Risk/Waste Management at Chernobyl

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Chernobyl NPP

- 4 RBMKs
- Accident in Unit 4, April 1986
- Evacuation and exclusion zone
- Shelter constructed within months
- Decontamination of other units and continued operation

Shelter Implementation Plan (SIP)

- "The main objective of the SIP, developed in a co-operative effort between the European Union, the United States and Ukraine, is to protect the personnel, population and environment from the threat of the huge radioactive inventory of the Chernobyl Unit 4 Shelter." EBRD 2000

SIP Packages

- Package A Civil engineering
- Package B Operations and monitoring
- Package C Emergency systems
- Package D Fuel containing material

Package A
Civil engineering

- Structural stabilization design integration and mobilization
- Structural investigation and monitoring
- Geotechnical investigation
- Safe confinement strategy

Package B
Operations and monitoring

- Seismic characterization and monitoring
- Radiological protection program
- Industrial safety, fire protection infrastructure and access control
- Integrated monitoring system
- Integrated database/configuration management

Package C
Emergency systems

- Emergency preparedness
- Dust management
- Emergency dust suppression system
- Criticality control and nuclear system
- Contained water management

Dust management

- Large mass of dust in shelter
- Dust generated by weathering of FCM
- Airborne dose hazard
- Water spray system
- When tested in February, it snowed

Emergency Dust Suppression

- New, untested concept to be mounted on roof
- Potential benefits
- Potential costs
- Project not completed

Contained water management

- Liquid radwaste treatment facility
- Primarily for liquid wastes from Units 1-3 but will also treat operational waste water from Shelter

Package D
Fuel containing material

- FCM initial characterization
- FCM removal and waste management strategy
- FCM removal technology development
- FCM activities largely deferred, risk mitigated by new safe confinement

Magnitudes
Radiation levels and volumes

- FCM radiation levels still prohibitive
- Reduction due to decay slowing
- Volumes difficult to quantify, but very large
  - More than 95% of fuel remains inside the Unit from initial loading.
  - total amount of nuclear fission materials is about 200 tons.
  - Unidentified burial sites within Zone
  - Comingled waste/Decommissioning of Units 1-3

Capabilities

- New safe confinement estimated complete 2015
- Industrial Complex for Solid Radwaste Management turned over 2009
- Engineered near surface disposal facility 55,000 m^3 turned over December 2007
- Liquid radwaste treatment facility design started 2001, not yet operational

Conclusions

- At Chernobyl, risk management is waste management
- Waste management may not be waste disposal
- International cooperation may be required and is achievable