

Fostering of Integrated Global Networks through Leveraging and Positive Feedback Loops

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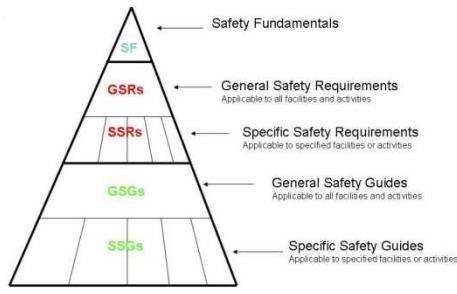
**IUR International Workshop on Worldwide Harmonization of
Radioecology Networks**

Aix en Provence, France, 19-20 June 2014



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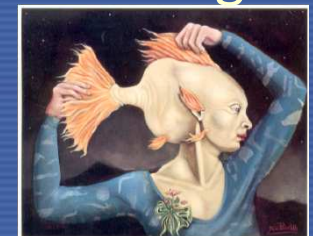
International Atomic Energy Agency



Summary:

(starting from where we left off...)

- The IAEA is responsible for activities of coordination, information sharing and development of safety standards.
- Activities are carried out in a harmonized manner, with consideration of those undertaken by other organizations.
- For example, international model validation programmes provide a forum for evaluation of tools and standardization of approaches to assess potential risk. Findings from such studies can then be considered in IAEA safety standards (e.g., updated SRS 19).
- In addition, through such programmes, international data are compiled to gain understanding of natural processes for a range of situations.



