

International Atomic Energy Agency

Department of Nuclear Safety and Security

Incident and Emergency Centre

Perspectives for assessment and prognosis process from an NPP exercise and a response to a real event

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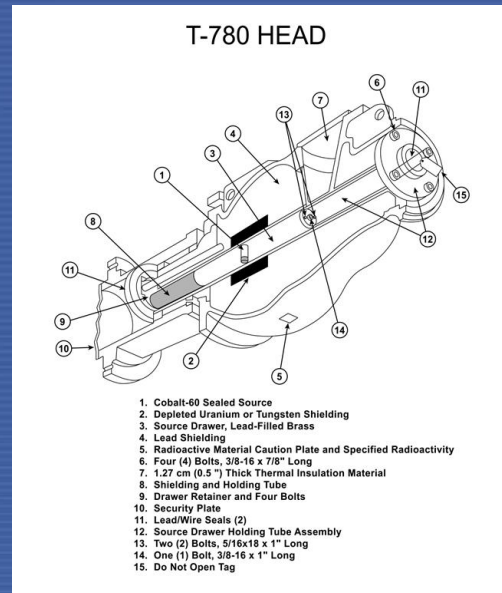
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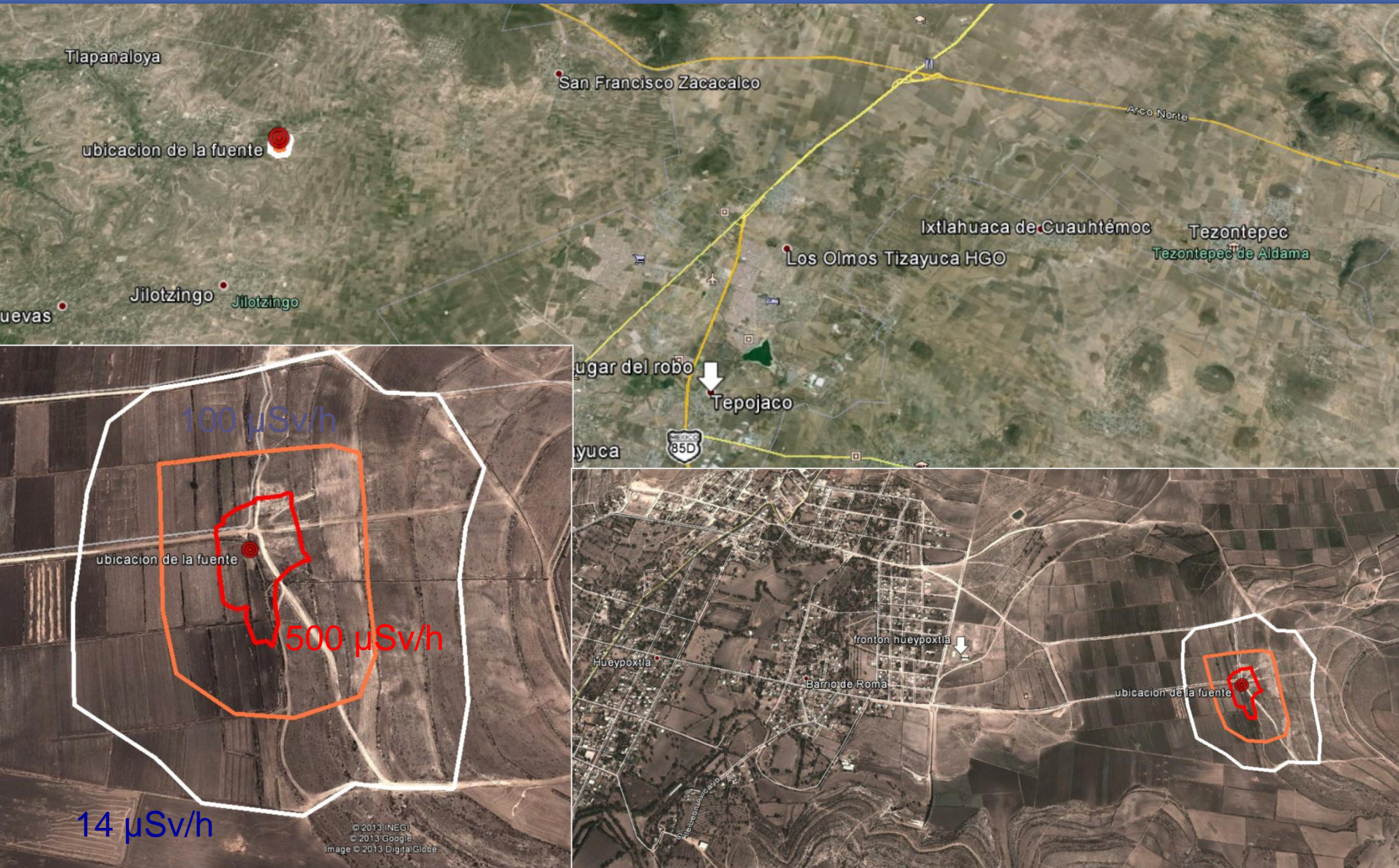
Introduction

