TOWARDS A SUSTAINABLE AND RESPONSIBLE USE OF NUCLEAR ENERGY

Seoul National University
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The IAEA and its mission

Accelerate and enlarge the contribution of Atomic Energy to peace, health and prosperity

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TOWARDS A SUSTAINABLE AND RESPONSIBLE USE OF NUCLEAR ENERGY

- ***The IAEA and the Global Nuclear Safety and Security Framework***
- ***The IAEA Response to Fukushima Daiichi Accident***
- ***Ways to strengthen the protection of the public and the environment***

IAEA Mission and Activities: Three Pillars

- **Safety & Security**

The IAEA works to protect people and the environment from harmful radiation exposure

- **Safeguards & Verification**

The IAEA works to prevent the further spread of nuclear weapons

- **Science & Technology**

The IAEA works to mobilize peaceful applications of nuclear science and technology to developing countries.

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Safety History: from Chernobyl to Fukushima

- Acceleration in development of safety standards, guidelines and services to assist countries affected
- Adoption of the Notification and Assistance Conventions (1986), and of the Convention on Nuclear Safety in 1994
- Department of Nuclear Safety was created a decade later
- 25 years later: Fukushima

"…Radioactivity does not respect national boundaries, or national sovereignties. Rules ensuring the safe use of large-scale nuclear activities should therefore be worked out internationally and accepted to apply everywhere…."

Hans Blix,
former IAEA Director General

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Security History: 9/11

September 11, 2001 aftermath of terrorist attack:

- Security risks from outside groups or insider threats became of paramount concern surrounding nuclear power plant critical infrastructure
- Questionable whether reactors would withstand such attacks
- 2003 Office of Security
- Amendment of the CPPNM launched in 1998, adopted in 2005, in Force: 20??
- Lessons from Fukushima?

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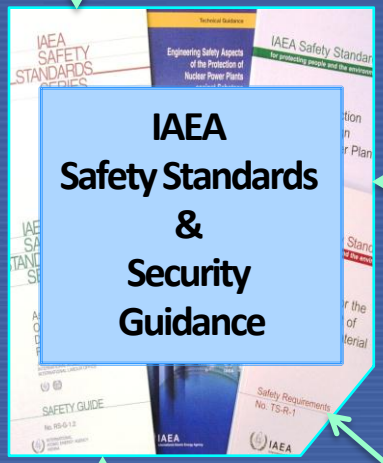
Global Nuclear Safety and Security Framework

Conventions: NSC,JC, CPPNM, UNSCR 1540…etc

International Instruments

CoCs: RRs & S&S of RSs



IAEA Safety Standards & Security Guidance

IAEA Safety & Security Peer Reviews & Advisory Services

Global Knowledge Network

Regulations & enforcements

National & Regional Nuclear Safety & Security Infrastructure

Research, Education & Training

Operation & use

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Status of the IAEA Safety Standards

Safety Standards are:

- Non binding on Member States but may be adopted by them
- Binding for IAEA's own activities
- Binding on States in relation to operations assisted by the IAEA or States wishing to enter into project agreements with IAEA
- Voluntarily binding for States that have imbedded IAEA Safety Standards in their National Regulations

