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**INTERNATIONAL STANDARD PROBLEMS**

**(ISP)**

**BRIEF DESCRIPTIONS**

**(1975-1994)**

**July 1994**



**COMMITTEE ON THE SAFETY OF NUCLEAR INSTALLATIONS**  
**OECD NUCLEAR ENERGY AGENCY**

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ORGANISATION FOR ECONOMIC  
CO-OPERATION AND DEVELOPMENT

NUCLEAR ENERGY AGENCY

STEERING COMMITTEE  
FOR NUCLEAR ENERGY

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COMMITTEE ON THE SAFETY OF NUCLEAR INSTALLATIONS  
PRINCIPAL WORKING GROUP ON COOLANT SYSTEM BEHAVIOUR (PWG2)  
PRINCIPAL WORKING GROUP ON  
CONFINEMENT OF ACCIDENTAL RADIOACTIVE RELEASES (PWG4)

CSNI  
INTERNATIONAL STANDARD PROBLEMS (ISP)

BRIEF DESCRIPTIONS  
(1975-1994)

015684

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## O E C D

The Convention establishing the Organisation for Economic Co-operation and Development (OECD) was signed on 14th December 1960.

Pursuant to Article 1 of the Convention, the OECD shall promote policies designed:

- to achieve the highest sustainable economic growth and employment and a rising standard of living in Member countries, while maintaining financial stability, and thus to contribute to the development of the world economy;
- to contribute to sound economic expansion in Member as well as non-member countries in the process of economic development; and
- to contribute to the expansion of world trade on a multilateral, non-discriminatory basis in accordance with international obligations.

The current Signatories of the Convention are Australia, Austria, Belgium, Canada, Denmark, Finland, France, the Federal Republic of Germany, Greece, Iceland, Ireland, Italy, Japan, Luxembourg, Mexico, the Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, Turkey, the United Kingdom and the United States. The Commission of the European Communities takes part in the work of the OECD (Article 13 of the OECD Convention).

## N E A

The OECD Nuclear Energy Agency (NEA) was established on 1st February 1958 under the name of the OEEC European Nuclear Energy Agency. NEA membership today consists of all European Member countries of OECD as well as Australia, Canada, Japan, Republic of Korea, Mexico and the United States. The Commission of the European Communities takes part in the work of the Agency.

The primary objective of NEA is to promote co-operation among the governments of its participating countries in furthering the development of nuclear power as a safe, environmentally acceptable and economic energy source.

NEA works in close collaboration with the International Atomic Energy Agency (IAEA), with which it has concluded a Co-operation Agreement, as well as with other international organisations in the nuclear field.

## C S N I

The NEA Committee on the Safety of Nuclear Installations (CSNI) is an international committee made up of scientists and engineers. It was set up in 1973 to develop and coordinate the activities of the OECD Nuclear Energy Agency concerning the technical aspects of the design, construction and operation of nuclear installations insofar as they affect the safety of such installations. The Committee's purpose is to foster international co-operation in nuclear safety amongst the OECD Member countries.

## FOREWORD

Over the last twenty years the NEA Committee on the Safety of Nuclear Installations (CSNI) has sponsored some forty International Standard Problems (ISPs) in the fields of in-vessel thermal-hydraulic behaviour, fuel behaviour under accident conditions, fission product release and transport, core/concrete interactions, hydrogen distribution and mixing, containment thermal-hydraulics. ISPs are comparative exercises in which predictions of different computer codes for a given physical problem are compared with each other or with the results of a carefully controlled experimental study. The main goal of ISP exercises is to increase confidence in the validity and accuracy of tools which are used in assessing the safety of nuclear installations. Moreover, they enable code users to gain experience and demonstrate their competence. ISPs are performed as "open" or "blind" problems. In an open Standard Problem the results of the experiment are available to the participants before performing the calculations, while in a blind Standard Problem the results are locked until the calculational results are made available for comparison.

While code verification is primarily a task for institutions developing codes, requiring considerable financial resources for performing a large number of calculations and comparing relevant experimental results with calculated data, ISP exercises can be considered as a supplementary activity, validating appropriate code applications through the analyses of experts different from the code developers.