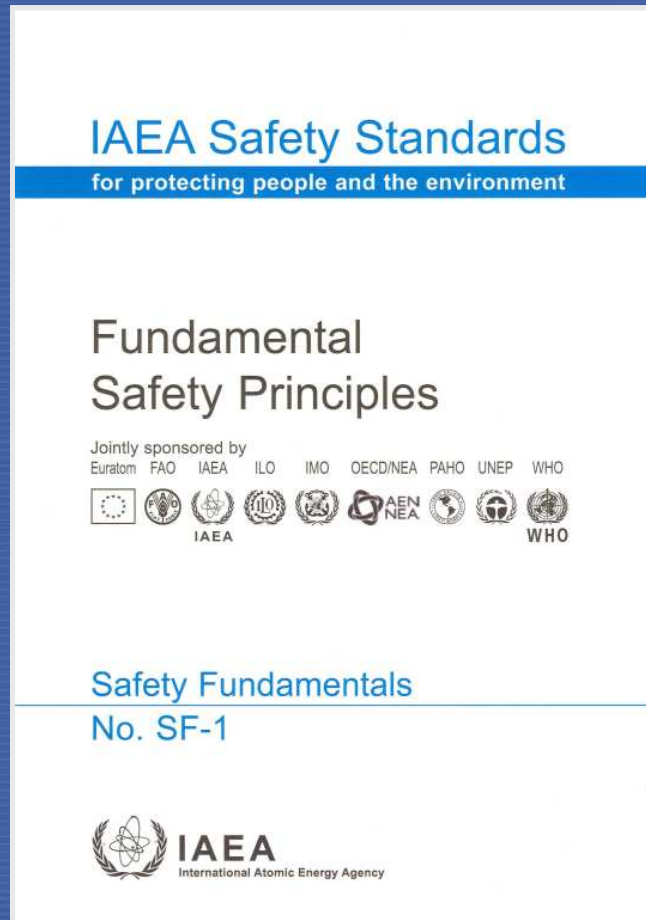


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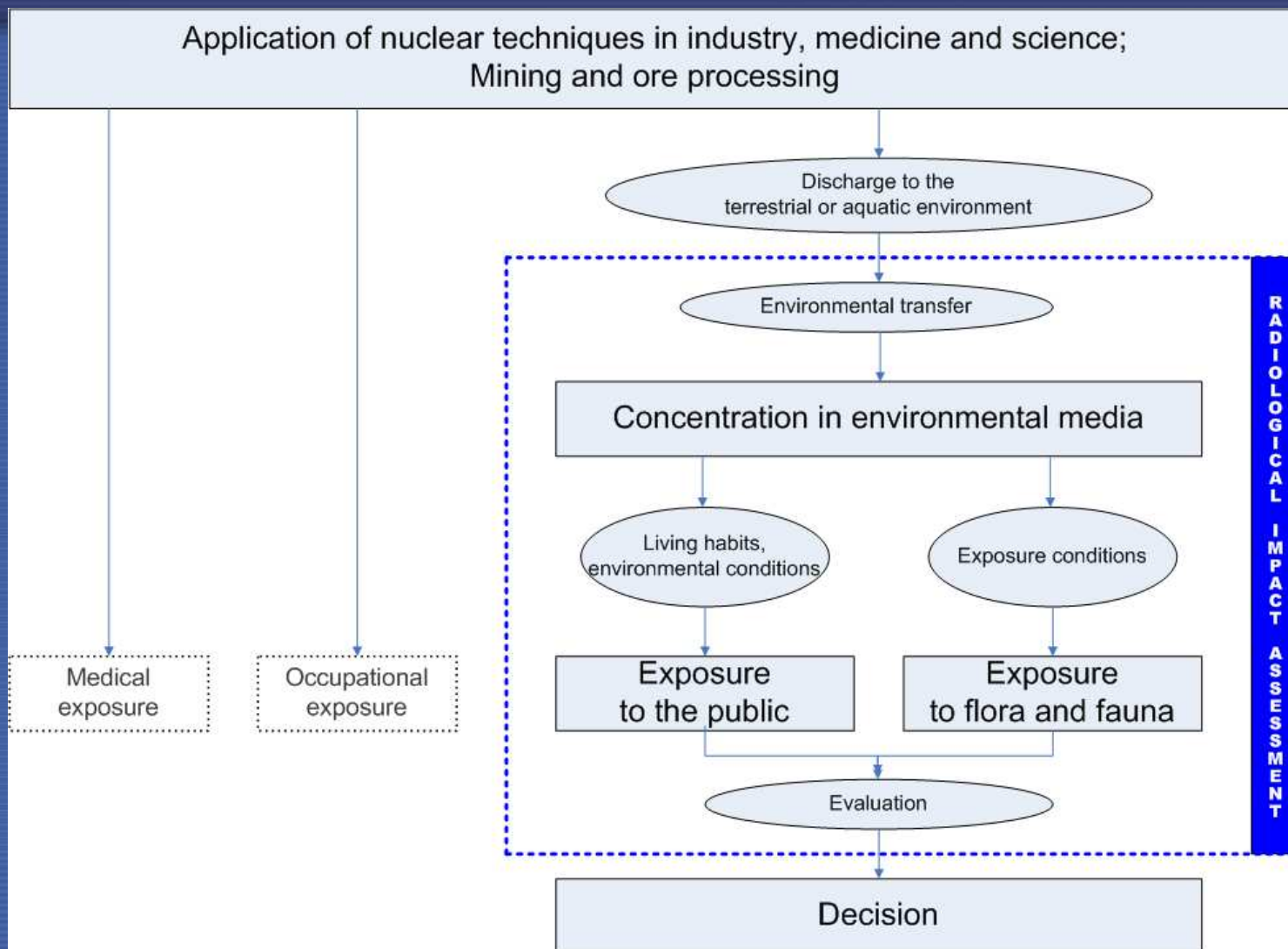
- The outputs of activities, such as MODARIA, form the technical basis that informs higher-level IAEA guidance documents.
- One example is IAEA SRS-19, which provides guidance on predicting radionuclide transport in the environment and corresponding doses .
- **Through such activities and programmes, it would be useful to identify mechanisms to leverage such efforts and strengthen international networking.**
- **In this way, self-perpetuating positive feedback loops can be created to the benefit of the international community.**

The Basis – the Safety Fundamentals



“The fundamental safety objective is to protect people and the environment from harmful effects of ionizing radiation.”

Radiological Impact Assessment

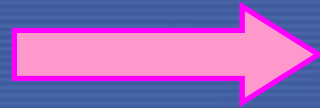


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Some Possible Objectives

- A Rough Breakdown -

Tool Development



How to?

Tool Testing



How good?

Compilation, Evaluation &
Harmonization (?)



Where can this fit?

Compatibility, Consensus
& Guidance



Where do we go from here?

Key Steps in Harmonized Protection

Tool Development



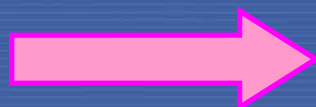
e.g., CROM (SRS-19), RESRAD codes, ERICA, PC-CREAM, **CROMERICA** (& others)

Tool Testing



MODARIA, EMRAS-II, EMRAS (& predecessors – VAMP, BIOMASS, etc.)

Compilation, Evaluation & Harmonization



e.g., IAEA guidance on Radiological Environmental Impact Analysis, Revision of Safety Review Series (SRS)-19, etc.

Compatibility, Consensus & Guidance



IAEA, ICRP, UNSCEAR, IUR, BIOPROTA, etc.