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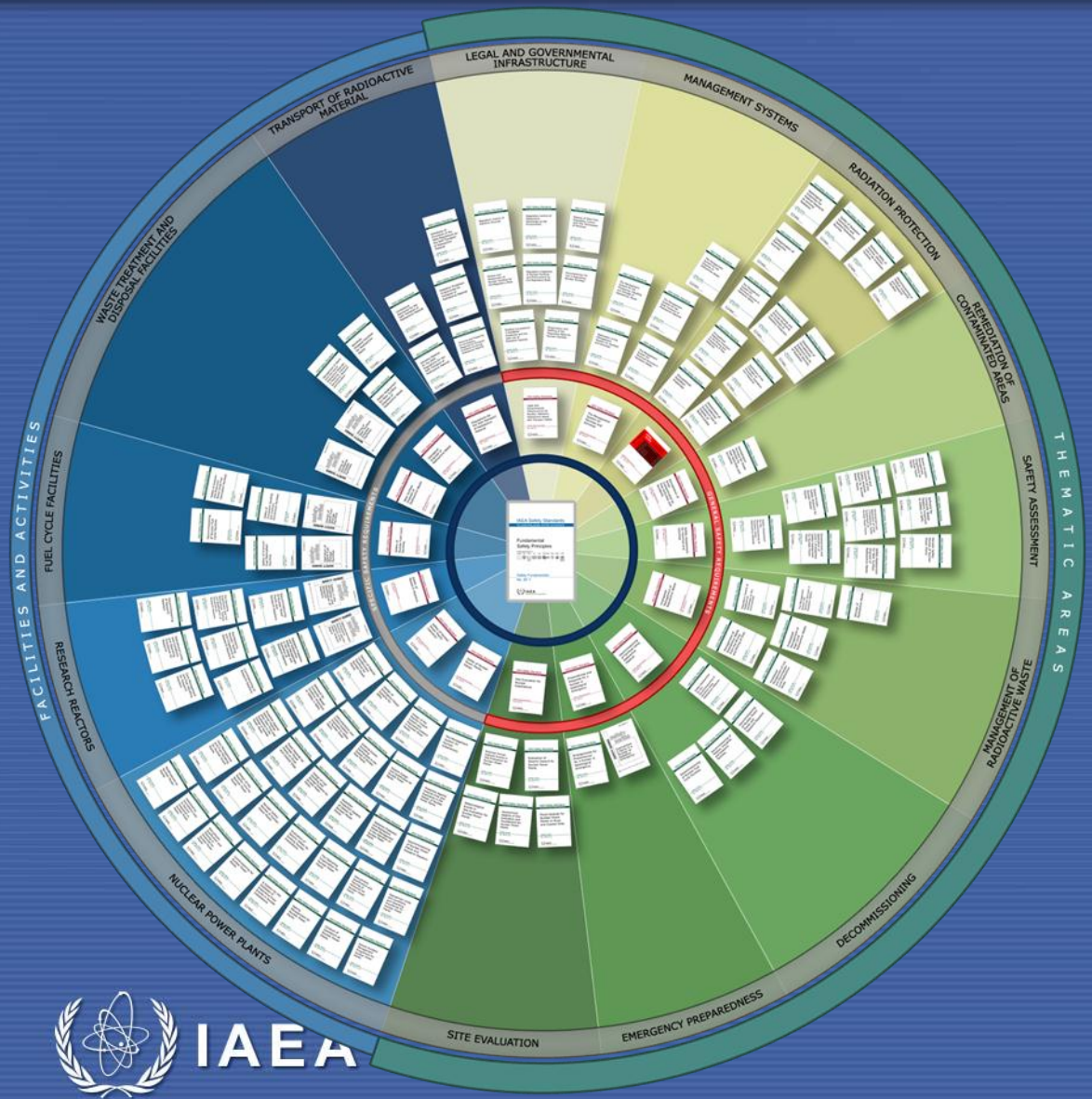
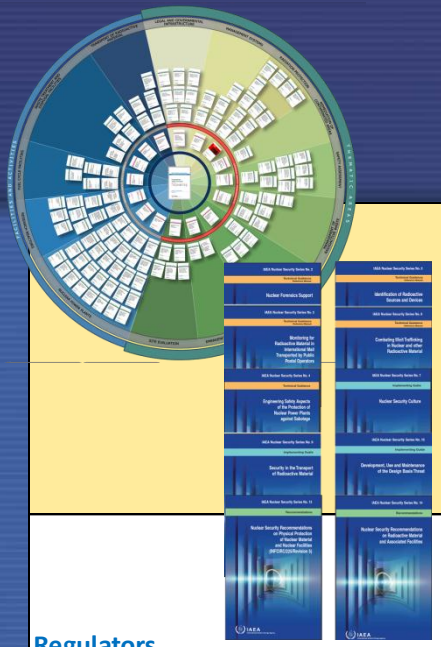
Safety Standards and Security Guidelines



