Creating a Regulatory Basis for Safety Culture Development Based on Experience in International and National Approaches to Regulation and Supervision of Legacy

Malgorzata K Sneve
Norwegian Radiation Protection Authority

Panel on Worldwide Regulatory Oversight of Radioactive Legacy Sites.

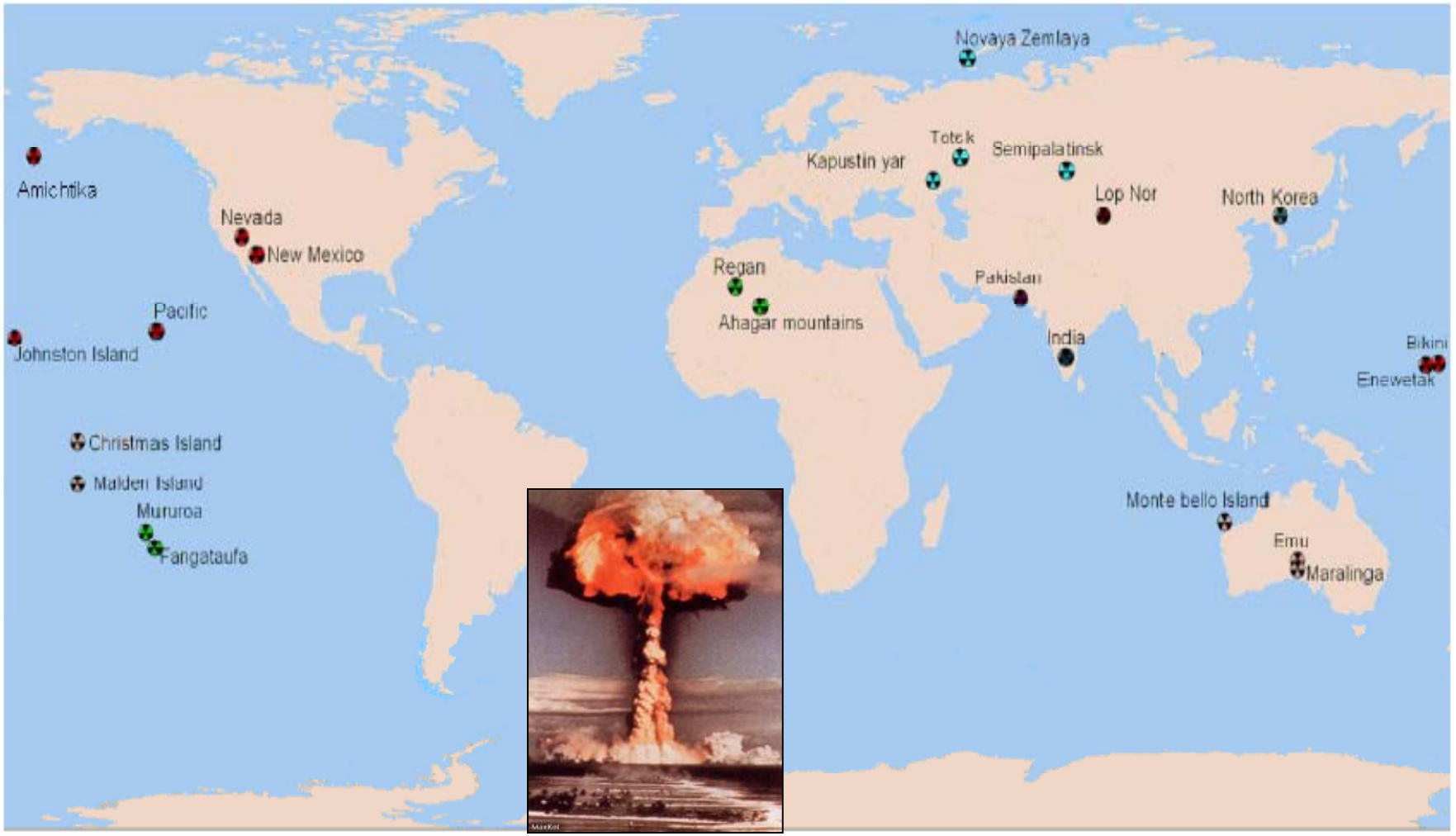
Waste Management 2011, 27 February – 3 March 2011