- Purpose is to provide two examples from a real radiological emergency and an actual exercise at a nuclear power plant
- Focus will be on discussing observations and interactions from Member State perspective, followed by IAEA perspective

2013, Mexico, Co-60 Radiotherapy



Source location and survey



Source recovery



Final check after source recovery



IAEA Role in Response

Notification and Official Information Exchange

- Initial notification from official contact point (CP)
- Information reviewed and published
- Technical details shared on Unified System for Information Exchange in Incidents or Emergencies (USIE)

“...vehicle transporting a teletherapy source ...Co-60 approximately 3000 Ci...was robbed...”

“...authorities have been alerted...squad composed of police and personnel from the regulatory authority has been dispatcheda statement has been released to the press to notify the public of this event...”

Technical details shared immediately



To: IAEA (EC); United States of America		MESSAGE No. 1 For Authority use only
EMERCON	EMERCON	ADVISORY
> IAEA HEADER		
IAEA ref No:	IAEA/2013/03/RR/001	
Message Status:	Verified by IAEA	
Publication Name:		
Changes by IAEA:		
Fax Distribution List:		
Name of Duty Manager:	Pete Wells	
> BASIC INFORMATION		
Reporting STATE:	Mexico	
Is this an official Notification under the Early Notification Convention of actual or potential international transboundary release of radiological significance for another State?	No	
Competent Authority:	Comisión Nacional de Seguridad Nuclear y Salvaguardias (CNSNS)	
Telephone:	+52-5550903200	
Fax:	+52-5550904193	
Email:	mexico.mnp@cnsns.gob.mx	
Website URL:		
Contact person (official position):	Ing. Juan Eibenschütz Hartman	
Event type:	Missing Dangerous Source	
Nature of event:	Theft of a vehicle transporting a Category 1 Source	
Type of facility:		
Emergency class declared:		
Basis for declaration:		
Name of place/facility:	Tepic, Jalisco, Mexico	
Coordinates:		
Date and time of event:	2013-12-03 08:00 UTC	
Date and time of emergency declaration:		
Information VALID at:	2013-12-03 14:00 UTC	
> EVENT DESCRIPTION		
Event summary:	A vehicle transporting a teletherapy source from the IMSS Hospital in Tepic, Jalisco, Mexico (Co-60 approximately 3000 Ci) to the Radioactive Waste Storage Center (CADER) in Tepic, Jalisco, Mexico was robbed while the driver was waiting in a gas station for the CADER to open in the Municipality of Tepic, Jalisco.	
> ACTIONS TAKEN/PLANNED		
Actions taken/planned:	The Mexican law enforcement authorities have been alerted, as Civil Protection and the Mexican Nuclear Regulatory Authority. A squad composed of police and personnel from the regulatory authority has been dispatched to the town near the Tepic area to begin searching for the missing source, and a statement has been released to the press to notify the public of this event.	
> MEDIA INFORMATION		
Provisional IES rating:		
Media contact telephone:		
Public website URL:	http://www.cnsns.gob.mx	
Press release attached:	No	
> OTHER RELEVANT INFORMATION		
Other relevant information:		
Further information website URL:		
Further information in attachment:	No	

IAEA Role in Response

Informing the Public

- Immediately prepared public press release
- Coordinated with counterpart and released on IAEA homepage

“Mexico has informed the IAEA's Incident and Emergency Centre (IEC) of the theft of a truck carrying a dangerous radioactive source...”

