

FRAMATOME ANP

SWR-1000: NRC-Visit

Quality Assurance for External Vessel Cooling Test

QA for External Vessel Cooling Test - Roadmap

> QA system of the FANP Technical Center

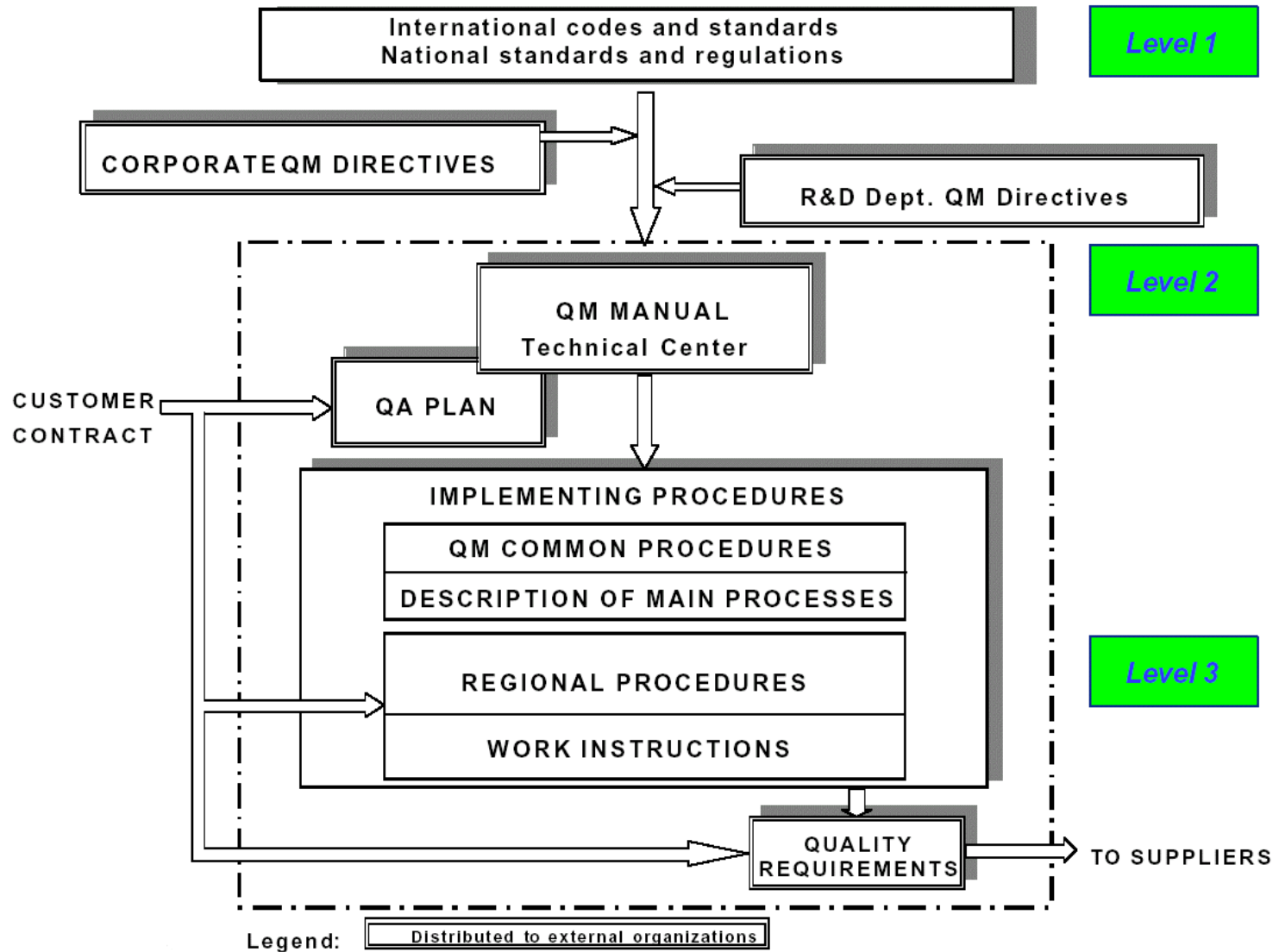
> QA for External Vessel Cooling Test

■ Design and Manufacturing

■ Measuring and Test Equipment

■ Data Acquisition

QA System of FANP Technical Center - Structure of QA Documents

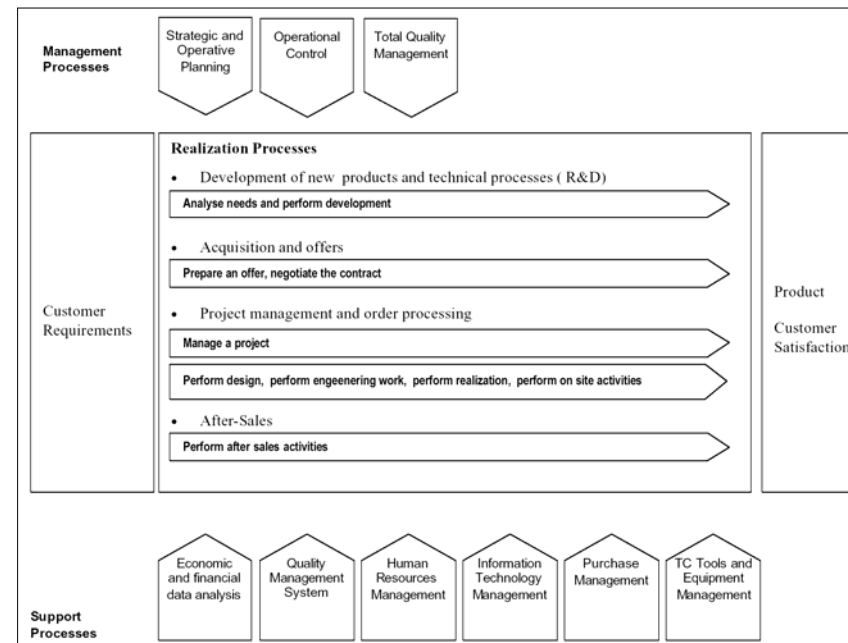


QA System of FANP Technical Center - Quality Management Manual (QMM)

- > framework for the QA system of the Technical Center
- > identical to the QMMs of the business sectors *Services, Projects & Engineering* except Organization and Processes