Statens strålevern
Norwegian Radiation Protection Authority

Objectives of Panel Discussion

- Integration of the regulatory challenges into operational practice
- International forum for regulatory cooperation based on experience from bilateral cooperation programs
- Role of international organizations in solving legacy problems:
  - IAEA: nuclear and radiation safety fundamentals (principles, standards, regulations, guidance on good practice)
  - NEA-OECD: avoid new legacies in nuclear renaissance, improving safety culture.. but what does this mean for regulatory supervision?
  - WHO: integrating radiation and other hazards?
  - EBRD/EC: efficiency of programs to support cooperation on legacy management in different countries?

Places of Global Nuclear Tests

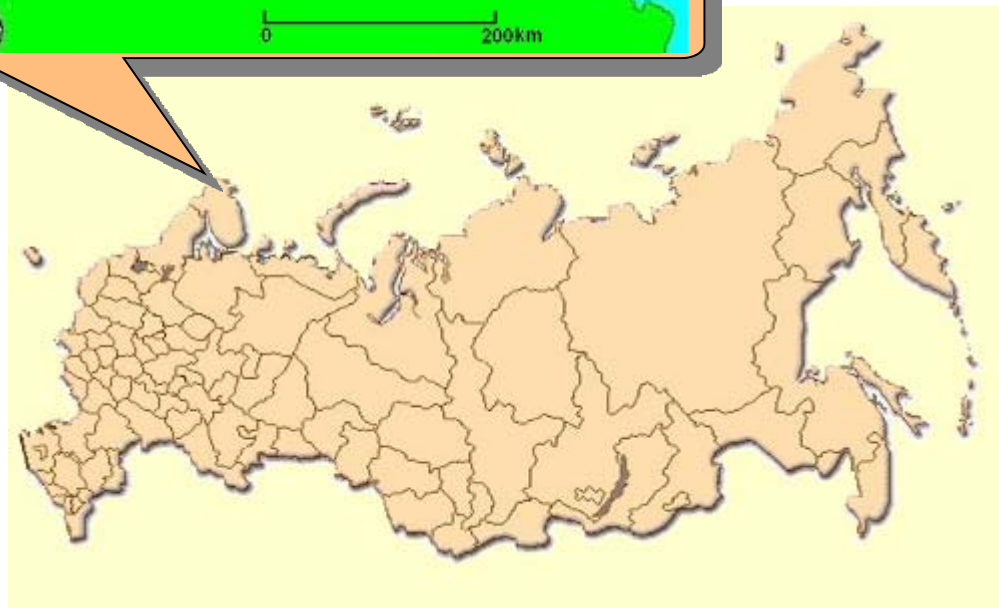


(UNSCEAR-2000)

Global Nuclear Legacy Issues

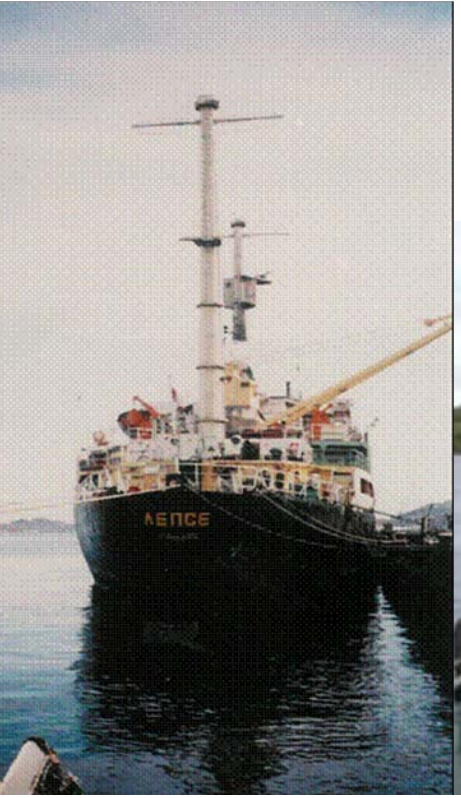
- Elimination of the environmental and human health hazards from existing nuclear legacies
- Confidence in the regulatory process and involvement of the supervisory bodies within the complexity of the problems
- Role of the regulatory bodies, including contributing to decision making on selection of appropriate strategies and technologies
- Regulatory challenges related to local site specific discussions to identify the optimum protection solution, using international recommendations and standardised values as a guideline

