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User manual. For the probabilistic fuel performance code FRP

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USER MANUAL
For the Probabilistic Fuel Performance Code FRP

John Friis Jensen and Ib Misfeldt

Abstract This report describes the use of the probabilistic fuel performance code FRP. Detailed descriptions of both input to and output from the program are given. The use of the program is illustrated by an example.

INIS-descriptors: BWR TYPE REACTORS; F CODES; FAILURES; FUEL PINS; MANUALS; PERFORMANCE; PROBABILITY; PWR TYPE REACTORS; RELIABILITY

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CONTENTS

1. INTRODUCTION

A computer system for the statistical evaluation of LWR fuel performance has been developed. The computer code FRP[1], Fuel Reliability Predictor, calculates the distributions for parameters characterizing the fuel performance and failure probability.

The statistical methods employed are either Monte Carlo simulations or a low-order Taylor approximation.

Included in the computer system is a deterministic fuel performance code, FFRS[2], which has been verified by comparison with data from irradiation experiments.

The distributions for all material data utilized in the fuel simulations are estimates from the best available information in the literature.

For the failure prediction, a stress corrosion failure criterion has been derived. The failure criterion is based on data from out-of-reactor stress corrosion experiments performed on unirradiated and irradiated zircaloy with iodine present.

Figure 1 illustrates the general layout of the system.
Based on the applied load, H(t), the design and material data, X, the program calculates the fuel state, Y(t), distribution of temperature, strain, stress, etc., in pellet and cladding as functions of time, and the failure probability for different failure criteria as a function of time, W(t).

In the following chapters the detailed input specifications are given together with some explanation of the output. Finally, the use of the program is illustrated by an example.

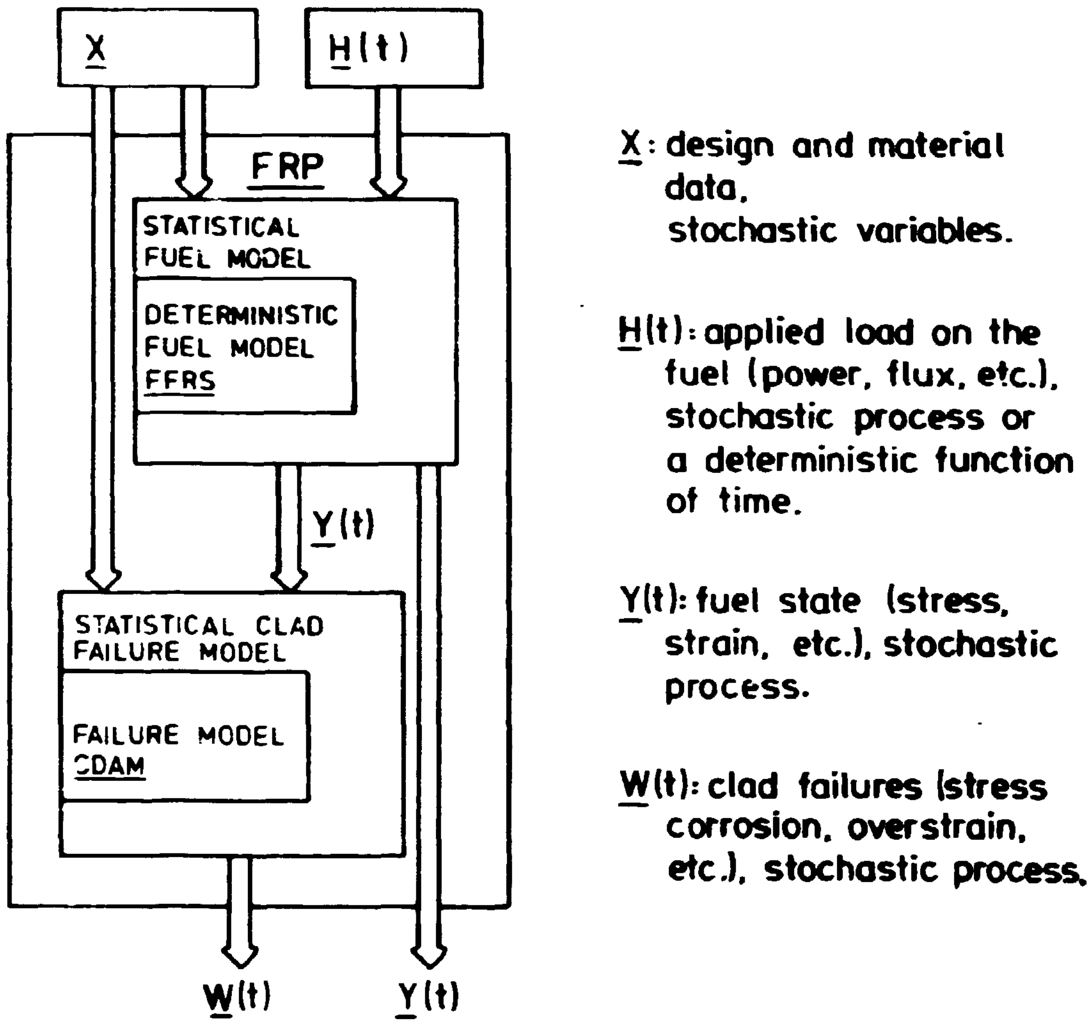

Figure 1. The Fuel Reliability Predictor.

2. INPUT SPECIFICATION

The syntax of the input is illustrated in Figure 2. Each bracket corresponds to a logical unit which is described in this chapter.

Data for the whole run:

[Head (1 card text information)]

[Control variables:
Namelist GEOTID]

[$\underline{X}^o$; Stochastic variables in design and material data]

Specific data for an experiment. Can be repeated for up to 100 experiments:

[Experiment name and experimental data]

[$\underline{H}(t)$ Power history;
each card describes 1 time step]

[$\underline{X}^s$; Design and material data, specific for this experiment]

Figure 2. Syntax of the input to FRP.

2.1. Heading

Head: Text information about the run (1 card)

2.2. Control variables

A namelist, GEOTID, containing administrative variables and numerical constants.

2.2.1. Administrative variables

Name	Type*	Default		
CASE	I	1		Selector for calculational mode
			CASE = 1	Deterministic calculation using the mean values of X
			CASE = 2	Monte Carlo simulation
			CASE = 3	Calculation by a second order Taylor approximation
			CASE = 4	Deterministic calculation using the mode values of X
IROD	I	0		Selector for experiment, $0 \le IROD \le 100$
			IROD = 0	Gives the result for all experiments specified in the input.
			IROD ≠ 0	Gives the result for experiment number IROD
LOOPS	I	100		Number of trials in a Monte Carlo simulation $2 \le LOOPS \le 1000$
RANDST	I	777		The starting point for the random generator, RANDST≠0
NBGR	I	1		Grouping of the Monte Carlo output, see. p. 23.
POINTS	I	3	}	Describes the polynominal approximation used for the calculation of the partial derivatives in the Taylor approximation. A polynomial of order "ORDER", is fitted to "POINTS" sets of x, F(x) where the values of x are spaced by DEL * mean (X) for DEL>0 or by - DEL * standard deviation (X) for DEL<0
ORDER	I	1	}	
DEL	R	0.5E-1	}	

---

* I = integer, R = real, and L = logical

Name	Type	Default		
ALL	L	TRUE		All stochastic variables are used in the Taylor approximation.
			ALL=FALSE	Only the variables specified by IMPORT are used in the Taylor approximation.
IMPORT	Integer array			If IMPORT (i) = 1, variable no i is included in the taylor app. (ALL=TRUE overwrites IMPORT). IMPORT is initialized to all zeros
FILEUD	I	0		Generation of data to plots
			FILEUD=0	No plot information
			FILEUD=X	The plot information is written on permanent files with the names FILEX, where X is FILEUD, FILEUD+1, ..., for the experiments in the input. $11 \le X \le 20$ are valid file names
MAXBER	I	0		No calculation with maximal interaction.
			MAXBER=1	For MAXBER=1 the program performs 2 simulations, the normal as for MAXBER=0, and a calculation with maximal interaction, where the same time step and gas release as in the first is used, but the thermal expansion of the fuel is ALFAF × MALFAF and the BOL cold gap is TGAB × MTGAB
PAR	R	1.00		Factor for modification of the standard deviations. All standard deviations are multiplied by PAR

OUT	I	1	OUT=0	Minimal output
			OUT=1	Normal output
			OUT=2	Maximal output
OUT2	I	0		Not used
WDATA	L	FALSE		If WDATA=TRUE a file with the name FILE8 is generated. The file contains the complete input for a calculation with the WAFER code. Should be used together with IROD≠0
IPOW	1	0		If IPOW=1, the stochastic variables in the power history are used. If IPOW=0 the stochastic variables in the power history are neglected

2.2.2. Model selectors

Name	Type	Default		
ROSST	L	TRUE		The heat transfer model proposed by Ross and Stoute[3] is used
RELMOD	I	3		Selector for the 3 possible gas-release models
			RELMOD=1	A model proposed by W.B. Lewis[4]
			RELMOD=2	A modified BNWHT[5] model. For fuel temperatures below 1000°C a constant instead of the proposed equation is used.
			RELMOD=3	The LOOPY[6] model, developed at Studsvik
				The NRC correction for high burnup is incorporated in all three models
NKPSW	L	FALSE		Swelling model from ref. 1
			NKPSW=TRUE	Swelling model proposed by N. Kjær-Petersen[7]

2.2.3. Numerical data

Name	Type	Default	
EPSILO	R	0.1E-1	General accuracy used as stop-criteria in iterations.
EPSH	R	0.1E-1	Stop-criterion for iterations on the gap-conductance
EPSK	R	0.1E-1	Stop-criterion for iterations on the contact pressure
ANTITR	I	100	Maximum number of iterations
MAXTID	R	800.0	Maximum time step for constant power (hours)
POW0	R	2000.0	Maximum power step during contact (W/m)
DG0	R	0.5E-5	Constants used for the determination of the time step length
DRBRG	R	0.5E-1	
MAXPST	I	5	
NANULI	I	20	Number of annuli used in the calculation of gaseous swelling. NANULI$\leq$50

2.3. Stochastic variables in design and material data, $\underline{X}^o$

Each card in $\underline{X}^o$ contains the following data:

1 card	Variable no	col 1 - 10
	Distribution	col 11 - 20
	The mean value	col 21 - 30
	The coefficient of variation*	col 31 - 40

* Defined as, the standard deviation divided by the mean value. If the mean value is 0.0, the standard deviation is given directly.

The remaining columns are not used.

Valid distributions are: 1 = normal distribution
2 = lognormal distribution
3 = uniform distribution
4 = deterministic value

The integers in cols. 1-10 and 11-21 must be placed correctly and justified without any decimal point. The variables need not follow in ascending order. $\underline{X}^o$ is terminated by a "variable no"> 80.

DESIGN DATA

No	Name	Unit	
1	L	m	The pellet length, not used
2	RCI	m	Inner radius of the cladding
3	TCLAD	m	Thickness of the cladding
4	TGAB	m	The radial gap
5	TDEN	%TD	The pellet density in per cent of the theoretical density
6	LEQ	m	The equivalent stack length
7	VP	m^3	Volume of plenum
8	RF	m^3	Volume of the fill gas, helium
9	RR	m^3	Additional gas volume, fission gas mixture
10	SIGMAF	N/m^2	Uniaxial yield strength at 300°C for unirradiated material
11	KAPPA	m^{-1}	The inverse diffusion length for thermal neutrons in the fuel
12	YF		Anisotropic factors for the cladding material (12–14)
13	YH		
14	YG		
15	GRAIN	um	Grain size in the pellets
16	RH1	cm	Surface roughness of the cladding
17	RH2	cm	Surface roughness of the pellet

No	Name	Unit	Description
18	PORR1	m	The porosity in the fuel is assumed to have three typical radii: PORR1, PORR2, and PORR3; the porosity in each group is POR1, POR2, and POR3
19	PORR2	m	
20	PORR3	m	
21	POR1		
22	POR2		
23	POR3		
24	WEFF	m^3	Densification parameter
25	DUMMY		Dummy variable
26	C0	W/m	1st- and 2nd-order terms in the thermal Conductivity of zircaloy
27	C1	W/m	
28	ALFAF	K^{-1}	Thermal expansion of the fuel (UO_2)
29	ALFAC	K^{-1}	Thermal expansion of zircaloy
30	EC	N/m^2	Young's modulus for zircaloy
31	H0HE	W/cm^oC	Contact conductivity with helium gas
32	H0FISG	W/cm^oC	Contact conductivity with fission gas
33	HMEYER	Kg/mm^2	The Meyer hardness of zircaloy
34	KM	W/m	Mean thermal conductivity of UO_2 and zircaloy
35	CRS	W/m	Constant in the gap conductions equation.
36	A0		Not used
37	E0	W/m	Factor in the porosity correction to the UO_2 thermal conductivity
38	E1		Constants in the UO_2 thermal conductivity equation
39	E2		
40	E3		
41	E4		
42	EFIS	MeV	Fission energy
43	KMAX	MP	Constants in relation to plastic deformation of zircaloy
44	DELK	MP/K	
45	NPL		
46	BFL	cm/n	Coefficient in the fluence hardening
47	FCLAD		Zircaloy creep
48	FUO2		UO_2 creep
49	KSW	$FIMA^{-1}$	Solid swelling rate
50	KHTSW	$FIMA^{-1}K^{-1}$	Constant in the hot (gaseous) swelling rate
51	MHTSWL		Maximum gaseous swelling fraction

No	Name	Unit	
52	KBU		Not used
53	LAM		Not used
54	NY		Poisson's ratio for zircaloy
55	QREF		Parameters in FFRS (55–56)
56	QBURN		
57	PO	N/m^2	Saturation pressure of fission gas with respect to stress corrosion
58	TSC		Temperature difference, corresponding to one decade shift in time to failure for stress corrosion
59	SIGN		Normalization stress for stress corrosion
60	FSC		Factor containing the uncertainty for the stress corrosion failure criterion
61	SIGFAC		Stress concentration in the cladding
62	ECCENT		Eccentricity of the pellet's location in the cladding
63	MALFAF		Factors used in determining the maximum interaction. See definition of MAXBER (63–64)
64	MTGAB		
65	RAMPST		The first time step in the ramp
66	PFAC1		Scaling factors in the power history (66–68). The power from step 0 to step IX1 is multiplied by PFAC1. The power from step IX1+1 to step IX2 is multiplied by PFAC2. The power from step IX2+1 to step IX3 is multiplied by PFAC3. The power from step IX3+1 is unchanged
67	PFAC2		
68	PFAC3		
69	TFAC		Temperature factor, the cladding surface temperature is multiplied by TFAC
70	FFAC		Flux factor, the fast flux is multiplied by FFAC
71	TAUREL		Time constant in the transient fission gas release

No	Name	Unit	
			The release in a time step is (1-exp(-TAUREL * ΔT)) multiplied by the steady-state release
72	IX1		Separating points in the power history. (See PFAC1)
73	IX2		
74	IX3		
75	RELOPT		Parameters in the WAFER swelling model.
76	KPOR		
77	RINNER		Inner fuel radius in the LOWI design
78	DUMMY3		Dummy variables
79	DUMMY2		
80	DUMMY1		

The end of the material data list is indicated by a No > largest valid number (80).

