

# CERTA - TN

European Thematic Network for the Consolidation of the  
Integral System Effect Experimental Databases for Reactor  
Thermal-Hydraulic Safety Analysis

on behalf of the partners

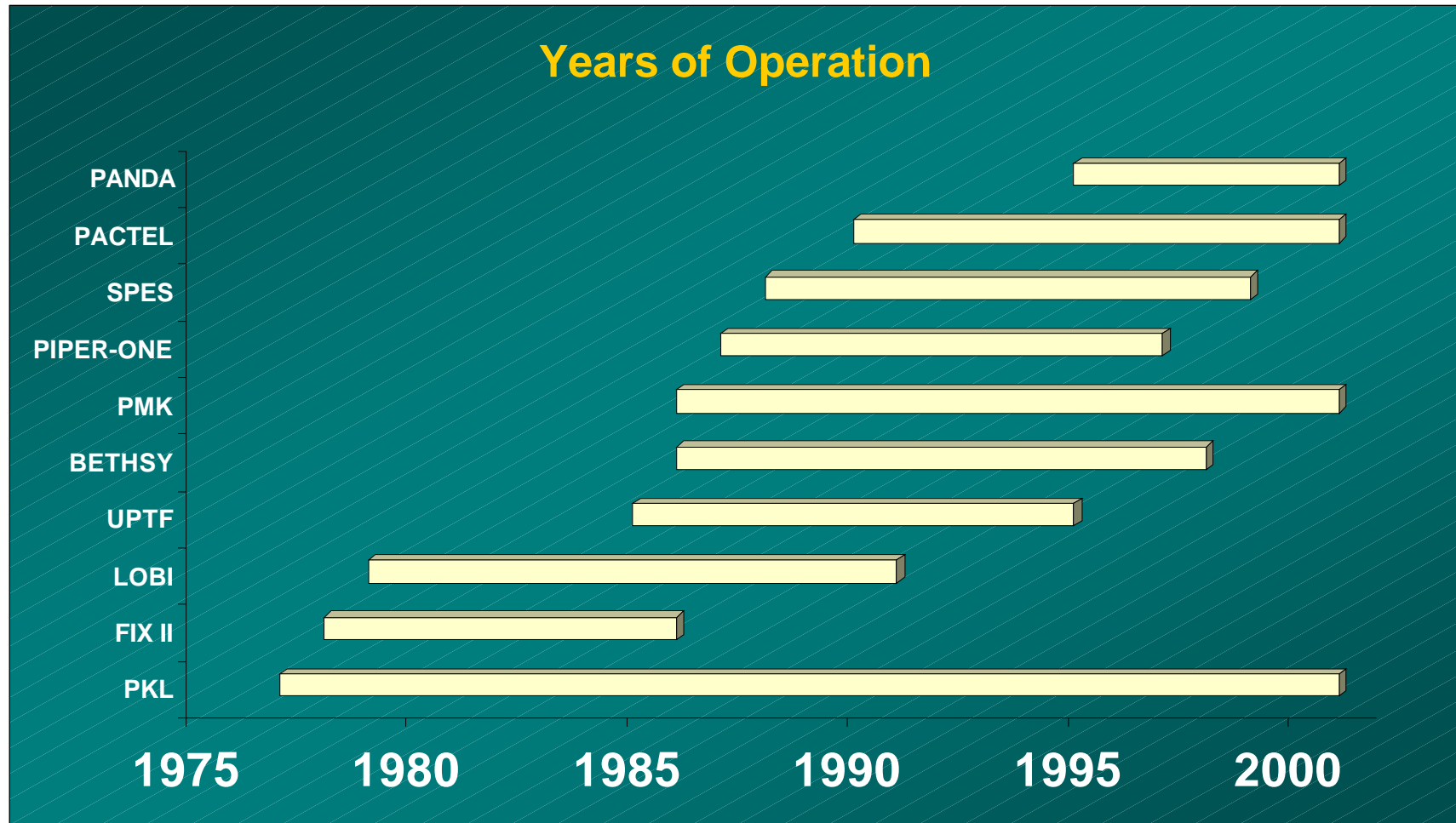
F. D'Auria

FISA-2003 Symposium

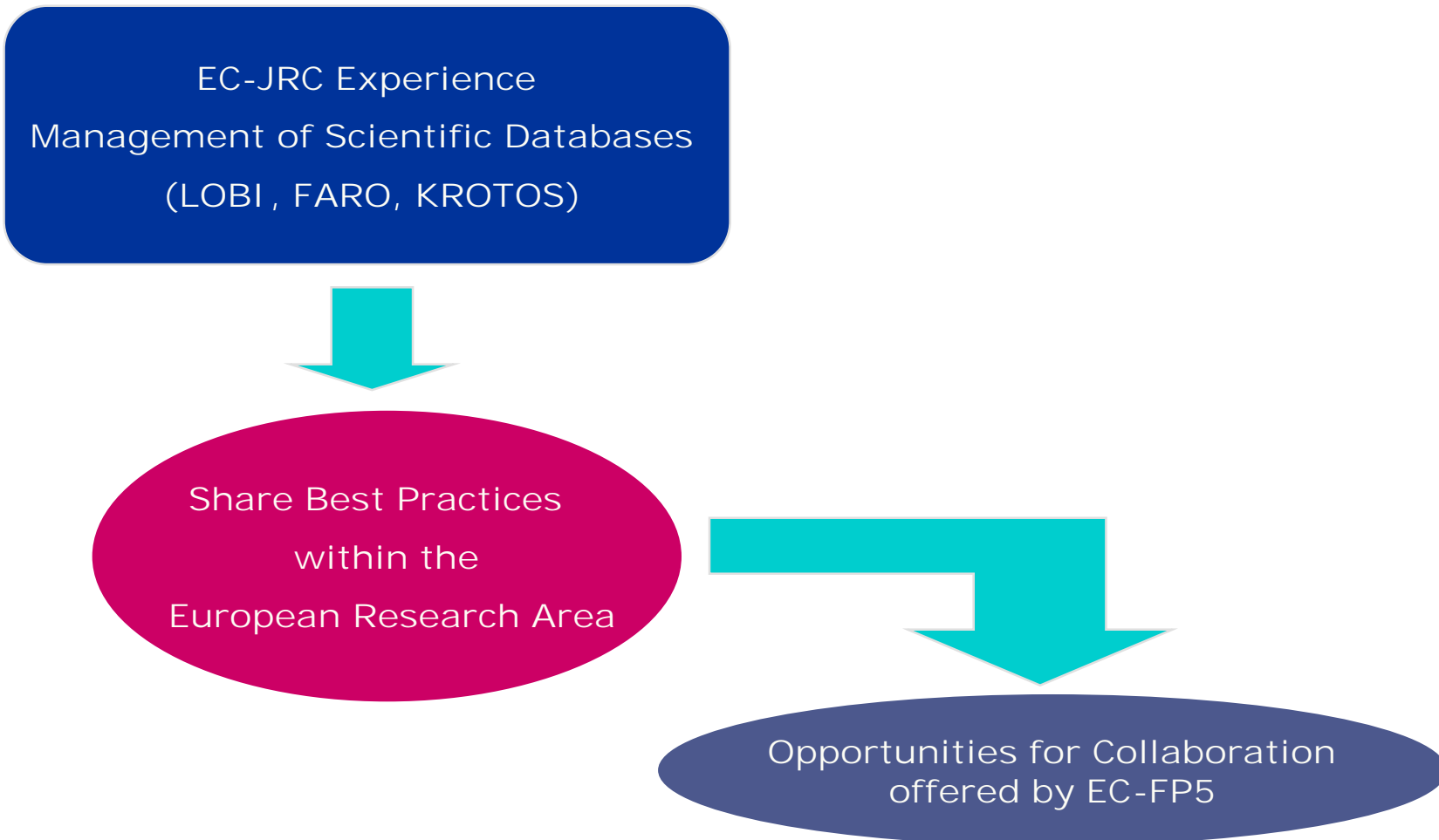
Luxembourg; 10-13 November, 2003

- | **Provide a consolidated framework to preserve the experimental databases acquired in European LWR integral test facilities adopting modern web-based information technologies:**
  - 4 share best practices at the pan-European level
  - 4 secure a distributed repository of technical/scientific information
  - 4 ensure availability of reference databases for code development and assessment
  - 4 built-up of new competence and code users training
  
- | **Supporting the European Research Area:**
  - 4 enhance exchange and dissemination of information
  - 4 foster a common safety culture at the pan-European level
  - 4 optimise results through synergy of resources
