



International Agreement Report

Assessment of RELAP5/MOD 2, Cycle 36, Against FIX-II Split Break Experiment No. 3027

Prepared by
J. Eriksson

Swedish Nuclear Power Inspectorate
P.O. Box 27106
S102 #52 Stockholm, Sweden

Office of Nuclear Regulatory Research
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

September 1986

Prepared as part of
The Agreement on Research Participation and Technical Exchange
under the International Thermal-Hydraulic Code Assessment
and Application Program (ICAP)

Published by
U.S. Nuclear Regulatory Commission

NOTICE

This report was prepared under an international cooperative agreement for the exchange of technical information.* Neither the United States Government nor any agency thereof, or any of their employees, makes any warranty, expressed or implied, or assumes any legal liability or responsibility for any third party's use, or the results of such use, of any information, apparatus product or process disclosed in this report, or represents that its use by such third party would not infringe privately owned rights.

Available from

Superintendent of Documents
U.S. Government Printing Office
P.O. Box 37082
Washington, D.C. 20013-7082

and

National Technical Information Service
Springfield, VA 22161

NUREG/IA-0005



International Agreement Report

Assessment of RELAP5/MOD 2, Cycle 36, Against FIX-II Split Break Experiment No. 3027

Prepared by
J. Eriksson

Swedish Nuclear Power Inspectorate
P.O. Box 27106
S102 #52 Stockholm, Sweden

Office of Nuclear Regulatory Research
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

September 1986

Prepared as part of
The Agreement on Research Participation and Technical Exchange
under the International Thermal-Hydraulic Code Assessment
and Application Program (ICAP)

Published by
U.S. Nuclear Regulatory Commission

NOTICE

This report documents work performed under the sponsorship of the SKI/STUDSVIK of Sweden. The information in this report has been provided to the USNRC under the terms of an information exchange agreement between the United States and Sweden (Technical Exchange and Cooperation Arrangement Between the United States Nuclear Regulatory Commission and the Swedish Nuclear Power Inspectorate and Studsvik Enerigiteknik AB of Sweden in the field of reactor safety research and development, February 1985). Sweden has consented to the publication of this report as a USNRC document in order that it may receive the widest possible circulation among the reactor safety community. Neither the United States Government nor Sweden or any agency thereof, or any of their employees, makes any warranty, expressed or implied, or assumes any legal liability of responsibility for any third party's use, or the results of such use, or any information, apparatus, product or process disclosed in this report, or represents that its use by such third party would not infringe privately owned rights.

1985-10-22

SKI Project 85026, 13.3-917/84

John Eriksson

Swedish Nuclear Power Inspectorate

ICAP
Assessment of RELAP5/MOD2, Cycle 36, Against
FIX-II Split Break Experiment No 3027

ABSTRACT

The FIX-II split break experiment No. 3027 has been analyzed using the RELAP5/Mod2 code. The code version used, Cycle 36, is a frozen version of the code.

Four different prediction calculations were carried out to study the sensitivity on various parameters to changes of break discharge, initial coolant mass, and passive heat structures. The differences between the calculations and the experiment have been quantified over intervals in real time for a number of variables available from the measurements during the experiment.

The core inventory expressed by the differential pressure over the core was generally underpredicted. Dryout times were generally overpredicted, probably due to differences in the used dryout correlation.

Approved by-

Eric Ullstam

1985-10-22

LIST OF CONTENTS

	<u>Page</u>
1. INTRODUCTION	1
2. FACILITY AND TEST DESCRIPTION	3
2.1 Test facility	3
2.2 The experiment	5
2.3 Measurement uncertainty	7
3. CODE AND MODEL DESCRIPTION	9
3.1 The code features	9
3.2 The calculation input model	10
4. THE BASE CASE CALCULATION	12
4.1 Base case calculation results	12
5. SENSITIVITY RESULTS AND DISCUSSION	17
6. RUN STATISTICS	20
7. CONCLUSIONS	21
REFERENCES	23
FIGURES	24
TABLES	31
APPENDICES	
A. Input listings	
B. Data comparison plots	
C. Calculation to experiment data uncertainties	

1985-10-22

1. INTRODUCTION

There is a growing interest in modifying existing rules for reactor licensing and safety thermal-hydraulic calculation away from those stated in Appendix K (1) towards procedures based on best estimate types of calculations. Although Appendix K furnishes a set of skillfully and simply phrased rules, its present and inherent conservatism on safety has been partly regarded as in growing contradiction to the increasing knowledge gained from experimental programs. The many advanced best estimate thermal-hydraulic reactor codes in existence today demonstrate this.

When the simply formulated older calculation rules were replaced by best estimate type calculation procedures another measure of reliability had to be found to replace the earlier conservatism. To intentionally fulfill that aspect of a code the natural course will be an assurance of a reasonable reliability of the predicted data. Plans for conducting code assessments for the purpose of determining the accuracy and the validity of advanced LWR system codes were proposed some years ago (2). Today the International Code Assessment Program (ICAP) is in progress, under the auspices of the USNRC (3).

The calculations presented in this report is a Swedish contribution to the ICAP. The contribution is funded by the Swedish Nuclear Power Inspectorate.

In the present study the frozen version of RELAP5/MOD2 is assessed against LOCA experiment No. 3027, carried out the FIX-II test facility at Studsvik. The experiment is one of a test series, see Table 1, conducted in 1984. This test was conducted to check the reproducibility of Test 3025, which had been

1985-10-22

used as a "double-blind" international standard problem (ISP-15).

A description of the test facility and this particular test is provided in Chapter 2. A description of the input model is given in Chapter 3. The base case and sensitivity calculations are discussed in Chapters 4 and 5. Run statistics are given in Chapter 6. General conclusions are drawn in Chapter 7.

Appendix A contains the complete input lists. The data comparison plots are included in Appendix B. Finally, results of the statistical analyses of differences between experiment and predictions for discrete time intervals are included in Appendix C.

1985-10-22

2. FACILITY AND TEST DESCRIPTION

The FIX-II integral test facility was completed at the end of 1981. It is run by Studsvik Energiteknik AB under contract to the Swedish Nuclear Power Inspectorate. The experimental program comprises investigations of the fuel-to-coolant heat transfer. Various blow-down and pump trip situations conceivable in Swedish BWR's are simulated.

2.1 Test facility

The test facility itself, which is assumed to be stripped from gear not involved in the present experiment, is shown in Figure 1. The volume scaling is 1:777 of the Oskarshamn-II reactor, which is of the ASEA-ATOM external recirculation pump design. An exhaustive description of the FIX-II test facility may be obtained from Ref 4, which also provides additional references where various problems pertaining to the construction period are discussed. Therefore, only some fundamental aspects of the facility will be presented here.

The core model involves a full length rod bundle, which in the geometry is closely related to a fuel element of the ASEA-ATOM design and electrically heated by DC. Here, however, there are only 6 x 6 rod simulators instead of the 8 x 8 rods in a fuel element. Figures 2 and 3a show details from the core simulator design. As seen, filler bodies are placed between the square-section fuel channel and the circular-section pressure vessel to reduce the water-filled volume, which otherwise may influence the test by the leakage of steam to the upper plenum. The water surrounding the fillers is externally recirculated and cooled by 200 to 250 kW.

1985-10-22

The upper part of the pressure vessel, Figure 3b, holds the steam separator and the steam condenser volume with its three sprinklers. During steady state power operation the steam outlet is closed. The turbine power is modelled by the partial circulation of water from the downcomer through an external 6 MW cooler with feedback to the sprinklers of the steam condenser and into the upper part of the downcomer. The flow rate in the two branches with cooled water is adjusted to control the pressure and the inlet subcooling. The remaining downcomer flow, representing the recirculation coolant flow in the reference reactor, splits at the lower downcomer end into two loops. One loop represents three of the intact recirculation lines of the reference reactor, while the other loop, representing a fourth recirculation line, incorporates the break devices. Both loops have a recirculation pump. The intact loop pump speed is regulated according to a pre-determined speed history.

The FIX-II has, as part of the core model, an external bypass simulator through which about 12 % of the recirculation mass flow branches out through a regulation valve. This bypass is heated separately to represent the channel wall heat transfer. At the lower end of the bypass, Figure 3c, there is a stagnant water volume to simulate the reference reactor area for the control rod guide tubes.

Since the FIX-II facility has been designed for blowdown experiments only, no emergency core cooling equipment is installed.

1985-10-22

The data collection system is constructed around a signal processor controlling 192 measurement channels. The selection of measurements is made in a signal exchange terminal. A multipurpose minicomputer transfers the raw-data of measured parameters to a magnetic tape. From this tape, the final analysis at the central computer gives the desired tables and plots from an experiment. The data acquisition system includes measurements to obtain:

- pressures (PT)
- differential pressures (dPT)
- temperatures of fluids (TE)
- mass flow (dPT, PT, TE)
- electric currents (I) and voltages (U)
- pump speeds (nT)
- water level positions (CE)
- valve positions

at places shown in the instrumentation diagram, Figure 4.

For recording clad temperatures there were about 100 thermocouples engaged at 16 axial levels of the heated length in the 36-rod bundle.

2.2 The experiment

The preparation of the experiment is initiated several hours before the actual experiment. For the heat-up of the facility, a 200 kW preheater is involved for a period lasting about 5 h. The recirculation pumps are running during this period too. Initial conditions are then established by switching the power supplies to the bundle and

1985-10-22

the bypass with the 6 MW cooler and the condenser spray in operation. The preheater is now disconnected. For about 10 to 30 minutes, the electric power to the rod bundle and the bypass heating is gradually increased until the initial test conditions are reached. Necessary calibrations are made, and once the equilibrium conditions are finally approved, the sequency control equipment is activated for break opening, valve manoeuvres, power reduction, pump speed changes and so forth, according to a programmed scheme for the test. For the split break test No. 3027, the transient ends 85 s after opening of the break.

In the present FIX-II experiment, the speed of the pump on the intact recirculation line decreased from the break time to about 20 % of the initial speed at end of the transient. The speed of the broken recirculation line pump was not adjusted.

The break flow escaping through the fast opening break valve, Figure 1, is discharged into the receiving tank, T2. Initially, the tank is partly filled with cold water for efficient pool condensation of the break flow.

The split break assembly consists of a T-piece on the line from pump P2 to the lower plenum. A break flow limiting orifice, downstream of the break isolation valve, consists of an exchangeable conical inlet part followed by a restriction pipe. In experiment No. 3027, the restriction pipe and flange diameter was 12 mm corresponding to a 31 % area of one recirculation line.

1985-10-22

Apart from the heat removal from the filler body space, see Chapter 2.1, some 100 kW are also lost by the non-perfect insulation encapsulating the recirculation lines and the pressure vessel. The magnitude of the steady state heat losses was one argument for not performing experiments with very small break areas at FIX-II. For BWR plants, the break size used is more interesting than small leakages.

The main measured parameters for the steady state before break are reproduced from Ref 3 in Table 4. The test performance chronology, related to the programming of the sequence control equipment, is given in Table 5.

Experimental raw data were collected for the whole period of the transient. However, internal flows were then only evaluated until about 30 s due to uncertainties expected with the two-phase flow rate measurements.

A summary of the main results (including event times, maximum cladding temperatures and some peak mass flows) is given in Table 6, see also Ref 5.

2.3 Measurement uncertainty

To obtain estimates for the accuracy of the measured data, test procedures were adapted within the experimental program. Probable errors and errors corresponding to a 95 % confidence level as derived from these tests are summarized in Table 2a. The probable errors of derived quantities, foremost mass flows, are given in Table 2b. The pump speeds are measured and controlled using a

1985-10-22

tachometer of a 1 r/s accuracy. The pump characteristics, on the other hand, were verified against the manufacturer's data for cold water single phase operation, however, no tests of an in-loop hot water performance were conducted (private comm L Nilsson).

1985-10-22

3. CODE AND MODEL DESCRIPTIONS

The assessment calculation for the FIX-II experiment No. 3027 was done using the RELAP5/Mod 2, Cycle 36, code received at the beginning of February 1985. The descriptive document available for this code at the time of preparing the calculation input was the rather detailed code manual (7) also explicitly containing an input data requirements manual. The code features are discussed in Chapter 3.1.

Due to the close relation to the RELAP5/Mod1 code, which has been extensively used at STUDSVIK, an existing input for the FIX-II test No. 3025 (6, 8), the previous ISP-15 exercise, formed the basis for the present RELAP5/Mod2 input. Details of the input are discussed in Chapter 3.2. Here the steady state calculation is assumed to be part of the input preparation.

3.1 The Code Features

An extensive code description for the RELAP5/Mod2 is given in the Ref 7. The main characteristics of the code are summarized in Table 3.

Since the RELAP5/Mod2 code is primarily developed for pressure reactor application, the question arises whether some important features are missing from the code for a BWR-type application like the present FIX-II experiment. A key peculiarity in this respect, is the absence in the FIX-II facility of a core top spray cooling due to the fact that facility is designed for experiments until end of blow-down only. The steady state cooling, however, is accomplished by a cold water injection at the top of an

1985-10-22

internal condenser space above the core and the steam separator. The condenser space is voluminous; it results in about three quarters of the total system space being above the core top level. Thus, it is assumed that the condenser spray vaporizes without impact on the core behaviour during normal operation. Deficient sophistication in modelling droplet flows in RELAP5/Mod2 should, therefore, be far less important when predicting the present experiment than in the case of an experiment also including core cooling by refill and core top spray.

3.2 The calculation Input Model

The model geometry used in the present calculations is closely related to geometries used in several previous calculations for FIX-II experiments using previous RELAP5/Mod1 code versions (6 and 8). The nodalization diagram for the geometric modelling used is shown in Figure 5. Figures 6 and 7 account for the modelling in the geometry of the test facility.

To reproduce fundamental measured steady state quantities, see Table 4, the input for the steady state search run was modified by some additional components and regulating control systems:

- I To obtain the steady state dome pressure, a time dependent volume outside of the opened steam relief valve was added. This volume had the experimentally measured dome pressure rather than the atmospheric outside pressure later during the transient.
- II The speed of the pumps P1 and P2 was regulated using the RELAP5 control system to fulfill the measured mass flows.

1985-10-22

- III To branch off the correct mass flow into the core bypass, the junction from the lower plenum was modelled as a motor valve. By trip logic, the opening of that valve was regulated to give the experimental bypass mass flow. When entering into the transient calculation, the valve setting was logically latched.
- IV The measured steam separator collapsed level was satisfied by connecting an auxiliary time dependent volume to the top of the steam separator. The connecting junction was modelled to regulate the collapsed level by water phase flow rate, depending on the level height error.
- V The calculation was performed using the RELAP5/Mod2 steady-state option.

Evidently, some non-zero flows (points I and IV) will remain in the junctions from the pressure- and level regulating time dependent volumes. These flows are quite small and are influenced by the system heat balance.

The input for the steady state calculation is given in the Appendix A.

1985-10-22

4. THE BASE CASE CALCULATION

The transient calculation of the base case (called Case A) was based on the restart-plot file obtained from the previously discussed steady state calculation. The additional components and regulators discussed in Chapter 3.2 were deleted, see the transient restart input in Appendix A.10. The calculation was performed under the transient calculation option. In addition, when verifying the quality of the steady state, the opening of the break was delayed.

The calculation of the transient itself was carried out without any particular problems. The smooth lapse of the CPU-time, Plot B.34 and of the computation mass error, Plot B.35, again indicate this.

4.1 Base case calculation results

A set of results from the base case calculation and the sensitivity calculations were selected to fulfil the requirement on assessment parameters given in Table 3 of Ref 3. Those parameters plotted are listed in the Table 8 and the corresponding plots reproduced in Appendix B. Since some of the parameters are not available from the experimental measurements, only the comparisons between the different calculations are shown in the plots, compare Table 8. As regards the mass flow comparisons, it must again be pointed out that the experimental data are not reliable after voiding has begun which for most measurement positions occurs about 20 s after the break time.

1985-10-22

The system boundary conditions concerning the total mass inventory are the shutting of the spray flow and the feed water valves, which take place very soon after the break occurs. There is a good correlation between calculation and experiment in the mass flow rate through the steam relief valve, plot B.27. However, the break mass flow which in the experiment is measured by the increasing content of a flow receiving tank, plot B.30, has been obviously underestimated in the base case calculation. Plot B.29, where the experimental curve is derived from the receiving tank content, shows the same break flow underestimation from the calculation, particularly up to 30 s. Plot B.29 shows a pronounced peak in the measured mass flow during the very first seconds after the break on account of steam accumulating in the tubes leading from the break to the condenser receiving tank, where previously only water was present. This results in a measured superimposed volume equivalent to a water mass of about 20 kg from about 3 s from the end of the test. At the end of the test, the break valve is closed causing the receiving tank mass content to reduce with the superimposed steam volume, see Plot B.30. In the light of this correction to the total experimental break loss, the base case calculation underestimated the break loss by about 30 kg until end of the test. The calculated mass inventory in the system, Plot B.26, obviously has the opposite time elapse to that of the integrated break loss.

The thermal-hydraulic conditions in the system are also partly controlled by heat exchange with the core and other boundary structures. Plot B.3 shows the calculated heat exchange with all the

1985-10-22

passive wall structures in the loop except for the separate filler body space with a known cooling power of about 260 kW in steady state operation. As Plot B.3 shows, the heat returning from the passives does exceed the decay core heating from about 30 s on. Thereby, the structure wall thickness was generally selected at 0.09 times the tube inner diameter, also compensating for flanges and other extras.

System pressures, Plots B.20, B.21 and B.33 were well predicted over the whole transient for the base case. The cycling of the steam relief valve, compare Plot B.27, dominates the behaviour of the system pressure.

From the experiment, evaluated in-loop main recirculation flows are available at the bypass inlet, at the pressure sides of the two main pumps and also at the broken loop between break and vessel inlet, see Plots B.22, B.23, B.24 and B.25. Two additional measurements valid for in-loop mass flows are the differential pressures over the orifice in the steam separator, Plot B.17, and over the core inlet restriction, Plot B.2. As mentioned before, the mass flows evaluated from the experiment, i.e. plots B.22 through B.25, are not reliable after the formation of steam has started. On the plots, the time for initiating steam formation is clearly seen to range between 20 and 25 s as enhancing flow oscillations. Up to that time, the predicted base case flow rates essentially compare well with the measurements. The most conspicuous differences are that the mass flows at the broken loop pump and at the broken loop vessel inlet, plots B.24 and B.25, are underestimated in their magnitude thus showing an underestimation in the break flow.

1985-10-22

Plots B.1, B.13 and B.28 show calculated fluid densities at the core bottom, at the reactor vessel bottom and upstream of the break. Fluid densities were not directly measured in the experiment.

Several fluid temperature measurements were carried out in the experiment. At the break, plot B.31, there is a good agreement between the base case calculation and the experiment, similarly also after about 15 s at the downcomer bottom, Plot B.19. The difference in the calculated and the experimental fluid temperatures at the downcomer bottom before 15 s is due to the amount of void. In the experiment, the measured two-phase level did not reach the downcomer bottom until about 13 s (5), see also Plot B.14. The temperatures at the core inlet, Plot B.10, at the core outlet, Plot B.11, and in the upper plenum, Plot B.18, all show underestimations in the calculation after some 50 s, although the system pressure compares well with the experiment. The calculated temperature is still typically that of saturation at the high void while in the experiment, slightly superheated pure steam fills the vessel.

The fluid inventories of the core, Plot B.12, the upper plenum, Plot B.16, the downcomer, Plot B.14, and of the lower plenum, Plot B.15, are compared in the quantity of differential pressures as directly measured in the experiment. The differential pressure over the core, Plot B.12, is underpredicted during the period between 2.3 and 12 s when the steam relief valve is closed. In the calculation, the main part of this differential pressure is due to the dynamic two-phase wall friction. As the core boundary mass flows

1985-10-22

compare reasonably well in the time interval, the difference in the core differential pressure is most likely caused by a strong wall friction dependance on the void fraction profile in the core. The differential pressure in the lower plenum, Plot B.15, is overpredicted in the base case after about 30 s. Comparison with Plot B.13 shows the dependance of the differential pressure on the fluid density at the bottom of the vessel.

The comparisons of the rod clad temperatures are done at the clad inner surface which is most closely equivalent to the thermocouple positions of the heated rods in the experiment. The rod calculated clad temperatures, Plots B.4 through B.9, agree reasonably well at various levels of the core with the measurements in the experiment until dryout conditions occur. Above the core midplane, levels 9, 12 and 15, the dryouts are predicted to occur definitely later than in the experiment. Actually, the calculated dryout of all levels was delayed until the void was .985 or higher. In RELAP5/Mod2 the critical heat flux is calculated according to a modified Zuber correlation using $1-\alpha$ (α is the steam void) as a factor. This should be compared with the corresponding RELAP5/ Mod1 correlation using $.96-\alpha$ as a factor in the critical heat flux expression, also in a modified Zuber correlation. The delay in the outset of the calculated dryouts is probably a result of the critical heat flux correlation rather than of errors in the core voids.

1985-10-22

5. SENSITIVITY RESULTS AND DISCUSSION

The base case calculation (Case A) compared well with the experiment on many parameters, however, in the important heater rod temperatures after dryout, a better prediction was desired. Consequently, with the aim of lowering the core void, the break discharge coefficient, having been .85 in the base case, was assumed to be 1.0 in a first sensitivity calculation, Case B. Actually, Plots B.5 through B.8 show a better agreement in the clad temperatures at the high power levels of the model rod. At the low power levels at the bottom and at the top of the core the comparison was no better. Looking at hydraulic quantities the differential pressure over the core, Plot B.12, the system pressure, Plot B.20, and the reversed broken loop cold leg flow at the vessel inlet, Plot B.25, changed for the worse. However, the most striking evidence that the increase of the break mass flow had been constructive was the far better agreement in the mass loss, Plot B.30.

A source of uncertainty regarding the experiment is the amount of initial fluid in the facility before the break. The water volume in the experiment was accounted for by the water level in the downcomer part of the steam condenser (5). In the steady state calculation, that same level had been satisfied using a regulating system for an auxiliary flow between the loop and a time dependent volume containing saturated water. Examination of data from other FIX-II tests indicated that the initial mass of about 285 Kg, obtained by leveling off the downcomer water level according to measurement, might be a lower limit of the mass in the

1985-10-22

system. Differences between the initial masses in the calculation and in the experiment arise from water in the spray, the feedwater, the cooling return lines and some additional short blind lines ending in valves which are closed in the experiment. The mass of water in those lines is estimated at about 4 kg. Another potential source of initial mass difference is the amount of liquid in droplet form in the steam condenser. Since the volume of the condenser is about $.6 \text{ m}^3$, an actual void fraction of $\sim .90$ in the experiment instead of $\sim .96$ in the calculation means a mass difference of about 26 kg. Actually, the calculated droplet - water falling velocity of 1.2 M/s in the steady state is too high. According to the spray nozzle manufacturers specification, the spray mean droplet diameter at the actual water flow should be about .9 mm or some 1.0 mm after steam condensation. With this droplet size, the droplet falling velocity is only about .8 m/s relative to the upward velocity of steam of .2 m/s. The conclusion must be drawn that the calculation greatly underestimates the condenser water mass estimates. In a second sensitivity calculation, Case C, again with a discharge coefficient of 1.0, the calculating was done using an initial mass of 315 kg instead of 285 kg. Plot B.30 now shows a good agreement between the predicted break mass loss and the final experimental mass accumulated in the break receiver after closing the break. Fluid temperatures, Plots B.10, B.11, B.18, B.19 and B.31, which had worsened by the sole increase in the discharge coefficient in Case B, again agreed with the experiment in the Case C run. As a consequence, the same statement also applies to the system pressures, Plots B.20, B.21 and B.33.

1985-10-22

On the other hand, the pressure drops in the downcomer and in the lower plenum, Plots B.14 and B.15, do indicate some overestimation in the system fluid mass. The prediction of the heated rod clad temperatures remained the same as in the base case and the Case B calculation.

The amount heat returning from the passive structures, Plot B.3, is essential during the later part of the transient. Though the structure wall thicknesses were chosen by a simple rule of thumb, the structure modelling is believed to be reasonably reliable. To quantify the effect of the structure heat exchange on the system, a calculation, case D, was performed using the larger discharge coefficient and the larger initial mass but removing all passives. Fluid temperatures such as at the core inlet, Plot B.10, naturally decreased more rapidly towards the end of the transient. An interesting discovery is the close similarity in the system pressure between calculation Case B and Case D. This similarity may be explained in terms of the system that is, if it is due to the heat structures or if it is due to an amount coolant that has been added itself. From about 30 s until the end of the transient, the heat returning from the structures was about 12 MWs, see Plot B.3. In the Case B calculation, Plot B.26 shows a decrease at the same time, of the calculated mass content from 110.5 to 35.2 kg. In case D, the decrease is from 132.5 to 50.75 kg. Reading the system pressures of 4.7 MPa at 30 s and 1.9 MPa at 75 s from Plot B.20 and using approximate changes in the enthalphy obtained from the water data, Case B shows about 11 MWs less enthalpy increase than Case D due to differences in mass content. This is close to the 12 MWs missing with the heat structures absent in the Case D calculation.

1985-10-22

6. RUN STATISTICS

The transient calculation model used with the base case RELAP5/Mod2 prediction for the FIX-II test No. 3027 was modelled by:

58	volumes
60	junctions
70	heat structures

The volumes number includes two pump components and five time dependent volumes and among the junctions there are two valve components and four time dependent junctions.

The computer efficiency is summarized in Table 7 from the Major Edit print outs, see also Plot B.34. The table also gives the number of time step reductions from requested time steps forced by the current transport limit in the interval from the previous Major Edit. Actually the requested maximum time steps, as input values, were set high, thereby forcing the code to establish its own time steps.

The transient calculation needs were:

computer time	CPU = 828.3-118.1=710.2 s
number of time steps	DT = 972-200=782
number of volumes	C = 58
transient real time	RT = 75. s

from which also a code efficiency factor of

$$\frac{\text{CPU} \times 10^3}{\text{C} \times \text{DT}} = 15.7$$

is obtained, compare Ref 3. The computer used was a Cyber 180-835.

1985-10-22

7. CONCLUSIONS

The calculation for the FIX-II No. 3027 split break and a calculation for the LOBI ISP-18 test carried out at the same time, were the first assessments done at Studsvik using the RELAP5/Mod2 code. As a lot of experience on preceeding RELAP codes had already been gained there were no particular problems in getting along with the RELAP5/Mod2. The difficulty with problems in a calculation like this, lies in making sure that the specifications for the two thousand lines of input are as correct as possible.

Although the results may seem to be credible from the calculations, there are some parameters which do cast doubt on the prediction quality. A key parameter among these being the pressure difference over the core which was underestimated. This example also emphasizes the problem of reading the information of coolant mass distribution in the experiment. In the experiment there were no in-system void measurements and the orifice mass flow measurements were also unreliable after flashing had begun. The cause of the lack of agreement in the core head therefore remains undetermined.

Important differences between experimental and calculated dryout times at various elevations were noted. This could have been caused by inability to predict the core inventory or by an inadequate dryout correlation. It is noted that dryout was calculated only for very high void fractions. It might therefore be suspected that the discrepancies are mainly caused by the dryout correlation.

In the present calculation, the RELAP5/Mod2 code was not faced with a core top spray. However,

1985-10-22

the condenser in-loop spray cooling caused trouble because the code is only capable of describing the condenser hydraulics by using the vertical slug flow regime available. Because of this the water content in the condenser was underestimated by a factor of about two.

1985-10-22

REFERENCES

1. Acceptance Criteria for Emergency Core Cooling Systems for Light-Water Cooled Nuclear Power Reactors, 10 CFR, Part 50 (Appendix K), Fed Regist, 39(3). (January 1974).
2. FABIC S and ANDERSEN P S
Plans for Assessment of Best Estimate LWR System Codes.
U.S. Nuclear Regulatory Commission
NUREG-0676.
3. ODAR, F and BESSETTE D E
Guidelines and Procedures for the International Thermal-Hydraulic Code Assessment and Applications Program (Draft).
U.S. Nuclear Regulatory Commission, 1985.
4. NILSSON, L and GUSTAFSSON, P-Å
FIX-II LOCA Blowdown and Pump Trip Heat Transfer Experiments, Summary report for phase 2: Description of experimental equipment.
STUDSVIK/NR-83/238, Parts 1, 2 and 3.
5. NILSSON, L et al
FIX-II - LOCA Blowdown and Pump Trip Heat Transfer Experiments. Experimental results from LOCA test No. 3027.
STUDSVIK/NR-84/485.
6. ROSDAHL, Ö and TANGEN, K
Numerical simulation of the FIX-II test 3025 (ISP-15) split-break LOCA using RELAP5/MOD 1. Post-test analysis
STUDSVIK/NR-83/330.
7. RANSOM, V H and WAGNER, R J
RELAP5/MOD 2 Code Manual
Volume 1: Code Structure Systems Models and Solution Methods.
Volume 2: Users Guide and Input Requirements.
EGG-SAAM-6377, EG & G Idaho, Inc.
April 1984.
8. ERIKSSON, J
Analysis of the FIX-II Split-Break Experiment (No 3031) using the RELAP5 code.
STUDSVIK/NR-84/396.

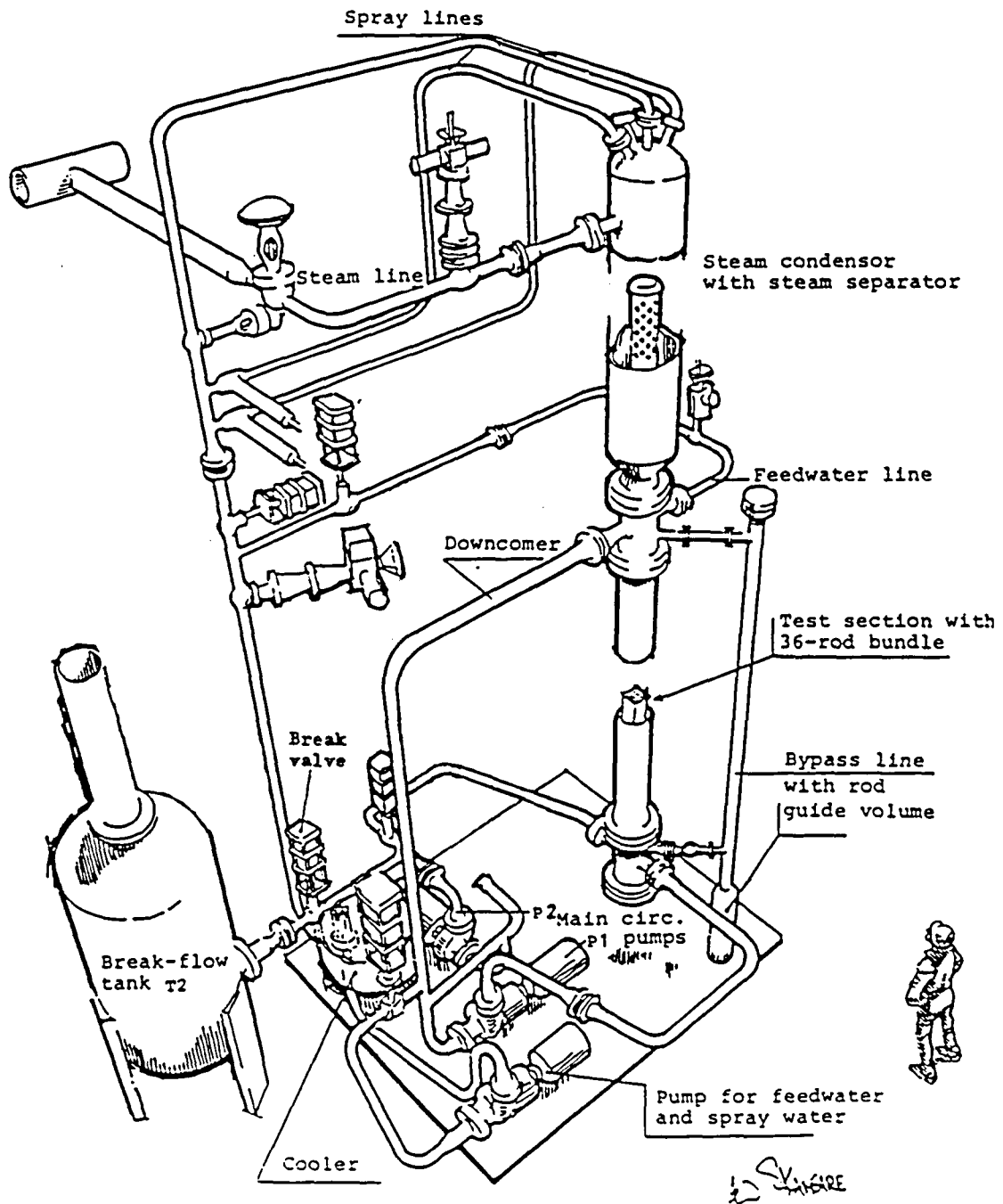


Figure 1

View of the FIX-II facility, condition for split break experiments.