“...The Mexican authorities are currently conducting a search for the source and have issued a press release to alert the public... IAEA has made an offer of good offices to Mexico...”

Information with the public
shared immediately



Mexico Informs IAEA of Theft of Dangerous Radioactive Source



The international radiation symbol, or trefoil, indicates hazardous radioactive material. (Graphic: IAEA)

Mexico has informed the IAEA's Incident and Emergency Centre (IEC) of the theft of a truck carrying a dangerous radioactive source used in medical treatment.

Mexico's "Comisión Nacional de Seguridad Nuclear y Salvaguardias (CNSNS)" said the truck, which was transporting the cobalt-60 teletherapy source from a hospital in the northern city of Tijuana to a radioactive waste storage centre, was stolen in Tepojaco near Mexico City at around 08:00 UTC on 2 December 2013.

At the time the truck was stolen, the source was properly shielded. However, the source could be extremely dangerous to a person if removed from the shielding, or if it was damaged.

The Mexican authorities are currently conducting a search for the source and have issued a press release to alert the public.

The IAEA has made an offer of good offices to Mexico, a process that makes the IAEA available to provide assistance if requested by a Member State, and the IEC remains in contact with the CNSNS.

IAEA Role in Response

Assessment and Prognosis

- IAEA Technical Team working in IEC received additional information from official CP
 - Pictures
 - Strategy to inform the public
 - Provided advice on expected radiation fields (on discovery), etc
- IAEA Technical Team provided radiation safety information and diagrams of equipment during source loading
- IAEA Technical Team understood response actions



IAEA Role in Response

Assessment and Prognosis

...the Mexican authorities and the IAEA believe the general public is safe and will remain safe

...[IAEA] believes the actions taken in response to the discovery of the source are appropriate and follow Agency guidance for this type of event



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Mexico Says Stolen Radioactive Source Found in Field



The international radiation symbol, or trefoil, indicates hazardous radioactive material. (Graphic: IAEA)

Story Resources

- ∞ Mexico Informs IAEA of Theft of Dangerous Radioactive Source, 4 December 2013
- ∞ IAEA Incidents and Emergencies (IEC)
- ∞ Comisión Nacional de Seguridad Nuclear y Salvaguardias (CNSNS)

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Mexico has informed the IAEA's Incident and Emergency Centre (IEC) that it has located a dangerous radioactive source that had been missing since the truck on which it was being transported was stolen on 2 December 2013.

Mexico's "Comisión Nacional de Seguridad Nuclear y Salvaguardias (CNSNS)" said law enforcement authorities tracked the teletherapy device down to a field near the town of Hueypoxtlá in Mexico State, very close to where the truck was stolen, at around 14:00 (20:00 UTC) on 4 December 2013.

The radioactive cobalt-60 source contained in the device has been removed from its protective shielding, but there is no indication that it has been damaged or broken up and no sign of contamination to the area. Police have secured the area around the source to a distance of 500 metres.

The source, with an activity of 3 000 curies (111 terabequerels), is considered Category 1. The IAEA defines a Category 1 source as extremely dangerous to the person. If not safely managed or securely protected, it would be likely to cause permanent injury to a person who handled it or who was otherwise in contact with it for more than a few minutes. It would probably be fatal to be close to this amount of unshielded radioactive material for a period in the range of a few minutes to an hour.

Mexican authorities are assessing potential radiation exposure to persons who may have been close to the unshielded source, and hospitals have been alerted to watch for symptoms of such exposure.

People exposed to the source do not represent a contamination risk to others.

