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# FUELPIN: A Data Retrieval System for Nuclear Fuel Pin Information



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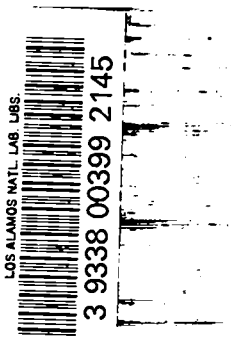

# FUELPIN: A DATA RETRIEVAL SYSTEM FOR NUCLEAR FUEL PIN INFORMATION

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## ABSTRACT

The Fortran IV computer code FUELPIN was developed to assist in the surveillance of large numbers of nuclear fuel pins. Using sixteen levels of sorting and thirty-one key pin characteristics, the computer code sorts through large blocks of pin data to determine those pins having the desired characteristics. Allowance is also made for miscellaneous information on (1) fuel type, (2) clad material, (3) bond data, and (4) general pin information.

Upon execution the blocks of fuel pin information are inspected to insure that the data are credible, i.e., between experimentor specified limits. Octal stops are provided, numbered, and discussed in the codes comment section so as to block all paths of code execution known to indicate operational error. All parameter sort information is also inspected for potential input error with some minor correctional measures accomplished upon detection of an error condition.

Though limited to blocks of two hundred and fifty pins per run, large numbers of pins may be efficiently examined through problem stacking and proper use of a built in computer time economizing scheme.


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## I. INTRODUCTION

Surveillance of a large number of nuclear fuel pins requires some type of data retrieval system. For this task the computer code FUELPIN was developed. FUELPIN was designed to handle in excess of thirty parameters for each of two hundred and fifty pins as well as descriptive information on (1) fuel type, (2) clad material, (3) bond data, and (4) general pin information. Software extension to handle larger numbers of pins was not thought advisable because of the available computer space limitations but an unlimited number of pins could be examined in two hundred and fifty pin blocks.

FUELPIN and the fuel pin data on which it operated, i.e., its data base, were designed to (1) provide complete information on all pins in house, (2) allow selection of those pins having specific physical characteristics, (3) provide maximum software protection of the data base, and (4) provide code execution output in essentially final report form. When coding effort terminated, items one through three were virtually completed and item four unstarted.

## II. CONSTRUCTION OF DATA BASE

In order to provide detailed information on the major aspects of the potentially large number of fuel pins involved, an extended list of the needed fuel pin data was compiled. In addition to indicating the specific data involved, Table I also contains the name used by the code during input, the array name in which

all data of the same type is stored, and the name of the relevant sort parameter. Details of input formats and variable designations can be found in the initial comment section of the computer listing.

Additional information is required for program execution as shown in Table II. Originally these variables, like those in Table I, were to be used in parameter sorting, but termination of coding effort occurred before this could be implemented. The parameters in Table II differ from those in Table I, however, in one major way - most of the input is conditional and depends on exactly how the Table I values were specified.

Another critical point on data base construction is the handling of the fuel, clad, bond, and general pin information comment statements. These conditional comment cards are read only if the respective integer input flags (C, C1, C2, and C3) are in the range of one through five. Blank or negative values are reset to zero and values larger than five cause code execution to stop. Since the maximum possible number of computer words needed to store this data is as indicated below, it would be impractical to use dimensioned arrays.

Words Needed

$$\text{For Comment Cards} = \left(5\ \frac{\text{cards}}{\text{comments}}\right)\left(4\frac{\text{comments}}{\text{pin}}\right)\left(8\ \frac{\text{words}}{\text{card}}\right)\left(250\ \text{pins}\right) = 40,000\ \text{words}\ (116,100\ \text{octal}) \quad (1)$$

Instead, after the initial echo check, the comment card images are written serially onto temporary disk files thus requiring no dimension statements or dedicated computer word space. To use this scheme effectively, however, requires that these files be rewound to the proper starting words before any additional output of this information can be performed. This rewind sequence has not been written and is not included in the attached listing.

Finally, since a major effort was expended to use variable names which were easily associated with the actual parameter designation, extensive use of INTEGER and REAL declaration statements was necessary. It was imperative that all such statements logically match one another so that no subtle changes would occur in data manipulation or storage. Similar care was exercised in matching the sort parameter names with those used for the input variable and array names, in order to avoid improper sorting. Input data checking, including this type of cross-checking, is extensively performed during execution as discussed in the software protection section.

## III. PARAMETER SORTING

Sixteen levels of parameter sorting are possible using any of the twenty-three sort parameters specified in Table I. As explained under the listing comment section entitled "Specification of Sorts Desired," SORTYPE value numbers are used to flag those parameters over which sorts are to be performed. Clear description of the required input formats is given in the comment section of the listing. For the three SORTYPE values where no sort was desired, the octal stop numbers which will be encountered if such a sort is attempted are shown (Table I).

Basically only three types of sort parameter input are required. Alpha-numeric or straight alphabetic input are accomplished through the use of A10 or I5, A5 formats.* The only critical software consideration was the matching of all variable names to avoid data conversions within the computer and the systematic right or left justification of any data using an A type input format. This justification is crucial since any difference in data location will result in differences in the representation of the data as stored in the computer and thus eliminate the possibility of locating the information when attempting a sort.

Numerical data, representing a potential range of real number values over which sorts are to be performed,≠ invariably require 5X, 2F10.0 input formats. As all of these input sequences are virtually identical, the one for fuel center line temperature will be examined in detail.

*SORTYPE = 1, 3, 12, and 19.

≠SORTYPE = 5-7, 10, 11, 13-15, 20-22.

```
CHECKING FOR DUPLICATE SORT
      ICLTMAX = ICLTMAX + 1
      IF(ICLTMAX.GT. 1) STOP 206
CHECKING FOR END OF FILE MARK
      IF(EOF,1) 2360,2380
 2360 STOP 207
 2380 CONTINUE
CONSTRUCTING MINIMUM RANGE SORT
      IF(CLTMAX.NE. CLTMIN) GO TO 2370
      CLTMAX = CLTMAX + 0.0001
      CLTMIN = CLTMIN - 0.0001
CORRECTING FOR INPUT DATA INVERSION
 2370 IF(CLTMIN.LT. CLTMAX) GO TO 2375
      CLTHD = CLTMAX
      CLTMAX = CLTMIN
      CLTMIN = CLTHD
CHECKING FOR SORT PARAMETER CREDIBILITY
 2375 CONTINUE
      IF(CLTMAX.LT. 0.00 .OR. CLTMAX.GT. 2000.0) STOP 210
      IF(CLTMIN.LT. 0.00 .OR. CLTMIN.GT. 2000.0) STOP 211
CHECKING INPUT DATA
      WRITE(2,360) I, CLTMAX, CLTMIN
```

As can be seen from this example, five types of data input checking are performed on each such data input. First a flag is incremented and checked to ensure that a duplicate sort has not been requested. Since this type of sort request could only occur if potentially mutually exclusive sorts are requested or if an input error is made, code termination occurs if this condition is detected. Similarly, if an EØF (end of file) is detected during data input, an octal stop is encountered. Sort parameter credibility is also checked at the end of each input sequence giving the experimentor an opportunity to set up realistic limiting values for the sort parameters involved. All three of these checks can result in code termination and are designed as part of the software protection to be discussed in the following section.

The remaining two types of data checking, namely data inversion and setting up minimum range sorts, are not part of the software protection sequences and hence no octal stop statements are involved. The data inversion statements merely allow the code operator to input the two respective sort limits in any sequence he chooses and upon execution the necessary ordering is automatically performed. Minimum range sorts are necessary since the actual sorting sequences expect a range of values over which parameter sorting is to be performed. If one wants all the fuel pins with a center line temperature of exactly $1000^{\circ}$, for instance, both CLTMAX and CLTMIN are given values of 1000 and the "software" automatically sets up a sorting range of 999.9999 to 1000.0001, or a differential of 2.0E-04. This should be more than adequate resolution and this difference is used in all similar sorts.