Experiments selected to support ISP exercises are exceptionally well documented; they provide the framework for several code validation matrices.

## ISPs

Number	Date	Title
1	1975	Standard Problem 1 - Edwards' Pipe
2	1975	Analysis of Semiscale Blowdown Test 11
3	6/77	CSNI Standard Problem 3; Comparison of LOCA Analysis Codes
4	3/78	United States Standard Problem 6 and International Standard Problem 4: Semiscale MOD1 Test S-02-6
5	1/79	Final Comparison Report on LOFT Test L1-4
6	1978	ISP-6: Calculations Comparison Report
7	6/79	Comparison Report on OECD-CSNI LOCA Standard Problem No. 7: Analysis of a Reflooding Experiment
8	1979	Semiscale MOD1 Test S-06-03 (LOFT Counterpart Test)
9	4/81	LOFT Test L3-1
10	9/81	OECD-CSNI LOCA Standard Problem No. 10: "Refill and Reflood Experiment in a Simulated PWR Primary System (PKL)"
11	1984	LOFT L3-5 and L3-6 Tests
12	9/82	ROSA-III 5% Small Break Test, Run 912
13	4/83	International Standard Problem 13 (LOFT Experiment L2-5)
14	2/85	Behavior of a Fuel Bundle Simulator during a Specified Heatup and Flooding Period (REBEKA Experiment)
15	11/83	LOCA Experiment at FIX-II Facility
16	6/85	Rupture of a Steam Line within the HDR Containment Leading to an Early Two-Phase-Flow
17	1984	Marviken BWR Standard Problem
18	4/87	LOBI-MOD2 Small Break LOCA Experiment
19	1987	Behavior of a Bundle during a large break LOCA transient with a Two-Peaks Temperature History
20	12/88	Doel 2 Steam Generator Tube Rupture Event
21	11/89	Piper-One, Simulation of Small and Intermediate Break LOCA for BWRs
22	10/90	SPES - Loss of Feedwater Transient in Italian PWR
23	12/89	Rupture of a Large Diameter Pipe in the HDR Containment
24	12/89	SURC-4 - Core-Concrete Interaction Test
25	2/91	ACHILLES - N2 injection from accumulators and faster (best estimate) reflood rates
26	2/92	ROSA-IV LSTF Cold-Leg Small-Break LOCA Experiment
27	1992	BETHSY - Small break LOCA with Loss of HP Injection
28	12/92	PHEBUS SFD B9+ - Experiment on the Degradation of a PWR Type Core
29	2/93	HDR Experiment - Hydrogen distribution inside the HDR containment under severe accident conditions
30	4/92	BETA II Core-Concrete Interaction Experiment (Test V5.1)
31	7/93	CORA-13 Experiment on Severe Fuel Damage
32	---	FLHT-6 Experiment (cancelled)
33	TBD	PACTEL - VVER-440 Natural Circulation Test Behaviour
34	TBD	Falcon Experiments FAL-ISP-1 and FAL-ISP-2
35	TBD	NUPEC Hydrogen Distribution Test M-7-1
36	TBD	CORA - VVER Severe Fuel Damage Experiment (Test W2)

### Containment Analysis Standard Problems (CASPs)

CASP-1	5/80	Steamline Rupture within a Chain of Compartments
CASP-2	5/82	Water Line Rupture in a Branched Compartment Chain
CASP-3	4/83	Final Comparison Report for Containment Standard Problem Exercise 3

<u>Number</u>	<u>Date</u>	<u>CSNI Report No.</u>	<u>Author</u>
1	1975	None	

Title

Standard Problem 1 - Edwards' Pipe

Subject

Discharge, pressure waves

Description

Analysis of the blowdown of a straight pipe filled with pressurized water. Test modeled is reported by A.R. Edwards and T.P. O'Brien in "Studies of Phenomena Connected with the Depressurization of Water Reactors", Journal of the British Nuclear Energy Society, pp. 125-135, April 1970.

