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POST OFFICE BOX X
OAK RIDGE, TENNESSEE 37830

ORNL

FOREIGN TRIP REPORT

ORNL/FTR-897

DATE: August 13, 1980

SUBJECT: Report of Foreign Travel of David G. Thomas, Manager, Steam Water Instrumentation Development Program and Modeling

TO: Herman Postma

FROM: David G. Thomas

PURPOSE: To participate in the 2D/3D Coordination Meeting in Munich for the purpose of reviewing the progress of work by German, Japanese, and U.S. participants and to review schedules and problems. In another meeting in Erlangen, the latest results from the Steam/Water Instrumentation Development Program as well as the current design and development status of the tie-plate drag body were reviewed in detail.

SITES VISITED: July 10-11 Kraftwerk Union, Erlangen, FRG, Dr. Sawitzki
July 15-18 2D/3D Meeting, Munich, FRG

ABSTRACT: The traveler, D. G. Thomas, participated in the regularly scheduled 2D/3D coordination meeting in Munich, FRG, as a member of the U.S. delegation. During the course of the meeting, NRC recommended that 36 tie-plate drag bodies plus a "few" DP systems should be installed in the UPTF. An extensive discussion was held on comparability of UPTF and SCTF core II end box measurements and ORNL agreed to perform additional turbine calibration tests with the turbine located in the position it will be in SCTF core II. The traveler also visited KWU in Erlangen, FRG, to present a detailed review of the latest IDL test results and the current design and development status of the tie-plate drag body.

REPORT

The 2D/3D Refill/Reflood Program has three coordination meetings scheduled each year. The locations of these meetings are rotated between the three countries participating in the program. The primary purposes of the meetings are for each participant to inform all others on their current work status and to prepare near-term detailed plans and more general long-range plans. Discussions of design issues are conducted and information and plans are presented to address the issues. Problem areas are identified and either resolved or mechanisms for their resolution are presented and agreed upon.

Specific items related to the Instrument Development Loop Program which were proposed for discussion included:

1. Results of calibration tests in steam/water loop
2. Performance of tie-plate drag body including measurement accuracy
3. Thermal and mechanical stress analysis of tie-plate drag body components
4. Calibration flow range capability
5. Comparability of UPTF and SCTF core II end box measurements.

Items 1 through 4 were discussed in detail at the meeting with KWU staff at Erlangen on July 10-11. In addition a short movie was shown illustrating the nature of the two-phase flow beneath the tie-plate. In a separate meeting on the afternoon of July 11, Mr. Kiehne of KWU reviewed for the traveler the test setup, boundary conditions, and results of the Waterfall tests made several years ago. These tests were conducted in a full-scale simulation of 1/2 of the upper plenum of a KWU reactor. The objective was to determine the distribution of ECCS water injected through the hot leg into the upper plenum. The tests showed that the support columns broke the water stream into sheets which penetrated to the center of the test facility before reaching the level of the upper core support plate.

A summary of items 1 to 4 was presented at a plenary session of the 2D/3D coordination meeting. During the instrumentation experts group meeting, there was an extensive discussion of the comparability of UPTF

and SCTF core II end box mass flow measurements. It was concluded that in general the measurements would be comparable except in high flow upflow. The principal problem with that flow condition was that currently the turbine meters in the two facilities are located in different positions. ORNL agreed to make a series of calibration tests with the turbine meter relocated to the position it will occupy in SCTF core II.

The following items of interest to the IDL program were presented at the 2D/3D coordination meeting.

1. Superheated steam will not be used in the UPTF tests. Saturated steam at 20 Bar will be the most severe conditions encountered by the tie-plate drag body.
2. NRC recommended that UPTF be supplied with 36 tie-plate drag bodies plus a few (nine) DP systems to provide confirmatory measurements.
3. Douglas Chapin of MPR presented a preliminary assessment of drag body stresses in UPTF and concluded that they will be no more limiting than other existing structural components that are not part of the drag body.
4. The UPTF schedule is slipping and it is proposed that SCTF III will be the coupling experiment with UPTF instead of SCTF II. This will impact the delivery date for the tie-plate drag bodies.
5. The slab core facility will use eight non-split KWU-type end boxes, three of the scalloped-hole type and five of the round-hole type.
6. The next coordination meeting is proposed for November 3-6, 1980, at Los Alamos Scientific Laboratory.