Coded data* as well as integer input≠ use primarily 5X, 15 formats. For coded data, the particular coded representations of alpha-numeric input are discussed in the initial comment section of the code. Software checks are performed during execution to ensure that no coded values used either in constructing the data base or in setting up sort parameters are undefined.

Once all SORTYPE values and their corresponding limiting values have been read in and checked, subroutine SORTASK is used to perform the actual eliminations. As with the types of sort parameter inputs required, only three main types of logic checks are necessary. For a A formatted elimination, such as CLADUAL (SORTYPE value = 12), the test is for an exact match. Thus for the KKth pin examined, in order to detect a specific cladding type, both the computer array element, denoted CLADS(kk), and the input value CLADUAL must be exactly alike. The specific FORTRAN statement used is as indicated below and analogous tests are performed in all similar cases. Integer tests are also performed in this manner.

```
IF(CLADS(kk) .NE. CLADUAL) GO TO 55
```

The section of subroutine SORTASK entitled "SETTING UP MASTER STORAGE LOGIC FOR MULTIPLE ELIMINATIONS" is used to keep track of those fuel pins meeting the sort parameters specified.

*SORTYPE = 4, 16, 17, 23.

≠SORTYPE = 2.

Once it is determined that a particular pin meets whatever criterion is being used, the sequential position of that set of data in the data base is saved in the array named ISAVE. At the end of the first and all subsequent sorts, this array is printed out. Only the first sort, however, examines all the pins present in the data base because later sorts are only done on those pins whose sequential position is still contained in ISAVE. Obviously, the most economical way to run the routine is to specify the less likely pin parameters first so that later sorts have fewer pins to consider.

For numeric, real data used to sort for pins having a specified range of values, statements like the one for fuel center line temperature shown below are used.

IF(FUELS(kk) .GE. CLTMIN .AND. FUELCLS (kk) .LE. CLTMAX) GØ TØ 35

Note: Exactly the same value could have been specified for CLTMIN and CLTMAX without resorting to setting up minimum range values but since computer representation of numbers can vary slightly from those specified on the input cards, this tack was avoided.

## IV. SOFTWARE PROTECTION

As can be seen from Table III, 166 out of the 213 octal stops present in the code, i.e., 85%, arise from the five causes noted. The EØF tests are done simply as good programming practice but all the remaining octal stops are designed to block paths known a priori to be logically in error.

Checking for duplicate sort, as discussed in the previous section, is used to detect an operator error. Only one sort on any given parameter was deemed desirable per problem execution.

Data base and sort parameter out of range error flags arise mainly from input credibility checks. All input data used either in the data base or in setting up the requested sorts are tested to ensure that the numbers are either within the expected experimental limits or are previously defined coded input. These stop statements are extremely important because through them the experimentor can check range of the data being manipulated.

Sort parameter conflicts arise from only two sources. If the input variable SØRTYPE is set equal to eight, nine, eighteen, or greater than twenty-three, execution ceases because no sorting was to be done on the parameters indicated by these SORTYPE values. The remainder of the octal stops involved ensures that a SØRTYPE value is not encountered in a part of the code where it logically does not belong.

Normal code termination is done at octal stop number 777. If any other value is listed, the exact nature of the error and its location in the code can be determined from the appropriate comment section at the front of Appendix A. For instance, if octal stop number fourteen is encountered the error is shown to be in the main program under the comment section heading "READING DATA ENTRY" and caused by an improper exit from the comment reading loop involved.

## V. OUTPUT

As illustrated in the three sample listings in Appendix B, the first set of output is an echo check of the pins in the data base in the order that they were encountered. This echo-checking is obtained through the input parameter PAR which can be used to (1) provide an echo check of all pins involved, (2) suppress completely the echo check, or (3) pass control of the echo-checking to the individual pins as defined in the DUMP parameter on the first card in each data set.

After the echo-checking, the sequential order, the type of sort requested, and the particular sort parameters involved are listed. The type of sort requested is obtained by storing descriptive names in Hollerith fields in the array named KEY and having the SORTYPE value used trigger the appropriate response. The sort parameters printout is taken directly from the input values.

Finally the ISAVE vector is printed out after each completed sort with a special heading being attached

to the final values. It should be noted that the numbers indicated are the sequential positions of individual data blocks in the data base, exactly the numbers printed out when using the PAR parameter to obtain a complete echo check.

## VI. UNCOMPLETED WORK

Two major coding efforts remain uncompleted. First, none of the parameters listed in Table II have been incorporated in any of the sorting sequences. These variables require nothing really new as far as software logic is concerned, but since the data depend in many cases on previously defined parameters, more than normal care must be used in setting up these sorts. Second, the output is highly limited and contains one known formatting error. To expand the output will require the writing of the necessary output statements in addition to providing the logic necessary to rewind the temporary disk file storage of the comment card images.

TABLE I

| | Fuel Pin Data | Input Variable Name | Array Name | Sort Parameter Name |
|---|---|---|---|---|
| 1. | Source Element | SOURCE | SOURCE(250) | ISOURCE |
| 2. | Task I.D. | TASK | TASKS(250) | ITASK |
| 3. | Number | NUMBER ID | NUMBERS(250) IDS(250) | INUMBER ID |
| 4. | Fuel Type | FUEL | FUELS(250) | IFUEL |
| 5. | Uranium Composition | UCOMP | UCOMPS(250) | UCMAX, UCMIN |
| 6. | $U^{235}$ Enrichment | RICH235 | RICH35S(250) | MAX235,MIN235 |
| 7. | $U^{233}$ Enrichment | RICH233 | RICH33S(250) | RMAX233,RMIN233 |
| 8. | Plutonium Composition | PUCOMP | Not Stored | No sort desired |
| 9. | $Pu^{239}$ Enrichment | RICH239 | Not Stored | No sort desired |
| 10. | Fuel Density | RHO | RHOS(250) | RHOMAX,RHOMIN |

TABLE I -- Continued

| | Fuel Pin Data | Input Variable Name | Array Name | Sort Parameter Name |
|---|---|---|---|---|
| 11. | Smear Density | SMEAR | SMEARS(250) | SMEARMX,SMEARMI |
| 12. | Cladding Type | CLAD | CLADS(250) | CLADUAL |
| 13. | Coldwork (%) | COLDWRK | COLDWRS(250) | COLDMAX,COLDMIN |
| 14. | Cladding O.D. | CLADOD | CLADODS(250) | CLADMAX,CLADMIN |
| 15. | Wall Thickness | WALLTK | WALLTKS(250) | WALLMAX,WALLMIN |
| 16. | Bond Type | BOND | BONDS(250) | IBOND |
| 17. | Encapsulation | ENCAP | ENCAPS(250) | IENCAPS |
| 18. | Shroud | SHROUD | Not stored | No sort desired |
| 19. | Subassembly Type | SUBASSM | SUBASSS(250) | SUBVAL |
| 20. | Linear Power | LINPOW | LINPOWS(250) | RLINMAX,RLINMIN |
| 21. | Clad Temperature | CLADTMP | CLADTMS(250) | CLADTMX,CLADTMI |
| 22. | Fuel Center Line Temperature | FUELCLT | FUELCLS(250) | CLTMAX,CLTMIN |
| 23. | Status | STATUS | STATUSS(250) | STATVAL |

TABLE II

| | Fuel Pin Data | Input Variable Name | Array Name |
|---|---|---|---|
| 24. | Pin Location | LOCAT | LOCATS(250) |
| 25. | Pin Disposition | DISP | DISP(250) |
| 26. | Report Status | IREPORT | Not stored |
| 27. | Subassembly Number | SANO | SANOS(250) |
| 28. | Current Burnup | CURBU | CURBUS(250) |
| 29. | Goal Burnup | GOALBU | GOALBUS(250) |
| 30. | Report Number | REPORT | REPORTS(250) |
| 31. | Treat Test Number | TESTNO | TESTNOS(250) |