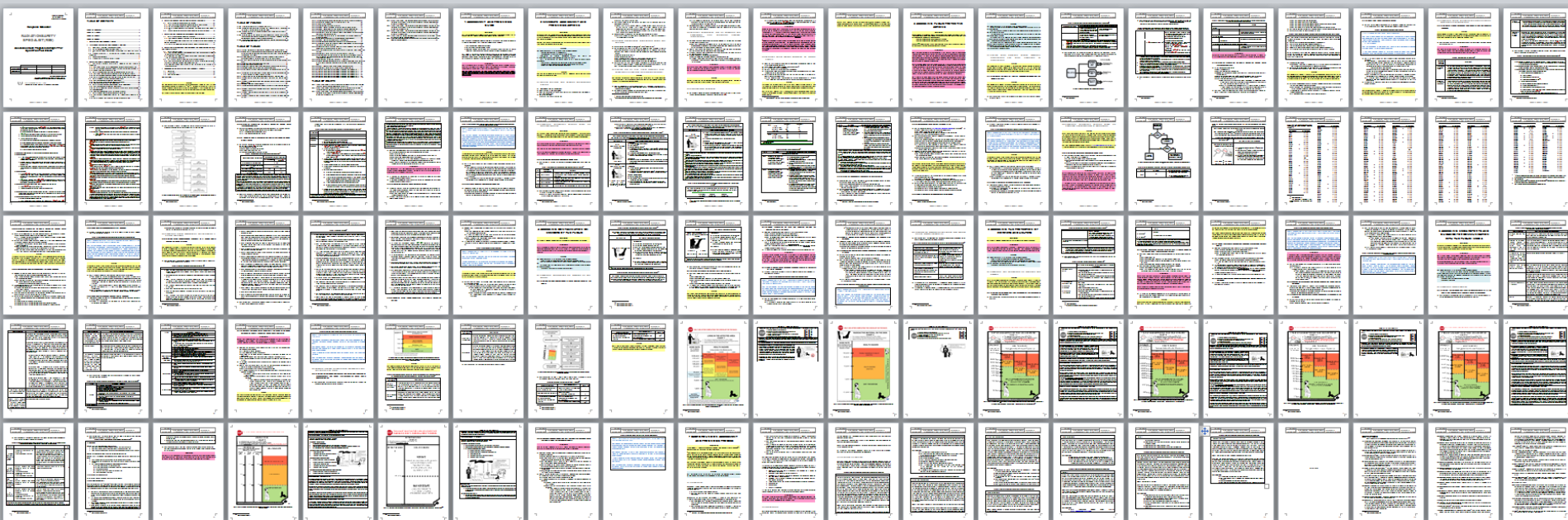
Based on the information available, the Mexican authorities and the IAEA believe the general public is safe and will remain safe.

The CNSNS and the Instituto Nacional de Investigaciones Nucleares (ININ) are preparing plans to recover and secure the source.

The IAEA remains in close contact with the Mexican authorities. It believes the actions taken in response to the discovery of the source are appropriate and follow Agency guidance for this type of event.

IAEA Role in Response

Assessment and Prognosis Procedures



IAEA has developed detailed internal procedures for assessment and prognosis and has conducted training of staff

IAEA Role in Response

Impact of Harmonized Message

Radioactive material container from hijacked truck found empty in Mexico

Published time: December 04, 2013 23:21
Edited time: December 06, 2013 14:34

[Get short URL](#)



Federal policemen stand guard in front of the National Institute for Nuclear Research (ININ) — the destination of the truck transporting a "teletherapy source" containing cobalt-60 which was stolen by gunmen on December 2 — in Maquixico, Mexico state on December 4, 2013. (AFP Photo / Yuri Cortez)



Mexican police located a stolen truck which contained dangerous radioactive material the UN warned could be used to construct a "dirty bomb." The safety container holding that cargo was found empty, with the material abandoned nearby.

The IAEA believes that there is no risk to public health in Mexico after a stolen radioactive shipment from a truck was recovered in a field.

Based on the information available, the Mexican authorities and the IAEA believe the general public is safe and will remain safe," the International Atomic Energy Agency said in a statement after the missing cargo of cobalt-60 enough to make a dirty bomb was found about half a mile from the container in central Mexico.