2.4. Experimental data

It is possible to specify the most important PIE data in connection with the experiment name, these data are then printed in a table together with the corresponding calculated values.

2 cards	Experimental name	col 1 - 6
	Midpellet ramp strain, EPSMAX	col 11 - 20
	Interface ramp strain, MEPSM	col 21 - 30
	Max centre temperature, MTCENT	col 61 - 70
	Midpellet EOL strain, EPSSL	col 71 - 80
	Interface EOL strain, MEPSSL	col 1 - 10
	Released fission gas, RELFG	col 11 - 20
	Failure (1=failure, 0=No-failure)	col 31 - 40

2.5. Power history, H(t)

Each card contains the following data in format (7G10.0)

	step end time (hours)
	step power (W/m)
	step outer cladding temperature (^{o}C)
1 card	step coolant pressure (Pa)
	step inverse neutron diffusion length (KAPPA), m^{-1}
	step fast flux ($n/cm^2 \cdot s$)
	The number of subdivisions of the step

If for any step ≠ step 1, the power, the outer cladding temperature, the coolant pressure, KAPPA or the fast flux are 0.0 (= blank columns), the value from the previous time step is used in the time step. If KAPPA = 0.0 in time step 1, KAPPA is assumed to be constant, given by KAPPA in the design data.

The power history is terminated by a "step-end-time" = 0.0.

2.6. Special design and material data, $\underline{X}^s$

The specific design and material data for each experiment are in the same format as $\underline{X}^o$. Even if no specific design and material data are present, the logical unit (specific ...) must be terminated by a card with no>80.

3. OUTPUT SPECIFICATION

The general form of the output from FRP is illustrated in Fig. 3. Each bracket corresponds to a logical item which is further described in the following. The parameter "OUT" determines the amount of output, on the Figure is specified for which values of "OUT" the individual logical items are printed.

[Head]
[Control variables]
[$\underline{X}^o$]

[Experiment name]
[$\underline{H}(t)$]
[$\underline{X}^s$]

[$\underline{X}$; Stochastic variables used for this experiment. ($\underline{X}^o$ with the changes specified by $\underline{X}^s$)]

[$\underline{y}(t)$ and $\underline{w}(t)$; Fuel state and clad failures] CASE 1 and 4

[$\underline{Z}$; Distribution of EOL and extreme values] CASE 2 and 3

(Experiment name through Distribution of EOL: For each experiment OUT $\geq$ 1)

[$\underline{z}$; EOL and extreme values compared with experimental values] CASE 1 and 4

[$\underline{Z}$; EOL, extreme values and failure probability compared with experimental values.] CASE 2 and 3

Figure 3. Output from FRP

3.1. Detailed description of the output common for all Cases

Head	Always printed
Control variables:	Always printed Printout of the present variables
General input design	
Data, X^o:	Always printed
NO	The number of the variable
VARIABLE	The name of the variable
DISTRIBUTION	The distribution used for the variable
MEAN VALUE	The mean value of the variable
COEF. OF VAR.	The coefficient of variation for the variable
Input power history, H(t):	Printed for OUT $\geq$ 1
STEPNR	Step no. in the power history
SLUTTID	The accumulated time (hours) at the end of the time step.
EFFEKT	The pin power at the end of the time step (W/m)
TCY	The outer cladding temperature (^oC)
PY	The outer pin pressure (Pa)

KAPPA	The inverse diffusion length (m^{-1})
FIFAST	The fast flux (energy > 1 MeV)
<u>Design data</u>, <u>X</u>:	Printed for OUT $\geq$ 1 Outprint of the design data, including the default values
<u>Material data</u>, <u>X</u>:	Printed for OUT $\geq$ 1 Outprint of the material data, including the default values

CASE X:

X = 1	Deterministic calculation using the mean values
X = 2	Monte Carlo simulation
X = 3	Taylor approximation
X = 4	Deterministic calculation using the mode values

At last there is a comparison of some important calculated data and PIE data, for each of the specified pins. Where no PIE data is specified a question mark is printed.

Exp. no.	Experiment numbers in the input
Name	Experimental name
EPSMAX	Midpellet ramp strain. Calculated from the time step given by RAMPST. If RAMPST = 0, the deformation between the EOL strain and the minimum strain during the life is used
MEPSM	As for EPSMAX with stress concentration

SIGMAX	Maximum stress without stress concentration
PKSTRS	Maximum stress with stress concentration
MAXSCD	Stress corrosion damage index with stress concentration
MTCENT	Maximum center temperature
EPSSL	Midpellet EOL strain
MEPSSL	Interface EOL strain
RELFG	Released fission gas
SIGDAM	Eqvivalent SCC damage stress without stress concentration
PKDAM	Eqvivalent SCC damage stress with stress concentration
P OF F	Probability of failure. Calculated based on the assumption that PKDAM is normally distributed. The failure criteria is (225, 15) MPa. P of F = P(PKDAM $\geq$ (225, 15) MPa)

3.2. Description of the output special for CASE 1 and 4

Fuel state, Y(t): Printed for OUT $\geq$ 1

1. Page

STEPNO	The actual step number

END-TIME	The accumulated time from the starting point (hours)
DURATION	The duration of the present step (hours)
TYPE	1 of 3 possible power states. RAMP, STEADY, or FALL which mean increasing-, steady- or decreasing power
POWER	The power of the end of the time step (W/cm)
BURNUP	The fuel burnup measured in parts per million
FRATE MIDDEL	The mean fission rate in the fuel during the time step (PPM/hour)
TCY	Outer temperature of the cladding (^{o}C)
TCI	Inner temperature of the cladding (^{o}C)
TSURF	Surface temperature of the fuel (^{o}C)
TCENT	Centre temperature of the fuel (^{o}C)
TBRIDGE	The bridge temperature (^{o}C)
RBRIDGE	The radius of the bridge (mm)

2. Page

STEPNO	The present step number
EPSEL	Elastic strain (0/00)
EPSTH	Permanent tangential strain (0/00)
PLAST	Yield and primary creep deformation in the present step (0/00)
TOTPLAST	Plastic deformation giving the position in the yield diagram (strain hardening) (0/00)
DVS	Relative UO_2 volume increases by swelling, densification, and relocation (0/00)
RELFG	Fission gas release (0/0)
HG	Thermal conductivity between fuel and cladding
CA	The contact area between fuel and cladding. (Fraction of total area)
SIGTH	Tangential stress (MPa)
SGEN	The generalized stress (MPa)
KONPRE	The contact pressure between fuel and cladding (MPa)
GAB	The gab between fuel and cladding (um)

3. Page. Calculation with maximum interaction

STEPNO	The actual step number
MSIGTH	Maximal tangential stress (MPa)
MAXSCD	Maximal stress corrosion damage index
MAXEPS	Maximal permanent tangential strain (0/00)
TCENT	Centre temperature (^{o}C)
TBRIDGE	Bridge radius (mm)
KONPRE	Contact pressure between fuel and cladding (MPa)
GAB	The gab between fuel and cladding (um)

'Exp. No.' Gas data

HELIUM	The amount of helium in the pin (m^3)
FISGAS	The amount of released fission gas in the pin (m^3)

3.3. Description of the output special for CASE 2

For all of the variables Z_i (explained for CASE 1), the following are calculated:

MEAN	The mean value
STDEV	Standard deviation

MY2 — 2nd order moment around mean, the variance

MY3 — 3rd order moment around mean, skewness of the distribution

MY4 — 4th order moment around mean, the kurtosis

COEFV — Coefficient of variation

SQB1 — The skewness relative to the degree of spread

B2 — The relative measure of kurtosis

For all Z_i the calculated values of z_i are written in ascending order. If NBGR > 1 the values are grouped with NBGR in each group, and the group avarage value is written. LOOPS/NBGR must be an integer. Below each value (or group) the corresponding fractile is given.

3.4. Description of the output special for CASE 3

For all the variables Z_i (explained for CASE 1) the following are calculated:

VAR*(DF/DX)**2 — Lowest-order contribution to the variance. The variance multiplied by the 1st derivative of the state variable

VAR*(D2F/DX2) — The second-order term in the mean value. The variance multiplied by the 2nd derivative of the state variable

VAR-2.LED	The second-order contribution to the variance
MY3	3rd order moment around mean, skewness of the distribution
MY4	4th order moment around mean, the kurtosis
DFDX	The 1st derivative of the state variable
D2FDX2	The 2nd derivative of the state variable
MEAN	Mean value
STDEV	Standard deviation
F(MEAN(X))	The lowest-order approximation to the mean value. The deterministic value calculated using the mean value of all stochastic variables
3.ORD-VAR	3rd order term in the approximation of the variance
COEFV	Coefficient of variation
SQB1	The skewness relative to the degree of spread
B2	The relative measure of kurtosis.

3.5. Additional output for OUT=2 (Maximum output)

For OUT=2 there is an output of the namelist GEOTID. After the material data, there is a complete outprint of the initialized data, so it is possible to check the values in case of trouble.

In CASE 1 there is an outprint of a name list TESTUD containing global variables for FFRS.

In CASE 2 there is an outprint of the values of $\underline{Z}$; for each Monte Carlo trial.

4. REFERENCES

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APPENDIX A

A numerical example

The use of the program is illustrated by an example which simulates a control rod sequencing in a BWR, where the power is returned to full power immediately after the control rod movements. A fuel rod in a high power position, close to a control rod which was inserted a short period and then withdrawn is analysed. For the design data values are chosen that are typical for BWR.

The power history, design data, and stochastic variables in the material data are described in the following.

The power as a function of time is shown in Fig. A.1.

The uncertainty of the individual pin powers, as calculated by a reactor physics calculation, is at least $\pm 5\%$ (± 1 standard deviation). The three power levels (P_1, P_2, and P_3) can be considered as independent. The uncertainties of the fast flux and the outer cladding temperature are assumed to be $\pm 5\%$ (± 1 standard deviation) and $\pm 2\%$ (± 1 standard deviation), respectively. The power levels, the outer cladding temperature and the fast flux are assumed to follow a normal distribution.

The irradiation conditions (power history) are summarized in Table A.1.

The used design data are shown in Table A.2. The nominal values are used as mean values, the standard deviations are based on typical tolerances for BWR fuel. All design variables are assumed to be normally distributed.

For the material data the default values in FRP are used. The mean value, standard deviation, and distribution type is shown in Table A.3 for the stochastic variables in the material equations.

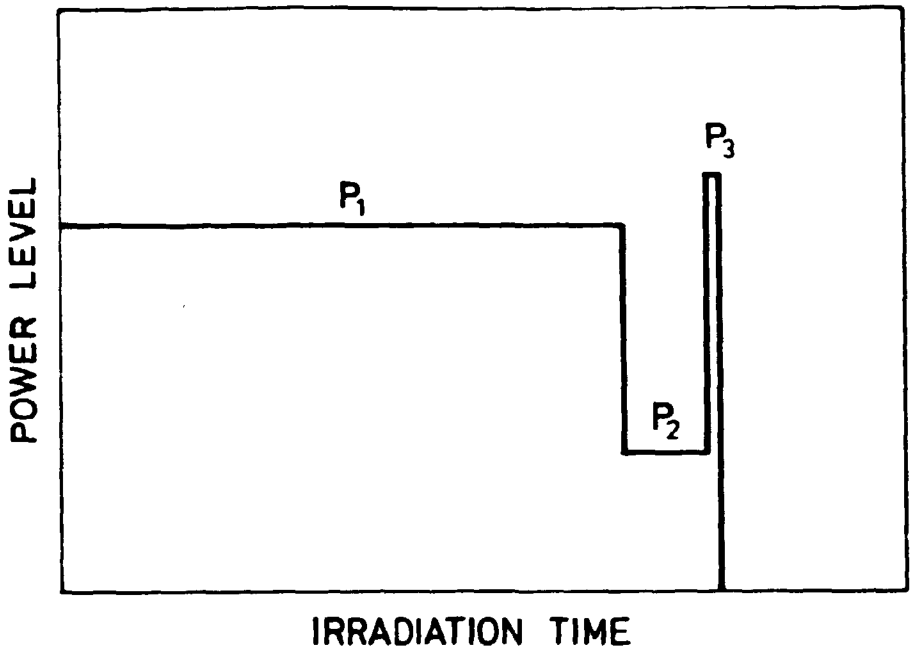

Fig. A.1. Power history for the example.