Some Cases and Examples:

- **Case 1:** Model validation programmes (e.g., MODARIA)
- **Case 2:** Update to Safety Guidance (e.g., SRS 19)



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Nuclear Safety Resolution September 2013

General Conference

GC(57)/RES/9

Date: September 2013

General Distribution

Original: English

Fifty-seventh regular session

Item 15 of the agenda
(GC(57)/24)

Measures to strengthen international
cooperation in nuclear, radiation, transport and
waste safety

60. Encourages the participation of Member States in the **Modelling and Data for Radiological Impact Assessments (MODARIA)** programme, launched in November 2012 to foster, develop and maintain capabilities in assessing radiological impacts from radionuclides being released or extant in the environment;

Case 1: Model Validation Programmes

- Needs for Modelling -

- **Requirements for assessment models**
 - Simple and transparent
 - Harmonized
 - Widely applicable
 - Conservative, but not too pessimistic
 - Provide certainty with to legal issues
- **Sound scientific base of assessments of radiological impacts**
 - Understand underlying transfer mechanism and exposure processes
 - Explore possibilities and limitations of modelling
 - Needed in any licensing process
 - Monitoring
 - Optimize monitoring
 - Interpretation of monitoring results
 - Appropriate allocation of efforts for environmental monitoring

Past Model Validation Programmes:

- **VAMP: Validation of Model Predictions (1988-1996)**
 - Mainly scenarios from Chernobyl release
 - Transfer data collection
- **BIOMOVs: BIOSpheric Model Validation Study, with SSI, Sweden, 1991-1996**
 - short- and long-term releases
 - power reactors, solid waste disposal repositories, uranium mill tailings
- **BIOMASS (1996-2001)**
 - Chernobyl scenarios
 - Environmental clean-up
 - Long-term environmental impact of waste disposal: *Reference biospheres*
- **EMRAS (2003-2007)**
 - Scenarios from routine and accident situations
 - Transfer data review and update
 - Biota model testing and comparison
- **EMRAS II (2009-2011)**
 - Continuation of EMRAS

Current Programme is MODARIA

The screenshot shows the IAEA website interface. At the top, there is a navigation bar with links for 'Contact Us', 'Site Index', and 'News Feeds'. The IAEA logo and name are on the left, and a search bar is on the right. Below the navigation bar, there are several menu items: 'About Us', 'Our Work', 'News Centre', 'Publications', and 'Nucleus'. The main content area is titled 'Nuclear Safety & Security' and includes sub-links for 'Nuclear Applications', 'Nuclear Energy', 'Nuclear Safety & Security', 'Safeguards', and 'Technical Cooperation'. The central focus is the 'MODARIA' section, which includes a title, a subtitle 'Modelling and Data for Radiological Impact Assessments', and a 'Background' section. The background section describes the program's aim and lists previous international exercises. To the left of the main content is a sidebar with a tree view of 'Nuclear Safety & Security' topics. To the right is another sidebar with 'Resources' and 'Page links' sections. At the bottom left of the page, there is a 'rate this page' widget with a star rating from 0 to 4.

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↑ Nuclear Safety & Security

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- Conventions & Codes
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- Meetings
- Special projects

MODARIA

Modelling and Data for Radiological Impact Assessments

Background

The general aim of the MODARIA Programme is to improve capabilities in the field of environmental radiation dose assessment by means of acquisition of improved data for model testing, model testing and comparison, reaching consensus on modelling philosophies, approaches and parameter values, development of improved methods and exchange of information.

MODARIA continues some of the work of previous international exercises in the field of radioecological modelling and focuses on areas where uncertainties remain in the predictive capability of environmental models. These previous international exercises include BIOMOV5 (BIOspheric Model Validation Study) and BIOMOV5 II, initiated by the Swedish Radiation Authority in 1985, and the programmes sponsored by the IAEA: VAMP (Validation of Model Predictions, 1988–1996) and BIOMASS (BIOsphere Modelling and ASSEssment, 1996–2001), EMRAS (Environmental Modelling for RAdiation Safety), 2003–2007 and EMRAS II which ran from 2009 to 2011.

Resources

- EMRAS II
- Environmental Assessment

Page links

- Objectives
- Organization of the MODARIA Programme
- MODARIA Working Groups
- First Technical Meeting
- Second Technical Meeting

Good 4 3 2 1 0 Poor

rate this page

Identification of MODARIA Topics:

- **Questionnaire in 2012**
 - Sent to potential participants and organisations involved in previous programmes internationally
 - Scientific interests and gaps were identified to reflect needs in Member States
 - 160 responses were received from 49 Member States
- **Preparation Meeting in March 2012**
 - Developed proposals for a new programme
- Presentation of identified topics during the 1st Technical Meeting and finalization of Working Groups.