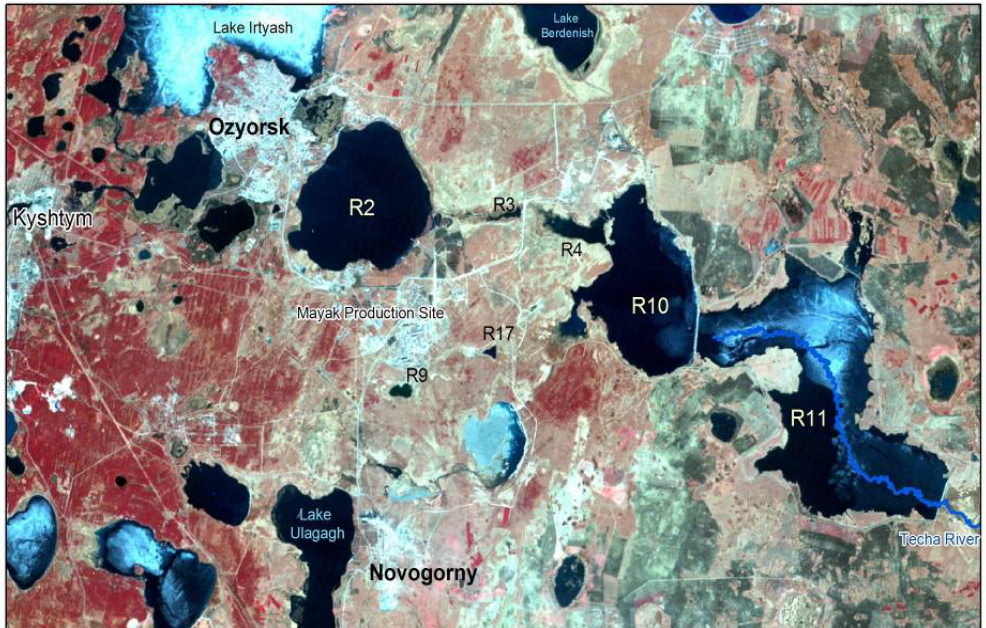
Major Legacy Sites in Northwest Russia



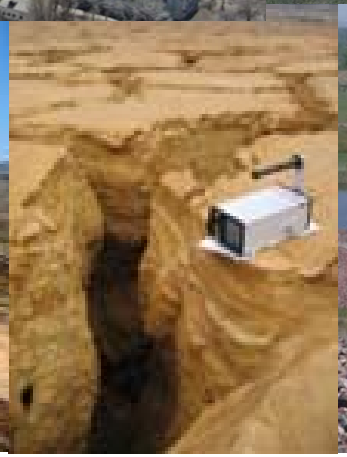
- Andreeva Bay
- Gremikha
- Other nuclear facilities

Russian Nuclear Legacy Objects and Sites





Uranium Legacy in Central Asia



Uranium Mining Remediation and Rehabilitation Works in Australia









Uranium Mining Legacy in France

Tailings pile, water treatment ponds and sludge disposal in old mine workings in Limoges in France