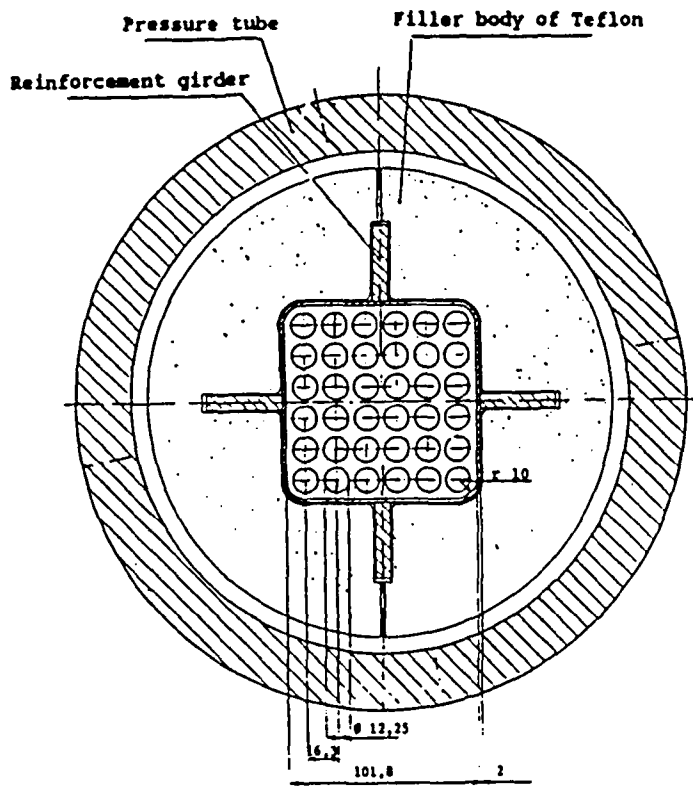


Figure 2.A

Cross section of pressure vessel and rod bundle

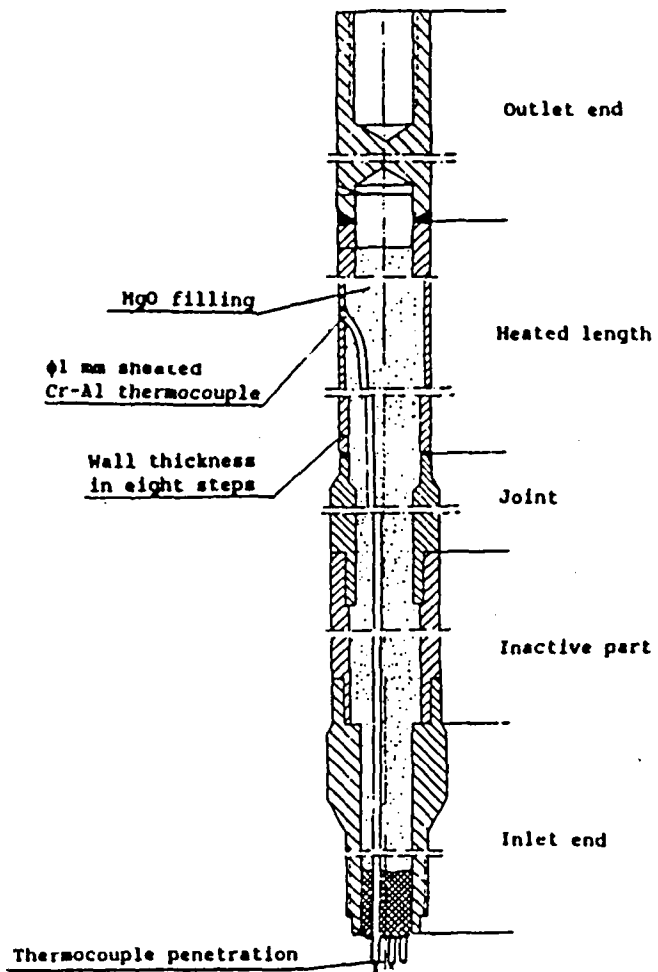


Figure 2.B

Design of a fuel rod simulator

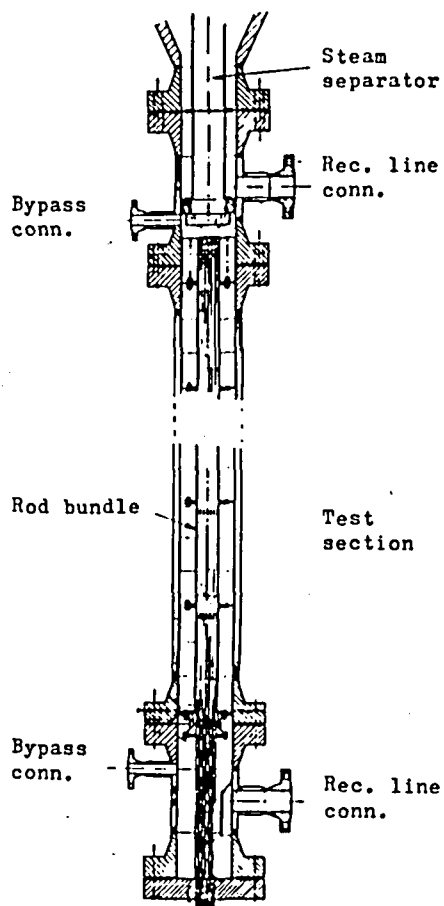


Figure 3.A

Lower plenum and core region

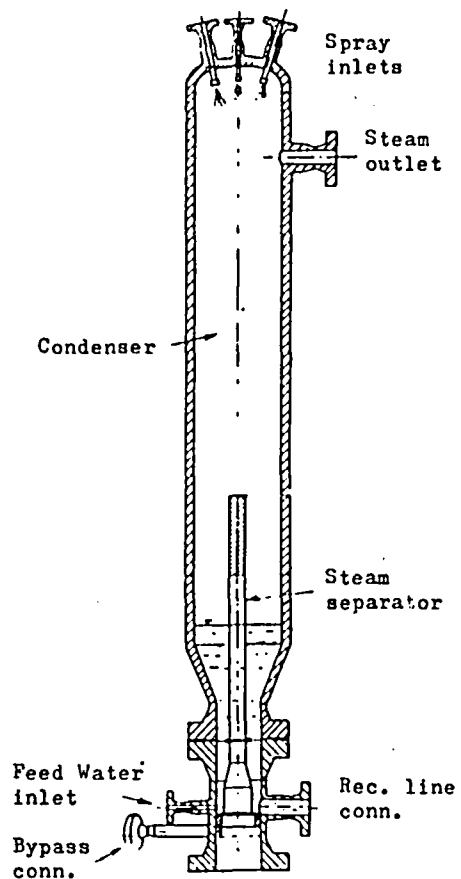


Figure 3.B

Steam separator and steam condenser

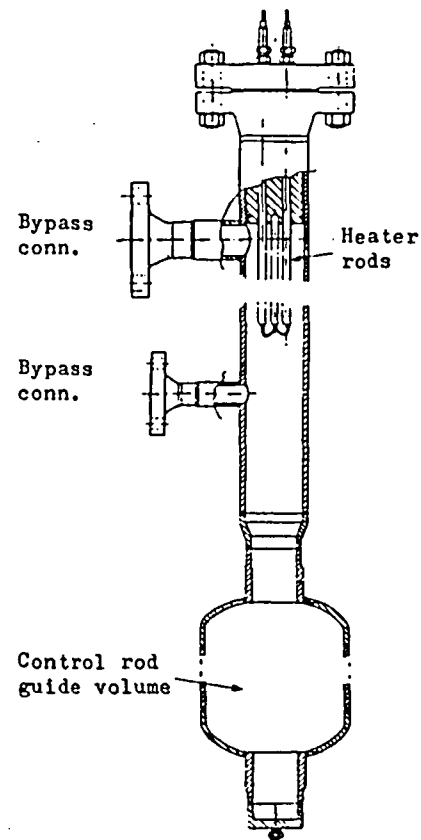


Figure 3.C

The external core bypass

1985-10-22

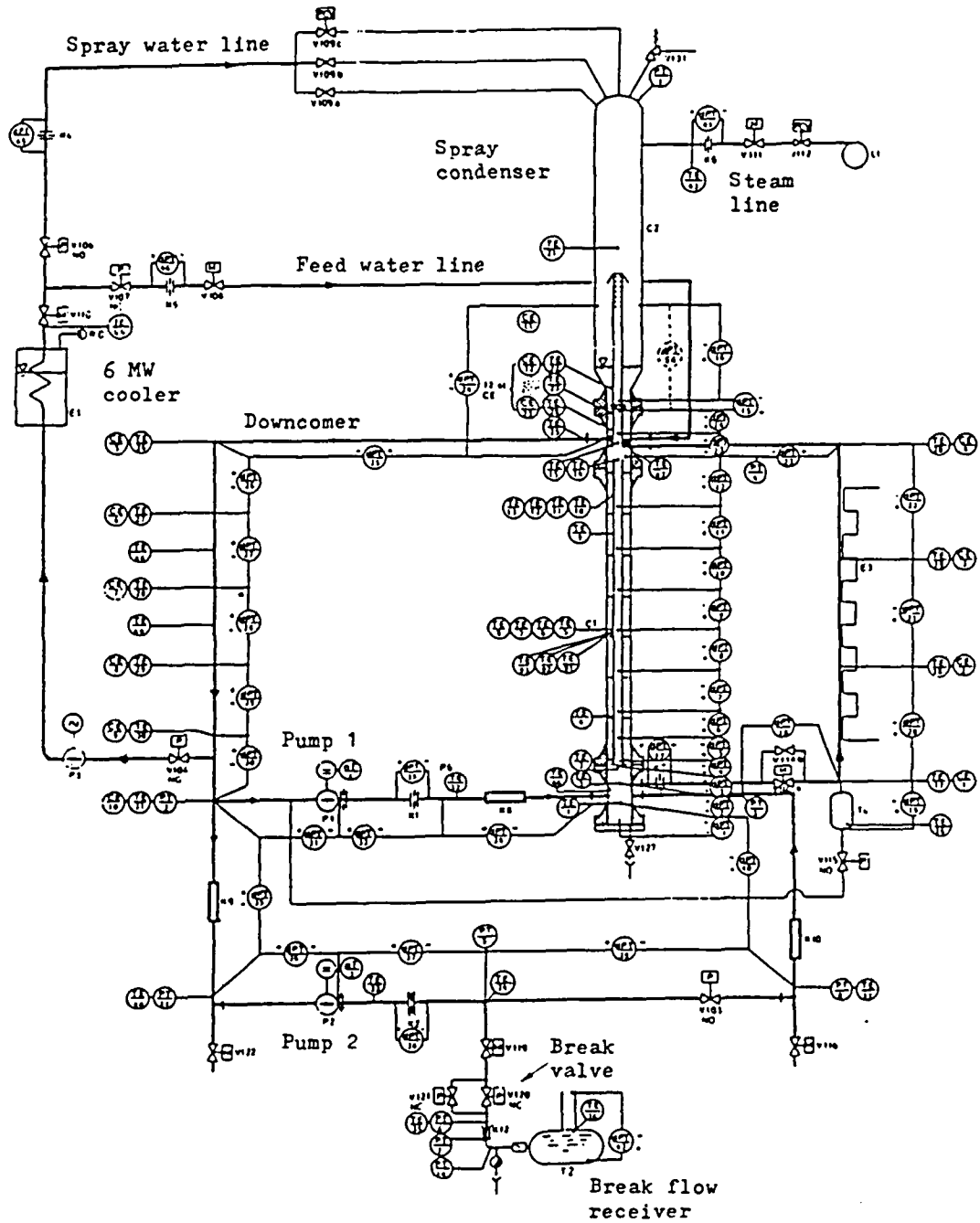


Figure 4

Instrumentation diagram for FIX-II

1985-10-22

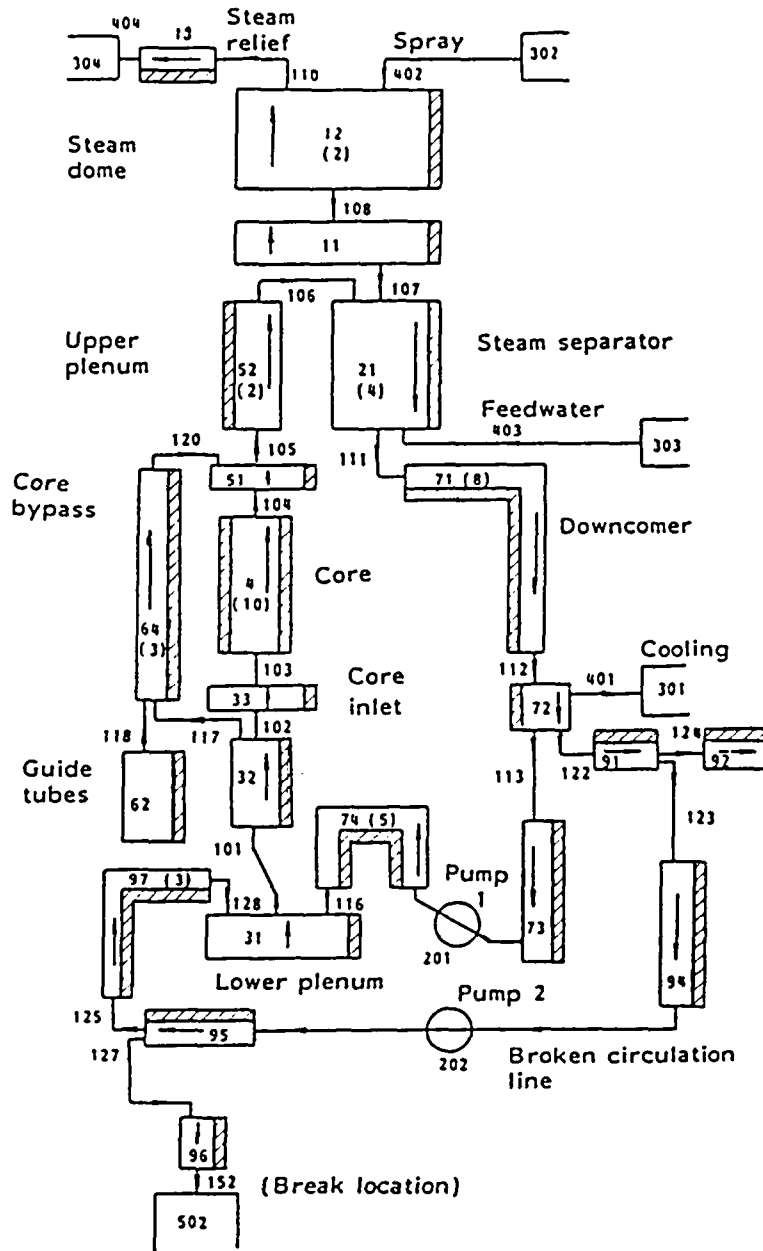


Figure 5

The nodalization diagram for FIX-II

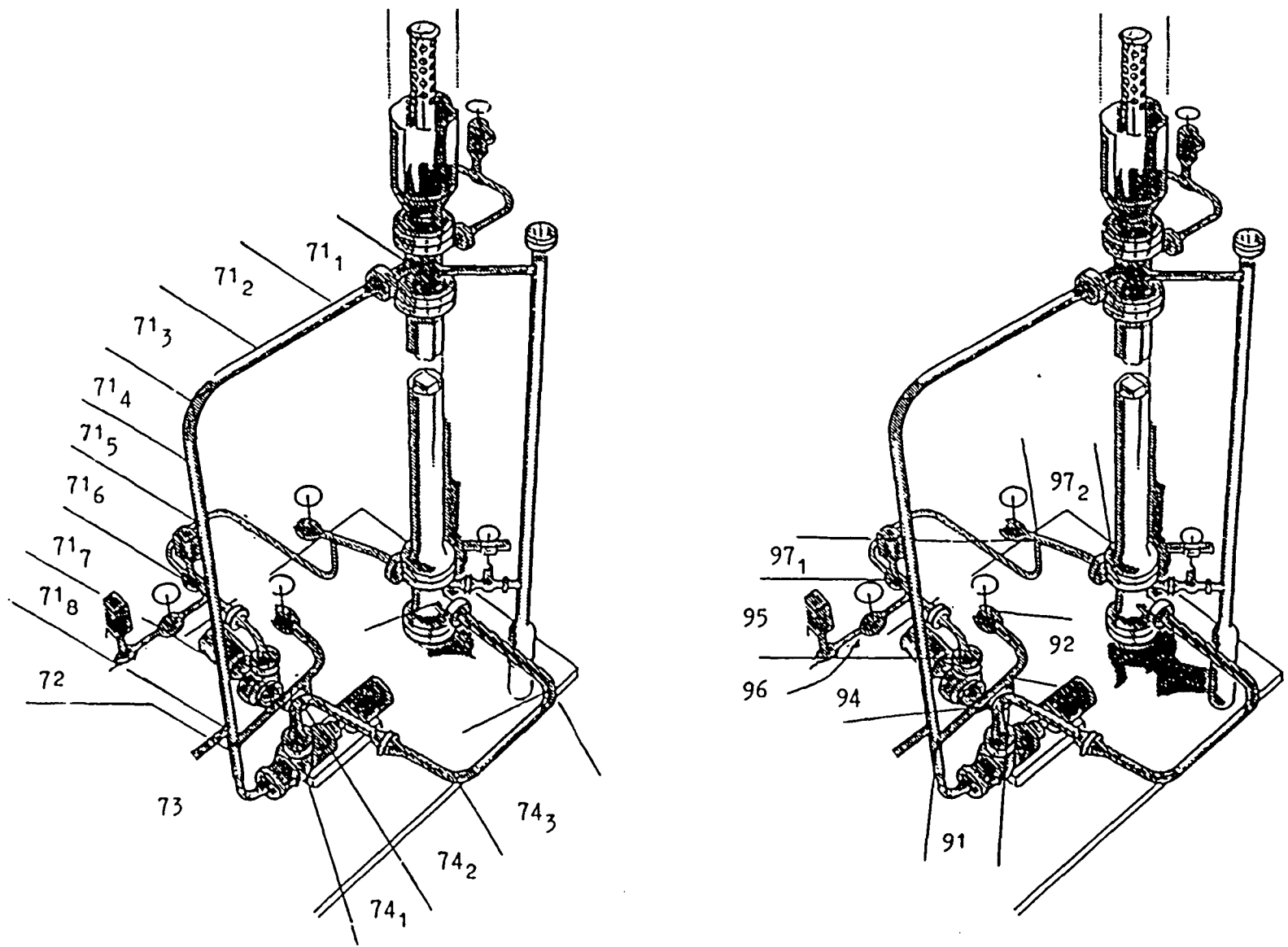


Figure 6

Nodalization of the recirculation lines

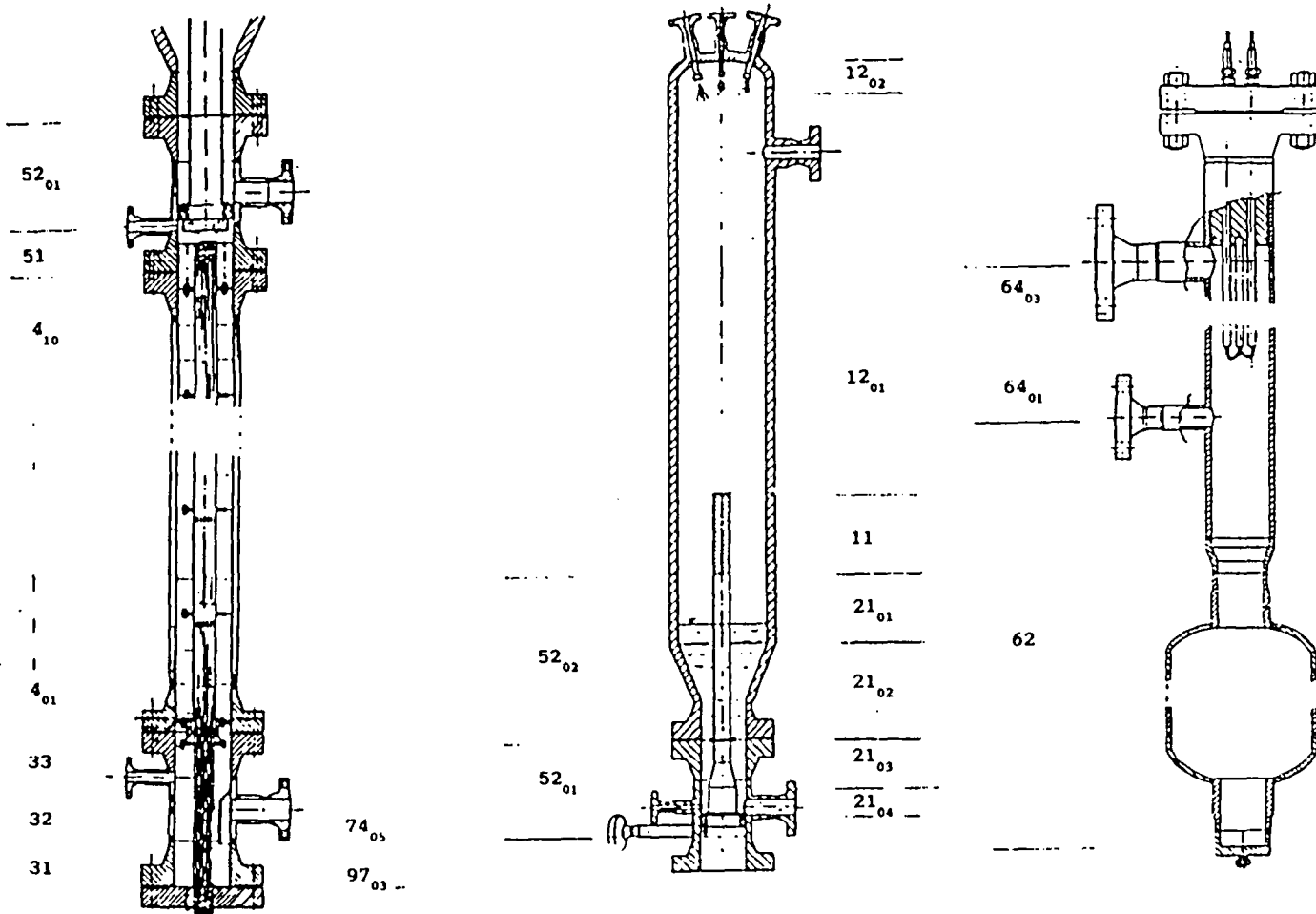


Figure 7

Nodalization of the main volumes of the FIX-II
(compare Figure 3).

1985-10-22

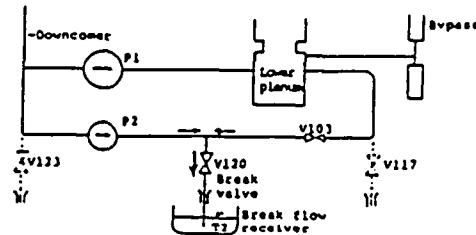
Table 1

The test matrix for the first FIX-II LOCA experimental period. Test No. 3027 is one matrix No. 2 experiment.

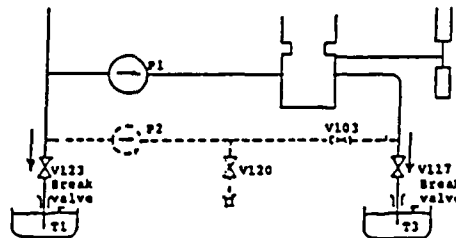
Test matrix No.	1	2	3	4	5	6
Break classification	Split breaks				Guillotine breaks	
Type of simulation (see Figure 17)	A				B	C
Break I.D. (mm)	12.0	12.0	15.0	30.5	16.0+ 21.6	21.6+ 21.6
Relative break area (%)*	31	31	48	200	155	200
Initial bundle power (MW) - hot channel - average	2.35	3.35	3.35	2.35	2.35	3.35

* Refers to the scaled down flow area of one main recirculation pipe in FIX-II compared with the Oskarshamn 2 reactor.

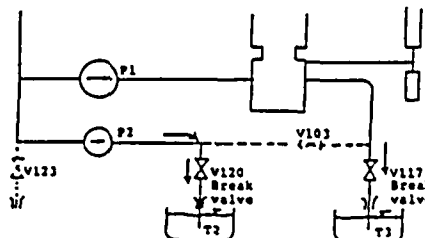
Break type A
Split break



Break type B
Simplified guillotine break



Break type C
Guillotine break



1985-10-22

Table 2.A

Evaluated measurement errors

Quantity	Probable error	Error corresponding to 95 % confidence level
Pressures	0.014 MPa	0.04 MPa
Fluid temperatures	1°C	2°C
Cladding temperatures	1.6°C	3.2°C
Small range differential pressures (5 to 7.5 kPa)	0.13 kPa	0.3 kPa
Medium range differential pressures (25 to 50 kPa)	0.22 kPa	0.5 kPa
High range differential pressures (100 to 700 kPa)	0.26 kPa	0.65 kPa

Table 2.B

Errors in derived quantities

Quantity	Probable error
Mass flow rate in orifice meter K1 (P1)	0.2 kg/s
Mass flow rate in orifice meter K2 (P2)	0.14 kg/s
Mass flow rate in orifice meter K6 (steam flow)	~10 % of actual value
Mass flow rate in orifice meter K7 (Bypass)	~10 % of actual value
Break mass flow rate	~10 % of actual value
Electric power to bundle and bypass heaters	1 % of max value

1985-10-22

Table 3

RELAP5/Mod 2 code features

COMPUTATION PROCESSING FEATURES

- Several problem type and execution control options as
 - a. steady state initialisation using fictitious structure heat capacities for faster convergence
 - b. transient calculation
 - c. strip type execution, to select requested parameters from a restart file
 - d. trip system, to decide on actions during calculation due to reaching specified conditions in calculation parameters.
 - e. ability to delete or add hydrodynamic components, structure components and control variables at a restart of calculation.

CLASSIFICATION OF HYDRODYNAMIC MODEL

- One-dimensional, with provisions for
 - a. choked flow model
 - b. abrupt area change model
 - c. cross flow junctions.
- Two-fluid, six equation, space-time numerical solution scheme.
- flow regime oriented field characteristics depending on mass flux and void fraction for
 - a. horizontal flow with bubbly, slug, mist and stratified fields
 - b. vertical flow with bubbly, slug, annular-mist (and stratified) fields
 - c. high mixing flow with bubbly and mist fields (for pumps).

1985-10-22

Table 3 con'tHYDRODYNAMIC COMPONENTS (Input systematics)

- Volume type components
 - a. single volume
 - b. pipe and annulus, for condensed input of several similar single volumes
 - c. time dependent volume, for defining a boundary source with a time dependent fluid state
 - d. branch, a volume capable of two or more connecting junctions at either end
 - e. pump, characterized by rated values for flow, head, torque, density and moment of inertia. The single phase homologous curve, two-phase multipliers and phase difference tables to model the dynamic pump behaviour
 - f. special system components for steam separator, jetmixer, turbine and accumulator.
- Junction type components
 - a. single junction
 - b. time dependent junction, for a time dependent junction flow with a time dependent or controlled flow state
 - c. cross-flow junction, to model a small cross flow, a tee branch or a small leak flow
 - d. valve, various operation characteristics available for check valve, trip valve, inertial valve and relief valve.

INTERPHASE CONSTITUTIVE EQUATIONS

- Interphase drag
 - a. steady drag due to viscous shear depending on flow regime. Semi-empirical mechanisms to describe flow regime transitions
 - b. dynamic drag due to virtual mass effect.
- Interphase mass and heat transfer depending on flow regime and the fluid fields to saturation temperature differences

1985-10-22

Table 3 con'tFLUID TO WALL CONSTITUTIVE EQUATIONS

- Wall friction due to wall shear effects formulated for flow regimes and based on a two-phase multiplier approach.
- Wall heat transfer depending on flow characteristics defined for
 - a. single-phase forced convection (Dittus-Boelter)
 - b. saturated nucleate boiling (Chen)
 - c. subcooled nucleate boiling (modified Chen)
 - d. critical heat flux (Biasi or modified Zuber)
 - e. transition film boiling (Chen)
 - f. film boiling (Bromley-Pomeranz and Dougall-Rohsenow)
 - g. condensation (partly Dittus-Boelter).
- Interfacial mass transfer at the wall depending on wall, fluid and saturation temperatures for
 - a. subcooled and saturated boiling
 - b. transition film and film boiling
 - c. condensation.

HEAT STRUCTURES

These may be rectangular, cylindrical or spherical in shape. The structure position is defined through component numbers of left and right hand side hydraulic components. A structure is physically defined by the geometry and the temperature dependent conductivity and volumetric heat capacity data. The structure model is further specified by the number of internal mesh points in the direction of heat flow.

CONTROL COMPONENTS

By these new (control) variables are defined from calculated parameters using algebra, standard functions, trip type operands or integrals.

Table 4

Initial conditions, measured for test No. 3027
and predicted (Data for test No. 3025 within
parenthesis).

		Test		Prediction
Pressure in the steam dome	MPa	6.96	(7.00)	6.98
Power to the 36-rod bundle (incl connections)	MW	3.425	(3.385)	3.385
Power to the bypass heaters	kW	65.7	(57.4)	57.4
Cooling power in the filler body space	kW	264	(196)	207
Mass flow rate through pump P1	kg/s	4.85	(4.56)	475
Mass flow rate through pump P2	kg/s	1.60	(1.55)	1.49
Mass flow rate in the bypass	kg/s	78	(.71)	.61
Mass flow rate in the 36-rod bundle	kg/s	5.67	(5.40)	5.62
Mass flow rate in the spray line	kg/s	5.10	(5.36)	5.36
Mass flow rate in the feed water line	kg/s	2.54	(2.49)	2.49
Temperature of water at the bundle inlet (TE2)	°C	267	(269)	268
Temperature of feed and spray water	°C	179	(181)	180
Water level in the spray condenser (Fig 6)	m	.791	(.815)	.825
Rotational speed of pump P1	/s	27.16	(25.46)	26.89
Rotational speed of pump P2	/s	35.57	(33.42)	35.32

Table 5

List of events in test No. 3027 and in prediction case A (Data for Test No. 3025 within parenthesis).

Event	Imposed action		Time (s)		Prediction
			System	reaction	
The break occurs (Valve V120 starts to open)	0	0		0	
Start of coast down of pump P1	0.0	(0.0)			0.0
Flow reversal in the samll RCL between break and LP			0.0	(0.0)	0.0
Start of power decay in rod bundle	0.0				0.0
Start of power decay in bypass heaters	0.1	(1.1)			0.0
The SRV starts to open	0.5	(0.4)			0.4
The SRV is fully open	1.0	(1.0)			1.0
The first dryout occurs (level 16 to 12, several rods)			1.2-2.2	(1.4)	not seen
The SRV starts to close	1.6	(1.6)			1.6
Minimum in steam dome pressure occurs (6.69 MPa)			1.9	(1.8)	1.8
The spray flow is closed	2.1	(1.8)			1.9
The feed water flow is closed	2.1	(1.9)			2.0
Valve V104 to the evaporation cooler is closed	2.1	(2.0)			2.0
The SRV is closed	2.5	(2.3)			2.3
Rewetting of the first dryout			3.5	(3.6)	not seen

Table 5 con't

Event	Imposed action		Time (s)	
			System reaction	Prediction
Maximum in steam domw pressure (7.31 MPa)			7.4	(7.8) 8.1
The SRV starts to open	12.0	(11.8)		12.3
The SRV is fully open	12.7-78.7	(12.3-75.3)		12.8
The water (two phase) level reaches lowermost part of the downcomer			14.1	(13.9) 13.5
Cavitation in pump P2 in the broken RCL			14.7	(14.7) 15.3
Flow reversal at the bundle inlet			15.0	15.4
Flow reversal in part of the intact RCL			24.4	(21.) 22.2
Flasning starts in the LP			23-24	(22.) 21.
Level swell (recovery) in lower and middle part of the downcomer			24-30	(23-31) 236-29.4
Flashing starts in the bypass guide tubes volume			24.3	(25) 25.6
Peak in teh bypass flow into the UP			25.3	(26.7) 20.4 and 31.0
Core uncoverly begins at rod level 16			45.	(49.) 63.
Core uncoverly begins at rod level 7			51.	(51.) 61.
Core uncoverly begins at rod level			67.	(62) not seen
Tripping of the bundle power (stop signal of test)			70.5	(75.2) 75.

Table 6

Main results measured for the test No. 3027 and predicted (Data for the test 3025 within parenthesis).

Simple-value parameter		Experiment		Prediction (Case A)
<u>Time to</u>				
- (first) dryout	(s)	1.2	(1.4)	-
- max rod temperature	"	2.7	(3.6)	-
- rewetting, max	"	3.5	(3.6)	-
- bundle uncoverly	"	45	(49)	62
- 2.0 MPa dome pressure	"	80.5	(79)	~ 78.5
- end of break discharge	"	78.5	(75.6)	75
<u>Dome pressure</u>				
- max after the break	(MPa)	7.31	(7.34)	7.35
- at end of break discharge	"	2.09	(2.15)	2.15
<u>Max break mass flow</u>				
- through break	(kg/s)	8.2	7.4	6.8
- through pump P2	"	~4.1	3.6	3.3
- from lower plenum	"	~4.5	-	3.5
<u>Integrated mass flow</u>				
- through break	(kg)	222	(214)	195
- through steam relief valve	"	40	(39.7)	39.8

Table 6 con't

<u>Simple-value parameter</u>		<u>Experiment</u>		<u>Prediction (Case A)</u>
<u>Max rod temperature</u>				
- during dryout	(°C)	360	(389)	-
- at end of break discharge	"	382	(352)	~303
<u>Position of max rod temp</u>				
- during dryout	(rod/level)	10/14	(16/14)	-
- at end of discharge	"	14/11	(22/7)	/5

Table 7

Run statistics data (Case A)

Transient time (s)	Computer CPU time (s)	Number of time steps	Number of reduced current	Number of reduced mass
-5	0.	0		
0	118.1	200	100*	0
10	229.1	384	90	0
20	227.6	455	19	0
30	353.9	533	7	1
40	437.1	612	6	0
50	517.6	695	13	2
60	569.3	759	11	0
70	766.8	928	1	63**
75	828.3	982	0	10

* All current limit time step reductions was caused by core flows

** Mass error limitation occuring in downcomer lower part

1985-10-22

Table 8

Parameters plotted and used in the assessment comparison.

COMPONENT	CONTINUOUS PARAMETER *	EXPERIMENT (IDENTIFIER)	PREDICTION (MINOR EDIT)	PLOT IDENTIF.		PLOT NO.
				EXP.	CALC.	
CORE	FLUID DENSITY, BOTTOM	***	RHO 04.01	RH1?		B. 1
	MASS FLOW RATE, INLET *	DPT 4	P 33.01 - P04.01	D 4	PD4?	B. 2
	HEATING POWER	X 801	CNTRLVAR 57	X801	HP1?	B. 3
	CLAD TEMPERATURE, LEVEL 1	TE 191, TE 206, TE 211, TE 246	HTTEMP 4.0100	TC 1	HT1?	B. 4
	-"- , LEVEL 3	TE 108, TE183, TE 243, TE 248	HTTEMP 4.0300	TC 3	HT2?	B. 5
	-"- , LEVEL 5	TE 202, TE 227, TE 232, TE 237, TE 252	HTTEMP 4.0400	TC 5	HT3?	B. 6
	-"- , LEVEL 9	TE 102, TE 137, TE 167, TE 172, TE 187, TE 197, TE 272	HTTEMP 4.0600	TC 9	HT4?	B. 7
	-"- , LEVEL 12	TE 118, TE 123, TE 128, TE 148, TE 223	HTTEMP 4.0700	TC12	HT5?	B. 8
	-"- , LEVEL 15	TE 175, TE 190, TE 275	HTTEMP 4.1000	TC15	HT6?	B. 9
	INLET TEMPERATURE	TE 3	TEMPF 33.01	T 3	TF1?	B.10
	OUTLET TEMPERATURE	TE 14	TEMPF 51.01	T 14	TF2?	B.11
	CORE INVENTORY *	DPT 5 + DPT 6+ DPT 7 + DPT 8+ DPT 9 + DPT 10+ DPT 11 + DPT 12	P 04.01- P 51.01 **	D CO	PDC?	B.12
	VESSEL	FLUID DENSITY, BOTTOM	***	RHO 31.01	RH2?	
DOWNCOMER MASS INVENTORY *		DPT 27 + DPT 28 + DPT 29 + DPT 30	P 71.03 - P 72.01 **	D DC	PDD?	B.14
LOWER PLENUM MASS INVENTORY *		DP 2 + DP3 - DP 1	P 31.01 - P 32.01 **	D LP	PDL?	B.15
UPPER PLENUM MASS INVENTORY *		DP 13 + DP 14	P 51.01 - P 52.01 **	D UP	PDU?	B.16
PRESSURE LOSS, S.S. ORIFICE		DP 56	P 52.01 - P 52.02	D 56	PDS?	B.17
UPPER PLENUM TEMPERATURE		TE 15	TEMPF 52.01	T 15	TF4?	B.18
DOWNCOMER TEMPERATURE, BOTTOM		TE 31	TEMPF 71.08	T 31	TF3?	B.19
LOWER PLENUM PRESSURE		PT 3	P 31.01	P 3	P 1?	B.20
UPPER PLENUM PRESSURE		PT 4	P 52.01	P 4	P 2?	B.21
MASS FLOW RATE, BYPASS		X 602	MFLOWJ 117	X602	MF1?	B.22

1985-10-22

COMPONENT	CONTINUOUS PARAMETER *	EXPERIMENT (IDENTIFIER)	PREDICTION (MINOR EDIT)	PLOT IDENTIF.		PLOT NO.
				EXP.	CALC.	
RECIRCULATION LINE	MASS FLOW RATE, I. L. PUMP (ORIFICE K1)	X 603	MFLOWJ 201.02	X603	MF2?	B.23
	MASS FLOW RATE, B. L. PUMP (ORIFICE K2)	X 604	MFLOWJ 202.02	X604	MF3?	B.24
	MASS FLOW RATE, B. L. VESSEL INLET (SPOOL PIECE K10)	X 610	MFLOWJ 97.02	X610	MF4?	B.25
SYSTEM	MASS INVENTORY	***	TMASS		MAT?	B.26
	MASS FLOW RATE, STEAM RELIEF	X 607	MFLOWJ 404	X607	MF5?	B.27
	HEAT LOSS, PASSIVES	***	CNTRLVAR 53		HL1?	B. 3
BREAK	FLUID DENSITY	***	RHO 96.01		RH3?	B.28
	MASS FLOW RATE	X 636	MFLOWJ 152	X636	MF6?	B.29
	MASS FLOW RATE, INTEGRATED	X 661	CNTRLVAR 55	X661	ML1?	B.30
	INLET TEMPERATURE	TE 34	TEMPF 96.01	T 34	TF5?	B.31
	INLET SUBCOOLING	***	TEMPG 96.01 - TEMPF 96.01		TSU?	B.32
	INLET PRESSURE	PT 6	P 96.01	P 6	P 3?	B.33
RELAP5/MOD2	COMPUTAION CPU TIME	***	CPUTIME		CPU?	B.34
	COMPUTATION MASS ERROR	***	EMASS		MAE?	B.35

* THE COMPARISON PARAMETERS ARE THOSE REPORTED AS DIRECTLY MEASURED
OR AS COMPUTED RESULTS FROM THE EXPERIMENT.
PRESSURE DIFFERENCE INSTEAD OF MASS FLOW RATE OR OF MASS INVENTORY.