The UN watchdog said it been notified by Mexico's CNSNS nuclear safety authority that the protective shielding had "no indication that it has been damaged or broken up and no sign of contamination to the area."

It is "absolutely certain that whoever removed this material by hand is either already dead or about to die," Juan Eibenschutz, CNSNS director, told Milenio television.

"It would probably be fatal to be close to this amount of unshielded radioactive material for a period in the range of a few minutes to an hour," he said.

The US which borders Mexico was happy to see the situation resolved.

"What's most important is that the vehicle and equipment were recovered and the situation was resolved," White House press secretary Jay Carney said.



General view on December 4, 2013. Worker truck transporting a "teletherapy source" (AFP Photo / Yuri Cortez)

It is believed that the truck driver stole their truck.

On Wednesday, The vehicle was found transporting cobalt-60 from a hospital. Nuclear safety director Juan Eibenschutz said the truck was found about 10 kilometers from where the truck was stolen.

Mexico's national nuclear safety commission CNSNS has said that the thieves, thought to be unaware of the contents which have now been located, removed it from its protective container and were exposed to dangerous levels of radiation.

"This is a radioactive source that is very strong," Eibenschutz told the AP, saying that exposure could cause death almost immediately if in close proximity.

"Fortunately there are no people where the source of radioactivity is," Eibenschutz added.

So far there were no indications that the theft of the cobalt was an intentional act of terrorism, said Eibenschutz. The stolen radioactive material was used in radiation therapy equipment that is now obsolete and is being phased out of Mexico's public health system.



Photo from [cnsns.gob.mx](#)

Federal police and the military have been mobilized in the municipalities of Hueypoxtla and Zumpango. CNSNS says the recovered radioactive material will be returned to a sealed case as soon as possible.

An official familiar with similar cases told the AP that unintentional theft of radioactive materials are

"Based on the information available, the Mexican authorities and the IAEA believe the general public is safe and will remain safe," the International Atomic Energy Agency said in a statement...

Impact of Harmonized Message

"Fortunately there are no people where the source of radioactivity is," Eibenschutz added. [Juan Eibenschutz, CNSNS director]

So far there were no indications that the theft of the cobalt was an intentional act of terrorism, said Eibenschutz. The stolen radioactive material was used in radiation therapy equipment that is now obsolete and is being phased out of Mexico's public health system.



General view on December 4, 2013 of the place in Tepojaco, Hidalgo state where the Volkswagen Worker truck transporting a "teletherapy source" containing cobalt-60 was stolen by gunmen on December 2. (AFP Photo / Yuri Cortez)

It is believed that the truck drivers were sleeping at a gas station when gunmen assaulted them and stole their truck.

On Wednesday, The vehicle was found close to where it was stolen outside of Mexico City as it was transporting cobalt-60 from a hospital in Tijuana to a radioactive waste storage center. Mexico's nuclear safety director Juan Eibenschutz said radioactivity had been detected about a half mile (1 kilometer) from where the truck and container were located.

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Photo from cnsns.gob.mx

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Impact of Harmonized Message

"Fortunately there are no people where the source of radioactivity is," Eibenschutz added. [Juan Eibenschutz, CNSNS director]

Assessment and prognosis process achieves harmonized public messaging keeping the public better informed

health system.

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General view on D
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December 2. (AFP)

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IAEA Role in Response

Assessment and Prognosis

- First notification from official CP
- Site area emergency at CANDU NPP
- IAEA Technical Team was asked by leader to confirm that this matches Emergency Action Levels (EALs) [in IAEA Safety Standards]
- Following sequence of events took place

Assessment and Prognosis

Initial Contact

0:00

← Contact established with CP (Phone)

IAEA Technical Team asked for information about the event based on data needed to establish status of critical safety functions + event classification



Assessment and Prognosis

Initial Contact

0:00

Contact established with CP (Phone)



Assessment and Prognosis

IAEA Assessment

0:00

Contact established with CP (Phone)

0:20

IAEA Technical Team discusses information, follows procedures and reaches conclusion that event classification differs from EAL in IAEA Safety Standards



Assessment and Prognosis

IAEA Assessment

0:00

Contact established with CP (Phone)

0:20

Assessment finished. Requires resolution.