  - 4 networking centres of excellence

- | The safety analysis of design basis accidents and transients in water cooled reactors is generally based on:
  - 4 experimental investigations in integral system effect test facilities for the identification/verification of safety relevant thermal-hydraulic phenomena
    - è extrapolation to the reactor case impaired by test facility scale dependent distortions and simulation constraints
  - 4 computer code simulation calculations for the provision of realistic predictions of reactor system behaviour
    - è reference experimental databases required for model and/or code development and assessment
  
- | A large international effort devoted during the past three decades to enhance water reactor safety thermal-hydraulic analysis capabilities through experimental investigations and system codes development



- I Preservation and access/retrieve capabilities to reactor safety experimental databases are issues often debated in the nuclear community
  - 4 value of embedded technical/scientific information (c. 1000 LOCA and Transients in CERTA)
  - 4 accrued financial investment (c. 500 M? in CERTA)
  - 4 current and prospected research funding constraints
  - 4 obsolescence of data storage and access/retrieve techniques
  - 4 persisting requirements for code development and assessment
  
- I Adoption of modern hardware/software Information technologies to facilitate
  - 4 e-storage of experimental data as well as of supporting documentation
  - 4 web-based user-friendly capabilities to access and retrieve data
  - 4 lessen dependence from or loss of dedicated know-how, know-why, know-where
  - 4 upgradability and transferability



- u **Related EC- FP5 Projects**

- u **ASTAR:** *Advanced three-dimensional two-phase simulation tool for application to reactor safety*
- u **EUROFASTNET:** *European group for future advances in sciences and technology for nuclear engineering thermal-hydraulics*

