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**PROBABILITY BASED DESIGN CRITERIA
FOR ICE LOADS ON FIXED STRUCTURES
IN THE BEAUFORT SEA**

FINAL REPORT

VOLUME II. USER'S GUIDE TO PROGRAM BOREAS

by


**Det norske Veritas
Calgary, Alberta, Canada**

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DET NORSKE VERITAS

Technical Report

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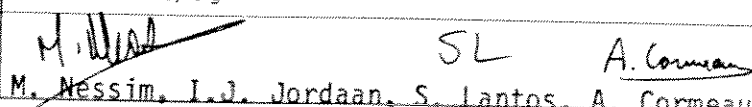
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Summary

A probabilistic model for estimating year-round ice forces on fixed structures in the Beaufort Sea was developed. The model uses site specific environmental ice parameters into appropriate ice-structure interaction models to obtain load probability distributions. These are then used in extremal analysis to develop the maximum annual ice load resulting from any ice load scenario, or combinations of scenarios. A computer package BOREAS was developed to carry out the analysis and produce results which are directly applicable to the choice of design criteria for ice loads. The report is divided into two volumes as follows:

- VOLUME I : Study Description
- VOLUME II : User's Guide to Program BOREAS

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Work carried out by/sign  M. Nessim, I.J. Jordaan, S. Lantos, A. Cormeau	

4 Indexing terms

ICE DESIGN CRITERIA
PROBABILISTIC ANALYSIS
ICE CONDITIONS
COMPUTER SOFTWARE

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CHAPTER 1

INTRODUCTION

1.1 Purpose of System

The purpose of the computer package BOREAS is to develop probabilistic descriptions of the maximum annual ice loads on a fixed offshore structure, due to a user defined combination of ice loading scenarios. The theory and methodology are described in detail in Volume I (Study Description) of this report.

1.2 Overall Structure

The package consists of three separate programs as follows:

1. INREAS: an input program which accepts environmental data and creates a data file.
2. BOREAS: a main program which performs the calculation using the data created by INREAS, and creates output results.
3. OUREAS: an output program which processes the results of BOREAS.

1.3 System Features

The package has the following features:

1. Both the input and output programs (INREAS and OUREAS) are fully interactive.
2. INREAS has a built-in set of input parameter default values. The user has the option of modifying any of these default values.
3. The package is organized in a modular fashion with each element of the problem treated in a separate subroutine. This allows future replacement or modification of different modules with minimal effort.
4. All three programs have data retrieval facilities to minimize computing time losses in case of system failure.
5. All screen inputs are checked for the number and type (i.e. real or integer) of data entries to eliminate execution errors due to accidental keyboard errors.
6. Reasonable bounds are set for all input parameters to ensure the consistency and accuracy of input data. The allowable parameter ranges are wide enough to allow sensitivity analyses.

1.4 Scope

i) Structural geometries

The following structural geometries are considered:

1. Vertical sided structures with cylindrical sides (i.e. circular in plan) or flat sides (i.e. polygonal in plan). A polygon can have up to 20 sides and is defined by the coordinates of its apexes with respect to any two perpendicular axes through its centre. The apexes are to be entered sequentially in a clockwise direction starting with an arbitrary apex. The polygon must be concave with respect to its centre.
2. Upward and downward breaking cones. Cones are not allowed in the landfast ice zone.

ii) Ice Load Scenarios

The seasons and ice load scenarios considered are as illustrated in Table 1.4.1. The scenarios are dealt with in the program in the same order given in the table. This order is significant for the use of data retrieval facilities, and this will be discussed further in Sections 2.2 and 3.6. In INREAS, the user has the option of specifying any one scenario or combination of scenarios to be considered in the run being performed. Out of the scenario considered, OUREAS allows the user to extract the probabilistic description for the load per individual event and the extremal load for each scenario separately, as well as for the extremal load due to any scenario combination.

Table 1.4.1. Ice Load Scenarios

SEASON	LANDFAST ICE ZONE	ACTIVE ICE ZONE
Break-up	<ul style="list-style-type: none"> - first year ridges - level ice - multi-year floes 	<ul style="list-style-type: none"> - first year ridges - level ice - multi-year floes
Winter	<ul style="list-style-type: none"> - level ice 	<ul style="list-style-type: none"> - first year ridges - level ice - multi-year floes
Summer	<ul style="list-style-type: none"> - multi-year floes - ice island fragments - ice islands 	<ul style="list-style-type: none"> - multi-year floes - ice island fragments - ice islands

CHAPTER 2

FILES AND FILE HANDLING

2.1 File Handling Options

The program provides two file handling options, namely internal file handling from within the program and external file handling using job control language. The appropriate choice of either option depends on the operating system of the computer used, as will be explained in this section. The option to be implemented is determined by the value of the parameter INTFN in subroutine UNITS. This subroutine exists in all three programs (INREAS, BOREAS and OUREAS), and the value of INTFN must be the same in all three programs. INTFN defines the file handling option as follows:

- i) INTFN = 1 File handling from within the program:

In this option, the user will be asked interactively to define the names of all files used (except scratch files which are only used internally and do not contain any useful output upon program termination). The implementation of this option requires opening and closing files from within the program, using the Fortran statements OPEN and CLOSE. The user must, therefore, ensure that the operating system of the computer hardware used allows for file handling from within the program. If this option is used, the parameter NFCHAR in subroutine UNITS should be set equal to the maximum allowable number of characters for a file name. This should be done in all three programs (INREAS, BOREAS and OUREAS).

ii) INTFN = 0 External file handling:

In this option, files are set using job control language externally from the program. $INTFN = 0$ will cause the program to bypass file name definition and file OPEN and CLOSE statements. Files will be given names which depend on the unit number used for each file (see Section 2.4). A file on unit 10, for example, will be automatically given the name FILE10. This option must be used if the operating system of the computer hardware used does not allow opening and closing files from within the program (e.g. IBM computers).

2.2 File Types, Structure, and Usage

- i) **Input File:** Used for sequential READ of formatted input data.
- ii) **Output File:** Used for sequential WRITE of formatted output data
- iii) **Back-up File:** Back-up files are sequential formatted files used in INREAS and OUREAS to provide a data retrieval facility which reduces interactive running time. This facility allows bypassing the interactive input of a portion of the data by retrieving the information from a back-up file created from a previous run. This option is useful if a certain amount of input data is the same for both runs. The use of the back-up file depends on the data retrieval status (i.e. on or off). This is best illustrated by an example. Assume that a new run of program INREAS is to be performed with no data retrieval (say RUN1). The back-up file in this case is a new file which is used as a WRITE file and, at the end of the run, contains all screen messages and user's responses. Assume that the user wishes to perform a new run of INREAS (RUN2), which has a certain amount of information in common with RUN1. The user can, in this case, edit the back-up file created by RUN1 to remove all data starting with and including the first user's response which is not the same as for RUN2. RUN2 can then be started with the retrieval mode on, and the back-up file defined as the back-up file obtained from RUN1 after editing as discussed above. In the retrieval mode, the back-up file will be used as a READ file from which the user's responses will be retrieved without displaying the corresponding messages. When the end of the back-up file is reached (i.e. beginning of new input specific to RUN2), the retrieval status will be automatically switched to off, and messages will start to appear on the screen to prompt the user to enter the rest of the input data. At the end of RUN2, a new back-up file will be created which contains complete back-up information for RUN2. Back-up files can also be used to retrieve informaton from runs which are interrupted due to system or execution errors.

iv) **Data Base File:** This is a sequential unformatted file which contains the results of the computation carried out by BOREAS. Each entry to this file is defined on two data records. The first data record contains three attribute parameters denoting the key, size and type of the entry, while the second record contains the entry itself. Each entry is either a character variable, an integer array, or a real array. The above-mentioned attribute parameters of each entry are defined as follows:

- key: defines the meaning of the entry (e.g. run title, file name, average value of force in given scenario, cumulative distribution function of force in given scenario, etc.).
- size: defines the number of characters (1 to 72) for a character variable or the dimension of the array (1 to 201) for a real or integer array.
- type: defines whether the data is an integer array (=1), a real array (=2), or a character variable (=3).

The data base file is accessed by BOREAS in the same manner in which the back-up files are accessed by INREAS and OUREAS (as explained in (iii) above). This depends on the re-start status. The data base file is accessed as a WRITE file if the re-start status is inactive. If re-start is active, the program uses the data base file as a READ file until the end of file is reached and then switches its status to a WRITE file. Data is transferred to and from the data base at the end of the calculations for each scenario. The scenarios are dealt with in the same order shown in Table 1.1. The re-start option can be used to add specific scenarios to the data base. Assume, for example, that a run was carried out to cover all break-up loading scenarios (see Table 1.1). If the user wishes to add the winter scenarios to the data base then a new input file should be created, which contains the input parameters for both the break-up and winter scenarios. BOREAS can then be run in the re-start mode using the new

input file and the data base file created by the previous break-up run. The program will automatically bypass the calculations made in the previous run, carry out the calculations for the additional scenarios (i.e. winter in this case), and create a new data base which contains both break-up and winter results. Summer can be added to this new data in a similar manner. This segmentation is useful to meet the CPU time limitations per run which may be imposed on some users.

It is emphasized that the sequence of calculation of load scenarios is as shown in Table 1.1 and this order should be followed if a run is to be segmented in this manner. Also, if a run is interrupted due to system related reasons, one need not re-run the whole job. The run can be re-started using the same input file and the portion of the data base available from the previous interrupted run. It is noted that unlike the back-up file usage for INREAS and OUREAS, the data base file is an unformatted file which cannot and need not be edited.

- v) **Scratch Files:** these are used internally in the program as WRITE/READ files and are deleted at the end of the program execution.

2.3 Units

The file unit numbers are assigned in subroutine UNITS, which exist in each of the programs INREAS, BOREAS, and OUREAS. The default unit numbers used are in the range of 10 through 17. On some computer systems, some unit members are reserved for specific devices (e.g. screen or printer). The user should edit subroutine UNITS in each of the three programs (INREAS, BOREAS, and OUREAS), and if necessary, change the values of the unit numbers to ensure that no such restrictions apply to the unit numbers used. This need only be done in subroutine UNITS. Table 2.3.1 and 2.3.2 detail the units used in each of the three programs with a description of the type and usage of each file, for the cases of INTFN = 0 and INTFN = 1, respectively (see Section 2.1).

**Table 2.3.1. Unit Numbers and Corresponding Files
(INTFN = 0)**

PROGRAM	UNIT	FORM	USAGE
INREAS	NUOUT	Formatted	- output file
	NUBU	Formatted	- output back-up file for normal mode of execution (i.e. no retrieval) - input back-up file for retrieval mode of execution.
	NUSCBU	Formatted	- output back-up file for retrieval mode of execution
	NUSCRA	Formatted	- scratch file
BOREAS	NUIN	Formatted	- input file
	NUOUT	Formatted	- output file
	NUDUMP	Formatted	- output file
	NUDB	Unformatted	- output data base file for normal mode of execution (i.e. re-start off) - input data base file for re-start mode of execution
	NUSCDB	Unformatted	- output data base file for re-start mode of execution
	NUSCRA	Formatted	- scratch file
OUREAS	NUOUT	Formatted	- output file
	NUBU	Formatted	- output back-up file for normal mode of execution (i.e. no retrieval) - input back-up file for retrieval mode of execution.
	NUSCBU	Formatted	- output back-up for retrieval mode of execution.
	NUDB	Unformatted	- input data base file
	NUSCRA	Formatted	- scratch file

Table 2.3.1. Unit Numbers and Corresponding Files
(INTFN = 1)

PROGRAM	UNIT	FORM	USAGE
INREAS	NUOUT	Formatted	- output file
	NUBU	Formatted	- output back-up file for normal mode of execution (i.e. no data retrieval) - input/output back-up file for retrieval mode of execution
	NUSCRA	Formatted	- scratch file
	NUSCBU	Formatted	- scratch file
BOREAS	NUIN	Formatted	- input file
	NUOUT	Formatted	- output file
	NUDUMP	Formatted	- output file
	NUDB	Unformatted	- output data base file for normal mode of execution (i.e. re-start off) - input/output data base file for re-start mode of execution
	NUSCDB	Unformatted	- scratch file
	NUSCRA	Formatted	- scratch file
OUREAS	NUOUT	Formatted	- output file
	NUBU	Formatted	- output back-up file for normal mode of execution (i.e. no data retrieval) - input/output back-up file for retrieval mode of execution
	NUDB	Unformatted	- input data base file
	NUSCRA	Formatted	- scratch file
	NUSCBU	Formatted	- scratch file

2.4 Input/Output Organization

The organization of the input and output for each program and the manner in which these files interconnect is shown in Figures 2.4.1 and 2.4.2 for INTFN = 0 and INTFN = 1 (see Section 2.1) respectively. The following comments are noted:

- i) The output file of INREAS is used as input file for BOREAS. The same file is connected to NUOUT while running INREAS and to NUIN while running BOREAS. This should not cause any confusion, since unit numbers are internal parameters in each program. The connection should be made through the file name. For example, for INTFN = 1, INREAS can be run with an output file name of "CASE1". In this event, BOREAS should be run with an input file name of "CASE1". For INTFN = 0 (see Section 2.1), this connection should be done externally using Job Control Language.
- ii) The output data base file of BOREAS is used as input data base file for OUREAS. The connection between these files should be made as described under i) above. It is noted that for INTFN = 0 (see Section 2.1), the output data base file of BOREAS is given on NUDB for normal execution (without re-start), and on NUSCDB for re-started runs.

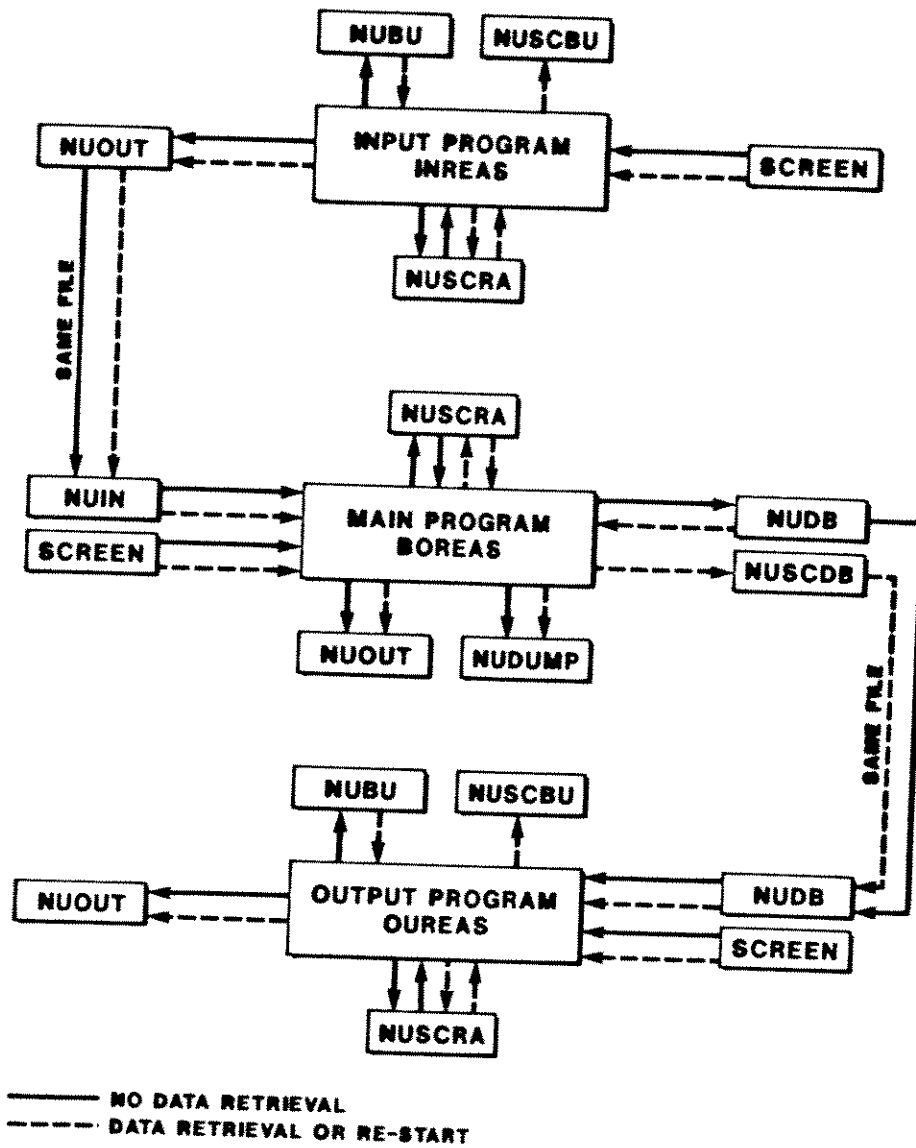


Figure 2.4.1. File Organization and Usage
for INTFN = 0 (External File Handling)

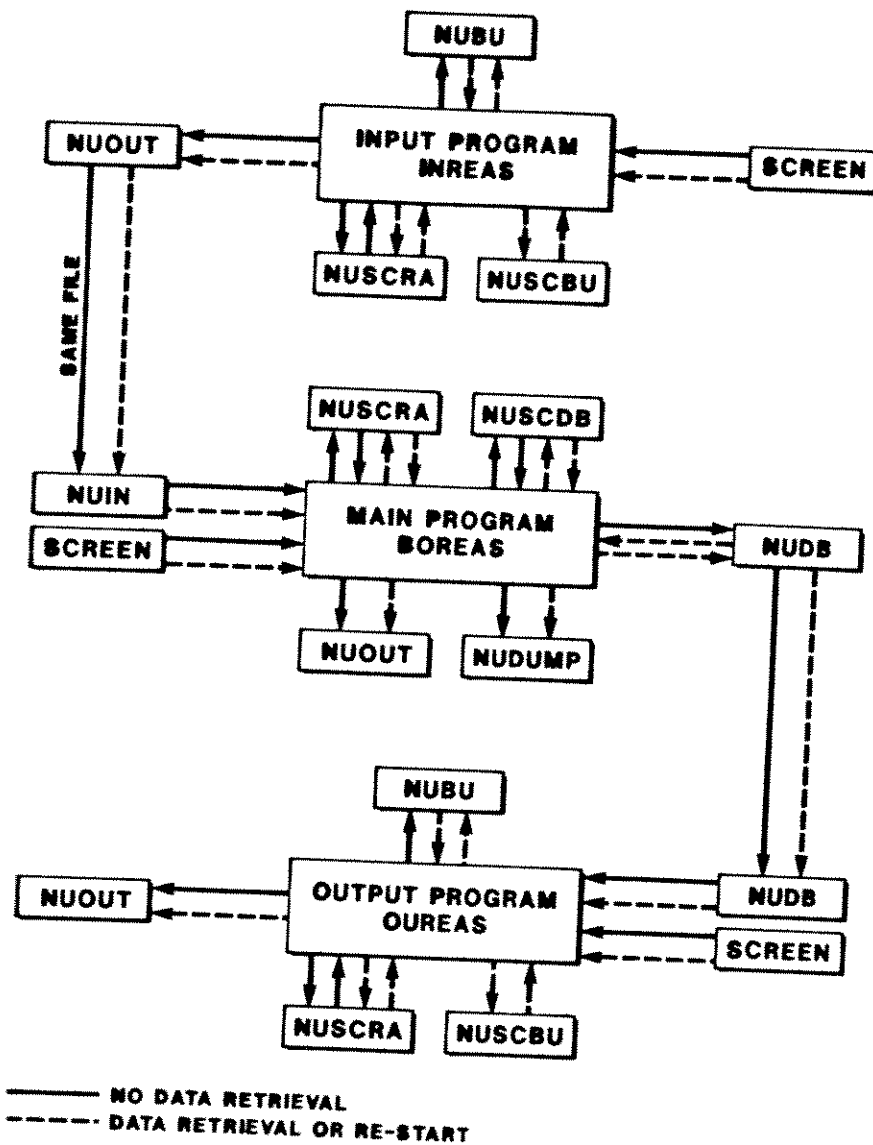


Figure 2.4.2. File Organization and Usage
for INTFN = 1 (Internal File Handling)

CHAPTER 3

RUNNING THE PROGRAM

3.1 Introduction

In this chapter, the preparatory steps required before running the program are explained (Section 3.2), and running the program is discussed in Sections 3.3 to 3.5. Using the re-start and data retrieval options is also demonstrated in Section 3.6. The method of running the program is illustrated by an example. It is recommended that the user follow the steps discussed in this chapter in order to reproduce the example results. This will help familiarize the user with running the program.