APPENDIX A

Itinerary

July 10-11: Meeting at the Kraftwerk Union, Erlangen, FRG

July 15-18: 2D/3D Coordination Meeting, Munich, FRG

APPENDIX B

The following is a list of the participants in the meetings on July 10-11, 1980, at the Kraftwerk Union in Erlangen.

H. Renner (NUS)
Dr. Sawitzki (KWU)
H. Kiehne (KWU)
Dr. Emmerling (KWU)
Hr. Strobel (KWU)
Fr. Hampel (BATTELLE)
H. Hofmann (GRS)
K. Riedle (KWU)

The following is a list of the participants in the 2D/3D coordination meetings the week of July 14-18 in Munich.

USA

L. S. Tong (USNRC)
W. S. Farmer (USNRC)
Y. Y. Hsu (USNRC)
L. M. Shotkin (USNRC)
W. L. Kirschner (LASL)
B. G. Eads (ORNL)
W. L. Zabriskie (ORNL)
B. J. Daly (LASL)
R. E. Rice (INEL)
D. M. Chapin (MPR)
C. K. Lewe (NUS)
H. Renner (NUS)
D. G. Thomas (ORNL)

FRG

F. Mayinger (UH)
H. Hofmann (GRS)
E. F. Hicken (GRS)
F. Winkler (KWU)
Fr. Hampel (Battelle)
Hr. Strobel (KWU)
Dr. Sawitzki (KWU)
H. Keihne (KWU)
D. Hein (KWU)
Dr. Melchoir (KWU)
Dr. Emmerling (KWU)

Japan

M. Nozawa (JAERI)
K. Hirano (JAERI)
Y. Murao (JAERI)
T. Iguchi (JAERI)
M. Sobajima (JAERI)

APPENDIX C

U S. Handouts

Appendix 3 of Trilateral Agreement (Draft Program Plan)

Instrument Development Loop Program, D. G. Thomas (ORNL)

Drag Body Spider Stress Analysis (ORNL)

2D/3D Program, EG&G Idaho Program Status

LASL 2D/3D Analysis Status

CCTF Posttest Analysis of Test C1-1 with Trac-PD2

Selection of Instrumentation for Measurement of Flow at Upper Plenum

Objectives of the 2D/3D Program

Specification Test Facility for Two-Phase Flow Testing (UPTF Instr. Pipe)

Analysis of Cylindrical Core Test Facility Core No. 1, Runs 13, 24, and 29

Proposed Plan for New SCTF-II (Hsu, Shotkin, Farmer)

FRG Handouts

Draft Program Plan for the 2D/3D Project

Influence of Nitrogen Injection on Instrument Behavior

UPTF-Status

UPTF-Schedule

Schedule DAS and Instrumentation Delivery

APPENDIX C (Continued)

Japanese (JAERI) Handouts

Appendix 2 of Trilateral Agreement (Draft Program Plan)

Conceptual Design of UP Structures for SCTF II

Conceptual Design and Errata for Combined Injection Nozzles for SCTF

CCTF Test Results

Status of CCTF-II Instrumentation

Problem in the Core-II Structural Design for the SCTF

Status of CCTF Core II Design

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4. Director, Division of Safeguards and Security, DOE
5-6. Director, Division of International Security Affairs, DOE, Washington, D.C.
7. L. S. Tong, Assistant Director, Division of Reactor Safety Research, NRC, Washington, D.C.
8. W. S. Farmer, Manager, 2D/3D Program, NRC, Washington, D.C.
9. Y. Y. Hsu, NRC, Washington, D.C.
10. J. A. Lenhard, DOE-ORO
11. J. S. Denton, DOE-ORO
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19. Herman Postma, Director, ORNL
20-21. D. G. Thomas
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23. S. E. Bolt
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