TABLE III

| Type of Fatal Error | Number of Such Tests Performed | Possible Octal Stops Encountered |
|---|---|---|
| Unexpected EØF | 32(40) | 1-3, 24-26, 34, 44-46, 51, 61-70, 100, 101, 104 111, 112, 115, 117, 121, 123, 137, 203, 207, 213 |
| Attempting Second Sort | 21(25) | 43, 55-57, 73-76, 102, 103 105, 106, 110, 114, 116, 120 122, 127, 202, 206, 212 |
| Data Base Parameter out of Range | 25(31) | 4-13, 15-23, 27-33, 35, 36, 47, 50, 124 |
| Sort Parameter Out of Range | 27(33) | 107, 113, 140-164, 204 205, 210, 211 |
| Sort Parameter Conflict | 13(15) | 52-54, 60, 125, 126, 130, 133, 134, 136, 165 166, 201 |

# APPENDIX A



## COMPUTER LISTING FOR FUELPIN

```
      PROGRAM FUELPIN(INP,FSET1=INP,OUT,FSET2=OUT,FSET3,FSET4,FSET5,FSET
     16)
C     GREEN
C
C*****************************************************************************
C
C     DUMP PARAMETER OVERRIDE:
C
C     PAR.  FORMAT(9X,I1).
C     PAR = 1 FOR COMPLETE ECHO-CHECK OF ALL PINS.
C           2 FOR COMPLETE SUPPRESSION OF ECHO CHECK.
C           3 FOR USE OF DUMP PARAMETER AS STATED BELOW.
C     NOTE THIS IS ONLY ONE CARD PLACED IN FRONT OF THE DATA DECK.
C
C*****************************************************************************
C
C     DATA ENTRIES:  FOR SETTING UP ORIGINAL DATA DECK.
C
CARD ONE.
C     SOURCE, TASK, NUMBER, TO, DUMP.  FORMAT(A10,2I5A,I5,A5,I5).
C     DUMP = LESS THAN ONE TO TERMINATE FUEL PIN DATA READ.  BLANK CARD =ONKS.
C            1 FOR COMPLETE PIN BY PIN DATA PRINTOUT.
C            ANY OTHER FIVE DIGIT INTEGER FOR SUPPRESSION OF DATA DUMP.
C     IF THE NUMBER VALUE TO BE ENTERED IS ALPHANUMERIC. USE THE A5 FIELD FOR
C     THE ALPHABETIC PART.
C
CARD TWO.
C     FUEL, UCOMP, RICM235, RICM233, PUCOMP, RICM239, RHO, C.
C     FORMAT(5X,I1,6F10.0,2A,I2).
C     FUEL = 1 FOR CARBIDE.
C            2 FOR NITRIDE.
C
CARD THREE.  CONDITIONAL.
C     COMMENT(J),J=1,8.  FORMAT(8A10). FUEL INFORMATION.
C     READS UP TO 5 SUCH CARDS DEPENDING ON THE VALUE OF C.
C     BE BRIEF.  COMMENTS COST REAL MONEY.
C
CARD FOUR.
C     SHEAR, CLAD, COLUMN, CLADDO, WALLTK, BOND, ENCAP, SHROUD, C1, C2
C     FORMAT(2E10.,4A10,2I1,2E10.,5(4X,I1)).
C     BOND  = 1 FOR YES.     ENCAP  = 1 FOR YES.     SHROUD  = 1 FOR YES.
C             2 FOR NO.              2 FOR NO.               2 FOR NO.
C
CARD FIVE.  CONDITIONAL.
C     COMM1(J),J=1,8.  FORMAT(8A10).  CLADDING INFORMATION.
C     READS UP TO 5 SUCH CARDS DEPENDING ON THE VALUE OF C1.
C     BE BRIEF.  COMMENTS COST REAL MONEY.
C
CARD SIX.  CONDITIONAL.
C     COMM2(J),J=1,8.  FORMAT(8A10).  BOND INFORMATION.
C     READS UP TO 5 SUCH CARDS DEPENDING ON THE VALUE OF C2.
C     BE BRIEF.  COMMENTS COST REAL MONEY.
C
CARD SEVEN.
C     SUBASSM, LINPOW, CLADTMP, FUELCLT, STATUS, C3.
C     FORMAT(A10,3F10.,2(4X,I1)).
C     STATUS = 1 FOR IN PROCESS.
C              2 FOR IN STORAGE.
C
CARD EIGHT.  CONDITIONAL.
C     COMM3(J),J=1,8.  FORMAT(8A10).  GENERAL INFORMATION.
C     READS UP TO 5 SUCH CARDS DEPENDING ON THE VALUE OF C3.
C     BE BRIEF.  COMMENTS COST REAL MONEY.
C
CARD NINE.
C     LOCAL, DISP, IREPORT.  FORMAT(3(3X,I2)).
C     LOCAL =  ONE              TWO              THREE            FOUR
C              (IN PROCESS)     (EBR-II)         (HOT CELL)       (TREAT)
C     DISP  =  1 - ARCHIVE.     1 - PRE-IRRAD.   1 - NDT.         1 - TEST
C              2 - DESIGN       2 - INTERIM.     2 - DESTRUCTIVE.    NO.
C              3 - FABRICATION.
C              4 - NDT.
C     IREPORT =1 - COMPLETE WITH REPORT NO. SPECIFIED BELOW.
C              2 - IN PROCESS.
C              3 - FOR ANY OTHER VALUE ENTERED = A NO-OP.
C
C
CARD TEN.  CONDITIONAL.
C     SAMO, CURRO, QUALBU.  FORMAT(A10,2I5A,F5.0)
C     READ IF LOCAL EQUALS 2.
C
CARD ELEVEN.  CONDITIONAL.
C     REPORT.  FORMAT(A10).
C     READ IF IREPORT EQUALS 1.
C
CARD TWELVE.  CONDITIONAL.
C     TESTNO.  FORMAT(A10).
C     READ IF LOCAL EQUALS 3.
C
C*****************************************************************************
C
C     SPECIFICATION OF SORTS DESIRED.
C
CARD ONE.
C     SORTYPE(I),I=1,10.  FORMAT(16I5).
C     TERMINATED BY BLANK ENTRY OR FULL CARD.
C     NORMAL CODE EXIT WHEN EOF ENCOUNTERED HERE.
C
CARD TWO.
C     TITLE(I),I=1,8.  FORMAT(8A10).
C
C*****************************************************************************
C
C     SPECIFICATION OF SORT PARAMETERS:
C
C     SORTYPE        ASSOCIATED VARIABLES                          FORMAT
C      VALUE         REQUIRED AS INPUT                             SPECIFICATION
C
C                                                                  A10
C        1           ISOURCE                                       5X,I5
C        2           ITASK                                         5X,I5,A5
C        3           INUMBER          IOI
C        4           IFUEL                                         5X,I5
C        5           UCMAX            UCMIN                        5X,2F10.0
C        6           MAX235           MIN235                       5X,2F10.0
C        7           MMAX233          MMIN233                      5X,2F10.0
C        8           ERROR RESULTING IN OCTAL STOP 71.
C        9           ERROR RESULTING IN OCTAL STOP 72.
C       10           RHOMAX           RHOMIN                       5X,2F10.0
C       11           SMEARMX          SMEARMI                      5X,2F10.0
C       12           CLADDAL                                       A10
C       13           COLOMAX          COLOMIN                      5X,2F10.0
C       14           CLADMAX          CLADMIN                      5X,2F10.0