** CORRECTIONS APPLIED TO RESUME THE CORRECT PRESSURE SENSOR LEVELS.

*** NO DATA AVAILABEL FROM THE EXPERIMENT.



1985-10-22

```

* INPUT FOR RELAPS/MO02
* FIX-11 SPLIT BREAK STEADY-STATE (PRECALCULATION)
* ****CHANGES BY DLC FOR 3027 SIMULATION, MARCH 85
* 24APR85 DLC CORE ROUGHNESS CHANGED TO 1E-4 FROM 0.0
* 24APR85 DLC JUNG 5201 W CHANGED FROM 2.34 TO 1.70
* 24APR85 DLC JUNG 103 KP CHANGED FROM 0.43 TO 0.34
* 24APR85 DLC ABOVE CHANGES MADE TO GET RS DP TO AGREE WITH 3027 DP
* ****CHANGE CARDS ADDED AT END OF DECK ****
* 100 0/0 POWER MEAN CORE CHANNEL
0000100 NEW STDY-ST
0000101 RUN
0000105 10. 20.
0000203 24.0 1.0E-6 0.0E-2 00001 3 100 1000
*
*
0000302 P 032010000 *PRESSURE LOWER PLENUM VOL 2
0000303 P 004010000 *PRESSURE CORE VOL 1
0000312 P 004100000 *PRESSURE CORE VOL 10
0000315 P 051010000 *PRESSURE UPPER PLENUM
0000316 P 011010000 *PRESSURE STEAM DOME VOL11
0000317 P 012010000 *PRESSURE STEAM DOME VOL12-1
0000318 P 021000000 *PRESSURE DC ANNULUS VOL4
0000320 CNTRLVAR 041 *LIQUID LEVEL IN DC ANNULUS
0000321 VLVAREA 000000117 *VALVE AREA BY-PASS INLET
0000331 VOIDG 004010000 *VOID CORE VOL 1
0000332 VOIDG 004020000 *VOID CORE VOL 2
0000333 VOIDG 004030000 *VOID CORE VOL 3
0000334 VOIDG 004040000 *VOID CORE VOL 4
0000335 VOIDG 004050000 *VOID CORE VOL 5
0000336 VOIDG 004060000 *VOID CORE VOL 6
0000337 VOIDG 004070000 *VOID CORE VOL 7
0000338 VOIDG 004080000 *VOID CORE VOL 8
0000339 VOIDG 004090000 *VOID CORE VOL 9
0000340 VOIDG 004100000 *VOID CORE VOL 10
0000341 VOIDG 064030000 *VOID BY-PASS OUTLET
0000342 VOIDG 052020000 *VOID RISER TOP
0000343 VOIDG 011010000 *VOID STEAM DOME VOL11
0000344 VOIDG 012010000 *VOID STEAM DOME VOL12-1
0000345 VOIDG 012020000 *VOID STEAM DOME VOL12-2
0000346 VOIDG 021010000 *VOID DC ANNULUS VOL1
0000347 VOIDG 021020000 *VOID DC ANNULUS VOL2
0000348 VOIDG 021030000 *VOID DC ANNULUS VOL3
0000349 VOIDG 021040000 *VOID DC ANNULUS VOL 4
0000350 VOIDG 064010000 *VOID BYPASS VOL1
0000351 VOIDG 062010000 *VOID GUID TUBE VOL
0000352 VOIDG 032010000 *VOID LOWER PLENUM VOL2
0000353 VOIDG 031010000 *VOID LOWER PLENUM VOL1
0000354 VOIDG 090010000 *VOID BREAK VOLUME
0000355 QUALS 013010000 *QUALITY STEAM LINE
0000356 VOIDG 073010000 *VOID PUMP P1 SUCTION LINE
0000357 VOIDG 094010000 *VOID PUMP P2 SUCTION LINE
0000359 MFLOWJ 404000000 *MASS FLOW STEAM VALVE
0000360 MFLOWJ 110000000 *MASS FLOW STEAM RELIEF
0000361 MFLOWJ 103000000 *MASS FLOW CORE INLET
0000362 MFLOWJ 004020000 *MASS FLOW CORE JUN 2
0000363 MFLOWJ 004030000 *MASS FLOW CORE JUN 4
0000364 MFLOWJ 004040000 *MASS FLOW CORE JUN 6
0000365 MFLOWJ 004000000 *MASS FLOW CORE JUN 8
0000366 MFLOWJ 104000000 *MASS FLOW CORE OUTLET
0000367 MFLOWJ 117000000 *MASS FLOW BY-PASS INLET
0000368 MFLOWJ 120000000 *MASS FLOW BY-PASS OUTLET
0000369 MFLOWJ 100000000 *MASS FLOW FROM RISER
0000370 MFLOWJ 107000000 *MASS FLOW FROM STEAM DOME VOL11
0000371 MFLOWJ 100000000 *MASS FLOW FROM STEAM DOME VOL12-1
0000372 MFLOWJ 012010000 *MASS FLOW FROM STEAM DOME VOL12-2
0000373 MFLOWJ 021010000 *MASS FLOW DC ANNULUS JUN 1
0000374 MFLOWJ 021020000 *MASS FLOW DC ANNULUS JUN 2
0000375 MFLOWJ 021030000 *MASS FLOW DC ANNULUS JUN 3
0000376 MFLOWJ 201020000 *MASS FLOW PUMP1 OUTLET
0000377 PMPVEL 000000201 *PUMP1 VELOCITY (RAD/S)
0000378 MFLOWJ -202020000 *MASS FLOW PUMP2 OUTLET
0000379 PMPVEL 000000202 *PUMP2 VELOCITY (RAD/S)
0000380 CNTRLVAR 53 *STRUCTURE HEAT LOSS
0000381 CNTRLVAR 54 *STRUCTURE HEAT LOSS INTEGRATED
0000382 CNTRLVAR 55 *INTEGRATED BREAK LOSS
0000383 CNTRLVAR 56 *BOX-HEAT LOSS
0000384 CNTRLVAR 57 *COR-POWER
0000385 CNTRLVAR 58 *RY-PASS POWER
0000386 CNTRLVAR 59 *TOTAL POWER
0000387 CNTRLVAR 113 *AUXIL. HEAT LOSS
0000388 CNTRLVAR 042 *LIQUID LEVEL IN UPPER PLENUM
0000389 CNTRLVAR 043 *LIQUID LEVEL IN CORE
0000390 CNTRLVAR 044 *LIQUID LEVEL IN LOWER PLENUM
0000391 CNTRLVAR 014 *FLOW DUAL CORE VOL5
0000392 CNTRLVAR 015 *FLOW DUAL CORE VOL6
0000393 CNTRLVAR 016 *FLOW DUAL CORE VOL7
0000394 CNTRLVAR 017 *FLOW DUAL CORE VOL8
0000395 CNTRLVAR 018 *FLOW DUAL CORE VOL9
0000396 CNTRLVAR 019 *FLOW DUAL CORE VOL10
*
* PUMP DUMMY TRIP
0000501 TIME 0 QT NULL 0 0. L *USED AT STEADY S
* BY-PASS VALVE TRIPS
0000502 MFLOWJ 117000000 QT NULL 0 0.601 N *STEADY STATE
0000503 MFLOWJ 117000000 LT NULL 0 0.599 N *STEADY STATE
* RUPTURE TRIPS
0000504 TIME 0 QT NULL 0 1000. L *STEADY STATE CAR
0000505 TIME 0 LT NULL 0 0. L
*
*
0110000 VOL11 ANNULUS
0110001 1
0110101 0.0 1
0110301 0.463 1
0110401 0.00970 1
0110601 90. 1
0110801 0. 0. 1
0111001 00 1
*
*
0120000 VOL12 PIPE
0120001 2
0120101 0.0 2
0120301 2.200 1 0.130 2
0120401 0.43200 1 0.02418 2
0120601 90. 2
0120801 0. 0. 2
0121001 00 1 01 2
0121101 1000 1
*
*
0130000 VOL13 SHGLVOL
0130101 0. 3.85% 0.01831 0. 90. 3.85% 0. 0. 00 *STEADY STATE CA
*
*
0210000 VOL21 ANNULUS
0210001 4

```

The steady state input

1985-10-22

```

0210101 0.0 4
0210201 0. 1 0.035137 2 0. 3
0210301 0.400 1 0.549 2 0.206 3 0.156 4
0210401 0.07500 1 0.04205 2 0.01250 3 0.00527 4
0210601 -90. 4
0210801 0. 0.3960 1 0. 0.2692 2 0. 0.1516 3 0. 0.1117 4
0210901 0. 0. 1 0.96 0.96 2 0. 0. 3
0211001 00 0
0211101 1000 3
*****
0641101 1000 2
*
* BROKEN CIRCULATION LINE
*****
0710000 VOL71 PIPE
0710001 0
0710101 0.0 0
0710301 0.9907 3 0.0198 0
0710401 0.009146 3 0.007726 0
0710601 0. 3 -90. 0
0710801 0. 0. 0
0710901 0.00 0.00 2 0.10 0.10 3 0.00 0.00 7
0711001 00 0
0711101 1000 7
*****
0720000 VOL72 BRANCH
0720001 0
0720101 0. 0.300 0.002025 0. -90. -0.300 0. 0. 00
*****
0730000 VOL73 SINGL VOL
0730101 0. 1.240 0.01129 0. -90. -0.750 0. 0. 00
*****
0740000 VOL74 PIPE
0740001 5
0740101 0.00 5
0740201 0. 1 0.001304 2 0. 4
0740301 0.553 1 1.117 2 2.076 3 1.500 4 0.215 5
0740401 0.00360 1 0.00475 2 0.01225 3 0.00823 4 0.00226 5
0740601 90. 1 0. 4 -90. 5
0740801 0. 0. 4 0. 0.0015 5
0740901 0.17 0.17 1 0.79 0.79 2 0.22 0.22 3 1.00 1.00 4
0741001 00 5
0741101 1000 1 1000 2 1000 3 1000 4
*****
0620000 VOL62 SINGL VOL
0620101 0. 1.221 0.03227 0. -90. -1.221 0. 0. 00
*****
0640000 VOL64 PIPE
0640001 3
0640101 0.0 3
0640301 1.467 1 1.335 2 1.308 3
0640401 0.01181 1 0.00963 2 0.01157 3
0640601 90. 3
0640801 0. 0.0690 1 0. 0.0672 2 0. 0.0674 3
0640901 0.00 0.00 2
0641001 00 3
*****
0910000 VOL91 BRANCH
0910001 0
0910101 0. 1.246 0.00570 0. 0. 0. 0. 0. 00
*****
0920000 VOL92 SINGL VOL
0920101 0. 1.339 0.00500 0. 0. 0. 0. 0. 00
*****
0940000 VOL94 SINGL VOL
0940101 0. 1.100 0.00256 0. -45. -0.620 0. 0. 00
*****
0950000 VOL95 BRANCH
0950001 0
0950101 0. 1.699 0.00336 0. 14.3 0.417 0. 0. 00
*****
0960000 VOL96 BRANCH
0960001 0
0960101 0. 1.475 0.00629 0. 0. 0. 0. 0. 00
*****
0970000 VOL97 PIPE
0970001 3
0970101 0.0 3
0970301 2.709 1 1.422 2 0.215 3
0970401 0.00530 1 0.00757 2 0.00226 3
0970601 5.0 1 0. 2 -90. 3
0970701 0.261 1 0. 2 -0.215 3
0970801 0. 0. 2 0. 0.006042 3
0970901 1.43 1.43 1 1.00 1.00 2
0971001 00 3
0971101 0000 1 0000 2
*****
2010000 PUMP1 PUMP
2010101 0. 0.750 0.01010 0. 16.4 0.263 0
2010108 073010000 0.00427 0.17 0.37 0000
2010109 074000000 0.000900 3.00 1.00 0000
2010201 1 4.56 0. 0.
2010202 1 4.56 0. 0.
2010301 0 0 0 -1 0 0 0
2010302 303.69 0.540354 0.0383 50. 81.7 1. 1000.
2010303 0. 0. 0. 0.
* NYA HOMOLOGA PUMPRURVOR. DATA KOMMEN FRÅN ASEA-ATOMS GÖBLIN-BER.
* TORQUE-KURVORNA SÄRNAR REJTYDELSE I DETTA FALL OCH HÄR DÄRFÖR INTE
* RÖNTHULLERATS, KOLLAN FÖR EN DEL DATA NR ÖKAND.
*011100 1 1
*011101 0.00+1.181 0.27+1.100 0.47+1.100
*011102 0.04+1.170 1.00+1.000
*011200 2 1
*****
2011201 0.00 0.04 0.09 0.07 0.19 0.09 1.00 1.00
2011202 0.30 0.92 0.59 0.962 0.00 0.99
2011300 1 2
2011301 0.0+0.560 0.41+0.16 0.51+0.05 0.76+0.48
2011302 1.00+1.00
2011400 2 2
2011401 0.0+1.16 0.5+0.00 0.60+0.30 1.00+1.00
2011500 1 3
2011501 -1.00+2.00 -0.95+1.81 -0.62+1.52 -0.50+1.39
2011600 1 4
2011601 -1.00+2.00 -0.79+1.53 -0.63+1.25 -0.30+0.93
2011602 0.00+0.72
2011700 2 3
2011701 -1.00+3.31 -0.83+2.70 -0.60+2.29 -0.56+1.95
2011702 -0.37+1.49 -0.22+1.19 -0.10+0.99 0.00+0.04
2011800 2 4
2011801 -1.00+3.31 -0.79+2.70 -0.59+2.37 -0.41+2.04
2011802 -0.21+1.78 0.00+1.55
* TWO PHASE MULTIPLIER TABLES
2013000 0
2013001 0.0+0.0 0.1+0.0 0.15+0.05 0.24+0.0 0.3+0.06 0.4+0.08
2013002 0.6+0.97 0.8+0.0 0.9+0.8 0.96+0.5 1.0+0.0
2013100 0
2013101 0.0+0.0 0.1+0.0 0.15+0.05 0.24+0.0 0.3+0.06 0.4+0.08
2013102 0.6+0.97 0.8+0.0 0.9+0.8 0.96+0.5 1.0+0.0
* TWO PHASE DIFFERENCE FOR PUMP HEAD (SEMI SCALE)
2014100 1 1
2014101 0.0+0.0 0.1+0.03 0.2+1.09 0.5+1.02 0.7+1.01 0.9+0.94 1.0+1.0
2014200 1 2
2014201 0.0+0.0 0.1+0.04 0.2+0.0 0.3+0.1 0.4+0.21 0.8+0.67
2014202 0.9+0.00 1.0+1.0
2014300 1 3
2014301 -1.0+1.16 -0.9+1.24 -0.8+1.77 -0.7+2.36 -0.6+2.79
2014302 -0.5+2.91 -0.4+2.67 -0.25+1.69 -0.1+0.5 0.0+0.0
2014400 1 4
2014401 -1.0+1.16 -0.9+0.70 -0.8+0.5 -0.7+0.31 -0.6+0.17
2014402 -0.5+2.00 -0.35+0.8 -0.2+0.05 -0.1+0.00 0.0+0.11
* TWO PHASE DIFFERENCE FOR PUMP TORQUE IN SINGLE PHASE, WHICH MEANS
* THAT FULLY DEGRADED TORQUE IS ZERO!
2016000 2 1
2016001 0.00 0.04 0.09 0.07 0.19 0.09
2016002 0.30 0.92 0.59 0.962 0.00 0.99
2016100 2 2
2016101 0.0+1.16 0.5+0.00 0.60+0.30 1.00+1.00
2016102 2 3
2016103 -1.00+3.31 -0.83+2.70 -0.60+2.29 -0.56+1.95
2016104 -0.37+1.49 -0.22+1.19 -0.10+0.99 0.00+0.04
2016200 2 4
2016201 -1.00+3.31 -0.79+2.70 -0.59+2.37 -0.41+2.04
2016202 -0.21+1.78 0.00+1.55
** PUMP1 REGULATOR
2016100 501 CNTRLVAR 003 *STEADY STATE CAMU
2016101 0. 0. 1000. 1000. *STEADY STATE CAMU
** PUMP1 CONTROL SYSTEM
20500100 MASSDIFF1 SUM 100. 0. *STEADY STATE CAMU
20500101 4.56 -1.0 WLOWJ 201020000 *STEADY STATE CA
20500200 INTEGRAL1 INTFORAL 1. 0. 0 *STEADY STATE CAMU

```


1985-10-22

1200101 097010000 031010000 0. 0.00 0.00 0100
1200201 1 1.55 0. 0. 0. 0.00

* COOLING SYSTEM

3010000 COOLING TMDPVOL
3010101 0.003959 1. 0. 0. 0. 0. 0. 10
3010200 2
3010201 0. 7000000. 0.

4040101 013010000 304000000 0. 0. 0. 1000 *STEADY S
4040201 1 0. 0. 0. *STEADY STATE CARD

4010000 COOLING TMDPJUM
4010101 072000000 301000000 0.
4010200 1 504
4010201 0. 7.85 0. 0. 1.70 7.85 0. 0. 2.0 0. 0. 0.

* DUMP VOLUMES

5020000 DUMP3 TMDPVOL
5020101 1.00 1.00 0. 0. 0. 0. 0. 0. 00
5020200 2
5020201 0. 100000. 1.0

3020000 SPRAYFLOW TMDPVOL
3020101 0.002525 1. 0. 0. 90. 1. 0. 0.02576 10
3020200 3
3020201 0. 7500000. 454.0

* SPLIT RUPTURE IN CIRCULATION LINE

1520000 BREAK VALVE
1520101 096010000 502000000 0.0001131 0. 0. 0100 0.85 0.85 *
1520201 1 0. 0. 0.
1520300 MTRVLV
1520301 0000504 0000505 5.00 0.0 *OPENING TIME .20 SEC

4020000 SPRAYFLOW TMDPJUM
4020101 302000000 021010000 0.
4020200 1 504
4020201 0. 5.36 0. 0. 1.65 5.36 0. 0. 1.9 0. 0. 0.

* HEAT STRUCTURES

14010000 1 7 2 1 0. * CORE
14010100 0 1
14010101 4 0.004725 2 0.006125
14010201 1 4 -2 6
14010301 0.0 4 1.0 6
14010400 0
14010401 570. 7
14010501 0 0 0 1 13.248 1
14010601 004010000 0 1 1 13.248 1
14010701 1 0.0764 0. 0. 1
14010901 10 0.01742 0. 0. 1
14020000 1 7 2 1 0.
14020100 0 1
14020101 4 0.005175 2 0.006125
14020201 1 4 -2 6
14020301 0.0 4 1.0 6
14020400 4010
14020501 0 0 0 1 13.248 1
14020601 004020000 0 1 1 13.248 1
14020701 1 0.1030 0. 0. 1
14020901 10 0.01742 0. 0. 1
14030000 1 7 2 1 0.
14030100 0 1
14030101 4 0.005275 2 0.006125
14030201 1 4 -2 6
14030301 0.0 4 1.0 6
14030400 4010
14030501 0 0 0 1 13.248 1
14030601 004030000 0 1 1 13.248 1
14030701 1 0.1130 0. 0. 1
14030901 10 0.01742 0. 0. 1
14040000 0 1 7 2 1 0.
14040100 0 1
14040101 4 0.005375 2 0.006125
14040201 1 4 -2 6
14040301 0.0 4 1.0 6
14040400 4010
14040501 0 0 0 1 13.248 1
14040601 004040000 0 1 1 13.248 1
14040701 1 0.0877 0. 0. 1
14040901 10 0.01742 0. 0. 1
14050000 1 7 2 1 0.
14050100 0 1
14050101 4 0.004975 2 0.006125
14050201 1 4 -2 6
14050301 0.0 4 1.0 6
14050400 4010
14050501 0 0 0 1 13.248 1
14050601 004050000 0 1 1 13.248 1
14050701 1 0.1190 0. 0. 1
14050901 10 0.01742 0. 0. 1
14060000 1 7 2 1 0.
14060100 0 1
14060101 4 0.004975 2 0.006125
14060201 1 4 -2 6
14060301 0.0 4 1.0 6
14060400 4010
14060501 0 0 0 1 13.248 1
14060601 004060000 0 1 1 13.248 1
14060701 1 0.1133 0. 0. 1
14060901 10 0.01742 0. 0. 1
14070000 1 7 2 1 0.
14070100 0 1
14070400 4010
14070501 0 0 0 1 13.248 1
14070601 004070000 0 1 1 13.248 1
14070701 1 0.1130 0. 0. 1
14070901 10 0.01742 0. 0. 1
14080000 1 7 2 1 0.
14080100 4020
14080400 4010
14080501 0 0 0 1 13.248 1
14080601 004080000 0 1 1 13.248 1
14080701 1 0.1024 0. 0. 1
14080901 10 0.01742 0. 0. 1
14090000 1 7 2 1 0.
14090100 0 1
14090101 4 0.004975 2 0.006125
14090201 1 4 -2 6
14090301 0.0 4 1.0 6
14090400 4010
14090501 0 0 0 1 13.248 1
14090601 004090000 0 1 1 13.248 1
14090701 1 0.0877 0. 0. 1
14090901 10 0.01742 0. 0. 1
14100000 1 7 2 1 0.
14100100 0 1
14100101 4 0.004975 2 0.006125
14100201 1 4 -2 6
14100301 0.0 4 1.0 6
14100400 4010
14100501 0 0 0 1 13.248 1
14100601 004100000 0 1 1 13.248 1
14100701 1 0.0514 0. 0. 1
14100901 10 0.01742 0. 0. 1
10440000 1 7 2 1 0. * BY MASS
10440100 0 1
10440101 1 0.006125

3030000 SUBCOOLING TMDPVOL
3030101 0.000511 1. 0. 0. 0. 0. 0. 10
3030200 3
3030201 0. 7500000. 454.0

4030000 SUBCOOLING TMDPJUM
4030101 303000000 021010000 0.
4030200 1 504
4030201 0. 2.4900 0. 0. 1.9 2.4900 0. 0. 2.0 0. 0. 0.

* STEAM RELIEF

3040000 RELIEF TMDPVOL
3040101 0.00036 1. 0. 0. 90. 1. 0. 0. 00 *STEADY STATE
3040200 2
3040201 0. 7000000. 1.0 *STEADY STATE CARD

*OLD MODEL
*OLD MODEL
*OLD MODEL
*OLD MODEL
*OLD MODEL
*OLD MODEL
*OLD MODEL

4040000 DOMECTRL SWOLJUM *STEADY STATE CARD

STUDSVIK ENERGITEKNIK AB

STUDSVIK/NR-85/99 Appendix A.5

1985-10-22

10640201 2 1
 10640301 1.0 1
 10640400 0
 10640401 570. 2
 10640501 0 0 0 1 2.67 1
 10640601 064010000 0 1 1 2.67 1
 10640701 2 0.25 0. 0. 1
 10640901 0 0. 0. 0. 1
 * MYDR DIA IN HEAT AND MYDR STRUCTURE THE SAME
 10650000 1 2 2 1 0.
 10650100 0640
 10650400 0640
 10650501 0 0 0 1 2.67 1
 10650601 064020000 0 1 1 2.67 1
 10650701 2 0.40 0. 0. 1
 10650901 0 0.01742 0. 0. 1
 10660000 1 2 2 1 0.
 10660100 0640
 10660400 0640
 10660501 0 0 0 1 2.67 1
 10660601 064030000 0 1 1 2.67 1
 10660701 2 0.27 0. 0. 1
 10660901 0 0.01742 0. 0. 1

* BOX WALL TO ACCOUNT FOR HEAT LOSSES
 14000000 10 2 1 1 0.
 14000100 0 1
 14000101 1 0.002
 14000201 3 1
 14000301 0. 1
 14000401 450. 1
 14000402 540. 2
 14000501 -401
 14000601 004010000 010000 -1 3400 0 0.15 10
 14000701 0 0. 0. 10 0 0.15 10
 14000901 0 0. 0. 10

* GENERAL TABLE GIVING HEAT TRANSFER COEFF. AT OUTSIDE OF BOX WALL.

20240000 MTC-1
 20240001 0. 1.7213E3 * MTC DETERMINED TO GIVE HEAT LOSS OF APP.

* GENERAL TABLES GIVING THE TEMPERATURES AT THE OUTSIDE OF THE
 * BOX WALL. TEMPERATURE IS SUPPOSED TO VARY LINEARLY BETWEEN 403 K
 * AT INLET TO 493 K AT OUTLET.

20240100 TEMP
 20240101 0. 407.5
 *
 20240200 TEMP
 20240201 0. 416.5
 *
 20240300 TEMP
 20240301 0. 425.5
 *
 20240400 TEMP
 20240401 0. 434.5

20240500 TEMP
 20240501 0. 443.5
 *
 20240600 TEMP
 20240601 0. 452.5
 *
 20240700 TEMP
 20240701 0. 461.5
 *
 20240800 TEMP
 20240801 0. 470.5
 *
 20240900 TEMP
 20240901 0. 479.5
 *
 20241000 TEMP
 20241001 0. 488.5
 *
 13100000 1 4 1 1 0.00
 13100100 0 2
 13100101 0.005 1 0.015 2 0.00 3
 13100201 3 3
 13100301 -0.3
 13100401 560. 4
 13100501 32010000 0 1 0 .179 1
 13100601 -13 0 3014 0 .179 1
 13100701 0 .0 .0 .0 1
 13100801 0 .0 .0 .0 1
 *
 13200000 1 4 2 1 .132
 13200100 0 2
 13200101 0.005 1 0.015 2 0.01 3
 13200201 3 3
 13200301 -0.3
 13200401 560. 4
 13200501 32010000 0 1 1 .325 1
 13200601 -13 0 3014 1 .325 1
 13200701 0 .0 .0 .0 1
 13200801 0 .0 .0 .0 1
 *
 13300000 1 4 2 1 .132
 13300100 0 2
 13300101 0.005 1 0.015 2 0.03 3
 13300201 3 3
 13300301 -0.3
 13300401 560. 4
 13300501 33010000 0 1 1 .271 1
 13300601 -13 0 3014 1 .271 1
 13300701 0 .0 .0 .0 1
 13300801 0 .0 .0 .0 1
 *
 15100000 1 3 2 1 .132
 15100100 0 1
 15100101 2 .162
 15100201 3 2
 15100301 .0 2

15100401 560. 3
 15100501 51010000 0 1 1 .179 1
 15100601 -13 0 3014 1 .179 1
 15100701 0 .0 .0 .0 1
 15100801 0 .0 .0 .0 1
 *
 15210000 1 3 2 1 .063
 15210100 0 1
 15210101 2 .065
 15210201 3 2
 15210301 .0 2
 15210401 560. 3
 15210501 52010000 0 1 1 .437 1
 15210601 0 0 0 1 .437 1
 15210701 0 .0 .0 .0 1
 15210801 0 .0 .0 .0 1
 *
 15220000 1 3 2 1 .050
 15220100 0 1
 15220101 2 .052
 15220201 3 2
 15220301 .0 2
 15220401 560. 3
 15220501 52020000 0 1 1 .953 1
 15220601 0 0 0 1 .953 1
 15220701 0 .0 .0 .0 1
 15220801 0 .0 .0 .0 1
 *
 11100000 1 4 2 1 .250
 11100100 0 2
 11100101 0.005 1 0.015 2 0.033 3
 11100201 3 3
 11100301 .0 3
 11100401 560. 4
 11100501 11010000 0 1 1 .458 1
 11100601 -13 0 3014 1 .458 1
 11100701 0 .0 .0 .0 1
 11100801 0 .0 .0 .0 1
 *
 11210000 1 4 2 1 .250
 11210100 0 2
 11210101 0.005 1 0.015 2 0.033 3
 11210201 3 3
 11210301 .0 3
 11210401 560. 4
 11210501 12010000 0 1 1 2.200 1
 11210601 -13 0 3014 1 2.200 1
 11210701 0 .0 .0 .0 1
 11210801 0 .0 .0 .0 1
 *
 11220000 1 4 1 1 0.00
 11220100 0 2
 11220101 0.005 1 0.015 2 0.033 3
 11220201 3 3
 11220301 .0 3
 11220401 560. 4
 11220501 12020000 0 1 0 .400 1
 11220601 -13 0 3014 0 .400 1

STUDSVIK ENERGITEKNIK AB

STUDSVIK/NR-85/99 Appendix A.6
1985-10-22

11220701 0 .0 .0 .0 1
11220801 0 .0 .0 .0 1
*
12110000 1 4 2 1 .250
12110100 0 2
12110101 0.005 1 0.015 2 0.033 3
12110201 3 3
12110301 .0 3
12110401 560. 4
12110501 21010000 0 1 1 .400 1
12110601 -13 0 3014 1 .400 1
12110701 0 .0 .0 .0 1
12110801 0 .0 .0 .0 1
*
12120000 1 4 2 1 .170
12120100 0 2
12120101 0.005 1 0.015 2 0.033 3
12120201 3 3
12120301 .0 3
12120401 560. 4
12120501 21020000 0 1 1 .549 1
12120601 -13 0 3014 1 .549 1
12120701 0 .0 .0 .0 1
12120801 0 .0 .0 .0 1
*
12130000 1 4 2 1 .132
12130100 0 2
12130101 0.005 1 0.015 2 0.01 3
12130201 3 3
12130301 .0 3
12130401 560. 4
12130501 21030000 0 1 1 .286 1
12130601 -13 0 3014 1 .286 1
12130701 0 .0 .0 .0 1
12130801 0 .0 .0 .0 1
*
12140000 1 4 2 1 .132
12140100 0 2
12140101 0.005 1 0.015 2 0.01 3
12140201 3 3
12140301 .0 3
12140401 560. 4
12140501 21040000 0 1 1 .146 1
12140601 -13 0 3014 1 .146 1
12140701 0 .0 .0 .0 1
12140801 0 .0 .0 .0 1
*
17100000 0 3 2 1 .0540
17100100 0 1
17100101 2 .0707
17100201 3 2
17100301 .0 2
17100401 560. 3
17100501 71010000 010000 1 1 0.99A 3
17100502 71040000 010000 1 1 0.820 A
17100601 -13 0 3014 1 0.99A 3
17100602 -13 0 3014 1 0.820 A
17100701 0 .0 .0 .0 0

17100801 0 .0 .0 .0 0
*
17200000 1 3 2 1 .0540
17200100 0 1
17200101 2 .0707
17200201 3 2
17200301 .0 2
17200401 560. 3
17200501 72010000 0 1 1 .300 1
17200601 -13 0 3014 1 .300 1
17200701 0 .0 .0 .0 1
17200801 0 .0 .0 .0 1
*
17300000 1 3 2 1 .0540
17300100 0 1
17300101 2 .0707
17300201 3 2
17300301 .0 2
17300401 560. 3
17300501 73010000 0 1 1 .716 1
17300601 -13 0 3014 1 .716 1
17300701 0 .0 .0 .0 1
17300801 0 .0 .0 .0 1
*
17400000 4 3 2 1 .0369
17400100 0 1
17400101 2 .0445
17400201 3 2
17400301 .0 2
17400401 560. 3
17400501 74010000 0 1 1 .573 1
17400502 74020000 0 1 1 1.117 2
17400503 74030000 0 1 1 2.874 3
17400504 74040000 0 1 1 1.580 4
17400601 -13 0 3014 1 .573 1
17400602 -13 0 3014 1 1.117 2
17400603 -13 0 3014 1 2.874 3
17400604 -13 0 3014 1 1.580 4
17400701 0 .0 .0 .0 4
17400801 0 .0 .0 .0 4
*
17450000 1 3 1 1 0.00
17450100 0 1
17450101 2 .003
17450201 3 2
17450301 .0 2
17450401 560. 3
17450401 74050000 0 1 0 .055 1
17450601 -13 0 3014 0 .055 1
17450701 0 .0 .0 .0 1
17450801 0 .0 .0 .0 1
*
18200000 1 3 2 1 .0875
18200100 0 1
18200101 2 .0995
18200201 3 2
18200301 .0 2
18200401 560. 3

18200501 62010000 0 1 1 1.221 1
18200601 -13 0 3014 1 1.221 1
18200701 0 .0 .0 .0 1
18200801 0 .0 .0 .0 1
*
18400000 3 3 2 1 .0486
18400100 0 1
18400101 2 .0572
18400201 3 2
18400301 .0 2
18400401 560. 3
18400501 64010000 0 1 1 1.440 1
18400502 64020000 0 1 1 1.335 2
18400503 64030000 0 1 1 1.363 3
18400601 -13 0 3014 1 1.440 1
18400602 -13 0 3014 1 1.335 2
18400603 -13 0 3014 1 1.363 3
18400701 0 .0 .0 .0 3
18400801 0 .0 .0 .0 3
*
19100000 1 3 2 1 .0369
19100100 0 1
19100101 2 .0445
19100201 3 2
19100301 .0 2
19100401 560. 3
19100501 91010000 0 1 1 1.246 1
19100601 -13 0 3014 1 1.246 1
19100701 0 .0 .0 .0 1
19100801 0 .0 .0 .0 1
*
19200000 1 3 2 1 .0369
19200100 0 1
19200101 2 .0445
19200201 3 2
19200301 .0 2
19200401 560. 3
19200501 92010000 0 1 1 1.339 1
19200601 -13 0 3014 1 1.339 1
19200701 0 .0 .0 .0 1
19200801 0 .0 .0 .0 1
*
19400000 1 3 2 1 .0246
19400100 0 1
19400101 2 .0301
19400201 3 2
19400301 .0 2
19400401 560. 3
19400501 94010000 0 1 1 1.108 1
19400601 -13 0 3014 1 1.108 1
19400701 0 .0 .0 .0 1
19400801 0 .0 .0 .0 1
*
19500000 1 3 2 1 .0246
19500100 0 1
19500101 2 .0301
19500201 3 2
19500301 .0 2

STUDSVIK ENERGITEKNIK AB

STUDSVIK/NR-85/99 Appendix A.7

1985-10-22

19500001 500. 3
 19500501 95010000 0 1 1 1.003 1
 19500601 -13 0 3014 1 1.003 1
 19500701 0 .0 .0 .0 1
 19500801 0 .0 .0 .0 1
 *
 19600000 1 3 2 1 .0309
 19600100 0 1
 19600101 2 .0445
 19600201 3 2
 19600301 .0 2
 19600401 560. 3
 19600501 96010000 0 1 1 1.475 1
 19600601 -13 0 3014 1 1.475 1
 19600701 0 0. 0. 0. 1
 19600801 0 0. 0. 0. 1
 *
 19710000 1 3 2 1 .0246
 19710100 0 1
 19710101 2 .0301
 19710201 3 2
 19710301 .0 2
 19710401 560. 3
 19710501 97010000 0 1 1 2.780 1
 19710601 -13 0 3014 1 2.780 1
 19710701 0 .0 .0 .0 1
 19710801 0 .0 .0 .0 1
 *
 19720000 1 3 2 1 .0406
 19720100 0 1
 19720101 2 .050
 19720201 3 2
 19720301 .0 2
 19720401 560. 3
 19720501 97020000 0 1 1 1.420 1
 19720601 -13 0 3014 1 1.420 1
 19720701 0 .0 .0 .0 1
 19720801 0 .0 .0 .0 1
 *
 19730000 1 3 1 1 0.00
 19730100 0 1
 19730101 2 .003
 19730201 3 2
 19730301 .0 2
 19730401 560. 3
 19730501 97030000 0 1 0 .055 1
 19730601 -13 0 3014 0 .055 1
 19730701 0 .0 .0 .0 1
 19730801 0 .0 .0 .0 1
 *
 12010000 1 3 1 1 0.00
 12010100 0 1
 12010101 2 .020
 12010201 3 2
 12010301 .0 2
 12010401 560. 3
 12010501 201010000 0 1 0 0.40 1
 12010601 -13 0 3014 0 0.50 1