Peer Reviews and Advisory Services



	Nuclear Safety	Radiation Protection & Safety	Radioactive Waste Management	Transport	Incident & Emergency	Nuclear Security
Regulators	IRRS, SCEA, INSARR, SSRS, Advisory mission for source safety, RP Fact Finding Mission	IRRS, EduTA, SSRS, RP Fact Finding Mission, Advisory mission for source safety	IRRS, NSRW waste management missions	IRRS, TranSAS	EPREV, SSRS, IRRS	IRRS, SCEA, IPPAS, INSServ, SSRS
Operating organizations	OSART, SCEA, INSARR, SEDO, SSRS	ORPAS. OSART, SEDO, SSRS, INSARR	SEDO, NSRW waste management missions, INSARR	TranSAS	EPREV, SEDO, OSART, SSRS, INSARR	IPPAS, SSRS
Vendors	SCEA					SCEA
Educators	SCEA, SEDO, OSART	ORPAS, EduTA			EPREV (EPR)	IPPAS, INSServ
Law Enforcement		ORPAS		IPPAS, INSServ	EPREV	INSServ
State officials / Governments						
Health sector		ORPAS, RPoPAS			EPREV	
TSOs						

The Integrated Regulatory Review Service ” - IRRS

- IRRS is a peer review of regulatory authorities practices against the benchmark of IAEA Safety Standards
- IRRS contributes to the harmonization of regulatory approaches among MS and provides real opportunities to obtain direct feedback from the application of international standards
- IRRS is not an individual judgement or opinion, it doesn’t provide a licensees’ safety review

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Operational Safety Review Team OSART

OSART Objectives

- To improve operational safety at an individual plant
- Objectively assess safety performance using IAEA Safety Standards as a basis
- Provide recommendations and suggestions for safety improvement
- Exchange information and experience:
  - ✓ provide Member States with good practices
  - ✓ provide plant with informal practical advice
- Well qualified experts with management experien
  selection; diverse experience representing NPP
  and technical support organizations.
- Transparency of the review and reporting proces

