The Potential role of TSOs in the IAEA Assessment and Prognosis process

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International Atomic Energy Agency

IAEA Role and Responsibility in response

1. Notification and official information exchange
2. Provision of assistance on request
3. Provision of public information
4. Assessment of potential emergency consequences and prognosis of possible emergency progression
5. Coordination of inter-agency response

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IAEA Role and Responsibility in Response

- Assessment of potential emergency consequences and prognosis of possible emergency progression

IAEA Action Plan on Nuclear Safety

'Enhance transparency and effectiveness of communication and improve dissemination of information'

- "The IAEA Secretariat to provide Member States, international organizations and the general public with timely, clear, factually correct, objective and easily understandable information during a nuclear emergency on its potential consequences, including analysis of available information and prognosis of possible scenarios based on evidence, scientific knowledge and the capabilities of Member States."

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IAEA Role and Responsibility in Response

- GC(57)/RES/9 para 103 stated that:
- *"Requests the Secretariat, in close cooperation with Member States, to continue to develop an effective public communication strategy and to maintain and further develop arrangements to provide Member States, international organizations and the general public with timely, clear, factually correct, objective and easily understandable information during a nuclear or radiological emergency, including the analysis of available information and the prognosis of potential consequences;"*

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IAEA Role and Responsibility in Response

- GC(58)/RES/10 para 103 and 104 state that:
- *"103. Requests the Secretariat to work with Member States to develop arrangements for assessments, prognosis and communication, making effective use of Member State capabilities that could be used during an emergency, and encourages Member States to inform, and periodically update, the Secretariat and other Member States of their capabilities;"*

- *"104. Encourages the Secretariat and Member States operating nuclear power plants to work together with a view to developing arrangements for the timely sharing of relevant technical parameters during an emergency to support the assessment and prognosis processes conducted by the Secretariat and other Member States;"*

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Assessment & Prognosis in Emergency

Principal Objective

- To determine where and what protective and/or other response actions need to be taken and to provide advice, as required

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Specific Tasks (1)

1. Develop a ‘reasonably’ bounding estimate of potential accident progression and associated exposure pathways
   - Based on information available, evidence, scientific knowledge
2. Evaluate relevant information to determine if public is safe and will continue to be safe, and if not identification of additional actions that should be considered
3. Evaluate relevant information to determine if workers and emergency workers are safe and will continue to be safe and, if not, to determine additional actions that should be considered

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Specific Tasks (2)

4. Identify actions that should be considered to address issues associated with international trade and interests
5. Assess protective and other response actions being implemented, recommended or discussed
   - Determine if they are doing more good than harm and, if not, identify actions that should be considered by MS, international organizations and Secretariat to address that situation
6. Actively alert Member States in which response actions may need to be considered
7. On-going assessment and prognosis based on event progression