3.2 Preparation

1. Read program listing from tape. The tape contains 3 separate files containing the Fortran listings of programs INREAS, BOREAS, and OUREAS. The label attached to the tape reel includes the required attributes to complete this step.
2. Edit each of the three programs and locate subroutine UNITS. The following steps should be followed to ensure that subroutine UNITS is properly set:
 - i) check the value of INTFN and change it if necessary to correspond to the operating system of your computer (see Section 2.1 for details). The value of INTFN must be the same in all three programs (INREAS, BOREAS and OUREAS).
 - ii) if INTFN = 1 (i.e. file handling from within program), the parameter NFCHAR in subroutine UNITS should be set equal to the maximum permissible number of characters for a file name. The default value is NFCHAR = 7. NFCHAR must have the same value in all three programs.
 - iii) all unit number assignment statements should be checked and, if necessary, changed to ensure that they are all permissible unit numbers (see Section 2.3).

It is emphasized that the above steps i), ii) and iii) should be carried out for all three programs INREAS, BOREAS and OUREAS.

3. For the main program BOREAS, the maximum number of simulations per scenario is 4000. This is defined in parameter statements in each of the subroutines MYFLOE, SILD, ACTLVL, LSTLVL, and RYFIDG. You may wish to increase this number for one or more scenarios to obtain more simulations, or decrease it to meet computer system limitations. If this is the case, edit program BOREAS and locate the statement PARAMETER (NSMAX = 4000) in each of the above-mentioned subroutines. Change the value 4000 to the desired number.

It

is noted that NSMAX can be set to different values in each of the above-mentioned subroutines to generate different maximum numbers of simulations for different scenarios. The scenarios corresponding to each of the above-mentioned subroutines are as follows:

- i) MYFLOE: multi-year floe interactions
 - ii) SILD: ice island and island fragment interactions
 - iii) ACTLVL: level ice in the active ice zone (i.e. shear zone or pack ice zone)
 - iv) LSTLVL: level ice in the landfast ice zone
 - v) FYRIDG: first-year ridges
4. Compile programs INREAS, BOREAS, and OUREAS to obtain a code file for each program.

3.3 Running INREAS

The purpose of INREAS is to create a data file which will be later used by BOREAS to perform the calculations. The program also creates a back-up file which can be used later to facilitate future runs of INREAS (see Section 2.2). The input program INREAS is fully interactive, and is self explanatory. Once the execution of the program is started, the user should answer the appropriate questions regarding the location and geometry of the structure, and the seasons and scenarios to be considered in the run. Environmental parameters required for the problem will be displayed in a series of menus which give the default values of these parameters. By following the program instructions, the user can change the values of any of these environmental parameters as desired.

Probabilistic parameters are defined by the mean, standard deviation, probability density function and lower bound. The mathematical density functions available in the current version are:

- normal
- lognormal
- beta
- uniform
- gamma
- exponential

In addition, any parameter can be given a fixed (deterministic) value, or described by a numerical cumulative distribution which can be obtained by digitizing a set of data. The latter option is useful in cases where data is available to which a mathematical density function cannot be fitted. A numerical distribution can be described by up to 20 points, each defined by a given value of the parameter and the corresponding cumulative probability. The parameter values must be given in an increasing order, and the cumulative probabilities must be monotonically increasing between 0 and 1.

It is important to note that parameter probabilistic descriptions must be defined for the full range of possible values of the parameter (0 to ∞ in most cases). The user can set lower bounds for each parameter below which the values of the parameter are not to be considered. The input distribution parameters, however, must be based on the full range of parameter values. The parameters of truncated data sets (e.g. ridge height data given only for ridges higher than 0.7 m say), cannot be used directly in the model. A correction must be applied to infer the data parameters for the full parameter range (i.e. for all ridge heights between zero and ∞ in the above-mentioned example) from those of the truncated data set.

An example run is given in the following pages. The example is for a circular vertical structure in the shear zone of the Canadian Beaufort Sea. The scenarios considered in the example are first-year ridges, level ice, and multi-year floes in the winter season. The program defaults are used for all parameters. No retrieval from back-up files was implemented in this example. The example is displayed on the next few pages as follows:

- i) pages 3-3-3 to 3-3-14 show a complete print out of the program prompts and the user's response;
- ii) page 3-3-15 shows a print out of the output data file of INREAS created by this run; and
- iii) pages 3-3-16 to 3-3-18 show a print out of the output back-up file created by this run of INREAS. This is very similar to item i) above.

It is noted that the example is run for INTFN = 1 (see Section 2.1). For INTFN = 0, the result would be exactly the same except that the messages concerning the definition of file names would be suppressed, and the user must attach the appropriate files externally.

***** P R O G R A M I N R E A S *****

INTERACTIVE PRE-PROCESSOR FOR PROGRAM BOREAS
DEVELOPED BY DET NORSKE VERITAS
VERSION V2-5-1986

***** FILE NAMES AND INPUT STATUS *****

DO YOU WISH TO RETRIEVE DATA FROM BACK-UP FILE

1 = YES 0 = NO

0

ENTER NAME OF OUTPUT FILE (MAX. 7 CHARACTERS)

intest

ENTER NAME OF NEW BACK-UP FILE (MAX. 7 CHARACTERS)

butest

ENTER RUN TITLE (MAX. 60 CHARACTERS)

TEST CASE

***** GEOGRAPHIC LOCATION *****

1 = CANADIAN BEAUFORT 2 = U.S. BEAUFORT
1

INPUT ICE ZONE
1 = LANDFAST ZONE 2 = SHEAR ZONE
2

INPUT WATER DEPTH (M)
20.

INPUT DISTANCE OFFSHORE (KM)
40.

***** STRUCTURAL GEOMETRY *****

INPUT TYPE OF STRUCTURE

1 = VERTICAL 2 = CONICAL

1

SHAPE OF STRUCTURE IN PLAN

1 = CIRCULAR 2 = POLYGONAL

1

INPUT STRUCTURAL DIAMETER IN METERS

100.

STRUCTURAL GEOMETRY USED IS AS FOLLOWS:

INDEX	PROPERTY	CURRENTLY USED
1.	SHAPE	VERTICAL
2.	SHAPE IN PLAN	CIRCULAR
3.	DIAMETER	100.00 M

ENTER INDEX OF LINE YOU WISH TO CHANGE (0=NONE)

0

***** SEASONS AND SEASON BOUNDARIES *****

DO YOU WISH TO CONSIDER THE BREAK-UP SEASON
1 = YES 0 = NO

0

DO YOU WISH TO CONSIDER THE WINTER SEASON
1 = YES 0 = NO

1

DO YOU WISH TO CONSIDER THE SUMMER SEASON
1 = YES 0 = NO

0

3-3-8

SEASONS CONSIDERED ARE AS FOLLOWS:

SEASONS	STATUS
---------	--------

SUMMER	NO
WINTER	YES
BREAK-UP	NO

DO YOU WISH TO CHANGE

1 = YES 0 = NO

0

3-3-9

SEASON BOUNDARY VALUES USED ARE AS FOLLOWS:

INDEX	PARAMETER	MEAN (DAY-MONTH)	STD. DEV. (DAYS)	DISTRIBUTION
1.	FREEZE-UP	5-11	22.80	NORMAL
2.	BEGINNING OF BREAK-UP	22- 6	18.10	NORMAL

ENTER INDEX OF LINE YOU WISH TO CHANGE (0=NONE)

0

3-3-10

***** WINTER INPUT PARAMETERS *****

DO YOU WISH TO CONSIDER FIRST YEAR RIDGES

1 = YES 0 = NO

1

DO YOU WISH TO CONSIDER LEVEL ICE

1 = YES 0 = NO

1

DO YOU WISH TO CONSIDER MULTIYEAR FLOES

1 = YES 0 = NO

1

GROWTH RATE OF FY ICE = 0.008500 M/DAY

DO YOU WISH TO CHANGE

1 = YES 0 = NO

0

WINTER FY RIDGE PARAMETERS USED ARE AS FOLLOWS :

INDEX	PARAMETER	UNITS	MEAN	STD. DEV.	DISTRIBUTION
1.	RIDGE COVERAGE	PERCENT	30.0000	0.0000	DETERMINISTIC
2.	RIDGE HEIGHT	M	0.9000	0.9000	EXPONENTIAL
3.	RIDGE LENGTH	M	150.0000	0.0000	DETERMINISTIC
4.	ICE SPEED	M/S	0.0620	0.0730	GAMMA
5.	FRICTION ANGLE	DEG.	25.0000	0.0000	DETERMINISTIC
6.	COHESION	MPA	0.0350	0.0000	DETERMINISTIC

ENTER INDEX OF PARAMETER YOU WISH TO CHANGE (0=NONE)
LOWER BOUND CAN ALSO BE SET FOR SELECTED PARAMETER

0

WINTER LEVEL ICE PARAMETERS USED ARE AS FOLLOWS :

INDEX	PARAMETER	UNITS	VALUE
1.	AVERAGE ICE PRESSURE	MPA	0.30E+00
2.	MEAN OF EXTREMAL PRESSURE COMPONENT	MPA	0.20E+00
3.	S.D. OF EXTREMAL PRESSURE COMPONENT	MPA	0.15E+00
4.	CREEP EXPONENT		0.30E+01
5.	CREEP MULTIPLIER		0.10E-04
6.	CREEP-CRUSHING TRANSITION STRAIN RATE	S**-1	0.10E-04

ENTER INDEX OF PARAMETER YOU WISH TO CHANGE (0=NONE)
LOWER BOUND CAN ALSO BE SET FOR SELECTED PARAMETER

0

PROBABILITY DISTRIBUTION OF ICE VELOCITY

VALUES CURRENTLY USED ARE AS FOLLOWS :

INDEX	PARAMETER	CURRENTLY USED
1.	DISTRIBUTION TYPE	GAMMA
2.	MEAN	0.0620
3.	STANDARD DEVIATION	0.0730
4.	LOWER BOUND	0.00E+00

ENTER INDEX OF LINE YOU WISH TO CHANGE (0=NONE)

0

INTRVAL OVER WHICH VELOCITY MEASUREMENTS ARE AVERAGED = 24.00 HOUR
DO YOU WISH TO CHANGE

1 = YES 0 = NO

0

WINTER MY FLOE PARAMETERS USED ARE AS FOLLOWS :

INDEX	PARAMETER	UNITS	MEAN	STD. DEV.	DISTRIBUTION
1.	MY CONCENTRATION	TENTHS	0.2000	0.4000	BETA
2.	ICE VELOCITY	M/S	0.0620	0.0730	GAMMA
3.	FLOE DIAMETER	KM	0.1000	0.1500	GAMMA
4.	FLOE THICKNESS	M	3.9000	1.6000	GAMMA
5.	ICE PRESSURE	MPA	0.5000	0.5000	EXPONENTIAL
6.	MY RIDGE COVERAGE	PERCENT	30.0000	0.0000	DETERMINISTIC
7.	MY RIDGE HEIGHT	M	0.9000	0.9000	EXPONENTIAL
8.	MY RIDGE LENGTH	M	150.0000	0.0000	DETERMINISTIC
9.	FY ICE PRESSURE	MPA	0.0500	0.0500	NORMAL

ENTER INDEX OF PARAMETER YOU WISH TO CHANGE (0=NONE)
LOWER BOUND CAN ALSO BE SET FOR SELECTED PARAMETER

0

STOP

3-3-15

```

***RUN TITLE
TEST CASE
***GEOGRAPHIC LOCATION, WATER DEPTH, DISTANCE OFFSHORE
CANADA          SHEAR          20.000          40.000
***STRUCTURAL GEOMETRY
VERTICAL
CIRCULAR
*DIAMETER
  100.000
***SEASONS AND SEASON BOUNDARIES
*SEASON INDEX
  2
*FREEZE-UP DATE
  309.000          22.800          NORMAL
*BEGINNING OF BREAK-UP DATE
  173.000          18.100          NORMAL
***WINTER ICE PARAMETERS
*INDEX FOR WINTER LOADING CASES
  7
*RATE OF FY ICE GROWTH
  0.008500
**FY RIDGE PARAMETERS
*COVERAGE (PERCENT)
  0.30000E+02    0.00000E+00    0.00000E+00    DETERMINISTIC
*HEIGHT (M)
  0.90000E+00    0.90000E+00    0.76000E+00    EXPONENTIAL
*LENGTH (M)
  0.15000E+03    0.00000E+00    0.00000E+00    DETERMINISTIC
*VELOCITY (M/S)
  0.62000E-01    0.73000E-01    0.00000E+00    GAMMA
*FRICTION ANGLE (RAD.)
  0.43633E+00    0.00000E+00    0.00000E+00    DETERMINISTIC
*COHESION (MPA)
  0.35000E-01    0.00000E+00    0.00000E+00    DETERMINISTIC
**LEVEL ICE PARAMETERS
*ICE PRESSURE :AVERAGE ,AND MEAN AND S.D. OF EXTREMAL COMPONEN T
  0.300E+00    0.200E+00    0.150E+00
*CREEP EXPONENT, CREEP MULTIPLIER, CREEP-CRYCHING TRANSITION
  0.300E+01    0.100E-04    0.100E-04
*VELOCITY (M/S)
  0.62000E-01    0.73000E-01    0.00000E+00    GAMMA
*VELOCITY MEASUREMENT INTERVAL (HOUR)
  0.240E+02
**MY FLOE PARAMETERS
*CONCENTRATION (TENTHS)
  0.20000E+00    0.40000E+00    0.00000E+00    BETA
*VELOCITY (M/S)
  0.62000E-01    0.73000E-01    0.00000E+00    GAMMA
*DIAMETER (KM)
  0.10000E+00    0.15000E+00    0.50000E+00    GAMMA
*THICKNESS (M)
  0.39000E+01    0.16000E+01    0.00000E+00    GAMMA
*MY ICE PRESSURE (MPA)
  0.50000E+00    0.50000E+00    0.00000E+00    EXPONENTIAL
*RIDGE COVERAGE (PERCENT)
  0.30000E+02    0.00000E+00    0.00000E+00    DETERMINISTIC
*RIDGE HEIGHT (M)
  0.90000E+00    0.90000E+00    0.00000E+00    EXPONENTIAL
*RIDGE LENGTH (M)
  0.15000E+03    0.00000E+00    0.00000E+00    DETERMINISTIC
*FY ICE PRESSURE (MPA)
  0.50000E-01    0.50000E-01    0.00000E+00    NORMAL

```

ENTER RUN TITLE (MAX. 60 CHARACTERS)
TEST CASE

1 = CANADIAN BEAUFORT 2 = U.S. BEAUFORT
1

INPUT ICE ZONE
1 = LANDFAST ZONE 2 = SHEAR ZONE
2

INPUT WATER DEPTH (M)
20.

INPUT DISTANCE OFFSHORE (KM)
40.

INPUT TYPE OF STRUCTURE
1 = VERTICAL 2 = CONICAL
1

SHAPE OF STRUCTURE IN PLAN
1 = CIRCULAR 2 = POLYGONAL
1

INPUT STRUCTURAL DIAMETER IN METERS
100.

STRUCTURAL GEOMETRY USED IS AS FOLLOWS:

INDEX	PROPERTY	CURRENTLY USED
1.	SHAPE	VERTICAL
2.	SHAPE IN PLAN	CIRCULAR
3.	DIAMETER	100.00 M

ENTER INDEX OF LINE YOU WISH TO CHANGE (0=NONE)
0

DO YOU WISH TO CONSIDER THE BREAK-UP SEASON
1 = YES 0 = NO
0

DO YOU WISH TO CONSIDER THE WINTER SEASON
1 = YES 0 = NO
1

DO YOU WISH TO CONSIDER THE SUMMER SEASON
1 = YES 0 = NO
0

SEASONS CONSIDERED ARE AS FOLLOWS:

SEASONS	STATUS
SUMMER	NO
WINTER	YES

BREAK-UP

NO

DO YOU WISH TO CHANGE

1 = YES 0 = NO

0

3-3-17

SEASON BOUNDARY VALUES USED ARE AS FOLLOWS:

INDEX	PARAMETER	MEAN (DAY-MONTH)	STD. DEV. (DAYS)	DISTRIBUTION
1.	FREEZE-UP	5-11	22.80	NORMAL
2.	BEGINNING OF BREAK-UP	22- 6	18.10	NORMAL

ENTER INDEX OF LINE YOU WISH TO CHANGE (0=NONE)

0

DO YOU WISH TO CONSIDER FIRST YEAR RIDGES

1 = YES 0 = NO

1

DO YOU WISH TO CONSIDER LEVEL ICE

1 = YES 0 = NO

1

DO YOU WISH TO CONSIDER MULTIYEAR FLOES

1 = YES 0 = NO

1

GROWTH RATE OF FY ICE = 0.008500 M/DAY

DO YOU WISH TO CHANGE

1 = YES 0 = NO

0

WINTER FY RIDGE PARAMETERS USED ARE AS FOLLOWS :

INDEX	PARAMETER	UNITS	MEAN	STD. DEV.	DISTRIBUTION
1.	RIDGE COVERAGE	PERCENT	30.0000	0.0000	DETERMINISTIC
2.	RIDGE HEIGHT	M	0.9000	0.9000	EXPONENTIAL
3.	RIDGE LENGTH	M	150.0000	0.0000	DETERMINISTIC
4.	ICE SPEED	M/S	0.0620	0.0730	GAMMA
5.	FRICTION ANGLE	DEG.	25.0000	0.0000	DETERMINISTIC
6.	COHESION	MPA	0.0350	0.0000	DETERMINISTIC

ENTER INDEX OF PARAMETER YOU WISH TO CHANGE (0=NONE)

LOWER BOUND CAN ALSO BE SET FOR SELECTED PARAMETER

0

WINTER LEVEL ICE PARAMETERS USED ARE AS FOLLOWS :

INDEX	PARAMETER	UNITS	VALUE
1.	AVERAGE ICE PRESSURE	MPA	0.30E+00
2.	MEAN OF EXTREMAL PRESSURE COMPONENT	MPA	0.20E+00
3.	S.D. OF EXTREMAL PRESSURE COMPONENT	MPA	0.15E+00
4.	CREEP EXPONENT		0.30E+01
5.	CREEP MULTIPLIER		0.10E-04
6.	CREEP-CRUSHING TRANSITION STRAIN RATE	S**-1	0.10E-04

ENTER INDEX OF PARAMETER YOU WISH TO CHANGE (0=NONE)

LOWER BOUND CAN ALSO BE SET FOR SELECTED PARAMETER

0

VALUES CURRENTLY USED ARE AS FOLLOWS :

INDEX PARAMETER CURRENTLY USED

1.	DISTRIBUTION TYPE	GAMMA
2.	MEAN	0.0620
3.	STANDARD DEVIATION	0.0730
4.	LOWER BOUND	0.00E+00

ENTER INDEX OF LINE YOU WISH TO CHANGE (0=NONE)

INTERVAL OVER WHICH VELOCITY MEASUREMENTS ARE AVERAGED = 24.00 HOUR

1 = YES 0 = NO

WINTER MY FLOE PARAMETERS USED ARE AS FOLLOWS :

INDEX PARAMETER UNITS MEAN STD. DEV. DISTRIBUTION

1.	MY CONCENTRATION	TENTHS	0.2000	0.4000	BETA
2.	ICE VELOCITY	M/S	0.0620	0.0730	GAMMA
3.	FLOE DIAMETER	KM	0.1000	0.1500	GAMMA
4.	FLOE THICKNESS	M	3.9000	1.6000	GAMMA
5.	ICE PRESSURE	MPA	0.5000	0.5000	EXPONENTIAL
6.	MY RIDGE COVERAGE	PERCENT	30.0000	0.0000	DETERMINISTIC
7.	MY RIDGE HEIGHT	M	0.9000	0.9000	EXPONENTIAL
8.	MY RIDGE LENGTH	M	150.0000	0.0000	DETERMINISTIC
9.	LY ICE PRESSURE	MPA	0.0500	0.0500	NORMAL

ENTER INDEX OF PARAMETER YOU WISH TO CHANGE (0=NONE)
 LOWER BOUND CAN ALSO BE SET FOR SELECTED PARAMETER

3.4 Running BOREAS

The purpose of BOREAS is to use the input data file created by INREAS to perform the calculations and create the following files (see Chapter 2 for file organization):

- i) A main output file which contains the important output parameters such as the force distribution parameters, the frequencies of occurrence of each scenario, the number of simulations in each case, etc.
- ii) A dump output file (optional), which contains the ice parameters and resulting force in each Monte Carlo simulation for a given ice feature type in a given season. The user can also define a cut-off load value below which the simulation is not to be recorded in the dump file.
- iii) A data base file which contains the detailed probabilistic description of the load for each scenario. This file is unformatted and can only be accessed through the output program OUREAS.