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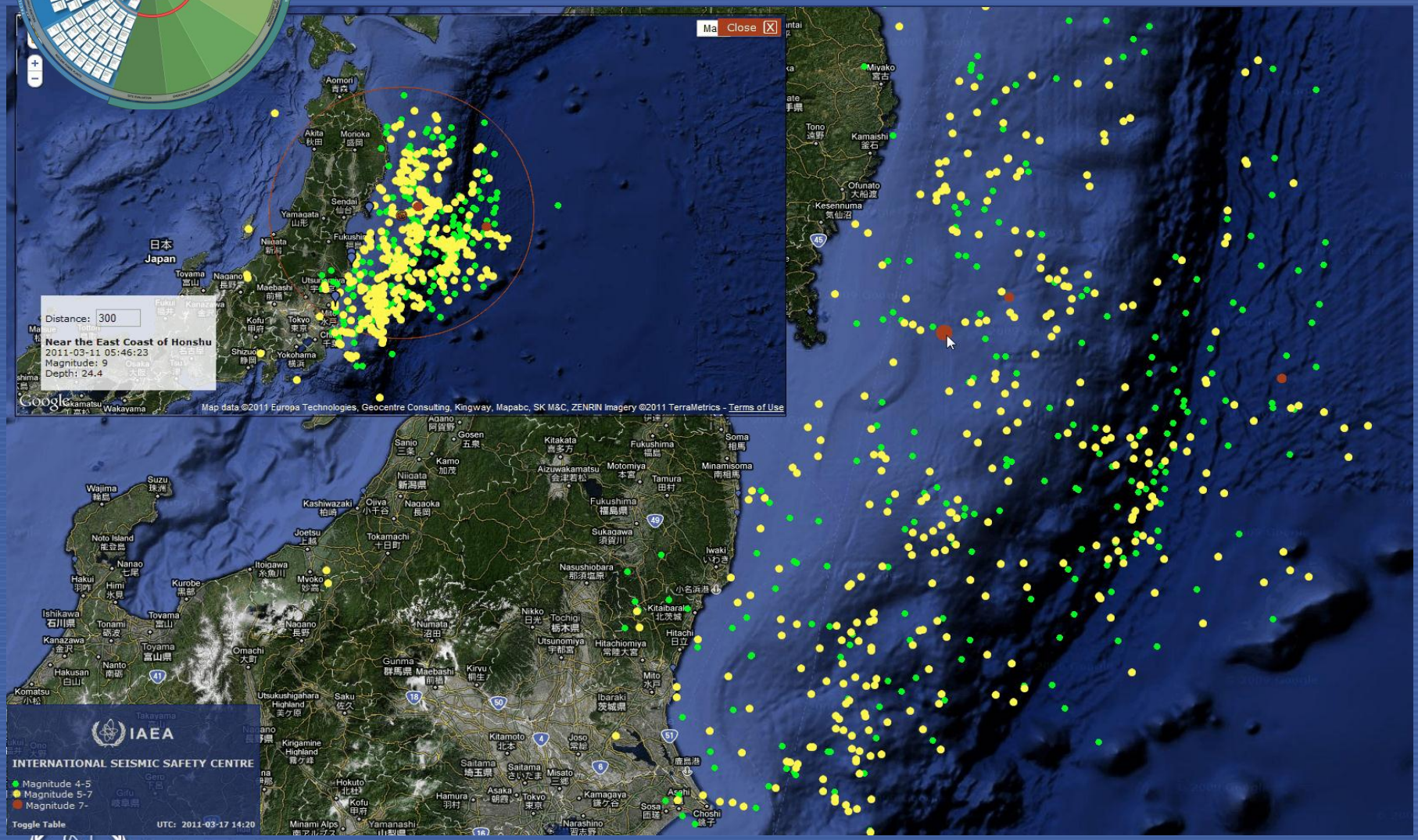
Safety of Nuclear Installations:

Seismic Centre: Site Safety Review Services



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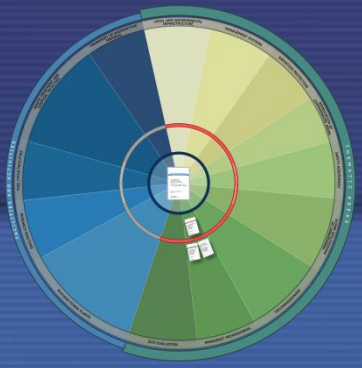

Emergency Preparedness and Response IEC

- Emergency Preparedness Review Services (EPREV)
- to appraise preparedness for nuclear and/or radiological emergencies in the Member States
- assesses the current situation vis-à-vis the relevant IAEA standards
- ConvEx Exercises

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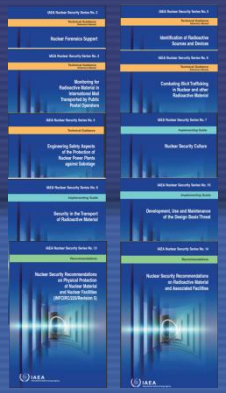

Nuclear Security services

- Security Advisory Missions (IPPAS)
- INSSP – Integrated Nuclear Security Support Plans
- Illicit Trafficking Data Base & INTERPOL
- Promoting and assisting countries in setting up Nuclear Security Support Centres
- Provide nuclear security measures at major public events (Pan-American Games -Brazil and Summer Olympic Games -China)
- Forensics

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Context

- Natural disaster
- Tragic loss of life
- Impairment of infrastructure
- Unprecendented scenario

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IAEA Response to Fukushima

- International Seismic Safety Centre (ISSC)
  - potential for heavy damage at 4 sites
    - Fukushima Daiichi
    - Fukushima Daini
    - Onagawa
    - Tokai
  - potential for a tsunami
- Incident and Emergency Centre notified and manned as a result to the ISSC report.
- IEC has been continuously (24/7) staffed since event occurred during 54 days.

