Idaho National Engineering and Environmental Laboratory

INSP IRUG-related Activities in FY-2001

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2001 RELAP5 Users Seminar
Elkhorn Resort
Sun Valley, Idaho
September 5-7, 2001
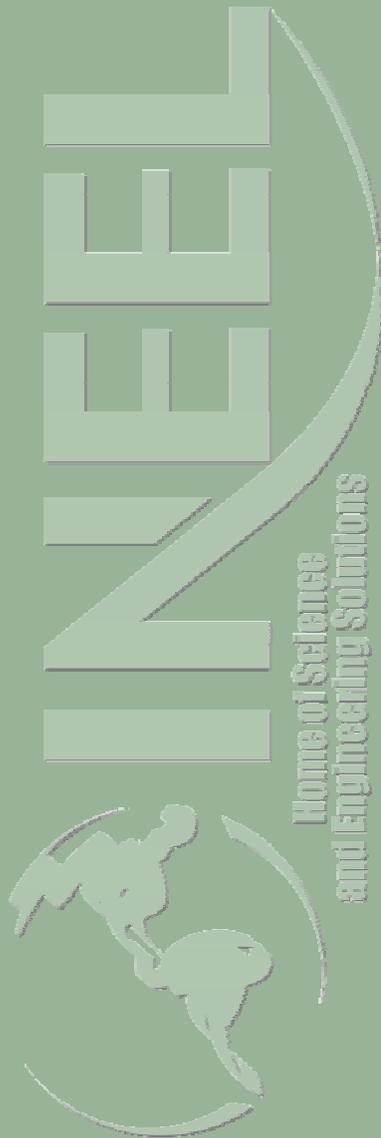
INSP Program Overview

- *Sponsored by the U.S. DOE*
- *Overall purpose is to enable the former Soviet states to safely operate, analyze, and regulate their plants*
- *Training in the application of RELAP5 to reactor safety analysis is part of the program*
  - *Model development consultation support*
  - *Code development support*
  - *Most of the organizations are using RELAP5/MOD3.2*
- *DOE has sponsored IRUG participation for Armenia, Bulgaria, Lithuania, Russia, Slovakia, and Ukraine*

Obninsk Meeting

- *An IRUG session was held at the Fifth International Information Exchange Forum on the Safety Analysis of VVER and RBMK Reactors in Obninsk, Russia, in October 2000.*

- *About 50 people attended the sessions.*

- *16 papers were presented on the assessment and application of the RELAP5 code for VVER and RBMK reactors.*

Armenia

- *RELAP5 will be the primary tool used in developing their Safety Analysis Report.*

- *Basic RELAP5 training was provided in Yerevan in April/May to personnel from the power plant and a technical support institute (Armatom).*

- *Procedures have been developed and reviewed that address plant data collection and preparation of a RELAP5 input model for the Armenian Nuclear Power Plant.*

Bulgaria

- *RELAP5/MOD3.2 input models were developed for both VVER-440 and VVER-1000 plants at Kozloduy.*

- *RELAP5/MOD3.2 was used in the development of emergency operating instructions for Kozloduy.*

- *Kozloduy NPP VVER-1000 Coupled Code Benchmark Specification*

  - *Joint effort between Penn State and INRNE*

  - *MCP switched on with 3 loops in operation*

  - *Test problem for coupled 3-D kinetics/ thermal-hydraulics codes*

Lithuania

- *The Lithuanian Energy Institute has developed a RELAP5-3D model of the Ignalina RBMK plant.*

- *The model uses the nodal kinetics and a user-defined cross section subroutine.*

- *The model is being benchmarked against steady state and transient plant data.*

- *Transient calculations are also being compared to Russian code calculations.*

Russia

- *The code is being assessed using data from Russian integral and separate effects test facilities*

- *RELAP5/MOD3.2 did not simulate CHF data well; the Osmachkin correlation was added to RELAP5-3D to improve the modeling capability.*

- *On-call assistance, mostly with installation or operating system questions.*

- *RRC-KI and INEEL developed RELAP5-3D model of Kursk-1 RBMK plant*

- *RBMK applications have demonstrated a need for kinetics feedback to the time step control.*

Slovakia

- *Limited on-call support*

- *RELAP5/MOD3.2 and RELAP5-3D are being used by both government and private organizations.*

- *Slovak nuclear power plants and facilities in other countries are being analyzed.*

Ukraine

- *Most of the work at the plants and institutes is being done with RELAP5/MOD3.2.*

- *A nodal kinetics models of VVER-1000 (Zaporozhzhya) and VVER-440 (Rivne) reactors being developed at Kyiv University. This is the first major effort using the hexagonal geometry option.*

- *Some errors in the kinetics have been found and corrected, and some additions have been made to accommodate the very large meshes that are being used.*

INSP Summary

- *Training in the use of RELAP5 has been provided to safety analysts from former Soviet states.*

- *Input models have been, or are being, developed for many VVER and RBMK reactors.*

- *Many changes have been made to the nodal kinetics model to accommodate the needs of the foreign users.*

- *Funding for the INSP is decreasing.*