BOREAS uses 6 IMSL (International Mathematical and Statistical Library) (1) routines as follows:

- i) MDNOR calculates the cumulative probability for a standard normal density function
- ii) MDGAM calculates the cumulative probability for a standard gamma density function
- iii) MDBETA calculates the cumulative probability for a standard beta density function
- iv) GGUBT generates a random number from a basic 0-1 uniform density function
- v) GGBTR generates a random number from a beta density function
- vi) GGAMR generates a random number from a standard gamma density function

The user should therefore ensure that the IMSL is linked before running BOREAS.

Once the execution of BOREAS is started, the user is asked to define the file names (only for INTFN = 1, see Section 2.1) and the run status (normal or re-start). Also, some run specific parameters are requested by the program as follows:

- The dump option status (see ii) above), active or inactive. If the dump option is active, the user would also be asked to define a minimum load value above which a certain simulation is to be recorded on the dump file.
- The tolerance: this is defined as the acceptable ratio of change of the mean force value due to one additional simulation. The tolerance governs the number of simulations (lower tolerances would lead to larger numbers of simulations). The program stops when 5 consecutive values of the error are less than the prescribed tolerance. If the maximum number of simulations is reached before convergence, a warning message will be written to the output file.
- The bin width of the histogram in which the force values are to be grouped for further analysis. Since the maximum number of bins is 200, the user should choose the bin width such that the maximum expected load value is smaller than the upper bound of the 200th bin (i.e. maximum load $\leq 200 \times$ bin width). If this condition is not satisfied, force values which fall outside of all bins will be ignored and a warning message will be written in the input file.
- Finally, a randomly chosen number is required as an initial seed for random number generation.

An example run is given here which uses the data file created by the INREAS run given in Section 3.3 as an input file. The re-start option is off, and the run is based on INTFN = 1 (see Section 2.1). INTFN = 0 would give the same outputs, except that the program messages prompting the user to define file names would be suppressed, and the user must attach the appropriate files externally. The example is displayed on the next few pages as follows:

- i) Page 3-4-4 shows a print-out of the program messages and the user's response;
- ii) Page 3-4-5 and 3-4-6 show the output file; and
- iii) Pages 3-4-7 to 3-4-9 show the dump file.

The program also creates a data base file which cannot be displayed here because it is an unformatted file. The file contains probabilistic descriptions of the loads for different scenarios as shown in Table 3.4.1.

**Table 3.4.1. Probabilistic Load Descriptors
Contained in the Data Base File
for Different Load Scenarios**

Season	Scenario	Parameter		
		One Event	Monthly Extremes	Season Extremes
Break-up	First-year ridges	✓		✓
	Level ice			✓
	Multi-year floes	✓		✓
Winter	First-year ridges	✓		✓
	Level ice		✓	✓
	Multi-year floes	✓		✓
Summer	Multi-year floes	✓		✓
	Ice island fragments	✓		✓
	Ice islands	✓		✓

***** P R O G R A M B O R E A S *****

PROBABILISTIC ASSESSMENT OF YEAR-ROUND ICE LOADS ON
FIXED OFFSHORE STRUCTURES
DEVELOPED BY DET NORSKE VERITAS
VERSION V2-5-1986

NAME OF DATA BASE FILE (MAX. 7 CHARACTERS)
dbtest

ENTER RE-START OPTION (0 = OFF 1 = ON)
0

NAME OF INPUT FILE (MAX. 7 CHARACTERS)
intest

NAME OF OUTPUT FILE (MAX. 7 CHARACTERS)
outest

DO YOU WISH TO DUMP INPUT PARAMETERS FOR LOADS ABOVE
A USER-DEFINED CUTOFF VALUE

AVAILABLE ONLY FOR THE FOLLOWING ICE FEATURES :
ICE ISLANDS , ICE ISLAND FRAGMENTS,
MY FLOES , FY RIDGES

1 = YES 0 = NO

1
NAME OF DUMP FILE (MAX. 7 CHARACTERS)
dumtest

ENTER LOAD CUT-OFF VALUE (MN)
0.

ENTER ERROR TOLERANCE FOR MEAN VALUE OF FORCE
.025

ENTER BIN WIDTH FOR LOAD PROBABILITY DISTRIBUTION
MAXIMUM NUMBER OF BINS IS 200
10.

ENTER YOUR FAVOURITE RANDOM NUMBER (DOUBLE PRECISION)
(WILL BE USED AS SEED FOR RANDOM NUMBER GENERATION)
99.d0

RUN TITLE : TEST CASE
 =====

I/O FILE NAMES :
 =====

DATA BASE FILE : dbtest
 INPUT FILE : intest
 DUMP FILE : dumtest

STATISTICAL PARAMETERS :
 =====

TOLERANCE FOR MEAN FORCE = 0.25E-01
 BIN WIDTH FOR FORCE PDF = 10.00 MN

WINTER SEASON :
 =====

AVERAGE SEASON LENGTH = 229. DAYS

FIRST YEAR RIDGES :

AVERAGE INTERACTION RATE = 0.13E+05 PER SEASON
 NUMBER OF SIMULATIONS = 28

FORCE DISTRIBUTION PARAMETERS :

FORCE	MEAN (MN)	S.D. (MN)
FOR ONE COLLISION	21.18	25.35
EXTREMAL	114.99	1.15

FIRST YEAR LEVEL ICE :

MONTHLY EXTREMAL FORCE DISTRIBUTION PARAMETERS (MN) :

MONTH NO.	ICE THK.	NO. OF SIMS.	MEAN(MN)	S.D.(MN)
1	0.59	41	40.52	16.32
2	0.84	39	61.26	24.32
3	1.10	51	72.57	28.70
4	1.35	36	90.23	39.59
5	1.61	34	115.99	44.92
6	1.86	43	122.94	48.06
7	2.12	34	145.50	55.13

SEASON EXTREME FORCE (MN) :
 MEAN = 176.92 MN
 STD. DEV. = 38.58 MN

MULTIYEAR FLOE COLLISIONS :

3-4-6

AVERAGE COLLISION RATE	=	0.18E+02	PER SEASON
PROBABILITY OF RIDGE ENCOUNTER	=	0.22E-01	PER 1 M OF PENETRATION
NUMBER OF SIMULATIONS	=	50	

FORCE DISTRIBUTION PARAMETERS :

FORCE	MEAN (MN)	S.D. (MN)
FOR ONE COLLISION	51.65	45.47
EXTREMAL	152.79	38.63

WINTER
FIRST YEAR RIDGES

HEIGHT M	COHESION MPA	FRC AGL RAD.	FORCE MN
.786E+00	.350E-01	.436E+00	.396E+01
.103E+01	.350E-01	.436E+00	.679E+01
.286E+01	.350E-01	.436E+00	.549E+02
.127E+01	.350E-01	.436E+00	.104E+02
.913E+00	.350E-01	.436E+00	.536E+01
.239E+01	.350E-01	.436E+00	.378E+02
.803E+00	.350E-01	.436E+00	.413E+01
.179E+01	.350E-01	.436E+00	.210E+02
.948E+00	.350E-01	.436E+00	.578E+01
.123E+01	.350E-01	.436E+00	.981E+01
.402E+01	.350E-01	.436E+00	.111E+03
.108E+01	.350E-01	.436E+00	.756E+01
.179E+01	.350E-01	.436E+00	.211E+02
.954E+00	.350E-01	.436E+00	.586E+01
.153E+01	.350E-01	.436E+00	.153E+02
.101E+01	.350E-01	.436E+00	.661E+01
.366E+01	.350E-01	.436E+00	.912E+02
.112E+01	.350E-01	.436E+00	.816E+01
.132E+01	.350E-01	.436E+00	.114E+02
.921E+00	.350E-01	.436E+00	.546E+01
.781E+00	.350E-01	.436E+00	.391E+01
.212E+01	.350E-01	.436E+00	.296E+02
.872E+00	.350E-01	.436E+00	.488E+01
.196E+01	.350E-01	.436E+00	.254E+02
.164E+01	.350E-01	.436E+00	.176E+02
.203E+01	.350E-01	.436E+00	.271E+02
.127E+01	.350E-01	.436E+00	.104E+02
.216E+01	.350E-01	.436E+00	.307E+02

WINTER
MULTIYEAR FLOES

FY THK c FORCE M c MN	YM THK M	FLD DIAM KM	VELOCITY M/S	ECCEN. M	APR AGLE RAD.	FY PRESS MPA	MY PRESS MPA
.138E+01	.377E+01	.127E+01	.312E-01	.464E+03	.000E+00	.101E-01	.120E+00
c .177E+02							
.109E+01	.288E+01	.625E+00	.299E+00	.251E+03	.000E+00	.157E+00	.304E+00
c .892E+02							
.807E+00	.354E+01	.102E+01	.371E+00	.295E+03	.000E+00	.700E-01	.485E+00
c .103E+03							
.371E+00	.389E+01	.645E+00	.239E-01	.250E+03	.000E+00	.907E-01	.104E+00
c .386E+01							
.172E+01	.253E+01	.544E+00	.556E-01	.601E+02	.000E+00	.797E-01	.137E+01
c .743E+02							
.152E+01	.791E+01	.512E+00	.857E-01	.506E+02	.000E+00	.105E-01	.667E-01
c .153E+02							
.165E+01	.617E+01	.653E+00	.135E+00	.260E+03	.000E+00	.130E+00	.133E+01
c .140E+03							
.243E-01	.351E+01	.618E+00	.349E+00	.298E+03	.000E+00	.162E-01	.405E-01
c .758E+01							

.132E+00	.230E+01	.826E+00	.985E-01	.142E+03	.000E+00	.503E-01	.427E+00
\c .186E+02							
.986E+00	.291E+01	.855E+00	.114E+00	.213E+03	.000E+00	.158E-01	.254E-01
\c .760E+01							
.185E+01	.443E+01	.637E+00	.228E+00	.122E+03	.000E+00	.163E+00	.133E+01
\c .207E+03							
.194E+01	.528E+01	.543E+00	.223E+00	.179E+03	.000E+00	.771E-01	.563E+00
\c .813E+02							
.338E+00	.258E+01	.645E+00	.704E-01	.253E+03	.000E+00	.927E-01	.130E+00
\c .202E+02							
.708E+00	.268E+01	.651E+00	.368E+00	.236E+03	.000E+00	.680E-01	.356E+00
\c .480E+02							
.171E+01	.177E+01	.615E+00	.513E-01	.305E+03	.000E+00	.383E-01	.518E+00
\c .820E+01							
.983E+00	.262E+01	.929E+00	.987E-01	.138E+03	.000E+00	.464E-03	.604E+00
\c .246E+02							
.846E-01	.280E+01	.733E+00	.128E+00	.187E+03	.000E+00	.403E-01	.789E+00
\c .337E+02							
.157E+01	.365E+01	.846E+00	.598E-01	.231E+03	.000E+00	.451E-01	.762E+00
\c .600E+02							
.217E+00	.340E+01	.135E+01	.121E+00	.925E+02	.000E+00	.757E-01	.293E+00
\c .418E+02							
.133E+01	.222E+01	.525E+00	.912E-01	.262E+03	.000E+00	.230E-01	.532E+00
\c .162E+02							
.164E+01	.364E+01	.555E+00	.191E+00	.333E+02	.000E+00	.127E+00	.446E+00
\c .115E+03							
.120E+01	.415E+01	.544E+00	.964E-01	.111E+03	.000E+00	.544E-01	.157E+01
\c .707E+02							
.308E+00	.497E+01	.795E+00	.859E-01	.387E+03	.000E+00	.648E-01	.725E-01
\c .159E+02							
.148E+01	.481E+01	.662E+00	.236E+00	.233E+03	.000E+00	.766E-01	.183E+00
\c .750E+02							
.124E+01	.470E+01	.624E+00	.177E+00	.211E+03	.000E+00	.939E-01	.244E+01
\c .157E+03							
.130E+01	.309E+01	.842E+00	.235E+00	.261E+03	.000E+00	.115E+00	.130E+01
\c .127E+03							
.125E+01	.190E+01	.114E+01	.372E-01	.307E+03	.000E+00	.328E-01	.225E+00
\c .192E+02							
.120E+00	.147E+01	.670E+00	.163E+00	.324E+02	.000E+00	.276E-01	.107E+01
\c .239E+02							
.157E+01	.347E+01	.591E+00	.170E+00	.279E+02	.000E+00	.347E-01	.130E+01
\c .769E+02							
.223E+00	.395E+01	.664E+00	.184E+00	.199E+03	.000E+00	.143E+00	.689E+00
\c .573E+02							
.691E+00	.190E+01	.621E+00	.537E+00	.296E+03	.000E+00	.202E-01	.943E+00
\c .503E+02							
.325E-01	.291E+01	.786E+00	.217E+00	.192E+03	.000E+00	.159E-01	.224E-01
\c .430E+01							
.144E+01	.945E+01	.561E+00	.229E+00	.504E+01	.000E+00	.226E-02	.309E-01
\c .158E+02							
.336E+00	.241E+01	.639E+00	.149E+00	.296E+03	.000E+00	.714E-02	.204E-01
\c .271E+01							
.183E+01	.385E+01	.121E+01	.106E+00	.152E+03	.000E+00	.574E-02	.774E-01
\c .129E+02							
.690E+00	.122E+01	.530E+00	.556E-01	.291E+03	.000E+00	.338E-01	.381E+00
\c .135E+02							
.149E+01	.347E+01	.878E+00	.521E+00	.343E+03	.000E+00	.740E-03	.487E-02
\c .201E+01							
.117E+01	.549E+01	.103E+01	.122E+00	.241E+03	.000E+00	.676E-02	.149E-01
\c .820E+01							
.442E+00	.269E+01	.109E+01	.376E-01	.485E+03	.000E+00	.113E+00	.125E+01
\c .544E+02							
.184E+01	.298E+01	.864E+00	.382E-01	.121E+03	.000E+00	.868E-01	.132E+00
\c .185E+02							
.107E+01	.233E+01	.608E+00	.438E+00	.274E+03	.000E+00	.915E-01	.297E+00
\c .597E+02							

.133E+01	.532E+01	.718E+00	.909E-01	.132E+03	.000E+00	.107E+00	.989E+00
\c .103E+03							
.168E+01	.558E+01	.627E+00	.208E+00	.291E+03	.000E+00	.626E-01	.140E+00
\c .596E+02							
.122E+01	.984E+01	.574E+00	.337E+00	.183E+03	.000E+00	.881E-02	.315E+00
\c .939E+02							
.131E+01	.585E+01	.517E+00	.254E+00	.108E+03	.000E+00	.762E-01	.101E+01
\c .124E+03							
.454E+00	.307E+01	.672E+00	.116E+00	.125E+03	.000E+00	.126E+00	.616E+00
\c .388E+02							
.125E+01	.583E+01	.733E+00	.314E+00	.197E+03	.000E+00	.697E-02	.342E-01
\c .223E+02							
.465E+00	.341E+01	.638E+00	.133E+00	.338E+03	.000E+00	.488E-01	.110E+01
\c .410E+02							
.193E+00	.366E+01	.733E+00	.177E+00	.343E+03	.000E+00	.426E-01	.660E+00
\c .407E+02							
.189E+01	.527E+01	.772E+00	.659E-01	.141E+03	.000E+00	.423E-01	.257E+00
\c .613E+02							

3.5 Running OUREAS

The purpose of OUREAS is to process the output of BOREAS which is given on an unformatted data base file as discussed in Section 2.4 and Section 3.4. The data base contains the run title and the appropriate probabilistic description for the load in each scenario as detailed in Table 3.4.1. On the data base, all forces are described by the cumulative density function. OUREAS performs the following functions:

- i) Extract the probabilistic description for the load and/or extreme load during any of the scenarios available on the data base.
- ii) Compute the extremal load cumulative distribution function from the scenario extremes for any combination(s) of scenarios.
- iii) Convert the probabilistic load description, if necessary, to present it in any of the following formats:
 - Cumulative density function (CDF)
 - Probability of exceedance plot (POE)
 - Probability density function (PDF)
 - Return period plot (REP)

The output of OUREAS is in the form of printed x-y arrays with the x representing the force values and the y representing the requested probabilistic description. Before each array, the run title, output format, curve description and axes labels are given. The program does not plot the results. If plotted output is required, the user should write an interface program to plot the results in this output file. It is noted that if the return period is selected as an output format, the last y value on the curve would always be ∞ (due to the definition of the return period). A value of 10E10 will be given to denote that the curve is asymptotic to the corresponding force value.

An example is given here, where the data base created by BOREAS (see example of Section 3.4) is processed. The example is run in the normal mode (i.e. no data retrieval) and for INTFN = 1 (see Section 2.1). For INTFN = 0, the output would be the same except that the prompt messages for file name definitions would be suppressed. The user should attach his files externally. This program is interactive and self explanatory. The example is given in this section as follows:

- i) Pages 3-5-3 to 3-5-11 give a print out of the interactive prompt messages and user's response. Note that the table giving the options processed (page 3-5-6, and updated on page 3-5-9) can accommodate up to 20 entries. If more scenarios are processed, the first option will be overwritten by the 21st, and so on.
- ii) Pages 3-5-12 to 3-5-15 give a print of the output file resulting from this run.
- iii) Pages 3-5-16 to 3-5-17 show the back-up file created by OUREAS. This file is similar to item i) above.

It is worth noting that OUREAS can be re-run with the same data base file to produce other results, or the same results in different formats.

**** P R O G R A M O U R E A S ****

INTERACTIVE POST-PROCESSOR FOR PROGRAM BOREAS
DEVELOPED BY DET NORSKE VERITAS
VERSION V2-5-1986

DEFINE INPUT MODE

0 = INTERACTIVE

1 = RETRIEVE FROM BACK-UP FILE

ENTER OPTION 0 OR 1

0

ENTER NAME OF NEW BACKUP FILE (MAX. 7 CHARACTERS)
buotest

ENTER NAME OF FILE FOR PRINTED OUTPUT (MAX. 7 CHARACTERS)
ouptest

ENTER NAME OF DATA BASE FILE (MAX. 7 CHARACTERS)
dbtest

THE FOLLOWING INFORMATION IS AVAILABLE ON DATA BASE

WINTER

FIRST YEAR RIDGES

FIRST YEAR LEVEL ICE

MULTI-YEAR FLOES

SUMMER

MULTI-YEAR FLOES

MORE INFO TO COME, PRESS SPACE BAR TO CONTINUE

SELECT PROCESSING OPTION

- 1 = PROCESS EACH SINGLE SCENARIO ON DATA BASE
- 2 = COMBINE ALL SCENARIOS ON DATA BASE
- 3 = SELECT ONE SCENARIO
- 4 = COMBINE SCENARIOS ONE BY ONE

ENTER OPTION 1 TO 4 OR 0 TO STOP

2

AVAILABLE FORMATS FOR OUTPUT

INDEX	FORMAT	STATUS
1.	CUMULATIVE PROBABILITY	(CDF) NOT PROCESSED
2.	PROBABILITY DENSITY	(PDF) NOT PROCESSED
3.	PROBABILITY OF EXCEEDANCE	(POE) NOT PROCESSED
4.	RETURN PERIOD	(RPE) NOT PROCESSED

ENTER INDEX TO CHANGE OR 0 TO EXIT

1

AVAILABLE FORMATS FOR OUTPUT

INDEX	FORMAT	STATUS
1.	CUMULATIVE PROBABILITY	(CDF) PROCESSED
2.	PROBABILITY DENSITY	(PDF) NOT PROCESSED
3.	PROBABILITY OF EXCEEDANCE	(POE) NOT PROCESSED
4.	RETURN PERIOD	(RPE) NOT PROCESSED

ENTER INDEX TO CHANGE OR 0 TO EXIT

4

AVAILABLE FORMATS FOR OUTPUT

INDEX	FORMAT	STATUS
1.	CUMULATIVE PROBABILITY	(CDF) PROCESSED
2.	PROBABILITY DENSITY	(PDF) NOT PROCESSED
3.	PROBABILITY OF EXCEEDANCE	(POE) NOT PROCESSED
4.	RETURN PERIOD	(RPE) PROCESSED

ENTER INDEX TO CHANGE OR 0 TO EXIT

0

THE FOLLOWING OPTIONS HAVE BEEN PROCESSED :

* = ON DATA BASE H/V = HORIZONTAL/VERTICAL
 1 = ONE INTERACTION E = EXTREMAL

DRAWING NUMBER	WINTER				SUMMER		BREAK-UP			FORMAT
	FYR	FYLI	MYF	MYF	II	IIF	FYR	FYLI	MYF	
	*	*	*	*						
1	H E	H E	H E	H E						CDF
2	H E	H E	H E	H E						RPE