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IAEA Response to Fukushima (cont'd)

- Director General formed Fukushima Accident Coordination Team (FACT) and visited Japan
- Deputy Director General & Head of Nuclear Safety and Security Department
  - Fukushima Nuclear Safety Team (FNST)
  - Fukushima Radiological Consequences Team (FRCT)
  - Fukushima Monitoring Teams (FMT)

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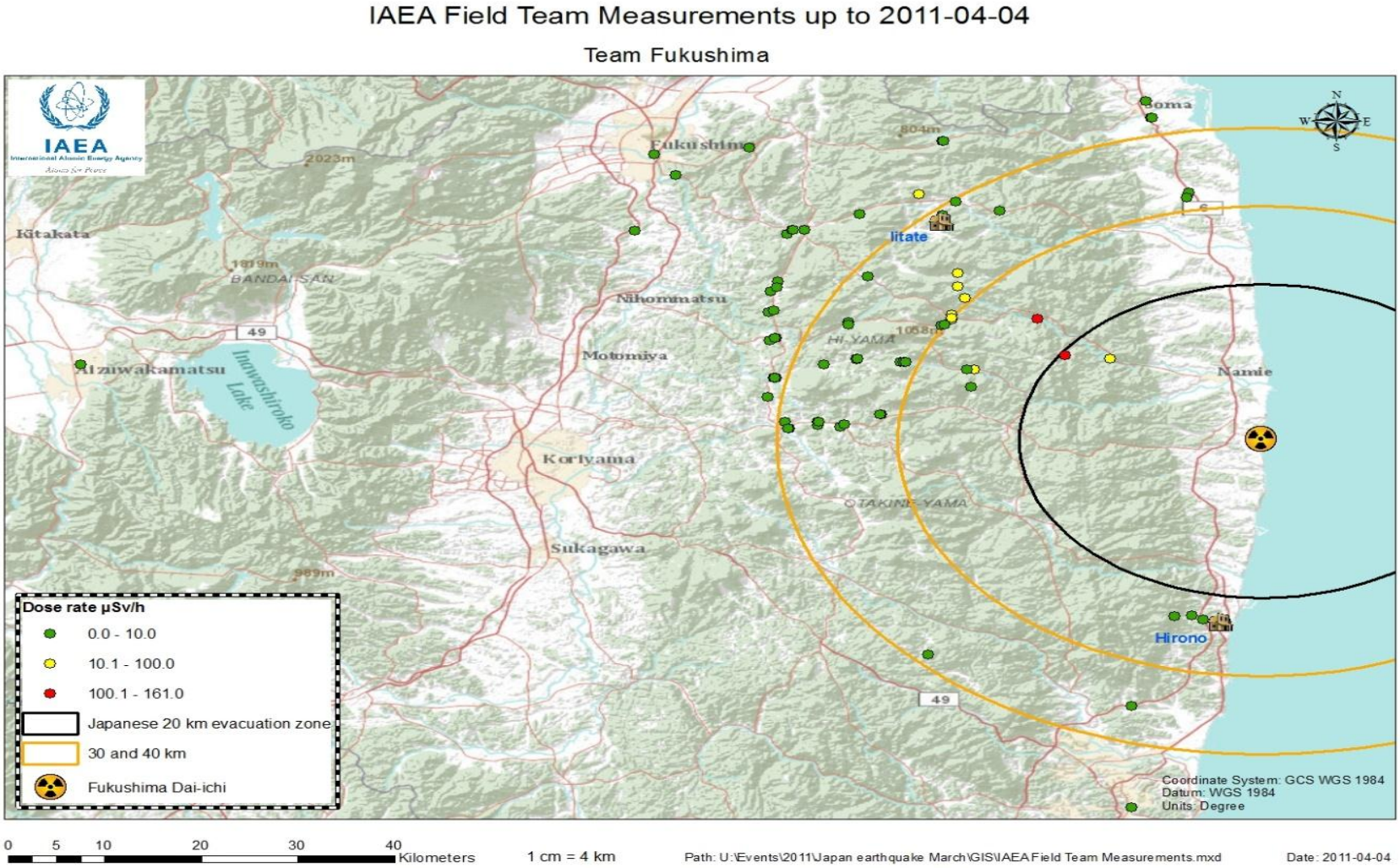
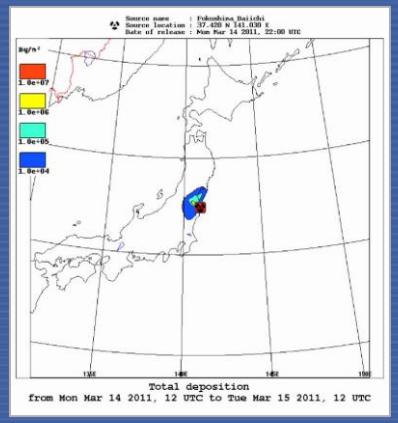
Radioactivity Monitoring Teams