MODARIA Working Groups:

- **Theme 1: Remediation of Contaminated Areas**
 - WG 1 — *Remediation strategies* and decision aiding techniques
 - WG 2 — Exposures in *urban environments* and effect of remedial measures
 - WG 3 — **Radiological impacts** from *NORM and legacy sites* and remediation
- **Theme 2: Uncertainties and Variability**
 - WG 4 — Analysis of **radio-ecological data**
 - WG 5 — **Uncertainty** from routine discharges of radionuclides
 - WG 6 — **Environmental modelling** for radioactive waste disposal facilities
 - WG 7 — Models for accidental tritium releases
- **Theme 3: Exposures and Effects on Biota**
 - WG 8 — Transfer and exposure **models** for **flora and fauna**
 - WG 9 — **Effects** on populations of wildlife species
- **Theme 4: Marine Modelling**
 - WG 10 — Dispersion and transfer in **the marine environment**

Positive Feedback Loops:

Needs

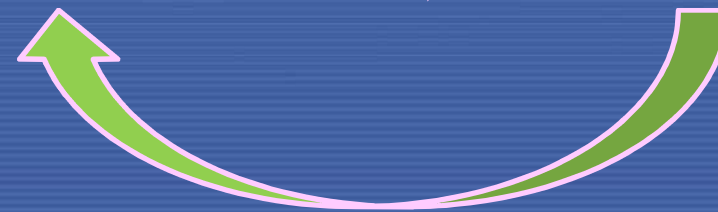
Member States
Needs for
Tools,
Parameter
Values,
Capacity-
building

Tool Development and Testing

VAMP
BIOMOVS
BIOMASS
EMRAS
EMRAS II
MODARIA
BIOPROTA
etc.

Outcomes

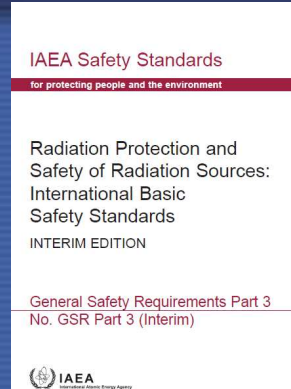
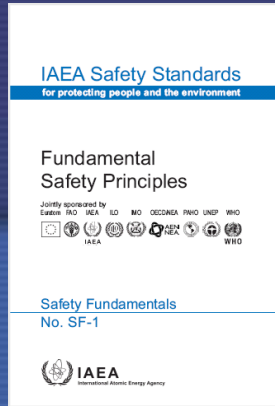
- Knowledge sharing
- Linkages with other networks
- New ideas
- Gap filling
- New knowledge and new tools



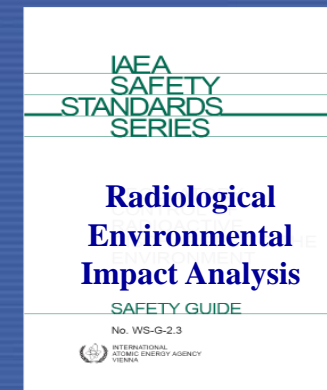
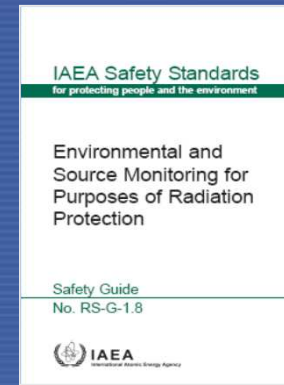
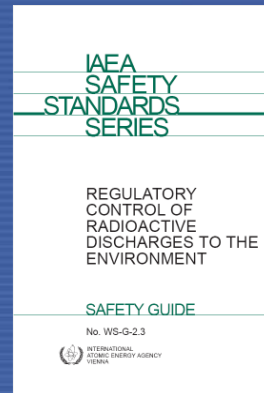
Positive Feedback

IAEA Document STRUCTURE

*Safety Fundamentals
(high-level objectives,
concepts & principles)*



*Safety Standards
(‘shall’ requirements)*



*Safety Guides
(‘should’ recommended actions, conditions
or procedures to meet safety requirements)*

Potential Area of Mutual Interest:

*Technical Report Series & Technical Documents
(technical basis)*



Case 2: Incorporation of Current Scientific Knowledge into Safety Guidance

SRS 19: Assessing Public Exposure and Environmental Impacts due to Radioactive Discharges from Facilities and Activities

- Currently under revision.
- Being expanded into three volumes to update the previous single volume.
- SRS 19 (Volumes 1 and 2) are focused on human protection and are fairly far along in terms of drafting:
 - Volume 1: “*Screening Assessment of Public Exposure*”
 - Volume 2: “*Generic Models for Use in Assessing the Impact of Radioactive Discharges*”
- SRS 19 (Volume 3) will be focused on development of screening-level assessment of environmental impacts for Planned Exposure situations (flora and fauna).
- The first consultancy meeting for the preparation of SRS 19 (Volume 3) was held in December 2013.