Type

Open exercise

Facility

Edwards' Pipe

Country

UK

<u>Number</u>	<u>Date</u>	<u>CSNI Report No.</u>	<u>Author</u>
2	1975	None	

Title  
Analysis of Semiscale Blowdown Test 11

Subject  
Large break LOCA blowdown

Description

Type  
Blind exercise

Facility  
Semiscale

Country  
USA

<u>Number</u>	<u>Starting Date</u>	<u>CSNI Report No.</u>	<u>Date</u>	<u>Author</u>
3	1976	15	6/77	W.T. Hancox, B.H. McDonald

Title  
CSNI Standard Problem 3; Comparison of LOCA Analysis Codes

Subject  
Pipe discharge

Description  
Blowdown experiment of initially subcooled fluid with heat addition, conducted by CISE for AECL.

Type  
Open exercise

Facility  
CISE

Country  
Canada



<u>Number</u>	<u>Starting Date</u>	<u>CSNI Report No.</u>	<u>Date</u>	<u>Author</u>
4	1976	16, 50	3/78	H.M. Delaney

Title

United States Standard Problem 6 and International Standard Problem 4 : Semiscale Mod 1 Test S-02-6

Subject

6% small break LOCA

Description

Comparison Report of Test S-02-6 of the Semiscale Mod-1 Facility. This test was a 6% small break area blowdown heat transfer test from initial conditions of 2265 psia, 542 F, and 148 lbm/sec in the cold leg using 5.5 ft. PWR type electric core heater rods.

Type

Blind exercise

Facility

Semiscale

Country

USA

<u>Number</u>	<u>Starting Date</u>	<u>CSNI Report No.</u>	<u>Date</u>	<u>Author</u>
5	1977	29 (+ Addendum)	1/79	B.L. Hansen

Title

Final Comparison Report on LOFT Test L1-4

Subject

Isothermal large break LOCA

Description

Non-nuclear isothermal blowdown test with a primary volume of 7.71 cu. m. and starting from initial conditions of 552.2 K, 15.73 MPa, and 268.4 kg/s mass flow on the intact loop. Simulation of a 200% double-ended offset shear in the cold leg of a four loop large PWR.

Type

Blind exercise

Facility

LOFT

Country

USA

<u>Number</u>	<u>Starting Date</u>	<u>CSNI Report No.</u>	<u>Date</u>	<u>Author</u>
6	----	30	1978	

Title

ISP-6: Calculations Comparison Report

Subject

Discharge from top of vertical vessel

Description

Simulation of a steamline rupture with a pressure vessel not equipped with internals, to determine the water level and phase separation effects during the initial blowdown phase.

Type

Open exercise

Facility

Battelle

Country

Germany

<u>Number</u>	<u>Starting Date</u>	<u>CSNI Report No.</u>	<u>Date</u>	<u>Author</u>
7	----	55	6/79	R. Deruaz, N. Tellier

Title

Comparison Report on OECD-CSNI LOCA Standard Problem No. 7: Analysis of a Reflooding Experiment

Subject

Reflood of heated tube

Description

Separate effects experiment performed on the ERSEC loop at the Grenoble Nuclear Centre. Investigated the thermal-hydraulics of the reflood phase of a loss of coolant accident.

Type

Blind exercise

Facility

ERSEC

Country

France

<u>Number</u>	<u>Starting Date</u>	<u>CSNI Report No.</u>	<u>Date</u>	<u>Author</u>
8	----	38	1979	

Title

Semiscale MOD1 Test S-06-03 (LOFT Counterpart Test)

Subject

Large break LOCA

Description

Intended to determine the maximum cladding temperature associated with a high-powered rod peak density of 39.4 kW/m, or 75% of the maximum peak power density of 52.5 kW/m. Designed to obtain thermal-hydraulic response data from blowdown, refill, and reflood transients to assist the LOFT Program in the planning of the first LOFT nuclear test series.