> contains

- organizational structure, responsibilities
- process charts of the Technical Center
- description of the main processes



> regular indoctrination, e.g. during department meetings

QA System of FANP Technical Center - QA Certificates

AF AQ CERTIFICATION **NIS ZERT**

N° QUAL/2002/19028

FRAMATOME ANP TECHNICAL CENTER

MANAGEMENT OF ENGINEERING AND R&D PROJECTS AND/OR DESIGN AND REALIZATION OF EQUIPMENT, PROCUREMENT OF EQUIPMENT AND/OR SERVICES IN THE FOLLOWING FIELDS: MATERIAL, ENGINEERING AND TESTING, FAILURE ANALYSIS, RADIOCHEMISTRY, ANALYTICAL CHEMISTRY, RADIATION METROLOGY, HOT CELLS, THERMAL HYDRAULICS AND FLUID DYNAMICS, COMPONENTS ENGINEERING, CONTROL SYSTEMS, COMPONENTS QUALIFICATION, FABRICATION, CORROSION/CHEMISTRY, NON-DESTRUCTIVE EXAMINATIONS, FLUID AND STRUCTURAL MECHANICS, WELDING.

(Traduction en français ci-dessous en annexe n° 1)
(Translation in French and in German on appendix n° 1)

BP 13 F-71380 SAINT-MARCEL FRANCE
BP 161 Porte Magenta - 1, rue Baptiste Marcel F-71205 LE CREUSOT - FRANCE
Freysebenstraße 1 D-91058 ERLANGEN GERMANY
Selgenstedter Strasse 100 D-43791 KARLSTEIN GERMANY

AFAD et NIS ZERT certifient que pour les activités et sites référencés ci-dessus toutes les dispositions prises en œuvre pour répondre aux exigences requises par le norme internationale.
AFAD and NIS ZERT certify that all the arrangements covering the above mentioned activities and locations are established in meet the requirements of the international standard.

ISO 9001 : 2000

cet ISO examinée et jugée conforme
has been examined and found conform

2002-10-21
2005-10-20

Le Président du Comité de Certification AFAD
The President of the Certification Committee of AFAD
C. GUERIN

Le Directeur Général d'AFAD
The Managing Director of AFAD
C. PEYRAT

Le Directeur Général de NIS ZERT
The Managing Director of NIS ZERT
M. KRUSCHEL

Le Représentant de l'Entreprise
On behalf of the Firm
M. ERVE

AFAD - ZULU APPRAT-ARTIFERIE-BAUWERK
NIS ZERT/ISO 9001:2000

Deutsches Akkreditierungssystem Prüfwesen GmbH
represented in the
Deutsches Akkreditierungsrat

Accreditation

Deutsches Akkreditierungssystem Prüfwesen GmbH herewith confirms that the

Framatome ANP GmbH
Freysebenstraße 1
91058 Erlangen

with its testing laboratories

**Thermal hydraulics and fluid dynamics (NT 31),
Components and control engineering (NT 32)**

under the terms of DIN EN ISO/IEC 17025:2000 to carry out tests in areas of
**Thermal hydraulics and fluid dynamics, qualification of components and systems
for or process plants under operational and accident conditions,
diagnosis on power plant components**

Methods listed in the annex.
has proved for its testing activities that it operates a quality system which
with the requirements of DIN EN ISO 9001:1994.
This certificate is valid from 28-08-2001 to 27-08-2006.
Certificate number: **DAP-PL-2587.15**

001

Benannt
Director
**DAP Deutsches Akkreditierungssystem
Prüfwesen GmbH**

Dipl.-Ing. H.-G. Joss
Responsible Assessor for DAP GmbH
TÜV Süddeutscher Bau und Betriebs GmbH
München

Translation for information purposes only. The German certificate is authoritative.
See notes overleaf.

1st Issue

CERTIFICATE

NIS Zertifizierungs- und Umweltgutachter GmbH
hereby certifies, that the company
Framatome ANP GmbH
91050 Erlangen, Germany
locations at Erlangen, Offenbach and Karlstein

for the scope

BWR Plant Engineering, Civil Engineering, Electrical Engineering, Lifting and Power Plant Services as well as Development, Design, and Commissioning of Nuclear Power Plants and Research Reactors; design and sales & marketing of nuclear fuel assemblies and other components; Inspection and Diagnostic Systems and Engineering; and Power Plant Chemistry, Technology Engineering and Testing

has implemented and now maintains an
environmental management system.

An environmental audit performed by NIS ZERT
has verified that this environmental system fulfills
the requirements of the following standard:
DIN EN ISO 14001
(ISO 14001 : 1996, EN ISO 14001 : 1996)

(Audit Report No. 0565 Erw. 01, Erg. 01)

This certificate, No. 0565U, is
valid until November 09, 2002.

(Initial certificate: November 10, 1999)
Hanau, February 16, 2001

Hent Kruschel
Responsible Assessor for NIS ZERT

Jutta Förster
Project manager

NIS Zertifizierungs- und Umweltgutachter GmbH - Dillingenstraße 2 - 63452 Hanau
Telefon 0 61 81 / 93 370 - Telefax 0 61 81 / 99 3799 - Telefax 0 61 81 / 99 3799