Table A.1. Power history for the example

period h	power* w/cm	fast flux* 10^{14}n/cm^2 sec	outer cladding temperature* °C
0-24	0-360	0-1.0	295
24-15400	360	1.0	295
15400-15401	360-136	1.0-0.4	295
15401-17630	136	0.4	295
17630-17630.01	136-410	0.4-1.15	295
17630.01-17654	410	1.15	295

*mean values

Table A.2. Design data for the example

Design parameter	Short name	Mean value	Standard deviation	Unit
Inner cladding radius	RCI	5.33	0.0075	mm
Cladding thickness	TCLAD	0.80	0.021	mm
Radial gap	TGAB	0.11	0.011	mm
Density	TDEN	96	0.67	% TD
Equivalent length	LEQ[1]	3.6	0.72	m
Plenum volume	VP	37.	7.4	cm^3
Fill gas volume	RF	37.	7.4	cm^3
Cladding yield strength at 300°	SIGMAF	300.	15.	MP
Inverse neutron diffusion length	KAPPA	80.	16.	m^{-1}
Average grain size	GRAIN	25.	5.	μm
Cladding surface roughness	RH1	130	26.	μm
Fuel surface roughness	RH2	90	18.	μm
Densification parameter	WEFF[2]	0.1×10^{-4}	0.035×10^{-4}	

Anisotropy factors : YF = .5; YH = .75, YG = .25

Porosity distribution: 0.16% porosity with r = 0.1 μm
1.6% porosity with r = 0.6 μm
2.2% porosity with r = 6 μm

Table A.3. Stochastic variables in the material equations

Material property	Short name	Distri-bution*	Mean value	Standard deviation	Unit
Zircaloy thermal conductivity	CO	N	13.5	1.01	W/m
UO_2 thermal expansion	ALFAF	N	$1x10^{-5}$	$0.1x10^{-5}$	K^{-1}
Zircaloy thermal expansion	ALFAC	N	$0.53x10^{-5}$	$0.05x10^{-5}$	K^{-1}
Young's modulus, zircaloy	EC	N	$7.6x10^{10}$	$0.5x10^{10}$	N/m^2
Mean thermal conductivity of UO_2 and zircaloy	KM	N	6.5	0.98	W/m
A constant in the gap conductance equation	CRS	LN	1.2	0.42	-
Factor in the porosity correction to the UO_2 thermal conductivity	EO	N	2.5	0.5	-
Constant in the UO_2 thermal conductivity	EI	N	8.056	0.3	-
Fission energy	EFIS	N	200	20	MeV
	KMAX	N	$1.2x10^9$	$0.12x10^9$	MP
Zircaloy plastic deformation	DELK	N	$-1.4x10^6$	$0.22x10^6$	MP/K
	NPL	N	0.1	0.012	-
	BFL	N	$0.4x10^{-21}$	$0.08x10^{-21}$	cm/n
Zircaloy creep	FCLAD	LN	1.2	0.5	-
UO_2 creep	FUO2	LN	1.7	2.5	-
Solid swelling	KSW	N	0.8	0.08	$FIMA^{-1}$
Hot (gaseous) swelling	KHTSW	N	$4.75x10^{-3}$	$1x10^{-3}$	$FIMA^{-1}K^{-1}$
	NHTSWL	N	0.1	0.02	-
Poisson's ratio, zircaloy	NY	N	0.3	0.07	-
Parameters in FPRS	QREF	N	$20.x10^3$	$4.x10^3$	-
	QBURN	N	$0.5x10^{-6}$	$0.1x10^{-6}$	-
Stress concentration in the cladding	SIGFAC	N	1.25	0.2	-
Eccentricity of the pellet	ECCENT	LN	0.5	0.2	-

* N = normal distribution
LN = lognormal distribution

APPENDIX B

Complete input for the example described in Appendix A.

With this input a deterministic calculation is performed, the mean value is used for all stochastic variables (CASE 1).

If one of the other 3 cases are wanted the only necessary change is to insert a specification of the case in the namelist GEOTID.

```
***************  EXAMPLE 1 ***********************************
&GEOTID
&END
          2          1 5.33 E-03   .00141
          3          1 0.80 E-03   .03
          4          1 0.11 E-03   .011
          5          1 96.0        .01
          6          1 3.6         .20
          7          1 37.  E-06   .20
          8          1 37.  E-06   .20
         10          4 300. E+06   .05
         11          4 .080 E+03   .20
         12          4 0.5
         13          4 0.75
         14          4 0.25
         15          1 2.25        .20
         16          4 1.30 E-03   .20
         17          4 .90  E-03   .20
         18          4 .100 E-06
         19          4 0.60 E-06
         20          4 6.00 E-06
         21          4 0.0016
         22          4 0.016
         23          4 .022
         24          1 .100 E-04   .350
         65          4   5.
         69          4   1.0        0.02
         72          4   2.
         73          4   4.
         74          4   6.
       1000
PIN X       .500  E-03.150  E-02                                    .170  E+04-.400 E-02
-.300 E-03   .150                  1.
0.1            1.      285.      7.1   E+06          1.0
24.        36000.      295.      7.1   E+06          1.0   E+14
15400.
15401.     13600.                                    0.4   E+14
17630.
17630.01   41000.                                    1.15  E+14
17654.
17654.5        1.                                    1.
17655.                  20.      1.0   E+05

       1000
```

APPENDIX C

Complete output from a deterministic calculation with FRP. The output corresponds exactly to the job given in Appendix B.

**************** EXAMPLE 1 ***********************************

CONTROLE VARIABLES: READ VIA NAMELIST GEOTID

ADMINISTRATION:	MODEL CONSTANTS:	NUMERICAL CONSTANTS:	DEBUG OPTIONS:
CASE = 1	NELMOD= 3	NAMULI= 20	TESTST= 1
IROD = 0	NKPSN = F	MAXTID= 800.	TESTSL=1000
FILEUO= 0		POWO = 2000.	MCTEST= F
OUT = 1		UGO = .[illegible]E-05	TSTLUP= 1
OUT2 = 0		UNBRG = [illegible]50	TFHUCH= F
NDATA = F		MAXPST= [illegible]	TPRMI = F
MAXBER= 0		EPSILU= .10E-01	TRAMP = F
IPOW = 1		EPSH = .10E-01	TCYCLE= F
PAR = 1.000		EPSK = .10E-01	TKONT = F
ALL = T		ANTITR= 100	TCRBRD= F
LOOPS = 100			TSSCLO= F
RANDST= 777			TGAS = F
NBGR = 1			
POINTS= 3			
ORDER = 1			
DEL = .50E-01			

GENERAL INPUT DESIGN DATA

NO	VARIABLE	DISTRIBUTION	MEAN VALUE	COEF. OF VAR.
2	RCI	NORMAL	.5330E-02	.141E-02
3	TCLAD	NORMAL	.8000E-03	.300E-01
4	TGAB	NORMAL	.1100E-03	.110E-01
5	TDEN	NORMAL	.9600E+02	.100E-01
6	LEO	NORMAL	.3600E+01	.200E+00
7	VF	NORMAL	.3700E-04	.200E+00
8	RF	NORMAL	.3700E-04	.200E+00
10	SIGMAF	DETERM	.3000E+09	.500E-01
11	KAPPA	DETERM	.6000E+02	.200E+00
12	YF	DETERM	.5000E+00	0.
13	YM	DETERM	.7500E+00	0.
14	YG	DETERM	.2500E+00	0.
15	GRAIN	NORMAL	.2250E+01	.200E+00
16	RM1	DETERM	.1300E-02	.200E+00
17	RM2	DETERM	.9000E-03	.200E+00
18	PORR1	DETERM	.1000E-06	0.
19	PORR2	DETERM	.6000E-06	0.
20	PORR3	DETERM	.6000E-05	0.
21	POR1	DETERM	.1600E-02	0.
22	POR2	DETERM	.1600E-01	0.
23	POR3	DETERM	.2200E-01	0.
24	WEFF	NORMAL	.1000E-04	.350E+00
65	RAMPST	DETERM	.5000E+01	0.
69	TFAC	DETERM	.1000E+01	.200E-01
72	IX1	DETERM	.2000E+01	0.
73	IX2	DETERM	.4000E+01	0.
74	IX3	DETERM	.6000E+01	0.

PIN X

INPUT POWER HISTORY

STEPNR	SLUTTID	EFFEKT	TCY	PY	KAPPA	FIFAST
1	0.1	1.0	2.850E+02	7.100E+06	0.	1.000E+00
2	24.0	36000.0	2.950E+02	7.100E+06	0.	1.000E+14
3	15400.0	36000.0	2.950E+02	7.100E+06	0.	1.000E+14
4	15401.0	13600.0	2.950E+02	7.100E+06	0.	4.000E+13
5	17630.0	13600.0	2.950E+02	7.100E+06	0.	4.000E+13
6	17630.0	41000.0	2.950E+02	7.100E+06	0.	1.150E+14
7	17654.0	41000.0	2.950E+02	7.100E+06	0.	1.150E+14
8	17654.5	1.0	2.950E+02	7.100E+06	0.	1.000E+00
9	17655.0	1.0	2.000E+01	1.000E+05	0.	1.000E+00

INPUT DESIGN DATA

NO	VARIABLE	DISTRIBUTION	MEAN VALUE	COEF. OF VAR.

DESIGN DATA

NO	VARIABLE	DISTRIBUTION	MEAN VALUE	COEF. OF VAR.
1	L	DETERM	-.1000E+02	0.
2	RCI	NORMAL	.5330E-02	.141E-02
3	TCLAD	NORMAL	.8000E-03	.300E-01
4	TGAP	NORMAL	.1100E-03	.110E-01
5	TDEN	NORMAL	.9600E+02	.100E-01
6	LFG	NORMAL	.3600E+01	.200E+00
7	VP	NORMAL	.3700E-04	.200E+00
8	RF	NORMAL	.3700E-04	.200E+00
9	RR	DETERM	0.	0.
10	SIGMAF	DETERM	.3000E+09	.500E-01
11	KAPPA	DETERM	.8000E+02	.200E+00
12	YF	DETERM	.5000E+00	0.
13	YH	DETERM	.7500E+00	0.
14	YG	DETERM	.2500E+00	0.
15	GRAIN	NORMAL	.2250E+01	.200E+00
16	RH1	DETERM	.1300E-02	.200E+00
17	RH2	DETERM	.9000E-03	.200E+00
18	PORR1	DETERM	.1000E-06	0.
19	PORR2	DETERM	.6000E-06	0.
20	PORR3	DETERM	.6000E-05	0.
21	POR1	DETERM	.1600E-02	0.
22	POR2	DETERM	.1600E-01	0.
23	POR3	DETERM	.2200E-01	0.
24	WEFF	NORMAL	.1000E-04	.350E+00

MATERIAL DATA

NO	VARIABLE	DISTRIBUTION	MEAN VALUE	COEF. OF VAR.
26	CO	NORMAL	.1350E+02	.750E-01
27	C1	DETERM	.1100E-01	0.
28	ALFAF	NORMAL	.1000E-04	.100E+00
29	ALFAC	NORMAL	.5300E-05	.100E+00
30	EC	NORMAL	.7600E+11	.700E-01
31	MOHE	DETERM	.2400E+05	0.
32	MOFISG	DETERM	.8000E+04	0.
33	MMETER	DETERM	.6900E+09	0.
34	KM	NORMAL	.6500E+01	.150E+00
35	CRS	LOGNORM	.1200E+01	.350E+00
36	AO	DETERM	.5000E+00	0.
37	EO	NORMAL	.2300E+01	.200E+00
38	E1	NORMAL	.8056E+01	.370E-01
39	E2	DETERM	-.4223E-02	0.
40	E3	DETERM	.1238E-05	0.
41	E4	DETERM	-.1170E-09	0.
42	EFIS	NORMAL	.2000E+03	.100E+00
43	KMAX	NORMAL	.1200E+10	.100E+00
44	DELK	NORMAL	-.1400E+07	.160E+00
45	MPL	NORMAL	.1000E+00	.120E+00
46	BFL	LOGNORM	.1100E-20	.800E+00
47	FCLAD	LOGNORM	.1300E+01	.400E+00
48	FUO2	LOGNORM	.1700E+01	.150E+01
49	KSW	NORMAL	.8000E+00	.100E+00
50	KHTSW	NORMAL	.4750E-02	.200E+00
51	MHTSWL	NORMAL	.1000E+00	.200E+00
52	KBU	DETERM	-.9430E+03	0.
53	LAM	NORMAL	-.1000E+02	0.
54	NY	NORMAL	.3000E+00	.220E+00
55	QREF	NORMAL	.2000E+05	.200E+00
56	QBURN	NORMAL	.5000E-06	.200E+00
57	PO	DETERM	.1000E+05	0.
58	TSC	DETERM	.4000E+02	0.
59	SIGN	DETERM	.4000E+09	0.
60	FSC	DETERM	.1000E-01	0.
61	SIGFAC	NORMAL	.1250E+01	.150E+00
62	ECCENT	LOGNORM	.5000E+00	.400E+00
63	MALFAF	DETERM	.1000E+01	0.
64	MIGAP	DETERM	.1000E+01	0.
65	RAMPST	DETERM	.5000E+01	0.
66	PFAC1	NORMAL	.1000E+01	.500E-01
67	PFAC2	NORMAL	.1000E+01	.500E-01
68	PFAC3	NORMAL	.1000E+01	.500E-01
69	TFAC	DETERM	.1000E+01	.200E-01
70	FFAC	NORMAL	.1000E+01	.500E-01
71	TAUREL	DETERM	.1000E+03	0.
72	IX1	DETERM	.2000E+01	0.
73	IX2	DETERM	.4000E+01	0.
74	IX3	DETERM	.6000E+01	0.
75	RELOPT	NORMAL	.4000E+00	.200E+00
76	KPUR	NORMAL	.2000E+00	.200E+00
77	RINNER	DETERM	.1000E+00	0.
78	DUMMY3	DETERM	.1000E+01	0.
79	DUMMY2	DETERM	.1000E+01	0.
80	DUMMY1	DETERM	.1000E+01	0.