Uranium Mining Legacy in Niger

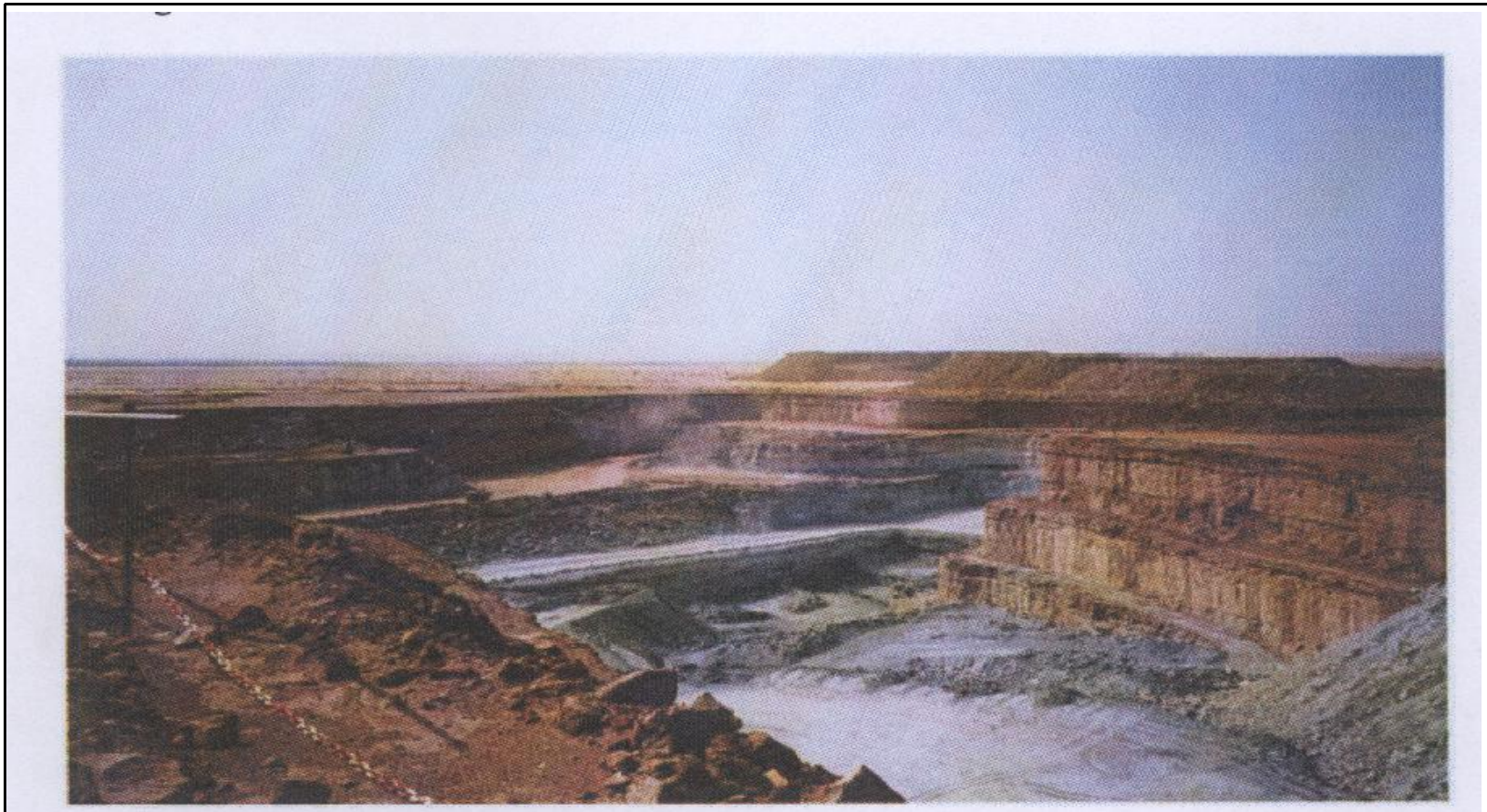