QA for External Vessel Cooling Test - Roadmap

> QA system of the FANP Technical Center

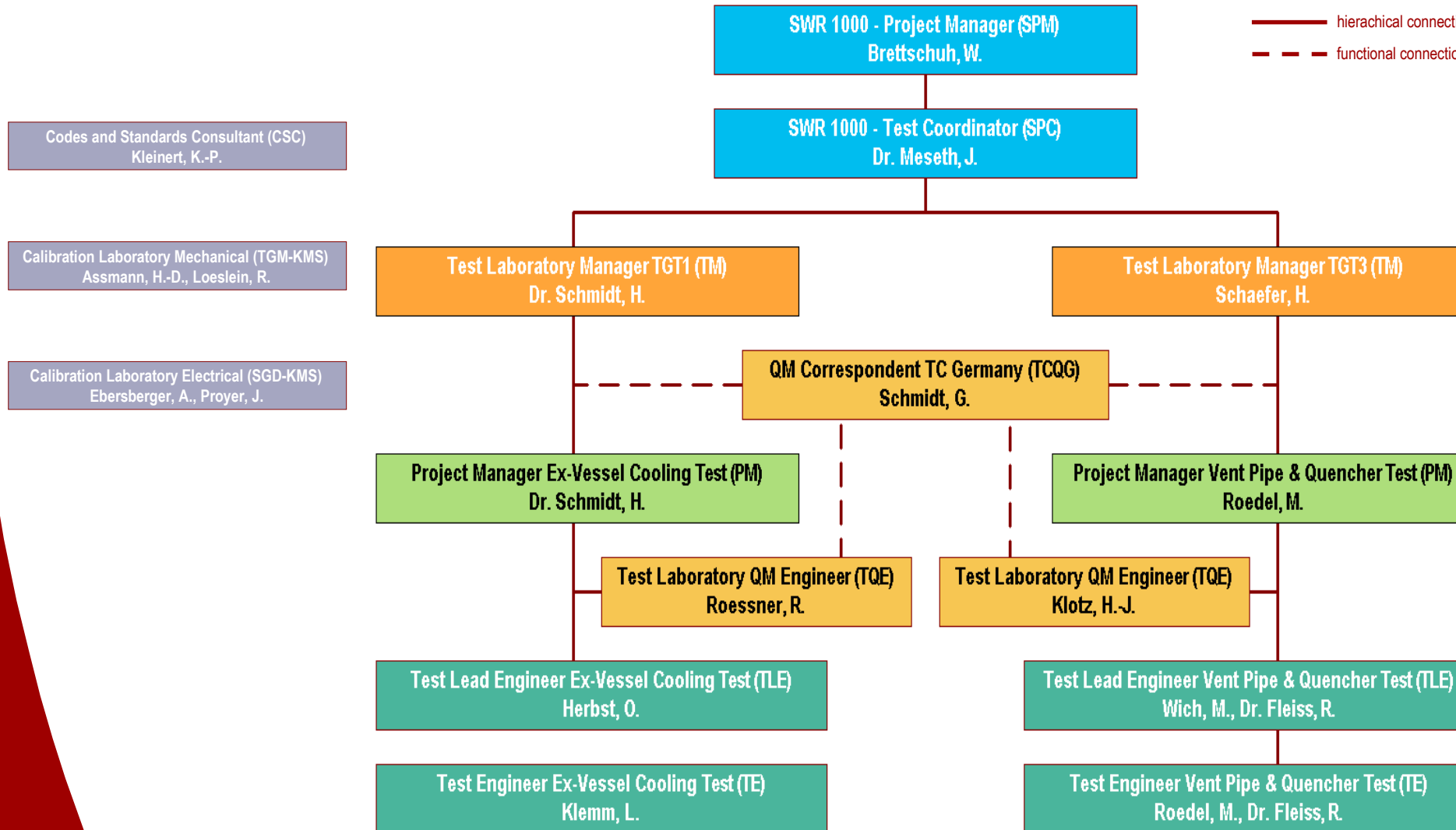
> **QA for External Vessel Cooling Test**

■ **Design and Manufacturing**

■ **Measuring and Test Equipment**

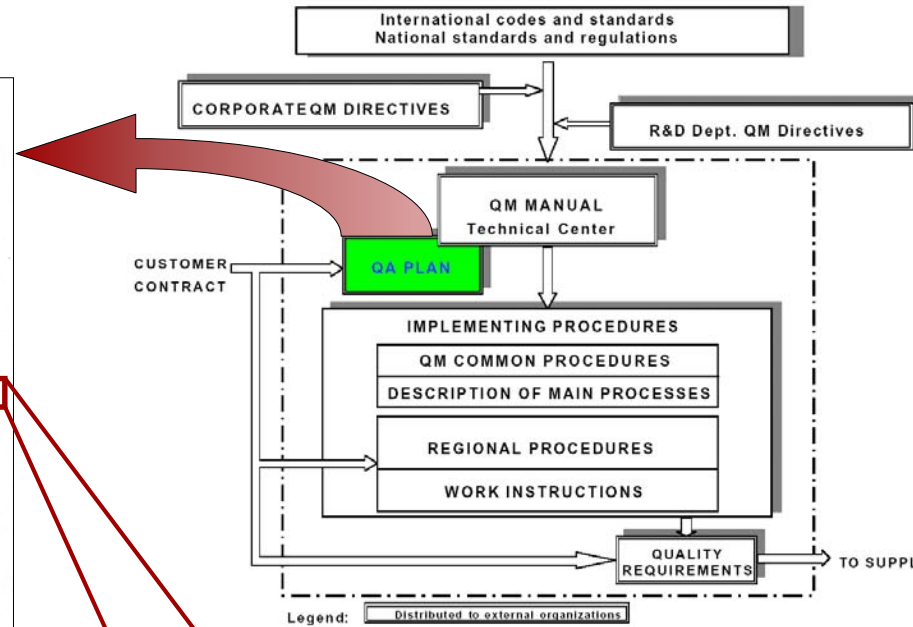
■ **Data Acquisition**

QA for External Vessel Cooling Test - Organizational Structure



QA for External Vessel Cooling Test - Quality Assurance Plan (QAP)

	Document:	Quality Assurance Plan (QAP)	QAP-No.:	TG-001
	Rev.:	A	Prepared by:	TGT
Title				
SWR 1000, Ex-Vessel Cooling Test, Vent Pipe Test and Quencher Test				
Proj.-Code	DCC	Contents Code	UND	
ZBX101	AQA			
Pages: 17		Appendices: 5		
Handling Instructions: RESTRICTED				
Table of Contents				
0	General.....			4
1	Quality Management System.....			5
2	Management Responsibility.....			8
3	Resource Management.....			11
4	Product Realization.....			13
5	Measurement, Analysis and Improvement.....			16
6	References.....			17
7	Appendices.....			17
Released:	Dr. J. Meseth	FANP NGPF	<i>J. Meseth</i>	Nov. 24, 2002
Reviewed:	K.-P. Kleinert	FANP SGQ	<i>K. Kleinert</i>	Nov 13, 2002
Reviewed:	G. Schmidt	FANP TGM	<i>G. Schmidt</i>	14.11.2002
Prepared:	R. Roessner	FANP TGT1	<i>R. Roessner</i>	14.11.2002
Prepared:	H.-J. Klotz	FANP TGT3	<i>H.-J. Klotz</i>	14.11.2002
	Name	Dept.	Signature	Date