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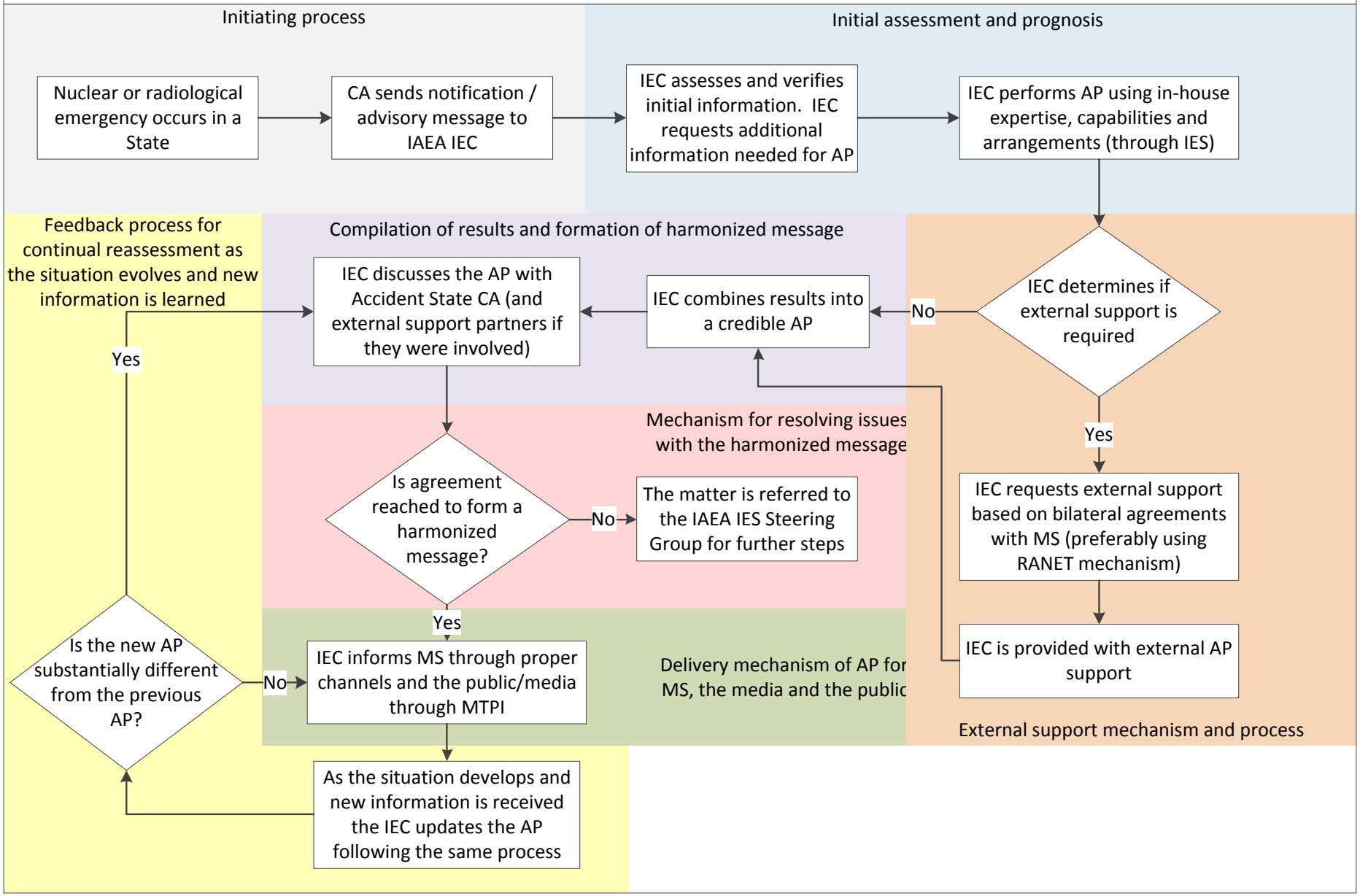
Assessment and prognosis process - Summary



Example of clear public messages

…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)

Listen to this story

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 Hueypoxtla 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.

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Example of clear public messages

Based on these reports and the information that has been made available, the IAEA considers <u>the public is safe</u> and sees no reason why this should not continue to be the case in the future.

…[IAEA] considers that the food supply chain is safely under control. The food supply in Japan <u>remains safe.</u>

Events and highlights on the progress related to recovery operations at Fukushima Daiichi NPS

February, 2014

Section 1: Executive summary

(1) The fact sheet uploaded in the link below is a summary of the current situation

http://www.kantei.go.jp/foreign/96_abe/decisions/2013/pdf/factsheet.pdf

(2) Information update from the previous fact sheet

There have been no updates from the previous fact sheet.

(3) The link of the previous fact sheet

There is no previous fact sheet at the moment.

Section 2: Current conditions and forecast onsite

2.1: Relevant information pertaining to issues related to the and fuel debris management)

(1) New Information

(i) Newly added topic (in past three months)

Newly added topics of the past three months are as issues, please refer to "related information".

- Decommissioning of Units 5 and 6 at Fukushima Daiichi Electric Power Company (TEPCO)) (January 31, 2014) http://www.tepco.co.jp/en/announcements/2014/123
- Nuclear Emergency Response Headquarters decided Pr Measures for Decommissioning and Contaminated Wat Economy, Trade and Industry (METI))(December 20, 201 http://www.meti.go.jp/english/earthquake/nuclear/de 001.pdf
- The results of the investigation and examining on matters of the Fukushima Nuclear Accident (TEPCO)(De http://www.tepco.co.jp/en/press/corp-com/release/20
- NRA's Action to TEPCO's Fuel Removal from Unit 4 Authority (NRA))(December 9, 2013) http://www.nsr.go.jp/english/data/131209.pdf
- Fuel removal from Unit 4 spent fuel pool has star (TEPCO)(November 18, 2013) http://www.tepco.co.jp/en/press/corp-com/release/20
- Nuclear Regulatory Authority (NRA)'s actions toward T reactor building, Fukushima Daiichi NPS (NRA)(Novemb