***** C A S E 1 *****

DETERMINISTIC CALCULATION

USING THE MEAN VALUES

PRINTOUT OF THE FUEL STATE

*************** EXAMPLE 1 ********************************** PIN X

STEPNO	END-TIME	DURATION	TYPE	POWER	BURNUP	FRATE	CAN-TEMPS			FUEL-TEMPS		
						MIDDEL	TCY	TCI	TSURF	TCENT	TBRIDGE	RBRIDGE
	H	H		W/CM	PPM	PPM/H	DC	DC	DC	DC	DC	MM
1	0.1	0.1	RAMP	0.	0.0	0.0000	285.	285.	285.	285.	285.	5.215
2	8.5	8.4	RAMP	127.	3.0	0.3546	289.	305.	486.	715.	682.	1.902
3	17.0	8.5	RAMP	254.	12.0	1.0638	292.	326.	577.	1172.	1158.	0.694
4	24.0	7.0	RAMP	360.	24.0	1.7138	295.	342.	620.	1610.	1597.	0.522
5	74.0	50.0	STEADY	360.	124.5	2.0093	295.	342.	615.	1601.	1589.	0.522
6	124.0	50.0	STEADY	360.	224.9	2.0093	295.	342.	613.	1597.	1584.	0.522
7	174.0	50.0	STEADY	360.	325.4	2.0093	295.	342.	611.	1592.	1579.	0.522
8	224.0	50.0	STEADY	360.	425.9	2.0093	295.	342.	609.	1588.	1575.	0.522
9	274.0	50.0	STEADY	360.	526.3	2.0093	295.	342.	606.	1584.	1570.	0.522
10	324.0	50.0	STEADY	360.	626.8	2.0093	295.	342.	604.	1580.	1566.	0.522
11	374.0	50.0	STEADY	360.	727.3	2.0093	295.	342.	602.	1576.	1563.	0.523
12	424.0	50.0	STEADY	360.	827.7	2.0093	295.	342.	601.	1572.	1559.	0.523
13	474.0	50.0	STEADY	360.	928.2	2.0093	295.	342.	599.	1569.	1556.	0.523
14	524.0	50.0	STEADY	360.	1028.7	2.0093	295.	342.	597.	1565.	1552.	0.523
15	574.0	50.0	STEADY	360.	1129.1	2.0093	295.	342.	595.	1562.	1548.	0.523
16	624.0	50.0	STEADY	360.	1229.6	2.0093	295.	342.	594.	1558.	1545.	0.523
17	674.0	50.0	STEADY	360.	1330.1	2.0093	295.	342.	592.	1555.	1542.	0.523
18	724.0	50.0	STEADY	360.	1430.5	2.0093	295.	342.	590.	1551.	1538.	0.523
19	774.0	50.0	STEADY	360.	1531.0	2.0093	295.	342.	589.	1548.	1535.	0.523
20	824.0	50.0	STEADY	360.	1631.4	2.0093	295.	342.	587.	1545.	1532.	0.523
21	874.0	50.0	STEADY	360.	1731.9	2.0093	295.	342.	586.	1542.	1529.	0.523
22	924.0	50.0	STEADY	360.	1832.4	2.0093	295.	342.	584.	1539.	1527.	0.524
23	974.0	50.0	STEADY	360.	1932.8	2.0093	295.	342.	583.	1537.	1524.	0.524
24	1024.0	50.0	STEADY	360.	2033.3	2.0093	295.	342.	581.	1534.	1521.	0.524
25	1074.0	50.0	STEADY	360.	2133.8	2.0093	295.	342.	580.	1530.	1517.	0.524
26	1124.0	50.0	STEADY	360.	2234.2	2.0093	295.	342.	578.	1527.	1514.	0.524
27	1174.0	50.0	STEADY	360.	2334.7	2.0093	295.	342.	577.	1524.	1511.	0.524
28	1224.0	50.0	STEADY	360.	2435.2	2.0093	295.	342.	575.	1521.	1508.	0.524
29	1274.0	50.0	STEADY	360.	2535.6	2.0093	295.	342.	574.	1518.	1504.	0.524
30	1324.0	50.0	STEADY	360.	2636.1	2.0093	295.	342.	572.	1515.	1501.	0.524
31	1374.0	50.0	STEADY	360.	2736.6	2.0093	295.	342.	571.	1512.	1498.	0.524
32	1474.0	100.0	STEADY	360.	2937.5	2.0093	295.	342.	568.	1508.	1495.	0.524
33	1574.0	100.0	STEADY	360.	3138.4	2.0093	295.	342.	566.	1503.	1490.	0.524
34	1674.0	100.0	STEADY	360.	3339.3	2.0093	295.	342.	564.	1499.	1486.	0.525
35	1774.0	100.0	STEADY	360.	3540.3	2.0093	295.	342.	562.	1494.	1481.	0.525
36	1874.0	100.0	STEADY	360.	3741.2	2.0093	295.	342.	559.	1489.	1476.	0.525
37	1974.0	100.0	STEADY	360.	3942.1	2.0093	295.	342.	557.	1484.	1472.	0.525
38	2074.0	100.0	STEADY	360.	4143.0	2.0093	295.	342.	554.	1479.	1466.	0.525
39	2174.0	100.0	STEADY	360.	4343.9	2.0093	295.	342.	552.	1474.	1461.	0.525
40	2274.0	100.0	STEADY	360.	4544.9	2.0093	295.	342.	549.	1468.	1456.	0.525
41	2374.0	100.0	STEADY	360.	4745.8	2.0093	295.	342.	547.	1463.	1451.	0.525
42	2474.0	100.0	STEADY	360.	4946.7	2.0093	295.	342.	544.	1458.	1445.	0.525
43	2574.0	100.0	STEADY	360.	5147.7	2.0093	295.	342.	541.	1452.	1439.	0.526
44	2674.0	100.0	STEADY	360.	5348.6	2.0093	295.	342.	538.	1446.	1433.	0.526
45	2774.0	100.0	STEADY	360.	5549.5	2.0093	295.	342.	536.	1441.	1428.	0.526
46	2874.0	100.0	STEADY	360.	5750.5	2.0093	295.	342.	533.	1435.	1423.	0.526
47	2974.0	100.0	STEADY	360.	5951.4	2.0093	295.	342.	531.	1430.	1418.	0.526

48	3074.0	100.0	STEADY	360.	6152.4	2.0093	295.	342.	528.	1425.	1412.	0.526
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	RAMP	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	RAMP	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	RAMP	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	STEADY	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	STEADY	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	STEADY	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	FALL	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	0.3	STEADY	0.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

STEPNO	STRAIN-CAN EPSEL 0/00	STRAIN-CAN EPSTH 0/00	STRAIN-CAN PLAST 0/00	STRAIN-CAN TOTPLAST 0/00	DVS 0/00	ALFA D/D	MG W/CM2-C	CA	STRESS-CAN SIGTH MP	STRESS-CAN SGEN MP	STRESS-CAN CONPRE MP	GAB MY
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

55	-0.5116	-1.4034	0.0000	0.0319	26.7911	2.8975	0.6585	0.60	-48.13	30.68	0.00	7.73
56	-0.5112	-1.4686	0.0000	0.0319	27.3612	2.8151	0.6749	0.62	-48.10	30.65	0.00	6.73
57	-0.5108	-1.5338	0.0000	0.0319	27.8474	2.7167	0.6904	0.64	-48.07	30.63	0.00	5.85
58	-0.5105	-1.5989	0.0000	0.0319	28.2815	2.6242	0.7055	0.66	-48.04	30.61	0.00	5.03
59	-0.5102	-1.6639	0.0000	0.0319	28.5027	2.5350	0.7177	0.68	-48.01	30.59	0.00	4.39
60	-0.5098	-1.7289	0.0000	0.0319	28.8877	2.4700	0.7303	0.70	-47.98	30.57	0.00	3.73
61	-0.5095	-1.7937	0.0000	0.0319	29.1067	2.3998	0.7410	0.71	-47.95	30.54	0.00	3.19
62	-0.5092	-1.8586	0.0000	0.0319	29.2893	2.3444	0.7509	0.73	-47.92	30.52	0.00	2.70
63	-0.5088	-1.9236	0.0000	0.0319	29.4183	2.2947	0.7595	0.75	-47.88	30.50	0.00	2.27
64	-0.5083	-1.9883	0.0000	0.0319	29.5509	2.2661	0.7691	0.77	-47.84	30.47	0.00	1.83
65	-0.5079	-2.0530	0.0000	0.0319	29.6869	2.2259	0.7770	0.79	-47.81	30.44	0.00	1.39
66	-0.5076	-2.1177	0.0000	0.0319	29.8265	2.1819	0.7858	0.82	-47.77	30.42	0.00	0.94
67	-0.5072	-2.1823	0.0000	0.0319	29.9618	2.1369	0.7940	0.86	-47.74	30.40	0.00	0.48
68	-0.5050	-2.2464	0.0000	0.0319	30.1005	2.0965	0.8001	1.00	-47.56	30.28	0.02	0.00
69	-0.4879	-2.3073	0.0000	0.0319	30.1921	2.0730	0.8012	1.00	-46.16	29.42	0.21	0.00
70	-0.4662	-2.4213	0.0000	0.0319	30.4424	2.0940	0.8025	1.00	-44.47	28.41	0.44	0.00
71	-0.4442	-2.5273	0.0000	0.0319	30.7030	2.1413	0.8038	1.00	-42.70	27.38	0.68	0.00
72	-0.4274	-2.6275	0.0000	0.0319	30.9619	2.1868	0.8048	1.00	-41.35	26.62	0.85	0.00
73	-0.4106	-2.7217	0.0000	0.0319	31.2199	2.2336	0.8058	1.00	-40.00	25.87	1.03	0.00
74	-0.3929	-2.8097	0.0000	0.0319	31.4768	2.2783	0.8069	1.00	-38.58	25.13	1.22	0.00
75	-0.3747	-2.8916	0.0000	0.0319	31.7331	2.3205	0.8079	1.00	-37.11	24.39	1.41	0.00
76	-0.3596	-2.9680	0.0000	0.0319	31.9992	2.3615	0.8088	1.00	-35.90	23.80	1.57	0.00
77	-0.3443	-3.1114	0.0000	0.0319	32.5398	2.4015	0.8097	1.00	-34.65	23.22	1.72	0.00
78	-0.3238	-3.2423	0.0000	0.0319	33.1281	2.4893	0.8109	1.00	-32.99	22.48	1.93	0.00
79	-0.3082	-3.3627	0.0000	0.0319	33.7597	2.5706	0.8117	1.00	-31.72	21.93	2.08	0.00
80	-0.2936	-3.4736	0.0000	0.0319	34.4329	2.6499	0.8125	1.00	-30.54	21.45	2.21	0.00
81	-0.2771	-3.5745	0.0000	0.0319	35.1455	2.9613	0.8132	1.00	-29.15	20.88	2.35	0.00
82	-0.2556	-3.6647	0.0000	0.0319	35.8955	3.3487	0.8141	1.00	-27.59	20.27	2.49	0.00
83	-0.2382	-3.7459	0.0000	0.0319	36.7058	3.8157	0.8149	1.00	-25.87	19.63	2.65	0.00
84	-0.4644	-3.7460	0.0000	0.0319	36.7065	4.3969	0.5372	0.57	-43.74	27.80	0.00	9.20
85	-0.4644	-3.8248	0.0000	0.0319	37.0205	4.3117	0.5518	0.59	-43.74	27.80	0.00	8.35
86	-0.4662	-3.9037	0.0000	0.0319	37.3355	4.2302	0.5682	0.61	-43.71	27.78	0.00	7.49
87	-0.4639	-3.9656	0.0000	0.0319	37.5933	4.1683	0.5820	0.62	-43.69	27.76	0.00	6.81
88	1.6145	-3.8888	0.0934	0.0934	37.5933	4.1683	0.9335	1.00	121.38	118.80	23.70	0.00
89	2.3375	-3.8654	0.0989	0.1923	37.5933	4.1943	0.9799	1.00	178.80	166.38	31.82	0.00
90	2.9806	-3.6649	0.1688	0.3611	37.5933	4.5842	1.0208	1.00	229.92	208.75	39.18	0.00
91	2.5958	-3.5402	0.1338	0.4949	37.5649	13.1642	0.9898	1.00	200.76	180.90	33.68	0.00
92	2.2514	-3.5110	0.0014	0.4962	37.5306	13.5668	0.9673	1.00	173.47	158.01	29.69	0.00
93	1.9649	-3.4740	0.0000	0.4963	37.5153	13.8896	0.9486	1.00	150.73	138.95	26.38	0.00
94	-0.3535	-3.4748	0.0011	0.0011	37.5157	14.1788	0.4040	0.46	-33.29	21.16	0.00	17.53
95	0.0821	-3.4748	0.0000	0.4952	37.5157	14.1788	0.4205	0.48	7.73	4.91	0.00	15.97