Type of Document/Record	Preparation	Review	Approval	Release
Test Requirements Document	STC	-	SPM	SPM
Test Procedure	TLE	TQE	PM	STC or SPM
Test Record	TE	-	TLE	TLE
Test Report (Final Report)	PM	TQE	TM	STC or SPM

QA for External Vessel Cooling Test - Involved Persons

- > The qualification records have to be filed in the Human Resources Department of Framatome ANP GmbH
- > The qualification of the personnel has been checked prior to the test
- > Specific QA indoctrination was performed prior to the test
 - QA Plan SWR-1000
 - 10CFR50, App. B
 - 10 CFR21
 - ANSI/ASME NQA-1-1989
 - applicable procedures

FRAMATOME ANP

INDIVIDUALS REQUIRING INDOCTRINATION

Project: SWR 1000: Ex-Vessel Cooling Test Project No.: ZBX101

Testing Schedule from: Nov. 2002 till: Jan. 2003

Name	Dept.	Function (e.g. design, calculation, design verification)
Dr. Holger Schmidt	FANP TGT1	Responsible for the Test-Project with TGT1
Lars Klemm	FANP TGT1	Responsible for the preparation of the test in the BENSON rig
Roland Roessner	FANP TGT1	QM Responsible of TGT1
Oliver Herbst	FANP TGT1	Responsible for the data acquisition
Ingo Ganzmann	FANP TGT1	Responsible for the test hydraulics
Günter Schmidt	FANP TGM	QM Correspondent of TG

29.10.2002 R. Roessner
 RDE/RME/TURE* Date *Delete if not applicable
 Original to: "Quality Management System"
 Framatome ANP GmbH QSH E601 Formsheet FS_2_2

FRAMATOME ANP

INDOCTRINATION COURSE RECORD

Date of Course: 29. Oktober 2002, 09:00 Uhr
 Erlangen, Bau 64 (Aquarium)

Fields of Indoctrination:
 QA Plan SWR 1000, Ex-Vessel Cooling Test (Draft QAP
 10CFR50, App. B, 10CFR21
 ANSI/ASME NQA-1-1989
 Applicable Procedures

Participant	Dept.
Dr. Holger Schmidt	FANP TGT1
Lars Klemm	FANP TGT1
Roland Roessner	FANP TGT1
Oliver Herbst	FANP TGT1
Ingo Ganzmann	FANP TGT1
Günter Schmidt	FANP TGM

[Handwritten signatures and dates in the form]

 Date 28 Oct. 2002

Framatome ANP GmbH QSH E601 Formsheet FS_2_2

QA for External Vessel Cooling Test - Design and Development

- > Design and development activities by the test laboratories were done according to QMM, Chapter 4.3, and associated implementing procedures
- > Design and development activities are related to
 - the design of the tests as documented and referenced in the test procedure
 - the design of the the test vessel which is an approx. 8° segment (sector) of the RPV bottom

QA for External Vessel Cooling Test - Manufacturing Control

**MECHANIK
CENTER**

List of certifications and qualifications obtained
Information given by MEC's Quality Management Department

Certificate	Issuer	Erlangen	Berlin
DIN EN ISO 9001	TÜV-Cert	x	x
Certification concerning the suitability of the quality assurance system according to KTA 1401 and AVS D 100/50	Bayernwerk AG	x	
Higher qualification certificate DIN 18800 Part 7, Par. 6.2 / DIN 15018 / Z30.3-DiBt	LGA Bavaria	x	
Lower qualification certificate DIN 18800 Part 7, Par. 6.3	SLV Berlin - Brandenburg		x
Certification according to AD specification HP 0 / EN 729-2	TÜV Southern Germany	x	
Zertifikat nach AD-Merkblatt HP 0 / EN 729-2	TÜV Rhineland / Berlin-Brandenburg		x
Certification according to KTA nuclear safety standards 3201.3, 3204, 3401.3, 3205.1, 3903, 3905 and 1408.3	TÜV Southern Germany	x	
Germanischer Lloyd / Welding qualification	Germanischer Lloyd		
Germanischer Lloyd / Welding of pressure vessels	Germanischer Lloyd		
Germanischer Lloyd / Authorization to transfer markings on test and examination certificates according to DIN EN 10204 3.1B / 3.1C	Germanischer Lloyd		
Qualification certificate for welding railborne vehicles and parts thereof DIN 6700 Part 2 Class C2.2	SLV Munich SLV Berlin-Brandenburg		
Verification of qualification for welding structural parts of aluminum DIN 4113	SLV Munich		
WIWEB welding qualification in connection with BWB according to VG 95077 Parts 1, 2, 3 / DIN 85004 Part 2	Armed forces scientific instit structural, explosive and fue WIWEB		
Verification as a B calibration laboratory for mechanical measuring variables	Siemens calibration service		
Verification of the QM system No. 29-2	ANF Lingen		
ASME Code Section VIII Div. 1 U und UM Stamp	ASME International		
Licence for production, repair, structural inspection and first pressure test for containers (type 4, like gas pressure switches and switch gears)	SVTI ASIT		
Certification according to QSF-A of the Association of the German Aerospace Industry	EADS - Augsburg		

**MECHANIK
CENTER**

Nr. 3227

Werkbescheinigung
Inspection Certificate

2.1 nach EN 10 204
2.1 to EN 10 204

Abteilung:
department: FANP NT 31

Auftrags-Nr.:
Order No: XNABE-D-0000-918617

Werkstoff-Normbez.
Mat. Stand. Desig: siehe Doku IVZ 527

Werkstoff-Nr.:
Material No: ---

Spezifikations-Nr.:
Specification No: ---

DIN bzw. Zeichng.-Nr.:
DIN and / or Drawing No: Skizze

Bezeichnung
Designation: Versuchsbehälter SWR 1000
Test Tank SWR 1000

Wir bestätigen, daß der oben genannte Behälter den Vereinbarungen der Beste
We hereby confirm that the a.m. tank meets the arrangements acc. to the order.