IAEA assessment on aspects presented in the February 2014 report *"Events and highlights on the progress related to recovery operations at Fukushima Daiichi NPS"*

The final IAEA Peer review report

The Final Report of the IAEA International Peer Review on the Mid- and Long-term Roadmap towards the Decommissioning of TEPCO's Fukushima Daiichi Nuclear Power Station Units 1-4 was published on the IAEA website on 13 February 2014. The mission was conducted from 25 November to 4 December 2013. The report acknowledges Japan's progress towards preparing Fukushima Daiichi for decommissioning and offers technical and policy advice on a range of issues, including fuel removal efforts, contaminated water management, and waste storage. As for the growing amounts of contaminated water at the site, the report advises that, to find a sustainable solution to the problem of managing contaminated water, TEPCO should consider all options, including the possible resumption of controlled discharges to the sea within authorized regulatory limits. TEPCO was advised to perform an assessment of the potential radiological impact to the population and the environment arising from the release of water containing tritium and any other residual radionuclides to the sea in order to evaluate the radiological significance and to have a good scientific basis for taking decisions. It is clear that final decision making will require engaging all stakeholders, including TEPCO, the NRA, the National Government, the Fukushima Prefecture Government, local communities and others. In this context, the report also stresses that the NRA should further enhance the seawater monitoring programme by coordinating interlaboratory comparisons to ensure good harmonization of the environmental data.

A press release describing the report is available on the IAEA webpage as is the full report:

- http://www.iaea.org/newscenter/news/2014/decommissioning.html
- http://www.iaea.org/newscenter/focus/fukushima/final_report120214.pdf

Measurements taken in the sea and surrounding areas

There is an intensive sea area monitoring programme established at the Fukushima Daiichi NPS. It comprises collection of seawater, sediment and marine biota, and is also focused primarily on fish. Recent results in the sea area around Fukushima Daiichi NPS have indicated that the radionuclide concentration levels outside the port and in the open sea have been relatively stable.

The measures from TEPCO to prevent contamination of the sea have been shown to be successful. The levels measured in seawater in the vicinity of the F1 area have remained relatively stable. Cs-134 and Cs-137 are in most cases below the detection limit of the analytical methods and are mostly below 1 Bq/L. As a comparison, the concentrations after the accident in March/April and May were about a factor of 10^5 (approximately 100,000 times) higher than the present levels. The reported levels of tritium are below any concern. See the following figure which shows the trend of some of the measurements at one location over time:

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Member State Support

- Incorporating the capabilities of Member States is an important part in maintaining a comprehensive response capability for all potential scenarios
  - This includes the ‘Accident State’
- TSO’s represent much of the advanced capabilities of Member States which could participate in this process

- How do we achieve these objectives together?

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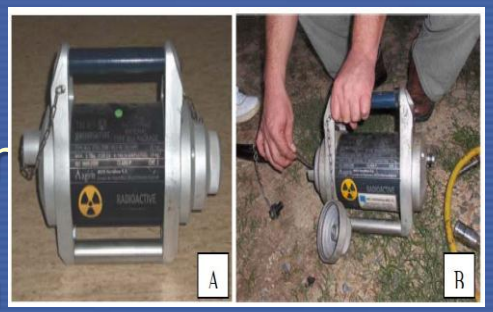
Response and Assistance Network (RANET)

- RANET was established in 2000
  - Operational tool to implement the Assistan Convention
  - Provision of international assistance upon request



- RANET is network of State Parties
  - Capable and willing to provide assistance upon request
  - Appropriately trained, equipped and qualified personnel
  - Respond quickly and effectively to emergencies

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EPR-RANET 2013

- Effective
  1 Sept 2013

- 8 Functional Areas
  - Defines 41 NAC
  - Covers wide range of response and assistance capabilities

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RANET Functional Areas

- Source Search and Recovery (SSR)
- Radiation Survey (RS)
- Environmental Sampling and Analysis (ESA)
- Radiological Assessment and Advice (RAA)
- Decontamination (DE)
- Medical Support (MS)
- Dose Assessment (DA)
- Nuclear Installation Assessment and Advice (NAA) - New in Sept 2013