- u **EU Enlargement**

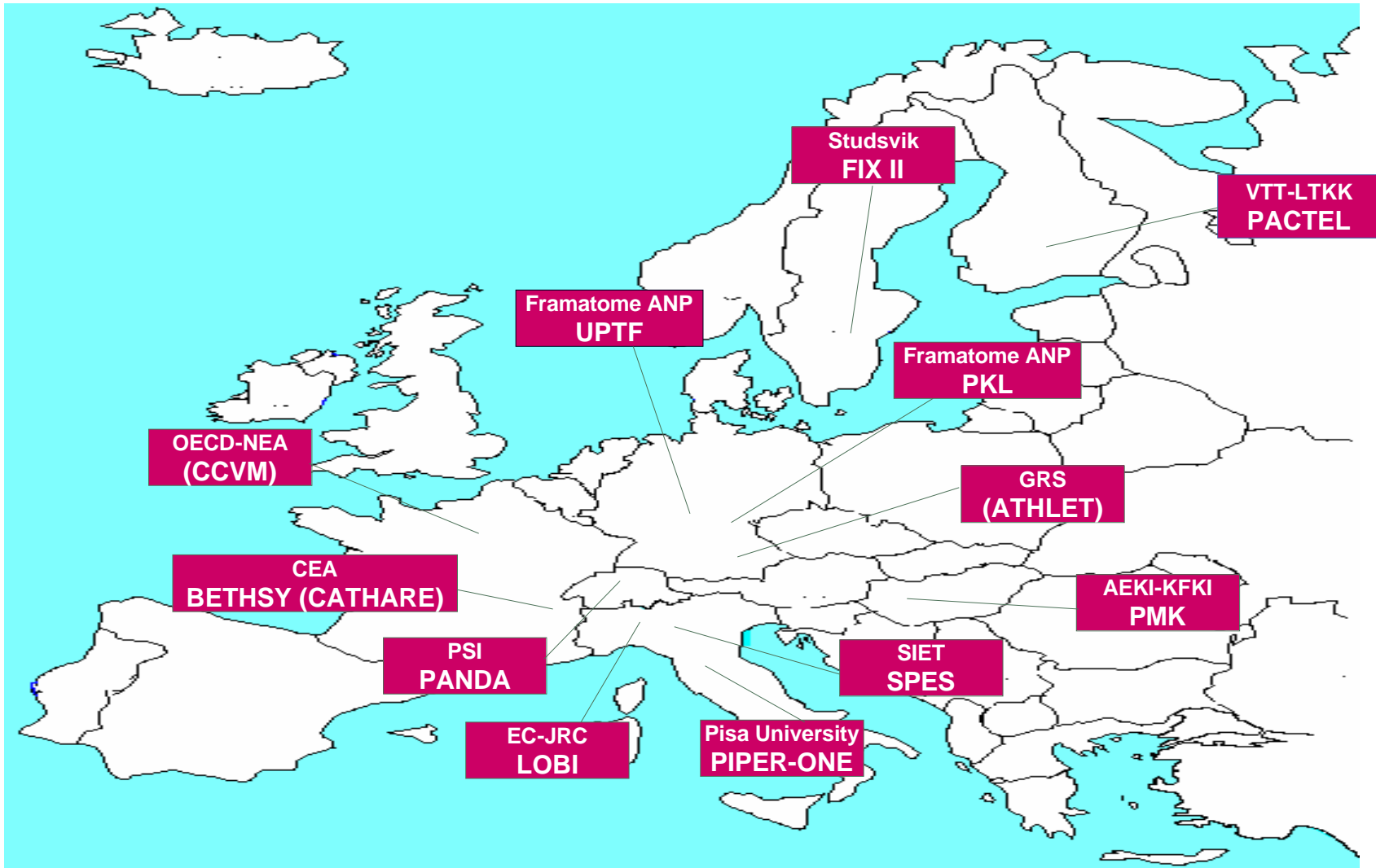
- u Reactor safety research programmes in EU Candidate Countries (e.g. PMK-KFKI, Hungary) and in the New Independent States (e.g.,PSB-EREC, Russian Federation)

- u **International Organisations**

- u **OECD/NEA:** Computer Code Validation Matrix (CCVM) Data Bank

ORGANIZATION	Country	Programme
EC- JRC	EU	LOBI
DIMNP-UP	Italy	PIPERONE
GRS	Germany	(ATHLET)
Framatome ANP	Germany	PKL, UPTF
AEKI -KFKI	Hungary	PMK
VTT-LTKK	Finland	PACTEL
SIET	Italy	SPES
CEA	France	BETSHY, (CATHARE)
Studsvik EcoSafe	Sweden	FIX-II
PSI	Switzerland	PANDA
OECD/NEA	Int.Org.	CCVM





Work Package 1

Status Report on Maintenance of European LWR Integral System Effect  
Thermal-Hydraulic Databases  
(Prof. F. D'Auria; Pisa University, Italy)

Work Package 2

Assessment of User Requirements to Access and Retrieve Experimental Data  
for the Development and Assessment of LWR Safety Codes  
(F. Steinhoff; GRS-Garching, Germany)

Work Package 3

Establishment of a Distributed Web-based Informatic Platform for Storage and  
Access/Retrieve of European LWR Integral System Effect Thermal-Hydraulic Databases  
(A. Annunziato; EC-JRC, Ispra)