Erlangen, den 21.11.2002

Der Werksachverständige
Works Inspector
Mechanik Center Erlangen GmbH
Qualitätssicherung



Fertigungskontrolle
Experimente zum Nachweis der Außenkühlung
Ort Mechanik Center Erlangen

Kontrolle entsprechend Bilder: Kontrolleur Aigner Datum 16.11.01 Untersc. Aigner

DSC01165.jpg
DSC01166.jpg
DSC01167.jpg
DSC01168.jpg
DSC01169.jpg
DSC01170.jpg
DSC01171.jpg
DSC01172.jpg
DSC01173.jpg

DSC01174.jpg
DSC01175.jpg
DSC01176.jpg

DSC01215.jpg
DSC01216.jpg
DSC01217.jpg
DSC01218.jpg
DSC01219.jpg
DSC01220.jpg
DSC01221.jpg
DSC01222.jpg
DSC01223.jpg

DSC01215.jpg
DSC01216.jpg
DSC01217.jpg
DSC01218.jpg
DSC01219.jpg
DSC01220.jpg
DSC01221.jpg
DSC01222.jpg
DSC01223.jpg

DSC01471.jpg
DSC01472.jpg

19.11.01 Untersc. Aigner

22.11.01 Untersc. Aigner

03.12.01 Untersc. Aigner

QA for External Vessel Cooling Test - Roadmap

> QA system of the FANP Technical Center

> **QA for External Vessel Cooling Test**

■ Design and Manufacturing

■ **Measuring and Test Equipment**

■ Data Acquisition

QA for External Vessel Cooling Test - Measuring and Test Process

		Document: Quality Assurance Plan (QAP)	QAP-No.: TG-001 Rev.: A Prepared by: TGT
Title SWR 1000, Ex-Vessel Cooling Test, Vent Pipe Test and Quencher Test			
Proj.-Code	DCC	Contents Code	UNID
ZBX101	AQA		
Pages: 17 Appendices: 5 Handling Instructions: RESTRICTED			
Table of Contents			
0	General.....	4	
1	Quality Management System.....	5	
2	Management Responsibility.....	8	
3	Resource Management.....	11	
4	Product Realization.....	13	
5	Measurement, Analysis and Improvement.....	16	
6	References.....	17	
7	Appendices.....	17	
Released:	Dr. J. Meseth	FANP NGPF	<i>J. Meseth</i> Nov. 24, 2002
Reviewed:	K.-P. Kleinert	FANP SGQ	<i>K.-P. Kleinert</i> Nov 13, 2002
Reviewed:	G. Schmidt	FANP TGM	<i>G. Schmidt</i> 14.11.2002
Prepared:	R. Roessner	FANP TGT1	<i>R. Roessner</i> 14.11.2002
Prepared:	H.-J. Klotz		
Name _____			
Framatome ANP GmbH QAP TG-001.doc			

	Ex-Vessel Cooling Test
Measuring process	Test specification TGT1/02/e42, Sect. 1.3
Test process	Test specification TGT1/02/e42, Sect. 1.4
Evaluation of test results	Test specification TGT1/02/e42, Sect. 1.4
Final report	Test specification TGT1/02/e42, Sect. 1.5

		Ref. (Department/Year/Language/Serial No.) FANP /TGT1/02/e42	
Subject/Title Test Procedure		Place	Date
		Erlangen	16.09.02
Tests to prove the functioning of the external cooling concept of the SWR 1000		Prepared by	Department
		Herbst, Oliver	TGT1
		Tel.	Signature
		97028	<i>O. Herbst</i>
Project SWR 1000		Reviewed by	Tel.
		Roessner, Roland	92352
Handling Instructions Unrestricted		Released by concerned department (content, handling, distribution, requirement)	
Export Classification (Reports with techn. content) AL: N ECCN: N		Dr. Holger Schmidt, TGT1 Mr. Werner Bretschuh, TGT3	
Proj.-Code	UA	DCC	Contents Code
ZXX020	BN		07045
Summary			Pages of 15 Appendices A text:
Framatome ANP is developing a new boiling water reactor called SWR 1000. Its safety concept consists of passive safety equipment combined with active systems, and through this diversity, meets the goal of reducing the probability of core damage compared to existing plants. Furthermore, the design is aimed at being able to control a postulated core melt accident to such an extent that the consequences of an accident remain restricted to the plant. The core melt is retained in the Reactor Pressure Vessel (RPV) at low pressure owing to cooling of the RPV exterior. For this purpose a passive flooding system is installed which feeds by gravity into the lower area of the drywell from the core flooding pool. The water will penetrate through apertures in the RPV-insulation into the gap between the insulation and the RPV-wall.			
Framatome ANP is preparing tests to confirm the functioning of the exterior cooling concept of the boiling water reactor SWR 1000. For this purpose, pretests have been performed to identify the shape of a section model. They are documented in the reports /1 to 4/, which are in German language. The fundamental ideas for performing the final test are described in /5 to 7/.			
It is the objective of the final test to identify safety margins of the exterior cooling concept by considering the influence of the control rod drive housings. In order to simulate the heat flux of the molten material heating wires will be installed on the upper surface.			
This report specifies, how the final test will be performed. The background, methodology and objectives of the final test are described in the appendix of this report.			
Distribution			
Mr. Bretschuh	NGPF	Mr. Brand	f.i.o. TGT
Mr. Bieler	NGEM4	Mr. Klotz	f.i.o. TGT3
Dr. Meseth	NGPF	Mr. G. Schmidt	f.i.o. TGM
Mr. Herbst	TGT1		
Mr. Klemm	TGT1		
Dr. Ganzmann	TGT1		
Framatome ANP GmbH			
<small>The reproduction, transmission or use of this document or its contents is not permitted without express written authority. Offenders will be liable for damages. All rights, including rights created by patent grant or registration of a utility model or design, are reserved.</small>			