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RANET Capabilities

Radiological Assessment and Advice

- Atmospheric dispersion
- Hydrospheric dispersion
- Radioecological models
- Dose predictions
- Public health protection
- Remediation and recovery

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RANET Capabilities

Nuclear Installation Assessment and Advice

- Nuclear Power Reactor Design Advice
- Nuclear Power Reactor Operations Advice
- Nuclear Power Reactor Accident Analysis
- Research Reactor Assessment and Advice
- Fuel Fabrication Facility Assessment and Advice
- Spent Fuel Storage Assessment and Advice
- Spent Fuel Reprocessing Assessment and Advice
- Operation of specialized technology

State Parties Registered in RANET

As of August 2014:

26 State Parties

Country	Source Search and Recovery	Radiation Survey	Environmental Sampling and Analysis	Radiological Assessment and Advice	Medical Support	Dose Assessment	Decontamination	Nuclear Installation Assessment and Advice
Argentina						FAT EBS		
Australia	FAT	FAT EBS	FAT				FAT	
Austria	FAT EBS	FAT EBS						
Canada						EBS		
China	FAT EBS	FAT EBS	FAT EBS	FAT EBS	FAT EBS	FAT EBS	FAT EBS	
Czech Republic	EBS	EBS	EBS	EBS		EBS		
Egypt	FAT EBS	FAT EBS	FAT EBS	FAT EBS	FAT EBS		FAT EBS	
Finland						EBS		
France	FAT	FAT	FAT EBS	EBS	FAT EBS	FAT EBS		
Germany	FAT EBS	FAT EBS	FAT EBS	FAT EBS	FAT EBS	FAT EBS	FAT	
Hungary	FAT	FAT	FAT EBS	FAT EBS	FAT	EBS	EBS	
Israel	FAT	FAT EBS	FAT EBS	EBS		EBS		
Japan		EBS	EBS	EBS	EBS	EBS		FAT EBS
Mexico	FAT	FAT	FAT			FAT		
Nigeria	FAT	FAT	FAT	FAT		FAT		
Norway			EBS					
Pakistan	FAT EBS	FAT EBS	FAT EBS	FAT EBS				
Romania	FAT	FAT EBS	FAT	FAT EBS		EBS	FAT	
Russian Federation		EBS	EBS	EBS	FAT EBS	FAT EBS		
Slovenia	FAT EBS	FAT EBS	FAT EBS	FAT	FAT	FAT		
Sri Lanka	FAT	FAT	FAT					
Sweden	FAT	FAT	FAT EBS	FAT EBS		EBS		
Switzerland	FAT EBS	FAT EBS	FAT EBS			EBS		
Turkey	FAT EBS	FAT EBS	FAT EBS	EBS		EBS		
United Kingdom		EBS	EBS	EBS		EBS		
United States of America	FAT EBS	FAT EBS	FAT EBS	FAT EBS	FAT EBS	FAT EBS		

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How to register

- Registration must be done through Competent Authority under the Emergency Conventions
- Form is available in RANET 2013
- Once registered, IAEA will contact you and develop a specific procedure concerning how to utilize your capabilities for supporting the assessment and prognosis process

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Next Steps

- Encourage RANET State Parties to register additional capabilities
- Encourage State Parties to register in RANET
- Build depth and redundancy
  - Regional distribution
  - NAA capabilities for different reactor and fuel types
- Establish and exercise protocols for NAC to perform assessment and prognosis with IAEA

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Conclusions

- Much work has been done to prepare, develop and implement processes required for assessment and prognosis process
- Continuous Member State involvement is critical
- TSOs represent an important part of the capabilities of Member States which can support assessment and prognosis process via RANET
- Continuous cooperation and collaboration in the future is critical

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Future activities

- International Experts' Meeting (IEM9) on Nuclear Accident Assessment and Prognosis during a Nuclear Power Reactor Incident or Emergency
  - April 2015 in Vienna, Austria
- International Conference on Global Emergency Preparedness and Response
  - 5-9 October 2015 in Vienna, Austria
- Technical Meeting on Emergency Centre Assessment and Prognosis Arrangements and Design
  - TBD November/December 2015 in Vienna, Austria

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Thank you!

For questions or comments contact:
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