12010701 0 .0 .0 .0 1
 12010801 0 .0 .0 .0 1
 *
 12020000 1 3 1 1 0.00
 12020100 0 1
 12020101 2 .020
 12020201 3 2
 12020301 .0 2
 12020401 560. 3
 12020501 202010000 0 1 0 0.300 1
 12020601 -13 0 3014 0 0.30 1
 12020701 0 .0 .0 .0 1
 12020801 0 .0 .0 .0 1
 *
 13110000 3 6 2 1 0. * COPPER WDS
 13110100 0 1
 13110101 3 0.0045 2 0.0070
 13110201 1 3 4 5
 13110301 0.0 5
 13110400 0
 13110401 570. 6
 13110501 0 0 0 1 5.40 1
 13110502 0 0 0 1 11.70 2
 13110503 0 0 0 1 9.80 3
 13110601 031010000 0 1 1 5.40 1
 13110602 032010000 0 1 1 11.70 2
 13110603 033010000 0 1 1 9.80 3
 13110701 0 0.00 0. 0. 3
 13110901 00 0.01742 0. 0. 3
 * COPPER CABLES
 15110000 1 4 2 1 0.
 15110100 0 1
 15110101 4 0.004
 15110201 4 4
 15110301 0.0 4
 15110400 0
 15110401 570. 4
 15110501 0 0 0 1 7.40 1
 15110601 051010000 0 1 1 7.40 1
 15110701 0 0.00 0. 0. 1
 15110901 00 0.01742 0. 0. 1
 *
 20100100 TBL/FCM 1 -1 * MG 0
 20100101 673. 4.50 573. 4.65 673. 3.75 773. 3.10
 20100102 873. 2.75 973. 2.50 1073. 2.30
 20100151 3300000. 3300000. 3320000. 3465000.
 20100152 3630000. 3713000. 3740000.
 *
 20100200 TBL/FCM 2 2 * INCONEL 600
 20100201 293. 1000. 10.974 0.0122 0.000002002 0. 0. 0. 0.
 20100251 293. 1000. 2665170. 4173.5 -1.7262 0. 0. 0. 0.
 *
 20100300 S-STEEL
 *
 20100400 TBL/FCM 1 1 * COPPER
 20100401 390.0
 20100451 3.48E+06

*
 * CORE POWER REDUCTION
 20200100 POWER 504 1. 3.385E6
 20200101 0.00 1.000 0.25 0.995 2.00 0.721 5.00 0.462
 20200102 7.50 0.337 10.0 0.232 12.5 0.165 15.0 0.125 20.0 0.083
 20200103 25.00 0.067 30.00 0.062 50.00 0.060 75.00 0.055 200.0 0.055
 * BY-PASS POWER REDUCTION
 20200200 POWER 504 1. 57.4E3
 20200201 0.00 1.000 1.00 0.552 2.00 0.469 5.00 0.402
 20200202 10.00 0.206 15.00 0.052 20.00 0.016 25.00 0.012 200.00 0.012
 *
 * LIQUID LEVEL IN DOME DC ANNULUS AND DOWNCOMER TO BREAK
 * HEIGHT OF LIQUID = FCT OF LIQUID VOID
 20201100 NORMAREA *VOL21-2
 20201101 0. 0. .2960 .2740 1.0 0.549
 20201200 NORMAREA *VOL21-3
 20201201 0. 0. 0.498 0.150 1.0 0.206
 20201300 TEMP
 20201301 0. 290.
 20201400 HTC-T
 20201401 0. 16.64 * ** AUXILIARY HEAT TRANSFER COEFF.
 20501100 LIQMS2-2 FUNCTION 1. 0. 1
 20501101 VOIDF 02102000 011
 20501200 LIQMS2-3 FUNCTION 1. 0. 1
 20501201 VOIDF 02103000 012
 20504100 LTGLEVDC SUM 1. 0. 1
 20504101 1.115 0.300 VOIDF 072010000
 20504102 0.820 VOIDF 071000000
 20504103 0.820 VOIDF 071070000
 20504104 0.820 VOIDF 071060000
 20504105 0.820 VOIDF 071050000
 20504106 0.820 VOIDF 071040000
 20504107 .146 VOIDF 021040000
 20504108 1. CNTRLVAR 012
 20504109 1. CNTRLVAR 011
 20504110 0.404 VOIDF 021010000
 * LIQUID LEVEL IN UPPER PLENUM AND STEAM PIPE
 * HEIGHT OF LIQUID = FCT OF LIQUID VOID
 20502100 NORMAREA *VOL52-1
 20502101 0. 0. 0.150 0.023 0.336 0.088
 20502102 0.654 0.239 0.875 0.309 1.0 0.525
 20502100 LIQMS2-1 FUNCTION 1. 0. 1
 20502101 VOIDF 052010000 021
 20504200 LIQLEVUP SUM 1. 0. 1
 20504201 0. 0.176 VOIDF 051010000
 20504202 1.0 CNTRLVAR 021
 20504203 0.952 VOIDF 052020000
 * LIQUID LEVEL IN CORE
 20504300 LIQLCORE SUM 0.360 0. 1
 20504301 0. 1. VOIDF 004010000
 20504302 1. VOIDF 004020000
 20504303 1. VOIDF 004030000
 20504304 1. VOIDF 004040000
 20504305 1. VOIDF 004050000
 20504306 1. VOIDF 004060000
 20504307 1. VOIDF 004070000

1985-10-22

```

20504300 1. VOIDF 004000000
20504300 1. VOIDF 004000000
20504310 1. VOIDF 004100000
* LIQUID LEVEL IN LOWER PLENUM
20504400 LIQLEVL SUM 1. 0. 1
20504401 0. 0.150 VOIDF 031010000
20504402 0.325 VOIDF 320100000
20504403 0.271 VOIDF 330100000
*
*ROD CLADDING TEMP SAVE UP
20506100 CLADTEMP1 MULT 1. 0. 1
20506101 HTTEMP 401000105 *ROD CLADDING INNER TEMP VOL1
1. 0. 1
20506200 CLADTEMP2 MULT 1. 0. 1
20506201 HTTEMP 402000105 *ROD CLADDING INNER TEMP VOL2
1. 0. 1
20506300 CLADTEMP3 MULT 1. 0. 1
20506301 HTTEMP 403000105 *ROD CLADDING INNER TEMP VOL3
1. 0. 1
20506400 CLADTEMP4 MULT 1. 0. 1
20506401 HTTEMP 404000105 *ROD CLADDING INNER TEMP VOL4
1. 0. 1
20506500 CLADTEMP5 MULT 1. 0. 1
20506501 HTTEMP 405000105 *ROD CLADDING INNER TEMP VOL5
1. 0. 1
20506600 CLADTEMP6 MULT 1. 0. 1
20506601 HTTEMP 406000105 *ROD CLADDING INNER TEMP VOL6
1. 0. 1
20506700 CLADTEMP7 MULT 1. 0. 1
20506701 HTTEMP 407000105 *ROD CLADDING INNER TEMP VOL7
1. 0. 1
20506800 CLADTEMP8 MULT 1. 0. 1
20506801 HTTEMP 408000105 *ROD CLADDING INNER TEMP VOL8
1. 0. 1
20506900 CLADTEMP9 MULT 1. 0. 1
20506901 HTTEMP 409000105 *ROD CLADDING INNER TEMP VOL9
1. 0. 1
20507000 CLADTEMP10 MULT 1. 0. 1
20507001 HTTEMP 410000106 *ROD CLADDING MIDDLE TEMP VOL10
0
* HEAT TRANSFER COEFF (HEAT RATE/(SURFACE TEMP-FLUID TEMP))
20508100 HTCOEF1 SUM 1. 0. 1
20508101 0. 1. HTMTC 401000101
20508200 HTCOEF2 SUM 1. 0. 1
20508201 0. 1. HTMTC 402000101
20508300 HTCOEF3 SUM 1. 0. 1
20508301 0. 1. HTMTC 403000101
20508400 HTCOEF4 SUM 1. 0. 1
20508401 0. 1. HTMTC 404000101
20508500 HTCOEF5 SUM 1. 0. 1
20508501 0. 1. HTMTC 405000101
20508600 HTCOEF6 SUM 1. 0. 1
20508601 0. 1. HTMTC 406000101
20508700 HTCOEF7 SUM 1. 0. 1
20508701 0. 1. HTMTC 407000101
20508800 HTCOEF8 SUM 1. 0. 1
20508801 0. 1. HTMTC 408000101
20508900 HTCOEF9 SUM 1. 0. 1
20508901 0. 1. HTMTC 409000101
20509000 HTCOEF10 SUM 1. 0. 1
20509001 0. 1. HTMTC 410000101
* LIQUID LEVEL CONTROL SYSTEM FOR DC (STEADY STATE ONLY)
3050000 LEVCTHVOL THDPVOL
3050101 1. 1. 0. 0. 0. 00
3050200 2
3050201 0. 7.0F6 0.
4050000 LEVCTRJUN THDPJUN
4050101 305000000 021010000 0.2
4050200 0 0 CNTRLVAR 049
4050201 -0.2 -0.2 0. 0.
4050202 0.2 0.2 0. 0.
20504900 LEVCTR SUM 2. 0. 0
20504901 6.340 -1. CNTRLVAR 041
0
0
0
20505000 STR-MLOSS SUM 1. 0. 0
20505001 0. 17900 HTNR 310000100
20505002 24955 HTNR 320000100
20505003 22474 HTNR 330000100
20505004 14844 HTNR 510000100
20505005 17298 HTNR 521000100
20505006 20939 HTNR 522000100
20505007 71943 HTNR 110000100
20505008 345575 HTNR 121000100
20505009 40000 HTNR 122000100
20505010 63460 HTNR 211000100
20505011 58641 HTNR 212000100
20505012 23721 HTNR 213000100
20505013 12109 HTNR 214000100
20505014 34363 HTNR 710000200
20505015 34363 HTNR 710000300
20505016 34363 HTNR 710000400
20505017 28234 HTNR 710000500
20505018 28234 HTNR 710000600
20505019 28234 HTNR 710000700
20505020 28234 HTNR 710000800
20505100 STR-MLOSS SUM 1. 0. 0
20505101 0. 28234 HTNR 710000000
20505102 10330 HTNR 720000100
20505103 24653 HTNR 730000100
20505104 13285 HTNR 740000100
20505105 25898 HTNR 740000200
20505106 66634 HTNR 740000300
20505107 36632 HTNR 740000400
20505108 55900 HTNR 745000100
20505109 67128 HTNR 620000100
20505110 43972 HTNR 640000100
20505111 40766 HTNR 640000200
20505112 41621 HTNR 640000300
20505113 20809 HTNR 910000100
20505114 14445 HTNR 910000100
20505115 49514 HTNR 201000100
20505116 0.24 HTNR 311000101
20505117 0.51 HTNR 311000201
20505118 0.43 HTNR 311000301
20505119 0.20 HTNR 511000101
20505120 30000 HTNR 202000100
0
20505200 STR-MLOSS SUM 1. 0. 0
20505201 0. 31045 HTNR 920000100
20505202 34198 HTNR 960000100
20505300 TOTAL SUM 1. 0. 0
20505301 0. 1. CNTRLVAR 50
0
20505302 1. CNTRLVAR 51
20505303 1. CNTRLVAR 52
0
20505400 STR-MTINT INTEGRAL 1. 0. 0
20505401 CNTRLVAR 50
0
20505500 BREAK-LOSS INTEGRAL 1. 0. 0
20505501 MFLOWJ 15200000
0
20505600 BOX-MLOSS SUM 1. 0. 0
20505601 0. 150 HTNR 400000100
20505602 150 HTNR 400000200
20505603 150 HTNR 400000300
20505604 150 HTNR 400000400
20505605 150 HTNR 400000500
20505606 150 HTNR 400000600
20505607 150 HTNR 400000700
20505608 150 HTNR 400000800
20505609 150 HTNR 400000900
20505610 150 HTNR 400001000
0
20505700 COR-POW FUNCTION 1. 0. 0
20505701 TIME 0 001
0
20505800 BYPASS-POW FUNCTION 1. 0. 0
20505801 TIME 0 002
0
20505900 TOT-POW SUM 1. 0. 0
20505901 0. 1. CNTRLVAR 57
20505902 1. CNTRLVAR 58
0
20510000 AUX-MLOSS SUM 1. 0. 0
20511001 0. 17900 HTNR 310000101
20511002 33001 HTNR 320000101
20511003 30990 HTNR 330000101
20511004 10220 HTNR 510000101
20511007 87194 HTNR 110000101
20511008 400037 HTNR 121000101
20511009 40000 HTNR 122000101
20511010 76914 HTNR 211000101
20511011 76923 HTNR 212000101
20511012 29111 HTNR 213000101
20511013 14844 HTNR 214000101
20511014 44333 HTNR 710000101
20511015 44333 HTNR 710000201
20511016 44333 HTNR 710000301
20511017 36426 HTNR 710000401
20511018 36426 HTNR 710000501
20511019 36426 HTNR 710000601
20511020 36426 HTNR 710000701
0
20511100 AUX-MLOSS SUM 1. 0. 0
20511101 0. 36426 HTNR 710000001
20511102 13327 HTNR 720000101
20511103 31906 HTNR 730000101
20511104 16021 HTNR 740000101
20511105 31232 HTNR 740000201
20511106 80348 HTNR 740000301
20511107 44179 HTNR 740000401

```

STUDSVIK ENERGITEKNIK AB

STUDSVIK/NR-85/99 Appendix A.9

1985-10-22

```

20511100      .05500  HTRNR  745000101
20511109      .74334  HTRNR  620000101
20511110      .51753  HTRNR  640000101
20511111      .47940  HTRNR  640000201
20511112      .48986  HTRNR  640000301
20511113      .34030  HTRNR  910000101
20511114      .22460  HTRNR  940000101
20511115      .31830  HTRNR  950000101
20511116      .52576  HTRNR  971000101
20511117      .44611  HTRNR  972000101
20511118      .05500  HTRNR  973000101
20511119      .50000  HTRNR  201000101
20511120      .30000  HTRNR  202000101
*
20511200      AUX-MTLOSS  SUM 1.  0.  0
20511201      0.  .37439  HTRNR  920000101
20511202      .41241  HTRNR  960000101
*
20511300      TT-AUX-MTL  SUM 1.  0.  0
20511301      0.  1.  CNTRLVAR 110
20511302      1.  1.  CNTRLVAR 111
20511303      1.  1.  CNTRLVAR 112
*
***** INITIAL VALUES
*
0310200  3  7117300.  541.74
0320200  3  7115560.  541.77
0330200  3  7113300.  541.80
0510200  2  7030120.  0.18041
0130200  2  7000700.  1.0
0720200  3  7041360.  541.79
0730200  3  7045300.  541.78
0620200  3  7073500.  540.48
0910200  3  7042680.  541.71
0920200  3  7042750.  541.62
0940200  3  7045350.  541.65
0950200  3  7124900.  541.65
0960200  3  7123710.  538.77
2010200  3  7112300.  541.83
2020200  3  7104330.  541.78
0041201  3  7072590.  550.84  0.  0.  0.  1
0041202  2  7069340.  0.004216  0.  0.  0.  2
0041203  2  7066310.  0.022467  0.  0.  0.  3
0041204  2  7063500.  0.039025  0.  0.  0.  4
0041205  2  7059940.  0.055152  0.  0.  0.  5
0041206  2  7056080.  0.070705  0.  0.  0.  6
0041207  2  7051950.  0.093267  0.  0.  0.  7
0041208  2  7047590.  0.113705  0.  0.  0.  8
0041209  2  7044210.  0.13741  0.  0.  0.  9
0041210  2  7039500.  0.25524  0.  0.  0.  10
0521201  2  7036870.  0.069336  0.  0.  0.  1
0521202  2  7002170.  0.29212  0.  0.  0.  2
0111201  2  7002930.  0.44092  0.  0.  0.  1
0121201  2  7002000.  0.52007  0.  0.  0.  1
0121202  2  7001350.  0.41925  0.  0.  0.  2
0211201  2  7003220.  0.44877  0.  0.  0.  1
0211202  2  7003550.  0.04018  0.  0.  0.  2

```

```

0211203  3  7009840.  550.91  0.  0.  0.  3
0211204  3  7011500.  541.94  0.  0.  0.  4
0711201  3  7010000.  541.83  0.  0.  0.  8
0741201  3  7120000.  541.75  0.  0.  0.  5
0641201  3  7063530.  545.99  0.  0.  0.  1
0641202  3  7053240.  553.89  0.  0.  0.  2
0641203  3  7043500.  550.02  0.  0.  0.  3
0971201  3  7116000.  541.65  0.  0.  0.  3
*
* JUNCTION INITIAL VALUES
0041300  0
0041301  1.198  1.382  0.  1  1.319  1.701  0.  2
0041302  1.699  3.017  0.  3  2.006  5.219  0.  4
0041303  2.278  6.435  0.  5  2.512  7.534  0.  6
0041304  2.862  8.385  0.  7  3.691  8.707  0.  8
0041305  4.251  9.297  0.  9
0521300  1
0521301  4.35  1.76  0.  1
0121300  1
0121301  -7.12  1.76  0.  1
0211300  1
0211301  11.47  0.  0.  3
0711300  1
0711301  13.96  0.  0.  7
0741300  1
0741301  0.56  0.  0.  4
0641300  1
0641301  0.60  0.  0.  2
0971300  1
0971301  1.55  0.  0.  2
*
* **** CHANGE CAKDS TO GET CORE PRESSURE DHP *****
0040001  1.E-4  0.0136  10
0520901  1.70  1.70  1
1030101  033010000 004000000 0.000473  0.340  0.200  0000

```

1985-10-22

```

* INPUT FOR RELAPS/MOD2
* F14-II SPLIT BREAK TRANSIENT / STEADY STATE TO S S
* 100 0/0 POWER MEAN CORE CHANNEL
* RESTART TRANSNT
0000100 RUN
0000101 001
0000105 10. 20.
0000201 5.0 1.0E-6 0.05 00002 5 100 100
0000203 00. 1.0E-6 0.2 00002 1 50 50
*
0000502 TIME 0 LT NULL 0 0. L
0000503 TIME 0 LT NULL 0 0. L
0000504 TIME 0 GE NULL 0 5. L
*

```

```

0130000 VOL13 SNGLYOL
1100101 0. 3.854 0.01831 0. 0. 0. 0. 0. 00
0130200 2 7000700. 1.
*****
1100000 JUN12-13 SNGLJUN
1100101 012010000 013000000 0.001432 0.95 0.95 0000
1100201 1 0. 0. 0.
*****
1170000 BT-PASS VALVE
1170101 032010000 064000000 0.000581 0. 0. 0000
1170201 1 0.60 0.
1170300 MTHVLV * CONSTANT AREA DURING THE TRANSIENT
1170301 0000503 0000502 0.02 0.1788
1170400 1.0 34.20
1170401 .000 .000 .000 .125 .0006 .0006 .200 .1301 .1301
1170402 .500 .1955 .1955 1.00 .2037 .2037
*****

```

```

3040000 RELIEF THDPVLS
3040101 0.00636 1. 0. 0. 0. 0. 0. 00
3040200 2
3040201 0. 100000. 1.0
*****
4040000 RELIEF THDPJUN
4040101 013010000 304000000 0.00009000
4040200 1 0 CTRLVAR 100
* TWO PHASE DIFFERENCE FOR PUMP HEAD (SEMICALE)
4040201 0. 0. 0. 0.
4040202 1.66 0. 1.6A 0.
*****

```

```

2010000 PUMP1 PUMP
2010101 0. 0.750 0.01010 0. 10.4 0.283 0
2010100 073010000 0.00427 0.17 0.37 0000
2010109 074000000 0.000000 3.00 1.00 0000
2010200 3 7.11264F 006 541.75
2010701 1 4.56 0. 0.
2010702 1 4.56 0. 0.

```

```

2010301 0 0 0 -1 0 0 0
2010302 303.69 0.556291 0.0383 50. 81.7 1. 1000.
2010303 0. 0. 0. 0. 0. 0.
* NYA HONOLOOA PUMPKURVOR, DATA KOMMER FRÅN ASEA-ATOMS GOBLIN-BER.
* TORQUE-KURVORNA SAKNAR BETYDELSE I DETTA FALL OCH MAN DÄRFÖR INTE
* KONTROLLERATS. KOLLAN PER EN DEL DATA ÖR OKÄND.
2011100 1 1
2011101 0.00+1.181 0.27+1.180 0.47+1.180
2011102 0.64+1.130 1.00+1.000
2011200 2 1
2011201 0.00+0.04 0.09+0.07 0.19+0.09
2011202 0.38+0.92 0.59+0.962 0.80+0.99 1.00+1.00
2011300 1 2
2011301 0.0+0.560 0.41+0.16 0.51+0.05 0.76+0.48
2011302 1.00+1.00
2011400 2 2
2011401 0.0+0.116 0.5+0.00 0.68+0.38 1.00+1.00
2011500 1 3
2011501 -1.00+2.00 -0.95+1.01 -0.62+1.52 -0.50+1.39
2011502 0.00+1.18
2011600 1 4
2011601 -1.00+2.00 -0.79+1.53 -0.63+1.25 -0.30+0.93
2011602 0.00+0.72
2011700 2 3
2011701 -1.00+3.31 -0.83+2.78 -0.68+2.29 -0.56+1.95
2011702 -0.37+1.49 -0.22+1.19 -0.10+0.99 0.00+0.84
2011800 2 4
2011801 -1.00+3.31 -0.79+2.78 -0.59+2.37 -0.41+2.04
2011802 -0.21+1.74 0.00+1.55
* TWO PHASE MULTIPLIER TABLES
2013000 0
2013001 0.0+0.0 0.1+0.0 0.15+0.05 0.24+0.8 0.3+0.96 0.4+0.98
2013002 0.6+0.97 0.8+0.9 0.9+0.8 0.96+0.5 1.0+0.0
2013100 0
2013101 0.0+0.0 0.1+0.0 0.15+0.05 0.24+0.8 0.3+0.96 0.4+0.98
2013102 0.6+0.97 0.8+0.9 0.9+0.8 0.96+0.5 1.0+0.0
* TWO PHASE DIFFERENCE FOR PUMP HEAD (SEMICALE)
2014100 1 1
2014101 0.0+0.0 0.1+0.83 0.2+1.09 0.5+1.02 0.7+1.01 0.9+0.94 1.0+1.0
2014200 1 2
2014201 0.0+0.0 0.1+0.04 0.2+0.0 0.3+0.1 0.4+0.21 0.6+0.67
2014202 0.9+0.80 1.0+1.0
2014300 1 3
2014301 -1.0+1.16 -0.9+1.24 -0.8+1.77 -0.7+2.36 -0.6+2.79
2014302 -0.5+2.91 -0.4+2.67 -0.25+1.69 -0.1+0.5 0.0+0.0
2014400 1 4
2014401 -1.0+1.16 -0.9+0.78 -0.8+0.5 -0.7+0.31 -0.6+0.17
2014402 -0.4+0.08 -0.35+0.0 -0.2+0.05 -0.1+0.08 0.0+0.11
* TWO PHASE DIFFERENCE FOR PUMP TORQUE (SINGLE PHASE, WHICH MEANS
* THAT FULLY DEGRADED TORQUE IS IFM0)
2014900 2 1
2014901 0.00+0.84 0.09+0.87 0.19+0.89
2014902 0.38+0.92 0.59+0.962 0.80+0.99 1.00+1.00
2014000 2 2
2014001 0.0+0.116 0.5+0.00 0.68+0.38 1.00+1.00
2015000 2 1
2015100 0.0+0.116 0.5+0.00 0.68+0.38 1.00+1.00
2015101 -1.00+3.31 -0.83+2.78 -0.68+2.29 -0.56+1.95

```

```

2015102 -0.37+1.49 -0.22+1.19 -0.10+0.99 0.00+0.84
2015200 2 4
2015201 -1.00+3.31 -0.79+2.78 -0.59+2.37 -0.41+2.04
2015202 -0.21+1.74 0.00+1.55
** PUMP1 SPEED
2016100 504
2016101 0.00 164.11 0.58 159.68
2016102 2.00 144.00 4.71 124.70 10.00 97.31
2016103 15.00 79.39 17.46 55.24 26.44 45.27
2016104 37.06 37.49 48.55 34.29 53.00 29.57
2016105 108.0 29.57
*****
2020000 PUMP2 PUMP
2020101 0. 0.700 0.00500 0. 72.0 0.228 0
2020108 094010000 0.0019 0.35 0.35 0000
2020109 095000000 0.000380 3.08 3.08 0000
2020200 3 7.10521E+06 541.46
2020201 1 1.55 0. 0.
2020202 1 1.55 0. 0.
2020301 0 0 -1 -1 0 0 0
2020302 303.69 0.755244 0.01056 25. 13.2 1. 1000.
2020303 0. 0. 0. 0. 0.
2021100 1 1
2021101 0.0 1.136 0.2 1.135 0.4 1.120
2021102 0.6 1.100 0.8 1.055 1.0 1.000
2021200 2 1
2021201 0.0 0.51 1.0 1.00
2021300 1 2
2021301 0.0 -0.560 0.2 -0.385 0.4 -0.180 0.5 -0.055
2021302 0.6 0.145 0.8 0.565 1.0 1.000
2021400 2 2
2021401 0.0 -0.47 0.2 -0.21 0.4 0.07
2021402 0.6 0.35 0.8 0.66 1.0 1.00
2021500 1 3
2021501 -1.00+2.00 -0.95+1.01 -0.62+1.52 -0.50+1.39
2021502 0.00+1.18
2021600 1 4
2021601 -1.00+2.00 -0.79+1.53 -0.63+1.25 -0.30+0.93
2021602 0.00+0.72
2021700 2 3
2021701 -1.00+3.31 -0.83+2.78 -0.68+2.29 -0.56+1.95
2021702 -0.37+1.49 -0.22+1.19 -0.10+0.99 0.00+0.84
2021800 2 4
2021801 -1.00+3.31 -0.79+2.78 -0.59+2.37 -0.41+2.04
2021802 -0.21+1.74 0.00+1.55
2023000 0
2023001 0.0 0.00 0.1 0.00 0.2 0.05 0.3 0.00 0.4 0.96 0.4 0.94
2023002 0.4 0.97 0.7 0.00 0.8 0.80 0.9 0.50 1.0 0.00
2023100 0
2023101 0.0 0.00 0.1 0.10 0.2 0.15 0.3 0.24 0.4 0.10 0.4 0.40
2023102 0.6 0.60 0.7 0.40 0.8 0.98 0.9 0.96 1.0 1.00
** PUMP2 SPEED
2024000 0
2024101 0.0 771.94
*****

```

1985-10-22

```

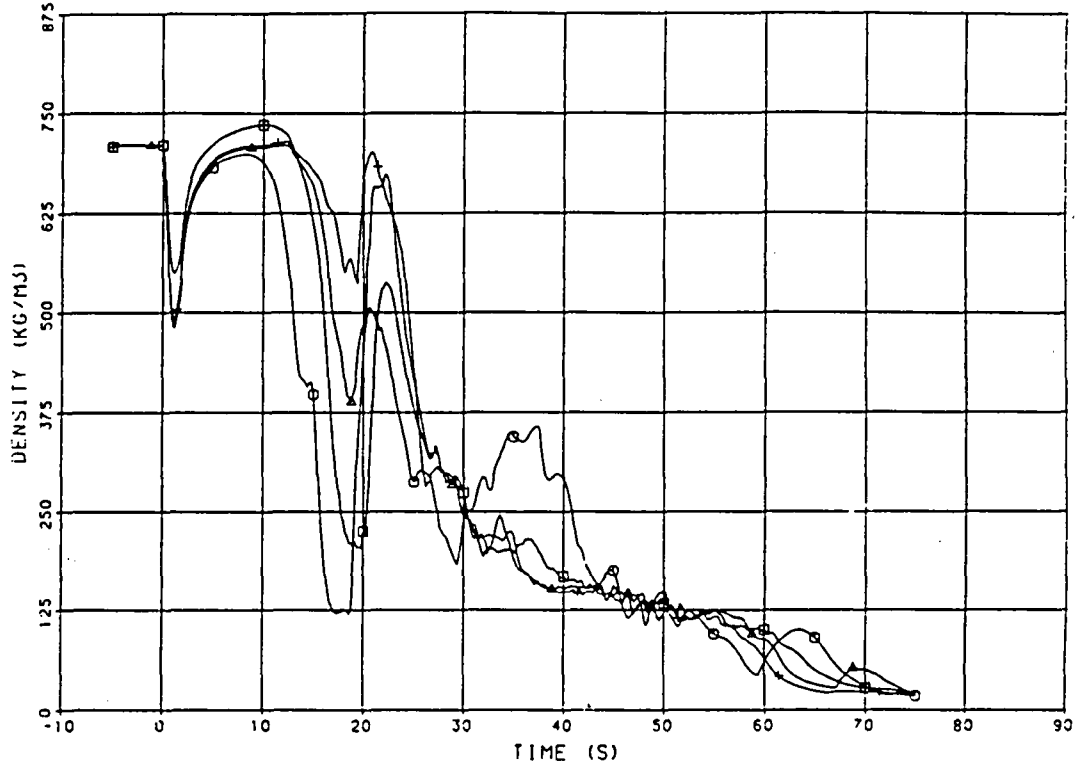
*STEAM RELIEF FLOW MODEL
20509300 RHOP MULT 1. 0. 0
20509301 RHOD 013010000 P 013010000
*
20509400 SONT POWERR 1. 0. 0
20509401 CNTRLVAR 093 0.5
*
20209300 NORMAREA
20209301 0. 0. 0.4 0. 1.0 1.
20209302 1.60 1. 2.30 0. 12.05 0.
20209303 12.65 1.
*
20509500 TBREAK TRIPDLAY 1. 0. 0
20509501 504
*
20509600 "T-TBREAK" SUM 1. 0. 0
20509601 0. 1. TIME 0
20509602 -1. CNTRLVAR 095
*
20509700 TRPTST TRIPUNIT 1. 0. 0
20509701 504
*
20509800 ATIME MULT 1. 0. 0
20509801 CNTRLVAR 096
20509802 CNTRLVAR 097
*
20509900 VLVAREA FUNCTION 1.0340E-4 0. 0
20509901 CNTRLVAR 098 093
*
20510000 MSSFLOW MULT 0.6836 0. 0
20510001 CNTRLVAR 099 CNTRLVAR 094
*
20500100 MASSDIFF1 DELETE
20500200 INTEGRAL1 DELETE
20500300 VELDIFF1 DELETE
20500400 MASSDIFF2 DELETE
20500500 INTEGRAL2 DELETE
20500600 VELDIFF2 DELETE
*
3050000 LEVCTRVL DELETE
4050000 LEVCTRJM DELETE
20504900 LEVCTR DELETE
*
. END

```


RELAP5/MOD2 CALCULATION FOR FIX-11. EXP 3027

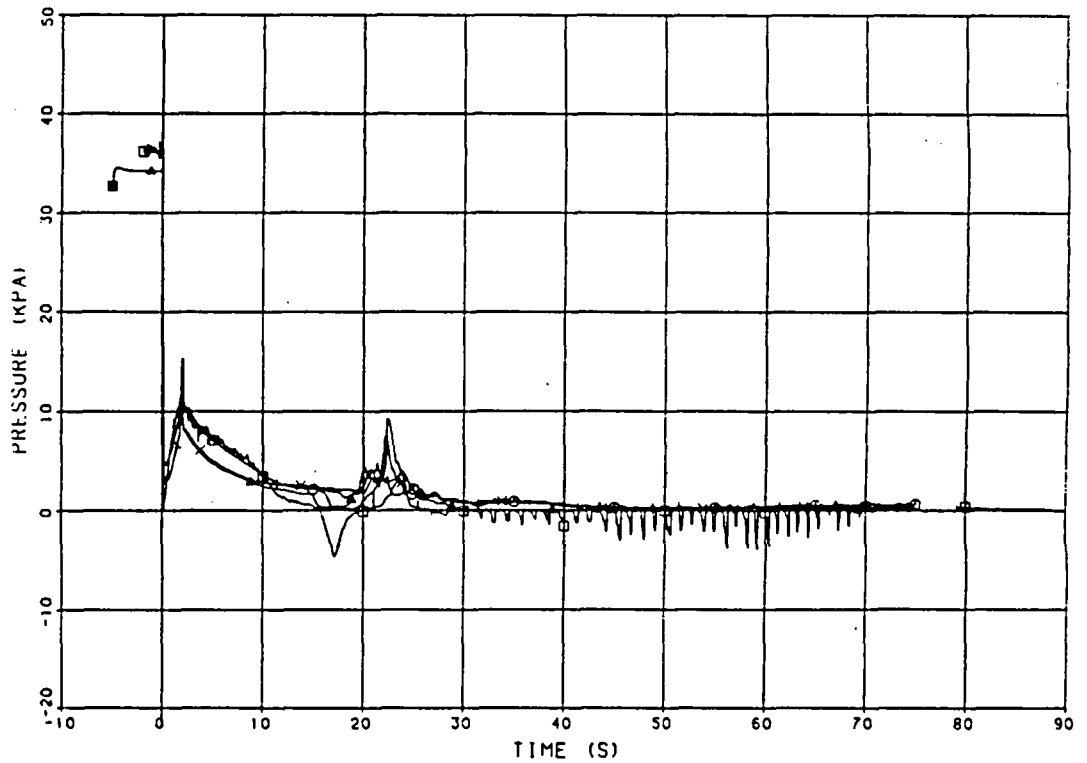
+ P 0 B FLUID DENSITY. CORE BOTTOM (RHO 0401) CASE A
 FLUID DENSITY. CORE BOTTOM (RHO 0401) CASE B
 FLUID DENSITY. CORE BOTTOM (RHO 0401) CASE C
 FLUID DENSITY. CORE BOTTOM (RHO 0401) CASE D

Plot B.1



X + P 0 B DIFF. PRESSURE. CORE INLET RESTRICTION (OPT 4) - EXPERIMENT
 DIFF. PRESSURE. CORE INLET RESTRICTION (P 3301 - P 401) CAS
 DIFF. PRESSURE. CORE INLET RESTRICTION (P 3301 - P 401) CAS
 DIFF. PRESSURE. CORE INLET RESTRICTION (P 3301 - P 401) CAS
 DIFF. PRESSURE. CORE INLET RESTRICTION (P 3301 - P 401) CAS