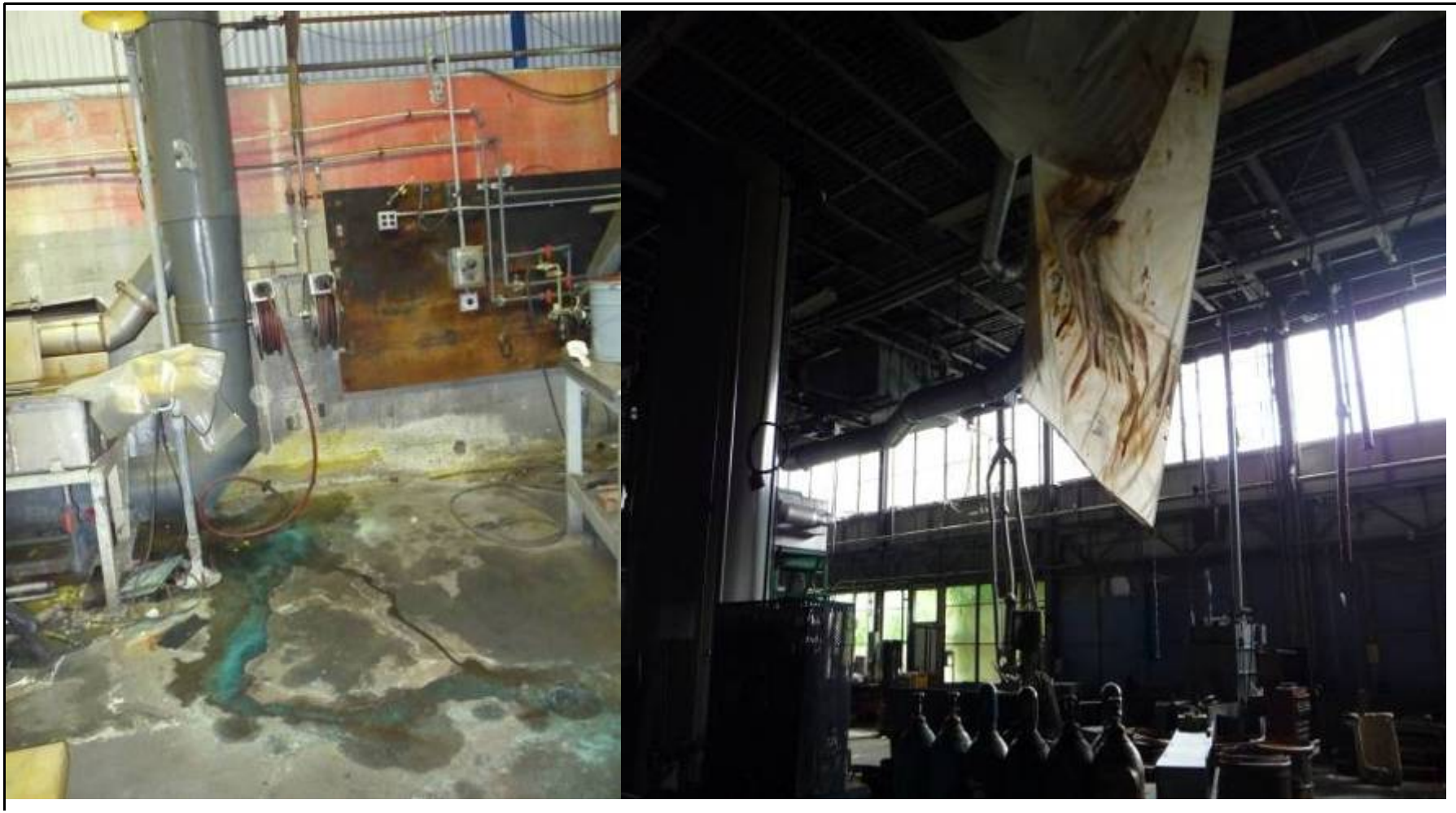