MORE INFO TO COME, PRESS SPACE BAR TO CONTINUE

THE FOLLOWING INFORMATION IS AVAILABLE ON DATA BASE

WINTER

FIRST YEAR RIDGES
FIRST YEAR LEVEL ICE
MULTI-YEAR FLOES

SUMMER

MULTI-YEAR FLOES

MORE INFO TO COME, PRESS SPACE BAR TO CONTINUE

SELECT PROCESSING OPTION

- 1 = PROCESS EACH SINGLE SCENARIO ON DATA BASE
- 2 = COMBINE ALL SCENARIOS ON DATA BASE
- 3 = SELECT ONE SCENARIO
- 4 = COMBINE SCENARIOS ONE BY ONE

ENTER OPTION 1 TO 4 OR 0 TO STOP

3

AVAILABLE FORMATS FOR OUTPUT

INDEX	FORMAT	STATUS
1.	CUMULATIVE PROBABILITY	(CDF) PROCESSED
2.	PROBABILITY DENSITY	(PDF) NOT PROCESSED
3.	PROBABILITY OF EXCEEDANCE	(POE) NOT PROCESSED
4.	RETURN PERIOD	(RPE) PROCESSED

ENTER INDEX TO CHANGE OR 0 TO EXIT

0

DEFINE SEASON

- 1 = WINTER
- 2 = SUMMER
- 3 = BREAK-UP

ENTER OPTION 1 TO 3

1

DEFINE SCENARIO

- 1 = FIRST YEAR RIDGES
- 2 = FIRST YEAR LEVEL ICE
- 3 = MULTI-YEAR FLOES

ENTER OPTION 1 TO 3

3

DEFINE PARAMETER

INDEX	FORMAT	SCENARIO	PARAMETER	COMPONENT
1.	CDF MY FLOES			
2.	CDF MY FLOES			ONE INTERACTION HORIZONTAL
3.	CDF PARAMETER 1. AND 2.			SEASON EXTREMES HORIZONTAL

ENTER INDEX OF PARAMETER FOR OUTPUT

3

THE FOLLOWING OPTIONS HAVE BEEN PROCESSED :

* = ON DATA BASE H/V = HORIZONTAL/VERTICAL
 1 = ONE INTERACTION E = EXTREMAL

DRAWING NUMBER	WINTER			SUMMER			BREAK-UP			FORMAT
	FYR	FYLI	MYF	MYF	II	IIF	FYR	FYLI	MYF	
	*	*	*	*						
1	H E	H E	H E	H E						CDF
2	H E	H E	H E	H E						RPE
3			H1E							CDF
4			H1E							RPE

MORE INFO TO COME, PRESS SPACE BAR TO CONTINUE

THE FOLLOWING INFORMATION IS AVAILABLE ON DATA BASE

WINTER

FIRST YEAR RIDGES
FIRST YEAR LEVEL ICE
MULTI-YEAR FLOES

SUMMER

MULTI-YEAR FLOES

MORE INFO TO COME, PRESS SPACE BAR TO CONTINUE

3-5-11

SELECT PROCESSING OPTION

- 1 = PROCESS EACH SINGLE SCENARIO ON DATA BASE
- 2 = COMBINE ALL SCENARIOS ON DATA BASE
- 3 = SELECT ONE SCENARIO
- 4 = COMBINE SCENARIOS ONE BY ONE

ENTER OPTION 1 TO 4 OR 0 TO STOP

0
STOP

```

*DRAWING NUMBER
1
*TITLE
TEST CASE
*FORMAT
CDF
*PARAMETER
WINTER //FY RIDGES //SEASON EXTREMES //HORIZONTAL COMPONENT
WINTER //FY LEVEL ICE //SEASON EXTREMES //HORIZONTAL COMPONENT
WINTER //MY FLOES //SEASON EXTREMES //HORIZONTAL COMPONENT
SUMMER //MY FLOES //SEASON EXTREMES //HORIZONTAL COMPONENT
*X LABEL
FORCE
*Y LABEL
CDF
*CURVE
0.0,0.0
10.0,0.0
20.0,0.0
30.0,0.0
40.0,0.0
50.0,0.0
60.0,0.0
70.0,0.0
80.0,0.0
90.0,0.0
100.0,0.0
110.0,0.0
120.0,0.0053882178
130.0,0.018366558
140.0,0.052037527
150.0,0.082468688
160.0,0.15036294
170.0,0.20644685
180.0,0.2768578
190.0,0.30269961
200.0,0.34830745
210.0,0.52638198
220.0,0.58327457
230.0,0.8567158
240.0,0.94001474
250.0,0.99999999
*DRAWING NUMBER
2
*TITLE
TEST CASE
*FORMAT
RPE
*PARAMETER
WINTER //FY RIDGES //SEASON EXTREMES //HORIZONTAL COMPONENT
WINTER //FY LEVEL ICE //SEASON EXTREMES //HORIZONTAL COMPONENT
WINTER //MY FLOES //SEASON EXTREMES //HORIZONTAL COMPONENT
SUMMER //MY FLOES //SEASON EXTREMES //HORIZONTAL COMPONENT
*X LABEL
FORCE
*Y LABEL
RPE
*CURVE
0.0,1.0
10.0,1.0
20.0,1.0

```

30.0,1.0
 40.0,1.0
 50.0,1.0
 60.0,1.0
 70.0,1.0
 80.0,1.0
 90.0,1.0
 100.0,1.0
 110.0,1.0
 120.0,1.0054174
 130.0,1.0187102
 140.0,1.0548941
 150.0,1.089881
 160.0,1.1769731
 170.0,1.2601538
 180.0,1.3828539
 190.0,1.4341022
 200.0,1.5344659
 210.0,2.1114061
 220.0,2.3996615
 230.0,6.9791365
 240.0,16.670763
 250.0,1.0E+10

*DRAWING NUMBER

3

*TITLE

TEST CASE

*FORMAT

CDF

*PARAMETER

WINTER //MY FLOES

*X LABEL

FORCE

*Y LABEL

CDF

*CURVE

0.0,0.0

10.0,0.16

20.0,0.36

30.0,0.44

40.0,0.48

50.0,0.55999999

60.0,0.66

70.0,0.7

80.0,0.77999999

90.0,0.81999999

100.0,0.84

110.0,0.88

120.0,0.9

130.0,0.94

140.0,0.96

150.0,0.96

160.0,0.98

170.0,0.98

180.0,0.98

190.0,0.98

200.0,0.98

210.0,1.0

*PARAMETER

WINTER //MY FLOES

*X LABEL

FORCE

*Y LABEL

CDF

*CURVE

0.0,1.6738206E-08

//ONE INTERACTION //HORIZONTAL COMPONENT

//SEASON EXTREMES //HORIZONTAL COMPONENT

10.0,2.9370781E-07
 20.0,1.0548088E-05
 30.0,4.4185214E-05
 40.0,9.0433347E-05
 50.0,0.00037881911
 60.0,0.0022701838
 70.0,0.0046463576
 80.0,0.019463275
 90.0,0.03983525
 100.0,0.056989309
 110.0,0.11663934
 120.0,0.16686716
 130.0,0.34152501
 140.0,0.48859426
 150.0,0.48859426
 160.0,0.69899523
 170.0,0.69899523
 180.0,0.69899523
 190.0,0.69899523
 200.0,0.69899523
 210.0,1.0

*DRAWING NUMBER

4

*TITLE

TEST CASE

*FORMAT

RPE

*PARAMETER

WINTER //MY FLOES

*X LABEL

FORCE

*Y LABEL

RPE

*CURVE

0.0,1.0

10.0,1.1904762

20.0,1.5625

30.0,1.7857143

40.0,1.9230769

50.0,2.2727273

60.0,2.9411764

70.0,3.3333333

80.0,4.5454544

90.0,5.5555553

100.0,6.2499998

110.0,8.3333333

120.0,9.9999999

130.0,16.6666666

140.0,25.0

150.0,25.0

160.0,50.00001

170.0,50.00001

180.0,50.00001

190.0,50.00001

200.0,50.00001

210.0,1.0E+10

*PARAMETER

WINTER //MY FLOES

*X LABEL

FORCE

*Y LABEL

RPE

*CURVE

0.0,1.0

10.0,1.0000003

20.0,1.0000106

//ONE INTERACTION //HORIZONTAL COMPONENT

//SEASON EXTREMES //HORIZONTAL COMPONENT

30.0,1.0000442
40.0,1.0000904
50.0,1.000379
60.0,1.0022753
70.0,1.004668
80.0,1.0198496
90.0,1.0414879
100.0,1.0604334
110.0,1.1320404
120.0,1.2002088
130.0,1.5186606
140.0,1.9553946
150.0,1.9553946
160.0,3.3222065
170.0,3.3222065
180.0,3.3222065
190.0,3.3222065
200.0,3.3222065
210.0,1.0E+10

ENTER NAME OF FILE FOR PRINTED OUTPUT (MAX. 7 CHARACTERS)
ouptest

ENTER NAME OF DATA BASE FILE (MAX. 7 CHARACTERS)
dbtest

SELECT PROCESSING OPTION

- 1 = PROCESS EACH SINGLE SCENARIO ON DATA BASE
- 2 = COMBINE ALL SCENARIOS ON DATA BASE
- 3 = SELECT ONE SCENARIO
- 4 = COMBINE SCENARIOS ONE BY ONE

ENTER OPTION 1 TO 4 OR 0 TO STOP
2

AVAILABLE FORMATS FOR OUTPUT

INDEX	FORMAT	STATUS
1.	CUMULATIVE PROBABILITY (CDF)	NOT PROCESSED
2.	PROBABILITY DENSITY (PDF)	NOT PROCESSED
3.	PROBABILITY OF EXCEEDANCE (POE)	NOT PROCESSED
4.	RETURN PERIOD (RPE)	NOT PROCESSED

ENTER INDEX TO CHANGE OR 0 TO EXIT
1

AVAILABLE FORMATS FOR OUTPUT

INDEX	FORMAT	STATUS
1.	CUMULATIVE PROBABILITY (CDF)	PROCESSED
2.	PROBABILITY DENSITY (PDF)	NOT PROCESSED
3.	PROBABILITY OF EXCEEDANCE (POE)	NOT PROCESSED
4.	RETURN PERIOD (RPE)	NOT PROCESSED

ENTER INDEX TO CHANGE OR 0 TO EXIT
4

AVAILABLE FORMATS FOR OUTPUT

INDEX	FORMAT	STATUS
1.	CUMULATIVE PROBABILITY (CDF)	PROCESSED
2.	PROBABILITY DENSITY (PDF)	NOT PROCESSED
3.	PROBABILITY OF EXCEEDANCE (POE)	NOT PROCESSED
4.	RETURN PERIOD (RPE)	PROCESSED

ENTER INDEX TO CHANGE OR 0 TO EXIT
0

SELECT PROCESSING OPTION

- 1 = PROCESS EACH SINGLE SCENARIO ON DATA BASE
- 2 = COMBINE ALL SCENARIOS ON DATA BASE
- 3 = SELECT ONE SCENARIO
- 4 = COMBINE SCENARIOS ONE BY ONE

ENTER OPTION 1 TO 4 OR 0 TO STOP
3

3-5-17

AVAILABLE FORMATS FOR OUTPUT

INDEX	FORMAT	STATUS
1.	CUMULATIVE PROBABILITY	(CDF) PROCESSED
2.	PROBABILITY DENSITY	(PDF) NOT PROCESSED
3.	PROBABILITY OF EXCEEDANCE	(POE) NOT PROCESSED
4.	RETURN PERIOD	(RPE) PROCESSED

ENTER INDEX TO CHANGE OR 0 TO EXIT
0

DEFINE SEASON

1 = WINTER
2 = SUMMER
3 = BREAK-UP

ENTER OPTION 1 TO 3
1

DEFINE SCENARIO

1 = FIRST YEAR RIDGES
2 = FIRST YEAR LEVEL ICE
3 = MULTI-YEAR FLOES

ENTER OPTION 1 TO 3
3

DEFINE PARAMETER

INDEX	FORMAT	SCENARIO	PARAMETER	COMPONENT
1.	CDF MY FLOES			ONE INTERACTION HORIZONTAL
2.	CDF MY FLOES			SEASON EXTREMES HORIZONTAL
3.	CDF PARAMETER 1. AND 2.			

ENTER INDEX OF PARAMETER FOR OUTPUT
3

SELECT PROCESSING OPTION

1 = PROCESS EACH SINGLE SCENARIO ON DATA BASE
2 = COMBINE ALL SCENARIOS ON DATA BASE
3 = SELECT ONE SCENARIO
4 = COMBINE SCENARIOS ONE BY ONE

ENTER OPTION 1 TO 4 OR 0 TO STOP
0

3.6 The Re-start and Data Retrieval Options

The example given in Sections 3.3 through 3.5 considered only some winter scenarios (first-year ridges and multi-year floes) for a vertical circular structure in the shear zone of the Canadian Beaufort Sea. This section will demonstrate the steps needed to add summer multi-year floes to the data base, taking advantage of the data retrieval option in INREAS and the re-start option in BOREAS, in order to minimize the computer and operator time required. It is emphasized that if a run is performed in segments in the manner shown here, the sequence of running the different scenarios must be the same as the order given in Table 1.4.1. The steps are as follows:

1. Edit the back-up file created by the previous run (see pages 3-3-14 to 3-3-15) and locate the first response from the top which is not valid for the present combination of scenarios. This is, in this case, the negative response to the summer season (marked with an arrow on page 3-3-14). Now, delete the bottom portion of the file starting with and including this response.
2. If $INTFN = 1$ (see Section 2.1), then move to step 3. If $INTFN = 0$, you need to ensure that the back-up file is attached to unit NUBU (i.e. the input back-up file as discussed in Section 2.3 and 2.4). This will be automatically the case if the back-up file was created by a run which did not use the retrieval option the present example). If the retrieval option were used in the run which produced the back-up file, the latter would be on unit NUSCBU, and should be reassigned to unit NUBU.
3. Run INREAS with the data retrieval option. No messages will appear on the screen until the end of the back-up file is reached, and then the program will switch back to interactive mode and you can continue to give the appropriate responses. A print out of the screen work for this run is given in pages 3-6-4 to 3-6-13. The resulting output data file is given on pages 3-6-14 to 3-6-15. A new back-up file is also created by this run, which contains complete back-up information corresponding to the updated run.

4. If INTFN = 1 (see Section 2.1), move to step 5. If INTFN = 0, you must ensure that the data base file from the previous run is attached to unit NUDB (i.e. the input data base file as discussed in Section 2.3 and 2.4). This will be automatically the case if the data base file was created by a run which did not use the re-start option (the present example). If the re-start option was used in the run which produced the data base file, the latter would be on unit NUSCDB, and should be reassigned to unit NUDB.
5. Run BOREAS in the re-start mode using the data base file created from the previous BOREAS run (see Section 3.5) and the data file created in Step 3 above as input (page 3-6-16). This run will produce a new output file (pages 3-6-17 to 3-6-18). If the dump option is active, the dump file will contain results for only the added scenario (summer multi-year floes). It is therefore important to save the dump file created by the original BOREAS run (see Section 3.4). The new dump file is given in pages 3-6-19 and 3-6-20. The run also produces a new data base file which contains the results for all winter scenarios considered in the original run, as well as the newly added summer multi-year floe scenario.
6. Run OUREAS using the new data base file to process the required output.

NOTE: For INTFN = 0, the back-up file created in Step 3 and the data base file created in Step 5 above will be on units NUSCBU and NUSCDB respectively (see also Table 2.3.1 and Figure 2.4.1). If INTFN = 1, the user need not be concerned with unit numbers since all files are defined by names entered interactively by the user.

The use of the data retrieval from back-up file for OUREAS was not needed for the above example. However, the steps for implementing this option in OUREAS are identical to those for INREAS. The only restriction is that the data base file must be the same for both the original run and the retrieval run.

The data retrieval and re-start option can also be used for retrieving data for any run of either of the three programs that is abnormally aborted provided that the system allows for the associated files to be created and properly closed. The procedure for any such retrieval operation is identical to the procedure followed in the above example.

***** P R O G R A M I N R E A S *****
INTERACTIVE PRE-PROCESSOR FOR PROGRAM BOREAS
DEVELOPED BY DET NORSKE VERITAS
VERSION V2-5-1986

***** FILE NAMES AND INPUT STATUS *****

DO YOU WISH TO RETRIEVE DATA FROM BACK-UP FILE
1 = YES 0 = NO

1

ENTER NAME OF OUTPUT FILE (MAX. 7 CHARACTERS)
intest

ENTER NAME OF OLD BACK-UP FILE (MAX. 7 CHARACTERS)
butest

DO YOU WISH TO CONSIDER THE SUMMER SEASON
1 = YES 0 = NO

1

SEASONS CONSIDERED ARE AS FOLLOWS:

SEASONS	STATUS
SUMMER	YES
WINTER	YES
BREAK-UP	NO

DO YOU WISH TO CHANGE

1 = YES 0 = NO
0

SEASON BOUNDARY VALUES USED ARE AS FOLLOWS:

INDEX	PARAMETER	MEAN (DAY-MONTH)	STD. DEV. (DAYS)	DISTRIBUTION
1.	BEGINNING OF BREAK-UP	22- 6	18.10	NORMAL
2.	END OF BREAK-UP	6- 7	22.90	NORMAL
3.	FREEZE-UP	5-11	22.80	NORMAL

ENTER INDEX OF LINE YOU WISH TO CHANGE (0=NONE)

0

***** WINTER INPUT PARAMETERS *****

DO YOU WISH TO CONSIDER FIRST YEAR RIDGES
1 = YES 0 = NO

1

DO YOU WISH TO CONSIDER LEVEL ICE
1 = YES 0 = NO

1

DO YOU WISH TO CONSIDER MULTIYEAR FLOES
1 = YES 0 = NO

1

GROWTH RATE OF FY ICE = 0.008500 M/DAY
DO YOU WISH TO CHANGE

1 = YES 0 = NO

0

WINTER FY RIDGE PARAMETERS USED ARE AS FOLLOWS :

INDEX	PARAMETER	UNITS	MEAN	STD. DEV.	DISTRIBUTION
1.	RIDGE COVERAGE	PERCENT	30.0000	0.0000	DETERMINISTIC
2.	RIDGE HEIGHT	M	0.9000	0.9000	EXPONENTIAL
3.	RIDGE LENGTH	M	150.0000	0.0000	DETERMINISTIC
4.	ICE SPEED	M/S	0.0620	0.0730	GAMMA
5.	FRICTION ANGLE	DEG.	25.0000	0.0000	DETERMINISTIC
6.	COHESION	MPA	0.0350	0.0000	DETERMINISTIC

ENTER INDEX OF PARAMETER YOU WISH TO CHANGE (0=NONE)
LOWER BOUND CAN ALSO BE SET FOR SELECTED PARAMETER

0

WINTER LEVEL ICE PARAMETERS USED ARE AS FOLLOWS :

INDEX	PARAMETER	UNITS	VALUE
1.	AVERAGE ICE PRESSURE	MPA	0.30E+00
2.	MEAN OF EXTREMAL PRESSURE COMPONENT	MPA	0.20E+00
3.	S.D. OF EXTREMAL PRESSURE COMPONENT	MPA	0.15E+00
4.	CREEP EXPONENT		0.30E+01
5.	CREEP MULTIPLIER		0.10E-04
6.	CREEP-CRUSHING TRANSITION STRAIN RATE	S**-1	0.10E-04

ENTER INDEX OF PARAMETER YOU WISH TO CHANGE (0=NONE)
LOWER BOUND CAN ALSO BE SET FOR SELECTED PARAMETER

0

PROBABILITY DISTRIBUTION OF ICE VELOCITY

VALUES CURRENTLY USED ARE AS FOLLOWS :

INDEX	PARAMETER	CURRENTLY USED
1.	DISTRIBUTION TYPE	GAMMA
2.	MEAN	0.0620
3.	STANDARD DEVIATION	0.0730
4.	LOWER BOUND	0.00E+00

ENTER INDEX OF LINE YOU WISH TO CHANGE (0=NONE)
0INTRVAL OVER WHICH VELOCITY MEASUREMENTS ARE AVERAGED = 24.00 HOUR
DO YOU WISH TO CHANGE1 = YES 0 = NO
0

WINTER MY FLOE PARAMETERS USED ARE AS FOLLOWS :

INDEX	PARAMETER	UNITS	MEAN	STD. DEV.	DISTRIBUTION
1.	MY CONCENTRATION	TENTHS	0.2000	0.4000	BETA
2.	ICE VELOCITY	M/S	0.0620	0.0730	GAMMA
3.	FLOE DIAMETER	KM	0.1000	0.1500	GAMMA
4.	FLOE THICKNESS	M	3.9000	1.6000	GAMMA
5.	ICE PRESSURE	MPA	0.5000	0.5000	EXPONENTIAL
6.	MY RIDGE COVERAGE	PERCENT	30.0000	0.0000	DETERMINISTIC
7.	MY RIDGE HEIGHT	M	0.9000	0.9000	EXPONENTIAL
8.	MY RIDGE LENGTH	M	150.0000	0.0000	DETERMINISTIC
9.	FY ICE PRESSURE	MPA	0.0500	0.0500	NORMAL

