

Workshop on the Application and Development of Nuclear Reactor Simulators for  
Educational Purposes

16 – 27 October 2000

in co-operation with the International Atomic Energy Agency (IAEA)

## Programme

All lectures will be held in the ICTP [Main Building](#), Lecture Room "C"  
Computer sessions will take place in the Computer Lab., Lobby, Main Building

### WEEK 1

## 16 October, Monday

8.30 – 9.30 ICTP Registration, Lobby, Main Building

9.30 – 10.30 Opening Session and Introduction

**R. Lyon** (IAEA, Vienna, Austria)

10.30 – 10.45 Coffee Break

10.45 – 12.15 Introduction to Various Modular Modelling Systems

**W. Lam** (CTI Simulation Int'l Corp., Toronto, Canada)

12.15 – 13.30 Lunch Break

13.30 – 15.30 Dynamic Simulation Fundamentals

**W. Lam** (CTI Simulation Int'l Corp., Toronto, Canada)

15.30 – 15.45 Coffee Break

15.45 – 17.15 CASSIM Simulation Fundamentals

**W. Lam** (CTI Simulation Int'l Corp., Toronto, Canada)

17.30 Small Reception, Main Building Cafeteria

## 17 October, Tuesday

9.00 – 11.00 Reactor Model Development

**W. Lam**(CTI Simulation Int'l Corp., Toronto, Canada)

11.00 – 11.15 Coffee break

11.15 – 12.15 Reactivity Feedback Effects

**W. Lam** (CTI Simulation Int'l Corp., Toronto, Canada)

12.15 – 13.30 Lunch Break

13.30 – 15.30 Overview of Reactor Control

**W. Lam** (CTI Simulation Int'l Corp., Toronto, Canada)

15.30 – 15.45 Coffee break

15.45 – 17.15 PHW Reactor Regulating System: Simulator Exercises

**W. Lam** (CTI Simulation Int'l Corp., Toronto, Canada)

## 18 October, Wednesday

9.00 – 11.00 PHW Reactor: Simulator Exercises (continued)

**W. Lam** (CTI Simulation Int'l Corp., Toronto, Canada)

11.00 – 11.15 Coffee break

11.15 – 12.15 Zonal Reactivity Control Modelling

**W. Lam** (CTI Simulation Int'l Corp., Toronto, Canada)

12.15 – 13.30 Lunch Break

13.30 – 15.30 Control Systems Modelling, Absorbers and Adjusters;  
Shutdown System Modelling

**W. Lam** (CTI Simulation Int'l Corp., Toronto, Canada)

15.30 – 15.45 Coffee break

15.45 – 17.15 Model Integration for Simple Reactor

**W. Lam** (CTI Simulation Int'l Corp., Toronto, Canada)

## 19 October, Thursday

9.00 – 11.00 Simulator: Exercises with Simple Reactor Model

**W. Lam** (CTI Simulation Int'l Corp., Toronto, Canada)

## Preliminary Programme

11.00 – 11.15 Coffee break

11.15 – 12.15 Reactor: Startup and Approach to Criticality

**W. Lam** (CTI Simulation Int'l Corp., Toronto, Canada)

12.15 – 13.30 Lunch Break

13.30 – 15.30 Reactor: Startup and Approach to Criticality

**W. Lam** (CTI Simulation Int'l Corp., Toronto, Canada)

15.30 – 15.45 Coffee break

15.45 – 17.15 Higher Fidelity Reactor Model

**W. Lam** (CTI Simulation Int'l Corp., Toronto, Canada)

## 20 October, Friday

9.00 – 11.00 CANDU Station Process Systems

**W. Lam** (CTI Simulation Int'l Corp., Toronto, Canada)

11.00 – 11.15 Coffee break

11.15 – 12.15 Overall Unit Control

**W. Lam** (CTI Simulation Int'l Corp., Toronto, Canada)

12.15 – 13.30 Lunch Break

13.30 – 15.30 Simulator: Start-up, Display, Plant Overview

**W. Lam** (CTI Simulation Int'l Corp., Toronto, Canada)

15.30 – 15.45 Coffee break

15.45 – 17.15 Simulator: Turbine Generator, UPR, Power Maneuver

**W. Lam** (CTI Simulation Int'l Corp., Toronto, Canada)

**WEEK 2**

## 23 October, Monday

9.00 – 11.00 Reactor: Assembly, Control Devices, Power Measurements,  
Regulating System, Moderator