C       15           WALLMAX          WALLMIN                      5X,2F10.0
C       16           IBUNU                                         5X,I5
C       17           IENDARS                                       5X,I5
C       18           ERROR RESULTING IN OCTAL STOP 77.
C       19           SUBVAL                                        A10
C       20           RLINMAX          RLINMIN                      5X,2F10.0
C       21           CLADTMX          CLADTMI                      5X,2F10.0
C       22           CLTMAX           CLTMIN                       5X,2F10.0
C       23           STATVAL                                       9A,I1
C
C*****************************************************************************
C
C     DEFINITION OF FSET USES:
C
C          1 INPUT:
C          2 OUTPUT.
C          3 FUEL INFORMATION.
C          4 CLADDING INFORMATION.
C          5 BOND INFORMATION.
C          6 GENERAL INFORMATION.
C
C*****************************************************************************
C
C     STRUCTURE OF CODE:
C
C     PROGRAM FUELPIN.  CONTAINS ALL READS FROM INPUT DECK.  CHECKS ALL DATA
C     AND ECHO-CHECKS IF REQUESTED.
```

```
C
C     SUBROUTINE SORTASK.  PERFORMS REQUESTED ELIMINATIONS ON MASTER DATA
C     SET.  SETS UP VECTOR ISAVE WHOSE ELEMENTS ARE THOSE LEFT AFTER
C     ELIMINATIONS.
C
C     SUBROUTINE STACK.  USES LIBRARY SUBROUTINES TO STRUCTURE ELEMENTS OF ISAVE
C     AS SPECIFIED BY APPROPRIATE INPUT.
C
C     SUBROUTINE TEXTPT.  PRINTS OUT IN REPORT FORM THE STRUCTURED DATA
C     SPECIFIED IN ISAVE.
C
C*********************************************************************
C
C     INTERNAL STOPS.
C
C     STOP  1  =  PROGRAM FUELPIN.  DETERMINING ORDER AND TYPES OF SORTS
C                 REQUESTED.  UNEXPECTED EOF IN TITLE READ.
C        4          IFUEL                                  5X,I5
C        5          UCMAX          UCMIN                   5X,2F10.0
C        6          XMA233         XMIN235                 5X,2F10.0
C        7          RMMA233        RMIN233                 5X,2F10.0
C        8          ERROR RESULTING IN OCTAL STOP 71.
C        9          ERROR RESULTING IN OCTAL STOP 72.
C       10          RHOMAX         RHOMIN                  5X,2F10.0
C       11          SMEARMX        SMEARMI                 5X,2F10.0
C       12          CLADUAL                                A10
C       13          COLOMAX        COLOMIN                 5X,2F10.0
C       14          CLADMAX        CLADMIN                 5X,2F10.0
C       15          WALLMAX        WALLMIN                 5X,2F10.0
C       16          IBOND                                  5X,I5
C       17          IENCAPS                                5X,I5
C       18          ERROR RESULTING IN OCTAL STOP 77.
C       19          SUBVAL                                 A10
C       20          RLINMAX        RLINMIN                 5X,2F10.0
C       21          CLADMX         CLADMI                  5X,2F10.0
C       22          CLIMAX         CLIMIN                  5X,2F10.0
C       23          STATVAL                                9A,11
C
C*********************************************************************
C
C     DEFINITION OF FSET USES.
C
C         1 INPUT.
C         2 OUTPUT.
C         3 FUEL INFORMATION.
C         4 CLADDING INFORMATION.
C         5 BOND INFORMATION.
C         6 GENERAL INFORMATION.
C
C*********************************************************************
C
C     STRUCTURE OF CODE.
C
C     PROGRAM FUELPIN.  CONTAINS ALL READS FROM INPUT DECK.  CHECKS ALL DATA
C     AND ECHO-CHECKS IF REQUESTED.
C
C     SUBROUTINE SORTASK.  PERFORMS REQUESTED ELIMINATIONS ON MASTER DATA
C     SET.  SETS UP VECTOR ISAVE WHOSE ELEMENTS ARE THOSE LEFT AFTER
C     ELIMINATIONS.
C
C     SUBROUTINE STACK.  USES LIBRARY SUBROUTINES TO STRUCTURE ELEMENTS OF ISAVE
C     AS SPECIFIED BY APPROPRIATE INPUT.
C
C     SUBROUTINE TEXTPT.  PRINTS OUT IN REPORT FORM THE STRUCTURED DATA
C     SPECIFIED IN ISAVE.
C
C*********************************************************************
C
C     INTERNAL STOPS.
C
C     STOP  1  =  PROGRAM FUELPIN.  DETERMINING ORDER AND TYPES OF SORTS
C                 REQUESTED.  UNEXPECTED EOF IN TITLE READ.
C     STOP  2  =  PROGRAM FUELPIN.  READING DATA ENTRY.
C                 UNEXPECTED EOF IN SOURCE READ.
C     STOP  3  =  PROGRAM FUELPIN.  READING DATA ENTRY.
C                 UNEXPECTED EOF IN FUEL READ.
C     STOP  4  =  PROGRAM FUELPIN.  READING DATA ENTRY.
C                 ERROR IN FUEL PARAMETER.
C     STOP  5  =  PROGRAM FUELPIN.  READING DATA ENTRY.
C                 ERROR IN UCOMP PARAMETER.
C     STOP  6  =  PROGRAM FUELPIN.  READING DATA ENTRY.
C                 ERROR IN MILL235 PARAMETER.
C     STOP  7  =  PROGRAM FUELPIN.  READING DATA ENTRY.
C                 ERROR IN MILL233 PARAMETER.
C     STOP 10  =  PROGRAM FUELPIN.  READING DATA ENTRY.
C                 ERROR IN RUCOMP PARAMETER.
C     STOP 11  =  PROGRAM FUELPIN.  READING DATA ENTRY.
C                 ERROR IN MILL239 PARAMETER.
C     STOP 12  =  PROGRAM FUELPIN.  READING DATA ENTRY.
C                 ERROR IN RHO PARAMETER.
C     STOP 13  =  PROGRAM FUELPIN.  READING DATA ENTRY.
C                 ERROR IN C PARAMETER.
C     STOP 14  =  PROGRAM FUELPIN.  READING DATA ENTRY.
C                 IMPROPER EXIT FROM COMMON READING LOOP.
C     STOP 15  =  PROGRAM FUELPIN.  READING DATA ENTRY.
C                 ERROR IN SMEAR PARAMETER.
C     STOP 16  =  PROGRAM FUELPIN.  READING DATA ENTRY.