MS/Press Briefings

- Daily/Weekly MS Briefings
  - Status of Fukushima Daiichi NPP
  - Radiological Status on site and off site
  - Marine monitoring
  - Food monitoring



Unit	1	2	3	4
Power (MWe /MWth)	460/1380	784/2381	784/2381	784/2381
Type of Reactor	BWR-3	BWR-4	BWR-4	BWR-4
Status at time of EQ	In service – auto shutdown	In service – auto shutdown	In service – auto shutdown	Outage
Core and fuel integrity	Damaged	Severe damage	Damaged	No fuel in the Reactor
RPV & RCS integrity	RPV temperature high but slowly decreasing	RPV temperature stable	RPV temperature stable	Not applicable due to outage plant status
Containment integrity	No information	Damage suspected	Damage suspected	
AC Power	AC power available - power to instrumentation – Lighting to Central Control Room	AC power available – power to instrumentation – Lighting to Central Control Room	AC power available – power to instrumentation – Lighting to Central Control Room	AC power available – power to instrumentation – Lighting to Central Control Room
Building	Severe damage	Slight damage	Severe damage	Severe damage
Water level of RPV	Around half of Fuel is uncovered	Around half of Fuel is uncovered	Around half of Fuel is uncovered	Not applicable due to outage plant status
Pressure of RPV	Slowly increasing	Stable	Stable	
CV Pressure Drywell	Stable	Stable	Stable	
Water injection to RPV	Injection of freshwater – via mobile electric pump with off-site power	Injection of freshwater – via mobile electric pump with off-site power	Injection of freshwater – via mobile electric pump with off-site power	
Water injection to CV	No information	No information	No information	
Spent Fuel Pool Status	Fresh water injection by concrete pump truck	Freshwater injection to the Fuel Pool Cooling Line	Freshwater injection via Fuel Pool Cooling Line and Periodic spraying	Fresh water injection by concrete pump truck

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IAEA International Fact-finding Expert Mission

- Based upon the agreement between the IAEA and the Government of Japan.
- Visited Japan between 24 May and 02 June 2011
  - For a preliminary assessment of the safety issues linked with the Fukushima Daiichi
  - And to identify areas that need further exploration or assessment, based on the IAEA safety standards
- Reported to the IAEA Ministerial Conference on Nuclear Safety (20-24 June 2011)

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IAEA Ministerial Conference, 20-24 June Vienna

- Scheduled for 20-24 June, 2011.
- Chaired by H.E the Governor of Brazil
  - ✓ One plenary Ministerial Session
  - ✓ Three Working Sessions:
    - ✓ Assessment of the accident
    - ✓ Emergency preparedness and response
    - ✓ Global nuclear safety framework
  - ✓ Final output: Ministerial declaration & recommendations for the future, Way forward through an action plan

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The IAEA Ministerial Conference

- Director General made five proposals:
  - to strengthen IAEA Safety Standards;
  - to systematically review the safety of all nuclear power plants, including by expanding the IAEA's programme of expert peer reviews;
  - to enhance the effectiveness of national nuclear regulatory bodies and ensure their independence;
  - to strengthen the global emergency preparedness and response system; and,
  - to expand the Agency's role in receiving and disseminating information.