# CERTA - TN

# experimental programmes

No.	PROGRAM	REFERENCE REACTOR	STATUS	Number of Tests	Overall Research Cost (M <sup>a</sup> )	Tests included in CERTA
1	PKL	KWU- PWR	In operation	136	50	2
2	BETHSY	Framatome PWR	In stand by	82	53	2
3	SPES	W-312 PWR, W-AP600	In stand by	26	18.4	2
4	LOBI	KWU- PWR	Dismantled	70	140	70
5	UPTF	KWU- PWR	Dismantled	237	215	2
6	PIPER-ONE	GE-BWR, SBWR	In stand by	34	4	2
7	PACTEL	VVER-440	In operation	184	4.1	2
8	PMK	VVER-440	In operation	48	1.8	2
9	FIX-II	ASEA-ATOM BWR	Dismantled	93	4.5	2
10	PANDA	GE-SBWR, ESBWR	In stand by	58	10	2

**Note: c. 1000 integral system tests and an economic investment of c. 500 M?**

# CERTA - TN

# the software

The STRESA software developed at JRC Ispra has been adopted as supporting informatic structure for CERTA

The collage displays several windows from the STRESA software interface:

- STRESA Index:** A navigation menu with categories like Resources, Facilities, Tests, STRESA Statistics, STRESA Documentation, and Contacts.
- FARO Test Facility:** A detailed view of a test facility, including a description, parameters, and a table of test results. The table lists test names, descriptions, parameters, and options.
- Graphs:** A line graph showing 'Current (I)' versus 'Time (s)' for a test, with multiple data series plotted.
- Search Engine:** A search interface with a text input field containing 'LOFW' and a 'Submit' button. It offers search options for local databases, the STRESA network, or the entire database.
- Technical Diagrams:** A cross-sectional diagram of a test facility component, labeled with 'Lateral flap' and 'Melt initial level'.
- Media Player:** A Windows Media Player window showing a video of a molten metal flow.
- Document Viewer:** A window displaying a document titled 'STRESA Index' with a 'Click above to download the document' prompt.

# STRESA Views

**JOINT RESEARCH CENTRE - Microsoft Internet Explorer**

Address: <http://asa2/certa/>

STRESA\_CERTA Database | Search | User data | Facilities | STRESA Map

**European Network for the Consolidation of the Integral System  
Experimental Data Bases for Reactor Thermal-Hydraulic Safety Analysis**

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**Table of content** controlled area Free area

**Facilities**

BETHSY	General information	F	<a href="http://asa2.jrc.it/stresa_cea/">http://asa2.jrc.it/stresa_cea/</a>
FIX-II	General information	SE ●	<a href="http://asa2.jrc.it/stresa_studsvik/">http://asa2.jrc.it/stresa_studsvik/</a>
LOBI	General information	EC ●	<a href="http://asa2.jrc.it/stresa/">http://asa2.jrc.it/stresa/</a>
PACTEL	General information	FIN	<a href="http://asa2.jrc.it/stresa_vtt/">http://asa2.jrc.it/stresa_vtt/</a>
PANDA	General information	CH	<a href="http://asa2.jrc.it/stresa_psi/">http://asa2.jrc.it/stresa_psi/</a>
PIPER-ONE	General information	I ●	<a href="http://asa2.jrc.it/stresa_pisa/">http://asa2.jrc.it/stresa_pisa/</a>
PKL	General information	D ●	<a href="http://asa2.jrc.it/stresa_FRAMATOME_ANP/">http://asa2.jrc.it/stresa_FRAMATOME_ANP/</a>
PMK	General information	H ●	<a href="http://guba.aeki.kfki.hu/stresa_aeki/">http://guba.aeki.kfki.hu/stresa_aeki/</a>
SPES	General information	I ●	<a href="http://asa2.jrc.it/stresa_siet/">http://asa2.jrc.it/stresa_siet/</a>
URTF	General information	D ●	<a href="http://asa2.jrc.it/stresa_FRAMATOME_ANP/">http://asa2.jrc.it/stresa_FRAMATOME_ANP/</a>