Figure 7 : photographie de la fosse de Tamou en exploitation actuellement

Radiological Legacy Sites in Belarus

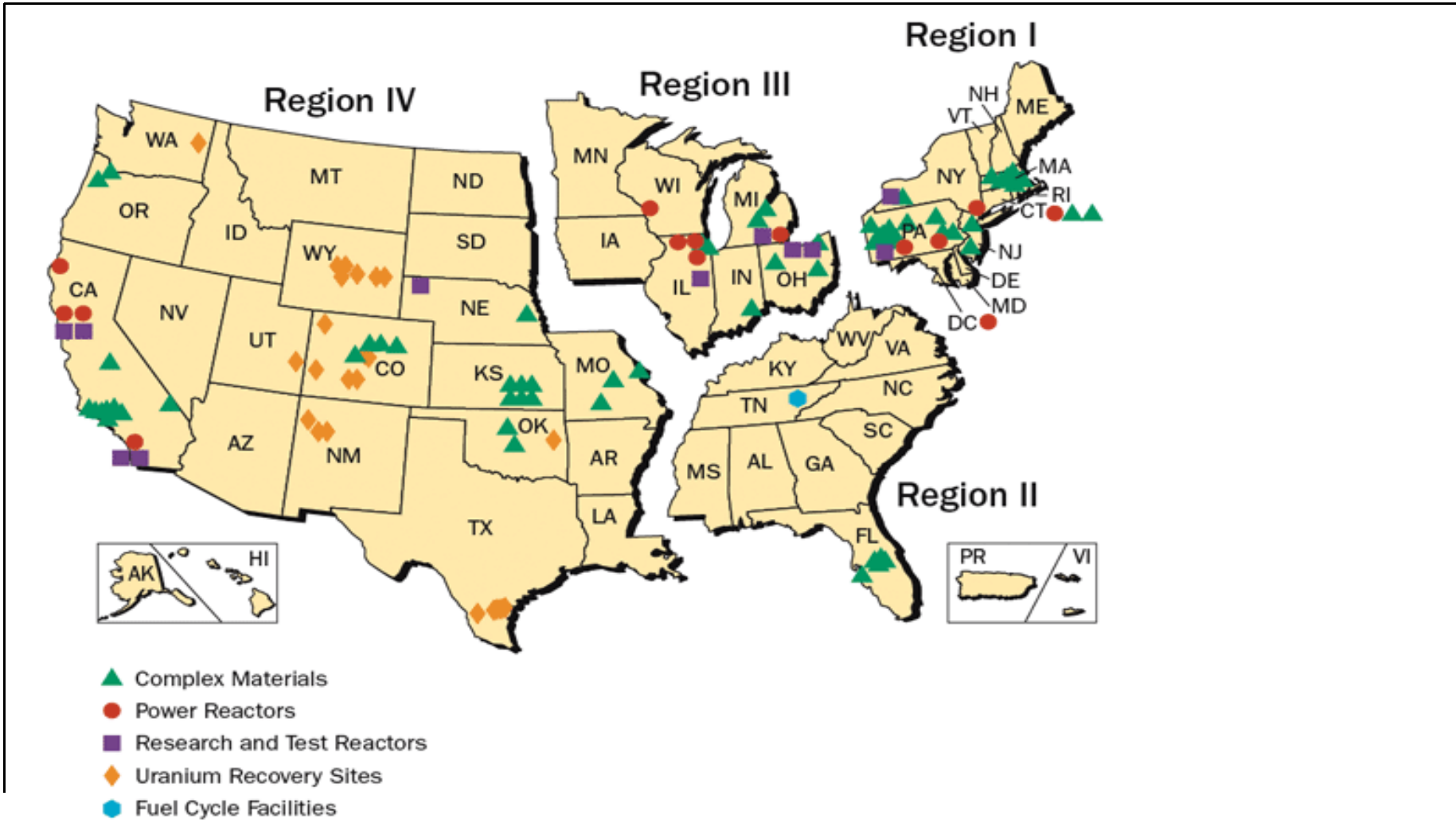
Recovered buried radiation sources from unknown users

Another Legacy Situation – Guess Where It Is?