ENTER INDEX OF PARAMETER YOU WISH TO CHANGE (<0=NONE>
 LOWER BOUND CAN ALSO BE SET FOR SELECTED PARAMETER

0

***** SUMMER INPUT PARAMETERS *****

DO YOU WISH TO CONSIDER MULTIYEAR FLOES

1 = YES 0 = NO

1

DO YOU WISH TO CONSIDER ICE ISLAND FRAGMENTS

1 = YES 0 = NO

0

DO YOU WISH TO CONSIDER ICE ISLANDS

1 = YES 0 = NO

0

ENTER DEFAULT OPTION FOR MULTIYEAR FLOES :

1 = PROGRAM DEFAULT

2 = USER VALUES AS DEFINED FOR PREVIOUS SEASONS

1

SUMMER FLOE PARAMETERS USED ARE AS FOLLOWS :

INDEX	PARAMETER	UNITS	MEAN	STD. DEV.	DISTRIBUTION
1.	MY CONCENTRATION	TENTHS	0.3000	1.0000	BETA
2.	FLOE VELOCITY	M/S	0.1700	0.1300	GAMMA
3.	FLOE DIAMETER	KM	0.1000	0.1500	GAMMA
4.	FLOE THICKNESS	M	3.9000	1.6000	GAMMA
5.	ICE PRESSURE	MPA	0.5000	0.5000	EXPONENTIAL
6.	MY RIDGE COVERAGE	PERCENT	30.0000	0.0000	DETERMINISTIC
7.	MY RIDGE HEIGHT	M	0.9000	0.9000	EXPONENTIAL
8.	MY RIDGE LENGTH	M	150.0000	0.0000	DETERMINISTIC

ENTER INDEX OF PARAMETER YOU WISH TO CHANGE (0=NONE)
 LOWER BOUND CAN ALSO BE SET FOR SELECTED PARAMETER

0

CORRELATION COEF. FOR ICE CONCENTRATION AND ICE VELOCITY = -.250
 DO YOU WISH TO CHANGE

1 = YES 0 = NO

0

STOP

```

***RUN TITLE
TEST CASE
***GEOGRAPHIC LOCATION, WATER DEPTH, DISTANCE OFFSHORE
CANADA          SHEAR          20.000          40.000
***STRUCTURAL GEOMETRY
VERTICAL
CIRCULAR
*DIAMETER
  100.000
***SEASONS AND SEASON BOUNDARIES
*SEASON INDEX
  6
*BEGINNING OF BREAK-UP DATE
  173.000          18.100          NORMAL
*END OF BREAK-UP DATE
  187.000          22.900          NORMAL
*FREEZE-UP DATE
  309.000          22.800          NORMAL
***WINTER ICE PARAMETERS
*INDEX FOR WINTER LOADING CASES
  7
*RATE OF FY ICE GROWTH
  0.008500
**FY RIDGE PARAMETERS
*COVERAGE (PERCENT)
  0.30000E+02    0.00000E+00    0.00000E+00    DETERMINISTIC
*HEIGHT (M)
  0.90000E+00    0.90000E+00    0.76000E+00    EXPONENTIAL
*LENGTH (M)
  0.15000E+03    0.00000E+00    0.00000E+00    DETERMINISTIC
*VELOCITY (M/S)
  0.62000E-01    0.73000E-01    0.00000E+00    GAMMA
*FRICTION ANGLE (RAD.)
  0.43633E+00    0.00000E+00    0.00000E+00    DETERMINISTIC
*COHESION (MPA)
  0.35000E-01    0.00000E+00    0.00000E+00    DETERMINISTIC
**LEVEL ICE PARAMETERS
*ICE PRESSURE :AVERAGE ,AND MEAN AND S.D. OF EXTREMAL COMPONENT
  0.300E+00    0.200E+00    0.150E+00
*CREEP EXPONENT, CREEP MULTIPLIER, CREEP-CRYCHING TRANSITION
  0.300E+01    0.100E-04    0.100E-04
*VELOCITY (M/S)
  0.62000E-01    0.73000E-01    0.00000E+00    GAMMA
*VELOCITY MEASUREMENT INTERVAL (HOUR)
  0.240E+02
**MY FLOE PARAMETERS
*CONCENTRATION (TENTHS)
  0.20000E+00    0.40000E+00    0.00000E+00    BETA
*VELOCITY (M/S)
  0.62000E-01    0.73000E-01    0.00000E+00    GAMMA
*DIAMETER (KM)
  0.10000E+00    0.15000E+00    0.50000E+00    GAMMA
*THICKNESS (M)
  0.39000E+01    0.16000E+01    0.00000E+00    GAMMA
*MY ICE PRESSURE (MPA)
  0.50000E+00    0.50000E+00    0.00000E+00    EXPONENTIAL
*RIDGE COVERAGE (PERCENT)
  0.30000E+02    0.00000E+00    0.00000E+00    DETERMINISTIC
*RIDGE HEIGHT (M)
  0.90000E+00    0.90000E+00    0.00000E+00    EXPONENTIAL
*RIDGE LENGTH (M)

```


0.15000E+03	0.00000E+00	0.00000E+00	DETERMINISTIC
*FY ICE PRESSURE (MPA)			
0.50000E-01	0.50000E-01	0.00000E+00	NORMAL
***SUMMER ICE PARAMETERS			
*INDEX FOR SUMMER LOADING CASES			
1			
**MY FLOE PARAMETERS			
*CONCENTRATION (TENTHS)			
0.30000E+00	0.10000E+01	0.00000E+00	BETA
*VELOCITY (M/S)			
0.17000E+00	0.13000E+00	0.00000E+00	GAMMA
*DIAMETER (KM)			
0.10000E+00	0.15000E+00	0.50000E+00	GAMMA
*THICKNESS (M)			
0.39000E+01	0.16000E+01	0.00000E+00	GAMMA
*PRESSURE (MPA)			
0.50000E+00	0.50000E+00	0.00000E+00	EXPONENTIAL
*RIDGE COVERAGE (PERCENT)			
0.30000E+02	0.00000E+00	0.00000E+00	DETERMINISTIC
*RIDGE HEIGHT (M)			
0.90000E+00	0.90000E+00	0.00000E+00	EXPONENTIAL
*RIDGE LENGTH (M)			
0.15000E+03	0.00000E+00	0.00000E+00	DETERMINISTIC
*CONCENTRATION-VELOCITY CORRELATION COEFF.			
-0.25000			

***** P R O G R A M B O R E A S *****

PROBABILISTIC ASSESSMENT OF YEAR-ROUND ICE LOADS ON
FIXED OFFSHORE STRUCTURES
DEVELOPED BY DET NORSKE VERITAS
VERSION V2-5-1986

NAME OF DATA BASE FILE (MAX. 7 CHARACTERS)
dbtest

ENTER RE-START OPTION (0 = OFF 1 = ON)
1

NAME OF INPUT FILE (MAX. 7 CHARACTERS)
inrst

NAME OF OUTPUT FILE (MAX. 7 CHARACTERS)
ourst

DO YOU WISH TO DUMP INPUT PARAMETERS FOR LOADS ABOVE
A USER-DEFINED CUTOFF VALUE

AVAILABLE ONLY FOR THE FOLLOWING ICE FEATURES :
ICE ISLANDS , ICE ISLAND FRAGMENTS,
MY FLOES , FY RIDGES

1 = YES 0 = NO

1
NAME OF DUMP FILE (MAX. 7 CHARACTERS)
dumrst

ENTER LOAD CUT-OFF VALUE (MN)
0.

ENTER YOUR FAVOURITE RANDOM NUMBER (DOUBLE PRECISION)
(WILL BE USED AS SEED FOR RANDOM NUMBER GENERATION)
50.d0

RUN TITLE : TEST CASE
 =====

I/O FILE NAMES :
 =====

DATA BASE FILE : dbtest
 INPUT FILE : inrst
 DUMP FILE : dumrst

STATISTICAL PARAMETERS :
 =====

TOLERANCE FOR MEAN FORCE = 0.25E-01
 BIN WIDTH FOR FORCE PDF = 10.00 MN

WINTER SEASON :
 =====

AVERAGE SEASON LENGTH = 229. DAYS

FIRST YEAR RIDGES :

AVERAGE INTERACTION RATE = 0.13E+05 PER SEASON
 NUMBER OF SIMULATIONS = 28

FORCE DISTRIBUTION PARAMETERS :

FORCE	MEAN (MN)	S.D. (MN)
FOR ONE COLLISION	21.18	25.35
EXTREMAL	114.99	1.15

FIRST YEAR LEVEL ICE :

MONTHLY EXTREMAL FORCE DISTRIBUTION PARAMETERS (MN) :

MONTH NO.	ICE THK.	NO. OF SIMS.	MEAN(MN)	S.D.(MN)
1	0.59	41	40.52	16.32
2	0.84	39	61.26	24.32
3	1.10	51	72.57	28.70
4	1.35	36	90.23	39.59
5	1.61	34	115.99	44.92
6	1.86	43	122.94	48.06
7	2.12	34	145.50	55.13

SEASON EXTREME FORCE (MN) :
 MEAN = 176.92 MN
 STD. DEV. = 38.58 MN

MULTIYEAR FLOE COLLISIONS :

AVERAGE COLLISION RATE = 0.18E+02 PER SEASON 3-6-18
 PROBABILITY OF RIDGE ENCOUNTER = 0.22E-01 PER 1 M OF PENETRATION
 NUMBER OF SIMULATIONS = 50

FORCE DISTRIBUTION PARAMETERS :

FORCE	MEAN (MN)	S.D. (MN)
FOR ONE COLLISION	51.65	45.47
EXTREMAL	152.79	38.63

SUMMER SEASON :
 =====

AVERAGE SEASON LENGTH = 122. DAYS

MULTIYEAR FLOE COLLISIONS :

AVERAGE COLLISION RATE = 0.17E+02 PER SEASON
 PROBABILITY OF RIDGE ENCOUNTER = 0.22E-01 PER 1 M OF PENETRATION
 NUMBER OF SIMULATIONS = 44

FORCE DISTRIBUTION PARAMETERS :

FORCE	MEAN (MN)	S.D. (MN)
FOR ONE COLLISION	41.75	41.14
EXTREMAL	141.50	60.76

SUMMER
MULTIYEAR FLOES

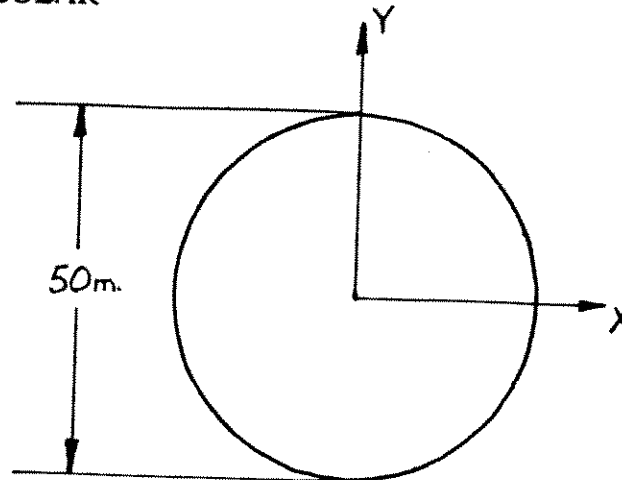
FY THK \c FORCE M \c MN	YM THK M	FLO DIAM KM	VELOCITY M/S	ECCEN. M	APR AGLE RAD.	FY PRESS MPA	MY PRESS MPA
.000E+00	.179E+01	.916E+00	.141E+00	.424E+03	.000E+00	.000E+00	.113E+00
\c .568E+01							
.000E+00	.395E+01	.931E+00	.677E-01	.390E+03	.000E+00	.000E+00	.117E+01
\c .391E+02							
.000E+00	.569E+01	.544E+00	.186E+00	.295E+03	.000E+00	.000E+00	.356E+00
\c .301E+02							
.000E+00	.171E+01	.187E+01	.255E+00	.105E+03	.000E+00	.000E+00	.614E-01
\c .235E+02							
.000E+00	.236E+01	.586E+00	.437E+00	.549E+01	.000E+00	.000E+00	.940E+00
\c .588E+02							
.000E+00	.730E+01	.790E+00	.190E+00	.341E+03	.000E+00	.000E+00	.126E-01
\c .762E+01							
.000E+00	.471E+01	.699E+00	.635E-01	.413E+02	.000E+00	.000E+00	.578E+00
\c .267E+02							
.000E+00	.458E+01	.779E+00	.142E+00	.835E+02	.000E+00	.000E+00	.758E+00
\c .569E+02							
.000E+00	.487E+01	.734E+00	.162E+00	.358E+03	.000E+00	.000E+00	.570E+00
\c .422E+02							
.000E+00	.505E+01	.634E+00	.145E+00	.296E+03	.000E+00	.000E+00	.667E-01
\c .904E+01							
.000E+00	.303E+01	.718E+00	.215E+00	.600E+02	.000E+00	.000E+00	.237E+00
\c .216E+02							
.000E+00	.266E+01	.523E+00	.198E+00	.558E+02	.000E+00	.000E+00	.666E+00
\c .285E+02							
.000E+00	.200E+01	.607E+00	.501E+00	.118E+03	.000E+00	.000E+00	.170E+01
\c .812E+02							
.000E+00	.458E+01	.623E+00	.246E+00	.145E+03	.000E+00	.000E+00	.616E-02
\c .247E+01							
.000E+00	.876E+00	.673E+00	.167E+00	.331E+03	.000E+00	.000E+00	.186E+00
\c .344E+01							
.000E+00	.464E+01	.667E+00	.313E+00	.210E+03	.000E+00	.000E+00	.598E+00
\c .695E+02							
.000E+00	.543E+01	.626E+00	.764E+00	.657E+02	.000E+00	.000E+00	.919E-01
\c .402E+02							
.000E+00	.313E+01	.541E+00	.909E-01	.246E+03	.000E+00	.000E+00	.178E+00
\c .725E+01							
.000E+00	.354E+01	.710E+00	.396E+00	.241E+03	.000E+00	.000E+00	.942E-01
\c .181E+02							
.000E+00	.305E+01	.793E+00	.951E-01	.141E+03	.000E+00	.000E+00	.465E+00
\c .209E+02							
.000E+00	.937E+01	.666E+00	.129E+00	.336E+02	.000E+00	.000E+00	.430E+00
\c .674E+02							
.000E+00	.776E+01	.732E+00	.437E+00	.219E+03	.000E+00	.000E+00	.713E-01
\c .384E+02							
.000E+00	.275E+01	.739E+00	.152E+00	.742E+02	.000E+00	.000E+00	.408E+00
\c .228E+02							
.000E+00	.240E+01	.617E+00	.239E+00	.153E+03	.000E+00	.000E+00	.766E+00
\c .347E+02							
.000E+00	.191E+01	.684E+00	.153E+00	.250E+03	.000E+00	.000E+00	.893E-01
\c .743E+01							

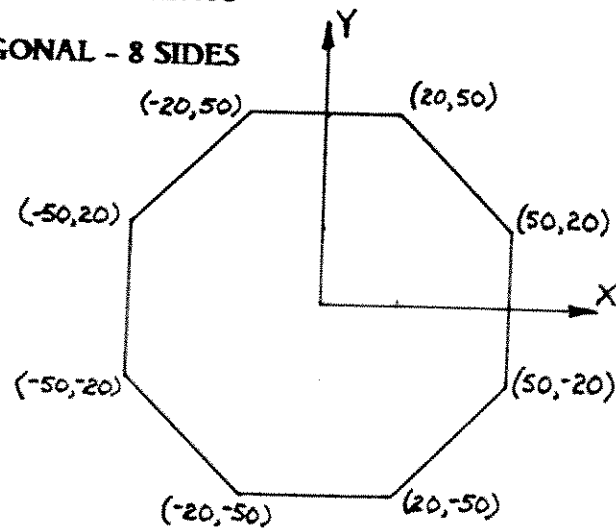
.000E+00	.314E+01	.507E+00	.270E-01	.114E+03	.000E+00	.000E+00	.975E-01
\c	.236E+01						
.000E+00	.372E+01	.731E+00	.517E+00	.977E+02	.000E+00	.000E+00	.566E+00
\c	.937E+02						
.000E+00	.410E+01	.635E+00	.865E-01	.324E+03	.000E+00	.000E+00	.647E+00
\c	.225E+02						
.000E+00	.364E+01	.751E+00	.448E+00	.248E+03	.000E+00	.000E+00	.561E-01
\c	.145E+02						
.000E+00	.321E+01	.623E+00	.139E+00	.427E+02	.000E+00	.000E+00	.563E+00
\c	.277E+02						
.000E+00	.460E+01	.130E+01	.562E+00	.379E+03	.000E+00	.000E+00	.462E+00
\c	.132E+03						
.000E+00	.413E+01	.835E+00	.921E-01	.325E+03	.000E+00	.000E+00	.187E-01
\c	.299E+01						
.000E+00	.234E+01	.633E+00	.281E+00	.212E+03	.000E+00	.000E+00	.123E+00
\c	.108E+02						
.000E+00	.430E+01	.549E+00	.101E+00	.303E+03	.000E+00	.000E+00	.356E+00
\c	.151E+02						
.000E+00	.264E+01	.822E+00	.307E+00	.388E+03	.000E+00	.000E+00	.216E+00
\c	.199E+02						
.000E+00	.486E+01	.786E+00	.513E+00	.397E+03	.000E+00	.000E+00	.342E+00
\c	.647E+02						
.000E+00	.392E+01	.648E+00	.297E+00	.460E+02	.000E+00	.000E+00	.129E+01
\c	.999E+02						
.000E+00	.575E+01	.812E+00	.690E+00	.277E+03	.000E+00	.000E+00	.991E+00
\c	.228E+03						
.000E+00	.578E+01	.804E+00	.350E+00	.250E+03	.000E+00	.000E+00	.471E+00
\c	.904E+02						
.000E+00	.287E+01	.561E+00	.216E+00	.892E+02	.000E+00	.000E+00	.108E+01
\c	.470E+02						
.000E+00	.559E+01	.108E+01	.358E+00	.395E+03	.000E+00	.000E+00	.975E-01
\c	.352E+02						
.000E+00	.473E+01	.102E+01	.124E+00	.506E+03	.000E+00	.000E+00	.548E+00
\c	.407E+02						
.000E+00	.638E+01	.865E+00	.156E+00	.144E+03	.000E+00	.000E+00	.446E+00
\c	.628E+02						
.000E+00	.421E+01	.807E+00	.156E+00	.386E+03	.000E+00	.000E+00	.121E+01
\c	.628E+02						

Chapter 4

TEST CASES

The following test cases use most parts of the program and are given here for verification purposes. It is recommended that the user run these cases and check the results before the program is used for other purposes. Pages 4-2 to 4-6 give a summary of the 10 test cases. Starting at page 4-7 and to the end of the chapter, the input data file, the screen input for BOREAS, the output file of the BOREAS run and the output dump file (if applicable) are given for each test case. In each case, the input data file for BOREAS should be created by the user by running INREAS and giving the appropriate responses guided by the appropriate summary information (pages 4-2 to 4-6) and the information in the input file itself as printed in the following pages. This information is needed for defining the geographic parameters, structural geometry and the definition of the season and scenario considered. For the ice parameters (including season boundary dates), the default values are used in all ten cases. The user can transfer these values to the input data file by maintaining the same default values displayed in the INREAS run. Once the input data file is created and checked, BOREAS can be run using the same screen input given in each case, and the resulting output file (and dump file, if applicable) should be checked.