Type

Open exercise

Facility

Semiscale

Country

USA

<u>Number</u>	<u>Starting Date</u>	<u>CSNI Report No.</u>	<u>Date</u>	<u>Author</u>
9	1980	66	4/81	A.C. Peterson, C. Polk, J.A. Sellars

Title

LOFT Test L3-1 Preliminary Comparison Report

Subject

2.5% small break LOCA

Description

Comparison report for L3-1 LOFT test. This test was a single ended small cold leg break experiment initiated from typical PWR operating conditions. Comparisons between measurements from Test L3-1 are made with calculations by 11 international participants using 7 different computer codes.

Type

Blind exercise

Facility

LOFT

Country

USA

<u>Number</u>	<u>Starting Date</u>	<u>CSNI Report No.</u>	<u>Date</u>	<u>Author</u>
10	1980	64	9/81	D.L. Nguyen, W. Winkler

Title

Comparison Report on OECD-CSNI LOCA Standard Problem No. 10: "Refill and Reflood Experiment in a Simulated PWR Primary System (PKL)"

Subject

Large break LOCA reflood

Description

Investigation of gravity-feed refill and reflood process within a pressure vessel after a LB-LOCA considering the influence of the simulated primary loops. Comparison report of PKL test K 9.

Type

Open exercise

Facility

PKL-I

Country

Germany

<u>Number</u>	<u>Starting Date</u>	<u>CSNI Report No.</u>	<u>Date</u>	<u>Author</u>
11	1981	99	1984	

Title

LOFT L3-5 and L3-6 Comparison Reports

Subject

2.5% small break LOCA

Description

Comparison using a pair of tests to assist in evaluating the effects of tripping the primary coolant pumps.

Type

Open exercise

Facility

LOFT

Country

USA



Number      Starting Date      CSNI Report No.      Date      Author  
12      ----      100      09/82      K. Tasaka et al.

Title  
ROSA-III 5% Small Break Test, Run 912

Subject  
5% small break in BWR

Description  
Test simulated a 5% split break at the recirculation pump inlet line with the assumption of HPCS  
D/G single failure. Peak cladding temperature was 839 K. All heater rods quenched after LPCS  
and LPCI actuation, and the effectiveness of ECCS for Cooling was confirmed.

Type  
Open exercise

Facility  
ROSA-III

Country  
Japan

<u>Number</u>	<u>Starting Date</u>	<u>CSNI Report No.</u>	<u>Date</u>	<u>Author</u>
13	----	101	4/83	J.D. Burtt, S.A. Crowton

Title

International Standard Problem 13 (LOFT Experiment L2-5) Preliminary Comparison Report

Subject

Large Break LOCA

Description

Simulation of a double ended offset shear guillotine cold leg rupture in a large PWR. A loss of offsite power was also simulated with a reactor coolant pump trip and an ECCS injection delay. The participants calculated the hydraulic response adequately, except where there were obvious modeling problems. Densities were calculated adequately in the sections where condensation did not occur. Break flows were generally over predicted. Clad temperature heatups were calculated adequately but quench times for cladding was predicted less well.

Type

Blind exercise

Facility

LOFT

Country

USA

<u>Number</u>	<u>Starting Date</u>	<u>CSNI Report No.</u>	<u>Date</u>	<u>Author</u>
14	1984	98	2/85	H. Karwat

Title

Behavior of a Fuel Bundle Simulator during a Specified Heatup and Flooding Period (REBEKA EXPERIMENT) (Results of Post-Test Analyses)

Subject

Behaviour of fuel rod simulator bundle

Description

Intended to predict in a integrated manner the transient behavior of an electrically heated fuel simulator bundle with respect to its local cladding temperatures, strains and time to rupture together with the thermohydraulic boundary conditions. Original aim not fully achievable. The applied codes for mechanical fuel behavior largely demonstrated their capabilities for pretest predictions when certain local fluiddynamic parameters are well known to the code users. Confirmed the difficulties expected with the proper analysis of thermohydraulics of the test, caused by the coupling between pin cooling conditions, rod upper plenum calculations and the feedback to clad deformation and burst simulation.

Type

Blind exercise

Facility

REBEKA

Country

Germany

<u>Number</u>	<u>Starting Date</u>	<u>CSNI Report No.</u>	<u>Date</u>	<u>Author</u>
15	----	102	11/83	

Title

LOCA Experiment at FIX-II Facility

Subject

31% break in BWR

Description

Simulated the conditions corresponding to an intermediate size break on one of the main recirculation lines of a BWR with external pumps. Comparison Report.

