radiological conditions; complete implementation within 1 hour			
	Activate on-site Emergency Response Team	Determine needed support and request immediately after classification; complete within 2 hours			
	Obtain support of off-site emergency services	Request support as soon as the need is recognized			
2	Develop environmental monitoring plan	Within 30 minutes after classification			
	Deploy on-site environmental monitoring teams	Within 30 minutes after classification; complete within 1 hour			
	Recommend off-site urgent protective actions	Within 30 minutes after classification		No off-site protective actions are expected to be required	
3	Initiate environmental monitoring off-site and near the facility	Within 1 hour after classification		No off-site environmental monitoring is expected to be required	
	Assess environmental monitoring results and revise environmental monitoring plan	On-site — complete within 1 hour after classification Off-site — Continuously, as environmental monitoring results are available			
	Review urgent protective actions	Continuously, as environmental monitoring results are available			
4	Project off-site radiological consequences	Commence within 1 hour using on-site environmental monitoring results		No off-site radiological consequences are expected	

Coordination of Emergency Response and Security Response (1)

- Facility-level response plans are elements of the Operator's license
  - Contingency Plan includes measures to prevent further damage, secure the facility, and protect emergency equipment and personnel
  - Emergency Plan includes measures to mitigate and minimize radiological consequences of sabotage as well as human errors, equipment failure, and natural disaster
  - The contingency plans and emergency plans should be complementary
  - Physical protection and safety should not adversely affect each other
- State should establish a national response framework
  - Ensures that the Operator's response plans are effective and that joint exercises, which simultaneously test emergency and contingency plans are conducted
  - Coordinates response at the State level in accordance with the national response framework

Coordination of Emergency Response and Security Response (2)

- On-site coordination is accomplished through Threat Category II Emergency Response Team
  - Initial coordination involves communication between CAS and Control Room
- Coordination procedures must be documented and exercised



Source: EPR-RESEARCH REACTOR (2011)

In Conclusion

- IAEA has extensive specific guidance for emergency response at research reactors
- Security Contingency Plan and Emergency Plan are elements of the facility's operating license
- Both plans are expected to be activated during a significant security event
- Coordination between security response and emergency response should be described in procedures and practiced

National Nuclear Security Administration

Questions, Comments, Concerns?

INS International Nuclear Security
Reducing Risk of Nuclear Terrorism