C                 ERROR IN CLADWRK PARAMETER.
C     STOP 17  =  PROGRAM FUELPIN.  READING DATA ENTRY.
C                 ERROR IN CLADUO PARAMETER.
C     STOP 20  =  PROGRAM FUELPIN.  READING DATA ENTRY.
C                 ERROR IN WALLTK PARAMETER.
C     STOP 21  =  PROGRAM FUELPIN.  READING DATA ENTRY.
C                 ERROR IN BOND PARAMETER.
C     STOP 22  =  PROGRAM FUELPIN.  READING DATA ENTRY.
C                 ERROR IN ENLAP PARAMETER.
C     STOP 23  =  PROGRAM FUELPIN.  READING DATA ENTRY.
C                 ERROR IN SHROUD PARAMETER.
C     STOP 24  =  PROGRAM FUELPIN.  READING DATA ENTRY.
C                 UNEXPECTED EOF IN COMM1 READ.
C     STOP 25  =  PROGRAM FUELPIN.  READING DATA ENTRY.
C                 UNEXPECTED EOF IN COMM2 READ.
C     STOP 26  =  PROGRAM FUELPIN.  READING DATA ENTRY.
C                 UNEXPECTED EOF IN SHROUD READ.
C     STOP 27  =  PROGRAM FUELPIN.  READING DATA ENTRY.
C                 ERROR IN LINPOW PARAMETER.
C     STOP 30  =  PROGRAM FUELPIN.  READING DATA ENTRY.
C                 ERROR IN CLADTMP PARAMETER.
C     STOP 31  =  PROGRAM FUELPIN.  READING DATA ENTRY.
C                 ERROR IN FUELTMP PARAMETER.
C     STOP 32  =  PROGRAM FUELPIN.  READING DATA ENTRY.
C                 ERROR IN STATUS PARAMETER.
C     STOP 33  =  PROGRAM FUELPIN.  READING DATA ENTRY.
C                 ERROR IN SMEAR READ.
C     STOP 34  =  PROGRAM FUELPIN.  READING LOCATION ENTRIES.
C                 UNEXPECTED EOF IN LOCAT READ.
C     STOP 35  =  PROGRAM FUELPIN.  READING LOCATION ENTRIES.
C                 ERROR IN LOCAT PARAMETER.
C     STOP 36  =  PROGRAM FUELPIN.  READING LOCATION ENTRIES.
C                 ERROR IN DISP PARAMETER.
C     STOP37-42=  PROGRAM FUELPIN.  READING LOCATION ENTRIES.
C                 IMPROPER LOCAL DISP PARAMETER SET.
C     STOP 43  =  PROGRAM FUELPIN.  SORTYPE(I).I=4,10.
C                 ATTEMPTED SECOND FUEL SORT.
C     STOP 44  =  PROGRAM FUELPIN.  READING LOCATION ENTRIES.
C                 UNEXPECTED EOF IN SAND READ.
C     STOP 45  =  PROGRAM FUELPIN.  READING LOCATION ENTRIES.
C                 UNEXPECTED EOF IN REPORT READ.
C     STOP 46  =  PROGRAM FUELPIN.  READING LOCATION ENTRIES.
C                 UNEXPECTED EOF IN TESTNO READ.
C     STOP 47  =  PROGRAM FUELPIN.  READING DATA ENTRY.
C                 ERROR IN L1 PARAMETER.
C     STOP 50  =  PROGRAM FUELPIN.  READING DATA ENTRY.
C                 ERROR IN L2 PARAMETER.
C     STOP 51  =  PROGRAM FUELPIN.  READING DATA ENTRY.
C                 UNEXPECTED EOF IN COMM3 READ.
C     STOP52-54=  PROGRAM FUELPIN.  DETERMINING ORDER AND TYPES OF SORTS.
C                 ERROR IN SORTYPE REQUESTED.
C     STOP 55  =  PROGRAM FUELPIN.  SORTYPE(I).I=1,3.
C                 ATTEMPTED SECOND SOURCE SORT.
C     STOP 56  =  PROGRAM FUELPIN.  SORTYPE(I).I=1,3.
C                 ATTEMPTED SECOND TASK SORT.
C     STOP 57  =  PROGRAM FUELPIN.  SORTYPE(I).I=1,3.
C                 ATTEMPTED SECOND NUMBER SORT.
C     STOP 60  =  PROGRAM FUELPIN.  SORTYPE(I).I=1,3.
C                 LOGIC ERROR IN ABOVE THREE COMBINATIONS.
C     STOP 61  =  PROGRAM FUELPIN.  SORTYPE(I).I=4,10.
C                 UNEXPECTED EOF IN IFUEL READ.
C     STOP 62  =  PROGRAM FUELPIN.  SORTYPE(I).I=1,3.
C                 UNEXPECTED EOF IN ISOURCE READ.
C     STOP 63  =  PROGRAM FUELPIN.  SORTYPE(I).I=1,3.
C                 UNEXPECTED EOF IN ITASK READ.
C     STOP 64  =  PROGRAM FUELPIN.  SORTYPE(I).I=1,3.
C                 UNEXPECTED EOF IN INUMBER READ.
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C     STOP65-70= PROGRAM FUELPIN.  SORTYPE(I),I=4,10.
C                UNEXPECTED EOF IN ELIMINATION MAX, MIN VALUES.
C     STOP71-72= PROGRAM FUELPIN.  SORTYPE(I),I=4,10.
C                ATTEMPTING UNALLOWED SORT.
C     STOP 73  = PROGRAM FUELPIN.  SORTYPE(I),I=4,10.
C                ATTEMPTED SECOND ELIMINATION ON U235 ENRICHMENT.
C     STOP 74  = PROGRAM FUELPIN.  SORTYPE(I),I=4,10.
C                ATTEMPTED SECOND ELIMINATION ON URANIUM COMPOSITION.
C     STOP 75  = PROGRAM FUELPIN.  SORTYPE(I),I=4,10.
C                ATTEMPTED SECOND ELIMINATION ON U233 ENRICHMENT.
C     STOP 76  = PROGRAM FUELPIN.  SORTYPE(I),I=4,10.
C                ATTEMPTED SECOND ELIMINATION ON FUEL DENSITY.
C     STOP 77  = PROGRAM FUELPIN.  SORTYPE(I),I=11,20.
C                ATTEMPTED UNALLOWED SHROUD SORT.
C     STOP 101 = PROGRAM FUELPIN.  SORTYPE(I),I=11,20.
C                UNEXPECTED EOF IN SHEARMX, SHEARMI READ.
C     STOP 101 = PROGRAM FUELPIN.  SORTYPE(I),I=11,20.
C                UNEXPECTED EOF IN CLADVAL READ.
C     STOP 102 = PROGRAM FUELPIN.  SORTYPE(I),I=11,20.
C                ATTEMPTED SECOND SHEAR SORT.
C     STOP 103 = PROGRAM FUELPIN.  SORTYPE(I),I=11,20.
C                ATTEMPTED SECOND CLAD SORT.
C     STOP 104 = PROGRAM FUELPIN.  SORTYPE(I),I=11,20.
C                UNEXPECTED EOF IN COLUMAX READ.
C     STOP 105 = PROGRAM FUELPIN.  SORTYPE(I),I=11,20.
C                ATTEMPTED SECOND COLOWRK SORT.
C     STOP 106 = PROGRAM FUELPIN.  SORTYPE(I),I=11,20.
C                ATTEMPTED SECOND BOND SORT.
C     STOP 107 = PROGRAM FUELPIN.  SORTYPE(I),I=11,20.
C                ERROR IN INBND PARAMETER.
C     STOP 110 = PROGRAM FUELPIN.  SORTYPE(I),I=11,20.
C                ATTEMPTED SECOND ENCAP SORT.
C     STOP 111 = PROGRAM FUELPIN.  SORTYPE(I),I=11,20.
C                UNEXPECTED EOF IN IBOND READ.
C     STOP 112 = PROGRAM FUELPIN.  SORTYPE(I),I=11,20.
C                UNEXPECTED EOF IN IENCAP READ.
C     STOP 113 = PROGRAM FUELPIN.  SORTYPE(I),I=11,20.