Type

Blind exercise

Facility

FIX-II

Country

Sweden

<u>Number</u>	<u>Starting Date</u>	<u>CSNI Report No.</u>	<u>Date</u>	<u>Author</u>
16	1984	112	6/85	M. Firmhaber

Title

Rupture of a Steam Line within the HDR Containment Leading to an Early Two-Phase-Flow

Subject

Containment behaviour during large break LOCA

Description

Containment Thermal/Hydraulic Experiment. Steam Line Rupture in the HDR Containment leading to early two-phase flow.

Type

Blind exercise

Facility

HDR

Country

Germany

<u>Number</u>	<u>Starting Date</u>	<u>CSNI Report No.</u>	<u>Date</u>	<u>Author</u>
17	-----	103	1984	

Title

Marviken BWR Standard Problem

Subject

BWR containment behaviour

Description

Thermal-Hydraulic experiment of Reactor blowdown in the Marviken Full Scale Pressure Suppression Containment.

Type

Open exercise

Facility

Marviken

Country

Sweden

<u>Number</u>	<u>Starting Date</u>	<u>CSNI Report No.</u>	<u>Date</u>	<u>Author</u>
18	1985	133	4/87	H. Städke

Title

LOBI-MOD2 Small Break LOCA Experiment Final Comparison Report

Subject

1% small break LOCA

Description

Simulates the transient thermo-hydraulic behavior of a PWR in case of a small break in the cold leg pipe between pump and pressure vessel. 26 participants from 12 OECD Member countries performed blind predictions for this experiment using 9 different LWR safety codes. The results of the comparison between calculated and measured data are presented and analysed. Specific emphasis is given to the prediction capabilities of the various codes involved in the exercise, to the influence of the code users on the predicted results and to the code running times. Code strength and deficiencies are identified and recommendations are given for further effort needed to improve the reliability of small break LOCA calculations.

Type

Blind exercise

Facility

LOBI-Mod 2

Organisation

CEC (JRC Ispra)

<u>Number</u>	<u>Starting Date</u>	<u>CSNI Report No.</u>	<u>Date</u>	<u>Author</u>
19	1986	131	1987	E. Scott de Martinville, M. Pignard

Title

Behavior of a bundle during a large break LOCA transient with a two-peaks temperature History

Subject

Behaviour of fuel rod bundle

Description

PHEBUS test number 218. Involves the transient behaviour of a reduced length nuclear fuel bundle submitted to a high temperature transient obtained under large break LOCA conditions.

Type

Open exercise

Facility

PHEBUS-CSD

Country

France



<u>Number</u>	<u>Starting Date</u>	<u>CSNI Report No.</u>	<u>Date</u>	<u>Author</u>
20	1987	154	12/88	E. Stubbe

Title

Doel 2 Steam Generator Tube Rupture Event

Subject

Steam generator tube rupture

Description

Comparison report of actual event at operating nuclear power plant. Information provided in common RELAP-5 input deck format.

Type

Open exercise

Facility

Doel-2 PWR

Country

Belgium

<u>Number</u>	<u>Starting Date</u>	<u>CSNI Report No.</u>	<u>Date</u>	<u>Author</u>
21	1988	162	11/89	F. D'Auria

Title

Piper-One, Simulation of Small and intermediate Break LOCA for BWRs (Experiment PO-SB-7)

Subject

1.6%/2.8% small break in BWR

Description

Intended to be a "double blind" small break LOCA experiment for BWRs. Is a counterpart of tests carried out in ROSA-III and FIST facilities. Simulates a SB-LOCA in the recirculation line of a GE BWR-6 plant.

Type

Blind exercise

Facility

PIPER-ONE

Country

Italy

<u>Number</u>	<u>Starting Date</u>	<u>CSNI Report No.</u>	<u>Date</u>	<u>Author</u>
22	1988	174 and NEA/CSNI/R(92)7	10/90 and 07/92	E. Negrenti et al.