**W. Lam** (CTI Simulation Int'l Corp., Toronto, Canada)

## Preliminary Programme

11.00 – 11.15 Coffee break

11.15 – 12.15 Simulator: Shutdown Rods, Reactivity Control, RRS/DPR, Reactor Stepback and Recovery, Absorber Rods

**W. Lam** (CTI Simulation Int'l Corp., Toronto, Canada)

12.15 – 13.30 Lunch Break

13.30 – 15.30 Heat Transport System

**W. Lam** (CTI Simulation Int'l Corp., Toronto, Canada)

15.30 – 15.45 Coffee break

15.45 – 17.15 Simulator: PHT Circuit

**W. Lam** (CTI Simulation Int'l Corp., Toronto, Canada)

## 24 October, Tuesday

9.00 – 11.00 Steam, Turbine and Feedwater

**W. Lam** (CTI Simulation Int'l Corp., Toronto, Canada)

11.00 – 11.15 Coffee break

11.15 – 12.15 Simulator: Steam Systems

**W. Lam** (CTI Simulation Int'l Corp., Toronto, Canada)

12.15 – 13.30 Lunch Break

13.30 – 15.30 Special Safety Systems

**W. Lam** (CTI Simulation Int'l Corp., Toronto, Canada)

15.30 – 15.45 Coffee break

15.45 – 17.15 Simulator: Reactor Trip and Recovery

**W. Lam** (CTI Simulation Int'l Corp., Toronto, Canada)

## 25 October, Wednesday

9.00 – 11.00 Overview of NPP with VVER–1000. Reactor Department Equipment. Constructional and Physical Characteristics of the Core.

**A. Borodin, S. Vygovsky**

(Moscow Institute for Physics & Engineering)

11.00 – 11.15 Coffee break

## Preliminary Programme

11.15 – 12.15 Overview of Reactor and VVER Simulator Control.

**A. Borodin, S. Vygovsky**

(Moscow Institute for Physics & Engineering, Russia)

12.15 – 13.30 Lunch Break

13.30 – 15.30 VVER Simulator : Investigation of the Core Major Neutron–Physics Characteristics and Stationary Processes Concerned with Fuel Burnup.

**A. Borodin, S. Vygovsky**

(Moscow Institute for Physics & Engineering, Russia)

15.30 – 15.45 Coffee break

15.45 – 17.15 VVER Simulator Exercises. Stationary Processes, Fuel Burnup, Determination of the Core Major Neutron–Physics Characteristics.

**A. Borodin, S. Vygovsky**

(Moscow Institute for Physics & Engineering, Russia)

## 26 October, Thursday

9.00 – 11.00 Overview of VVER. 1000 Operation. Classification of Regimes. Safe Operation Limits.

**A. Borodin, S. Vygovsky**

(Moscow Institute for Physics & Engineering, Russia)

11.00 – 11.15 Coffee break

11.15 – 12.15 VVER Simulator: Investigation of Non–Stationary Processes in VVER–1000 Concerned with Xenon Oscillations.

**A. Borodin, S. Vygovsky**

(Moscow Institute for Physics & Engineering, Russia)

12.15 – 13.30 Lunch Break

13.30 – 15.30 VVER Simulator Exercises. Reactor Trip, Xenon Oscillations and Recovery to Rated Power.

**A. Borodin, S. Vygovsky**

(Moscow Institute for Physics & Engineering, Russia)

15.30 – 15.45 Coffee break

15.45 – 17.15 VVER Simulator. Reactor Startup in Hot State.

**A. Borodin, S. Vygovsky**

(Moscow Institute for Physics & Engineering, Russia)

## 27 October, Friday

## Preliminary Programme

9.00 – 11.00 ARS

**R. Lyon** (IAEA, Vienna, Austria)

11.00 – 11.15 Coffee break

11.15 – 12.15 ARS

**R. Lyon** (IAEA, Vienna, Austria)

12.15 – 13.30 Lunch Break

13.30 – 15.30 CARDS

**R. Lyon** (IAEA, Vienna, Austria)

15.30 – 15.45 Coffee break

15.45 – 17.15 Wrap up Session

**R. Lyon** (IAEA, Vienna, Austria)



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