C                ERROR IN IENCAP PARAMETER.
C     STOP 114 = PROGRAM FUELPIN.  SORTYPE(I),I=11,20.
C                ATTEMPTED SECOND CLADOD SORT.
C     STOP 115 = PROGRAM FUELPIN.  SORTYPE(I),I=11,20.
C                UNEXPECTED EOF IN CLADMX READ.
C     STOP 116 = PROGRAM FUELPIN.  SORTYPE(I),I=11,20.
C                ATTEMPTED SECOND WALLTK SORT.
C     STOP 117 = PROGRAM FUELPIN.  SORTYPE(I),I=4,10.
C                UNEXPECTED EOF IN WALLMAX READ.
C     STOP 12- = PROGRAM FUELPIN.  SORTYPE(I),I=4,10.
C                ATTEMPTED SECOND SUBASSM SORT.
C     STOP 121 = PROGRAM FUELPIN.  SORTYPE(I),I=4,10.
C                UNEXPECTED EOF IN SUBMAX READ.
C     STOP 122 = PROGRAM FUELPIN.  SORTYPE(I),I=4,10.
C                ATTEMPTED SECOND LINPOW SORT.
C     STOP 123 = PROGRAM FUELPIN.  SORTYPE(I),I=4,10.
C                UNEXPECTED EOF IN RLINMAX READ.
C     STOP 124 = PROGRAM FUELPIN.  READING IN DATA ENTRY.
C                ERROR IN C3 PARAMETER.
C     STOP 125 = PROGRAM FUELPIN.  SORTYPE(I),I=4,10.
C                1ST VALUE TO LARGE.  LOGIC BREAKDOWN.
C     STOP 126 = PROGRAM FUELPIN.  SORTYPE(I),I=11,20.
C                1ST VALUE TO LARGE.  LOGIC BREAKDOWN.
C     STOP 127 = PROGRAM FUELPIN.  DETERMINING ORDER AND TYPES OF SORTS
C                DUPLICATE SORT REQUESTED.
C     STOP 13- = SUBROUTINE SORTASK.  FUEL, VCUMP, THRU RHO ELIMINATIONS.
C                ISORTER VALUE TO LARGE.  LOGIC BREAKDOWN.
C     STOP 131 = SUBROUTINE SORTASK.  FUEL, VCUMP, THRU RHO ELIMINATIONS.
C                ATTEMPTED UNALLOWED SORT.
C     STOP 132 = SUBROUTINE SORTASK.  FUEL, VCUMP, THRU RHO ELIMINATIONS.
C                ATTEMPTED UNALLOWED SORT.
C     STOP 133 = SUBROUTINE SORTASK.  SHEAR THRU WALLTK ELIMINATIONS.
C                ISORTER VALUE TO LARGE.  LOGIC BREAKDOWN.
C     STOP 134 = SUBROUTINE SORTASK.  BOND THRU LINPOW ELIMINATIONS.
C                ISORTER VALUE TO LARGE.  LOGIC BREAKDOWN.
C     STOP 135 = SUBROUTINE SORTASK.  BOND THRU LINPOW ELIMINATIONS.
C                ATTEMPTED UNALLOWED SORT.
C     STOP 136 = SUBROUTINE SORTASK.  CLADMP, FUELCLT, STATUS ELIMINATIONS.
C                ISORTER VALUE TO LARGE.  LOGIC BREAKDOWN.
C     STOP 137 = PROGRAM FUELPIN.  BANNERS DUMP PARAMETER OVERRIDE.
C                UNEXPECTED EOF IN PAN READ.
C     STOP 140 = PROGRAM FUELPIN.  SORTYPE(I),I=4,10.
C                IFUEL PARAMETER OUT OF RANGE.
C     STOP 141 = PROGRAM FUELPIN.  SORTYPE(I),I=4,10.
C                VCMIN PARAMETER OUT OF RANGE.
C     STOP 142 = PROGRAM FUELPIN.  SORTYPE(I),I=4,10.
C                VCMAX PARAMETER OUT OF RANGE.
C     STOP 143 = PROGRAM FUELPIN.  SORTYPE(I),I=4,10.
C                MAX235 PARAMETER OUT OF RANGE.
C     STOP 144 = PROGRAM FUELPIN.  SORTYPE(I),I=4,10.
C                MIN235 PARAMETER OUT OF RANGE.
C     STOP 145 = PROGRAM FUELPIN.  SORTYPE(I),I=4,10.
C                MMAX233 PARAMETER OUT OF RANGE.
C     STOP 146 = PROGRAM FUELPIN.  SORTYPE(I),I=4,10.
C                MMIN233 PARAMETER OUT OF RANGE.
C     STOP 147 = PROGRAM FUELPIN.  SORTYPE(I),I=4,10.
C                MNOMAX PARAMETER OUT OF RANGE.
C     STOP 150 = PROGRAM FUELPIN.  SORTYPE(I),I=4,10.
C                MNOMIN PARAMETER OUT OF RANGE.
C     STOP 151 = PROGRAM FUELPIN.  SORTYPE(I),I=11,20.
C                SHEARMX PARAMETER OUT OF RANGE.
C     STOP 152 = PROGRAM FUELPIN.  SORTYPE(I),I=11,20.
C                SHEARMI PARAMETER OUT OF RANGE.
C     STOP 153 = PROGRAM FUELPIN.  SORTYPE(I),I=11,20.
C                COLUMAX PARAMETER OUT OF RANGE.
C     STOP 154 = PROGRAM FUELPIN.  SORTYPE(I),I=11,20.
C                COLOMIN PARAMETER OUT OF RANGE.
C     STOP 155 = PROGRAM FUELPIN.  SORTYPE(I),I=11,20.
C                CLADMAX PARAMETER OUT OF RANGE.
C     STOP 156 = PROGRAM FUELPIN.  SORTYPE(I),I=11,20.
C                CLADMIN PARAMETER OUT OF RANGE.
C     STOP 157 = PROGRAM FUELPIN.  SORTYPE(I),I=11,20.
C                WALLMAX PARAMETER OUT OF RANGE.
C     STOP 160 = PROGRAM FUELPIN.  SORTYPE(I),I=11,20.
C                WALLMIN PARAMETER OUT OF RANGE.
C     STOP 161 =
C
C     STOP 162 = PROGRAM FUELPIN.  SORTYPE(I),I=21,23.
C                STATVAL PARAMETER OUT OF RANGE.
C     STOP 163 = PROGRAM FUELPIN.  SORTYPE(I),I=11,20.
C                RLINMAX PARAMETER OUT OF RANGE.
C     STOP 164 = PROGRAM FUELPIN.  SORTYPE(I),I=11,20.
C                RLINMIN PARAMETER OUT OF RANGE.
C     STOP 165 = PROGRAM FUELPIN.  DETERMINING ORDER AND TYPES OF SUMIS.
C                SORTYPE(I) RANGE ERROR.
C     STOP 166 = PROGRAM FUELPIN.  DETERMINING ORDER AND TYPES OF SUMIS.
C                10 MANY SUMIS REQUESTED.
C     167 - 176= PROGRAM FUELPIN.  SETTING UP PERMANENT STORAGE.
C                ATTEMPTING TO WRITE OUT TO MUCH INFORMATION.
C     177 - 200= PROGRAM FUELPIN.  READING DATA ENTRY.
C                ATTEMPTING TO OVERSTORE DIMENSIONED COMMENT VARIABLE.
C     STOP 201 = PROGRAM FUELPIN.  SORTYPE(I),I=21,23.
C                1ST RANGE ERROR.
C     STOP 202 = PROGRAM FUELPIN.  SORTYPE(I),I=21,23.
C                ATTEMPTED SECOND CLAUTMP SORT.
C     STOP 203 = PROGRAM FUELPIN.  SORTYPE(I),I=21,23.
C                UNEXPECTED EOF IN CLMOIMX READ.
C     STOP 204 = PROGRAM FUELPIN.  SORTYPE(I),I=21,23.
C                CLAUIMX PARAMETER OUT OF RANGE.
C     STOP 205 = PROGRAM FUELPIN.  SORTYPE(I),I=21,23.
C                CLAUIMI PARAMETER OUT OF RANGE.
C     STOP 206 = PROGRAM FUELPIN.  SORTYPE(I),I=21,23.
C                ATTEMPTED SECOND CLTMAX SORT.
C     STOP 207 = PROGRAM FUELPIN.  SORTYPE(I),I=21,23.