**Accesses to CERTA**  
**554**

**CERTA TN**

CERTA Activity	General information	EC
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The flags indicate that the objective of the CERTA activity, has been reached, i.e. the database is fully functional in

Start | Inboxes | Re: inter.zip - Me... | Contribution WT... | Microsoft Word | JOINT RESE... | 3:25 PM

JOINT RESEARCH CENTRE - Microsoft Internet Explorer

Address: <http://asa2/certa/>

STRESA\_CERTA Database | Search | User data | Facilities | STRESA Map

User: a\_annunz - authenticated on server CERTA

**PMK - Documents available for CERTA network**

Specific Documents

**CLB14: 7,4% CLB LOCA with Secondary B&F (SPE4)**

EDR	L. Szabados et. al. - 'Simulation of loss of coolant accident without high pressure injection but with secondary side bleed and feed' -	IAEA_TECHDOC_848.pdf	17.5 Mb
DAT	'Experiment WinGraf file' -	clb14.dat	142.1 kb

This test is part of the following network(s): [CERTA](#)

If you want to have access to data or documents you have to contact the following responsible of the data, specifying which data you want to access, clicking on following name:

Request authorization to access data to: A. Guba-KFKI-AEKI

In order to read the .pdf files you need the Adobe® Acrobat Reader. You can download it for various platform directly from Adobe or select the following: [Windows 95/98/NT](#)

Accesses to CERTA

**554**

Taskbar: Start | Inbox - Microsoft ... | Re: inter.zip - Me... | Contribution WT ... | Microsoft Word | JOINT RESE... | 3:26 PM

The image shows two overlapping browser windows from the Joint Research Centre website. The left window displays the 'STRESA CERTA Database' with a search bar and a list of transient tests under the heading 'Transient class: Transients in PWRs'. The right window shows the 'LOBI Test Facility' details for test 'A1-06', including a description '2A Break, Pump - Vessel, DC 12 mm' and a plot of 'Quantity (-)' versus 'Time (s)'. The plot shows two data series: 'ex06.dat\_PA40' (red 'X' markers) and 'ex06.dat\_PA51' (green 'Y' markers). The red series starts at approximately 15.5 at time 0 and decays to near zero by 40 seconds. The green series starts at approximately 3.0 at time 0 and also decays to near zero by 40 seconds. The plot is titled 'WebGraf 1.0 - 08-02-2000'.

LOBI	EC	Code	Description
LOBI	EC	A1-76	Steam Generator Performa
LOBI	EC	A2-77A	Natural Circulation
LOBI	EC	A2-90	LONOP - ATWS, Phases 1,2
LOBI	EC	BT-00	LOWF, Phases 1,2,3
LOBI	EC	BC-01	SG Secondary Mass Inven
LOBI	EC	BC-02	SG Heat Loss
LOBI	EC	BL-21	0.4% SG U-Tube Break
LOBI	EC	BT-02	Loss of all feedwater trans
LOBI	EC	BT-12	Large Steam Line Break
LOBI	EC	BT-03	LOFW - ATWS
LOBI	EC	A1-92	Natural Circulation, 40 bar
LOBI	EC	BC-03	SG Heat Loss
LOBI	EC	BC-04	Bypass Test
LOBI	EC	BL-22	0.4% SGTR, Upflow Side
LOBI	EC	A1-87	Plant Cooldown, MCP off
LOBI	EC	BT-04	Asymm. Cooldown - MCP or
LOBI	EC	BT-56	LOWF with Multiple Failure
LOBI	EC	BT-15+16	LOWF, SG Boiloff/Refill, MCP
LOBI	EC	BT-17	LOFW with SG, Bleed and F
LOBI	EC	BT-06	Small (10%) Feed Line Brea
LOBI	EC	BL-40	SGTR in a 1-Loop PWR
Piper-One	I	PO-IC-2	Phases A/II and B - Isolatic
PKL	D	III A2.1	Station Blackout CPT LOBI