CALCULATION WITH MAXIMUM INTERACTION

STEPNO	MSIGTH	MAXSCD	MAXEPS	TCENT	TBRIDGE	RBRIDGE	KONPRE	GAB
	MP		0/00	DC	DC	MM	MP	MY
1	-49.42	0.000000	-0.0163	285.	285.	5.215	0.00	100.76
2	-49.40	0.000000	-0.0227	715.	682.	1.902	0.00	83.20
3	-49.39	0.000000	-0.0252	1182.	1158.	0.626	0.00	66.63
4	-49.38	0.000000	-0.0279	1610.	1597.	0.522	0.00	52.06
5	-49.38	0.000000	-0.0449	1601.	1589.	0.522	0.00	51.41
6	-49.37	0.000000	-0.0618	1597.	1584.	0.522	0.00	50.53
7	-49.36	0.000000	-0.0787	1592.	1579.	0.522	0.00	49.62
8	-49.35	0.000000	-0.0955	1588.	1575.	0.522	0.00	48.71
9	-49.33	0.000000	-0.1124	1584.	1570.	0.522	0.00	47.78
10	-49.32	0.000000	-0.1292	1580.	1566.	0.522	0.00	46.85
11	-49.30	0.000000	-0.1460	1576.	1563.	0.523	0.00	45.91
12	-49.29	0.000000	-0.1628	1572.	1559.	0.523	0.00	45.03
13	-49.27	0.000000	-0.1797	1569.	1556.	0.523	0.00	44.14
14	-49.26	0.000000	-0.1965	1565.	1552.	0.523	0.00	43.25
15	-49.24	0.000000	-0.2133	1562.	1549.	0.523	0.00	42.35
16	-49.22	0.000000	-0.2300	1558.	1545.	0.523	0.00	41.46
17	-49.21	0.000000	-0.2468	1555.	1542.	0.523	0.00	40.57
18	-49.19	0.000000	-0.2636	1551.	1538.	0.523	0.00	39.68
19	-49.17	0.000000	-0.2804	1548.	1535.	0.523	0.00	38.82
20	-49.16	0.000000	-0.2971	1545.	1532.	0.523	0.00	38.06
21	-49.14	0.000000	-0.3139	1542.	1529.	0.524	0.00	37.29
22	-49.12	0.000000	-0.3306	1539.	1527.	0.524	0.00	36.52
23	-49.10	0.000000	-0.3474	1537.	1524.	0.524	0.00	35.76
24	-49.08	0.000000	-0.3641	1534.	1521.	0.524	0.00	34.99
25	-49.06	0.000000	-0.3808	1530.	1517.	0.524	0.00	34.23
26	-49.05	0.000000	-0.3975	1527.	1514.	0.524	0.00	33.47
27	-49.03	0.000000	-0.4142	1524.	1511.	0.524	0.00	32.77
28	-49.01	0.000000	-0.4309	1521.	1509.	0.524	0.00	32.07
29	-48.99	0.000000	-0.4476	1518.	1506.	0.524	0.00	31.37
30	-48.97	0.000000	-0.4643	1515.	1502.	0.524	0.00	30.67
31	-48.96	0.000000	-0.4810	1512.	1499.	0.524	0.00	29.98
32	-48.93	0.000000	-0.5143	1508.	1495.	0.524	0.00	28.90
33	-48.89	0.000000	-0.5476	1503.	1490.	0.524	0.00	27.81
34	-48.85	0.000000	-0.5809	1499.	1486.	0.525	0.00	26.72
35	-48.81	0.000000	-0.6141	1494.	1481.	0.525	0.00	25.64
36	-48.78	0.000000	-0.6473	1489.	1476.	0.525	0.00	24.62
37	-48.74	0.000000	-0.6804	1484.	1472.	0.525	0.00	23.61
38	-48.70	0.000000	-0.7136	1479.	1466.	0.525	0.00	22.60
39	-48.67	0.000000	-0.7467	1474.	1461.	0.525	0.00	21.60
40	-48.63	0.000000	-0.7797	1468.	1456.	0.525	0.00	20.68
41	-48.60	0.000000	-0.8128	1463.	1451.	0.525	0.00	19.77
42	-48.57	0.000000	-0.8458	1458.	1445.	0.525	0.00	18.85
43	-48.53	0.000000	-0.8788	1452.	1439.	0.526	0.00	17.95
44	-48.50	0.000000	-0.9117	1446.	1433.	0.526	0.00	17.04
45	-48.48	0.000000	-0.9447	1441.	1428.	0.526	0.00	16.27
46	-48.45	0.000000	-0.9776	1435.	1423.	0.526	0.00	15.50
47	-48.42	0.000000	-1.0105	1430.	1418.	0.526	0.00	14.73
48	-48.39	0.000000	-1.0433	1425.	1412.	0.526	0.00	13.96
49	-48.37	0.000000	-1.0762	1420.	1407.	0.526	0.00	13.26
50	-48.34	0.000000	-1.1090	1415.	1402.	0.526	0.00	12.56
51	-48.32	0.000000	-1.1418	1409.	1397.	0.526	0.00	11.86
52	-48.28	0.000000	-1.2073	1401.	1389.	0.526	0.00	10.74

53	-48.23	0.000000	-1.2727	1394.	1382.	0.526	0.00	9.73
54	-48.16	0.000000	-1.3381	1386.	1374.	0.526	0.00	8.73
55	-48.13	0.000000	-1.4034	1378.	1366.	0.527	0.00	7.73
56	-48.10	0.000000	-1.4686	1370.	1358.	0.527	0.00	6.73
57	-48.07	0.000000	-1.5338	1363.	1351.	0.527	0.00	5.85
58	-48.04	0.000000	-1.5989	1356.	1344.	0.527	0.00	5.03
59	-48.01	0.000000	-1.6639	1350.	1339.	0.527	0.00	4.39
60	-47.98	0.000000	-1.7289	1345.	1333.	0.527	0.00	3.73
61	-47.95	0.000000	-1.7939	1340.	1329.	0.527	0.00	3.19
62	-47.92	0.000000	-1.8588	1337.	1325.	0.527	0.00	2.70
63	-47.88	0.000000	-1.9236	1333.	1321.	0.527	0.00	2.27
64	-47.84	0.000000	-1.9883	1330.	1318.	0.527	0.00	1.83
65	-47.81	0.000000	-2.0530	1326.	1315.	0.527	0.00	1.39
66	-47.77	0.000000	-2.1177	1323.	1312.	0.527	0.00	0.94
67	-47.74	0.000000	-2.1823	1320.	1309.	0.527	0.00	0.46
68	-47.50	0.000000	-2.2463	1318.	1307.	0.527	0.02	0.00
69	-45.59	0.000000	-2.3058	1318.	1264.	1.131	0.21	0.00
70	-43.29	0.000000	-2.4144	1317.	1199.	1.692	0.44	0.00
71	-40.91	0.000000	-2.5122	1317.	1151.	2.021	0.68	0.00
72	-39.09	0.000000	-2.6022	1317.	1109.	2.275	0.85	0.00
73	-37.27	0.000000	-2.6843	1316.	1073.	2.479	1.03	0.00
74	-35.38	0.000000	-2.7583	1316.	1041.	2.651	1.22	0.00
75	-33.39	0.000000	-2.8243	1316.	1012.	2.779	1.41	0.00
76	-31.76	0.000000	-2.8836	1315.	984.	2.938	1.57	0.00
77	-30.11	0.000000	-2.9893	1315.	931.	3.187	1.72	0.00
78	-27.91	0.000000	-3.0781	1315.	882.	3.428	1.93	0.00
79	-26.25	0.000000	-3.1544	1314.	835.	3.647	2.08	0.00
80	-24.71	0.000000	-3.2194	1314.	790.	3.853	2.21	0.00
81	-22.97	0.000000	-3.2721	1314.	747.	4.049	2.35	0.00
82	-21.03	0.000000	-3.3116	1314.	706.	4.234	2.49	0.00
83	-18.91	0.000000	-3.3377	1313.	666.	4.415	2.65	0.00
84	-43.74	0.000000	-3.3378	609.	451.	4.415	0.00	9.20
85	-43.74	0.000000	-3.4166	607.	448.	4.415	0.00	8.35
86	-43.71	0.000000	-3.4955	604.	446.	4.415	0.00	7.49
87	-43.69	0.000000	-3.5574	602.	444.	4.415	0.00	6.81
88	183.56	0.000683	-3.3507	1312.	861.	3.489	23.70	0.00
89	262.60	0.001453	-3.1395	1380.	980.	3.124	31.92	0.00
90	332.83	0.035755	-2.7835	1472.	1103.	2.796	39.18	0.00
91	289.30	6.750139	-2.4880	1480.	1053.	3.029	33.68	0.00
92	251.57	14.049705	-2.4405	1467.	1000.	3.262	29.69	0.00
93	220.13	18.695736	-2.3839	1492.	959.	3.436	26.38	0.00
94	-33.29	18.695736	-2.3847	295.	295.	3.436	0.00	17.53
95	7.73	18.695736	-2.3847	295.	295.	3.436	0.00	15.97

PIN X GAS DATA

HELIUM: .3700E-04 FISGAS: .3868E-03

***************** EXAMPLE 1 *************************************

		EPSMAX	MEPSM	SIGMAX	PKSTRS	MAXSCD	HTCENT	EPSSL	MEPSSL	RELFG	SIGDAM	PKDAM	P OF F
1 PIN X	CAL	.271E-03	.953E-03	.230E+09	.333E+09	.187E+02	.161E+04	-.347E-02	-.238E-02	.142E+00	.249E+09	.343E+09	
	PIE	.500E-03	.150E-02	?	?	?	.170E+04	-.400E-02	-.300E-03	.150E+00	?		1.

APPENDIX D

Complete output from a Monte Carlo simulation. Only **"CASE"** is changed relative to the input given in Appendix B.

*************** EXAMPLE 1 ********************************

CONTROLE VARIABLES: READ VIA NAMELIST GEOTID

ADMINISTRATION:	MODEL CONSTANTS:	NUMERICAL CONSTANTS:	DEBUG OPTIONS:
CASE = 2	RELMOD= 3	NANULI= 20	TESTST= 1
IROD = 0	NKPSW = F	MAXTID= 800.	TESTSL=1000
FILEUD= 0		PUNO = 2000.	MCTEST= F
OUT = 1		UGU = .50E-05	TSTLUP= 1
OUT2 = 0		UNBRG = 0.050	TPROCH= F
WDATA = F		MAXPST= 5	TPRHL = F
MAXBER= 0		EPSILD= .10E-01	TRAMP = F
IPO = 1		EPSM = .10E-01	TCYCLE= F
PAR = 1.000		EPSK = .10E-01	TKONT = F
ALL = T		ANTITR= 100	TCRUND= F
LOOPS = 100			TSSCLD= F
RANDST= 777			TGAS = F
NBGR = 1			
POINTS= 3			
ORDER = 1			
DEL = .50E-01			

GENERAL INPUT DESIGN DATA

NO	VARIABLE	DISTRIBUTION	MEAN VALUE	COEF. OF VAR.
2	RCI	NORMAL	.5330E-02	.141E-02
3	TCLAD	NORMAL	.8000E-03	.300E-01
4	TGAB	NORMAL	.1100E-03	.110E-01
5	TDEN	NORMAL	.9600E+02	.100E-01
6	LEQ	NORMAL	.3000E+01	.200E+00
7	VP	NORMAL	.3700E-04	.200E+00
8	RF	NORMAL	.3700E-04	.200E+00
10	SIGMAF	DETERM	.3000E+09	.500E-01
11	KAPPA	DETERM	.8000E+02	.200E+00
12	YF	DETERM	.5000E+00	0.
13	YH	DETERM	.7500E+00	0.
14	YG	DETERM	.2500E+00	0.
15	GRAIN	NORMAL	.2250E+01	.200E+00
16	RH1	DETERM	.1300E-02	.200E+00
17	RH2	DETERM	.9000E-03	.200E+00
18	PORR1	DETERM	.1000E-06	0.
19	PORR2	DETERM	.6000E-06	0.
20	PORR3	DETERM	.6000E-05	0.
21	POR1	DETERM	.1600E-02	0.
22	POR2	DETERM	.1600E-01	0.
23	POR3	DETERM	.2200E-01	0.
24	WEFF	NORMAL	.1000E-04	.350E+00
65	RAMPST	DETERM	.5000E+01	0.
69	TFAC	DETERM	.1000E+01	.200E-01
72	IX1	DETERM	.2000E+01	0.
73	IX2	DETERM	.4000E+01	0.
74	IX3	DETERM	.6000E+01	0.

PIN X

INPUT POWER HISTORY

STEPNR	SLUTTID	EFFEKT	TCY	PY	KAPPA	FIFAST
1	0.1	1.0	2.850E+02	7.100E+06	0.	1.000E+00
2	24.0	36000.0	2.950E+02	7.100E+06	0.	1.000E+14
3	15400.0	36000.0	2.950E+02	7.100E+06	0.	1.020E+14
4	15401.0	13600.0	2.950E+02	7.100E+06	0.	4.000E+13
5	17630.0	13600.0	2.950E+02	7.100E+06	0.	4.000E+13
6	17630.0	41000.0	2.950E+02	7.100E+06	0.	1.150E+14
7	17654.0	41000.0	2.950E+02	7.100E+06	0.	1.150E+14
8	17654.5	1.0	2.950E+02	7.100E+06	0.	1.000E+00
9	17655.0	1.0	2.000E+01	1.000E+05	0.	1.000E+00

INPUT DESIGN DATA

NO	VARIABLE	DISTRIBUTION	MEAN VALUE	COEF. OF VAR.