C                UNEXPECTED EOF IN CLTMAX READ.
C     STOP 210 = PROGRAM FUELPIN.  SORTYPE(I),I=21,23.
C                CLTMAX PARAMETER OUT OF RANGE.
C     STOP 211 = PROGRAM FUELPIN.  SORTYPE(I),I=21,23.
C                CLTMIN PARAMETER OUT OF RANGE.
C     STOP 212 = PROGRAM FUELPIN.  SORTYPE(I),I=21,23.
C                ATTEMPTED SECOND STATVAL SORT.
C     STOP 213 = PROGRAM FUELPIN.  SORTYPE(I),I=21,23.
C                UNEXPECTED EOF IN STATVAL READ.
C
C*****************************************************************
C
C     DEFINITION OF IMPORTANT PARAMETERS.
C
C     IPRINT          = UNUSED PARAMETER SET BY NEGATIVE VALUE OF PAR.
C     ISAVE(I)        = ELEMENTS OF A(I,K) MATRIX BEING RETAINED.
C     ISOR            = NUMBER OF SORTS REQUESTED.
C     ITHACK          = NUMBER OF SORT PROBLEM BEING DONE.  USED PRIMARILY
C                       FOR DOING APPROPRIATE SET-EEN RUN INITIALIZATIONS.
C     PINSUM          = NUMBER OF FUEL PIN DATA SETS ENCOUNTERED.
C                       EQUIVALENT OT FINAL VALUE OF K PARAMETER.
C
C*****************************************************************
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C
      DIMENSION TITLE(8), COMMENT(40), COMM1(40), COMM2(40), COMM3(40),
     1 KEY(30)
      COMMON IC(250),       IL1(250),      IC2(250),      IC3(250),
     1       ISAVE(250),    SOURCES(250), TASKS(250),    NUMBERS(250),
     2       FUELS(250),    ULOMPS(250),  RICH235(250),  RICH233(250),
     3       RHOS(250),     SMEARS(250),  CLAOS(250),    CULOWRS(250),
     4       CLAOOS(250),   WALLTKS(250), BONDS(250),    ENCAPS(250),
     5       SUBASSS(250),  LINPOWS(250), CLAOTMS(250),  FUELCLS(250),
     6       STATUSS(250),  LOCATS(250),  DISPS(250),    SANDS(250),
     7       CUMBUS(250),   GOALBUS(250), REPORTS(250),  TESTNOS(250),
     8       IUS(250)
      INTEGER SORTYPE(16),
     1       TASK,    FUEL,    C,       C1,      C2,      BONO,
     2       ENCAP,   SMROUO,  STATUS,  C3,      PINSUM,  SORT,
     3       DISP,    OUMP,    PAR,     SOURCE,  STATVAL, SUBASSS,
     4       TASKS,   FUELS,   BONOS,   ENCAPS,  STATUSS, SUBASSM,
     5       SOURCES, SUBVAL
      REAL MAX235, MIN235, LINPOW, LINPOWS
      K = 0
      IPRINT = 0
      ITHACK = 0
C
C     OUMP PARAMETER OVERRIDE.
C
      READ(1,3001) PAR
      IF(EOF,1)2305,2310
 2305 STOP 137
 2310 CONTINUE
      IF(PAR .LT. 1) IPRINT = 1
      PAR = IABS(PAR)
      IF(PAR .LE. 1) PAR = 1
      IF(PAR .GT. 31 PAR = 3
C
C     INITIALIZATIONS.
C
      KEY(1) = 7HSOURCE $ KEY(11) = 7HSMEAR  $ KEY(21) = 7HCLAOIMP
      KEY(2) = 7HTASK   $ KEY(12) = 7HCLAO   $ KEY(22) = 7HFUELCLT
      KEY(3) = 7HNUMBER $ KEY(13) = 7HCULOWRK$ KEY(23) = 7HSTATUS
      KEY(4) = 7HFUEL   $ KEY(14) = 7HCLAOOO $ KEY(24) = 7HLOCAT
      KEY(5) = 7HULOMP  $ KEY(15) = 7HWALLTK $ KEY(25) = 7HDISP
      KEY(6) = 7HRICH235$ KEY(16) = 7HBOND   $ KEY(26) = 7HSAND
      KEY(7) = 7HRICH233$ KEY(17) = 7HENCAP  $ KEY(27) = 7HCUMBU
      KEY(8) = 7HSMROUO $ KEY(18) = 7HSMROUO $ KEY(28) = 7HGUALBU
      KEY(9) = 7HSMROUO $ KEY(19) = 7HSUBASSM$ KEY(29) = 7HREPORT
      KEY(10)= 7HRHO    $ KEY(20) = 7HLINPOW$ KEY(30) = 7HTESTNO
      KEY(31)= 7HIU
  300 CONTINUE
      K = K + 1
      IF(ITHACK .GT. 1) GO TO 275
      DO 345 I = 1,250
      IC(I) = 0
      IC1(I) = 0
      IC2(I) = 0
      IC3(I) = 0
      ISAVE(I) = 0
  345 CONTINUE
      DO 2320 I = 1,250
      LOCAS(I)  = 0
      DISPS(I)  = 0
      SANDS(I)  = 10H
      CUMBUS(I) = 0
      GOALBUS(I) = 0
      REPORTS(I) = 10H
      TESTNOS(I) = 10H
 2320 CONTINUE
  275 CONTINUE
      DO 335 I = 1,40
      COMMENT(I) = 10H
      COMM1(I) = 10H
      COMM2(I) = 10H
      COMM3(I) = 10H
  335 CONTINUE
      DO 325 I = 1,16
      SORTYPE(I) = 0
  325 CONTINUE
      DO 315 I = 1,8
      TITLE(I) = 10H
  315 CONTINUE
      IO = 10H
C
C     READING DATA ENTRY.
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C
      READ(1,1025) SOURCE, TASK, NUMBER, IO, OUMP
      IF(EOF,1)70,80
   70 CONTINUE
      STOP 2
   80 CONTINUE
      IF(OUMP .LT. 1) GO TO 2205
C     PRECEDING TEST CAN CAUSE EXIT FROM PIN DATA READ CYCLE.
      IOUMP = OUMP
      IF(PAR .EQ. 3) GO TO 2205
      OUMP = PAR
      IOUMP = OUMP
 2205 CONTINUE
      IF(OUMP .NE. 1) GO TO 245
      IF(ITHACK .GT. 1) GO TO 185
      WRITE(2,1150)
  185 CONTINUE
      WRITE(2,1060) K, SOURCE, TASK, NUMBER, IO
  245 CONTINUE
      READ(1,1030)FUEL, ULOMP, RICH235, RICH233, PUCOMP, RICH239, RHO, C
      IF(EOF,1)90,100
   90 CONTINUE
      STOP 3
  100 CONTINUE
      IF(FUEL .LT. 0 .OR. FUEL .GT. 21 STOP 4
      IF(ULOMP  .LT. 0.0 .OR. UCOMP  .GT. 100.01 STOP 5
      IF(RICH235 .LT. 0.0 .OR. RICH235 .GT. 100.01 STOP 6
      IF(RICH233 .LT. 0.0 .OR. RICH233 .GT. 100.01 STOP 7
      IF(PUCOMP  .LT. 0.0 .OR. PUCOMP  .GT. 100.01 STOPI0
      IF(RICH239 .LT. 0.0 .OR. RICH239 .GT. 100.01 STOPI1
      IF(RHO     .LT. 30.0 .OR. RHO    .GT. 100.01 STOPI2
      IF(C .LT. 0) C = 0
      IF(C .GT. 5) STOP 13
      IF(OUMP .NE. 1) GO TO 235
      IF(FUEL .EQ. 1) WRITE(2,1155)
      IF(FUEL .EQ. 2) WRITE(2,1140)
      WRITE(2,1020)
      WRITE(2,1145)UCOMP,RICH235,RICH233,PUCOMP,RICH239,RHO
  235 CONTINUE
      IF(C .EQ. 0) GO TO 1405
      ISTART = -7 $ ISTOP = 0
      DO 110 I = 1,C
      ISTART = ISTART + 8 $ ISTOP = ISTOP + 8
      IF(ISTOP .GT. 401 STOP 17
      READ(1,1005) (COMMENT(J),J=ISTART,ISTOP)
      IF(EOF,1)121,110
  121 CONTINUE
      STOP 14
  110 CONTINUE
 1405 CONTINUE
      READ(1,1035)SMEAR, CLAO, CULOWRK, CLAOOO, WALLTK, BONO, ENCAP,