Title

SPES - Loss of Feedwater Transient in Italian PWR. Final Comparison Report and Evaluation of Post-Test Analyses.

Subject

Loss of feed water

Description

Double-blind of FW without mitigation by aux FW or hi pressure injection. Eventually, HP injection into one loop of 3-loop W-PWR simulator and natural circulation cooldown. Included non-OECD participation.

Type

Blind exercise

Facility

SPES

Country

Italy

<u>Number</u>	<u>Starting Date</u>	<u>CSNI Report No.</u>	<u>Date</u>	<u>Author</u>
23	1988	160	12/89	H. Karwat

Title

Rupture of a large diameter pipe in the HDR containment

Subject

Containment behaviour during LBLOCA, including hydrogen injection and long-term T/H behaviour in containment

Description

Comparison of pre-test predictions to a large number of measured parameters. The exercise focused on the long-lasting post-blowdown phenomena expected inside a PWG containment. Local pressurization effects and the evolution of the maximum pressure were also addressed.

Type

Blind exercise

Facility

HDR

Country

Germany

Number            Starting Date            CSNI Report No.            Date            Author  
24                    ----                    155                    12/89            R. Bari, et.al.

Title  
SURC-4 - Core-Concrete Interaction Test

Subject  
Core-concrete interaction

Description  
First severe accident ISP, involving the interaction of 200 kg of stainless steel melt in a basaltic concrete crucible. Heat was supplied by an induction unit. During the experiment, a large chunk of Zircaloy and FP simulants were added, and the calculations attempted to predict the concrete ablation rate, the gas generation rates, the temperatures in the crucible and the melt, and the FP simulant release rates.

Type  
Blind exercise

Facility  
SURC

Country  
USA

<u>Number</u>	<u>Starting Date</u>	<u>CSNI Report No.</u>	<u>Date</u>	<u>Author</u>
25	1988	NEA/CSNI/R(91)11	02/91	B.J. Holmes

Title

ACHILLES - N2 injection from accumulators and faster (best estimate) reflood rates - Almost a separate effects test

Subject

Effect of accumulator gas during LOCA reflood

Description

The selected transient simulates the end of the accumulating discharge period in a postulated large break loss of coolant accident when the nitrogen, which is used to pre-pressurize the accumulators, enters the primary circuit. The resultant decrease in pressure drop between the accumulators and the pressure vessel causes an increase in the pressure at the top of the downcomer which in turn produces a surge of water into the core with subsequent oscillatory flow occurring between the core and downcomer. The test was performed in the ACHILLES test facility using a Best Estimate configuration at AEA Technology Winfrith.

Type

Blind exercise

Facility

Achilles

Country

United Kingdom

<u>Number</u>	<u>Starting Date</u>	<u>CSNI Report No.</u>	<u>Date</u>	<u>Author</u>
26	1989	NEA/CSNI/R(91)13	02/92	Y. Kukita et al.

Title

ROSA-IV LSTF-Cold-Leg Small-Break LOCA Experiment

Subject

5% small break LOCA

Description

Small Break LOCA in the ROSA-IV LSTF facility. Includes non-NEA participation.

Type

Open exercise

Facility

ROSA-IV LSTF

Country

Japan

<u>Number</u>	<u>Starting Date</u>	<u>CSNI Report No.</u>	<u>Date</u>	<u>Author</u>
27	1991	NEA/CSNI/R(92)20	1992	CEA

Title

BETHSY - Small break LOCA with loss of HP Injection

Subject

0.5% small break LOCA

Description

Depressurization and use of low pressure injection, and S/G cooldown. Open to non-OECD participation. BETHSY experiment 9.1B, 2 in. cold leg break without HPIS and with delayed ultimate procedure.

Type

Blind exercise

Facility

BETHSY

Country

France



<u>Number</u>	<u>Starting Date</u>	<u>CSNI Report No.</u>	<u>Date</u>	<u>Author</u>
28	1991	NEA/CSNI/R(92)17	12/92	CEA

Title

PHEBUS SFD B9+ - Experiment on the Degradation of a PWR Type Core

Subject

Core degradation with fresh fuel

Description

Predictions of the phenomena associated with a severe fuel damage accident, including the thermal behaviour of the bundle, the cladding oxidation level, fuel dissolution by molten zircaloy, decladding, and relocation of the molten material.