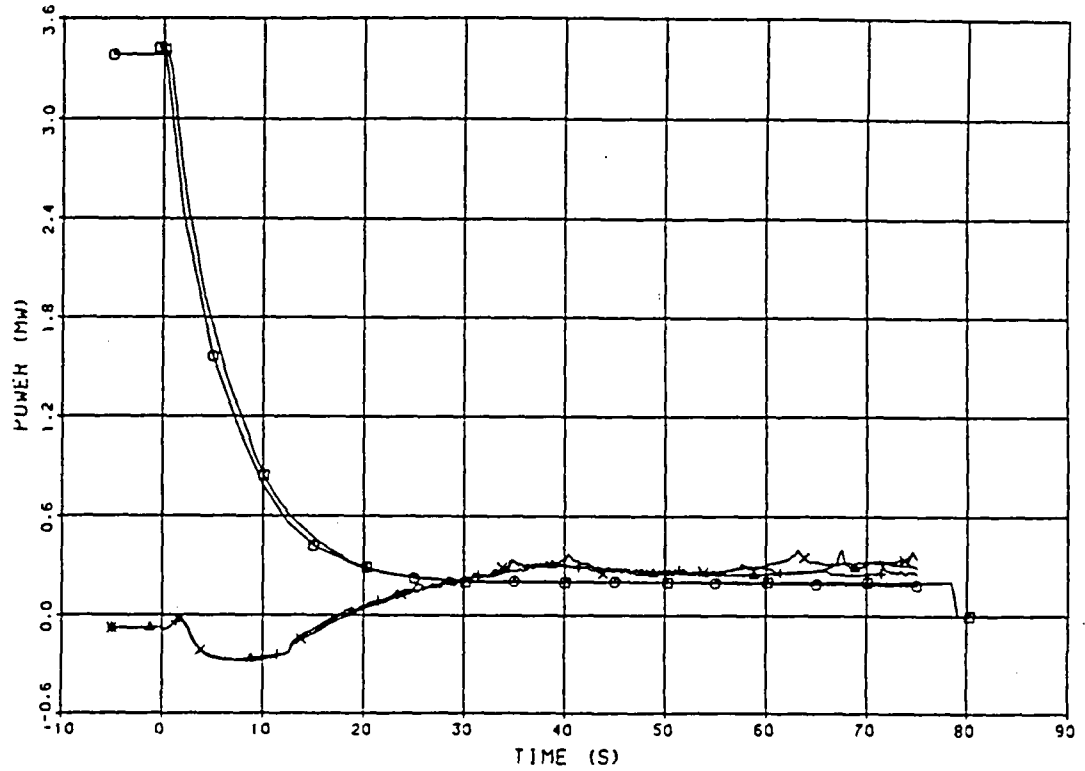
Plot B.2



RELAP5/MOD2 CALCULATION FOR FIX-11. EXP 3027

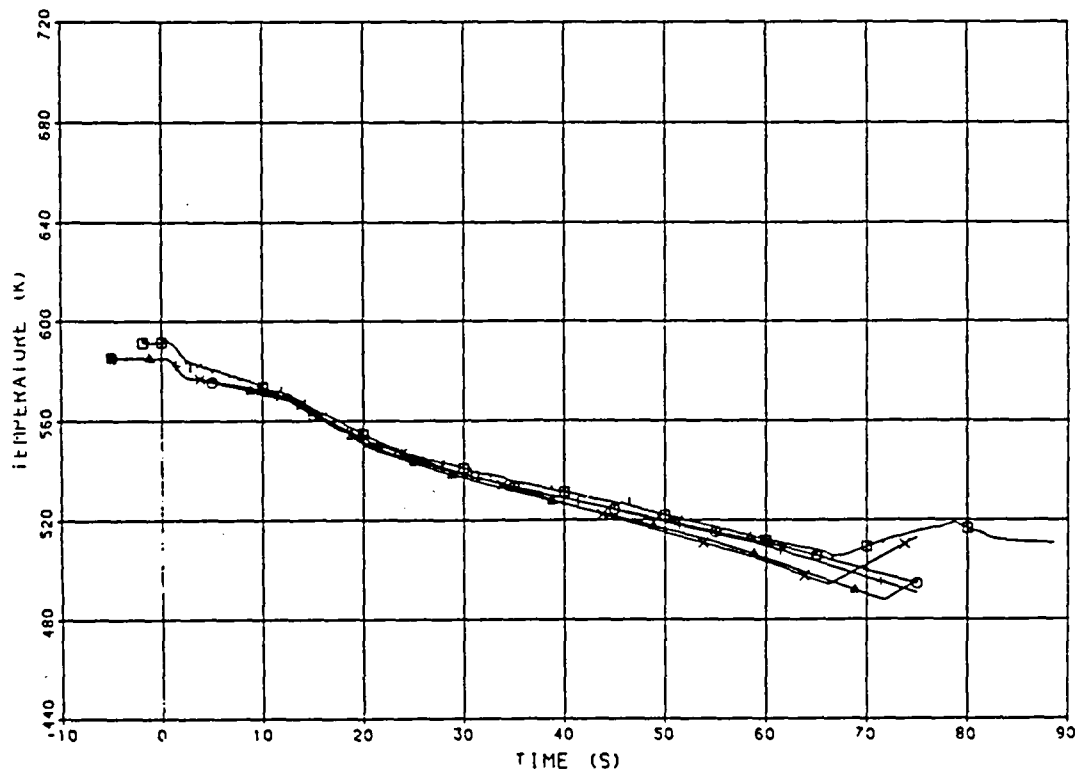
ELECTRIC POWER, CORE (CALCULATED) - EXPERIMENT
 CORE HEATING POWER (CNTRLVAR 57) CASE A
 HEAT LOSS FROM PASSIVES (CNTRLVAR 53) CASE A
 HEAT LOSS FROM PASSIVES (CNTRLVAR 53) CASE B
 HEAT LOSS FROM PASSIVES (CNTRLVAR 53) CASE C
 HEAT LOSS FROM PASSIVES (CNTRLVAR 53) CASE C

Plot B.3



MEAN CLAD TEMPERATURE, LEVEL 1 (T19) T206 T211 T246) - EXPERIMENT
 MEAN CLAD TEMPERATURE, LEVEL 1 (HTTEMP 401000105) CASE A
 MEAN CLAD TEMPERATURE, LEVEL 1 (HTTEMP 401000105) CASE B
 MEAN CLAD TEMPERATURE, LEVEL 1 (HTTEMP 401000105) CASE C
 MEAN CLAD TEMPERATURE, LEVEL 1 (HTTEMP 401000105) CASE D

Plot B.4



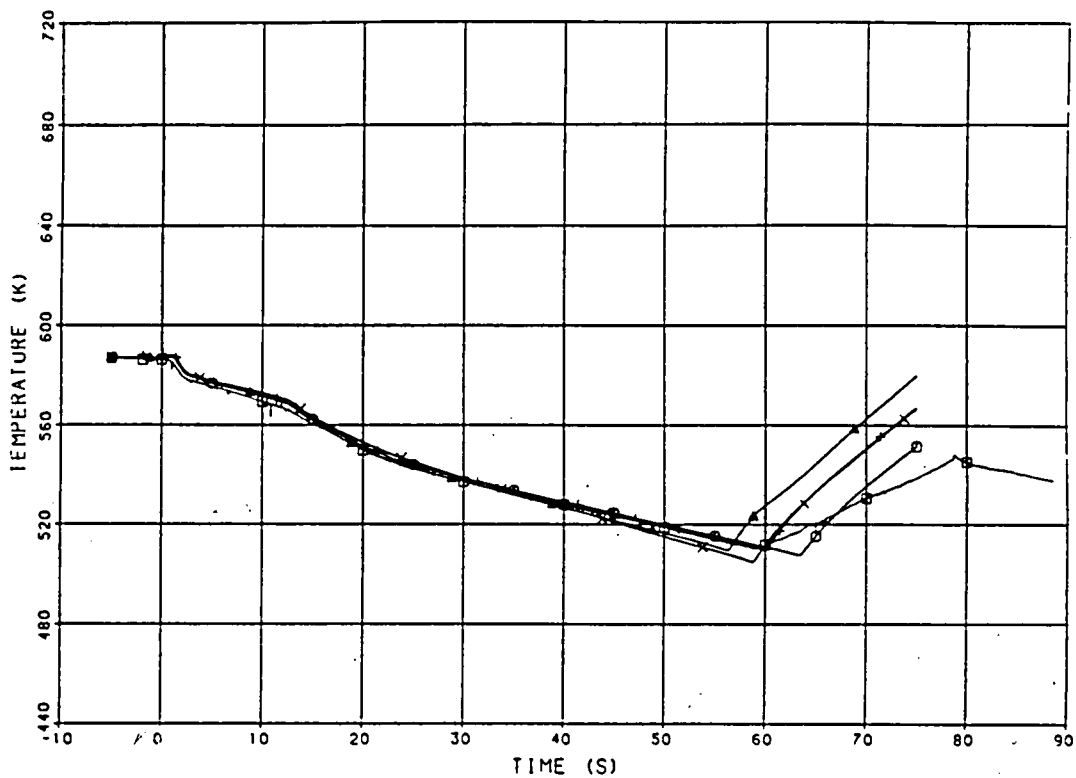
STUDSVIK/NR-85/99 Appendix B.3
1985-10-22

STUDSVIK ENERGITEKNIK AB

RELAP5/MOD2 CALCULATION FOR FIX-11. EXP 3027

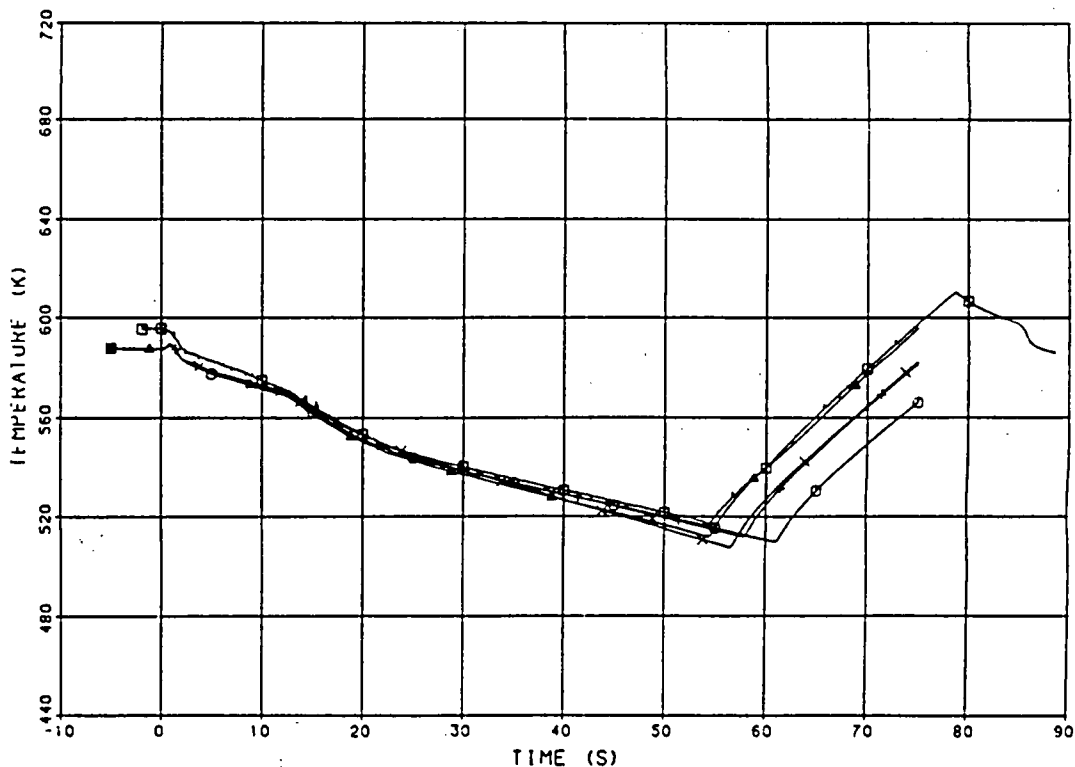
X+>000 MEAN CLAD TEMP., LEVEL 3 (T108 T183 T243 T248) - EXPERIMENT
 MEAN CLAD TEMPERATURE, LEVEL 3 (HTTEMP 403000105) CASE A
 MEAN CLAD TEMPERATURE, LEVEL 3 (HTTEMP 403000105) CASE B
 MEAN CLAD TEMPERATURE, LEVEL 3 (HTTEMP 403000105) CASE C
 MEAN CLAD TEMPERATURE, LEVEL 3 (HTTEMP 403000105) CASE D

Plot B.5



X+>000 MEAN CLAD TEMP., LEVEL 5 (T202 T227 T232 T237 T252) - EXPERIMENT
 MEAN CLAD TEMPERATURE, LEVEL 5 (HTTEMP 404000105) CASE A
 MEAN CLAD TEMPERATURE, LEVEL 5 (HTTEMP 404000105) CASE B
 MEAN CLAD TEMPERATURE, LEVEL 5 (HTTEMP 404000105) CASE C
 MEAN CLAD TEMPERATURE, LEVEL 5 (HTTEMP 404000105) CASE D

Plot B.6



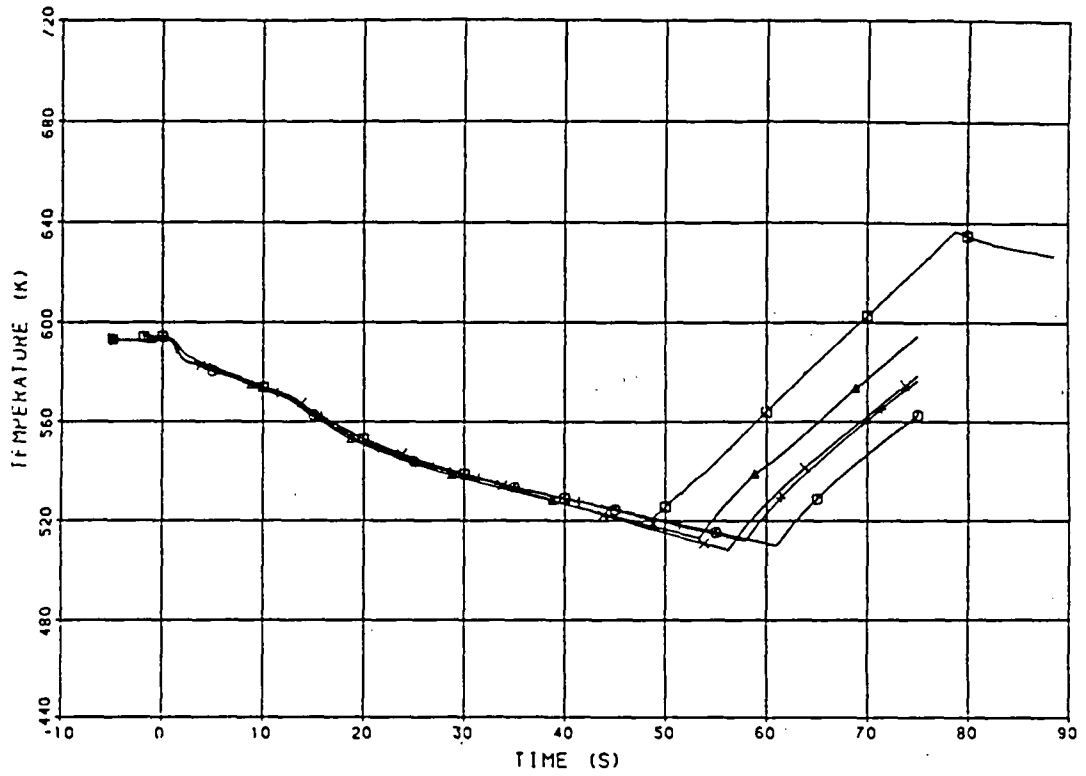
STUDSVIK/NR-85/99 Appendix B.4
1985-10-22

STUDSVIK ENERGITEKNIK AB

RELAP5/MOD2 CALCULATION FOR FIX-11, EXP 3027

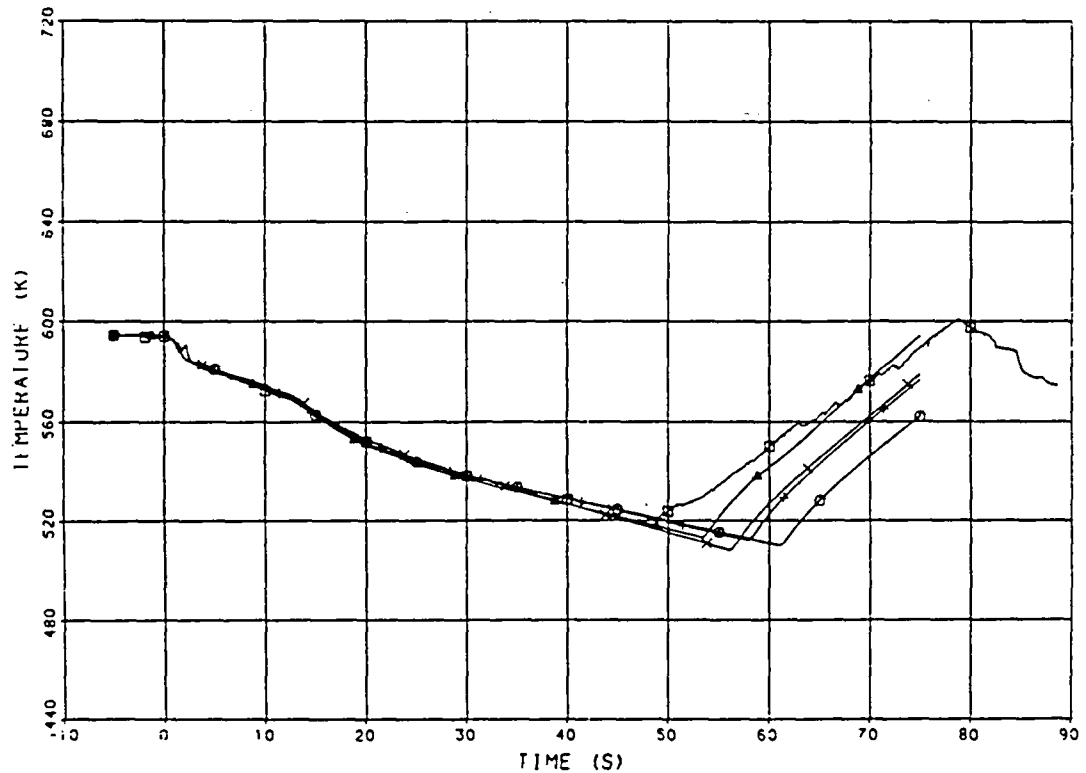
O O MEAN CLAD TEMP., LEVEL 9 (T102 T137 T167 T172 T187 T197 T27
 MEAN CLAD TEMPERATURE, LEVEL 9 (HTTEMP 406000105) CASE A
 MEAN CLAD TEMPERATURE, LEVEL 9 (HTTEMP 406000105) CASE B
 MEAN CLAD TEMPERATURE, LEVEL 9 (HTTEMP 406000105) CASE C
 X MEAN CLAD TEMPERATURE, LEVEL 9 (HTTEMP 406000105) CASE D

Plot B.7



O O MEAN CLAD TEMP., LEVEL 12 (T118 T123 T128 T148 T223) - EXPE
 MEAN CLAD TEMPERATURE, LEVEL 12 (HTTEMP 407000105) CASE A
 MEAN CLAD TEMPERATURE, LEVEL 12 (HTTEMP 407000105) CASE B
 MEAN CLAD TEMPERATURE, LEVEL 12 (HTTEMP 407000105) CASE C
 X MEAN CLAD TEMPERATURE, LEVEL 12 (HTTEMP 407000105) CASE D

Plot B.8



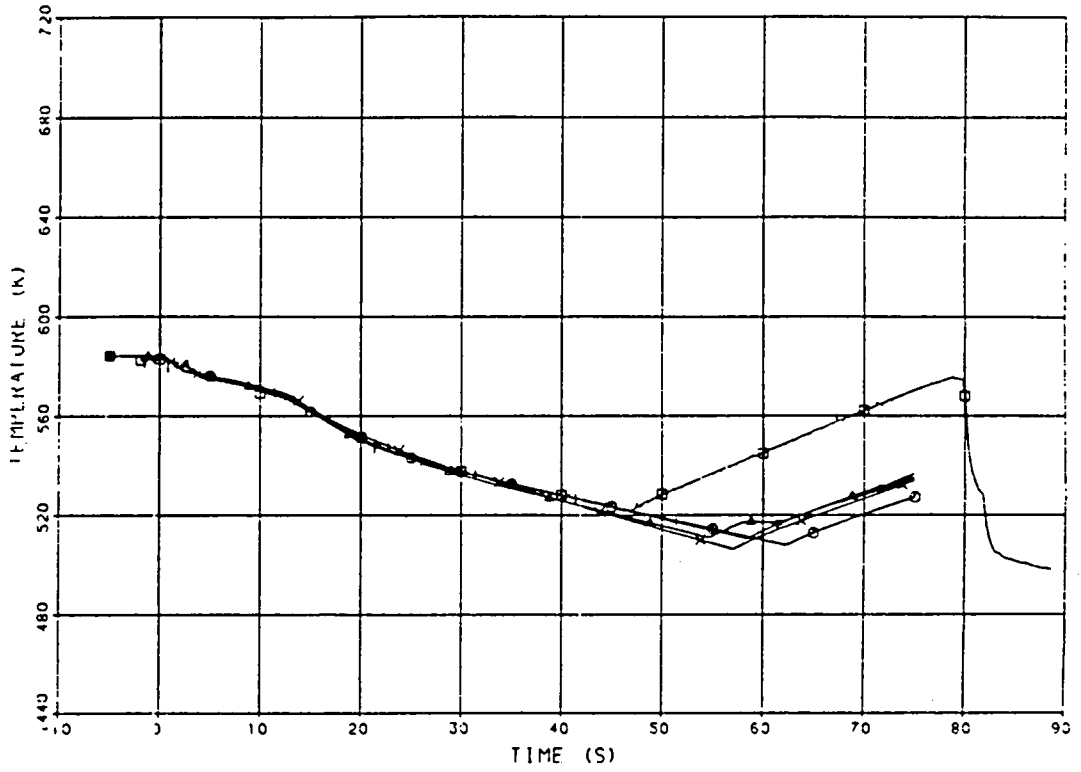
STUDSVIK/NR-85/99 Appendix B.5
 1985-10-22

STUDSVIK ENERGITEKNIK AB

RELAP5/MOD2 CALCULATION FOR FIX-III. EXP 3027

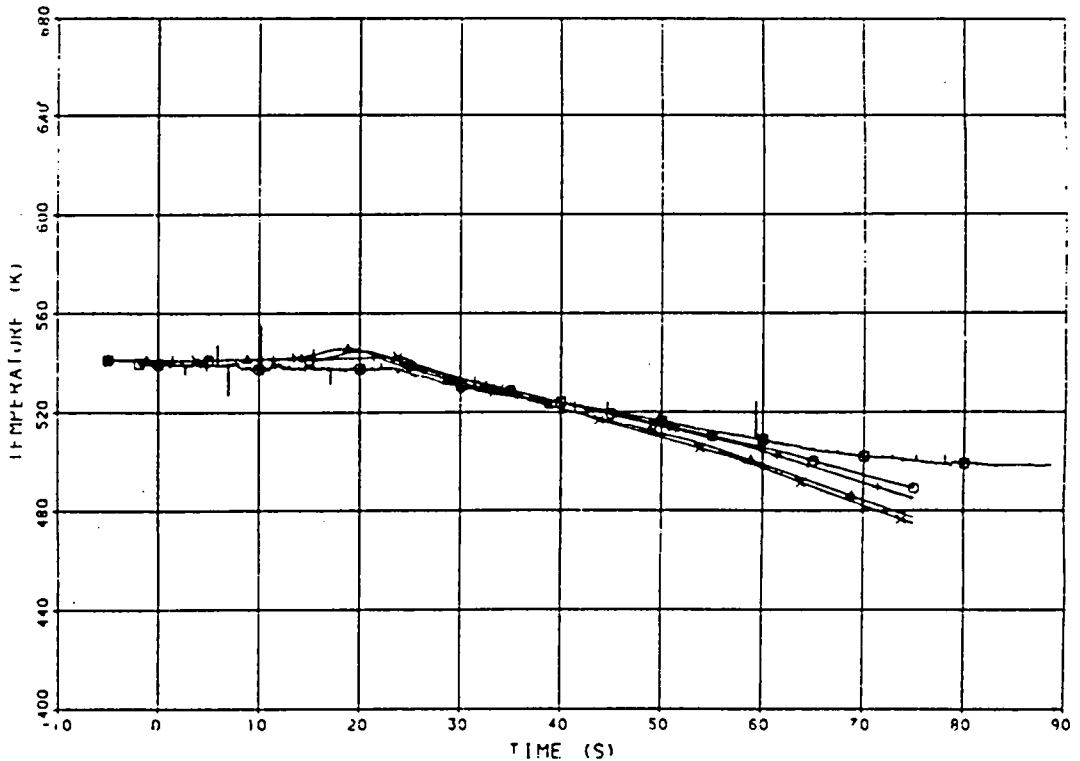
X + + + + + MEAN CLAD TEMP. LEVEL 15 (T175 T190 T275) - EXPERIMENT
 MEAN CLAD TEMPERATURE. LEVEL 15 (HTTEMP 410000105) CASE A
 MEAN CLAD TEMPERATURE. LEVEL 15 (HTTEMP 410000105) CASE B
 MEAN CLAD TEMPERATURE. LEVEL 15 (HTTEMP 410000105) CASE C
 MEAN CLAD TEMPERATURE. LEVEL 15 (HTTEMP 410000105) CASE D

Plot B.9



X + + + + + FLUID TEMPERATURE. CORE INLET (TE 3) - EXPERIMENT
 FLUID TEMPERATURE. CORE INLET (TEMPF 3301) CASE A
 FLUID TEMPERATURE. CORE INLET (TEMPF 3301) CASE B
 FLUID TEMPERATURE. CORE INLET (TEMPF 3301) CASE C
 FLUID TEMPERATURE. CORE INLET (TEMPF 3301) CASE D

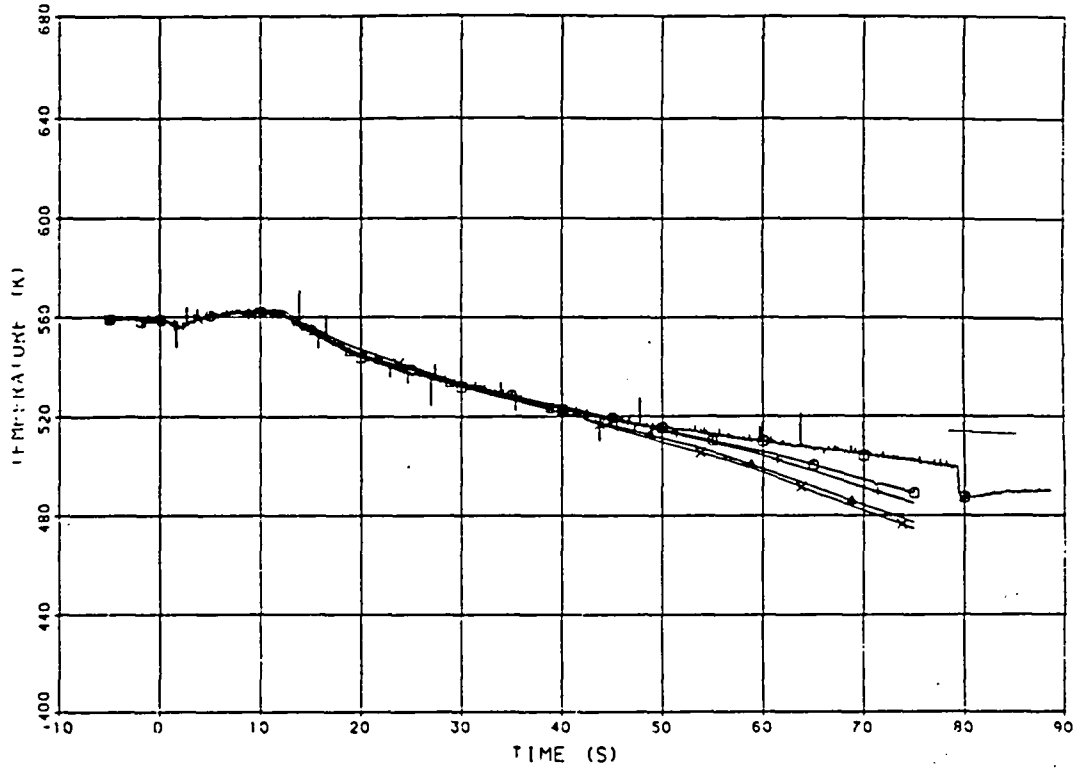
Plot B.10



RELAP5/MOD2 CALCULATION FOR FIX-11. EXP 3027

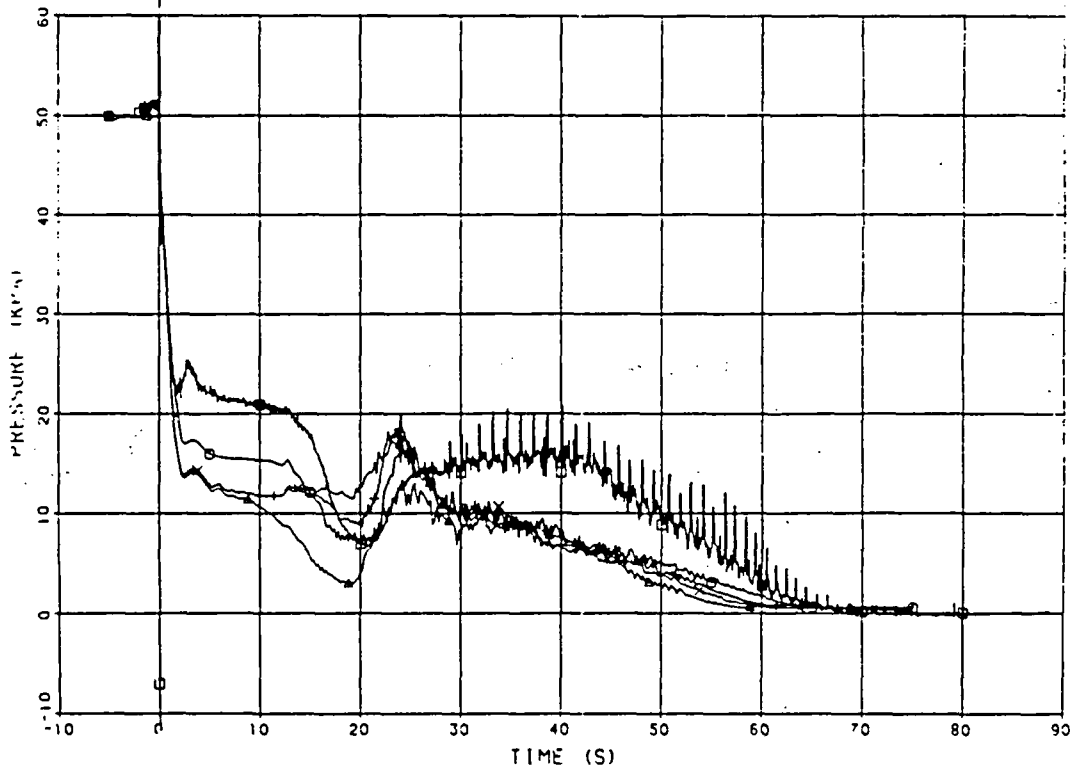
X + P 0 0 FLUID TEMPERATURE. CORE OUTLET (TE 14) - EXPERIMENT
 FLUID TEMPERATURE. CORE OUTLET (TEMPF S101) CASE A
 FLUID TEMPERATURE. CORE OUTLET (TEMPF S101) CASE B
 FLUID TEMPERATURE. CORE OUTLET (TEMPF S101) CASE C
 FLUID TEMPERATURE. CORE OUTLET (TEMPF S101) CASE D

Plot B.11



X + P 0 0 DIFF. PRESSURE. CORE (DPT 5 - DPT 6 - DPT 12) - EXPE
 DIFF. PRESSURE. CORE (FROM 401 - 9 S101) CASE A
 DIFF. PRESSURE. CORE (FROM 401 - 9 S101) CASE B
 DIFF. PRESSURE. CORE (FROM 401 - 9 S101) CASE C
 DIFF. PRESSURE. CORE (FROM 401 - 9 S101) CASE D

Plot B.12



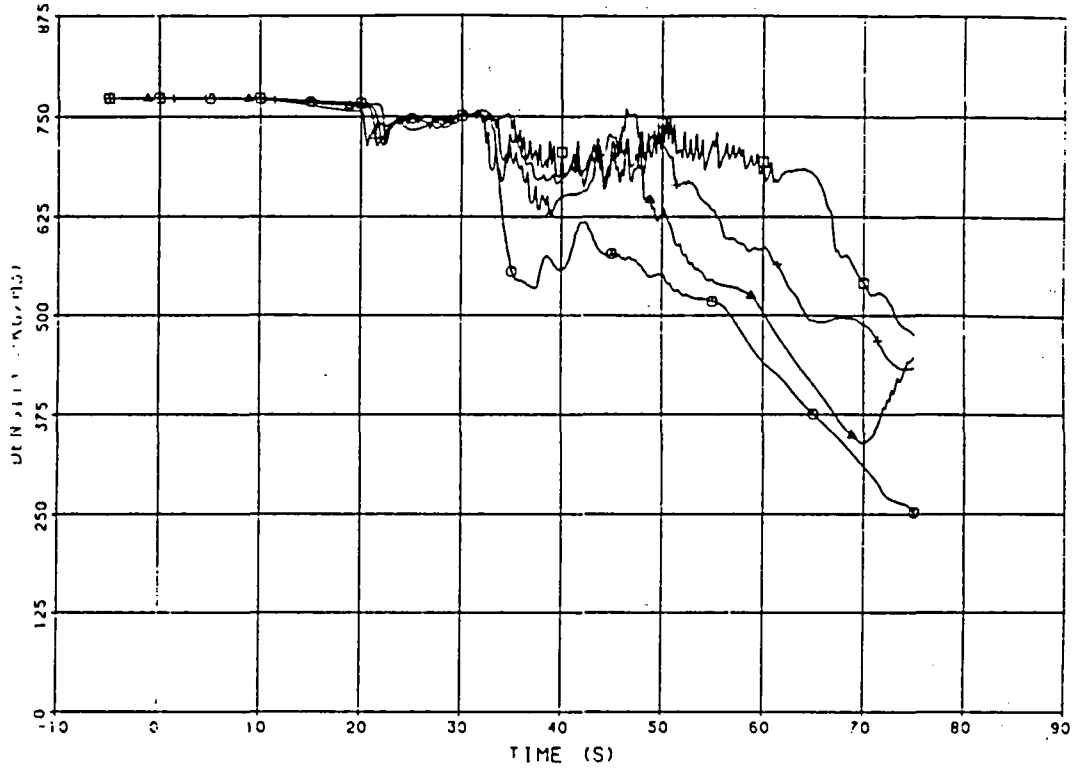
STUDSVIK/ NR-85/99 Appendix B.7
 1985-10-22

STUDSVIK ENERGITEKNIK AB

RELAPS/MOD2 CALCULATION FOR FIX-11, EXP 3027

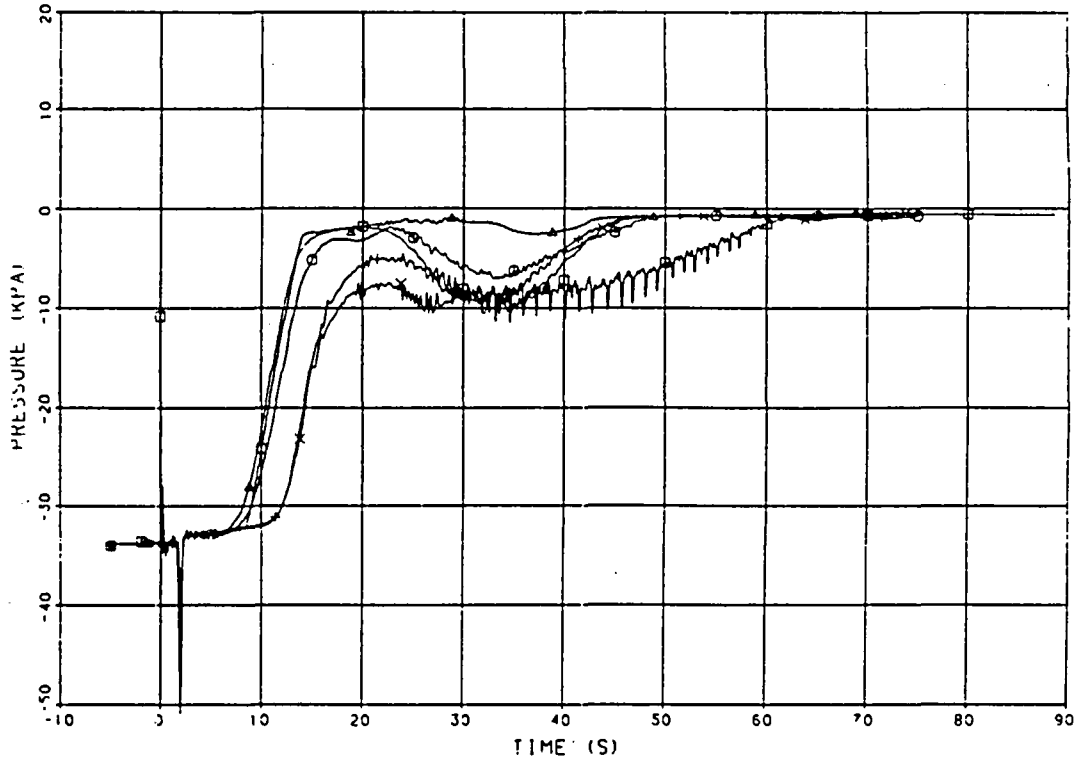
+>00 FLUID DENSITY, VESSEL BOTTOM (RHO 3101) CASE A
 FLUID DENSITY, VESSEL BOTTOM (RHO 3101) CASE B
 FLUID DENSITY, VESSEL BOTTOM (RHO 3101) CASE C
 FLUID DENSITY, VESSEL BOTTOM (RHO 3101) CASE D