TEST CASES**TEST NO. 1****SEASON: SUMMER****FEATURE: ICE ISLANDS****STRUCTURE: CIRCULAR**

TEST NO. 2**SEASON: SUMMER****FEATURE: ICE ISLAND FRAGMENTS****STRUCTURE: POLYGONAL - 8 SIDES**

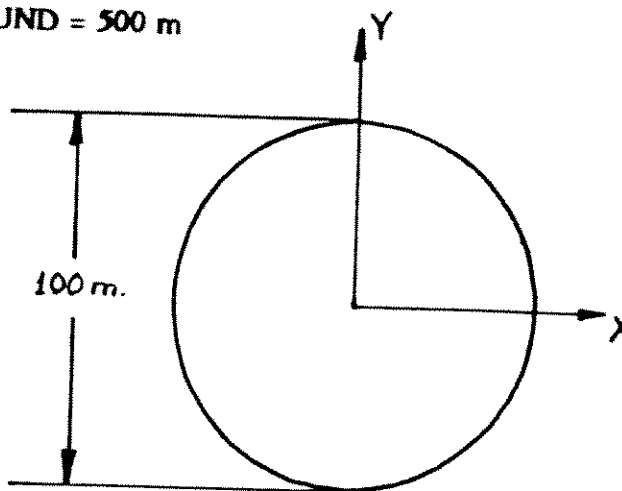
TEST NO.3

SEASON: WINTER

FEATURE: MULTI-YEAR FLOE

STRUCTURE: CIRCULAR

COMMENTS: MY FLOE DIAMETER
LOWER BOUND = 500 m



TEST NO.4

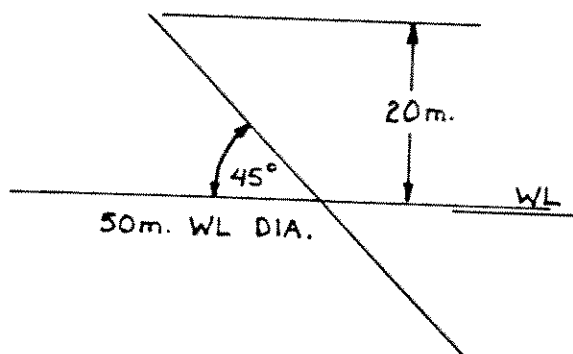
SEASON: WINTER

FEATURE: MULTI-YEAR FLOE

STRUCTURE: UPWARD-BREAKING CONE

COMMENTS: MY FLOE DIAMETER
LOWER BOUND = 500 m

MY FLOE SPEED
LOWER BOUND = 0.4 m/s



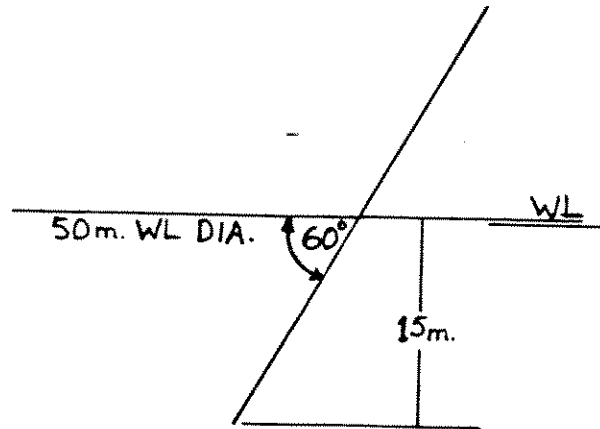
TEST NO.5

SEASON: WINTER

FEATURE: MULTI-YEAR FLOE

STRUCTURE: DOWNWARD-BREAKING CONE

COMMENTS: MY FLOE DIAMETER
LOWER BOUND = 500 m

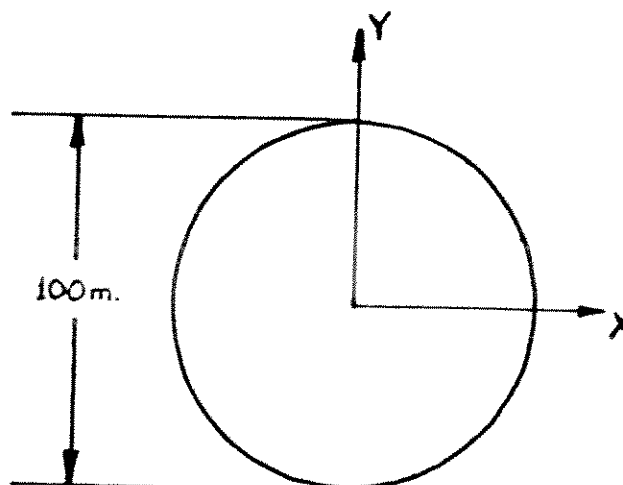


TEST NO.6

SEASON: WINTER

FEATURE: FIRST YEAR RIDGES

STRUCTURE: CIRCULAR

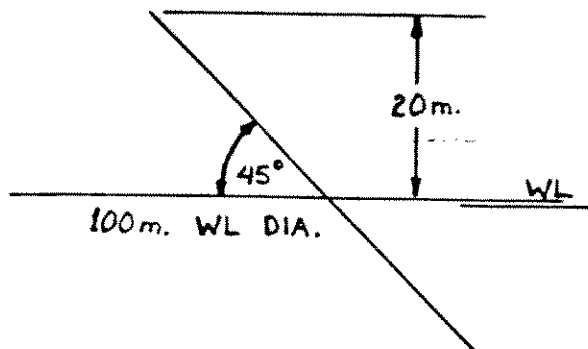


TEST NO.7

SEASON: BREAK-UP

FEATURE: FIRST YEAR RIDGES

STRUCTURE: UPWARD-BREAKING CONE



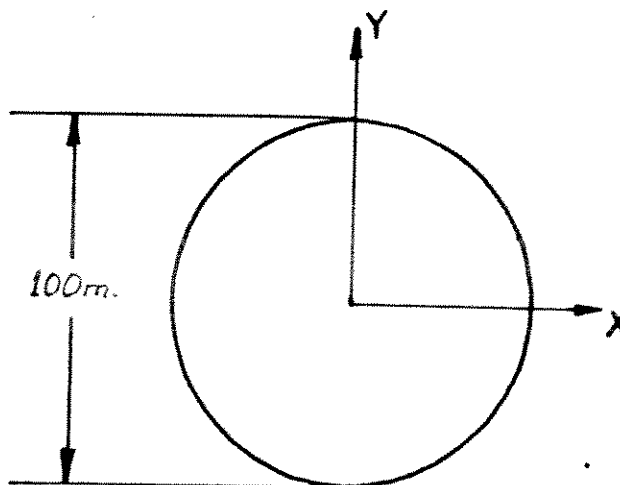
TEST NO.8

SEASON: WINTER

FEATURE: LEVEL ICE

STRUCTURE: CIRCULAR

COMMENTS: LANDFAST ICE ZONE - BREAK-OFF NOT CONSIDERED



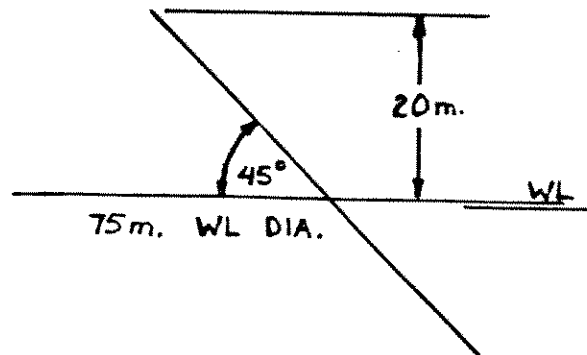
TEST NO.9

SEASON: WINTER

FEATURE: LEVEL ICE

STRUCTURE: UPWARD-BREAKING CONE

COMMENTS: ACTIVE ICE ZONE

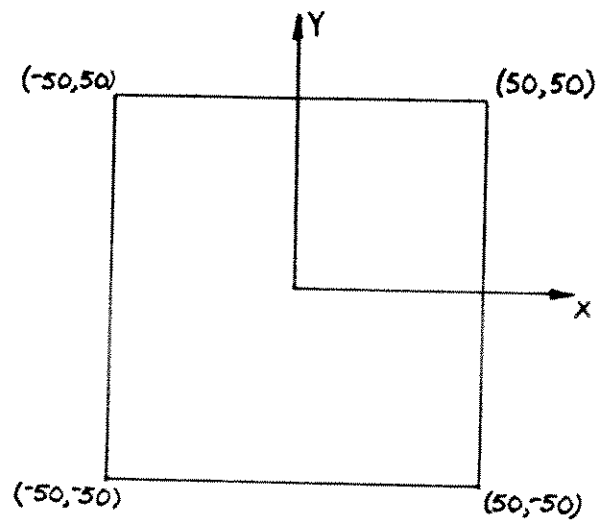


TEST NO.10

SEASON: BREAK-UP

FEATURE: LEVEL ICE

STRUCTURE: POLYGONAL - 4 SIDES



```

***RUN TITLE
TEST CASE 1
***GEOGRAPHIC LOCATION, WATER DEPTH, DISTANCE OFFSHORE
CANADA SHEAR 60.000 50.000
***STRUCTURAL GEOMETRY
VERTICAL
CIRCULAR
*DIAMETER
50.000
***SEASONS AND SEASON BOUNDARIES
*SEASON INDEX
4
*END OF BREAK-UP DATE
187.000 22.900 NORMAL
*FREEZE-UP DATE
309.000 22.800 NORMAL
***SUMMER ICE PARAMETERS
*INDEX FOR SUMMER LOADING CASES
4
**ICE ISLAND PARAMETERS
*CONCENTRATION (THETHS)
0.70000E-07 0.00000E+00 0.00000E+00 DETERMINISTIC
*VELOCITY (M/S)
0.17000E+00 0.13000E+00 0.00000E+00 GAMMA
*DIAMETER (KM)
0.12500E+02 0.70700E+01 0.50000E+01 NUMERICAL
6
0.50000E+01 0.00000E+00
0.10000E+02 0.60000E+00
0.15000E+02 0.70000E+00
0.20000E+02 0.80000E+00
0.25000E+02 0.90000E+00
0.30000E+02 0.10000E+01
*THICKNESS (M)
0.39750E+02 0.14500E+02 0.15000E+02 NUMERICAL
6
0.15000E+02 0.00000E+00
0.30000E+02 0.20000E+00
0.45000E+02 0.80000E+00
0.60000E+02 0.90000E+00
0.75000E+02 0.95000E+00
0.90000E+02 0.10000E+01
*PRESSURE (MPA)
0.50000E+00 0.50000E+00 0.00000E+00 EXPONENTIAL

```

***** P R O G R A M B O R E A S *****
PROBABILISTIC ASSESSMENT OF YEAR-ROUND ICE LOADS ON
FIXED OFFSHORE STRUCTURES
DEVELOPED BY DET NORSKE VERITAS
VERSION V2-5-1986

NAME OF DATA BASE FILE (MAX. 7 CHARACTERS)
db1

ENTER RE-START OPTION (0 = OFF 1 = ON)
0

NAME OF INPUT FILE (MAX. 7 CHARACTERS)
in1

NAME OF OUTPUT FILE (MAX. 7 CHARACTERS)
out1

DO YOU WISH TO DUMP INPUT PARAMETERS FOR LOADS ABOVE
A USER-DEFINED CUTOFF VALUE

AVAILABLE ONLY FOR THE FOLLOWING ICE FEATURES :
ICE ISLANDS , ICE ISLAND FRAGMENTS,
MY FLOES , FY RIDGES

1 = YES 0 = NO
1

NAME OF DUMP FILE (MAX. 7 CHARACTERS)
dum1

ENTER LOAD CUT-OFF VALUE (MN)
0.

ENTER ERROR TOLERANCE FOR MEAN VALUE OF FORCE
.1

ENTER BIN WIDTH FOR LOAD PROBABILITY DISTRIBUTION
MAXIMUM NUMBER OF BINS IS 200
20.

ENTER YOUR FAVOURITE RANDOM NUMBER (DOUBLE PRECISION)
(WILL BE USED AS SEED FOR RANDOM NUMBER GENERATION)
1.d0

RUN TITLE : TEST CASE 1
 =====

I/O FILE NAMES :
 =====

DATA BASE FILE : db1
 INPUT FILE : in1
 DUMP FILE : dum1

STATISTICAL PARAMETERS :
 =====

TOLERANCE FOR MEAN FORCE = 0.10E+00
 BIN WIDTH FOR FORCE PDF = 20.00 MN

SUMMER SEASON :
 =====

AVERAGE SEASON LENGTH = 122. DAYS

ICE ISLAND COLLISIONS :

AVERAGE COLLISION RATE = 0.14E-02 PER SEASON
 NUMBER OF SIMULATIONS = 11

FORCE DISTRIBUTION PARAMETERS :

FORCE	MEAN (MN)	S.D. (MN)
FOR ONE COLLISION	1351.42	1197.21
EXTREMAL	1.86	67.06

SUMMER
ICE ISLANDS

ICE THK M	ILD DIAM KM	VELOCITY M/S	ECCEN. M	APR AGLE RAD.	MY PRESS MPA	FORCE MN
.289E+02	.288E+02	.166E+00	.907E+04	.000E+00	.352E+00	.508E+03
.430E+02	.121E+02	.298E+00	.469E+04	.000E+00	.148E+01	.319E+04
.340E+02	.124E+02	.665E+00	.420E+04	.000E+00	.749E+00	.127E+04
.332E+02	.137E+02	.192E+00	.109E+04	.000E+00	.130E+01	.216E+04
.461E+02	.699E+01	.174E+00	.120E+04	.000E+00	.328E-01	.755E+02
.405E+02	.612E+01	.421E+00	.944E+02	.000E+00	.191E+01	.388E+04
.447E+02	.282E+02	.257E+00	.735E+04	.000E+00	.751E+00	.168E+04
.384E+02	.178E+02	.224E+00	.443E+04	.000E+00	.459E+00	.881E+03
.244E+02	.256E+02	.102E+00	.927E+04	.000E+00	.316E+00	.386E+03
.360E+02	.854E+01	.265E+00	.170E+04	.000E+00	.267E+00	.479E+03
.272E+02	.688E+01	.356E+00	.296E+04	.000E+00	.265E+00	.361E+03


```

***RUN TITLE
TEST CASE 2
***GEOGRAPHIC LOCATION, WATER DEPTH, DISTANCE OFFSHORE
U.S.          PACK          60.000          25.000
***STRUCTURAL GEOMETRY
VERTICAL
POLYGONAL
*NUMBER OF SIDES AND CORNER COORDINATES
      8
      20.000          50.000
      50.000          20.000
      50.000          -20.000
      20.000          -50.000
      -20.000          -50.000
      -50.000          -20.000
      -50.000          20.000
      -20.000          50.000
***SEASONS AND SEASON BOUNDARIES
*SEASON INDEX
      4
*END OF BREAK-UP DATE
      219.000          24.300          NORMAL
*FREEZE-UP DATE
      310.000          21.800          NORMAL
***SUMMER ICE PARAMETERS
*INDEX FOR SUMMER LOADING CASES
      2
**ICE ISLAND FRAGMENT PARAMETERS
*CONCENTRATION (THETHS)
      0.70000E-05      0.00000E+00      0.00000E+00      DETERMINISTIC
*VELOCITY (M/S)
      0.17000E+00      0.13000E+00      0.00000E+00      GAMMA
*DIAMETER (KM)
      0.70000E-01      0.43000E-01      0.00000E+00      NUMERICAL
      6
      0.00000E+00      0.00000E+00
      0.15000E-01      0.25000E-02
      0.30000E-01      0.15000E+00
      0.75000E-01      0.68000E+00
      0.15000E+00      0.93000E+00
      0.22500E+00      0.96000E+00
*THICKNESS (M)
      0.39750E+02      0.14500E+02      0.15000E+02      NUMERICAL
      6
      0.15000E+02      0.00000E+00
      0.30000E+02      0.20000E+00
      0.45000E+02      0.80000E+00
      0.60000E+02      0.90000E+00
      0.75000E+02      0.95000E+00
      0.90000E+02      0.10000E+01
*PRESSURE (MPA)
      0.50000E+00      0.50000E+00      0.00000E+00      EXPONENTIAL

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***** P R O G R A M B O R E A S *****

PROBABILISTIC ASSESSMENT OF YEAR-ROUND ICE LOADS ON
FIXED OFFSHORE STRUCTURES
DEVELOPED BY DET NORSKE VERITAS
VERSION V2-5-1986

NAME OF DATA BASE FILE (MAX. 7 CHARACTERS)
db2

ENTER RE-START OPTION (0 = OFF 1 = ON)
0

NAME OF INPUT FILE (MAX. 7 CHARACTERS)
in2

NAME OF OUTPUT FILE (MAX. 7 CHARACTERS)
out2

DO YOU WISH TO DUMP INPUT PARAMETERS FOR LOADS ABOVE
A USER-DEFINED CUTOFF VALUE

AVAILABLE ONLY FOR THE FOLLOWING ICE FEATURES :
ICE ISLANDS , ICE ISLAND FRAGMENTS,
MY FLOES , FY RIDGES

1 = YES 0 = NO

1
NAME OF DUMP FILE (MAX. 7 CHARACTERS)
dum2

ENTER LOAD CUT-OFF VALUE (MN)
0.

ENTER ERROR TOLERANCE FOR MEAN VALUE OF FORCE
.1

ENTER BIN WIDTH FOR LOAD PROBABILITY DISTRIBUTION
MAXIMUM NUMBER OF BINS IS 200
20.

ENTER YOUR FAVOURITE RANDOM NUMBER (DOUBLE PRECISION)
(WILL BE USED AS SEED FOR RANDOM NUMBER GENERATION)
1.d0

RUN TITLE : TEST CASE 2
 =====

I/O FILE NAMES :
 =====

DATA BASE FILE : db2
 INPUT FILE : in2
 DUMP FILE : dum2

STATISTICAL PARAMETERS :
 =====

TOLERANCE FOR MEAN FORCE = 0.10E+00
 BIN WIDTH FOR FORCE PDF = 20.00 MN

SUMMER SEASON :
 =====

AVERAGE SEASON LENGTH = 91. DAYS

ICE ISLAND FRAGMENT COLLISIONS :

AVERAGE COLLISION RATE = 0.14E-02 PER SEASON
 NUMBER OF SIMULATIONS = 10

FORCE DISTRIBUTION PARAMETERS :

FORCE	MEAN (MN)	S.D. (MN)
FOR ONE COLLISION	60.51	39.56
EXTREMAL	0.08	2.61

SUMMER
ICE ISLANDS

ICE THK M	ILD DIAM KM	VELOCITY M/S	ECCEN. M	APR AGLE RAD.	MY PRESS MPA	FORCE MN
.289E+02	.166E+00	.166E+00	.923E+02	.658E+00	.352E+00	.961E+02
.253E+02	.177E+00	.573E+00	.989E+02	.502E+00	.257E+00	.781E+02
.312E+02	.898E-01	.432E+00	.135E+02	.139E+01	.776E+00	.784E+02
.236E+02	.146E+00	.264E+00	.906E+02	.159E+00	.770E+00	.145E+03
.226E+02	.306E-01	.223E+00	.402E+02	.953E+00	.141E+00	.402E+01
.388E+02	.736E-01	.337E+00	.250E+02	.825E+00	.157E+00	.383E+02
.336E+02	.823E-01	.173E+00	.189E+02	.940E+00	.303E+00	.567E+02
.497E+02	.106E+00	.307E+00	.434E+02	.732E+00	.156E+00	.433E+02
.160E+02	.357E-01	.190E+00	.536E+02	.146E+01	.256E+00	.101E+02
.505E+02	.564E-01	.180E+00	.505E+02	.586E+00	.297E+00	.550E+02

```

***RUN TITLE
TEST CASE 3
***GEOGRAPHIC LOCATION, WATER DEPTH, DISTANCE OFFSHORE
CANADA                SHEAR                40.000                25.000
***STRUCTURAL GEOMETRY
VERTICAL
CIRCULAR
*DIAMETER
    100.000
***SEASONS AND SEASON BOUNDARIES
*SEASON INDEX
    2
*FREEZE-UP DATE
    309.000                22.800                NORMAL
*BEGINNING OF BREAK-UP DATE
    173.000                18.100                NORMAL
***WINTER ICE PARAMETERS
*INDEX FOR WINTER LOADING CASES
    4
*RATE OF FY ICE GROWTH
    0.008500
**MY FLOE PARAMETERS
*CONCENTRATION (TENTHS)
    0.20000E+00    0.40000E+00    0.00000E+00    BETA
*VELOCITY (M/S)
    0.62000E-01    0.73000E-01    0.00000E+00    GAMMA
*DIAMETER (KM)
    0.10000E+00    0.15000E+00    0.50000E+00    GAMMA
*THICKNESS (M)
    0.39000E+01    0.16000E+01    0.00000E+00    GAMMA
*MY ICE PRESSURE (MPA)
    0.50000E+00    0.50000E+00    0.00000E+00    EXPONENTIAL
*RIDGE COVERAGE (PERCENT)
    0.30000E+02    0.00000E+00    0.00000E+00    DETERMINISTIC
*RIDGE HEIGHT (M)
    0.90000E+00    0.90000E+00    0.00000E+00    EXPONENTIAL
*RIDGE LENGTH (M)
    0.15000E+03    0.00000E+00    0.00000E+00    DETERMINISTIC
*FY ICE PRESSURE (MPA)
    0.50000E-01    0.50000E-01    0.00000E+00    NORMAL

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***** P R O G R A M B O R E A S *****

PROBABILISTIC ASSESSMENT OF YEAR-ROUND ICE LOADS ON
FIXED OFFSHORE STRUCTURES
DEVELOPED BY DET NORSKE VERITAS
VERSION V2-5-1986

NAME OF DATA BASE FILE (MAX. 7 CHARACTERS)
db3

ENTER RE-START OPTION (0 = OFF 1 = ON)
0

NAME OF INPUT FILE (MAX. 7 CHARACTERS)
in3

NAME OF OUTPUT FILE (MAX. 7 CHARACTERS)
out3

DO YOU WISH TO DUMP INPUT PARAMETERS FOR LOADS ABOVE
A USER-DEFINED CUTOFF VALUE

AVAILABLE ONLY FOR THE FOLLOWING ICE FEATURES :
ICE ISLANDS , ICE ISLAND FRAGMENTS,
MY FLOES , FY RIDGES

1 = YES 0 = NO

1
NAME OF DUMP FILE (MAX. 7 CHARACTERS)
dum3

ENTER LOAD CUT-OFF VALUE (MN)
0.