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Major themes for strengthening nuclear safety

- The IAEA Safety Standards
- The Safety of NPPs
- Peer review mechanisms
- EPR Framework
- International cooperation
- Global nuclear safety framework

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IAEA Safety Standards

- There was a broad recognition that IAEA Safety Standards represent the common reference point for nuclear safety
- Not all Member States apply the Standards or fully implement them.
- Member States should be encouraged to commit to making national safety standards consistent with those of IAEA.
- Newcomers should fully implement IAEA Safety Standards before commissioning the first reactor

The IAEA was encouraged

- to review and update the Standards to take account of Fukushima
- to give special attention to Standards that deal with multiple severe hazards / multiple + single Unit nuclear sites / Cooling of reactors + fuel storage

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Review of NPPs

- *We the Ministers […] Encourage States with operating nuclear power plants to conduct, as a response to the accident at the Fukushima Daiichi Nuclear Power Station, comprehensive risk and safety assessments of their nuclear power plants in a transparent manner;*

- Member States to systematically review the safety of NPPs

- IAEA could lead in the harmonization of review methodologies

- Member States strongly encouraged to report results to CNS 2012

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Peer Reviews

- *We the Ministers […] Underline the benefits of strengthened and high quality independent international safety expert assessments, in particular within the established IAEA framework*
- **It was recognized** that peer reviews are voluntary but Member States with nuclear power programmes could consider giving prior consent to the IAEA
- The role of international peer reviews should be reinforced as part of the process of continuous improvement of safety:-
  - National regulatory frameworks(IRRS) / Nuclear installations(OSART) / Emergency Preparedness and Response (EPREV) / Design review services
- **It was proposed** that Member States with a nuclear program invite an IRRS every 10 years / IAEA to conduct an OSART of 1 in 10 NPP over a 3 year period.

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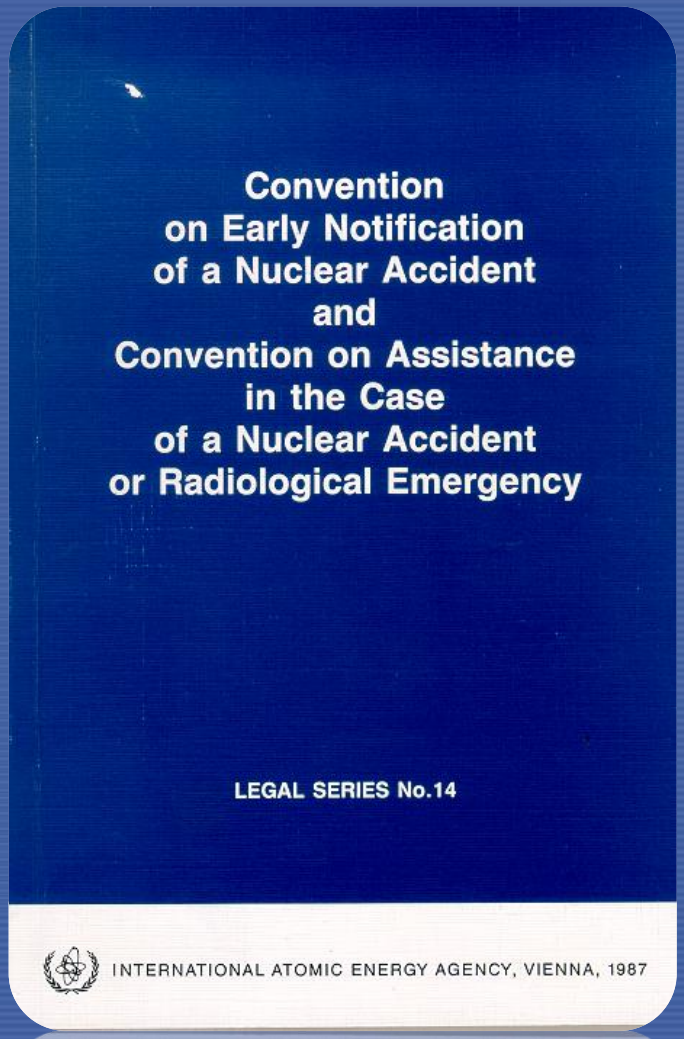
Emergency Preparedness & Response