DESIGN DATA

NO	VARIABLE	DISTRIBUTION	MEAN VALUE	COEF. OF VAR.
1	L	DETERM	-.1000E+02	0.
2	RCI	NORMAL	.5330E-02	.141E-02
3	TCLAD	NORMAL	.6000E-03	.300E-01
4	TGAB	NORMAL	.1100E-03	.110E-01
5	TDEN	NORMAL	.9600E+02	.100E-01
6	LEQ	NORMAL	.3600E+01	.200E+00
7	VP	NORMAL	.3700E-04	.200E+00
8	RF	NORMAL	.3700E-04	.200E+00
9	RR	DETERM	0.	0.
10	SIGNAF	DETERM	.3000E+09	.500E-01
11	KAPPA	DETERM	.8000E+02	.200E+00
12	YF	DETERM	.5000E+00	0.
13	YH	DETERM	.7500E+00	0.
14	YG	DETERM	.2500E+00	0.
15	GRAIN	NORMAL	.2250E+01	.200E+00
16	RH1	DETERM	.1300E-02	.200E+00
17	RH2	DETERM	.9000E-03	.200E+00
18	PORR1	DETERM	.1000E-06	0.
19	PORR2	DETERM	.6000E-06	0.
20	PORR3	DETERM	.6000E-05	0.
21	POR1	DETERM	.1600E-02	0.
22	POR2	DETERM	.1600E-01	0.
23	POR3	DETERM	.2200E-01	0.
24	WEFF	NORMAL	.1000E-04	.350E+00

MATERIAL DATA

NO	VARIABLE	DISTRIBUTION	MEAN VALUE	COEF. OF VAR.
26	CO	NORMAL	.1350E+02	.750E-01
27	CI	DETERM	.1100E-01	0.
28	ALFAF	NORMAL	.1000E-04	.100E+00
29	ALFAC	NORMAL	.5300E-05	.100E+00
30	EC	NORMAL	.7600E+11	.700E-01
31	MOHE	DETERM	.2400E+05	0.
32	MOFISG	DETERM	.8000E+04	0.
33	MMEYER	DETERM	.6900E+09	0.
34	KM	NORMAL	.6500E+01	.150E+00
35	CRS	LOGNORM	.1200E+01	.350E+00
36	AO	DETERM	.5000E+00	0.
37	EO	NORMAL	.2500E+01	.200E+00
38	E1	NORMAL	.6056E+01	.370E-01
39	E2	DETERM	-.4223E-02	0.
40	E3	DETERM	.1238E-05	0.
41	E4	DETERM	-.1170E-09	0.
42	EFIS	NORMAL	.2000E+03	.100E+00
43	KMAX	NORMAL	.1200E+10	.100E+00
44	DELK	NORMAL	-.1400E+07	.160E+00
45	NPL	NORMAL	.1000E+00	.120E+00
46	BFL	LOGNORM	.1100E-20	.800E+00
47	FCLAD	LOGNORM	.1200E+01	.400E+00
48	FUO2	LOGNORM	.1700E+01	.150E+01
49	KSH	NORMAL	.6000E+00	.100E+00
50	KHTSH	NORMAL	.6750E-02	.200E+00
51	MHTSHL	NORMAL	.1000E+00	.200E+00
52	KBU	DETERM	-.9430E+03	0.
53	LAM	NORMAL	-.1000E+02	0.
54	NY	NORMAL	.3000E+00	.220E+00
55	QREF	NORMAL	.2000E+05	.200E+00
56	QBURN	NORMAL	.5000E-06	.200E+00
57	PO	DETERM	.1000E+05	0.
58	TSC	DETERM	.4000E+02	0.
59	SIGN	DETERM	.4000E+09	0.
60	FSC	DETERM	.1000E-01	0.
61	SIGFAC	NORMAL	.1250E+01	.150E+00
62	ECCENT	LOGNORM	.5000E+00	.400E+00
63	MALFAF	DETERM	.1000E+01	0.
64	MTGAB	DETERM	.1000E+01	0.
65	RAMPST	DETERM	.5000E+01	0.
66	PFAC1	NORMAL	.1000E+01	.500E-01
67	PFAC2	NORMAL	.1000E+01	.500E-01
68	PFAC3	NORMAL	.1000E+01	.500E-01
69	TFAC	DETERM	.1000E+01	.200E-01
70	FFAC	NORMAL	.1000E+01	.500E-01
71	TAUREL	DETERM	.1000E+01	0.
72	IX1	DETERM	.2000E+01	0.
73	IX2	DETERM	.4000E+01	0.
74	IX3	DETERM	.6000E+01	0.
75	RELOPT	NORMAL	.4000E+00	.200E+00
76	KPOR	NORMAL	.2000E+00	.200E+00
77	RINNER	DETERM	.1000E+00	0.
78	DUMMY3	DETERM	.1000E+01	0.
79	DUMMY2	DETERM	.1000E+01	0.
80	DUMMY1	DETERM	.1000E+01	0.

***** C A S E 2 *****
***** C A S E 2 *****
MONTE CARLO

PIN X

CALCULATED MEAN AND HIGHER MOMENTS

```
MEAN AND STDEV FOR   EPSMAX:     MEAN=         .48709E-03          STDEV=          .40183E-03
MY2=  .1598E-06     MY3=  .4278E-10     MY4=  .8643E-13     COEFV=  .8249E+00     SQB1=  .6694E+00     B2=  .3382E+01

MEAN AND STDEV FOR   MEPSM :     MEAN=         .15265E-02          STDEV=          .13174E-02
MY2=  .1718E-05     MY3=  .2060E-08     MY4=  .9488E-11     COEFV=  .8630E+00     SQB1=  .9148E+00     B2=  .3214E+01

MEAN AND STDEV FOR   SIGMAX:     MEAN=         .25246E+09          STDEV=          .89124E+08
MY2=  .7864E+16     MY3= -.1279E+24     MY4=  .2710E+33     COEFV=  .3530E+00     SQB1= -.1835E+00     B2=  .4382E+01

MEAN AND STDEV FOR   PKSTRS:     MEAN=         .35909E+09          STDEV=          .14259E+09
MY2=  .2013E+17     MY3= -.1128E+24     MY4=  .1356E+34     COEFV=  .3971E+00     SQB1= -.3949E-01     B2=  .3346E+01

MEAN AND STDEV FOR   MAXSCD:     MEAN=         .33734E+11          STDEV=          .33722E+12
MY2=  .1126E+24     MY3=  .3721E+36     MY4=  .1242E+49     COEFV=  .9997E+01     SQB1=  .9849E+01     B2=  .9801E+02

MEAN AND STDEV FOR   MTCENT:     MEAN=         .16433E+04          STDEV=          .15328E+03
MY2=  .2326E+05     MY3=  .1580E+07     MY4=  .1650E+10     COEFV=  .9328E-01     SQB1=  .4454E+00     B2=  .3049E+01

MEAN AND STDEV FOR   EPSSL :     MEAN=        -.37416E-02          STDEV=          .22078E-02
MY2=  .4826E-05     MY3= -.1986E-07     MY4=  .2402E-09     COEFV= -.5901E+00     SQB1= -.1874E+01     B2=  .1031E+02

MEAN AND STDEV FOR   MEPSSL:     MEAN=        -.25761E-02          STDEV=          .23989E-02
MY2=  .5697E-05     MY3= -.1063E-07     MY4=  .2045E-09     COEFV= -.9312E+00     SQB1= -.7821E+00     B2=  .6301E+01

MEAN AND STDEV FOR   RELFG :     MEAN=         .17016E+00          STDEV=          .73207E-01
MY2=  .5306E-02     MY3=  .3446E-03     MY4=  .9402E-04     COEFV=  .4302E+00     SQB1=  .8916E+00     B2=  .3340E+01


MEAN AND STDEV FOR   SIGDAM:     MEAN=         .23954E+09          STDEV=          .97031E+08
MY2=  .9321E+16     MY3= -.3424E+24     MY4=  .2264E+33     COEFV=  .4051E+00     SQB1= -.6028E+00     B2=  .2606E+01

MEAN AND STDEV FOR   PKOAM :     MEAN=         .33312E+09          STDEV=          .12118E+09
MY2=  .1454E+17     MY3= -.1518E+25     MY4=  .8471E+33     COEFV=  .3638E+00     SQB1= -.8662E+00     B2=  .4009E+01
```

VALUES FOR EPSMAX

-.301E-03	-.197E-03	-.169E-03	-.957E-04	-.880E-04	-.803E-04	-.700E-04	-.217E-04
0.0070	0.0169	0.0269	0.0369	0.0468	0.0568	0.0667	0.0767
.232E-05	.190E-04	.451E-04	.486E-04	.930E-04	.988E-04	.106E-03	.107E-03
0.0867	0.0966	0.1066	0.1165	0.1265	0.1365	0.1464	0.1564
.108E-03	.110E-03	.121E-03	.123E-03	.138E-03	.148E-03	.167E-03	.186E-03
0.1663	0.1763	0.1863	0.1962	0.2062	0.2161	0.2261	0.2361
.187E-03	.191E-03	.193E-03	.235E-03	.241E-03	.258E-03	.260E-03	.262E-03
0.2460	0.2560	0.2659	0.2759	0.2859	0.2958	0.3058	0.3157
.264E-03	.279E-03	.289E-03	.289E-03	.306E-03	.309E-03	.314E-03	.318E-03
0.3257	0.3357	0.3456	0.3556	0.3655	0.3755	0.3855	0.3954
.326E-03	.340E-03	.344E-03	.345E-03	.353E-03	.359E-03	.368E-03	.372E-03
0.4054	0.4153	0.4253	0.4353	0.4452	0.4552	0.4651	0.4751
.389E-03	.424E-03	.450E-03	.456E-03	.463E-03	.469E-03	.474E-03	.485E-03
0.4851	0.4950	0.5050	0.5149	0.5249	0.5349	0.5448	0.5548
.505E-03	.526E-03	.544E-03	.547E-03	.565E-03	.574E-03	.587E-03	.601E-03
0.5647	0.5747	0.5847	0.5946	0.6046	0.6145	0.6245	0.6345
.612E-03	.616E-03	.633E-03	.636E-03	.655E-03	.657E-03	.659E-03	.672E-03
0.6444	0.6544	0.6643	0.6743	0.6843	0.6942	0.7042	0.7141
.714E-03	.718E-03	.720E-03	.735E-03	.756E-03	.763E-03	.776E-03	.845E-03
0.7241	0.7341	0.7440	0.7540	0.7639	0.7739	0.7839	0.7938
.866E-03	.872E-03	.884E-03	.884E-03	.889E-03	.916E-03	.961E-03	.964E-03
0.8038	0.8137	0.8237	0.8337	0.8436	0.8536	0.8635	0.8735
.971E-03	.978E-03	.993E-03	.994E-03	.100E-02	.103E-02	.122E-02	.134E-02
0.8835	0.8934	0.9034	0.9133	0.9233	0.9333	0.9432	0.9532
.135E-02	.144E-02	.155E-02	.177E-02	0.	0.	0.	0.
0.9631	0.9731	0.9831	0.9930	1.0030	1.0129	1.0229	1.0329

VALUES FOR MEPSM

-.300E-03	-.197E-03	-.172E-03	-.711E-04	-.700E-04	-.619E-04	.617E-04	.844E-04
0.0070	0.0169	0.0269	0.0369	0.0468	0.0568	0.0667	0.0767
.110E-03	.141E-03	.144E-03	.150E-03	.174E-03	.214E-03	.230E-03	.284E-03
0.0867	0.0966	0.1066	0.1165	0.1265	0.1365	0.1464	0.1564
.340E-03	.355E-03	.358E-03	.363E-03	.382E-03	.397E-03	.409E-03	.409E-03
0.1663	0.1763	0.1863	0.1962	0.2062	0.2161	0.2261	0.2361
.423E-03	.427E-03	.434E-03	.437E-03	.492E-03	.635E-03	.708E-03	.728E-03
0.2460	0.2560	0.2659	0.2759	0.2859	0.2958	0.3058	0.3157
.735E-03	.759E-03	.765E-03	.788E-03	.789E-03	.828E-03	.859E-03	.859E-03
0.3257	0.3357	0.3456	0.3556	0.3655	0.3755	0.3855	0.3954
.918E-03	.923E-03	.938E-03	.970E-03	.981E-03	.101E-02	.102E-02	.106E-02
0.4054	0.4153	0.4253	0.4353	0.4452	0.4552	0.4651	0.4751
.109E-02	.119E-02	.127E-02	.128E-02	.131E-02	.131E-02	.139E-02	.143E-02
0.4851	0.4950	0.5050	0.5149	0.5249	0.5349	0.5448	0.5548
.145E-02	.147E-02	.148E-02	.149E-02	.152E-02	.154E-02	.155E-02	.169E-02
0.5647	0.5747	0.5847	0.5946	0.6046	0.6145	0.6245	0.6345
.179E-02	.180E-02	.182E-02	.196E-02	.204E-02	.205E-02	.209E-02	.213E-02
0.6444	0.6544	0.6643	0.6743	0.6843	0.6942	0.7042	0.7141
.224E-02	.226E-02	.234E-02	.235E-02	.246E-02	.251E-02	.260E-02	.268E-02
0.7241	0.7341	0.7440	0.7540	0.7639	0.7739	0.7839	0.7938
.287E-02	.288E-02	.277E-02	.297E-02	.303E-02	.318E-02	.319E-02	.320E-02
0.8038	0.8137	0.8237	0.8337	0.8436	0.8536	0.8635	0.8735
.321E-02	.342E-02	.347E-02	.357E-02	.372E-02	.378E-02	.399E-02	.406E-02
0.8835	0.8934	0.9034	0.9133	0.9233	0.9333	0.9432	0.9532
.439E-02	.497E-02	.520E-02	.540E-02	0.	0.	0.	0.
0.9631	0.9731	0.9831	0.9930	1.0030	1.0129	1.0229	1.0329