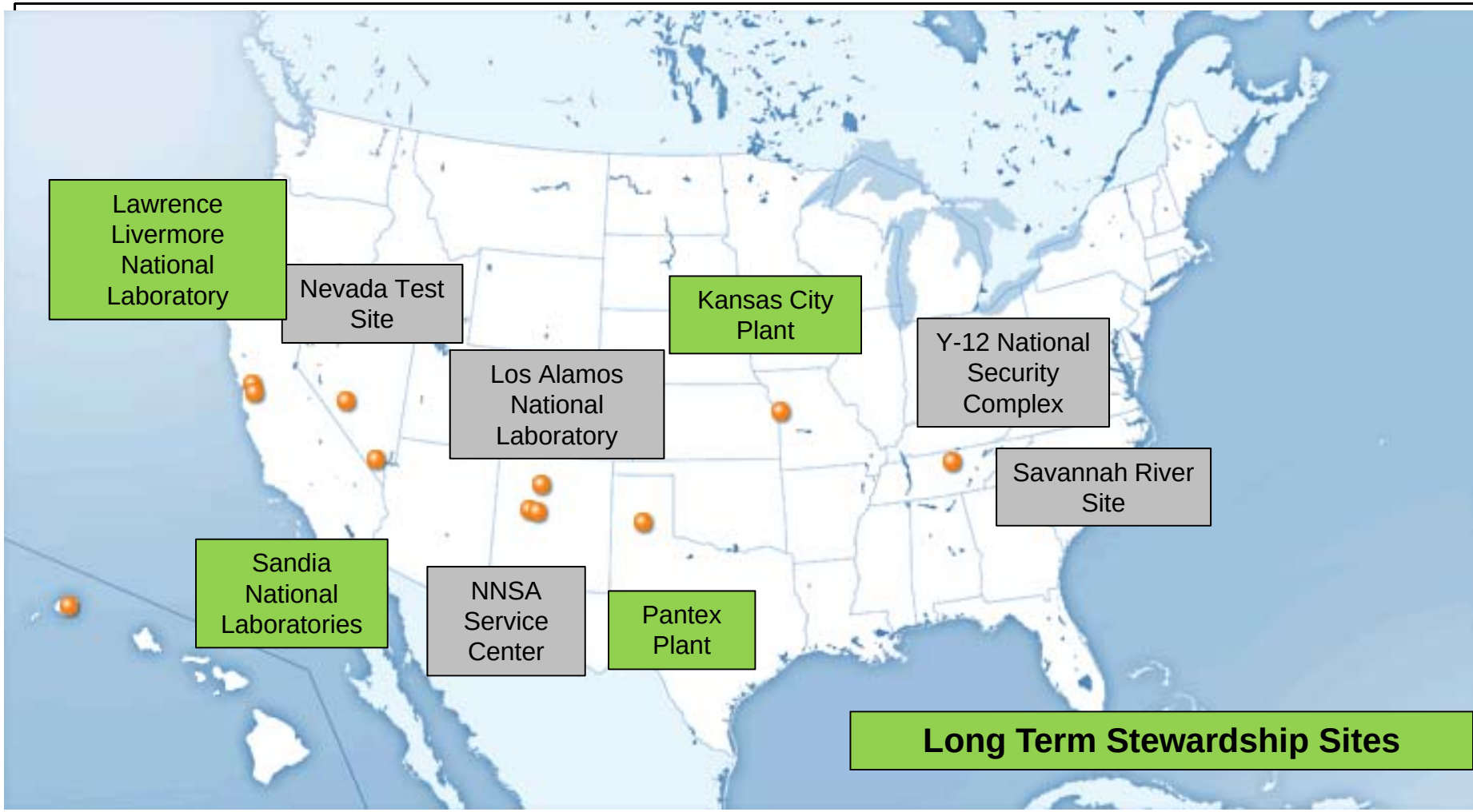


Nuclear Metals

US NRC Decommissioning Sites



US DOE National Nuclear Security Administration Sites



Regulation at Long Term Stewardship Sites

Well and surface water sampling monitoring and maintenance

Landfill monitoring before and after cover improvement

Per regulatory requirements, operate facilities to treat contaminated groundwater, perform environmental monitoring and maintain landfills.

Norwegian Regulatory Cooperation Experience

- Threat assessment to determine overall priorities from a regulatory perspective

- Results of threats assessment have been used to define regulatory development for:
  - protection of workers, the public and the environment during normal operations
  - addressing emergency preparedness and response
  - site characterisation activities
  - setting constraints and applying optimisation to all activities
  - waste management and transport on and off-site
  - rules for very low-level waste disposal on site
  - criteria for application at each stage of site remediation plan

