INEEL Activities in Support of INSP (International Nuclear Safety Program)

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USA

Idaho National Engineering and Environmental Laboratory

The major presentation topics are: (1 of 2)

★ **Brief description of INSP**

  ■ **Program participants**

  ■ **Program objectives**

  ■ **Primary INEEL activities**

★ **Significant activities since 1999 IRUG meeting**

  ■ **Safety Analysis Capability**

    ● **Bulgaria**

    ● **Slovak Republic**

  ■ **Code Validation for VVER Applications**

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The major presentation topics are:

★ **Significant activities since 1999 IRUG meeting (continued)**

- ■ **IRUG**
  - ● **Russia/Ukraine**
  - ● **Lithuania**
- ■ **Accident Analysis for RBMK NPPs with RELAP-3D**
  - ● **Model development**
  - ● **Training**
  - ● **Analyses**
- ■ **SAPHIRE**
- ■ **Two Phase Flow Instrumentation for the PSB Facility**

★ **Future Activities**

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Program
Description

DOE and international partners have developed INSP to help reduce safety risk at Soviet-designed nuclear power plants

★ **Program participants are: Armenia, Bulgaria, the Czech Republic, Hungary, Kazakhstan, Lithuania, Russia, Slovakia, Ukraine and USA**

★ **Program objectives include helping to:**

  ■ **Make Soviet-designed NPP operation safer**

  ■ **Sustain safety improvements**

  ■ **Build country specific infrastructure for safety analysis**

  ■ **Promote lasting safety culture consistent with international practices**

The significant INEEL activities are associated with:

★ **Provision of the RELAP5 and SAPHIRE codes and training in their use**

★ **Safety analysis training**

★ **Direct technical assistance, including joint input model development and analysis demonstration**

★ **Support to and participation in international user groups**

  ■ **IRUG (International RELAP5 User Group)**

  ■ **ISUG (International SAPHIRE User Group)**

★ **Code validation**

  ■ **RELAP5/MOD3.2**

  ■ **RELAP5/3-D (By special agreements)**

Significant activities since 1999 IRUG meeting

Activities to help develop enhanced safety analysis capability in Bulgaria & Slovak Republic include:

★ **Bulgaria**

■ **INEEL provided sample RELAP5 code exercises for the INRNE and KNPP analysts to work on. The results were returned to INEEL for review and comments. This training was conducted via email**

■ **INEEL conducted a training workshop in August to provide training in RELAP5 accident analysis. Participants were from INRNE and KNPP.**

■ **INEEL has provided consulting to KNPP and EGP personnel regarding installation and operation of RELAP5 and associated software products**

■ **INEEL provided the SAPHIRE code to KNPP, and installed it on KNPP computers. INEEL trained KNPP analysts in the use of SAPHIRE in October. Bulgaria has been included as a member of the SAPHIRE users group**

★ **Slovak Republic**

■ **INEEL provided on-call consulting support for UJD**

The activities related to code validation for VVER applications are:

★ **Performed and documented RELAP/MOD3.2 assessment using an 11% upper plenum break experiment in the ISB facility. Presented results at the Obninsk meeting (Oct 1999)**

★ **Contributing to the joint assessment report for that experiment**

★ **Presented results of the 2.4% downcomer break experiment at the NURETH-9 meeting (Sep 1999)**

The INSP support to IRUG members was (1 of 2):

★ **Russia & Ukraine**

- ■ **Conducted an IRUG meeting in conjunction with the annual Information Exchange Forum in Obninsk, Russia, in October 1999**

- ■ **INEEL provided code versions to several organizations in Russia and Ukraine**
  - ● **Kurchatov Institute**
  - ● **EDO Gidropress**
  - ● **Leningrad NPP**
  - ● **Engineering Technologies & Development, Kyiv**
  - ● **Slavutych Laboratory for International Research and Technologies**

- ■ **INEEL provided on-call consulting for personnel at**
  - ● **Ukraine: Rivne NPP, Zaporizhzhe NPP**
  - ● **Russia: EREC, GAN**

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The INSP support to IRUG members was (2 of 2):

★ **Lithuania**

- ■ **Developed and installed a RELAP5-3D code version on the Sun workstation at LEI**

- ■ **Debugged problems with the LEI input deck for the Ignalina plant and with the RELAP5-3D code**

- ■ **Created and installed a modified version of RELAP5-3D to accommodate the Ignalina input deck**

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Activities associated with accident analysis for RBMK NPPs with RELAP-3D included (1 of 2):

★ Training

- ■ INEEL conducted a training workshop in July on RELAP5-3D including usage of the nodal kinetics model. Participants were from RRC KI, EREC, and REA

- ■ Developed RELAP5-3D training materials

- ■ Delivered training course at Lithuanian Energy Institute (LEI) to 6 Lithuanian and 4 Ukrainian engineers

- ■ Follow-up assistance provided to LEI in the development of their RELAP5-3D input model for the Ignalina plant

★ Model Development

- ■ INEEL supported the development of the RELAP5-3D nodal kinetics input model for the Kursk 1 NPP including an interface to the two-group neutron cross-section library used by STEPAN

Activities associated with accident analysis for RBMK NPPs with RELAP-3D included (2 of 2):

★ **Analyses:**

  ■ **INEEL conducted analysis to support validation of RELAP5-3D using data from the RRC KI KS facility and the Japanese SEL and HTL tests**

  ■ **INEEL conducted transient calculations using the RELAP5-3D nodal kinetics model. Included were control rod withdrawal and pressure header break simulations**

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The support related to the SAPHIRE Multi-Language Code was:

★ **Dr. Ilya Denisov of RINSC visited INEEL in Oct 1999 to facilitate translation of the SAPHIRE help system and dialog boxes and messages into Russian**

★ **INEEL transferred the SAPHIRE Version 6.0 Help Manual to RINSC as well as the dialog box strings and the message strings for translation into Russian**

★ **The help Manual has been translated**

★ **Translation of message strings and dialog boxes is in progress**

★ **The Version 7.0 manual has been redlined for transmittal to RINSC for translation of updates into Russian**

★ **A Russian-speaking summer hire is available to assist with installation of translated text at INEEL**

★ **Plan to have Russian Language version of SAPHIRE completed by October 2000**

The continued support to implement two-phase flow instrumentation in the EREC PSB facility includes:

★ **The instrumentation was delivered in April 1999:**

  ■ **Stainless steel spool**

  ■ **Gamma densitometer**

  ■ **Drag screen**

  ■ **Supporting electronics and hardware**

★ **The Operation and Maintenance Manual and Calibration Report were sent in September 1999**

★ **A INEEL-EREC agreement has been generated to:**

  ■ **Provide INEEL staff support on-site at EREC in Sep 2000, Nov 2000 and Feb 2001 to help install, check-out, calibrate, and use the instruments.**

The
Future

INSP future activities relate to:

★ **Continuation of "in-progress" support**

  ■ **Support to IRUB and ISUG members**

  ■ **Conduct of RELAP5/MOD3.2 and SAPHIRE training (as requested by host countries and approved by DOE)**

  ■ **Support to host countries and performance of RELAP5 code validation for application to VVERs and RBMKs**

  ■ **Completion of support to EREC PSB instrumentation implementation**

★ **Other activities under consideration**

  ■ **Additional training for RELAP5-3D**

  ■ **Advanced training for RELP5/MOD3.2 (both on-site at host countries and remotely by the Internet)**