Plot B.13



0000 DIFF. PRESSURE, DOWNCOMER (DPT 27 - DPT 33) - EXPERI
 X +>00 DIFF. PRESSURE, DOWNCOMER (FROM P 7103 - P 7201) CASE A
 DIFF. PRESSURE, DOWNCOMER (FROM P 7103 - P 7201) CASE B
 DIFF. PRESSURE, DOWNCOMER (FROM P 7103 - P 7201) CASE C
 DIFF. PRESSURE, DOWNCOMER (FROM P 7103 - P 7201) CASE D

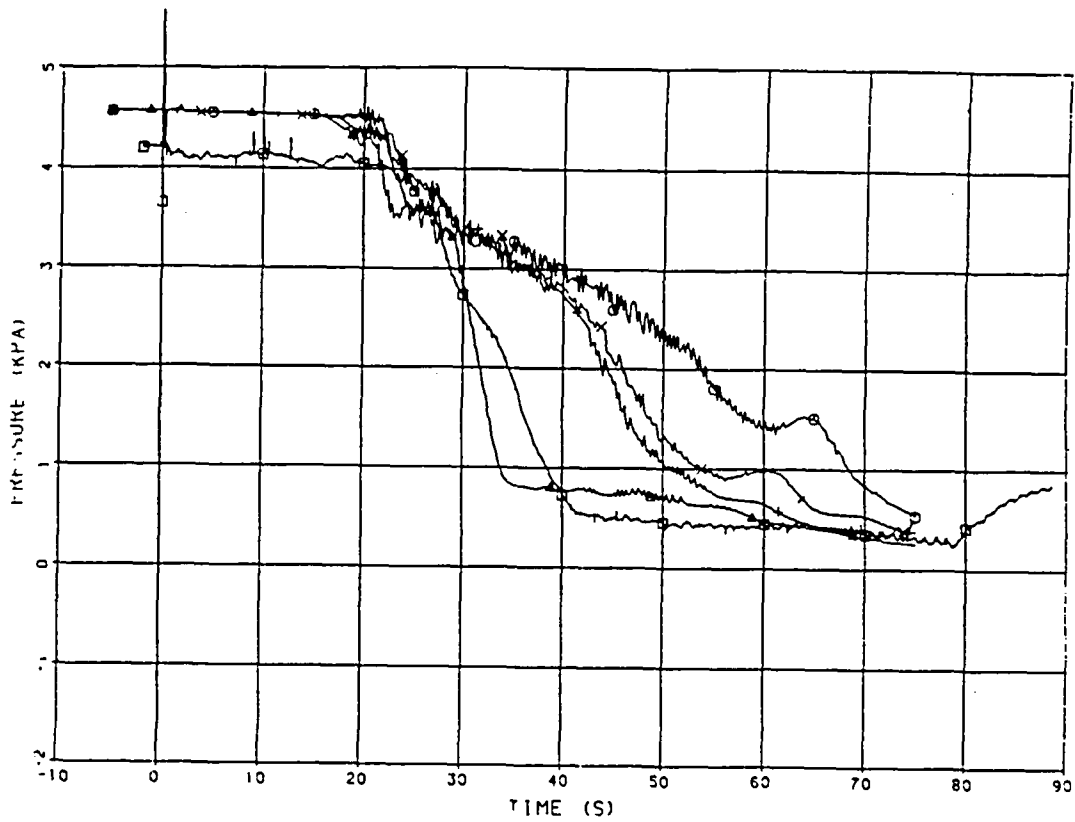
Plot B.14



RELAP5/MOD2 CALCULATION FOR FIX-II, EXP 3027

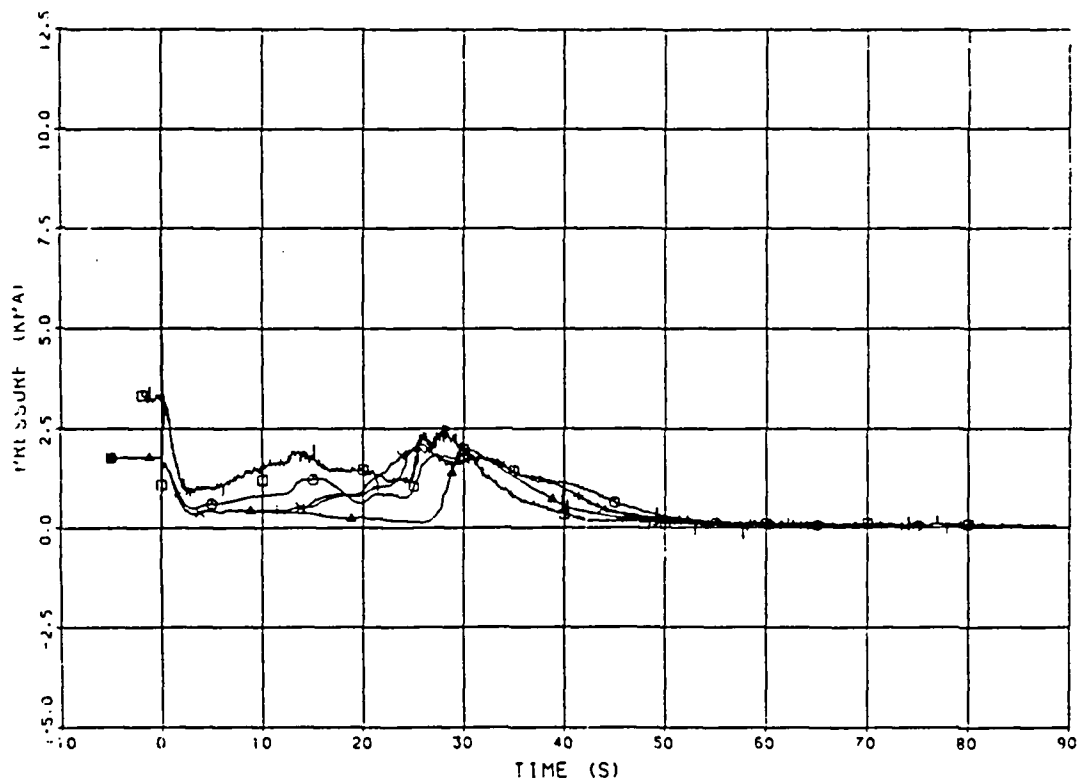
X+POG DIFF. PRESSURE, LOWER PLENUM (DPT 2 - DPT 3) - EXPERIMENT
 DIFF. PRESSURE, LOWER PLENUM (FROM P 3101 - P 3301) CASE A
 DIFF. PRESSURE, LOWER PLENUM (FROM P 3101 - P 3301) CASE B
 DIFF. PRESSURE, LOWER PLENUM (FROM P 3101 - P 3301) CASE C
 DIFF. PRESSURE, LOWER PLENUM (FROM P 3101 - P 3301) CASE D

Plot B.15



X+POG DIFF. PRESSURE, UPPER PLENUM (DPT 13 - DPT 14) - EXPERIMENT
 DIFF. PRESSURE, UPPER PLENUM (FROM P 5101 - P 5201) CASE A
 DIFF. PRESSURE, UPPER PLENUM (FROM P 5101 - P 5201) CASE B
 DIFF. PRESSURE, UPPER PLENUM (FROM P 5101 - P 5201) CASE C
 DIFF. PRESSURE, UPPER PLENUM (FROM P 5101 - P 5201) CASE D

Plot B.16



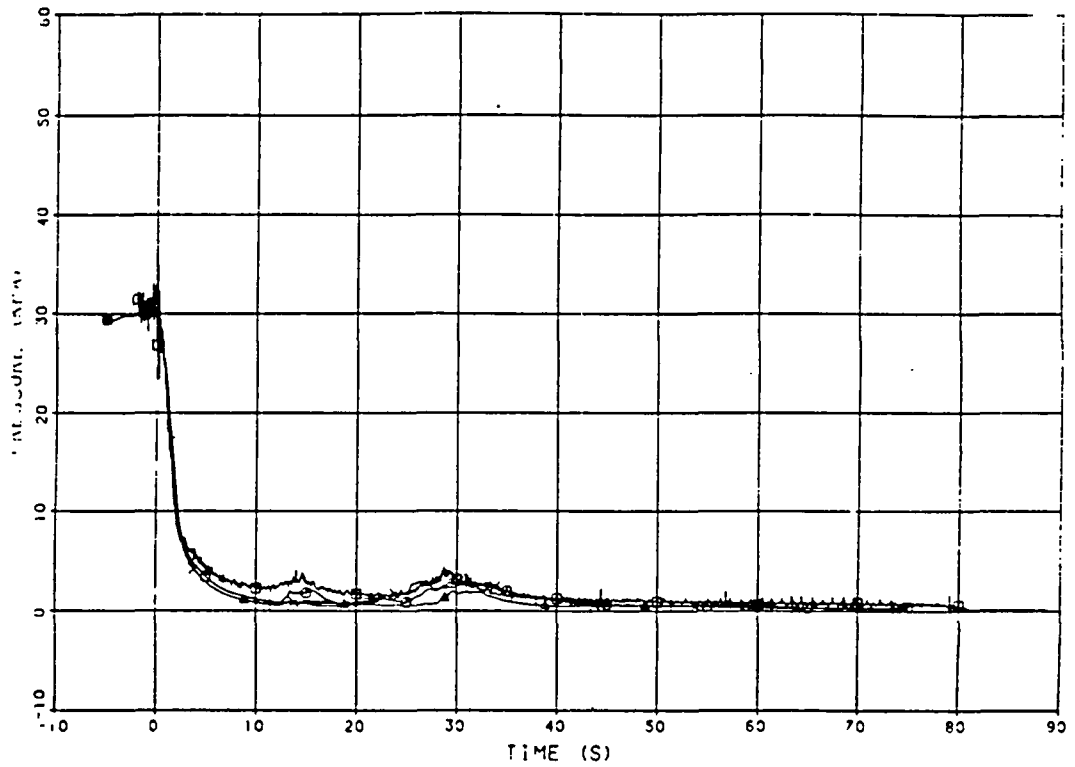
STUDSVIK/NR-85/99 Appendix B.9
1985-10-22

STUDSVIK ENERGITEKNIK AB

RELAP5/MOD2 CALCULATION FOR FIX-II, EXP 3027

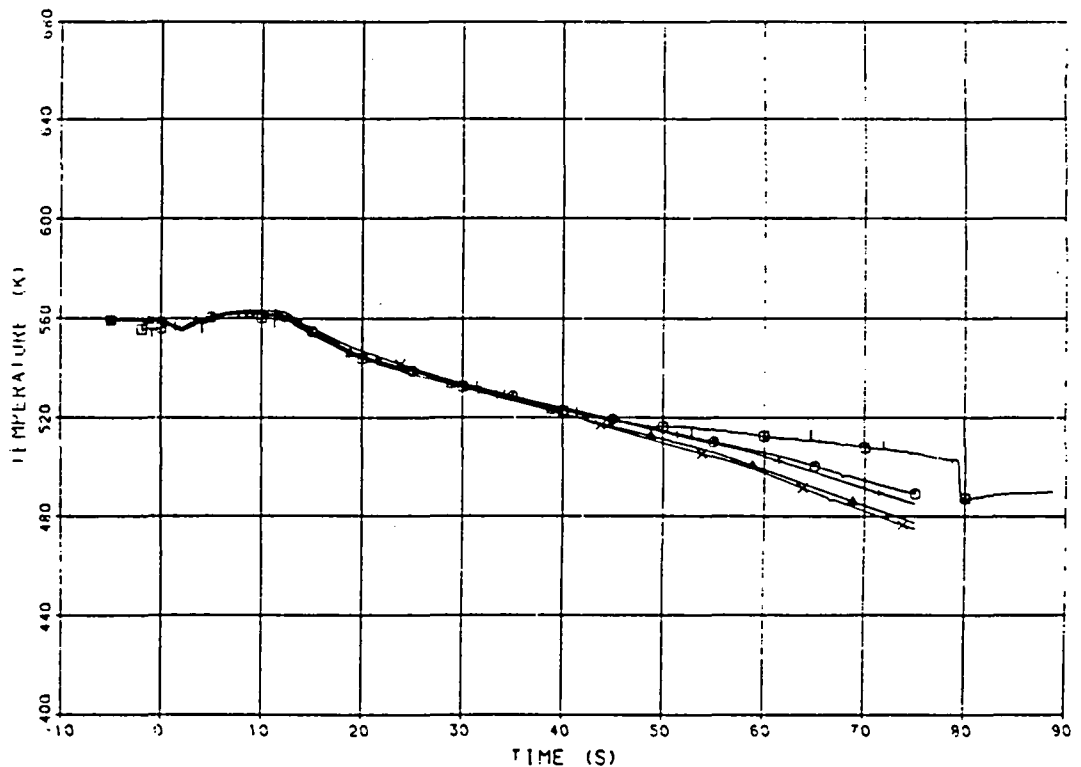
X+POB DIFF. PRESSURE, STEAM SEPARATOR ORIFICE (DPT 56) - EXPERIMENT
DIFF. PRESSURE, STEAM SEPARATOR ORIFICE (P 5201 - P 5202)
DIFF. PRESSURE, STEAM SEPARATOR ORIFICE (P 5201 - P 5202) C
DIFF. PRESSURE, STEAM SEPARATOR ORIFICE (P 5201 - P 5202)
DIFF. PRESSURE, STEAM SEPARATOR ORIFICE (P 5201 - P 5202)
DIFF. PRESSURE, STEAM SEPARATOR ORIFICE (P 5201 - P 5202) C

Plot B.17



X+POB FLUID TEMPERATURE, UPPER PLENUM (TE 15) - EXPERIMENT
FLUID TEMPERATURE, UPPER PLENUM (TEMP 5201) CASE A
FLUID TEMPERATURE, UPPER PLENUM (TEMP 5201) CASE B
FLUID TEMPERATURE, UPPER PLENUM (TEMP 5201) CASE C
FLUID TEMPERATURE, UPPER PLENUM (TEMP 5201) CASE D

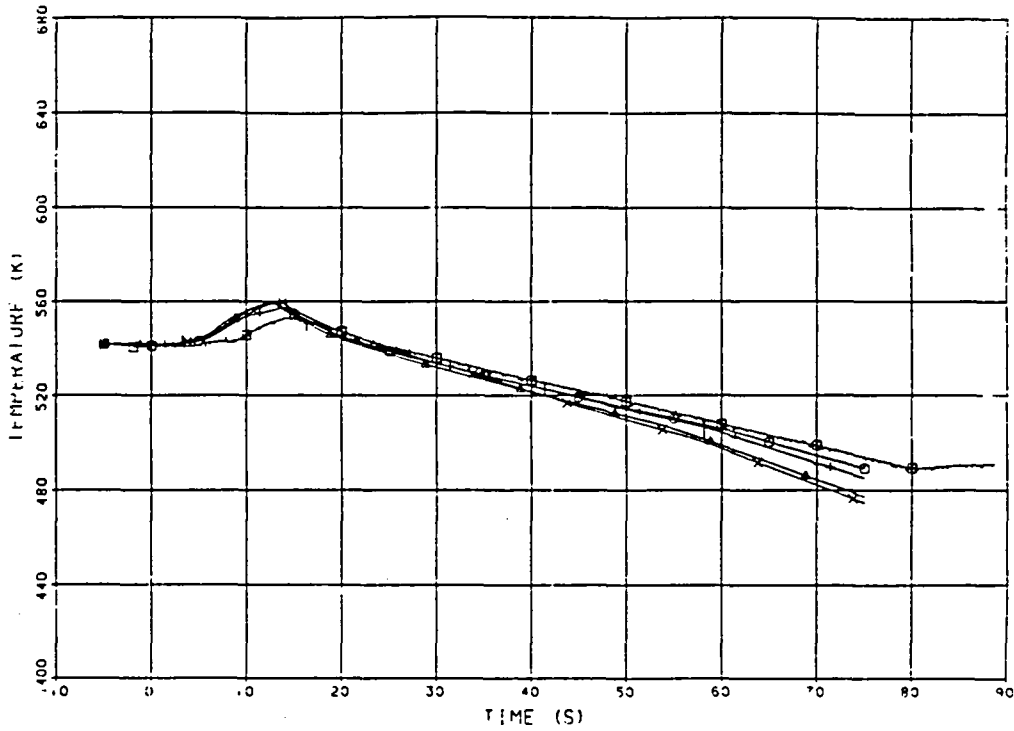
Plot B.18



RELAP5/MOD2 CALCULATION FOR FIX-11. EXP 3027

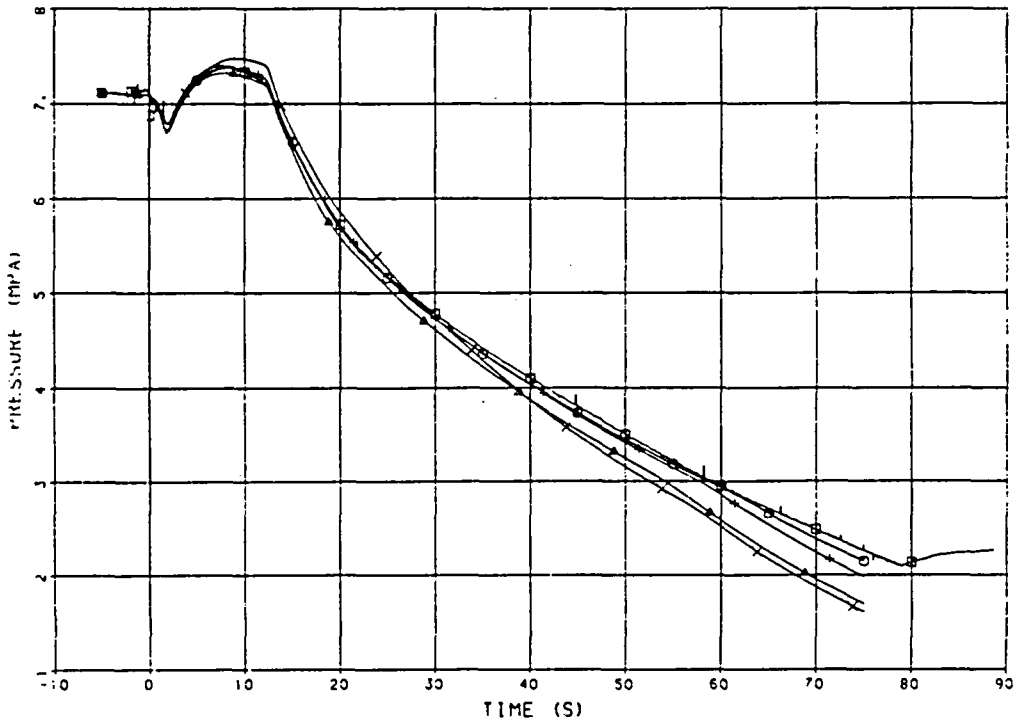
X + PDB
 FLUID TEMPERATURE. DOWNCOMER BOTTOM (TE 3) - EXPERIMENT
 FLUID TEMPERATURE. DOWNCOMER BOTTOM (TEMP 7108) CASE A
 FLUID TEMPERATURE. DOWNCOMER BOTTOM (TEMP 7108) CASE B
 FLUID TEMPERATURE. DOWNCOMER BOTTOM (TEMP 7108) CASE C
 FLUID TEMPERATURE. DOWNCOMER BOTTOM (TEMP 7108) CASE D

Plot B.19



X + PDB
 PRESSURE. LOWER PLENUM (PT 3) - EXPERIMENT
 PRESSURE. LOWER PLENUM (P 3101) CASE A
 PRESSURE. LOWER PLENUM (P 3101) CASE B
 PRESSURE. LOWER PLENUM (P 3101) CASE C
 PRESSURE. LOWER PLENUM (P 3101) CASE D

Plot B.20



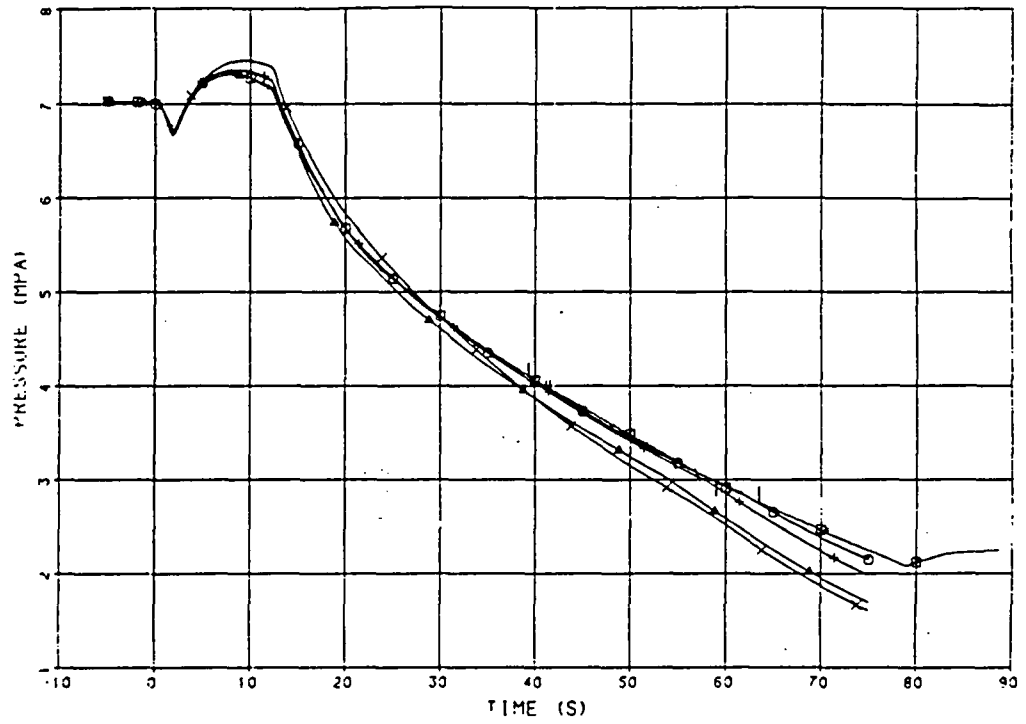
STUDSVIK/NR-85/99 Appendix B.11
1985-10-22

STUDSVIK ENERGITEKNIK AB

RELAP5/MOD2 CALCULATION FOR FIX-11. EXP 3027

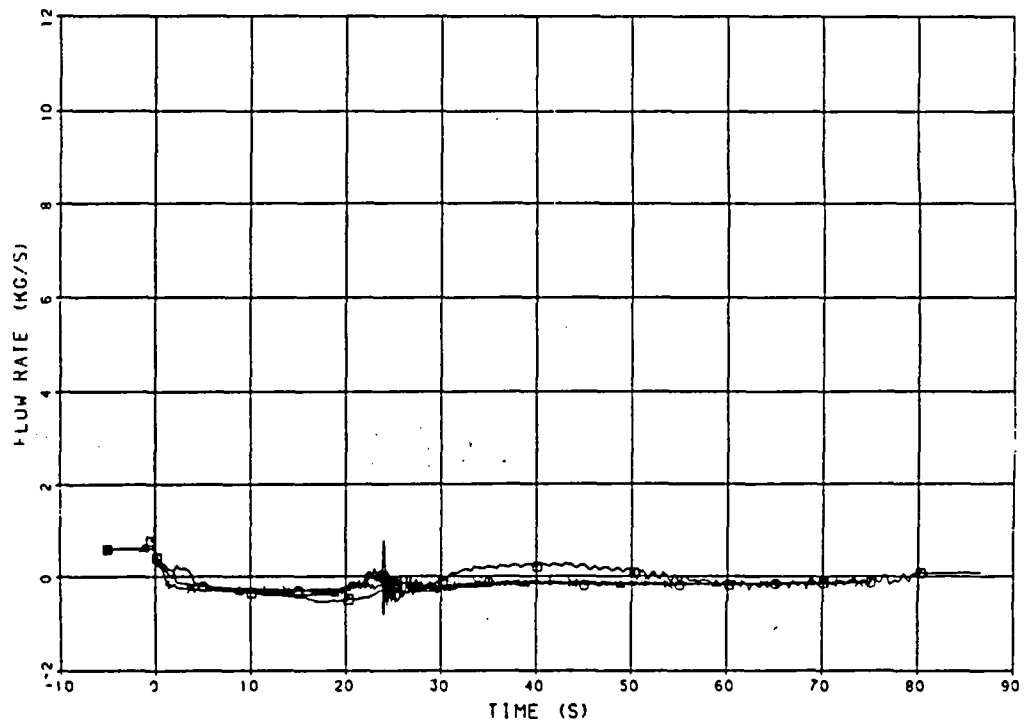
□ PRESSURE, UPPER PLENUM (PT 4) - EXPERIMENT
 ○ PRESSURE, UPPER PLENUM (P 5201) CASE A
 ▲ PRESSURE, UPPER PLENUM (P 5201) CASE B
 + PRESSURE, UPPER PLENUM (P 5201) CASE C
 x PRESSURE, UPPER PLENUM (P 5201) CASE D

Plot B.21



□ MASS FLOW RATE, BYPASS (CALCULATED) - EXPERIMENT
 ○ MASS FLOW RATE, BYPASS (MFLOWJ 117) CASE A
 ▲ MASS FLOW RATE, BYPASS (MFLOWJ 117) CASE B
 + MASS FLOW RATE, BYPASS (MFLOWJ 117) CASE C
 x MASS FLOW RATE, BYPASS (MFLOWJ 117) CASE D

Plot B.22



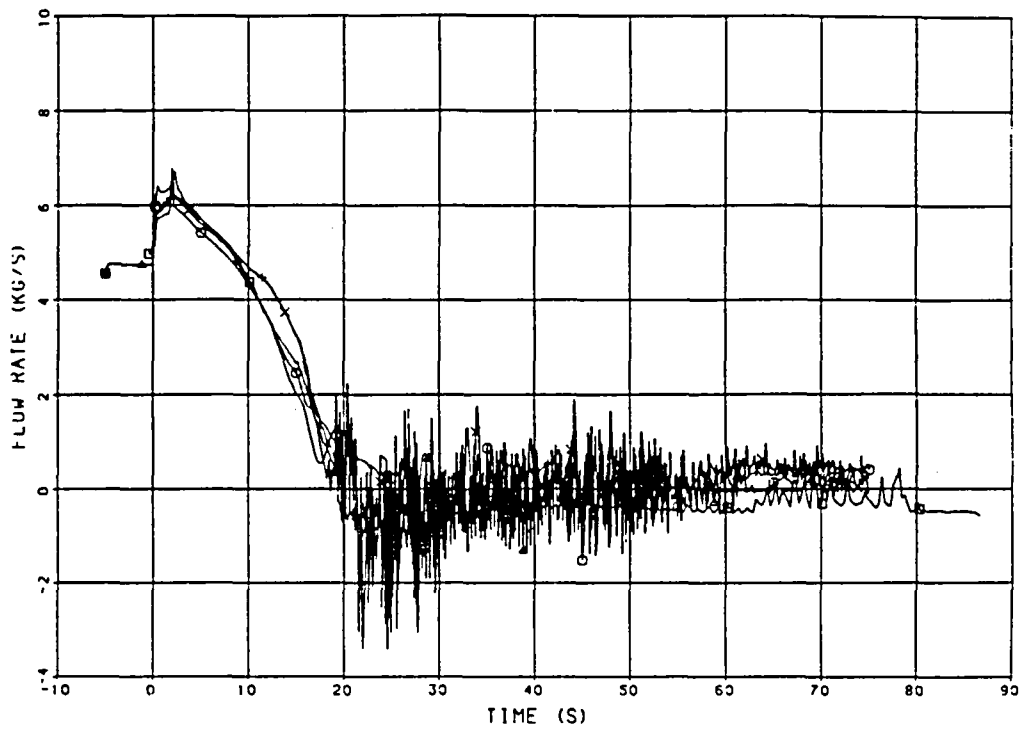
STUDSVIK/NR-85/99 Appendix B.12
1985-10-22

STUDSVIK ENERGITEKNIK AB

RELAP5/MOD2 CALCULATION FOR FIX-II, EXP 3027

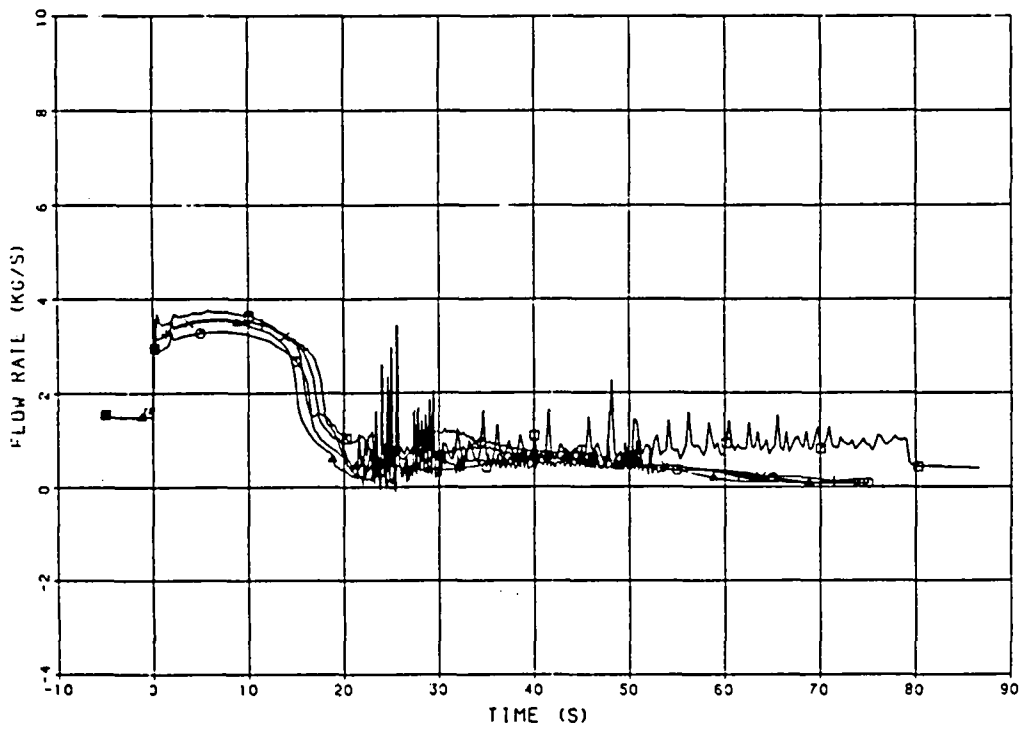
○○ MASS FLOW RATE. I.L. PUMP (CALCULATED) - EXPERIMENT
 ○○ MASS FLOW RATE. I.L. PUMP (MFLOWJ 20102) CASE A
 ○○ MASS FLOW RATE. I.L. PUMP (MFLOWJ 20102) CASE B
 ○○ MASS FLOW RATE. I.L. PUMP (MFLOWJ 20102) CASE C
 ○○ MASS FLOW RATE. I.L. PUMP (MFLOWJ 20102) CASE D

Plot B.23



○○ MASS FLOW RATE. B.L. PUMP (CALCULATED) - EXPERIMENT
 ○○ MASS FLOW RATE. B.L. PUMP (MFLOWJ 20202) CASE A
 ○○ MASS FLOW RATE. B.L. PUMP (MFLOWJ 20202) CASE B
 ○○ MASS FLOW RATE. B.L. PUMP (MFLOWJ 20202) CASE C
 ○○ MASS FLOW RATE. B.L. PUMP (MFLOWJ 20202) CASE D

Plot B.24



STUDSVIK/NR-85/99 Appendix B.13

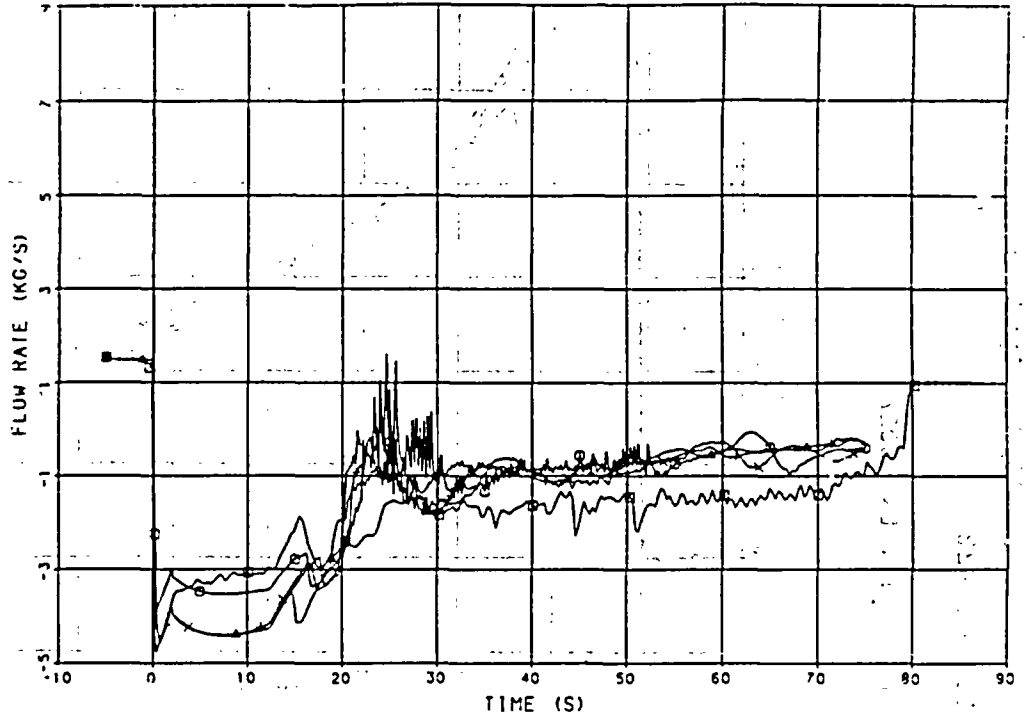
1985-10-22

RELAPS/MD2 CALCULATION FOR FIX-11, EXP 3027

STUDSVIK ENERGITEKNIK AB

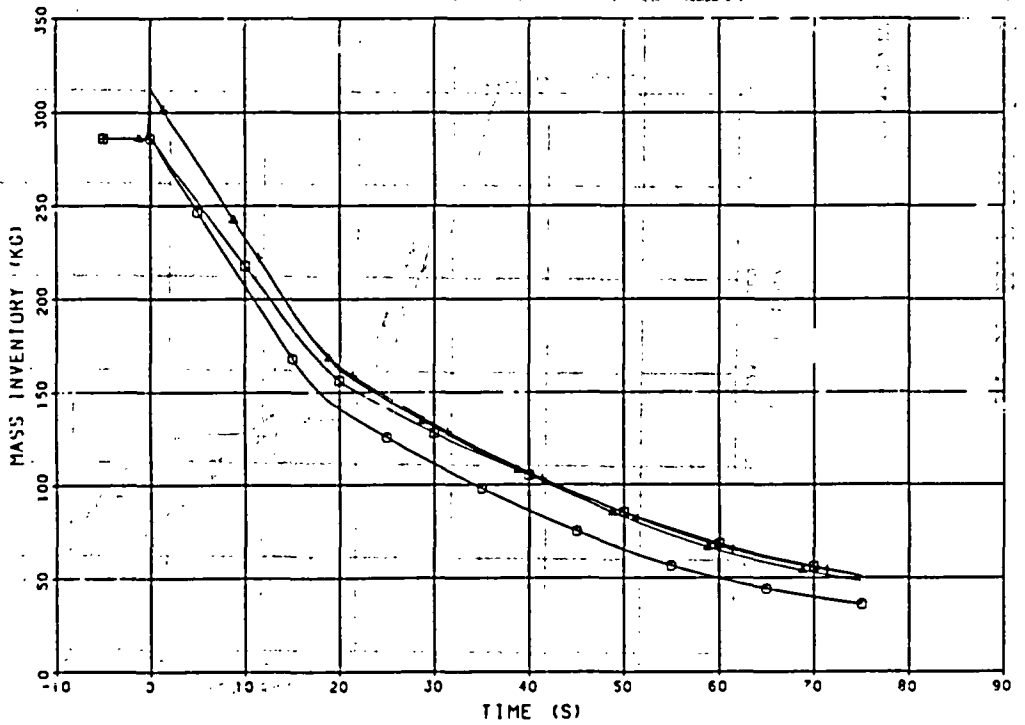
00400 MASS FLOW RATE, B.L. VESSEL INLET (SPOOL PIECE K10) - EXPER
X MASS FLOW RATE, B.L. VESSEL INLET (MFLOWJ 9702) CASE A
MASS FLOW RATE, B.L. VESSEL INLET (MFLOWJ 9702) CASE B
MASS FLOW RATE, B.L. VESSEL INLET (MFLOWJ 9702) CASE C
MASS FLOW RATE, B.L. VESSEL INLET (MFLOWJ 9702) CASE D