**ELECTROGORSK RESEARCH AND ENGINEERING CENTER - Microsoft Internet Explorer**

Address: <http://base.erec.ru/>

Links: [JRC Project Site](#)

**EREC**

[STRESA-EREC Database](#) | [Contents](#) | [Search](#) | [User data](#) | [News](#) | [Forum](#)

### STRESA: Storage of Thermal Reactor Safety Analysis Data

**STRESA EREC Index**

- STRESA rationales
- Facility
- Code
- Databank
- How to
- STRESA Documentation
- Links
- Messages
- Contacts

**Table of content**

Legend:  controlled area     free area

**Facility**

- [BC V-213](#)
- [PSB-VVER](#)
- [ISB-VVER](#)

**Code**

- [BOR3D](#)
- [STEG](#)
- [VAPEX-P](#)
- [VAPEX-D](#)

**Databank**

- [CRITICAL FLOW](#)
- [General information](#)

Powered by **STRESA**

Not Logged in

Accesses to STRESA EREC **843**

Internet

The Electrogorsk Research and Engineering Centre (EREC) of the Russian Federation has adopted the CERTA-STRESA system for the Bubble Condenser and PSB research programmes



**STRESA: Storage of Thermal Reactor Safety Analysis Data**

## CSNI CODE VALIDATION MATRIX

WELCOME INTO THE STRESA\_NEA DATABASE

In order to work properly you should not disable use of cookies. Nothing harmful will be written on your computer but this is needed to manage your requests. For more information on cookies, click [here](#)

TABLE OF CONTENTS

Integral Facility	General information	Country	URL
ANO-1 Unit 2		USA	
BETHSY	General information	France	
CAORSO		Italy	
CCTF		Japan	
CRYSTAL RIVER		USA	
DOEL-2		Belgium	
FIST	General information	USA	
FIX-II	General information	Sweden	<a href="http://193.125.78.104/stresa_studsvik/">http://193.125.78.104/stresa_studsvik/</a>
GERDA		Germany	
GINNA		USA	
LA SALLE		USA	
LEIBSTADT		Switzerland	
LOBI	General information	CEC	<a href="http://asa2.jrc.it/stresa/">http://asa2.jrc.it/stresa/</a>
LOFT	General information	USA	
LSTF (ROSA-IV)	General information	Japan	
MIST		USA	
OTIS	General information	USA	
PACTEL	General information	Finland	<a href="http://ydin.win.lut.fi/stresa_LTKK/">http://ydin.win.lut.fi/stresa_LTKK/</a>
PEACH-BOTTOM 2		USA	

Not Logged in

Accesses to STRESA\_NEA: **1343**

A Demonstration Database for the OECD/CSNI Code Validation Matrix based on the CERTA-STRESA system has been established

- | CERTA was envisaged as a **feasibility study** for the establishment of a web-based informatic platform networking European reactor safety experimental databases
- | Revisiting large scale reactor safety integral system effect thermal-hydraulic experimental programmes in view of the **resources** requirements and the current economic research constraints is perceived as practically impaired
- | Access to reactor safety thermal-hydraulic **databases** will be a **continuing requirement** to support application/improvement of current system codes and the development of advanced codes versions

- | The original objectives of CERTA have been **successfully achieved**
  - | CERTA main portal and partners-links established
  - | **2 tests** for each experimental programme are included in the database
- | The **completion of databases** including all tests performed in each experimental programme is **still an open issue** !
- | Preservation of water reactor safety thermal-hydraulic databases should be a **top priority** of the nuclear research community
- | A **joint international effort** is possible and should be pursued to meet this obligation (e.g.; under the auspices of OECD/NEA)