Type

Semi-blind exercise

Facility

PHEBUS-SFD/In-pile test

Country

France

<u>Number</u>	<u>Starting Date</u>	<u>CSNI Report No.</u>	<u>Date</u>	<u>Author</u>
29	1990	NEA/CSNI/R(93)4	02/93	H. Karwat

Title

HDR Experiment E11.2 - Hydrogen distribution inside the HDR containment under severe accident conditions

Subject

Hydrogen distribution in a PWR containment

Description

The objectives of the experiment E11.2 were the following:

- calculate the temperature distribution during the entire transient (small break LOCA blowdown with up to a 24 hour period of analysis of natural convection phenomena);
- study the distribution of energy during and after the SBLOCA phase;
- analyse the steam/air/hydrogen distribution within the containment atmosphere under severe accident conditions initiated by a SBLOCA.

Type

Open exercise

Facility

HDR

Country

Germany

<u>Number</u>	<u>Starting Date</u>	<u>CSNI Report No.</u>	<u>Date</u>	<u>Author</u>
30	1991	NEA/CSNI/R(92)9	04/92	M. Firmhaber and H. Alsmeyer

Title

BETA II Core-Concrete Interaction Experiment (Test V5.1)

Subject

Core-concrete interactions

Description

The aim of BETA Test V5.1 was to investigate the influence of a high content of metallic Zry-4 in the melt on the MCCI and to get quantitative information on the long-term aerosol generation during the interaction period.

Type

Open exercise

Facility

BETA

Country

Germany

<u>Number</u>	<u>Starting Date</u>	<u>CSNI Report No.</u>	<u>Date</u>	<u>Author</u>
31	1992	NEA/CSNI/R(93)17	07/93	M. Firmhaber et al.

Title  
CORA-13 Experiment on Severe Fuel Damage

Subject  
Core degradation and quench

Description  
Severe core damage experiment with quenching, of a full length simulated fuel bundle, heated with internal tungsten heaters. Investigations of the material relocation dynamics, quench phenomena and hydrogen generation.

Type  
Blind exercise

Facility  
CORA

Country  
Germany

Number  
32

Date  
----

CSNI Report No.  
----

Author  
USNRC

Title  
FLHT-6 Experiment

Subject  
BWR core degradation

Description  
Experimental destruction of a full length BWR fuel element, including absorber material, to investigate absorber interactions and blockage behaviour.

Type  
Blind exercise

Facility  
FLHT (NRU)

Country  
Canada

EXPERIMENT AND EXERCISE CANCELLED

<u>Number</u>	<u>Starting Date</u>	<u>CSNI Report No.</u>	<u>Date</u>	<u>Author</u>
33	03/92	TBD	1994	H. Purhonen et al.

Title

PACTEL-VVER-440 Natural Circulation Behaviour Test

Subject

VVER-440 natural circulation

Description

Investigation of the natural circulation behaviour of a VVER-440 type PWR with horizontal steam generators and loop seals in both hot and cold legs, and of the effect of opening a relief valve on the secondary side.

Type

Blind exercise

Facility

PACTEL

Country

Finland

<u>Number</u>	<u>Starting Date</u>	<u>CSNI Report No.</u>	<u>Date</u>	<u>Author</u>
34	03/92	TBD	1944	D.A. Williams

Title

Falcon Experiments FAL-ISP-1 and FAL-ISP-2

Subject

Fission product transport

Description

The objective of ISP-34 is to test computer codes designed to follow the transport and deposition, in both the primary circuit and containment building, of fission product and bulk reactor materials aerosols released from degrading fuel in a severe accident. Test FAL-ISP-1 had a high particle concentration and low relative humidity in the containment, with the aim of testing the impact of multicomponent aerosols involving different chemical species. Test FAL-ISP-2 studied lower particles concentrations with a high containment humidity in order to follow condensation of steam onto hygroscopic particles.