Plot B.25



+000 TOTAL MASS, IN SYSTEM CASE A
TOTAL MASS, IN SYSTEM CASE B
TOTAL MASS, IN SYSTEM CASE C
TOTAL MASS, IN SYSTEM CASE D

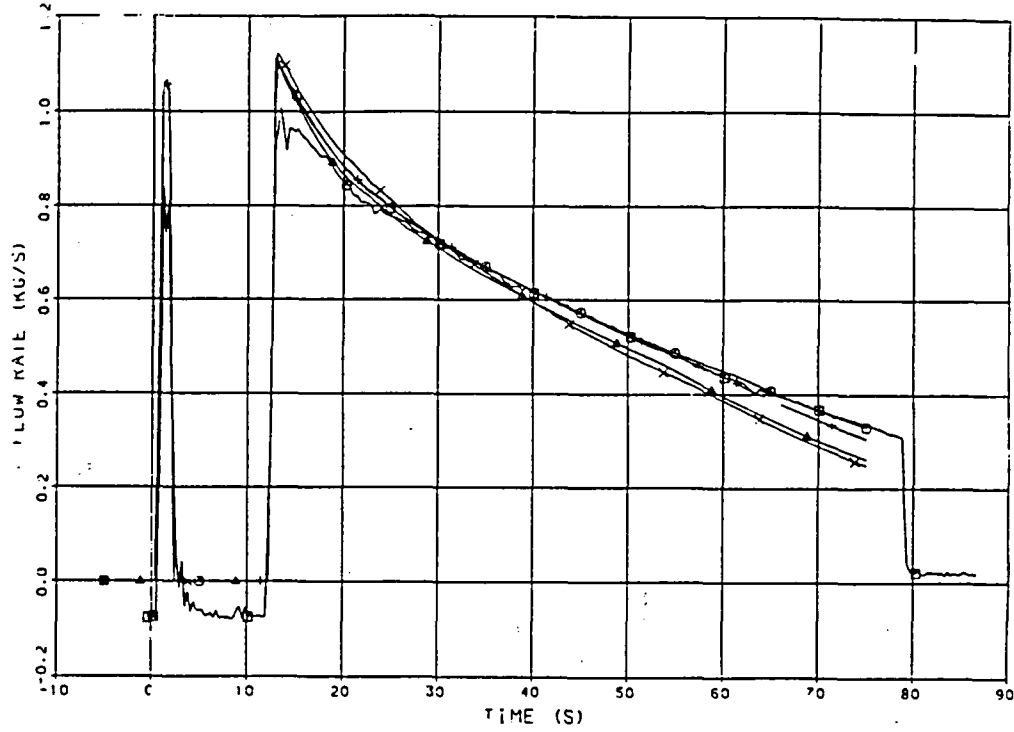
Plot B.26



RELAP5/MOD2 CALCULATION FOR FIX-11. EXP 3027

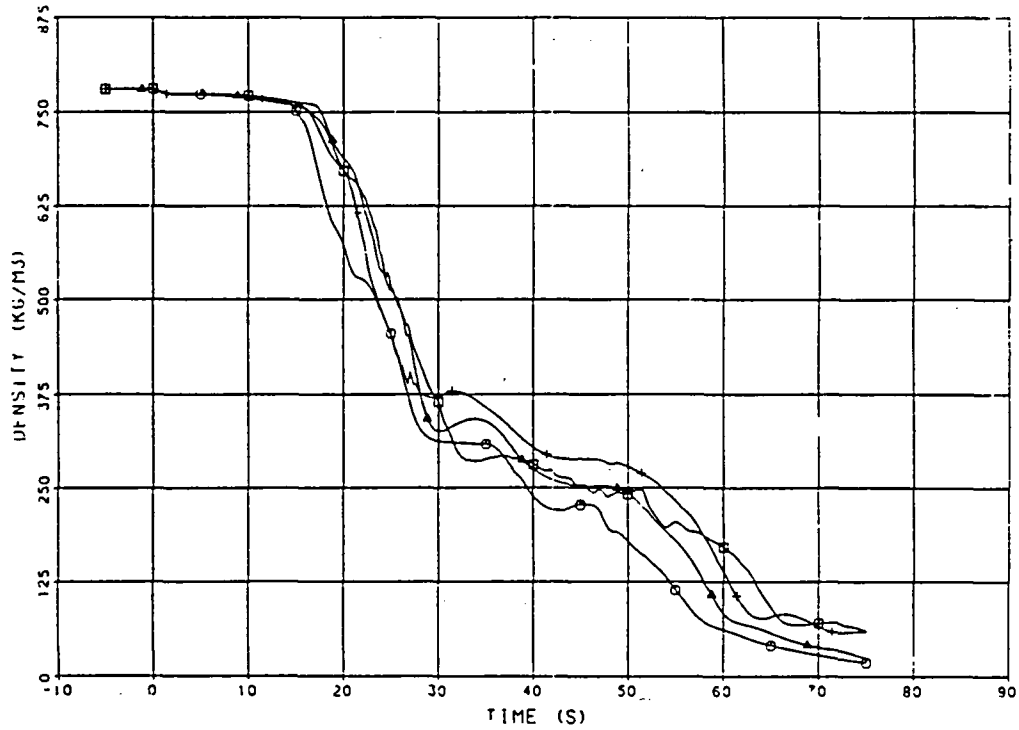
X+POB MASS FLOW RATE, STEAM RELIEF (CALCULATED) - EXPERIMENT
 MASS FLOW RATE, STEAM RELIEF (MFLOWJ 404) CASE A
 MASS FLOW RATE, STEAM RELIEF (MFLOWJ 404) CASE B
 MASS FLOW RATE, STEAM RELIEF (MFLOWJ 404) CASE C
 MASS FLOW RATE, STEAM RELIEF (MFLOWJ 404) CASE D

Plot B.27



↑POB FLUID DENSITY, BREAK (RHO 9601) CASE A
 FLUID DENSITY, BREAK (RHO 9601) CASE B
 FLUID DENSITY, BREAK (RHO 9601) CASE C
 FLUID DENSITY, BREAK (RHO 9601) CASE D

Plot B.28



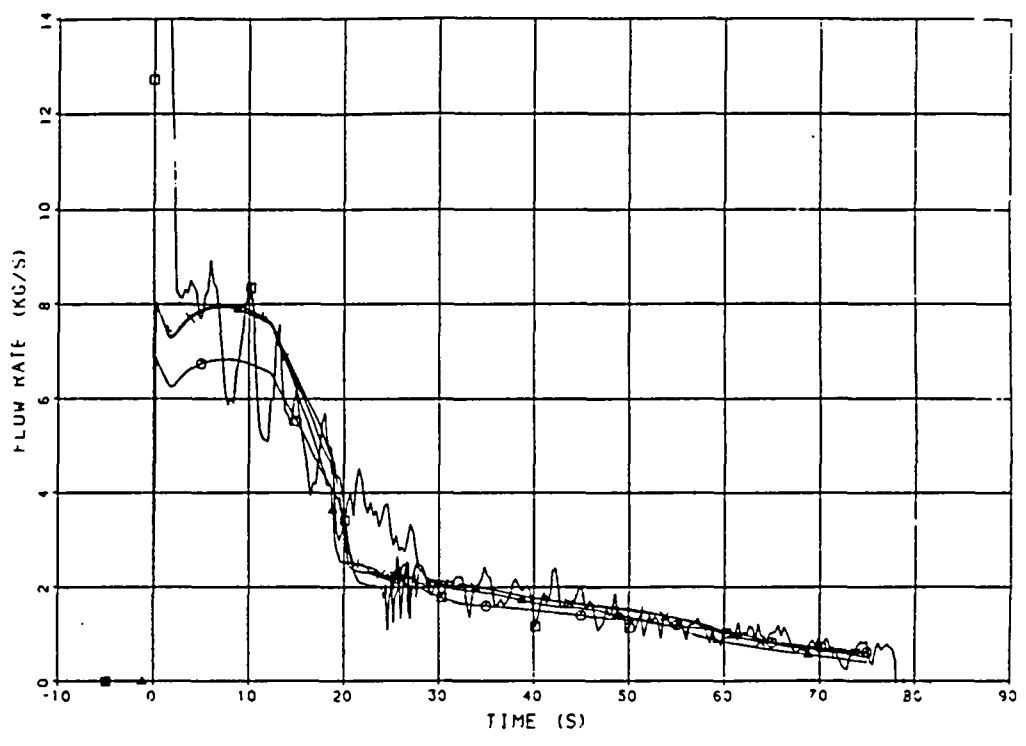
STUDSVIK/NR-85/99 Appendix B.15
1985-10-22

STUDSVIK ENERGITEKNIK AB

RELAP5/MOD2 CALCULATION FOR FIX-II. EXP 3027

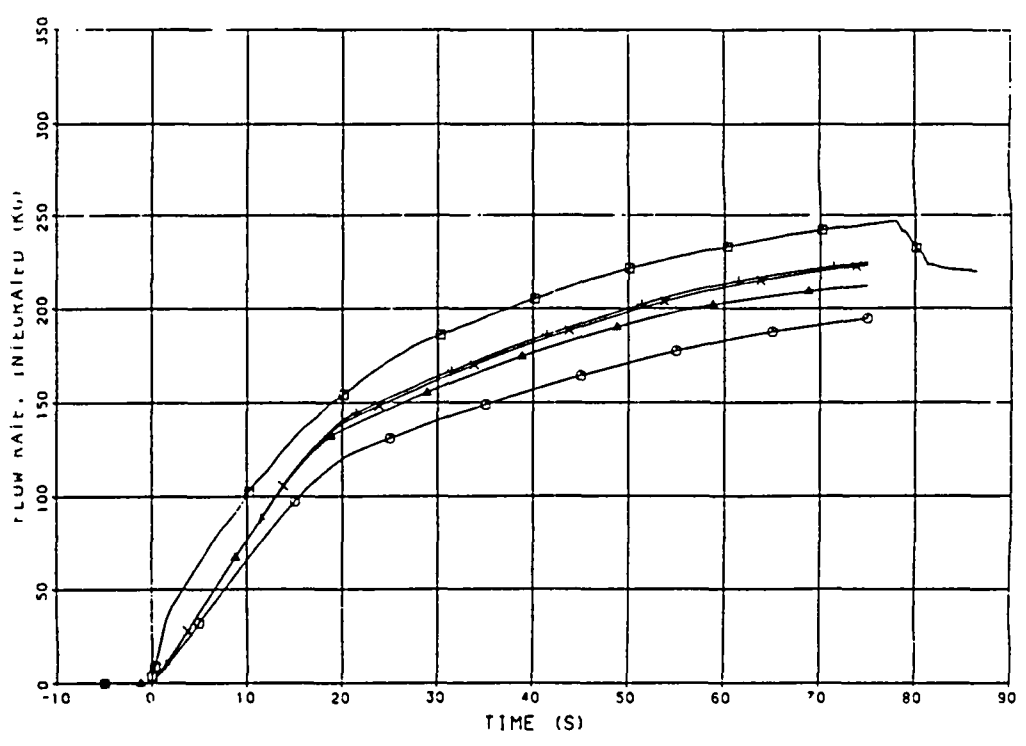
○ MASS FLOW RATE. BREAK FROM T2 INVENTORY (CALCULATED) - EXPE
 ○ MASS FLOW RATE. BREAK (MFLOWJ 152) CASE A
 ○ MASS FLOW RATE. BREAK (MFLOWJ 152) CASE B
 ○ MASS FLOW RATE. BREAK (MFLOWJ 152) CASE C
 ○ MASS FLOW RATE. BREAK (MFLOWJ 152) CASE D

Plot B.29



○ MASS LOSS. BREAK FLOW RECEIVER (CALCULATED) - EXPERIMENT
 ○ BREAK TOTAL MASS LOSS (CNTRLVAR 55) CASE A
 ○ BREAK TOTAL MASS LOSS (CNTRLVAR 55) CASE B
 ○ BREAK TOTAL MASS LOSS (CNTRLVAR 55) CASE C
 ○ BREAK TOTAL MASS LOSS (CNTRLVAR 55) CASE D

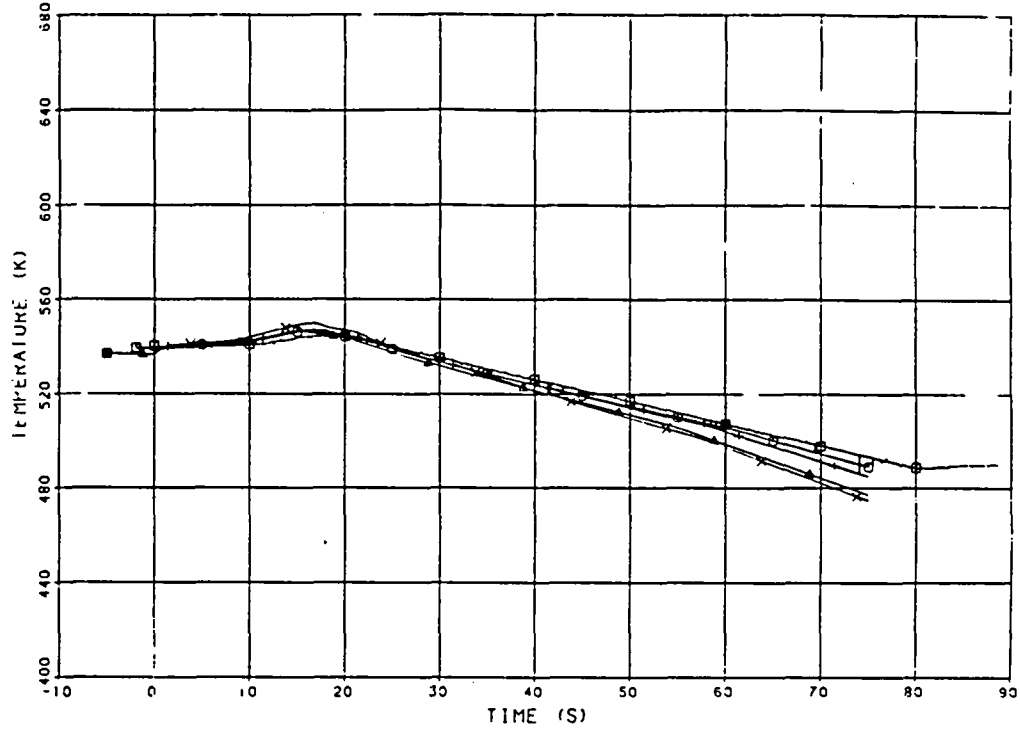
Plot B.30



RELAP5/MOD2 CALCULATION FOR FIX-11. EXP 3027

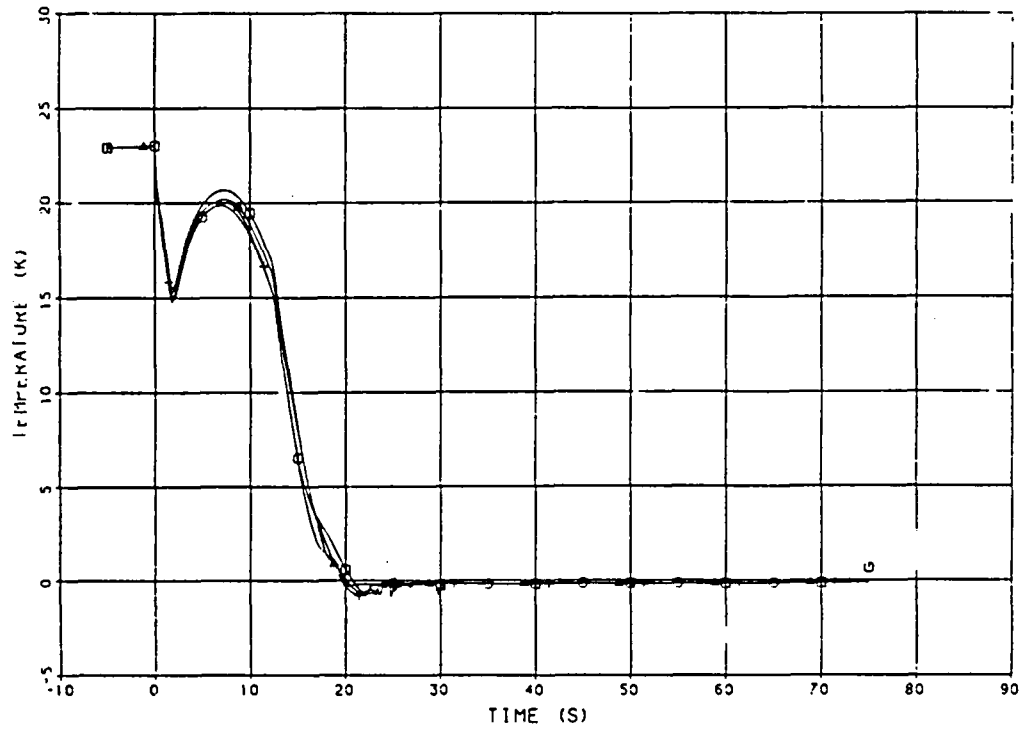
X + P 0 0
 FLUID TEMPERATURE. BREAK INLET (TE 34) - EXPERIMENT
 FLUID TEMPERATURE. BREAK INLET (TEMPF 9601) CASE A
 FLUID TEMPERATURE. BREAK INLET (TEMPF 9601) CASE B
 FLUID TEMPERATURE. BREAK INLET (TEMPF 9601) CASE C
 FLUID TEMPERATURE. BREAK INLET (TEMPF 9601) CASE D

Plot B.31



+ P 0 0
 SUBCOOLING. BREAK INLET (TEMP 9101) - TEMPF 9101 CASE A
 SUBCOOLING. BREAK INLET (TEMP 9101) - TEMPF 9101 CASE B
 SUBCOOLING. BREAK INLET (TEMP 9101) - TEMPF 9101 CASE C
 SUBCOOLING. BREAK INLET (TEMP 9101) - TEMPF 9101 CASE D

Plot B.32



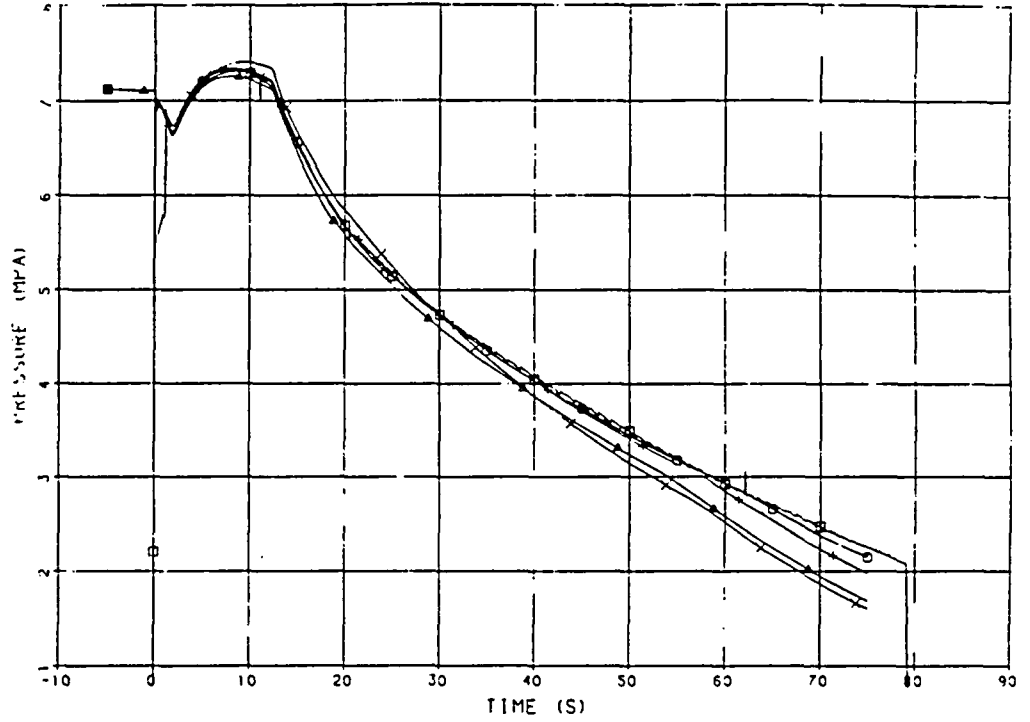
STUDSVIK/NR-85/99 Appendix B.17
1985-10-22

STUDSVIK ENERGITEKNIK AB

RELAP5/MOD2 CALCULATION FOR FIX-11. EXP 3027

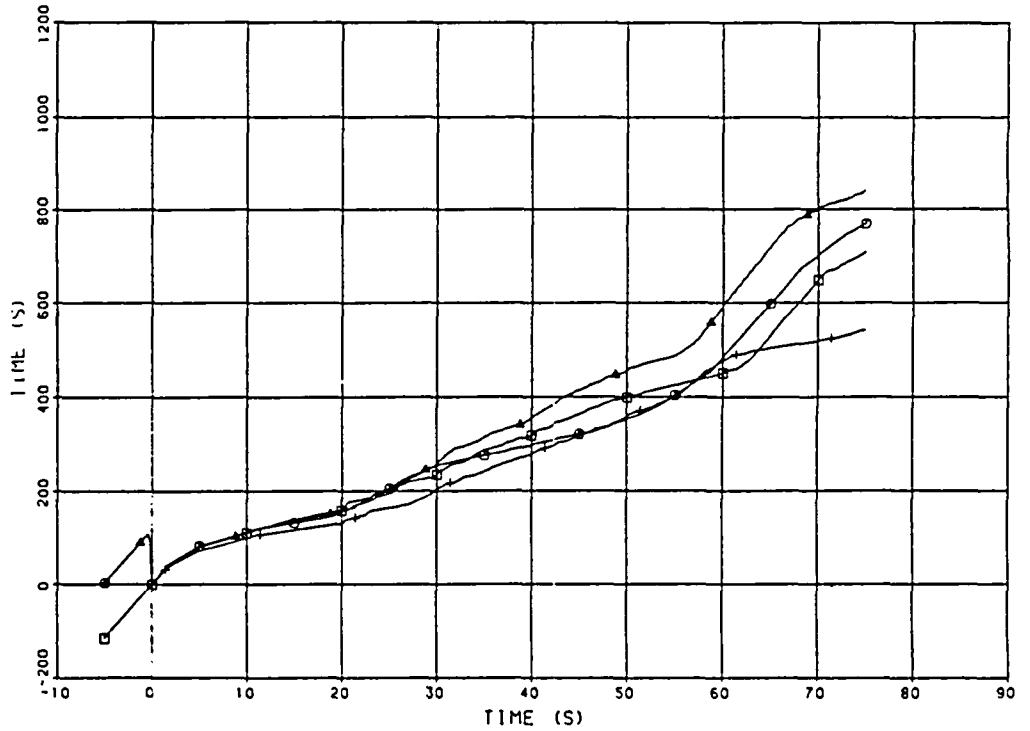
□ PRESSURE. BREAK INLET (PT 6) - EXPERIMENT
 ○ PRESSURE. BREAK INLET (P 9601) CASE A
 + PRESSURE. BREAK INLET (P 9601) CASE B
 × PRESSURE. BREAK INLET (P 9601) CASE C
 △ PRESSURE. BREAK INLET (P 9601) CASE D

Plot B.33



□ CPU TIME CASE A
 ○ CPU TIME CASE B
 + CPU TIME CASE C
 × CPU TIME CASE D

Plot B.34

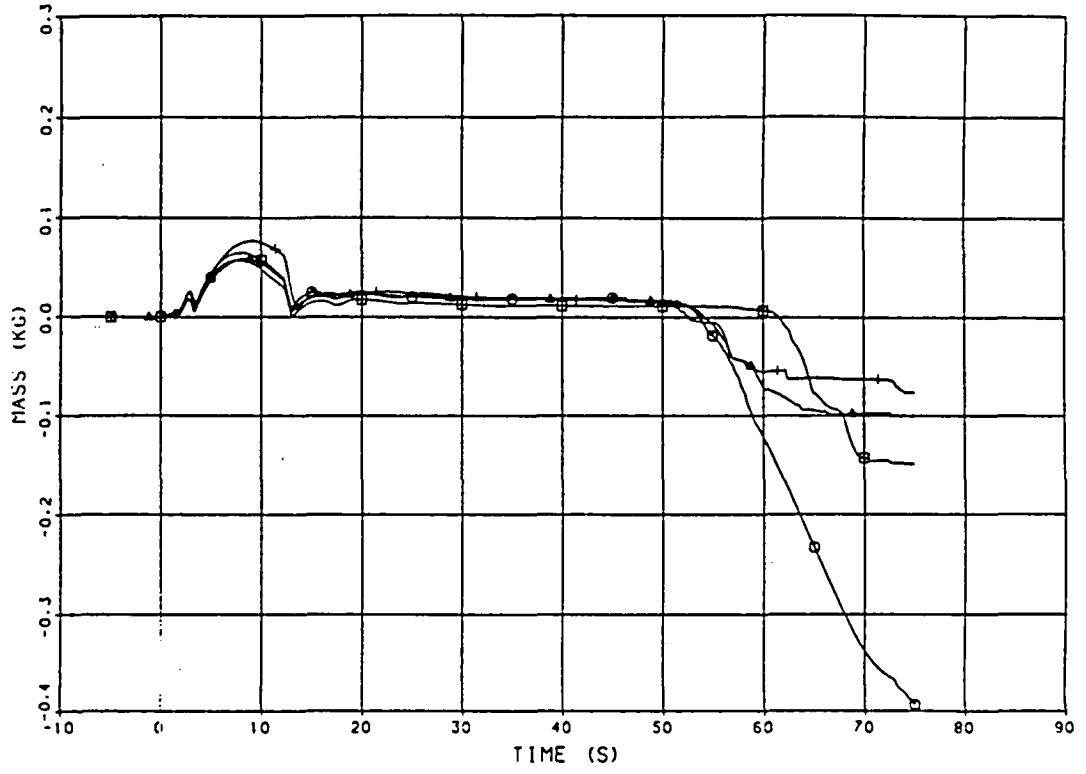


1985-10-22

RELAP5/MOD2 CALCULATION FOR FIX-11. EXP 3027

+	0.00	MASS ERROR	CASE A
		MASS ERROR	CASE B
		MASS ERROR	CASE C
		MASS ERROR	CASE D

Plot B.35



1985-10-22

Calculation to experiment data uncertainty

Case A

CONF CALCULATION-TO-EXPERIMENT DATA UNCERTAINTY ANALYSIS FOR NKC/ICAP.

FIRST LINE : DIFFERENCE BETWEEN CALCULATED AND (AVERAGED) EXPERIMENTAL DATA AT END OF THE INTERVAL
 SECOND LINE : MEAN DIFFERENCE OVER THE INTERVAL
 THIRD LINE : MEAN SIGMA OVER THE INTERVAL (ROOT MEAN SQUARE OF THE DIFFERENCE)

- CONF -		- - - - TIME INTERVAL - - - -							
CALC.	EXP.	0.0 - 4.00	12.00	18.00	24.00	30.00	45.00	60.00	75.00
P 1A - P 3	-.443E-01 -.609E-01 .693E-01	.432E-01 .664E-03 .321E-01	.104E-01 .543E-01 .612E-01	.135E-01 -.511E-02 .154E-01	-.301E-01 -.241E-01 .311E-01	-.622E-01 -.518E-01 .525E-01	-.127E-01 -.384E-01 .429E-01	-.165 -.621E-01 .724E-01	
P 2A - P 4	-.721E-01 -.230E-01 .305E-01	.402E-01 .409E-01 .514E-01	.432E-01 .468E-01 .923E-01	.364E-01 .207E-01 .231E-01	-.129E-01 -.167E-02 .161E-01	-.330E-01 -.240E-01 .260E-01	.119E-01 -.150E-01 .224E-01	-.866E-01 -.450E-01 .585E-01	
P 3A - P 5	-.340E-01 .255 .772	.648E-01 .112E-01 .323E-01	.183E-01 .656E-01 .714E-01	.372E-01 .197E-01 .300E-01	-.650E-02 .349E-02 .240E-01	-.546E-01 -.296E-01 .328E-01	.740E-02 -.198E-01 .278E-01	-.102 -.511E-01 .644E-01	
PD41 - D 4	-.445 .687 4.27	1.41 .429E-01 .413	2.20 2.36 2.61	.217 2.03 2.76	.786 1.49 1.55	.342 .981 1.07	.461 .839 1.14	.531 .590 .807	
PD4A - D LP	.444 .407 .430	.419 .422 .423	.365 .451 .453	.121 .262 .282	.491 .347 .382	2.28 1.67 1.79	.970 1.65 1.70	.251 .726 .789	
PD41 - D CO	-.4.97 -4.06 4.44	-5.58 -5.61 5.62	-4.95 -4.52 4.67	3.31 .943 1.76	-5.07 -1.00 3.25	-7.97 -7.24 7.38	-1.20 -4.31 4.66	.643 -357E-01 .743	
PD4A - D UP	-.444 -.645 .913	-.784 -.652 .661	-.496 -.566 .597	-.469 -.571 .594	-.446 -.477 .499	.496 .572 .614	-.333E-01 .111 .183	-.511E-01 -.413E-01 .465E-01	
PD4A - D DC	-.254 -.737 1.44	-4.78 -1.49 2.45	-1.04 -3.01 3.43	.964 -.506 .952	1.94 2.43 2.58	5.23 3.33 3.58	.921 3.41 4.12	.183 .119E-01 .259	
PD5A - D 56	-1.04 .820 2.14	-1.40 -1.15 1.16	-1.09 -1.12 1.24	-.549 -.801 .858	-.736 -.972 1.01	-.282 -.516E-01 .332	-.172 -.364 .384	-.167 -.388 .412	
MF1A - 1602	-.102E-01 -.136 -.183	.116 .620E-01 .693E-01	.204 .144 .142	.202 .232 .252	-.149 -.143 .217	-.362 -.369 .375	-.424E-01 -.184 .223	.440E-01 .723E-02 .483E-01	
MF2A - 1603	-.244 -.397 .431	.269E-01 -.144 .166	.333 .346 .421	-.842 -.775 1.03	-.520 -.404 1.16	.884 .332 .650	.680 .374 .653	.745 .404 .490	
MF3A - 1604	-.474 -.446 .484	-.373 -.410 .410	-.544 -.248 .361	-.654 -.409 .562	-.344 .129 .700	-.555E-01 -.265 .351	-.334 -.421 .550	-.822 -.763 .806	
MF4A - 1607	.705E-01 .931E-01 .160	.734E-01 .712E-01 .716E-01	.368E-01 .642E-01 .452E-01	.208E-01 .322E-01 .324E-01	.751E-02 .108E-01 .121E-01	.345E-02 .483E-02 .641E-02	.881E-02 .530E-02 .651E-02	-.402E-02 .334E-02 .719E-02	
MF4A - 1610	-.237 .231 .567	-.371 -.363 .364	-.245 -.510 .533	1.41 .628 1.14	.659 1.38 1.51	1.17 .694 .734	.840 .851 .890	.574 .872 .933	
MF4A - 1636	-.2.14 -.4.31 7.30	1.50 -.179 1.14	-1.28 .560E-01 .667	-1.47 -1.02 1.36	-.140E-01 -.893 1.10	-.619 -.320 .410	-.950E-02 -.201E-01 .195	-.218 -.534E-01 .178	
TF1A - T 3	2.42 1.95 2.00	2.91 3.16 3.39	5.53 3.71 3.61	3.85 5.97 6.07	3.65 3.40 3.41	.800 1.37 1.99	-2.93 -1.79 1.89	-11.6 -6.25 6.78	
TF2A - T 14	.250 -.417E-01 .750	-.690 .282 .580	.750 1.17 1.32	1.54 1.11 1.18	.530 1.36 1.74	.370 1.15 1.34	-4.18 -1.73 2.40	-12.8 -8.49 8.91	
TF4A - T 15	.960 1.26 1.39	2.47 1.70 1.77	1.41 1.66 1.67	1.71 1.75 1.27	1.23 1.20 1.23	.820 1.15 1.17	-6.66 -3.12 3.92	-16.3 -11.7 12.0	
TF3A - T 31	1.43 1.02 1.14	6.14 6.42 6.80	-.320 3.40 4.56	-1.69 -1.64 1.71	-1.93 -1.99 2.02	-2.61 -2.36 2.38	-1.00 -2.44 2.53	-4.73 -3.29 3.42	
TF4A - T 34	.960 .799 1.05	2.31 1.29 1.34	1.35 2.36 2.39	-.700E-01 .317 .546	-1.25 -1.27 1.36	-2.01 -1.91 1.92	-1.63 -1.94 1.96	-3.96 -2.72 2.89	

1985-10-22

- CODES -		- - - TIME INTERVAL - - -							
CALC.	EXP.	0.0 - 6.000	- 12.00	- 18.00	- 24.00	- 30.00	- 45.00	- 60.00	- 75.00
MT1A - TC 1		-4.90 -4.17 4.23	-2.50 -1.43 3.53	-1.84 -2.41 2.43	-2.20 -2.15 2.19	-2.34 -2.34 2.36	-2.67 -2.31 2.33	-1.31 -2.09 2.14	-21.0 -7.02 9.51
MT2A - TC 3		1.10 1.94 2.04	2.56 2.00 2.02	2.60 2.11 2.13	1.74 1.64 1.64	1.44 1.44 1.45	1.30 1.32 1.34	-0.570 1.29 1.33	12.4 0.39 6.70
MT3A - TC 5		-4.95 -4.92 4.03	-2.54 -3.73 3.80	-2.00 -2.23 2.24	-1.72 -1.75 1.78	-1.49 -1.74 1.75	-1.68 -1.65 1.65	-28.6 -6.84 10.8	-31.9 -31.4 31.4
MT4A - TC 9		-1.450 -1.39 1.44	-1.20 -1.19 1.20	-1.46 -1.08 1.12	-0.830 -0.868 0.985	-0.190 -0.432 0.463	-0.130 -0.117 0.197	-53.0 -19.4 26.0	-59.8 -56.6 56.6
MT5A - TC12		1.45 0.301 1.64	0.470 0.914 1.00	0.450 0.344 0.421	0.440 0.268 0.349	0.140 0.352E-01 0.219	0.600E-01 0.877E-01 0.168	-38.9 -13.3 16.2	-28.0 -33.4 33.8
MT6A - TC15		1.46 0.249 1.60	0.410 0.576 0.640	0.640 0.444 0.508	0.840 0.217 0.372	0. 0.983E-01 0.330	-0.800E-01 -0.543E-01 0.176	-34.9 -15.6 19.2	-43.6 -41.2 41.2
ML1A - X661		-35.0 -25.7 27.0	-35.1 -34.9 34.9	-34.8 -34.1 34.1	-40.3 -35.9 36.0	-45.2 -43.3 43.3	-50.0 -47.3 47.3	-50.1 -50.1 50.1	-50.8 -50.4 50.4
MP1A - X801		-0.127 -0.141 0.169	-0.435E-01 -0.403E-01 0.444E-01	-0.145E-01 -0.386E-01 0.408E-01	-0.440E-03 -0.498E-02 0.655E-02	0.616E-02 -0.194E-03 0.373E-02	0.224E-02 0.461E-02 0.483E-02	-0.679E-02 -0.177E-02 0.316E-02	-0.169E-01 -0.119E-01 0.122E-01

1985-10-22

Case B

CODE CALCULATION-TO-EXPERIMENT DATA UNCERTAINTY ANALYSIS FOR NRC/ICAAP.

