TRACE/SNAP User Workshop

September 30th – October 3rd, 2014

Hilton Garden Inn
Idaho Falls, Idaho

AGENDA

Highlights

- The Agenda is directed towards beginning users with some thermal-hydraulic system code experience
- Focus will be on using TRACE and SNAP for thermal-hydraulic analyses
- Facilities include a computer laboratory with one seat per attendee

DAY 1

MORNING

Introduction to Workshop
8:30 a.m. – 8:45 a.m.

Basics of TRACE Computer Code and Analysis Methods
8:45 a.m. – 10:00 a.m. Technical Lead: ISL

Code documentation
Basic TRACE code theory and governing equations
Closure relationships
Flow regimes
TRACE numerical solution scheme
TRACE code limitations
Special Process models
TRACE input and output
Hydrodynamic and heat structure components
Control system models
Example TRACE nuclear power plant system model nodalization
Status of ongoing TRACE code development

Introduction to the SNAP User Interface
10:00 a.m. – 12:00 Noon Technical Lead: APT

Objectives:
- Familiarize students with SNAP configuration and the Model Editor.

Presentations:
Introduction to SNAP

Exercise: Configuring SNAP
Editing and Existing Model
Working with Model Views
Model/Component Diff Viewer
Working with View Templates
Resource Bundle Import/Export
2D Drawing Features

LUNCH
12:00 Noon – 1:00 p.m.

AFTERNOON

Introduction to the SNAP Job Streams and Post Processing

1:00 p.m. – 4:30 p.m. Technical Lead: APT

Objectives:

- Familiarize students with SNAP Job Streams and Post-Processing.

Presentations:

SNAP Job Streams and Post-Processing

Exercise: Introduction to Job Streams
Working with Output Files
Restart Editing
User-Defined Numerics and Parametrics
Animating a Model
Interactive Controls
Importing A Completed Job
Using AptPlot and the ACS Plug-in
AptPlot Commands
AptPlot in Job Streams
Tabular Parametric and Axial Plotting
AptPlot Scripting

DAY 2

MORNING

TRACE Components and Facility Model Development - Part 1

8:30 a.m. – 12:00 Noon Technical Lead: ISL

Objectives:

- Familiarize students with PIPE, FILL, and HTSTR components, control system components, material properties, namelist variables and time step control
- Have students build a model from scratch
- Familiarize students with inserting and configuring the most common components
- Basic experience in adding control blocks to a model for extracting useful information
- Basic understanding of code assessments, identifying and modeling important phenomena

Presentations:

Introduce PIPE, FILL, and HTSTR components
Discuss material properties data, namelist variables, and time step data
Control System Input: signal variables and control blocks

Exercise: MIT Pressurizer Test ST4 assessment using all of the concepts introduced above

LUNCH

12:00 Noon – 1:00 p.m.

AFTERNOON

TRACE Components and Facility Model Development - Part 2

1:00 p.m. – 4:30 p.m. Technical Lead: ISL

Objectives:

- Familiarize students with VALVE, PUMP, BREAK, TEE, SEPD and JETP components
- Introduce active control using signal variables, trips, and control blocks

Presentations:

VALVE, PUMP, BREAK, TEE, SEPD and JETP components.
TRIPs.
Introduction to the TRACE three-loop plant model.

Exercise: PWR Model Setup – Exercise 1

Add trip controllers for a turbine stop valve.
Add a turbine stop VALVE component.

Exercise: PWR Model Setup – Exercise 2

Configure a TRACE PUMP component.

DAY 3

MORNING

TRACE Components and Facility Model Development - Part 3

8:30 a.m. – 12:00 Noon Technical Lead: ISL

Objectives:

- Introduce VESSEL, CHAN and CONTAN components
- Introduce basic configuration of POWER and powered HS components
- Introduce basic point kinetics
- Provide experience with renodalization
- Familiarize students with heat structure nodalization for fuel rods

Presentations:

VESSEL, CHAN and CONTAN components.
POWER and Powered Heat Structure Components.
Point reactor kinetics modeling.
Nodalization of fuel rods.

Exercise: PWR Model Setup – Exercise 3

Modify the VESSEL core region
Renodalize fuel rod heat structure radial noding
Add a top-skewed axial power profile
Obtain a correct fuel rod center line temperature

LUNCH

12:00 Noon – 1:00 p.m.

AFTERNOON

TRACE Modeling Issues and Guidelines

1:00 p.m. – 4:30 p.m. Technical Lead: ISL

Objectives:

- Familiarize students with proven modeling techniques and guidelines.
- Make students aware of various important modeling considerations.

Presentations:

L/D considerations, PWR loop seal nodalization, frictional pressure drop modeling, loop elevation closure, steam generator modeling, modeling of pipe breaks, reflood heat transfer modeling.

Exercise: FLECHT-SEASET reflood assessment

DAY 4

MORNING

Plant Simulations – PWR Steady-State

8:30 a.m. – 12:00 Noon Technical Lead: ISL

Objectives:

- PWR steady-state topics

Presentations:

Managing multiple simulations in a single model
Achieving steady-state target conditions
Debugging TRACE input errors
Break modeling and validation
Reflood configuration and steady-state calculation

Exercise:

Numerics Capabilities
Constrained Steady-State
PID Controller
Debugging TRACE Input Errors
Break Modeling
Reflood Model Activation
PWR Steady-State Calculation

LUNCH

12:00 Noon – 1:00 p.m.

AFTERNOON

TRACE Strengths and Weaknesses

1:00 p.m. – 2:00 p.m. Technical Lead: ISL

Objectives:
Developmental assessment results

Plant Simulations – PWR SBLOCA

2:00 p.m. – 4:30 p.m. Technical Lead: ISL

Plant SBLOCA exercise

Set up model for a small break loss-of-coolant accident calculation
Run the transient calculation and analyze the results