Type

FAL-ISP-1: open exercise

FAL-ISP-2: blind exercise

Facility

Falcon

Country

United Kingdom

<u>Number</u>	<u>Starting Date</u>	<u>CSNI Report No.</u>	<u>Date</u>	<u>Author</u>
35	03/93	TBD	1944	TBD (NUPEC)

Title

NUPEC Hydrogen Distribution Test M-7-1

Subject

Hydrogen Distribution and Mixing in a PWR-type containment

Description

The model containment vessel of the NUPEC Hydrogen Mixing and Distribution Test Facility is about 1/4 scale of an actual containment vessel and has inner structures composed of about 20 compartments. There were two periods in test M-7-1. During the pre-heating phase, steam was injected into the steam generator foundation compartment at a constant mass flow for about 3.5 hours. During the experiment itself, a steam/helium mixture was injected into the same compartment and spray water into the dome. These injections were terminated after 30 minutes. Pressure, temperatures and helium concentrations were measured during the experiment.

Type

Blind exercise

Facility

NUPEC Hydrogen Mixing and Distribution Test Facility

Country

Japan



<u>Number</u>	<u>Starting Date</u>	<u>CSNI Report No.</u>	<u>Date</u>	<u>Author</u>
36	02/94	TBD	TBD(1995)	TBD

Title

CORA-VVER Severe Fuel Damage Experiment (Test W2)

Subject

VVER core degradation

Description

ISP-36 is the first VVER-related ISP in the field of severe accidents, and also the first ISP co-sponsored by a non-OECD country. The main objectives of CORA Test-W2 included studies of temperature and material behaviour and hydrogen generation of a VVER fuel bundle, especially the influence of the hexagonal grid and the different material combinations (cladding, grid spacers and absorber rods) compared to western-type PWRs.

Type

Blind exercise.

Facility

CORA

Countries

Germany, Russian Federation

**CONTAINMENT ANALYSIS STANDARD PROBLEMS  
(CASPs)**

<u>Number</u>	<u>Date</u>	<u>CSNI Report No.</u>	<u>Author</u>
CASP-1	5/80	41	W. Winkler

Title

Comparison Report on OECD-CSNI Containment Standard Problem No. 1: "Steamline Rupture within a Chain of Compartments"

Subject

Steam discharge (1:4 scale)

Description

Comparison of experimental results of history of pressure, temperature, pressure difference, and water mass after a steamline rupture within a chain of six subsequent compartments (simplified integral test) with the corresponding results of best-estimate post-test calculations from computer codes for three different time intervals.

Type

Open exercise

Facility

Battelle Model Containment

Country

Germany

<u>Number</u>	<u>Date</u>	<u>CSNI Report No.</u>	<u>Author</u>
CASP-2	5/82	65	D.L. Nguyen, W. Winkler

Title

Comparison Report on OECD-CSNI Containment Standard Problem No. 2: "Water Line Rupture in a Branched Compartment Chain"

Subject

Water discharge (1:4 scale)

Description

Comparison report of temperature, pressure, pressure difference, and water mass in a reactor containment following a pipe rupture. Intended to come close to the accident conditions expected during the design of a full-pressure containment. Also, rupture was located in a relatively small compartment and the compartments were arranged in a branched chain with asymmetrical flow paths to ensure that water transport will heavily influence the results.

Type

Open exercise

Facility

Battelle Model Containment

Country

Germany

<u>Number</u>	<u>Date</u>	<u>CSNI Report No.</u>	<u>Author</u>
CASP-3	4/83	77	J. Marshall, W. Woodman

Title

Final Comparison Report for Containment Standard Problem Exercise 3

Subject

Large break LOCA (small scale)

Description

An insulated pressure vessel contains an electric heater to boil the water and raise pressure. The outlet pipe is heated by an electric heater type wound around the pipe and is thermally insulated. This pipe is blocked by a copper disc which is ruptured to start blowdown into a containment vessel which is not insulated and is freestanding within a large building.

Type

Open exercise

Facility

AAEC Lucas Heights blowdown/containment rig

Country

Australia