ENTER ERROR TOLERANCE FOR MEAN VALUE OF FORCE
.1

ENTER BIN WIDTH FOR LOAD PROBABILITY DISTRIBUTION
MAXIMUM NUMBER OF BINS IS 200
10.

ENTER YOUR FAVOURITE RANDOM NUMBER (DOUBLE PRECISION)
(WILL BE USED AS SEED FOR RANDOM NUMBER GENERATION)
1.d0

RUN TITLE : TEST CASE 3
 =====

I/O FILE NAMES :
 =====

DATA BASE FILE : db3
 INPUT FILE : in3
 DUMP FILE : dum3

STATISTICAL PARAMETERS :
 =====

TOLERANCE FOR MEAN FORCE = 0.10E+00
 BIN WIDTH FOR FORCE PDF = 10.00 MN

WINTER SEASON :
 =====

AVERAGE SEASON LENGTH = 229. DAYS

MULTIYEAR FLOE COLLISIONS :

AVERAGE COLLISION RATE = 0.18E+02 PER SEASON
 PROBABILITY OF RIDGE ENCOUNTER = 0.22E-01 PER 1 M OF PENETRATION
 NUMBER OF SIMULATIONS = 15

FORCE DISTRIBUTION PARAMETERS :

FORCE	MEAN (MN)	S.D. (MN)
FOR ONE COLLISION	60.32	50.23
EXTREMAL	163.53	20.19

WINTER
MULTIYEAR FLOES

FY THK \c FORCE M \c MN	YM THK M	FLO DIAM KM	VELOCITY M/S	ECCEN. M	APR AGLE RAD.	FY PRESS MPA	MY PRESS MPA
.335E+00 \c .332E+02	.178E+01	.803E+00	.103E+00	.334E+03	.000E+00	.442E-01	.169E+01
.547E+00 \c .377E+02	.339E+01	.578E+00	.470E-01	.626E+02	.000E+00	.303E-01	.215E+01
.159E+01 \c .175E+03	.357E+01	.673E+00	.268E+00	.255E+03	.000E+00	.164E+00	.598E+00
.193E+01 \c .190E+02	.239E+01	.849E+00	.998E-01	.233E+03	.000E+00	.188E-01	.402E-01
.223E-01 \c .117E+02	.183E+01	.776E+00	.760E-01	.953E+02	.000E+00	.123E+00	.453E+00
.452E+00 \c .539E+02	.238E+01	.116E+01	.198E+00	.485E+03	.000E+00	.103E+00	.757E+00
.341E-01 \c .170E+02	.225E+01	.734E+00	.506E-01	.156E+03	.000E+00	.590E-01	.958E+00
.293E+00 \c .106E+02	.175E+01	.796E+00	.185E-01	.361E+03	.000E+00	.275E-01	.140E+01
.131E+01 \c .225E+02	.429E+01	.555E+00	.141E+00	.306E+03	.000E+00	.747E-01	.973E-01
.117E+01 \c .143E+03	.530E+01	.735E+00	.241E+00	.186E+03	.000E+00	.538E-01	.123E+01
.167E-01 \c .515E+02	.511E+01	.740E+00	.769E-01	.312E+03	.000E+00	.389E-01	.134E+01
.629E+00 \c .567E+02	.782E+01	.639E+00	.182E+00	.236E+03	.000E+00	.693E-01	.243E+00
.422E+00 \c .448E+02	.494E+01	.608E+00	.384E+00	.174E+03	.000E+00	.685E-01	.146E+00
.669E+00 \c .967E+02	.538E+01	.676E+00	.148E+00	.192E+03	.000E+00	.795E-01	.113E+01
.775E+00 \c .132E+03	.311E+01	.938E+00	.329E+00	.271E+03	.000E+00	.180E+00	.389E+00


```

***RUN TITLE
TEST CASE 4
***GEOGRAPHIC LOCATION, WATER DEPTH, DISTANCE OFFSHORE
U.S.                PACK                45.000                20.000
***STRUCTURAL GEOMETRY
CONICAL
*SLOPE                WL DIAMETER    FREE BOARD    FRICTION COEFF.
      0.785                50.000        20.000                0.150
***SEASONS AND SEASON BOUNDARIES
*SEASON INDEX
      2
*FREEZE-UP DATE
      310.000                21.800
*BEGINNING OF BREAK-UP DATE
      199.000                20.600                NORMAL
***WINTER ICE PARAMETERS
*INDEX FOR WINTER LOADING CASES
      4
*RATE OF FY ICE GROWTH
      0.008500
**MY FLOE PARAMETERS
*CONCENTRATION (TENTHS)
      0.20000E+00    0.40000E+00    0.00000E+00    BETA
*VELOCITY (M/S)
      0.62000E-01    0.73000E-01    0.00000E+00    GAMMA
*DIAMETER (KM)
      0.10000E+00    0.15000E+00    0.50000E+00    GAMMA
*THICKNESS (M)
      0.39000E+01    0.16000E+01    0.00000E+00    GAMMA
*MY ICE PRESSURE (MPA)
      0.50000E+00    0.50000E+00    0.00000E+00    EXPONENTIAL
*RIDGE COVERAGE (PERCENT)
      0.30000E+02    0.00000E+00    0.00000E+00    DETERMINISTIC
*RIDGE HEIGHT (M)
      0.90000E+00    0.90000E+00    0.00000E+00    EXPONENTIAL
*RIDGE LENGTH (M)
      0.15000E+03    0.00000E+00    0.00000E+00    DETERMINISTIC
*FY ICE PRESSURE (MPA)
      0.50000E-01    0.50000E-01    0.00000E+00    NORMAL
*FLEXURAL RESISTANCE (MPA)
      0.25000E+00    0.15000E+00    0.00000E+00    NORMAL
*MODULUS OF ELASTICITY (GPA)
      0.50000E+01    0.00000E+00    0.00000E+00    DETERMINISTIC
*POISSON'S RATIO
      0.30000E+00    0.00000E+00    0.00000E+00    DETERMINISTIC

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***** P R O G R A M B O R E A S *****

PROBABILISTIC ASSESSMENT OF YEAR-ROUND ICE LOADS ON
FIXED OFFSHORE STRUCTURES
DEVELOPED BY DET NORSKE VERITAS
VERSION V2-5-1986

NAME OF DATA BASE FILE (MAX. 7 CHARACTERS)
db4

ENTER RE-START OPTION (0 = OFF 1 = ON)
0

NAME OF INPUT FILE (MAX. 7 CHARACTERS)
in4

NAME OF OUTPUT FILE (MAX. 7 CHARACTERS)
out4

DO YOU WISH TO DUMP INPUT PARAMETERS FOR LOADS ABOVE
A USER-DEFINED CUTOFF VALUE

AVAILABLE ONLY FOR THE FOLLOWING ICE FEATURES :
ICE ISLANDS , ICE ISLAND FRAGMENTS,
MY FLOES , FY RIDGES

1 = YES 0 = NO

1
NAME OF DUMP FILE (MAX. 7 CHARACTERS)
dum4

ENTER LOAD CUT-OFF VALUE (MN)
0.

ENTER ERROR TOLERANCE FOR MEAN VALUE OF FORCE
.1

ENTER BIN WIDTH FOR LOAD PROBABILITY DISTRIBUTION
MAXIMUM NUMBER OF BINS IS 200
10.

ENTER YOUR FAVOURITE RANDOM NUMBER (DOUBLE PRECISION)
(WILL BE USED AS SEED FOR RANDOM NUMBER GENERATION)
1.d0

RUN TITLE : TEST CASE 4
 =====

I/O FILE NAMES :
 =====

DATA BASE FILE : db4
 INPUT FILE : in4
 DUMP FILE : dump4

STATISTICAL PARAMETERS :
 =====

TOLERANCE FOR MEAN FORCE = 0.10E+00
 BIN WIDTH FOR FORCE PDF = 10.00 MN

WINTER SEASON :
 =====

AVERAGE SEASON LENGTH = 254. DAYS

MULTIYEAR FLOE COLLISIONS :

AVERAGE COLLISION RATE = 0.18E+02 PER SEASON
 PROBABILITY OF RIDGE ENCOUNTER = 0.18E-01 PER 1 M OF PENETRATION
 NUMBER OF SIMULATIONS = 12

FORCE DISTRIBUTION PARAMETERS :

FORCE	MEAN (MN)	S.D. (MN)
HOR. FORCE (ONE COLLISION)	32.48	24.27
VLE. FORCE (ONE COLLISION)	25.05	18.48
HOR.FORCE (EXTREMAL)	79.38	11.12
VLE.FORCE (EXTREMAL)	59.90	9.61

WINTER
MULTIYEAR FLOES

FY THK	YM THK	FLD DIAM	VELOCITY	ECCEN.	FY PRESS	MY PRESS	FLEX STR
\c EL MOD	POISN R.	H FORCE	VFORCE				
M	M	KM	M/S	M	MPA	MPA	MPA
\c GPA		MN	MN				
.371E+00	.178E+01	.744E+00	.103E+00	.294E+03	.442E-01	.169E+01	.591E+00
\c .500E+01	.300E+00	.262E+02	.195E+02				
.124E+01	.468E+01	.761E+00	.874E-02	.344E+03	.252E-01	.200E+00	.117E+00
\c .500E+01	.300E+00	.241E+02	.179E+02				
.137E+01	.386E+01	.802E+00	.131E+00	.769E+02	.102E+00	.535E+00	.508E+00
\c .500E+01	.300E+00	.890E+02	.658E+02				
.921E+00	.306E+01	.537E+00	.234E+00	.126E+03	.472E-01	.935E+00	.219E+00
\c .500E+01	.300E+00	.431E+02	.382E+02				
.144E+01	.182E+01	.530E+00	.124E+00	.205E+03	.664E-01	.154E+00	.129E+00
\c .500E+01	.300E+00	.456E+02	.337E+02				
.160E+01	.415E+01	.699E+00	.963E-02	.236E+03	.135E-01	.281E-01	.267E-01
\c .500E+01	.300E+00	.149E+02	.110E+02				
.666E+00	.650E+01	.799E+00	.176E+00	.190E+03	.662E-02	.213E-01	.115E-01
\c .500E+01	.300E+00	.220E+01	.225E+01				
.124E+01	.272E+01	.630E+00	.852E-01	.252E+03	.779E-01	.423E+00	.385E+00
\c .500E+01	.300E+00	.608E+02	.450E+02				
.290E+00	.561E+01	.102E+01	.324E-01	.383E+02	.229E-01	.504E-01	.268E-01
\c .500E+01	.300E+00	.681E+01	.504E+01				
.214E+01	.280E+01	.706E+00	.766E-01	.127E+03	.327E-01	.126E+01	.244E+00
\c .500E+01	.300E+00	.461E+02	.394E+02				
.641E+00	.123E+01	.619E+00	.331E+00	.835E+02	.168E-01	.314E-01	.108E-01
\c .500E+01	.300E+00	.121E+02	.892E+01				
.126E+01	.351E+01	.658E+00	.271E-01	.182E+03	.231E-01	.862E+00	.222E+00
\c .500E+01	.300E+00	.188E+02	.139E+02				

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***RUN TITLE
TEST CASE 5
***GEOGRAPHIC LOCATION, WATER DEPTH, DISTANCE OFFSHORE
CANADA SHEAR 40.000 25.000
***STRUCTURAL GEOMETRY
CONICAL
*SLOPE WL DIAMETER FREE BOARD FRICTION COEFF.
-1.047 50.000 15.000 0.150
***SEASONS AND SEASON BOUNDARIES
*SEASON INDEX
2
*FREEZE-UP DATE
309.000 22.800
*BEGINNING OF BREAK-UP DATE
173.000 18.100
***WINTER ICE PARAMETERS
*INDEX FOR WINTER LOADING CASES
4
*RATE OF FY ICE GROWTH
0.008500
**MY FLOE PARAMETERS
*CONCENTRATION (TENTHS)
0.20000E+00 0.40000E+00 0.00000E+00 BETA
*VELOCITY (M/S)
0.62000E-01 0.73000E-01 0.00000E+00 GAMMA
*DIAMETER (KM)
0.10000E+00 0.15000E+00 0.50000E+00 GAMMA
*THICKNESS (M)
0.39000E+01 0.16000E+01 0.00000E+00 GAMMA
*MY ICE PRESSURE (MPA)
0.50000E+00 0.50000E+00 0.00000E+00 EXPONENTIAL
*RIDGE COVERAGE (PERCENT)
0.30000E+02 0.00000E+00 0.00000E+00 DETERMINISTIC
*RIDGE HEIGHT (M)
0.90000E+00 0.90000E+00 0.00000E+00 EXPONENTIAL
*RIDGE LENGTH (M)
0.15000E+03 0.00000E+00 0.00000E+00 DETERMINISTIC
*FY ICE PRESSURE (MPA)
0.50000E-01 0.50000E-01 0.00000E+00 NORMAL
*FLEXURAL RESISTANCE (MPA)
0.25000E+00 0.15000E+00 0.00000E+00 NORMAL
*MODULUS OF ELASTICITY (GPA)
0.50000E+01 0.00000E+00 0.00000E+00 DETERMINISTIC
*POISSON'S RATIO
0.30000E+00 0.00000E+00 0.00000E+00 DETERMINISTIC

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***** P R O G R A M B O R E A S *****

PROBABILISTIC ASSESSMENT OF YEAR-ROUND ICE LOADS ON
FIXED OFFSHORE STRUCTURES
DEVELOPED BY DET NORSKE VERITAS
VERSION V2-5-1986

NAME OF DATA BASE FILE (MAX. 7 CHARACTERS)
db5

ENTER RE-START OPTION (0 = OFF 1 = ON)
0

NAME OF INPUT FILE (MAX. 7 CHARACTERS)
in5

NAME OF OUTPUT FILE (MAX. 7 CHARACTERS)
out5

DO YOU WISH TO DUMP INPUT PARAMETERS FOR LOADS ABOVE
A USER-DEFINED CUTOFF VALUE

AVAILABLE ONLY FOR THE FOLLOWING ICE FEATURES :
ICE ISLANDS , ICE ISLAND FRAGMENTS,
MY FLOES , FY RIDGES

1 = YES 0 = NO
1

NAME OF DUMP FILE (MAX. 7 CHARACTERS)
dum5

ENTER LOAD CUT-OFF VALUE (MN)
0.

ENTER ERROR TOLERANCE FOR MEAN VALUE OF FORCE
.1

ENTER BIN WIDTH FOR LOAD PROBABILITY DISTRIBUTION
MAXIMUM NUMBER OF BINS IS 200
10.

ENTER YOUR FAVOURITE RANDOM NUMBER (DOUBLE PRECISION)
(WILL BE USED AS SEED FOR RANDOM NUMBER GENERATION)
1.d0

RUN TITLE : TEST CASE 5
 =====

I/O FILE NAMES :
 =====

DATA BASE FILE : db5
 INPUT FILE : in5
 DUMP FILE : dump5

STATISTICAL PARAMETERS :
 =====

TOLERANCE FOR MEAN FORCE = 0.10E+00
 BIN WIDTH FOR FORCE PDF = 10.00 MN

WINTER SEASON :
 =====

AVERAGE SEASON LENGTH = 229. DAYS

MULTIYEAR FLOE COLLISIONS :

AVERAGE COLLISION RATE = 0.16E+02 PER SEASON
 PROBABILITY OF RIDGE ENCOUNTER = 0.18E-01 PER 1 M OF PENETRATION
 NUMBER OF SIMULATIONS = 17

FORCE DISTRIBUTION PARAMETERS :

FORCE	MEAN (MN)	S.D. (MN)
HOR. FORCE (ONE COLLISION)	38.46	39.98
VLE. FORCE (ONE COLLISION)	21.31	22.03
HOR. FORCE (EXTREMAL)	128.73	26.92
VLE. FORCE (EXTREMAL)	67.48	12.33

WINTER
MULTIYEAR FLOES

FY THK M GPA	YM THK M	FLO DIAM KM MN	VELOCITY M/S MN	ECCEN. M	FY PRESS MPA	MY PRESS MPA	FLEX STR MPA
.335E+00	.178E+01	.744E+00	.103E+00	.294E+03	.442E-01	.169E+01	.591E+00
\c .500E+01	.300E+00	.128E+02	.698E+01				
.112E+01	.468E+01	.761E+00	.874E-02	.344E+03	.252E-01	.200E+00	.117E+00
\c .500E+01	.300E+00	.215E+02	.118E+02				
.607E+00	.565E+01	.652E+00	.622E-01	.684E+02	.126E-01	.374E+00	.255E+00
\c .500E+01	.300E+00	.147E+02	.860E+01				
.187E+01	.219E+01	.554E+00	.110E+00	.132E+03	.139E+00	.219E+00	.104E+00
\c .500E+01	.300E+00	.140E+03	.777E+02				
.719E+00	.249E+01	.716E+00	.663E-01	.302E+03	.384E-01	.948E-01	.802E-02
\c .500E+01	.300E+00	.676E+01	.370E+01				
.106E+01	.557E+01	.609E+00	.373E-01	.877E+02	.109E-02	.152E+00	.118E+00
\c .500E+01	.300E+00	.308E+01	.180E+01				
.176E+01	.302E+01	.628E+00	.132E+00	.264E+02	.152E+00	.468E+00	.633E-01
\c .500E+01	.300E+00	.205E+02	.109E+02				
.226E+00	.207E+01	.530E+00	.252E+00	.103E+03	.373E-01	.653E+00	.293E-01
\c .500E+01	.300E+00	.217E+02	.116E+02				
.115E+00	.314E+01	.619E+00	.583E-01	.252E+03	.101E+00	.192E+00	.158E+00
\c .500E+01	.300E+00	.125E+02	.694E+01				
.133E+01	.513E+01	.549E+00	.721E-01	.659E+02	.119E-01	.694E+00	.314E+00
\c .500E+01	.300E+00	.156E+02	.909E+01				
.150E+01	.703E+01	.681E+00	.955E-01	.231E+03	.823E-01	.633E+00	.313E+00
\c .500E+01	.300E+00	.754E+02	.428E+02				
.172E+01	.313E+01	.550E+00	.382E+00	.108E+02	.131E+00	.254E+00	.112E+00
\c .500E+01	.300E+00	.125E+03	.679E+02				
.321E+00	.617E+01	.559E+00	.970E-01	.144E+03	.461E-01	.177E+01	.365E+00
\c .500E+01	.300E+00	.326E+02	.190E+02				
.123E+01	.238E+01	.592E+00	.421E-01	.257E+03	.105E+00	.705E+00	.328E+00
\c .500E+01	.300E+00	.762E+02	.424E+02				
.131E+01	.339E+01	.637E+00	.222E+00	.312E+03	.161E+00	.568E+00	.356E+00
\c .500E+01	.300E+00	.183E+02	.102E+02				
.279E+00	.344E+01	.694E+00	.287E+00	.553E+02	.497E-01	.510E+00	.113E+00
\c .500E+01	.300E+00	.412E+02	.221E+02				
.188E+01	.345E+01	.614E+00	.174E+00	.869E+01	.110E-01	.165E+00	.782E-01
\c .500E+01	.300E+00	.156E+02	.870E+01				

```

***RUN TITLE
TEST CASE 6
***GEOGRAPHIC LOCATION, WATER DEPTH, DISTANCE OFFSHORE
CANADA          SHEAR          30.000          20.000
***STRUCTURAL GEOMETRY
VERTICAL
CIRCULAR
*DIAMETER
  100.000
***SEASONS AND SEASON BOUNDARIES
*SEASON INDEX
  2
*FREEZE-UP DATE
  309.000          22.800
*BEGINNING OF BREAK-UP DATE          NORMAL
  173.000          18.100
***WINTER ICE PARAMETERS
*INDEX FOR WINTER LOADING CASES          NORMAL
  2
**FY RIDGE PARAMETERS
*COVERAGE (PERCENT)
  0.30000E+02    0.00000E+00    0.00000E+00
*HEIGHT (M)
  0.90000E+00    0.90000E+00    0.76000E+00    EXPONENTIAL
*LENGTH (M)
  0.15000E+03    0.00000E+00    0.00000E+00
*VELOCITY (M/S)
  0.62000E-01    0.73000E-01    0.00000E+00    DETERMINISTIC
*FRICTION ANGLE (RAD.)
  0.43633E+00    0.00000E+00    0.00000E+00    GAMMA
*COHESION (MPA)
  0.35000E-01    0.00000E+00    0.00000E+00    DETERMINISTIC

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***** P R O G R A M B O R E A S *****

PROBABILISTIC ASSESSMENT OF YEAR-ROUND ICE LOADS ON
FIXED OFFSHORE STRUCTURES
DEVELOPED BY DET NORSKE VERITAS
VERSION V2-5-1986

NAME OF DATA BASE FILE (MAX. 7 CHARACTERS)
db6

ENTER RE-START OPTION (0 = OFF 1 = ON)
0

NAME OF INPUT FILE (MAX. 7 CHARACTERS)
in6

NAME OF OUTPUT FILE (MAX. 7 CHARACTERS)
out6

DO YOU WISH TO DUMP INPUT PARAMETERS FOR LOADS ABOVE
A USER-DEFINED CUTOFF VALUE

AVAILABLE ONLY FOR THE FOLLOWING ICE FEATURES :
ICE ISLANDS , ICE ISLAND FRAGMENTS,
MY FLOES , FY RIDGES

1 = YES 0 = NO

1
NAME OF DUMP FILE (MAX. 7 CHARACTERS)
dum6

ENTER LOAD CUT-OFF VALUE (MN)
0.