VALUES FOR SIGMAX

.153E+07 0.0070	.614E+07 0.0169	.143E+08 0.0269	.452E+08 0.0369	.718E+08 0.0468	.118E+09 0.0568	.122E+09 0.0667	.141E+09 0.0767
.162E+09 0.0867	.170E+09 0.0966	.172E+09 0.1066	.173E+09 0.1165	.174E+09 0.1265	.175E+09 0.1365	.179E+09 0.1464	.180E+09 0.1564
.186E+09 0.1663	.187E+09 0.1763	.189E+09 0.1863	.190E+09 0.1962	.192E+09 0.2062	.195E+09 0.2161	.198E+09 0.2261	.200E+09 0.2361
.203E+09 0.2460	.206E+09 0.2560	.206E+09 0.2659	.211E+09 0.2759	.212E+09 0.2859	.212E+09 0.2958	.213E+09 0.3058	.216E+09 0.3157
.216E+09 0.3257	.216E+09 0.3357	.217E+09 0.3456	.221E+09 0.3556	.224E+09 0.3655	.228E+09 0.3755	.228E+09 0.3855	.229E+09 0.3954
.229E+09 0.4054	.231E+09 0.4153	.231E+09 0.4253	.232E+09 0.4353	.232E+09 0.4452	.235E+09 0.4552	.235E+09 0.4651	.235E+09 0.4751
.239E+09 0.4851	.241E+09 0.4950	.246E+09 0.5050	.249E+09 0.5149	.249E+09 0.5249	.255E+09 0.5349	.258E+09 0.5448	.258E+09 0.5548
.262E+09 0.5647	.262E+09 0.5747	.269E+09 0.5847	.270E+09 0.5946	.276E+09 0.6046	.281E+09 0.6145	.289E+09 0.6245	.290E+09 0.6345
.292E+09 0.6444	.297E+09 0.6544	.300E+09 0.6643	.301E+09 0.6743	.302E+09 0.6843	.303E+09 0.6942	.304E+09 0.7042	.307E+09 0.7141
.308E+09 0.7241	.309E+09 0.7341	.310E+09 0.7440	.310E+09 0.7540	.320E+09 0.7639	.323E+09 0.7739	.324E+09 0.7839	.325E+09 0.7938
.325E+09 0.8038	.325E+09 0.8137	.332E+09 0.8237	.333E+09 0.8337	.338E+09 0.8436	.342E+09 0.8536	.346E+09 0.8635	.347E+09 0.8735
.347E+09 0.8835	.348E+09 0.8934	.351E+09 0.9034	.353E+09 0.9133	.356E+09 0.9233	.358E+09 0.9333	.359E+09 0.9432	.368E+09 0.9532
.389E+09 0.9631	.442E+09 0.9731	.451E+09 0.9831	.546E+09 0.9930	0. 1.0030	0. 1.0129	0. 1.0229	0. 1.0329

VALUES FOR PKSTRS

.153E+07 0.0070	.614E+07 0.0169	.143E+08 0.0269	.666E+08 0.0369	.107E+09 0.0468	.137E+09 0.0568	.150E+09 0.0667	.168E+09 0.0767
.175E+09 0.0867	.187E+09 0.0966	.196E+09 0.1066	.200E+09 0.1165	.209E+09 0.1265	.216E+09 0.1365	.230E+09 0.1464	.232E+09 0.1564
.248E+09 0.1663	.249E+09 0.1763	.249E+09 0.1863	.254E+09 0.1962	.254E+09 0.2062	.263E+09 0.2161	.268E+09 0.2261	.268E+09 0.2361
.271E+09 0.2460	.273E+09 0.2566	.273E+09 0.2659	.277E+09 0.2759	.277E+09 0.2859	.279E+09 0.2958	.281E+09 0.3058	.284E+09 0.3157
.290E+09 0.3257	.300E+09 0.3357	.300E+09 0.3456	.306E+09 0.3556	.307E+09 0.3655	.308E+09 0.3755	.308E+09 0.3855	.318E+09 0.3954
.322E+09 0.4054	.324E+09 0.4153	.325E+09 0.4253	.331E+09 0.4353	.337E+09 0.4452	.339E+09 0.4552	.342E+09 0.4651	.343E+09 0.4751
.345E+09 0.4851	.349E+09 0.4950	.349E+09 0.5050	.351E+09 0.5149	.357E+09 0.5249	.363E+09 0.5349	.363E+09 0.5448	.381E+09 0.5548
.384E+09 0.5647	.393E+09 0.5747	.395E+09 0.5847	.397E+09 0.5946	.398E+09 0.6046	.399E+09 0.6145	.401E+09 0.6245	.404E+09 0.6345
.411E+09 0.6444	.418E+09 0.6544	.422E+09 0.6643	.423E+09 0.6743	.427E+09 0.6843	.434E+09 0.6942	.437E+09 0.7042	.442E+09 0.7141
.447E+09 0.7241	.455E+09 0.7341	.457E+09 0.7440	.460E+09 0.7540	.465E+09 0.7639	.467E+09 0.7739	.473E+09 0.7839	.487E+09 0.7938
.490E+09 0.8038	.492E+09 0.8137	.497E+09 0.8237	.498E+09 0.8337	.503E+09 0.8436	.503E+09 0.8536	.513E+09 0.8635	.514E+09 0.8735
.519E+09 0.8835	.525E+09 0.8934	.533E+09 0.9034	.554E+09 0.9133	.557E+09 0.9233	.559E+09 0.9333	.577E+09 0.9432	.610E+09 0.9532
.612E+09 0.9631	.616E+09 0.9731	.632E+09 0.9831	.790E+09 0.9930	0. 1.0030	0. 1.0129	0. 1.0229	0. 1.0329

VALUES FOR MAXSCO

0.	0.	0.	.183E-10	.365E-05	.306E-04	.316E-03	.656E-03
0.0070	0.0169	0.0249	0.0369	0.0468	0.0566	0.0667	0.0767
.176E-02	.214E-02	.674E-02	.185E-01	.825E-01	.367E+00	.666E+00	.705E+00
0.0867	0.0966	0.1066	0.1165	0.1265	0.1365	0.1464	0.1564
.169E+01	.174E+01	.189E+01	.243E+01	.246E+01	.308E+01	.324E+01	.358E+01
0.1663	0.1763	0.1863	0.1962	0.2062	0.2161	0.2261	0.2361
.415E+01	.417E+01	.613E+01	.681E+01	.905E+01	.911E+01	.122E+02	.133E+02
0.2460	0.2560	0.2659	0.2759	0.2859	0.2958	0.3058	0.3157
.162E+02	.182E+02	.187E+02	.210E+02	.213E+02	.218E+02	.265E+02	.303E+02
0.3257	0.3357	0.3456	0.3556	0.3655	0.3755	0.3855	0.3954
.304E+02	.329E+02	.340E+02	.360E+02	.399E+02	.403E+02	.411E+02	.533E+02
0.4054	0.4153	0.4253	0.4353	0.4452	0.4552	0.4651	0.4751
.581E+02	.628E+02	.645E+02	.700E+02	.742E+02	.762E+02	.798E+02	.818E+02
0.4851	0.4950	0.5050	0.5149	0.5249	0.5349	0.5449	0.5548
.820E+02	.964E+02	.108E+03	.112E+03	.114E+03	.116E+03	.122E+03	.129E+03
0.5647	0.5747	0.5847	0.5946	0.6046	0.6145	0.6245	0.6345
.159E+03	.221E+03	.269E+03	.599E+03	.880E+03	.127E+04	.137E+04	.199E+04
0.6444	0.6544	0.6643	0.6743	0.6843	0.6942	0.7042	0.7141
.324E+04	.713E+04	.112E+05	.181E+05	.185E+05	.240E+05	.265E+05	.373E+05
0.7241	0.7341	0.7440	0.7540	0.7639	0.7739	0.7839	0.7938
.386E+05	.674E+05	.158E+06	.169E+06	.179E+06	.233E+06	.511E+06	.675E+06
0.8038	0.8137	0.8237	0.8337	0.8436	0.8536	0.8635	0.8735
.180E+07	.215E+07	.261E+07	.373E+07	.126E+08	.254E+08	.450E+08	.102E+09
0.8835	0.8934	0.9034	0.9133	0.9233	0.9333	0.9432	0.9532
.133E+09	.379E+09	.409E+09	.337E+13	0.	0.	0.	0.
0.9631	0.9731	0.9831	0.9930	1.0030	1.0129	1.0229	1.0329

VALUES FOR MTCENT

.133E+04	.135E+04	.138E+04	.139E+04	.139E+04	.139E+04	.143E+04	.143E+04
0.0070	0.0169	0.0269	0.0369	0.0468	0.0568	0.0667	0.0767
.145E+04	.146E+04	.146E+04	.148E+04	.149E+04	.149E+04	.150E+04	.150E+04
0.0867	0.0966	0.1066	0.1165	0.1265	0.1365	0.1464	0.1564
.151E+04	.152E+04	.152E+04	.152E+04	.152E+04	.153E+04	.153E+04	.153E+04
0.1663	0.1763	0.1863	0.1962	0.2062	0.2161	0.2261	0.2361
.154E+04	.154E+04	.154E+04	.155E+04	.155E+04	.155E+04	.155E+04	.155E+04
0.2460	0.2560	0.2659	0.2759	0.2859	0.2958	0.3058	0.3157
.156E+04	.158E+04	.158E+04	.158E+04	.159E+04	.159E+04	.159E+04	.159E+04
0.3257	0.3357	0.3456	0.3556	0.3655	0.3755	0.3855	0.3954
.160E+04	.160E+04	.160E+04	.160E+04	.160E+04	.161E+04	.161E+04	.161E+04
0.4054	0.4153	0.4253	0.4353	0.4452	0.4552	0.4651	0.4751
.161E+04	.162E+04	.162E+04	.162E+04	.163E+04	.163E+04	.164E+04	.164E+04
0.4851	0.4950	0.5050	0.5149	0.5249	0.5349	0.5448	0.5548
.164E+04	.165E+04	.166E+04	.166E+04	.166E+04	.166E+04	.167E+04	.167E+04
0.5647	0.5747	0.5847	0.5946	0.6046	0.6145	0.6245	0.6345
.167E+04	.168E+04	.169E+04	.170E+04	.170E+04	.172E+04	.172E+04	.173E+04
0.6444	0.6544	0.6643	0.6743	0.6843	0.6942	0.7042	0.7141
.173E+04	.174E+04	.175E+04	.176E+04	.176E+04	.176E+04	.176E+04	.178E+04
0.7241	0.7341	0.7440	0.7540	0.7639	0.7739	0.7839	0.7938
.179E+04	.179E+04	.180E+04	.180E+04	.180E+04	.181E+04	.182E+04	.183E+04
0.8038	0.8137	0.8237	0.8337	0.8436	0.8536	0.8635	0.8735
.184E+04	.184E+04	.185E+04	.185E+04	.188E+04	.189E+04	.191E+04	.193E+04
0.8835	0.8934	0.9034	0.9133	0.9233	0.9333	0.9432	0.9532
.194E+04	.196E+04	.201E+04	.211E+04	0.	0.	0.	0.
0.9631	0.9731	0.9831	0.9930	1.0030	1.0129	1.0229	1.0329

VALUES FOR EPSSL

-.157E-01	-.911E-02	-.789E-02	-.740E-02	-.733E-02	-.710E-02	-.702E-02	-.693E-02
0.0070	0.0169	0.0269	0.0369	0.0468	0.0568	0.0667	0.0767
-.684E-02	-.681E-02	-.675E-02	-.657E-02	-.648E-02	-.621E-02	-.594E-02	-.586E-02
0.0867	0.0966	0.1066	0.1165	0.1265	0.1365	0.1464	0.1564
-.571E-02	-.566E-02	-.554E-02	-.518E-02	-.514E-02	-.513E-02	-.503E-02	-.468E-02
0.1663	0.1763	0.1863	0.1962	0.2062	0.2161	0.2261	0.2361
-.461E-02	-.449E-02	-.448E-02	-.447E-02	-.447E-02	-.431E-02	-.423E-02	-.423E-02
0.2460	0.2560	0.2659	0.2759	0.2859	0.2958	0.3058	0.3157
-.410E-02	-.407E-02	-.406E-02	-.393E-02	-.390E-02	-.387E-02	-.377E-02	-.375E-02
0.3257	0.3357	0.3456	0.3556	0.3655	0.3755	0.3855	0.3954
-.365E-02	-.365E-02	-.362E-02	-.361E-02	-.351E-02	-.344E-02	-.339E-02	-.330E-02
0.4054	0.4153	0.4253	0.4353	0.4452	0.4552	0.4651	0.4751
-.336E-02	-.335E-02	-.331E-02	-.320E-02	-.320E-02	-.316E-02	-.316E-02	-.315E-02
0.4851	0.4950	0.5050	0.5149	0.5249	0.5349	0.5448	0.5548
-.313E-02	-.308E-02	-.304E-02	-.304E-02	-.304E-02	-.291E-02	-.283E-02	-.277E-02
0.5647	0.5747	0.5847	0.5946	0.6046	0.6145	0.6245	0.6345
-.275E-02	-.275E-02	-.269E-02	-.259E-02	-.255E-02	-.253E-02	-.249E-02	-.246E-02
0.6444	0.6544	0.6643	0.6743	0.6843	0.6942	0.7042	0.7141
-.245E-02	-.242E-02	-.240E-02	-.236E-02	-.229E-02	-.226E-02	-.224E-02	-.219E-02
0.7241	0.7341	0.7440	0.7540	0.7639	0.7739	0.7839	0.7938
-.219E-02	-.216E-02	-.213E-02	-.200E-02	-.199E-02	-.173E-02	-.170E-02	-.169E-02
0.8038	0.8137	0.8237	0.8337	0.8436	0.8536	0.8635	0.8735
-.166E-02	-.149E-02	-.146E-02	-.135E-02	-.125E-02	-.124E-02	-.122E-02	-.103E-02
0.8835	0.8934	0.9034	0.9133	0.9233	0.9333	0.9432	0.9532
-.980E-03	-.896E-03	-.377E-03	.560E-03	0.	0.	0.	0.
0.9631	0.9731	0.9831	0.9930	1.0030	1.0129	1.0229	1.0329