Assessment and Prognosis

Preparing Public Statement

0:00

Contact established with CP (Phone)

0:20

Assessment finished. Requires resolution.

0:30

IAEA Technical Team briefs IAEA Public Information Officer. Shares basic technical data concerning situation with Public Information Officer. They begin drafting public press statement (without assessment)



Assessment and Prognosis

Preparing Public Statement

0:00

Contact established with CP (Phone)

0:20

Assessment finished. Requires resolution.

0:30

Public statement begins to be developed



Assessment and Prognosis

Harmonizing Message

0:00

Contact established with CP (Phone)

0:20

Assessment finished. Requires resolution.

0:30

Public statement begins to be developed

1:00

Discussions with a technical counterpart from Canada take place. Situation is explained.



Assessment and Prognosis

Harmonizing Message

0:00

Contact established with CP (Phone)

0:20

Assessment finished. Requires resolution.

0:30

Public statement begins to be developed

1:00

Discussions with a technical counterpart from Canada take place. Situation is explained.

1:15

Agreement is reached questions are clarified



Assessment and Prognosis

Finalizing process

0:00

Contact established with CP (Phone)

0:20

Assessment finished. Requires resolution.

0:30

Public statement begins to be developed

1:00

Discussions with a technical counterpart from Canada take place. Situation is explained.

1:15

Agreement is reached and issue is resolved

1:30

Content produced for status summary report

Assessment and Prognosis

Finalizing process

0:00

Contact established with CP (Phone)

0:20

Assessment finished. Requires resolution.

0:30

Public statement begins to be developed

1:00

Discussions with a technical counterpart from Canada take place. Situation is explained.

1:15

Agreement is reached and issue is resolved

1:30

Content produced for status summary report



IAEA

Total elapsed time 90 minutes

IAEA Role in Response

Parallel Member State Actions

0:00

Contact established with CP
(Phone)

0:20

Assessment finished.
Requires resolution.

0:30

Public statement begins to be
developed

1:00

Discussions with a technical
counterpart from Canada take
place. Situation is explained.

1:15

Agreement is reached and
issue is resolved

1:30

Content produced for status
summary report

**Total elapsed time 90
minutes**

IAEA Role in Response

Parallel Member State Actions

In parallel CNSC was:

- Responding (as per response plan)
- Providing briefings to other Federal departments
- Providing information to media/public

0:00

Contact established with CP (Phone)

0:20

Assessment finished. Requires resolution.

0:30

Public statement begins to be developed

1:00

Discussions with a technical counterpart from Canada take place. Situation is explained.

1:15

Agreement is reached and issue is resolved

1:30

Content produced for status summary report

Total elapsed time 90 minutes

IAEA Role in Response

Parallel Member State Actions

In parallel CNSC was:

- Responding based

0:00

Contact established with CP
(Phone)

0:20

Assessment finished.

IAEA Assessment and prognosis does not
replace Member State responsibilities or
actions during a response

1:30

Content produced for status
summary report

**Total elapsed time 90
minutes**

IAEA Role in Response

Customized Tools

- IAEA has developed tools for assessment and prognosis:
 - Reactors
 - Radiological sources
 - Environmental monitoring
 - Data handling
 - Other situations
- Details types of technical parameters and questions to consider



Step 2: Emergency classification assessment		
Technical team assessment	Technical justification(s)	
al team believes should be declared		
classification declared by the accident	Not applicable	
ective actions currently being	Instructions: If the technical team's emergency classification differs from the declared classification the team is expected to evaluate the protective actions being implemented. If the actions of the 'Accident State' taken in response to the emergency meet what would be expected by the technical team, then although the declared emergency classification is different the response remains appropriate and follows IEA guidance for this type of event. -Public protective actions are only required to be implemented in the event a General Emergency is declared. The types of actions are outlined in EPR-NPP PPA, 2013 page 7 (section 2.2). -If a site area emergency is declared no protective measures are required; however preparations to implement protective actions if the event classification worsens and offsite monitoring would be expected. -No protective actions would be expected if a facility emergency or alert was declared.	
Emergency classification?		
ction		Technical justification(s)
Step 3: Cr		
Step 4: A		
em(s)	Technical justification(s)	
s)		
generators)		