ENTER ERROR TOLERANCE FOR MEAN VALUE OF FORCE
.1

ENTER BIN WIDTH FOR LOAD PROBABILITY DISTRIBUTION
MAXIMUM NUMBER OF BINS IS 200
10.

ENTER YOUR FAVOURITE RANDOM NUMBER (DOUBLE PRECISION)
(WILL BE USED AS SEED FOR RANDOM NUMBER GENERATION)
1.d0

RUN TITLE : TEST CASE 6
 =====

I/O FILE NAMES :
 =====

DATA BASE FILE : db6
 INPUT FILE : in6
 DUMP FILE : dum6

STATISTICAL PARAMETERS :
 =====

TOLERANCE FOR MEAN FORCE = 0.10E+00
 BIN WIDTH FOR FORCE PDF = 10.00 MN

WINTER SEASON :
 =====

AVERAGE SEASON LENGTH = 229. DAYS

FIRST YEAR RIDGES :

AVERAGE INTERACTION RATE = 0.13E+05 PER SEASON
 NUMBER OF SIMULATIONS = 13

FORCE DISTRIBUTION PARAMETERS :

FORCE	MEAN (MN)	S.D. (MN)
FOR ONE COLLISION	29.26	26.30
EXTREMAL	75.00	0.00

WINTER
FIRST YEAR RIDGES

HEIGHT M	COHESION MPA	FRC AGL RAD.	FORCE MN
.316E+01	.350E-01	.436E+00	.672E+02
.229E+01	.350E-01	.436E+00	.347E+02
.313E+01	.350E-01	.436E+00	.661E+02
.154E+01	.350E-01	.436E+00	.154E+02
.173E+01	.350E-01	.436E+00	.195E+02
.283E+01	.350E-01	.436E+00	.537E+02
.105E+01	.350E-01	.436E+00	.716E+01
.339E+01	.350E-01	.436E+00	.776E+02
.105E+01	.350E-01	.436E+00	.709E+01
.168E+01	.350E-01	.436E+00	.184E+02
.906E+00	.350E-01	.436E+00	.527E+01
.803E+00	.350E-01	.436E+00	.414E+01
.786E+00	.350E-01	.436E+00	.396E+01

```

***RUN TITLE
TEST CASE 7
***GEOGRAPHIC LOCATION, WATER DEPTH, DISTANCE OFFSHORE
CANADA          SHEAR          35.000          40.000
***STRUCTURAL GEOMETRY
CONICAL
*SLOPE          WL DIAMETER    FREE BOARD    FRICTION COEFF.
      0.785          100.000      20.000      0.150
***SEASONS AND SEASON BOUNDARIES
*SEASON INDEX
      1
*BEGINNING OF BREAK-UP DATE
      173.000          18.100          NORMAL
*END OF BREAK-UP DATE
      187.000          22.900          NORMAL
***BREAK-UP ICE PARAMETERS
*INDEX FOR BREAK-UP LOADING CASES
      2
**FY RIDGE PARAMETERS
*COVERAGE (PERCENT)
      0.30000E+02      0.00000E+00      0.00000E+00      DETERMINISTIC
*HEIGHT (M)
      0.90000E+00      0.90000E+00      0.76000E+00      EXPONENTIAL
*LENGTH (M)
      0.15000E+03      0.00000E+00      0.00000E+00      DETERMINISTIC
*VELOCITY (M/S)
      0.42000E-01      0.42000E-01      0.00000E+00      EXPONENTIAL
*FRICTION ANGLE (RAD.)
      0.43633E+00      0.00000E+00      0.00000E+00      DETERMINISTIC
*COHESION (MPA)
      0.35000E-01      0.00000E+00      0.00000E+00      DETERMINISTIC

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***** P R O G R A M B O R E A S *****

PROBABILISTIC ASSESSMENT OF YEAR-ROUND ICE LOADS ON
FIXED OFFSHORE STRUCTURES
DEVELOPED BY DET NORSKE VERITAS
VERSION V2-5-1986

NAME OF DATA BASE FILE (MAX. 7 CHARACTERS)
db7

ENTER RE-START OPTION (0 = OFF 1 = ON)
0

NAME OF INPUT FILE (MAX. 7 CHARACTERS)
in7

NAME OF OUTPUT FILE (MAX. 7 CHARACTERS)
out7

DO YOU WISH TO DUMP INPUT PARAMETERS FOR LOADS ABOVE
A USER-DEFINED CUTOFF VALUE

AVAILABLE ONLY FOR THE FOLLOWING ICE FEATURES :
ICE ISLANDS , ICE ISLAND FRAGMENTS,
MY FLOES , FY RIDGES

1 = YES 0 = NO

1
NAME OF DUMP FILE (MAX. 7 CHARACTERS)
dum7

ENTER LOAD CUT-OFF VALUE (MN)
0.

ENTER ERROR TOLERANCE FOR MEAN VALUE OF FORCE
.1

ENTER BIN WIDTH FOR LOAD PROBABILITY DISTRIBUTION
MAXIMUM NUMBER OF BINS IS 200
10.

ENTER YOUR FAVOURITE RANDOM NUMBER (DOUBLE PRECISION)
(WILL BE USED AS SEED FOR RANDOM NUMBER GENERATION)
1.d0

RUN TITLE : TEST CASE 7
 =====

I/O FILE NAMES :
 =====

DATA BASE FILE : db7
 INPUT FILE : in7
 DUMP FILE : dum7

STATISTICAL PARAMETERS :
 =====

TOLERANCE FOR MEAN FORCE = 0.10E+00
 BIN WIDTH FOR FORCE PDF = 10.00 MN

BREAK-UP SEASON :
 =====

AVERAGE SEASON LENGTH = 20. DAYS

FIRST YEAR RIDGES :

AVERAGE INTERACTION RATE = 0.44E+03 PER SEASON
 NUMBER OF SIMULATIONS = 13

FORCE DISTRIBUTION PARAMETERS :

FORCE	MEAN (MN)	S.D. (MN)
HOR. FORCE (ONE COLLISION)	29.26	26.30
VLE. FORCE (ONE COLLISION)	29.28	26.32
HOR.FORCE (EXTREMAL)	75.00	0.00
VLE.FORCE (EXTREMAL)	75.00	0.00

RUN TITLE : TEST CASE 7
 =====

I/O FILE NAMES :
 =====

DATA BASE FILE : db7
 INPUT FILE : in7
 DUMP FILE : dum7

STATISTICAL PARAMETERS :
 =====

TOLERANCE FOR MEAN FORCE = 0.10E+00
 BIN WIDTH FOR FORCE PDF = 10.00 MN

BREAK-UP SEASON :
 =====

AVERAGE SEASON LENGTH = 20. DAYS

FIRST YEAR RIDGES :

AVERAGE INTERACTION RATE = 0.44E+03 PER SEASON
 NUMBER OF SIMULATIONS = 13

FORCE DISTRIBUTION PARAMETERS :

FORCE	MEAN (MN)	S.D. (MN)
HOR. FORCE (ONE COLLISION)	29.26	26.30
VLE. FORCE (ONE COLLISION)	29.28	26.32
HOR.FORCE (EXTREMAL)	75.00	0.00
VLE.FORCE (EXTREMAL)	75.00	0.00

BREAK-UP
FIRST YEAR RIDGES

HEIGHT M	COHESION MPA	FRC AGL RAD.	HOR. FORCE MN	VLE. FORCE MN
.316E+01	.350E-01	.436E+00	.672E+02	.673E+02
.229E+01	.350E-01	.436E+00	.347E+02	.348E+02
.313E+01	.350E-01	.436E+00	.661E+02	.662E+02
.154E+01	.350E-01	.436E+00	.154E+02	.155E+02
.173E+01	.350E-01	.436E+00	.195E+02	.195E+02
.283E+01	.350E-01	.436E+00	.537E+02	.537E+02
.105E+01	.350E-01	.436E+00	.716E+01	.717E+01
.339E+01	.350E-01	.436E+00	.776E+02	.776E+02
.105E+01	.350E-01	.436E+00	.709E+01	.710E+01
.168E+01	.350E-01	.436E+00	.184E+02	.184E+02
.906E+00	.350E-01	.436E+00	.527E+01	.528E+01
.803E+00	.350E-01	.436E+00	.414E+01	.414E+01
.786E+00	.350E-01	.436E+00	.396E+01	.397E+01

```

***RUN TITLE
TEST CASE 8
***GEOGRAPHIC LOCATION, WATER DEPTH, DISTANCE OFFSHORE
CANADA          LANDFAST          20.000          5.000
***STRUCTURAL GEOMETRY
VERTICAL
CIRCULAR
*DIAMETER
  100.000
***SEASONS AND SEASON BOUNDARIES
*SEASON INDEX
  2
*FREEZE-UP DATE
  309.000          22.800          NORMAL
*BEGINNING OF BREAK-UP DATE
  173.000          18.100          NORMAL
***WINTER ICE PARAMETERS
*INDEX FOR WINTER LOADING CASES
  1
*RATE OF FY ICE GROWTH
  0.008500
**LEVEL ICE PARAMETERS
*CREEP EXPONENT, CREEP MULTIPLIER, RATE OF VELOCITY REAKS
  0.300E+01  0.100E-04  0.100E+03
*PEAK VELOCITY (M/S)
  0.15000E-03  0.24000E-03  0.42300E-04  NUMERICAL
  7
  0.42300E-04  0.00000E+00
  0.85000E-04  0.70300E+00
  0.12700E-03  0.83500E+00
  0.21200E-03  0.88600E+00
  0.46600E-03  0.92400E+00
  0.97400E-03  0.98100E+00
  0.12280E-02  0.10000E+01
*BREAK-OFF INDEX
  0

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***** P R O G R A M B O R E A S *****

PROBABILISTIC ASSESSMENT OF YEAR-ROUND ICE LOADS ON
FIXED OFFSHORE STRUCTURES
DEVELOPED BY DET NORSKE VERITAS
VERSION V2-5-1986

NAME OF DATA BASE FILE (MAX. 7 CHARACTERS)
db8

ENTER RE-START OPTION (0 = OFF 1 = ON)
0

NAME OF INPUT FILE (MAX. 7 CHARACTERS)
in8

NAME OF OUTPUT FILE (MAX. 7 CHARACTERS)
out8

DO YOU WISH TO DUMP INPUT PARAMETERS FOR LOADS ABOVE
A USER-DEFINED CUTOFF VALUE

AVAILABLE ONLY FOR THE FOLLOWING ICE FEATURES :
ICE ISLANDS , ICE ISLAND FRAGMENTS,
MY FLOES , FY RIDGES

1 = YES 0 = NO
0

ENTER ERROR TOLERANCE FOR MEAN VALUE OF FORCE
.1

ENTER BIN WIDTH FOR LOAD PROBABILITY DISTRIBUTION
MAXIMUM NUMBER OF BINS IS 200
10.

ENTER YOUR FAVOURITE RANDOM NUMBER (DOUBLE PRECISION)
(WILL BE USED AS SEED FOR RANDOM NUMBER GENERATION)
1.d0

RUN TITLE : TEST CASE 8
 =====

I/O FILE NAMES :
 =====

DATA BASE FILE : db8
 INPUT FILE : in8

STATISTICAL PARAMETERS :
 =====

TOLERANCE FOR MEAN FORCE = 0.10E+00
 BIN WIDTH FOR FORCE PDF = 10.00 MN

WINTER SEASON :
 =====

AVERAGE SEASON LENGTH = 229. DAYS

FIRST YEAR LEVEL ICE :

MONTHLY EXTREMAL FORCE DISTRIBUTION PARAMETERS (MN) :

MONTH NO.	ICE THK.	NO. OF SIMS.	MEAN(MN)	S.D.(MN)
1	0.59	11	85.00	0.00
2	0.84	13	125.00	0.22
3	1.10	7	85.00	0.01
4	1.35	8	165.00	0.00
5	1.61	10	195.00	0.20
6	1.86	6	125.00	0.01
7	2.12	6	145.00	0.00

SEASON EXTREME FORCE (MN) :
 MEAN = 195.00 MN
 STD. DEV. = 0.20 MN

***RUN TITLE

TEST CASE 9

***GEOGRAPHIC LOCATION, WATER DEPTH, DISTANCE OFFSHORE

U.S. PACK 30.000 45.000

***STRUCTURAL GEOMETRY

CONICAL

*SLOPE	ML DIAMETER	FREE BOARD	FRICTION COEFF.
0.785	75.000	20.000	0.150

***SEASONS AND SEASON BOUNDARIES

*SEASON INDEX

2

*FREEZE-UP DATE

310.000 21.800

NORMAL

*BEGINNING OF BREAK-UP DATE

199.000 20.600

NORMAL

***WINTER ICE PARAMETERS

*INDEX FOR WINTER LOADING CASES

1

*RATE OF FY ICE GROWTH

0.008500

**LEVEL ICE PARAMETERS

*FLEXURAL STRENGTH : AVERAGE , MEAN AND S.D. OF EXTREMAL COMPONENT

0.200E+00 0.100E+00 0.500E-01

*ELASTIC MODULUS AND POISSON'S RATIO

0.500E+01 0.300E+00

***** P R O G R A M B O R E A S *****

PROBABILISTIC ASSESSMENT OF YEAR-ROUND ICE LOADS ON
FIXED OFFSHORE STRUCTURES
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NAME OF DATA BASE FILE (MAX. 7 CHARACTERS)
db9

ENTER RE-START OPTION (0 = OFF 1 = ON)
0

NAME OF INPUT FILE (MAX. 7 CHARACTERS)
in9

NAME OF OUTPUT FILE (MAX. 7 CHARACTERS)
out9

DO YOU WISH TO DUMP INPUT PARAMETERS FOR LOADS ABOVE
A USER-DEFINED CUTOFF VALUE

AVAILABLE ONLY FOR THE FOLLOWING ICE FEATURES :
ICE ISLANDS , ICE ISLAND FRAGMENTS,
MY FLOES , FY RIDGES

1 = YES 0 = NO
0

ENTER ERROR TOLERANCE FOR MEAN VALUE OF FORCE
.1

ENTER BIN WIDTH FOR LOAD PROBABILITY DISTRIBUTION
MAXIMUM NUMBER OF BINS IS 200
10.

ENTER YOUR FAVOURITE RANDOM NUMBER (DOUBLE PRECISION)
(WILL BE USED AS SEED FOR RANDOM NUMBER GENERATION)
1.d0

RUN TITLE : TEST CASE 9
 =====

I/O FILE NAMES :
 =====

DATA BASE FILE : db9
 INPUT FILE : in9

STATISTICAL PARAMETERS :
 =====

TOLERANCE FOR MEAN FORCE = 0.10E+00
 BIN WIDTH FOR FORCE PDF = 10.00 MN

WINTER SEASON :
 =====

AVERAGE SEASON LENGTH = 254. DAYS

FIRST YEAR LEVEL ICE :

MONTHLY EXTREMAL FORCE DISTRIBUTION PARAMETERS (MN) :

NO.	THK.	SIMS.	HOR. FORCE		VLE. FORCE	
			MEAN(MN)	S.D.(MN)	MEAN(MN)	S.D.(MN)
1	0.55	6	32.66	0.27	24.16	0.2
2	0.80	6	48.06	0.26	35.55	0.2
3	1.06	6	63.36	0.57	46.87	0.4
4	1.31	6	78.74	0.34	58.25	0.3
5	1.57	6	94.54	0.59	69.94	0.4
6	1.82	6	110.06	0.81	81.42	0.6
7	2.08	6	125.99	1.50	93.20	1.1
8	2.33	6	140.80	0.74	104.15	0.5

SEASON EXTREME FORCE (MN) :

HOR. FORCE :

MEAN = 141.67 MN
 STD. DEV. = 4.71 MN

VLE. FORCE :

MEAN = 105.00 MN
 STD. DEV. = 0.00 MN

***RUN TITLE

TEST CASE 10

***GEOGRAPHIC LOCATION, WATER DEPTH, DISTANCE OFFSHORE

CANADA SHEAR

50.000

80.000

***STRUCTURAL GEOMETRY

VERTICAL

POLYGONAL

*NUMBER OF SIDES AND CORNER COORDINATES

4

50.000 50.000

50.000 -50.000

-50.000 -50.000

-50.000 50.000

***SEASONS AND SEASON BOUNDARIES

*SEASON INDEX

1

*BEGINNING OF BREAK-UP DATE

173.000 18.100

NORMAL

*END OF BREAK-UP DATE

187.000 22.900

NORMAL

***BREAK-UP ICE PARAMETERS

*INDEX FOR BREAK-UP LOADING CASES

1

*FY ICE THICKNESS

1.500000

**LEVEL ICE PARAMETERS

*ICE PRESSURE : AVERAGE , AND MEAN AND S.D. OF EXTREMAL COMPONENT

0.300E+00 0.200E+00 0.150E+00

***** P R O G R A M B O R E A S *****

PROBABILISTIC ASSESSMENT OF YEAR-ROUND ICE LOADS ON
FIXED OFFSHORE STRUCTURES
DEVELOPED BY DET NORSKE VERITAS
VERSION V2-5-1986

NAME OF DATA BASE FILE (MAX. 7 CHARACTERS)
db10

ENTER RE-START OPTION (0 = OFF 1 = ON)
0

NAME OF INPUT FILE (MAX. 7 CHARACTERS)
in10

NAME OF OUTPUT FILE (MAX. 7 CHARACTERS)
out10

DO YOU WISH TO DUMP INPUT PARAMETERS FOR LOADS ABOVE
A USER-DEFINED CUTOFF VALUE

AVAILABLE ONLY FOR THE FOLLOWING ICE FEATURES :
ICE ISLANDS , ICE ISLAND FRAGMENTS,
MY FLOES , FY RIDGES

1 = YES 0 = NO
0

ENTER ERROR TOLERANCE FOR MEAN VALUE OF FORCE
.1

ENTER BIN WIDTH FOR LOAD PROBABILITY DISTRIBUTION
MAXIMUM NUMBER OF BINS IS 200
10.

ENTER YOUR FAVOURITE RANDOM NUMBER (DOUBLE PRECISION)
(WILL BE USED AS SEED FOR RANDOM NUMBER GENERATION)
1.d0

RUN TITLE : TEST CASE 10
=====

I/O FILE NAMES :
=====

DATA BASE FILE : db10
INPUT FILE : in10

STATISTICAL PARAMETERS :
=====

TOLERANCE FOR MEAN FORCE = 0.10E+00
BIN WIDTH FOR FORCE PDF = 10.00 MN

BREAK-UP SEASON :
=====

AVERAGE SEASON LENGTH = 20. DAYS

FIRST YEAR LEVEL ICE :

SEASON EXTREME FORCE (MN) :
MEAN = 110.00 MN
STD. DEV. = 38.73 MN

REFERENCE

1. IMSL Library Reference Manual, 1982. IMSL, Inc., Edition 9, June.