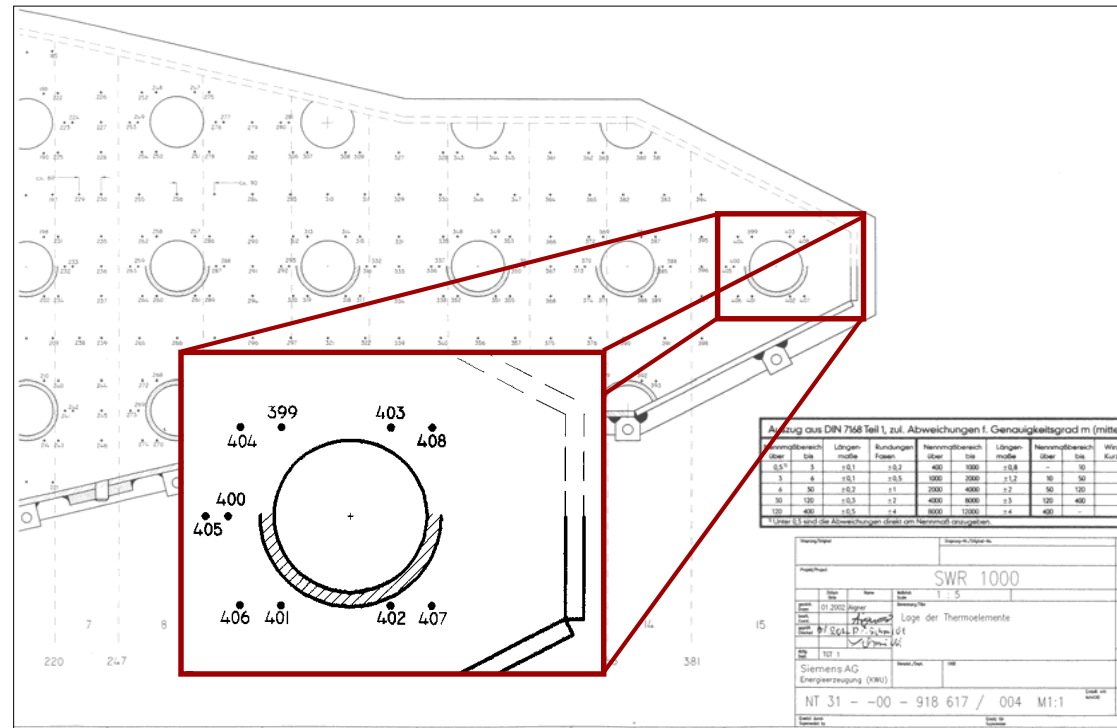
QA for External Vessel Cooling Test - Preparation of Measurement Techniques

As already mentioned, the requirements for the accuracy of the measurements are relatively low

- > Commercial accuracy is acceptable
- > Within all checks the whole chain has to be checked, from the sensor to the data acquisition
- > A separate error analysis is not required
- > But if calibrated equipment is requested, calibration tests have to be performed before and after the final test

QA for External Vessel Cooling Test - Measuring Techniques, Example: Thermocouples (1)

- > The temperature measurements of the heated surface will be checked based on plausibility
 - Plausibility check is described in the Test Procedure (FANP TGT1/02/e42)
 - Installation has to be done and checked according to the respective drawing



Auszug aus DIN 7568 Teil 1, zul. Abweichungen f. Genauigkeitsgrad m (mitte)

Nennmaß über	bis	Längen- maße	Rundungen Formen	Nennmaßbereich über		Längen- maße		Nennmaßbereich über		Wirk- länge
				bis	tol.	tol.	tol.	bis	tol.	
0,5/1	3	±0,1	±0,2	400	1000	±0,8	-	50	100	100
3	6	±0,2	±0,5	1000	2000	±1,2	10	50	100	100
6	30	±0,2	±1	2000	4000	±2	50	100	100	100
30	100	±0,3	±2	4000	8000	±3	100	400	100	100
100	400	±0,5	±4	8000	10000	±4	400	1000	100	100

1) Unter 0,5 sind die Abweichungen direkt an Nennmaß anzugeben.

SWR 1000	
1:5	
Lage der Thermoelemente	
Siemens AG	
Energieerzeugung (DRU)	
NT 31 - 00 - 918 617 / 004 M1:1	

QA for External Vessel Cooling Test - Measuring Techniques, Example: Thermocouples (2)

Belegungsplan SCXI 1303 - Module

Chassis	Slot	Kanal auf Platine	Thermoelement-Nr.	Kanal - Nr. in Meßstellenliste
1	3	0	RWT 001	0
1	3	1	RWT 002	1
1	3	2	RWT 003	2
1	3	3	RWT 004	3
1	3	4	RWT 005	4
1	3	5	RWT 006	5
1	3	6	RWT 007	6
1	3	7	RWT 008	7
1	3	8	RWT 009	8
1	3	9	RWT 010	9
1	3	10	RWT 011	10
1	3	11	RWT 012	11
1	3	12	RWT 013	12
1	3	13	RWT 014	13
1	3	14	RWT 015	14
1	3	15	RWT 016	15
1	3	16	RWT 017	16
1	3	17	RWT 018	17
1	3	18	RWT 019	18
1	3	19	RWT 020	19
1	3	20	frei	frei
1	3	21	RWT 022	21
1	3	22	RWT 023	22
1	3	23	RWT 024	23
1	3	24	RWT 025	24
1	3	25	RWT 026	25
1	3	26	RWT 027	26
1	3	27	frei	frei
1	3	28	RWT 029	28
1	3	29	RWT 030	29
1	3	30	frei	frei
1	3	31	Vergleichsstelle	31

Chassis	Slot	Kanal auf Platine	Thermoelement-Nr.	Kanal - Nr. in Meßstellenliste
1	4	0	RWT 032	32
1	4	1	RWT 033	33
1	4	2	frei	frei
1	4	3	RWT 035	35
1	4	4	RWT 036	36
1	4	5	RWT 037	37
1	4	6	RWT 038	38
1	4	7	RWT 039	39
1	4	8	RWT 040	40
1	4	9	RWT 041	41
1	4	10	RWT 042	42
1	4	11	RWT 043	43
1	4	12	RWT 044	44
1	4	13	RWT 045	45
1	4	14	RWT 046	46
1	4	15	frei	frei
1	4	16	RWT 048	48
1	4	17	RWT 049	49
1	4	18	RWT 050	50
1	4	19	RWT 051	51
1	4	20	frei	frei
1	4	21	RWT 053	53
1	4	22	frei	frei
1	4	23	RWT 055	55
1	4	24	RWT 056	56
1	4	25	RWT 057	57
1	4	26	RWT 058	58
1	4	27	RWT 059	59
1	4	28	frei	frei
1	4	29	frei	frei
1	4	30	RWT 062	62
1	4	31	Vergleichsstelle	63