Critical features: Cooling systems	Instructions:	
	Decreasing steam generator water level is an indication that secondary side heat removal could be lost. Begin trending the water level as a function of time to predict the time to steam generator dryout. Elevated steam generator pressure is an indicator of the potential loss of heat removal because low pressure injection systems are ineffective.	
Step 5: Predictions	Questions to consider:	Time(s)
Expect it to be?	<ul style="list-style-type: none"> What is the pressure of the steam generator? What is the temperature of the steam generator? What is the water level in the steam generator? What is the normal water level in the SG? What is the water level at which the steam generator is empty? Is the level increasing, decreasing or stable? What is the steam generator feed water injection flow rate? 	
	Technical parameters which may be useful to consider (if available):	
to occur (very low, low, medium, high)	<ul style="list-style-type: none"> RCS Pressure RCS Sub-cooling Margin PZR Water level SG Blowdown Activities SG Pressure Containment Pressure / Containment Temperature Vessel Water Level SG Blowdown Flow Rates Dose rate in the reactor Building Reactor Building Spray System Flow Sump Level RWST tank level Volume Activity at the Stack (normal and accidental) Steam generator water level (wide and narrow range) 	
to consider in the near future		

Simple, easy to understand visualizations

Auxiliary Systems

AC Power
(Offsite)

AC Power
(EDG)

DC Power

Control Systems

Auxiliary Systems

AC Power
(Offsite)

AC Power
(EDG)

DC Power

Control Systems

Auxiliary Systems

AC Power
(Offsite)

AC Power
(EDG)

DC Power

Control Systems

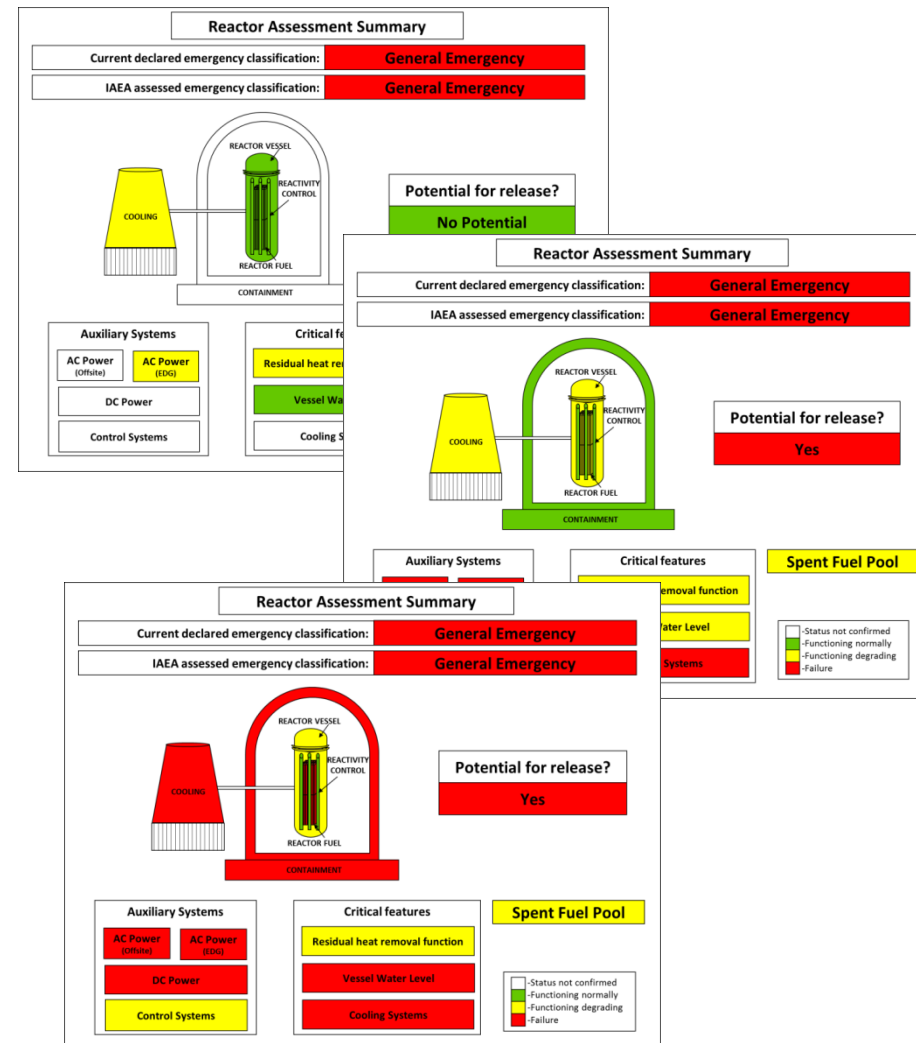
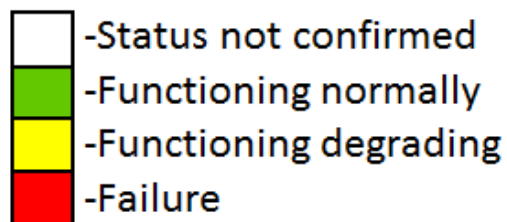
Auxiliary Systems