Complex Range of Legacy Sites

- Area from a few square metres up to square kilometres
- Geographic conditions of climate, geology, hydrology mean that different sites may need different engineering solutions even for similar legacy problem
- Physical condition of facilities, from the completely derelict to sites quite well-managed
- Near public communities and major cities, or very remote
- Uncharacterised radioactive materials, spent fuel in poor stores, low-level and disperse contamination
- Other uncharacterised chemo-toxic and dangerous materials
- Former energy research and production facilities (Mayak, Hanford, Sellafield...) with some very hazardous materials
- Uranium mines and ore processing facilities, with large volumes of low concentration waste

Complex Range of Regulatory Issues

- Difficulty in balancing the health, safety and environmental issues in de-licensing
- Complexity of the responsibilities if a nuclear legacy facility is discovered abandoned without any consideration of hazard
- Former military facilities under transfer from non-military to civilian supervision
- An initial investigation to identify serious hazards which require immediate action
- Approval of strategy for remediation allowing for future land use, and the corresponding end-points
- The role of stakeholders in this process

Options for Site Remediation in NW Russia

- **Conservation** (storage under surveillance) – excludes the potential threat of contamination of the STS territory, water area and air media. A guarded area is arranged and continuous radiation monitoring is carried out.

- **Conversion** (renovation) – refers to subsequent use of the STS territories and facilities in compliance with the existing regulatory documents to control the radiological impact on personnel and public. Limited use of the territory in combination with rehabilitation measures and radiation monitoring (“brown field” concept) is envisaged

- **Liquidation** – includes stage-by-stage dismantling and removal of equipment, removal of RW, including contaminated environmental objects, and guarantees of limited exposure dose for critical group of public at the level 1 mSv/y (“green field” or unlimited use concept)

Coordinating Safety Supervision Activities

- Radiation and nuclear safety is one among many safety and pollution issues to be addressed in legacy site management
- Balanced and proportionate approach to decision making including safety issues, social, cultural and economic factors
- Importance of proper engagement of stakeholders in the overall process of legacy site management
- Regulatory authorities provide independent supervision of remediation activities through a process of
  - development of necessary standards and norms,
  - authorisation of activities,
  - inspection and compliance monitoring
- Strong and independent regulatory supervision is a critical factor in provision of radiation and nuclear safety during all these activities

Challenges for Integrated Safety Supervision at Sites of Temporary Storage

Management at those legacy sites involves:

- operations to make existing hazardous situations safe
- routine releases of liquid and gaseous effluents during remediation
- treatment, transport and storage of radioactive waste
- consideration of potential accidents during operations
- major activities include
  - facility decommissioning
  - contaminated land management
  - development of waste treatment storage and disposal facilities

In other words there are many health safety and environment issues, each with its own apparent priorities to address

Sharing experience internationally

- Workshops and review meetings
- Study trips
  - **USA**: DOE, EPA, NRC, Hanford and Idaho
  - **UK**: EA, HPA, NII, SEPA, Dounreay, Windscale, Sellafield, Rosyth, Devonport
  - **France**: IRSN, Marcoule

Role of International Guidance and Recommendations

- IAEA Safety Fundamentals and Basic Safety Standards provide the over-arching basis for safety and radiation protection supervision
- More specific IAEA documents provide guidance on how to address particular topics
- These documents need interpretation at the national level, so as to take account of:
  - national regulatory frameworks, details of technology application, and geophysical factors,
  - as well as social, cultural and resourcing matters
- More needs to be done to identify the circumstances in which it is appropriate to derogate responsibility to regional and local levels

International Forum for Regulatory Supervision of Legacy Sites (RSLS)

This Forum was established with the objective:

To promote high standards of regulatory supervision for the management of legacy sites, in line with the IAEA Safety Standards and good international practices

To be achieved through:

- collection and collation of information on nuclear legacy sites, the historical experience of legacy supervision
- sharing of information on nuclear legacy site restoration plans, and the role of regulatory supervision in planning activities
- the generation of mutual support through presentation and discussion on how regulatory supervision can be made effective and efficient

Questions for discussion… !!

- Do we have good practice in integration of the regulatory processes into operational challenges in legacy management?
- Do regulators have sufficient cross-border interaction to gain benefit from sharing the experience?
- What should regulators expect from international organizations to help solve legacy problems?