Meßstellenliste:

MST	KAN STF	Bezeichnung	Kurzbezeichnung	Meßwandler	Meßbereich	SI-Meßbereich	Meßort	Bemerkung
1	0	Temperatur 001	TE RWT001	SCXI-11 02		0 - 1000 °C		SCXI Chassis1 SLO703
2	1	Temperatur 002	TE RWT002	SCXI-11 02		0 - 1000 °C		SCXI Chassis1 SLO703
3	2	Temperatur 003	TE RWT003	SCXI-11 02		0 - 1000 °C		SCXI Chassis1 SLO703
4	3	Temperatur 004	TE RWT004	SCXI-11 02		0 - 1000 °C		SCXI Chassis1 SLO703
5								SCXI Chassis1 SLO703
6								SCXI Chassis1 SLO703
7								SCXI Chassis1 SLO703
8								SCXI Chassis1 SLO703
9								SCXI Chassis1 SLO703
10								SCXI Chassis1 SLO703

Autor: Herbst
 Date: SWR1000.mst
 Versuchsdatum: 01.11.02



Geprüft
 14.3.03
 [Signature]

FANP TGT1 / Herbst / 3/13/03



Certificate of Calibration

Board Information

Serial Number: 0081ED
 NI Part Number: 1860541-01
 Description: DAQCard-6062E

Calibration Date: 16-MAY-2002
 Calibration Interval: 12 Months
 Calibration Due: 16-MAY-2003

Ambient Temperature: 23 °C
 Relative Humidity: 52 %

Certificate Information

Certificate Number: 460660
 Date Printed: 17-MAY-2002
 NI Part Number: 184632A-01

National Instruments certifies that at the time of manufacture, the above product was calibrated in accordance with the applicable National Instruments procedures. These procedures are in compliance with relevant clauses of ISO 9002 and are designed to assure that the product listed above meets or exceeds National Instruments specifications.

National Instruments further certifies that the measurements standards and instruments used during the calibration of this product are traceable to the National Institute of Standards and Technology or are derived from accepted values of natural physical constants.

The environment in which this product was calibrated is maintained within the operating specifications of the instrument and the standards.

For questions or comments, please contact National Instruments Technical Support.

Signed,
 [Signature]
 Joseph Brochtrup
 Test Engineering Manager

QA for External Vessel Cooling Test - Roadmap

> QA system of the FANP Technical Center

> **QA for External Vessel Cooling Test**

■ Design and Manufacturing

■ Measuring and Test Equipment

■ **Data Acquisition**

QA for External Vessel Cooling Test - Data Acquisition Software (1)

> *National Instruments' LabView
is most widely used to*

 *acquire*

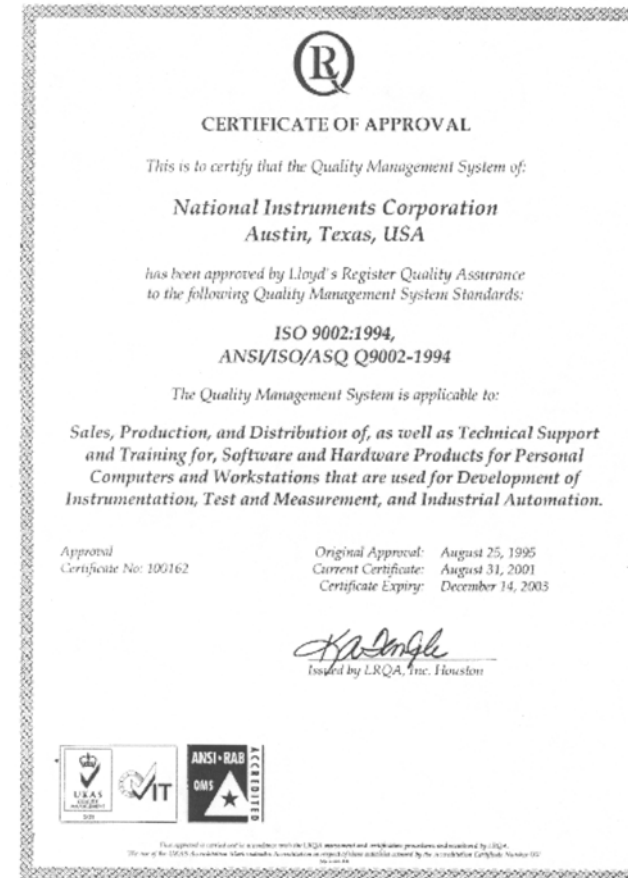
 *analyze*

 *present*

data

> Software, and any revisions to it,
is tested and/or validated prior to
use, approved for use, and archived

> Validation is performed by comparison with manual
calculations. The results are documented



QA for External Vessel Cooling Test - Data Acquisition Software (2)