AC Power
(Offsite)

AC Power
(EDG)

DC Power

Control Systems




Track and communicate accident evolution

IAEA Role in Response

Supporting Databases

- Static parameters for NPPs
 - Technical data
 - Diagrams
 - Site data
- Dynamic parameters for NPPs
 - Critical safety functions
 - Technology specific





IAEA

EPRIMS

Emergency Preparedness and Response
Information Management System

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EPR Info

Reports

Administration

Contacts & Status

Documents

About

About EPRIMS

The IAEA Emergency Preparedness and Response Information Management System (EPRIMS) is a web based platform enabling Member States and the IAEA to collectively generate national and regional profiles on emergency preparedness and response (EPR). Member States can develop communication channels at the national level to perform self-assessment of national EPR arrangements, in compatibility with IAEA safety standards. To facilitate the data collection, EPRIMS is linked to other IAEA information sources such as USIE, EPREV, IRRS, GNNNS and the IEC website. EPRIMS is a secure and restricted platform and allows Member States to manage its privacy settings and restrict information sharing. It is used for tracking the status and progress towards establishing, maintaining and sustaining effective EPR arrangements at national and regional level. It will facilitate the systematic identification and prioritization of national and regional EPR needs, and allow the IAEA to provide a tailored approach to address those needs.

Access to EPRIMS

EPRIMS is a role-based system. It means that only people with a username and password have access to the system. Depending on the user's role, he/she can have permissions to:

- read;
- read and edit;
- read, edit and publish.

For confidentiality reasons, Member States' users can only see by default their own national information. However, settings have been developed to enable Member States to share their EPR status with other Member States.

EPRIMS National Coordinator

A National EPRIMS Coordinator shall be identified in each Member State. The Coordinator will have "admin" rights, i.e. for adding other users from that Member State from different national organizations involve in national EPR. While only the National EPRIMS Coordinator has "publish" rights, he/she can assign read or read and edit rights to other users. The National EPRIMS Coordinator is formally nominated by the Member State through the National Competent Authority. The Coordinator's role is to ensure that the information in EPRIMS is accurate, comprehensive, up-to-date and truly reflects the national EPR capabilities. This will require that all data inputs are discussed and reviewed with concerned national organizations and counterparts. The Coordinator is also responsible for adding users within the Member State and assign (re-assigning) specific privileges. He/she is the single contact point between the Member State and the IAEA's Incident and Emergency Centre (IEC) for all issues relating to EPRIMS.

[illegible]

Summary

- IAEA conducts assessment and prognosis in actual emergencies and exercises
- Member State support is needed
 - Very important to exercise process
- Sharing of information is essential
 - Sharing during preparedness phase (EPRIMS)
 - Sharing during emergency (USIE/IRMIS)
- Harmonizing technical message is important and valuable in keeping public informed

Thank you!