VALUES FOR MEPSSL

-.134E-01	-.772E-02	-.684E-02	-.650E-02	-.645E-02	-.637E-02	-.578E-02	-.577E-02
0.0070	0.0169	0.0269	0.0369	0.0468	0.0568	0.0667	0.0767
-.558E-02	-.555E-02	-.551E-02	-.533E-02	-.529E-02	-.527E-02	-.520E-02	-.506E-02
0.0867	0.0966	0.1066	0.1165	0.1265	0.1365	0.1464	0.1564
-.494E-02	-.482E-02	-.449E-02	-.441E-02	-.430E-02	-.429E-02	-.412E-02	-.391E-02
0.1663	0.1763	0.1863	0.1962	0.2062	0.2161	0.2261	0.2361
-.375E-02	-.371E-02	-.365E-02	-.343E-02	-.342E-02	-.323E-02	-.320E-02	-.320E-02
0.2460	0.2560	0.2659	0.2759	0.2859	0.2958	0.3058	0.3157
-.320E-02	-.316E-02	-.313E-02	-.310E-02	-.306E-02	-.298E-02	-.294E-02	-.293E-02
0.3257	0.3357	0.3456	0.3556	0.3655	0.3755	0.3855	0.3954
-.291E-02	-.287E-02	-.285E-02	-.281E-02	-.275E-02	-.273E-02	-.269E-02	-.261E-02
0.4054	0.4153	0.4253	0.4353	0.4452	0.4552	0.4651	0.4751
-.258E-02	-.246E-02	-.236E-02	-.234E-02	-.224E-02	-.222E-02	-.218E-02	-.217E-02
0.4851	0.4950	0.5050	0.5149	0.5249	0.5349	0.5448	0.5548
-.216E-02	-.214E-02	-.213E-02	-.208E-02	-.184E-02	-.180E-02	-.178E-02	-.169E-02
0.5647	0.5747	0.5847	0.5946	0.6046	0.6145	0.6245	0.6345
-.166E-02	-.160E-02	-.158E-02	-.157E-02	-.152E-02	-.150E-02	-.149E-02	-.139E-02
0.6444	0.6544	0.6643	0.6743	0.6843	0.6942	0.7042	0.7141
-.137E-02	-.128E-02	-.120E-02	-.121E-02	-.118E-02	-.108E-02	-.891E-03	-.882E-03
0.7241	0.7341	0.7440	0.7540	0.7639	0.7739	0.7839	0.7938
-.882E-03	-.631E-03	-.631E-03	-.625E-03	-.539E-03	-.526E-03	-.495E-03	-.379E-03
0.8038	0.8137	0.8237	0.8337	0.8436	0.8536	0.8635	0.8735
-.232E-03	.264E-03	.354E-03	.399E-03	.505E-03	.607E-03	.709E-03	.116E-02
0.8835	0.8934	0.9034	0.9133	0.9233	0.9333	0.9432	0.9532
.145E-02	.227E-02	.293E-02	.349E-02	0.	0.	0.	0.
0.9631	0.9731	0.9831	0.9930	1.0030	1.0129	1.0229	1.0329

VALUES FOR HELFS

.419E-01 0.0070	.509E-01 0.0169	.564E-01 0.0269	.692E-01 0.0369	.738E-01 0.0468	.779E-01 0.0568	.823E-01 0.0667	.839E-01 0.0767
.858E-01 0.0867	.881E-01 0.0966	.912E-01 0.1066	.938E-01 0.1165	.969E-01 0.1265	.984E-01 0.1365	.101E+00 0.1464	.105E+00 0.1564
.109E+00 0.1663	.111E+00 0.1763	.111E+00 0.1863	.114E+00 0.1962	.114E+00 0.2062	.116E+00 0.2161	.118E+00 0.2261	.118E+00 0.2361
.120E+00 0.2460	.120E+00 0.2560	.123E+00 0.2659	.123E+00 0.2759	.127E+00 0.2859	.127E+00 0.2958	.128E+00 0.3058	.129E+00 0.3157
.131E+00 0.3257	.134E+00 0.3357	.135E+00 0.3456	.138E+00 0.3556	.138E+00 0.3655	.139E+00 0.3755	.140E+00 0.3855	.140E+00 0.3954
.140E+00 0.4054	.141E+00 0.4153	.143E+00 0.4253	.143E+00 0.4353	.148E+00 0.4452	.149E+00 0.4552	.150E+00 0.4651	.151E+00 0.4751
.152E+00 0.4851	.153E+00 0.4950	.154E+00 0.5050	.154E+00 0.5149	.156E+00 0.5249	.157E+00 0.5349	.159E+00 0.5448	.161E+00 0.5548
.162E+00 0.5647	.165E+00 0.5747	.170E+00 0.5847	.170E+00 0.5946	.171E+00 0.6046	.171E+00 0.6145	.172E+00 0.6245	.173E+00 0.6345
.181E+00 0.6444	.182E+00 0.6544	.186E+00 0.6643	.189E+00 0.6743	.190E+00 0.6843	.195E+00 0.6942	.195E+00 0.7042	.197E+00 0.7141
.197E+00 0.7241	.197E+00 0.7341	.200E+00 0.7440	.204E+00 0.7540	.207E+00 0.7639	.213E+00 0.7739	.219E+00 0.7839	.222E+00 0.7938
.223E+00 0.8038	.231E+00 0.8137	.232E+00 0.8237	.237E+00 0.8337	.242E+00 0.8436	.244E+00 0.8536	.251E+00 0.8635	.263E+00 0.8735
.264E+00 0.8835	.288E+00 0.8934	.290E+00 0.9034	.296E+00 0.9133	.317E+00 0.9233	.326E+00 0.9333	.329E+00 0.9432	.334E+00 0.9532
.348E+00 0.9631	.353E+00 0.9731	.354E+00 0.9831	.363E+00 0.9930	0. 1.0030	0. 1.0129	0. 1.0229	0. 1.0329

VALUES FOR SIGMAN

.103E+01 0.0070	.100E+01 0.0169	.100E+01 0.0269	.398E+00 0.0369	.575E+00 0.0468	.892E+00 0.0568	.947E+00 0.0667	.101E+09 0.0767
.103E+09 0.0867	.104E+09 0.0966	.105E+09 0.1066	.108E+09 0.1165	.111E+09 0.1265	.113E+09 0.1365	.114E+09 0.1464	.115E+09 0.1564
.116E+09 0.1663	.118E+09 0.1763	.118E+09 0.1863	.122E+09 0.1962	.124E+09 0.2062	.133E+09 0.2161	.146E+09 0.2261	.160E+09 0.2361
.179E+09 0.2460	.181E+09 0.2560	.182E+09 0.2659	.185E+09 0.2759	.189E+09 0.2859	.196E+09 0.2958	.202E+09 0.3058	.209E+09 0.3157
.217E+09 0.3257	.217E+09 0.3357	.220E+09 0.3456	.221E+09 0.3556	.226E+09 0.3655	.228E+09 0.3755	.230E+09 0.3855	.231E+09 0.3954
.235E+09 0.4054	.239E+09 0.4153	.240E+09 0.4253	.242E+09 0.4353	.247E+09 0.4452	.247E+09 0.4552	.247E+09 0.4651	.253E+09 0.4751
.255E+09 0.4851	.258E+09 0.4950	.262E+09 0.5050	.263E+09 0.5149	.268E+09 0.5249	.269E+09 0.5349	.271E+09 0.5448	.278E+09 0.5548
.282E+09 0.5647	.282E+09 0.5747	.283E+09 0.5847	.286E+09 0.5946	.287E+09 0.6046	.290E+09 0.6145	.290E+09 0.6245	.292E+09 0.6345
.292E+09 0.6444	.293E+09 0.6544	.295E+09 0.6643	.295E+09 0.6743	.298E+09 0.6843	.302E+09 0.6942	.303E+09 0.7042	.306E+09 0.7141
.306E+09 0.7241	.310E+09 0.7341	.310E+09 0.7440	.322E+09 0.7540	.323E+09 0.7639	.328E+09 0.7739	.332E+09 0.7839	.333E+09 0.7938
.334E+09 0.8038	.335E+09 0.8137	.335E+09 0.8237	.340E+09 0.8337	.340E+09 0.8436	.340E+09 0.8536	.342E+09 0.8635	.342E+09 0.8735
.343E+09 0.8835	.345E+09 0.8934	.346E+09 0.9034	.347E+09 0.9133	.347E+09 0.9233	.347E+09 0.9333	.348E+09 0.9432	.349E+09 0.9532
.355E+09 0.9631	.366E+09 0.9731	.372E+09 0.9831	.451E+09 0.9930	0. 1.0030	0. 1.0129	0. 1.0229	0. 1.0329

VALUES FOR PRDAM

.100E+01 0.0070	.100E+01 0.0169	.103E+01 0.0269	.530E+08 0.0369	.884E+08 0.0468	.981E+08 0.0568	.103E+09 0.0667	.107E+09 0.0767
.111E+09 0.0867	.112E+09 0.0966	.117E+09 0.1066	.127E+09 0.1165	.159E+09 0.1265	.194E+09 0.1365	.218E+09 0.1464	.224E+09 0.1564
.251E+09 0.1663	.252E+09 0.1763	.256E+09 0.1863	.265E+09 0.1962	.266E+09 0.2062	.275E+09 0.2161	.277E+09 0.2261	.282E+09 0.2361
.288E+09 0.2460	.288E+09 0.2560	.305E+09 0.2659	.310E+09 0.2759	.324E+09 0.2859	.326E+09 0.2958	.339E+09 0.3058	.341E+09 0.3157
.342E+09 0.3257	.343E+09 0.3357	.343E+09 0.3456	.344E+09 0.3556	.344E+09 0.3655	.345E+09 0.3755	.347E+09 0.3855	.348E+09 0.3954
.348E+09 0.4054	.348E+09 0.4153	.349E+09 0.4253	.349E+09 0.4353	.350E+09 0.4452	.350E+09 0.4552	.350E+09 0.4651	.353E+09 0.4751
.353E+09 0.4851	.354E+09 0.4950	.354E+09 0.5050	.355E+09 0.5149	.355E+09 0.5249	.355E+09 0.5349	.356E+09 0.5448	.356E+09 0.5548
.356E+09 0.5647	.358E+09 0.5747	.359E+09 0.5847	.359E+09 0.5946	.359E+09 0.6046	.359E+09 0.6145	.360E+09 0.6245	.360E+09 0.6345
.362E+09 0.6444	.365E+09 0.6544	.367E+09 0.6643	.370E+09 0.6743	.370E+09 0.6843	.381E+09 0.6942	.382E+09 0.7042	.386E+09 0.7141
.390E+09 0.7241	.390E+09 0.7341	.403E+09 0.7440	.407E+09 0.7540	.407E+09 0.7639	.410E+09 0.7739	.411E+09 0.7839	.415E+09 0.7938
.415E+09 0.8038	.421E+09 0.8137	.429E+09 0.8237	.431E+09 0.8337	.431E+09 0.8436	.434E+09 0.8536	.443E+09 0.8635	.446E+09 0.8735
.457E+09 0.8835	.458E+09 0.8934	.461E+09 0.9034	.465E+09 0.9133	.479E+09 0.9233	.488E+09 0.9333	.494E+09 0.9432	.505E+09 0.9532
.500E+09 0.9631	.521E+09 0.9731	.522E+09 0.9831	.653E+09 0.9930	0. 1.0030	0. 1.0129	0. 1.0229	0. 1.0329

.... EXAMPLE 1 ....

		EPSMAX	MEPSM	SIGMAX	PKSTRS	MAXSCD	NTCENT	EPSSL	MEPSSL	RELPB	SIGUAM	PRDAM	P OF F
1 PIN X	CAL	.407E-03	.153E-02	.252E+09	.359E+09	.337E+11	.166E+00	-.376E-02	-.250E-02	.170E+00	.248E+09	.333E+09	
	STD	.402E-03	.132E-02	.691E+08	.163E+09	.337E+11	.153E-03	-.231E-02	-.249E-02	.723E-01	.970E+08	.121E+09	.018E+00
	PIE	.500E-03	.150E-02	[illegible]	[illegible]	[illegible]	.170E+00	-.400E-02	-.300E-03	.150E+00	[illegible]		

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Title and author(s)	Date October 1980
USER MANUAL For the probabilistic fuel performance code FRP by John Friis Jensen Ib Misfeldt	Department or group Department of Reactor Technology Group's own registration number(s)
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Abstract	Copies to

Abstract

This report describes the use of the probabilistic fuel performance code FRP. Detailed descriptions of both input to and output from the program are given. The use of the program is illustrated by an example.

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