> Developers' experience

■ Test Lead Engineer

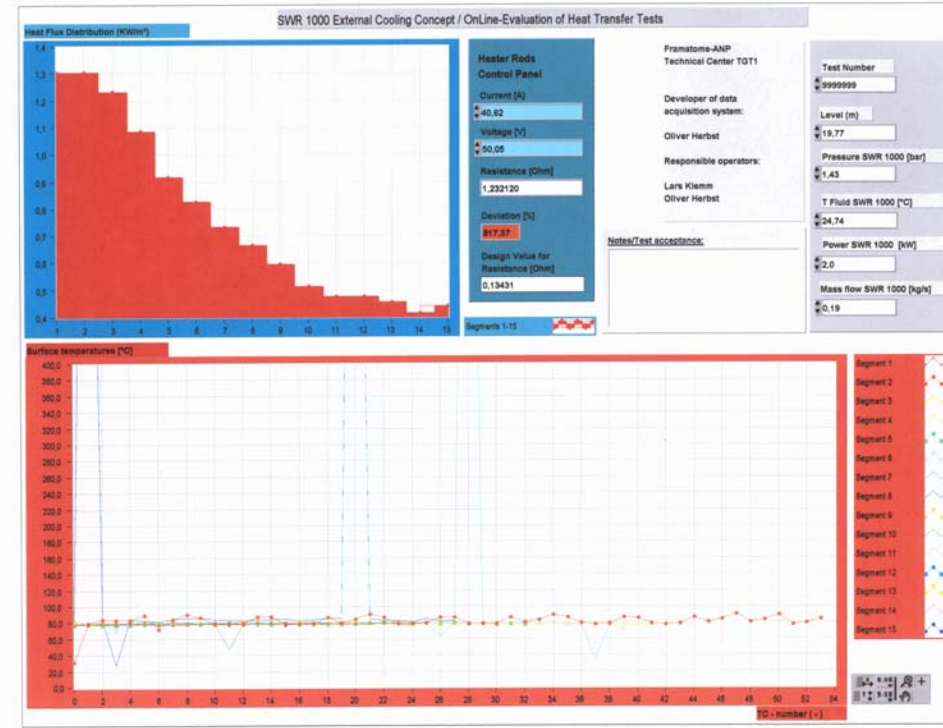
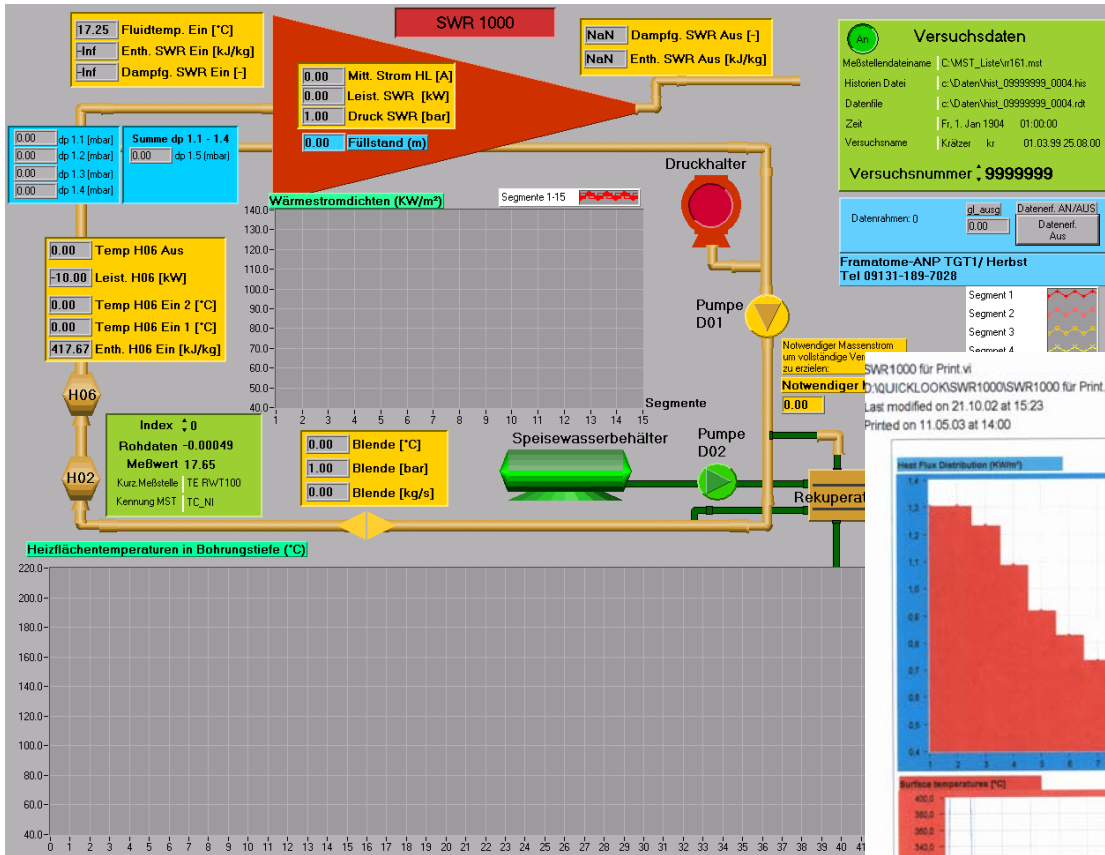
	year
1. Performed activities:	
• Planning and realization of tests on heat transfer and pressure drop of:	
• rifled tubes, type Foster Wheeler	1999
• rifled tubes, type 16 and type Babcock-Hitachi	1999
• rifled tubes, type 18 and type 19	2001
• Planning and realization of EU-projects	
• ISB 2000	2001
• HIPE CFB-Boiler	2002
• Evaluation of all tests; presentation of the results at license negotiations (Babcock&Wilcox, Ohio and Foster Wheeler, New Jersey, USA)	1999-2001
• Responsible for development of computer programs WATHUN2D and DRUBEN (heat transfer and pressure drop for boiler design)	2002
• Training of BENSON licensees in these programs	2001
• Development of the complete data acquisition, visualization and evaluation system with the software package LabView for BENSON-projects rifled tubes, type 18 and 19, for EU-projects ISB-2000 and HIPE and for the FANP-projects EPR-spreading concept and SWR1000-external cooling of RPV	2001/2002
• Software development for nuclear business (FLORA, Calculation of leakage rates within the scope of the LBB-concept). Presentation of the program at SMIRT16-conference in Washington, USA	2000/2001
• Co-author in VDI Wärmeatlas	2000-2002
2. Training:	
• LabView Data acquisition and visualization	2000
3. Indoctrination	
• Quality Management within Technical Center	2002
• QA Plan SWR 1000, QAP TG 001	
• 10CFR50, App. B, 10CFR21	
• ANSI/ASME NQA-1	
• Applicable procedures	

■ Test Engineer

	year
1. Performed activities:	
• Tests on heat transfer and pressure drop of:	
• rifled tubes, type 16 and type Babcock-Hitachi	1999
• rifled tubes, type 18 and type 19	2000
• rifled tube, type 20	2000
• Re-design of the control system of the BENSON test rig, incl. start-up tests	2001/02
• Development of a data acquisition system in exchange for the pen recorders of the BENSON test rig	2000
2. Training:	
• LabView Data acquisition and visualization	2000
3. Indoctrination	
• Quality Management within Technical Center	2000
• QA Plan SWR 1000, QAP TG 001	
• 10CFR50, App. B, 10CFR21	
• ANSI/ASME NQA-1	
• Applicable procedures	

QA for External Vessel Cooling Test Data Acquisition Software (3)

> Online display



> "Quicklook"