FIRST LINE : DIFFERENCE BETWEEN CALCULATED AND (AVERAGED) EXPERIMENTAL DATA AT END OF THE INTERVAL
 SECOND LINE : MEAN DIFFERENCE OVER THE INTERVAL
 THIRD LINE : MEAN SIGMA OVER THE INTERVAL (ROOT MEAN SQUARE OF THE DIFFERENCE)

- CODES -		- - - - TIME INTERVAL - - - -							
CALC.	EXP.	0.0 - 6.000	- 12.00	- 18.00	- 24.00	- 30.00	- 45.00	- 60.00	- 75.00
P 11 - F 3		-.850E-01 -.851E-01 .937E-01	-.188E-01 -.587E-01 .404E-01	-.123 -.421E-01 .653E-01	-.749E-01 -.100 .103	-.142 -.130 .132	-.251 -.203 .205	-.360 -.273 .274	-.419 -.476 .480
P 24 - F 4		-.614E-01 -.422E-01 .491E-01	.184E-01 -.105E-01 .743E-01	-.861E-01 -.301E-02 .534E-01	-.460E-01 -.707E-01 .745E-01	-.174 -.103 .106	-.218 -.173 .175	-.333 -.244 .244	-.539 -.457 .461
P 35 - P 6		-.960E-01 .210 .748	-.274E-01 -.685E-01 .716E-01	-.116 -.479E-01 .656E-01	-.527E-01 -.764E-01 .813E-01	-.117 -.111 .115	-.245 -.184 .187	-.343 -.256 .258	-.558 -.468 .472
PD4V - F 4		-2.78 -1.34 4.55	.860 -1.38 1.73	2.41 1.75 2.20	-1.68 1.64 2.41	.150 .721 .903	.924E-01 .413 .570	.304 .794 1.16	-.968E-03 .159 .600
PDLF - D LP		.443 .405 .428	.415 .414 .419	.291 .432 .435	-.131 .418E-01 .255	.292 .682E-01 .197	.225 -.301 .575	.400E-01 .210 .219	-.709E-01 -.268E-01 .447E-01
PDCH - D CO		-9.20 -7.12 8.18	-11.3 -9.95 9.96	-5.87 -10.4 10.6	-.640E-01 -1.83 2.97	-5.88 -3.61 4.13	-9.23 -7.75 7.85	-2.23 -6.23 6.47	.321 -.200 .876
PDUP - D UP		-.714 -.797 .987	-1.25 -.995 1.01	-1.19 -1.33 1.33	-1.06 -1.13 1.13	-.245 -1.39 1.51	.819E-01 -.311 .342	-.389E-01 -.238E-01 .581E-01	-.724E-01 -.509E-01 .556E-01
PDDB - D DC		-.161 -.183 1.44	.654 1.19 1.37	-.108E-01 -.210 .652	1.98 .446 .753	6.95 5.23 5.56	6.63 6.59 6.64	.917 4.00 4.38	.165 .250 .297
PD54 - D 56		-1.54 -.158 1.89	-1.56 -1.52 1.53	-1.47 -1.96 1.49	-.946 -1.06 1.07	-1.08 -1.84 1.91	-.554 -.638 .673	-.388 -.472 .484	-.353 -.493 .508
MF1R - 1A02		-.794E-01 -.246 .285	-.553E-01 -.107E-02 .325E-01	.152 .765E-01 .841E-01	.144 .179 .186	-.867E-01 .874E-01 .159	-.374 -.359 .365	-.436E-01 -.197 .234	.677E-01 .286E-01 .555E-01
MF2R - 1A03		-.644E-01 -.229 .298	-.571E-01 -.222E-01 .533E-01	-.486E-01 .460 .523	.374 -1.28 1.47	.544 .268 1.22	.888 .429E-01 .484	.465 .344 .590	.150 .240 .313
MF3L - 1A04		-.231 -.229 .267	-.189 -.192 .192	-.674 -.501 .596	-.494 -.694 .710	-.216 -.219 .318	.118E-01 -.247 .353	-.524 -.497 .598	-.829 -.856 .871
MF5R - 1A07		.705E-01 .928E-01 .140	.739E-01 .712E-01 .716E-01	.183E-01 .495E-01 .737E-01	.801E-02 .168E-01 .176E-01	-.862E-02 -.551E-02 .889E-02	-.251E-01 -.176E-01 .188E-01	-.442E-01 -.304E-01 .308E-01	-.728E-01 -.597E-01 .605E-01
MF4R - 1A10		-1.11 -.578 .839	-1.22 -1.23 1.23	-.281 -1.27 1.36	.987 .773 .948	-.657E-01 .247 .507	1.18 .603 .721	.852 .936 .956	.694 .955 .965
MF4R - 1A36		-1.02 -4.26 4.63	2.53 .904 1.44	-1.17 .704 1.02	-1.26 -1.20 1.29	.174 -.624 .807	-.470 -.111 .284	-.229 -.277E-01 .190	-.427 -.233 .285
TF1P - T 3		2.44 1.96 2.00	2.90 3.17 3.40	7.98 5.28 5.52	2.17 5.84 6.26	1.98 2.02 2.05	-3.76 -.938 2.03	-9.73 -5.97 6.19	-23.4 -15.6 16.1
TF2P - T 14		-.300 -.257 .820	-1.32 -.248 .561	-.730 .185 .671	.440 -.375E-02 .478	-.920 .733E-02 1.09	-2.60 -1.02 1.28	-11.0 -5.87 6.45	-24.7 -17.9 18.3
TF4P - T 15		1.01 1.28 1.41	1.81 1.37 1.42	-.900E-01 .715 .863	.710 .161 .402	-.230 -.166 .388	-2.17 -1.05 1.17	-13.4 -7.24 7.99	-28.1 -21.0 21.5
TF3L - T 31		2.22 1.17 1.33	8.88 7.63 8.02	-1.76 2.64 4.46	-2.73 -2.72 2.74	-3.58 -3.38 3.40	-5.61 -4.62 4.66	-7.89 -6.60 6.67	-16.5 -12.7 12.9
TF5R - T 34		1.05 .408 1.08	2.87 1.59 1.66	.420 2.33 2.46	-1.59 -.635 1.02	-2.99 -2.80 2.85	-5.06 -4.19 4.22	-8.58 -6.19 6.26	-15.9 -12.3 12.5

1985-10-22

- CODES -		- - - - TIME INTERVAL - - - -							
CALC.	EXP.	0.0 - 4.000	- 12.00	- 14.00	- 24.00	- 30.00	- 45.00	- 60.00	- 75.00
HT14	- TC 1	-4.48 -4.13 4.19	-2.56 -3.42 3.51	-1.96 -2.41 2.43	-3.00 -3.48 3.54	-3.48 -3.51 3.54	-5.51 -4.43 4.47	-7.47 -5.95 5.99	-20.4 -14.7 15.8
HT24	- TC 3	1.44 2.44 2.44	2.35 2.04 2.07	.660 1.45 1.58	.930 .579 .640	.100E+00 .443 .466	-1.57 -.784 .956	15.3 -1.81 5.13	48.7 27.7 28.7
HT34	- TC 5	-4.21 -4.43 4.44	-2.73 -3.52 3.56	-3.28 -2.93 2.96	-2.53 -2.81 2.83	-2.81 -2.94 2.95	-4.56 -3.74 3.77	-4.430 -4.00 4.32	-2.20 -2.45 2.51
HT40	- TC 6	-1.23 -1.44 1.73	-1.39 -1.30 1.32	-2.67 -1.74 1.82	-1.83 -1.84 1.93	-1.51 -1.61 1.63	-2.99 -2.14 2.18	-22.4 -14.7 17.0	-27.9 -25.3 25.3
HT4F	- TC12	1.03 .444E-01 1.54	.350 .715 .754	-.720 -.235 .531	-.360 -.639 .711	-1.18 -1.14 1.17	-2.77 -1.93 1.98	-8.77 -8.85 9.94	4.10 -1.82 4.97
HT4F	- TC15	1.24 .752 1.24	.370 .620 .655	-.150 .193 .448	.160 -.538 .619	-1.42 -.893 1.03	-2.69 -2.04 2.08	-27.8 -16.7 18.9	-34.3 -32.3 32.3
ML10	- A461	-22.8 -22.4 23.7	-22.4 -25.7 25.4	-16.1 -18.9 18.9	-24.7 -20.3 20.4	-28.1 -26.8 26.8	-29.8 -28.4 28.4	-29.9 -29.4 29.4	-33.3 -31.7 31.7
MP1F	- X801	-.127 -.141 .149	-.435E-01 -.403E-01 .444E-01	-.145E-01 -.386E-01 .408E-01	-.440E-03 -.498E-02 .655E-02	.616E-02 -.194E-03 .373E-02	.224E-02 .461E-02 .483E-02	-.679E-02 -.177E-02 .316E-02	-.169E-01 -.119E-01 .122E-01

1985-10-22

Case C

CODE CALCULATION-TO-EXPERIMENT DATA UNCERTAINTY ANALYSIS FOR NRC/ICAP.

FIRST LINE : DIFFERENCE BETWEEN CALCULATED AND (AVERAGED) EXPERIMENTAL DATA AT END OF THE INTERVAL
 SECOND LINE : MEAN DIFFERENCE OVER THE INTERVAL
 THIRD LINE : MEAN SIGMA OVER THE INTERVAL (ROOT MEAN SQUARE OF THE DIFFERENCE)

- CODES -		- - - - TIME INTERVAL - - - -							
CALC.	FAP.	0.0 - 6.000	- 12.00	- 18.00	- 24.00	- 30.00	- 45.00	- 60.00	- 75.00
P 1C - P 1		-.554E-01 -.499E-01 .668E-01	.591E-01 .172E-02 .385E-01	.320E-02 .403E-01 .515E-01	.308E-01 .121E-01 .233E-01	-.266E-01 -.142E-01 .273E-01	-.874E-01 -.536E-01 .538E-01	-.887E-01 -.768E-01 .774E-01	-.327 -.192 .201
P 2C - P 4		-.324E-01 -.172E-01 .221E-01	.894E-01 .461E-01 .594E-01	.329E-01 .729E-01 .819E-01	.929E-01 .348E-01 .384E-01	-.940E-02 .762E-02 .210E-01	-.568E-01 -.234E-01 .298E-01	-.627E-01 -.517E-01 .525E-01	-.248 -.174 .183
P 3C - P 6		-.666E-01 .235 .746	.501E-01 -.108E-01 .390E-01	.111E-01 .414E-01 .485E-01	.541E-01 .327E-01 .431E-01	.280E-02 .754E-02 .279E-01	-.821E-01 -.335E-01 .391E-01	-.702E-01 -.599E-01 .618E-01	-.266 -.184 .194
PD4C - D 4		-2.52 -1.14 4.46	1.37 -1.08 1.59	3.68 2.81 3.25	-6.44 2.36 2.80	.972 1.40 1.47	.250 .954 1.05	.469 .827 1.17	.220 .336 .680
PDLC - D LP		.444 .405 .429	.420 .421 .422	.394 .453 .454	.229 .368 .389	.572 .377 .402	1.43 1.45 1.53	.215 .555 .633	.173 .495E-01 .899E-01
PDCC - D CO		-4.81 -4.91 7.94	-8.80 -8.99 8.99	.262 -4.88 5.67	5.04 3.62 4.17	-4.37 -4.78 3.36	-8.56 -7.47 7.66	-2.06 -5.04 5.29	.454 -.210 .973
PDUC - D UP		-.701 -.793 .985	-1.20 -.968 .983	-.590 -1.02 1.07	.112 -.374 .450	-.484 -.188 .486	.233 .501 .547	-.478E-01 .376E-01 .960E-01	-.622E-01 -.457E-01 .504E-01
PDIC - D IC		-.160 -.161 1.66	-17.8 -5.17 7.96	-6.03 -13.6 14.5	-2.16 -3.51 3.65	-.744 -.190 1.11	6.03 2.50 3.54	.784 3.96 4.35	-.147 -.127 .273
PD5C - D 56		-1.60 -.233 1.82	-1.64 -1.53 1.54	-1.11 -1.74 1.80	-.357 -.708 .760	-.330 -.301 .694	-.459 .704E-01 .427	-.375 -.412 .425	-.252 -.467 .484
MF1C - A602		-.723E-01 -.240 .280	.849E-01 .111E-01 .408E-01	.196 .147 .155	.282 .299 .314	-.231 .166 .297	-.383 -.358 .364	-.604E-01 -.192 .227	.464E-01 .103E-01 .485E-01
MF2C - A603		-.319E-01 -.164 .264	.735 .223 .306	.747 1.05 1.06	-1.10 -.682 .963	-.207 -.871E-01 1.06	.452 .593 .793	.669 .634 .629	.564 .577 .688
MF7C - A604		-.201 -.204 .249	-.444E-01 -.129 .133	.387 .369 .639	-.473 -.316 .389	.524E-01 -.323E-01 .523	.100 -.737E-01 .255	-.402 -.419 .524	-.731 -.799 .817
MF5C - A607		.705E-01 .934E-01 .161	.739E-01 .712E-01 .716E-01	.352E-01 .588E-01 .802E-01	.235E-01 .340E-01 .342E-01	.795E-02 .118E-01 .133E-01	-.600E-04 .445E-02 .681E-02	-.231E-02 -.482E-03 .283E-02	-.288E-01 -.160E-01 .183E-01
MF4C - A610		-1.11 -.585 .845	-1.13 -1.22 1.22	-.779E-01 -.868 1.00	1.16 .623 1.15	.171 .622 .887	.983 .625 .685	.801 .843 .880	.742 .926 .933
MF6C - A636		-.949 -4.23 6.62	2.59 .962 1.48	-.460 1.03 1.23	-1.20 -.630 1.15	.244 -.599 .840	-.378 -.207E-01 .260	-.587E-01 .151 .235	-.327 -.182 .192
TF1C - T 3		2.45 1.96 2.01	2.98 3.21 3.44	4.13 3.57 3.80	3.40 4.44 4.45	3.72 3.52 3.53	-1.23 1.30 2.03	-4.35 -2.45 2.57	-15.6 -9.08 9.65
TF2C - T 14		.200E-01 -.130E-01 .725	-.620 .220 .572	.640 1.02 1.17	1.78 1.29 1.37	.570 1.48 1.84	-.100E-01 1.13 1.31	-5.59 -2.38 3.02	-16.8 -11.3 11.8
TF4C - T 15		1.23 1.50 1.61	2.50 1.89 1.95	1.25 1.55 1.58	2.00 1.42 1.44	1.27 1.35 1.39	.400 1.12 1.15	-8.07 -3.75 4.54	-20.3 -14.5 14.9
TF7C - T 31		2.31 1.21 1.34	5.60 6.33 6.56	-.290 2.78 3.48	-1.36 -1.36 1.41	-1.87 -1.42 1.85	-3.03 -2.36 2.39	-2.34 -3.09 3.13	-8.67 -6.12 6.32
TF5C - T 34		1.07 .418 1.09	2.80 1.61 1.68	2.37 2.53 2.54	-.220 .862 1.12	-1.42 -1.27 1.37	-2.45 -1.98 2.01	-3.15 -2.66 2.67	-8.07 -5.68 5.90

1985-10-22

- MODES -		- - - - TIME INTERVAL - - - -							
CALC.	EXP.	0.0 - 6.000	- 12.00	- 18.00	- 24.00	- 30.00	- 45.00	- 60.00	- 75.00
MT1C - TC 1		-4.65	-2.22	-2.92	-2.03	-2.31	-2.97	-2.44	-24.7
		-5.96	-3.07	-2.66	-2.59	-2.26	-2.30	-2.68	-9.58
MT2C - TC 3		4.03	3.20	2.70	2.62	2.28	2.32	2.70	11.9
		1.60	2.88	1.74	1.94	1.49	.980	-1.83	27.9
MT3C - TC 5		2.58	2.44	2.04	1.71	1.72	1.34	.677	15.3
		2.77	2.45	2.04	1.72	1.73	1.36	.766	17.4
MT4C - TC 9		-4.11	-2.18	-2.15	-1.46	-1.44	-2.00	-16.1	-16.6
		-4.39	-3.17	-2.28	-1.71	-1.66	-1.63	-6.50	-15.7
MT4C - TC 9		4.54	3.24	2.30	1.73	1.67	1.64	9.29	15.7
		-.960	-.670	-1.73	-.620	-.140	-.450	-.42.1	-45.7
MT4C - TC12		-1.43	-.805	-1.01	-.870	-.322	-.890E-01	-19.2	-42.2
		1.52	.860	1.13	1.00	.361	.200	25.2	42.3
MT4C - TC15		1.30	1.04	.130	.450	.190	-.250	-28.2	-13.4
		.282	1.21	.408	.245	.136	.111	-13.1	-18.4
MT4C - TC15		1.41	1.22	.658	.338	.264	.209	17.4	19.0
		1.38	.860	.480	.870	.400E-01	-.320	-31.7	-35.9
ML1C - X661		.467	.949	.514	.223	.187	-.555E-01	-16.0	-33.2
		1.55	.960	.705	.368	.358	.202	19.4	33.2
MP1C - X801		-28.6	-21.9	-15.7	-18.8	-21.9	-22.3	-19.7	-21.2
		-22.6	-25.0	-17.8	-15.4	-20.9	-21.6	-20.7	-20.5
MP1C - X801		23.6	25.0	17.9	15.5	20.9	21.6	20.8	20.5
		-.127	-.435E-01	-.145E-01	-.440E-03	.616E-02	.224E-02	-.679E-02	-.169E-01
MP1C - X801		-.161	-.803E-01	-.366E-01	-.498E-02	-.194E-03	.461E-02	-.177E-02	-.119E-01
		.169	.844E-01	.408E-01	.655E-02	.373E-02	.483E-02	.316E-02	.122E-01

1985-10-22

Case D

CODE CALCULATION-TO-EXPERIMENT DATA UNCERTAINTY ANALYSIS FOR NRC/ICAAP.

FIRST LINE : DIFFERENCE BETWEEN CALCULATED AND (AVERAGED) EXPERIMENTAL DATA AT END OF THE INTERVAL
 SECOND LINE : MEAN DIFFERENCE OVER THE INTERVAL
 THIRD LINE : MEAN SIGMA OVER THE INTERVAL (ROOT MEAN SQUARE OF THE DIFFERENCE)

- CODES -		- - - - TIME INTERVAL - - - -								
CALC.	EXP.	0.0 - 6.00	- 12.00	- 18.00	- 24.00	- 30.00	- 45.00	- 60.00	- 75.00	
P 1 - P 3		-.930E-02 -.691E-01 .593E-01	.193 .941E-01 .114	.153 .282 .184	.131 .153 .153	-.227E-01 .360E-01 .620E-01	-.303 -.168 .187	-.425 -.354 .355	-.704 -.556 .560	
P 2 - P 4		.137E-01 -.663E-02 .730E-01	.773 .139 .152	.180 .214 .216	.152 .173 .174	-.630E-02 .588E-01 .758E-01	-.272 -.140 .162	-.399 -.329 .330	-.624 -.538 .542	
P 3 - P 4		-.205E-01 .744 .765	.184 .812E-01 .103	.156 .163 .184	.156 .174 .176	.121E-01 .586E-01 .776E-01	-.295 -.146 .169	-.404 -.336 .337	-.640 -.545 .549	
PD4C - D 4		-2.51 -1.07 5.43	1.38 -1.10 1.60	4.10 2.95 3.41	-6.04 2.26 2.68	.940 1.19 1.31	.176 .962 1.05	.509 .790 1.16	.236 .437 .725	
PDLC - D LP		.442 .405 .428	.416 .419 .419	.412 .448 .449	.387 .370 .377	.536 .238 .299	1.62 1.53 1.61	.534 .818 .890	.547E-01 -.229 .278	
PDCC - D CO		-8.75 -6.81 7.85	-8.71 -8.94 8.94	2.74 -4.20 5.42	5.60 5.77 5.97	-4.42 -1.21 3.02	-8.96 -7.47 7.71	-2.29 -5.47 5.70	.351 -.318 .981	
PDUD - D UP		-.699 -.788 .981	-1.21 -.968 .964	-.631 -1.07 1.11	.611 -.141 .445	-.502 -.170 .498	.201 .482 .531	-.577E-01 .871E-02 .799E-01	-.751E-01 -.576E-01 .615E-01	
PDCC - D DC		-.870E-01 -1.13 1.64	-17.8 -5.04 7.90	-7.74 -14.6 15.3	-4.30 -5.97 6.02	-1.13 -2.78 3.34	5.77 1.44 3.03	.685 3.89 4.28	.140 -.300E-01 .249	
PD5C - D 56		-1.63 -.710 1.74	-1.66 -1.56 1.57	-1.18 -1.83 1.67	.220 -.521 .658	-.142 -.264 .380	-.471 .861E-01 .436	-.437 -.496 .507	-.343 -.503 .518	
MF1C - A602		-.702E-01 -.237 .277	.868E-01 .119E-01 .413E-01	.242 .156 .166	.282 .278 .283	-.210 .929E-02 .188	-.425 -.360 .366	-.627E-01 -.201 .237	.403E-01 .740E-02 .483E-01	
MF2C - A603		.252E-01 -.171 .264	.707 .207 .291	.653 .999 1.01	-.194 -.424 1.06	-.615 -.255 1.25	-.242 .552 .729	.838 .518 .675	.434 .611 .680	
MF3C - A604		-.204 -.214 .256	-.674E-01 -.138 .140	-.195 .182 .420	-.132 -.368 .407	.600 .186 .283	.253 .118 .300	-.366 -.387 .512	-.634 -.740 .780	
MF5C - A607		.705E-01 .934E-01 .161	.739E-01 .712E-01 .716E-01	.590E-01 .795E-01 .590E-01	.399E-01 .567E-01 .570E-01	.868E-02 .206E-01 .234E-01	-.343E-01 -.131E-01 .194E-01	-.536E-01 -.431E-01 .433E-01	-.851E-01 -.707E-01 .715E-01	
MF4C - A610		-1.11 -.562 .831	-1.12 -1.23 1.23	-.420 -.840 .954	.990 .908 1.38	.845 .468 .532	1.09 .803 .830	1.05 .832 .876	.550 .804 .840	
MF6C - A636		-.992 -.426 6.64	.257 .967 1.48	-.753 .867 1.13	-1.21 -.791 1.17	.290 -.588 .838	-.390 -.117E-01 .264	.560E-02 .148 .232	-.241 -.676E-01 .182	
TF1C - T 3		2.58 2.01 2.06	3.28 3.42 3.64	4.26 3.90 3.93	5.34 4.61 4.62	3.77 4.32 4.37	-4.65 -4.40 2.66	-11.1 -7.44 7.63	-25.9 -17.7 18.2	
TF2C - T 14		.320 .537E-01 .729	.730 .920 1.11	2.24 2.47 2.53	2.98 2.87 2.91	.620 2.12 2.43	-3.46 -5.80 1.43	-12.3 -7.38 7.87	-27.1 -19.9 20.4	
TF4C - T 14		1.43 1.50 1.61	3.75 2.75 2.82	2.65 3.00 3.01	3.24 3.02 3.03	1.33 2.00 2.09	-3.03 -5.95 1.39	-14.8 -8.75 9.41	-30.6 -23.1 23.5	
TF3C - T 31		3.09 1.47 1.69	8.25 8.35 8.64	1.33 4.66 5.30	-1.13 .273 .481	-1.83 -1.15 1.32	-6.43 -4.05 4.27	-9.14 -8.09 8.15	-19.0 -14.7 14.9	
TF5C - T 34		1.75 .893 1.44	4.85 2.82 2.95	4.03 5.14 5.15	.920 2.53 2.71	-1.28 -.669 1.01	-5.83 -3.63 3.87	-9.77 -7.59 7.65	-18.3 -14.2 14.4	

1985-10-22

- CONF5 -		- - - - TIME INTERVAL - - - -							
CALC.	EXP.	0.0 - 6.000	- 12.00	- 18.00	- 24.00	- 30.00	- 45.00	- 60.00	- 75.00
MT10 - TC 1		-4.35 -5.91 6.99	-1.15 -2.34 2.61	-1.43 -1.36 1.42	-1.700 -1.31 1.38	-2.05 -1.43 1.54	-4.16 -3.72 3.94	-4.79 -7.36 7.39	-3.03 -8.53 8.92
MT20 - TC 3		1.49 2.63 2.80	3.98 3.16 3.19	3.29 3.37 3.39	3.29 3.20 3.21	1.69 2.51 2.57	-2.27 -1.53 1.21	-1.940 -3.80 3.90	27.6 15.4 17.1
MT30 - TC 5		-1.84 -4.35 4.50	-1.09 -2.46 2.61	-1.600 -1.944 .993	-1.100 -1.185 .302	-1.24 -1.855 .947	-5.26 -3.13 3.33	-13.5 -9.52 10.6	-15.8 -14.8 14.8
MT40 - TC 9		-1.440 -1.36 1.46	.410 -.931E-01 .515	-1.180 .342 .526	.720 .609 .765	.700E-01 .489 .650	-3.67 -1.57 1.91	-37.9 -21.8 26.1	-43.7 -39.9 40.0
MT50 - TC12		1.62 .352 1.47	2.11 1.92 1.93	1.65 1.77 1.81	1.71 1.69 1.70	.400 .938 1.04	-3.46 -1.36 1.77	-23.7 -15.7 18.4	-11.2 -16.0 16.6
MT60 - TC15		1.43 .516 1.40	1.95 1.64 1.65	1.94 1.86 1.90	2.15 1.74 1.76	.290 1.03 1.18	-3.48 -1.47 1.87	-33.4 -20.8 22.8	-36.9 -35.0 35.0
ML10 - XA61		-28.8 -22.7 23.7	-22.0 -25.1 25.2	-16.7 -18.2 18.3	-20.8 -17.1 17.1	-23.9 -22.8 22.9	-24.1 -23.3 23.3	-21.6 -22.7 22.7	-22.5 -22.1 22.1
MP10 - XA01		-.127 -.161 .149	-.435E-01 -.803E-01 .944E-01	-.146E-01 -.386E-01 .408E-01	-.440E-03 -.498E-02 .655E-02	.616E-02 -.194E-03 .373E-02	.224E-02 .461E-02 .483E-02	-.679E-02 -.177E-02 .316E-02	-.169E-01 -.119E-01 .122E-01

1985-10-22

P 1A PRESSURE, LOWER PLENUM (P 3101) CASE A
 P 2A PRESSURE, UPPER PLENUM (P 5201) CASE A
 P 3A PRESSURE, BREAK INLET (P 9601) CASE A
 P04A DIFF. PRESSURE, CORE INLET RESTRICTION (P 3301 - P 401) CASE A
 P04A DIFF. PRESSURE, CORE (FROM P 401 - P 5101) CASE A
 P04A DIFF. PRESSURE, DOWNCOMER (FROM P 7103 - P 7201) CASE A
 P04A DIFF. PRESSURE, LOWER PLENUM (FROM P 3101 - P 3301) CASE A
 P04A DIFF. PRESSURE, UPPER PLENUM (FROM P 5101 - P 5201) CASE A
 P05A DIFF. PRESSURE, STEAM SEPARATOR ORIFICE (P 5201 - P 5702) CASE A
 TSUA SUBCOOLING, BREAK INLET (TEMP 9101 - TEMP 9101) CASE A
 HP1A CORE HEATING POWER (CNTRLVAR 57) CASE A
 ML1A HEAT LOSS FROM PASSIVES (CNTRLVAR 53) CASE A
 MF1A MASS FLOW RATE, BYPASS (MFLOWJ 117) CASE A
 MF2A MASS FLOW RATE, I.L. PUMP (MFLOWJ 20102) CASE A
 MF3A MASS FLOW RATE, B.L. PUMP (MFLOWJ 20202) CASE A
 MF4A MASS FLOW RATE, B.L. VESSEL INLET (MFLOWJ 9702) CASE A
 MF5A MASS FLOW RATE, STEAM RELIEF (MFLOWJ 404) CASE A
 MF6A MASS FLOW RATE, BREAK (MFLOWJ 152) CASE A
 RH1A FLUID DENSITY, CORE BOTTOM (RHO 0401) CASE A
 RH2A FLUID DENSITY, VESSEL BOTTOM (RHO 3101) CASE A
 RH3A FLUID DENSITY, BREAK (RHO 9601) CASE A
 HT1A MEAN CLAD TEMPERATURE, LEVEL 1 (HTTEMP 401000105) CASE A
 HT2A MEAN CLAD TEMPERATURE, LEVEL 3 (HTTEMP 403000105) CASE A
 HT3A MEAN CLAD TEMPERATURE, LEVEL 5 (HTTEMP 404000105) CASE A
 HT4A MEAN CLAD TEMPERATURE, LEVEL 9 (HTTEMP 406000105) CASE A
 HT5A MEAN CLAD TEMPERATURE, LEVEL 12 (HTTEMP 407000105) CASE A
 HT6A MEAN CLAD TEMPERATURE, LEVEL 15 (HTTEMP 410000105) CASE A
 TF1A FLUID TEMPERATURE, CORE INLET (TEMP 3301) CASE A
 TF2A FLUID TEMPERATURE, CORE OUTLET (TEMP 5101) CASE A
 TF3A FLUID TEMPERATURE, DOWNCOMER BOTTOM (TEMP 7108) CASE A
 TF4A FLUID TEMPERATURE, UPPER PLENUM (TEMP 5201) CASE A
 TF5A FLUID TEMPERATURE, BREAK INLET (TEMP 9601) CASE A
 CPUA CPUTIME CASE A
 MATA TOTAL MASS, IN SYSTEM CASE A
 MAEA MASS ERROR CASE A
 ML1A BREAK TOTAL MASS LOSS (CNTRLVAR 55) CASE A

P 3 PRESSURE, LOWER PLENUM (PT 3) - EXPERIMENT
 P 4 PRESSURE, UPPER PLENUM (PT 4) - EXPERIMENT
 P 6 PRESSURE, BREAK INLET (PT 6) - EXPERIMENT
 D 4 DIFF. PRESSURE, CORE INLET RESTRICTION (DPT 4) - EXPERIMENT
 D 56 DIFF. PRESSURE, STEAM SEPARATOR ORIFICE (DPT 56) - EXPERIMENT
 D LP DIFF. PRESSURE, LOWER PLENUM (DPT 2 + DPT 3 - DPT 1) - EXPERIMENT
 D CO DIFF. PRESSURE, CORE (DPT 5 + DPT 6 + ... + DPT 12) - EXPERIMENT
 D UP DIFF. PRESSURE, UPPER PLENUM (DPT 13 + DPT 14) - EXPERIMENT
 D DC DIFF. PRESSURE, DOWNCOMER (DPT 27 + ... + DPT 30) - EXPERIMENT
 X602 MASS FLOW RATE, BYPASS (CALCULATED) - EXPERIMENT
 X603 MASS FLOW RATE, I.L. PUMP (CALCULATED) - EXPERIMENT
 X604 MASS FLOW RATE, B.L. PUMP (CALCULATED) - EXPERIMENT
 X607 MASS FLOW RATE, STEAM RELIEF (CALCULATED) - EXPERIMENT
 X610 MASS FLOW RATE, B.L. VESSEL INLET (SPOOL PIECE K10) - EXPERIMENT
 X634 MASS FLOW RATE, BREAK FROM T2 INVENTORY (CALCULATED) - EXPERIMENT
 X661 MASS LOSS, BREAK FLOW RECEIVER (CALCULATED) - EXPERIMENT
 X801 ELECTRIC POWER, CORE (CALCULATED) - EXPERIMENT
 T 3 FLUID TEMPERATURE, CORE INLET (TE 3) - EXPERIMENT
 T 14 FLUID TEMPERATURE, CORE OUTLET (TE 14) - EXPERIMENT
 T 15 FLUID TEMPERATURE, UPPER PLENUM (TE 15) - EXPERIMENT
 T 31 FLUID TEMPERATURE, DOWNCOMER BOTTOM (TE 31) - EXPERIMENT
 T 34 FLUID TEMPERATURE, BREAK INLET (TE 34) - EXPERIMENT
 TC 1 MEAN CLAD TEMP., LEVEL 1 (T191 T206 T211 T246) - EXPERIMENT
 TC 3 MEAN CLAD TEMP., LEVEL 3 (T108 T183 T243 T248) - EXPERIMENT
 TC 5 MEAN CLAD TEMP., LEVEL 5 (T202 T227 T232 T237 T252) - EXPERIMENT
 TC 9 MEAN CLAD TEMP., LEVEL 9 (T102 T137 T167 T172 T187 T197 T27
 TC12 MEAN CLAD TEMP., LEVEL 12 (T118 T123 T128 T148 T223) - EXPERIMENT
 TC15 MEAN CLAD TEMP., LEVEL 15 (T175 T190 T275) - EXPERIMENT

NRC FORM 335 (2-84) NRCM 1102, 3201, 3202 BIBLIOGRAPHIC DATA SHEET SEE INSTRUCTIONS ON THE REVERSE.		U.S. NUCLEAR REGULATORY COMMISSION 1. REPORT NUMBER (Assigned by TIDC, add Vol. No., if any) NUREG/IA-0005 STUDSVIK/NR-85/99	
2. TITLE AND SUBTITLE Assessment of RELAP/MOD2, Cycle 36, Against FIX-II Split Break Experiment No. 3027		3. LEAVE BLANK	
5. AUTHOR(S) John Eriksson		4. DATE REPORT COMPLETED MONTH YEAR	
7. PERFORMING ORGANIZATION NAME AND MAILING ADDRESS (Include Zip Code) Swedish Nuclear Power Inspectorate P. O. Box 27106 S102 #52 Stockholm, Sweden		6. DATE REPORT ISSUED MONTH YEAR September 1986	
10. SPONSORING ORGANIZATION NAME AND MAILING ADDRESS (Include Zip Code) Office of Nuclear Regulatory Research U.S. Nuclear Regulatory Commission Washington, DC 20555		8. PROJECT/TASK/WORK UNIT NUMBER 9. FIN OR GRANT NUMBER	
12. SUPPLEMENTARY NOTES		11a. TYPE OF REPORT Technical b. PERIOD COVERED (Inclusive dates)	
13. ABSTRACT (200 words or less) <p>The FIX-II split break experiment No. 3027 has been analyzed using the RELAP5/Mod2 code. The code version used, Cycle 36, is a frozen version of the code.</p> <p>Four different prediction calculations were carried out to study the sensitivity on various parameters to changes of break discharge, initial coolant mass, and passive heat structures. The differences between the calculations and the experiment have been quantified over intervals in real time for a number of variables available from the measurements during the experiment.</p> <p>The core inventory expressed by the differential pressure over the core was generally underpredicted. Dryout times were generally overpredicted, probably due to differences in the used dryout correlation.</p>			
14. DOCUMENT ANALYSIS - a. KEYWORDS/DESCRIPTORS RELAP5/MOD2 FIX-II ICAP Code Assessment b. IDENTIFIERS/OPEN-ENDED TERMS		15. AVAILABILITY STATEMENT Unlimited 16. SECURITY CLASSIFICATION (This page) Unclassified (This report) Unclassified 17. NUMBER OF PAGES 18. PRICE	



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555

OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE, \$300

SPECIAL FOURTH-CLASS RATE
POSTAGE & FEES PAID
USNRC
WASH. D.C.
PERMIT No. G-67

NUREG/IA-0005

ASSESSMENT OF RELAP5/MOD 2, CYCLE 36, AGAINST FIX-II SPLIT BREAK
EXPERIMENT NO. 3027

SEPTEMBER 1986