Objective of the Revision of SRS 19:

- **To provide an “*up-to-date, structured approach to the prospective screening assessment of the impact of radioactive discharges on the general public in planned exposure situations*”**
- **Assessment of doses to the representative person from planned releases**
- **Emphasis on ease of use**

Why Revise SRS 19 ?

- Facilitate application of screening models
- Include different levels of assessment
- Include assessments of exposures to flora and fauna
- Updated database



Updated Database:

- SRS 19 developed in the early 1990s
- New data compilations (from IAEA Model Validation Programmes)
 - TECDOC 1616
 - TRS 472
 - Handbook on transfer parameters to assess concentrations in wildlife (EMRAS II)
- New BSS (GSR-3)
 - Representative person
 - Biota



Scope and Application:

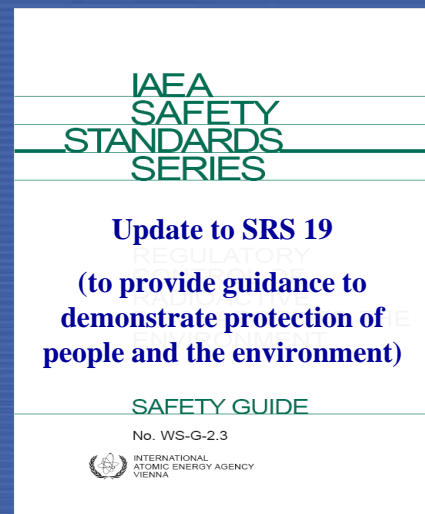
- **Applications:**
 - Environmental impact assessments of facilities and activities;
 - Safety assessments of facilities and activities;
 - Independent verifications of the safety assessments;
 - Optimization of protection and safety; and
 - Establishment of operational limits and conditions related to public exposure and protection of the environment.
- **Generic Dose Assessments for Screening Purposes:**
 - Indication of the magnitude of the radiological impact of a discharge.
 - Approaches intended to be conservative.
- **Not to be applied for:**
 - Emergency planning or emergency response,
 - Long-term assessments for waste disposal facilities, where, for example, the contamination of ground water could be relevant.
 - Dose assessments outside the scope of radiation protection, such as risk projection and epidemiological studies, individual-related assessments,

Positive Feedback Loops:

Outcomes from Tool Testing and Development

- Knowledge sharing
- Linkages with other networks
- New ideas
- Gap filling
- New knowledge and new tools

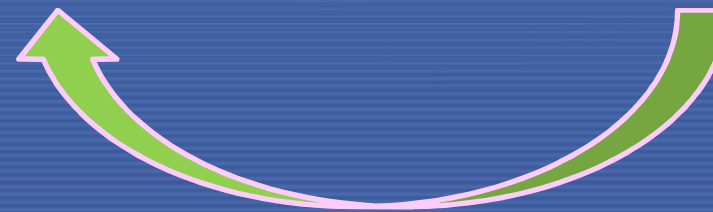
Development of Safety Guidance



Application of Guidance to Develop New Tools

Development of new **CROMERICA** tool

ERICA tool



Positive Feedback

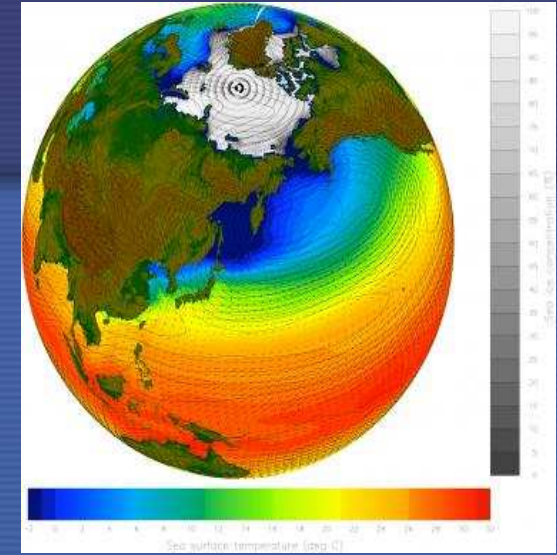




Summary:

(full circle...positive feedback loops)

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- One example is IAEA SRS-19, which provides guidance on predicting radionuclide transport in the environment and corresponding doses .
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Thank YOU!!