- Strengthen legal instruments, adopted 25 years ago, for international EPR framework, to address today's concerns.
- Member States should consider making use of systematic and regular Emergency Preparedness Review (EPREV) and follow-up missions to appraise national EPR arrangements and capabilities to ensure their continuous improvement



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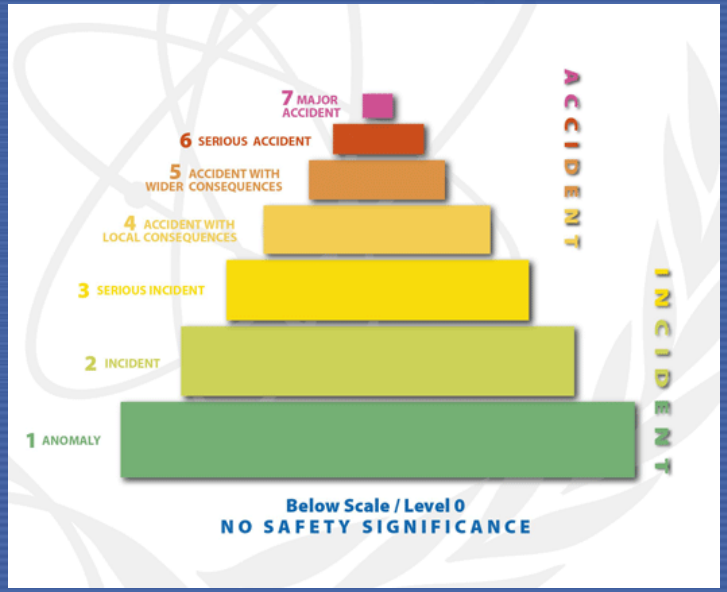
Receiving/Disseminating Information

- INES as a communication tool did not play its role: it should be reviewed and improved to make it more effective
- The IAEA was encouraged to institutionalize the practice of ‘fact finding missions’
- Criteria might be linked to INES



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International Cooperation

- Experience from the Fukushima accident has shown the Inter-Agency Committee on Radiological and Nuclear Emergencies (IACRNE) to be an effective and useful mechanism.
- The Joint Radiation Emergency Management Plan of the International Organizations (JPLAN) also demonstrated its usefulness but needs to be further developed.
- All Parties with a role in Nuclear Safety (Research, OECD/NEA, TSOs…) should work together
- The IAEA was encouraged to enhance its support to operating organisations which have the prime responsibility for nuclear safety.
- IAEA and WANO were encouraged to establish a mechanism to improve their cooperation.
- The remediation of contaminated land in Japan should benefit from the knowledge of international experts and the experience gained should be made available to the international community.

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The Global Nuclear Safety Framework

The need for strengthening the Global Nuclear Safety Framework was confirmed

- Primary responsibility for safety is placed on the operator with oversight from the National Regulatory Body
- Supported by an international framework
  - Intergovernmental Organizations
  - Operator Networks
  - Regulator Networks

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The Global Nuclear Safety Framework

- It was recognized that effective regulatory independence is one of the main pillars for nuclear safety,
- There is a need to strengthen national regulatory systems so that they have
  - The necessary competence
  - Appropriate regulatory powers, and
  - The ability to respond to safety concerns in a timely manner
- The Convention on Nuclear safety
  - Review its effectiveness
  - Review its mechanisms
  - Response to Fukushima should not wait for an amendment to the CNS
- IAEA plays a central role and is the appropriate international organization for strengthening the global nuclear safety framework.

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Summary

- **Now is the time to**
  - Strengthen the IAEA Safety Standards and consistently implement them
  - Review the safety of NPPs and commit to report the results to the 2012 CNS
  - Work together for the benefit of the worldwide nuclear community

For a sustainable and responsible use of Nuclear Energy, protecting the Public and the Environment

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Thank you