     1 SMROUO, C1, C2
      IF(EOF,1)130,140
  130 CONTINUE
      STOP 33
  140 CONTINUE
      IF(SMEAR   .LT. 50.00 .OR. SMEAR   .GT. 100.01 STOP 15
      IF(CULOWRK .LT. 0.00  .OR. CULOWRK .GT. 100.01 STOP 16
      IF(CLAOOO  .LT. 0.00  .OR. CLAOOO  .GT.   1.01 STOP 17
      IF(WALLTK  .LT. 0.00  .OR. WALLTK  .GT.  0.051 STOP 20
      IF(BOND    .LT. 1     .OR. BONO    .GT. 51 STOP 21
      IF(ENCAP   .LT. 1     .OR. ENCAP   .GT. 51 STOP 22
      IF(SMROUO  .LT. 1     .OR. SMROUO  .GT. 51 STOP 23
      IF(C1 .LE. 0) C1 = 0
      IF(C1 .GT. 5) STOP 47
      IF(C2 .LE. 0) C2 = 0
      IF(C2 .GT. 5) STOP 50
      IF(OUMP .NE. 1) GO TO 175
      WRITE(2,2225T SMEAR
      IF(ENCAP .EQ. 1) WRITE(2,1120)
      IF(ENCAP .EQ. 2) WRITE(2,1115)
      WRITE(2,1135T CLAO, CULOWRK, CLAOOO, WALLTK
      IF(BOND .EQ. 1) WRITE(2,1130)
      IF(BOND .EQ. 2) WRITE(2,1125)
      IF(SMROUO .EQ. 1) WRITE(2,1110)
      IF(SMROUO .EQ. 2) WRITE(2,1105)
  175 CONTINUE
      IF(C1 .EQ. 0) GO TO 1410
      ISTART =-7 $ ISTOP = 0
      DO 150 I = 1,C1
      ISTART = ISTART + 8 $ ISTOP = ISTOP + 8
      IF(ISTOP .GT. 40) STOP 200
      READ(1,1005) (COMM1(J),J=ISTART,ISTOP)
      IF(EOF,1)190,150
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  160 CONTINUE
      STOP 24
  150 CONTINUE
 1410 CONTINUE
      IF(C2 .EQ. 0) GO TO 1415
      ISTART = -7 $ ISTOP = 0
      DO 170 I = 1,C2
      ISTART = ISTART + 8 $ ISTOP = ISTOP + 8
      IF(ISTOP .GT. 40) STOP 201
      READ(1,1005) (COMM2(J),J=ISTART,ISTOP)
      IF(EOF,1)180,170
  180 CONTINUE
      STOP 25
  170 CONTINUE
 1415 CONTINUE
      READ(1,1040) SUBASSM, LINPOW, CLADTMP, FUELCLT, STATUS, C3
      IF(EOF,1)190,200
  190 CONTINUE
      STOP 26
  200 CONTINUE
      IF(LINPOW .LT. 0.0 .OR. LINPOW .GT. 1000.0) STOP 27
      IF(CLADTMP .LT. 0.0 .OR. CLADTMP .GT. 1000.0) STOP 30
      IF(FUELTMP .LT. 0.0 .OR. FUELTMP.GT. 4000.0) STOP 31
      IF(STATUS .LT. 1 .OR. STATUS .GT. 2) STOP 32
      IF(OUMP .NE. 1) GO TO 165
      WRITE(2,1100) SUBASSM,LINPOW,CLADTMP,FUELCLT
      IF(STATUS .EQ. 1) WRITE(2,1095)
      IF(STATUS .EQ. 2) WRITE(2,1090)
  165 CONTINUE
      IF(C3 .LT. 0) C3 = 0
      IF(C3 .GT. 5) STOP 124
      IF(C3 .EQ. 0) GO TO 1420
      ISTART = -7 $ ISTOP = 0
      DO 305 I = 1,C3
      ISTART = ISTART + 8 $ ISTOP = ISTOP + 8
      IF(ISTOP .GT. 40) STOP 202
      READ(1,1005) (COMM3(J),J=ISTART,ISTOP)
      IF(EOF,1) 295,285
  295 CONTINUE
      STOP 51
  285 CONTINUE
  305 CONTINUE
 1420 CONTINUE
C
C     READING LOCATION ENTRIES.
C
      READ(1,1045) LOCAT, DISP, IREPORT
      IF(EOF,1)210,220
  210 CONTINUE
      STOP 34
  220 CONTINUE
      IF(LOCAT .LT. 1 .OR. LOCAT .GT. 5) STOP 35
      IF(DISP .LT. 1) STOP 36
      IF(LOCAT .EQ. 5) GO TO 155
      IF(LOCAT .EQ. 1 .AND. DISP .GT. 4) STOP 37
      IF(LOCAT .EQ. 2 .AND. DISP .GT. 2) STOP 40
      IF(LOCAT .EQ. 3 .AND. DISP .GT. 2) STOP 41
      IF(LOCAT .EQ. 4 .AND. DISP .GT. 1) STOP 42
      IF(IREPORT .LT. 1 .OR. IREPORT .GT. 2) IREPORT = 3
      IF(OUMP .NE. 1) GO TO 155
      GO TO(1166,1165,111,1151),LOCAT
 1166 CONTINUE
      GO TO(111,105,95,91),DISP
  111 WRITE(2,89) $ GO TO 155
  105 WRITE(2,79) $ GO TO 155
   95 WRITE(2,69) $ GO TO 155
   91 WRITE(2,59) $ GO TO 155
  145 CONTINUE
      GO TO(45,35),DISP
   45 WRITE(2,29) $ GO TO 155
   35 WRITE(2,19) $ GO TO 155
 1171 CONTINUE
      GO TO(5,1160),DISP
    5 WRITE(2,1165) $ GO TO 155
 1160 WRITE(2,1170) $ GO TO 155
  135 WRITE(2,1070) $ GO TO 155
  155 CONTINUE
      IF(LOCAT .EQ. 2) GO TO 230
      IF(LOCAT .EQ. 5) GO TO 250
      GO TO 260
  230 CONTINUE
      READ(1,1050) SANO, LOWHO, GOALBU
      IF(EOF,1)270,131
  270 CONTINUE
      STOP 44
  131 CONTINUE
      IF(OUMP .NE. 1) GO TO 200
      WRITE(2,1201) SANO, LOWHO, GOALBU
      GO TO 240
  250 CONTINUE
      READ(1,1055) TESTNO
      IF(EOF,1)290,125
  290 CONTINUE
      STOP 46
  125 CONTINUE
      IF(OUMP .NE. 1) GO TO 260
      WRITE(2,1065) TESTNO
  260 CONTINUE
      IF(IMEPORT .NE. 1) GO TO 240
      READ(1,1055) REPORT
      IF(EOF,1) 280,24
  280 CONTINUE
      STOP 45
  240 CONTINUE
      IF(OUMP .NE. 1) GO TO 1450
      IF(IMEPORT .EQ. 1) WRITE(2,1255) REPORT
      IF(IMEPORT .EQ. 2) WRITE(2,1256)
 1250 CONTINUE
C
C     SETTING UP PERMANENT STORAGE.
C
CHECK THIS MODULE SECTION FOR LOGIC ERROR.
      BONDS(K)   =          BOND
      CLADDS(K)  =        CLADDU
      CLADS(K)   =          CLAD
      CLADIMS(K) =       CLADIMP
      COLORS(K)  =       COLORK
      CONBUS(K)  = 10H    CONBU
      DISPS(K)   = 10H      DISP
      ENCAPS(K)  =         ENCAP
      FUELCLS(K) =       FUELCLT
      FUELS(K)   =          FUEL
      GOALBUS(K) = 10H    GOALBU
      IOS(K)     =     10
      LINPOWS(K) =       LINPOW
      LOCATS(K)  = 10H     LOCAT
      NUMBERS(K) =       NUMBER
      REPORTS(K) = 10H    REPORT
      RHOS(K)    =          RHO
      RICHJDS(K) =       RICHJD
      RICHJSS(K) =       RICHJS
      SANOS(K)   = 10H      SANO
      SHEAMS(K)  =        SHEAM
      SOURCES(K) =       SOURCE
      STATUSS(K) =       STATUS
      SUBASSS(K) =       SUBASS
      TASKS(K)   =         TASK
      TESTNOS(K) = 10H    TESTNO
      UCONPS(K)  =        UCONP
      ALLIKS(K)  =       ALLTK
      ISTART = 1 $ ISTOP = 8
      DO 310 I = 1,C
      IF(ISTOP .GT. 40) STOP 167
      WRITE(3,1005) (COMMEN(J),J=ISTART,ISTOP)
      ISTART = ISTART + 8 $ ISTOP = ISTOP + 8
  310 CONTINUE
      ISTART = 1 $ ISTOP = 8
      DO 320 I = 1,C1
      IF(ISTOP .GT. 40) STOP 170
      WRITE(4,1005) (COMM1(J),J=ISTART,ISTOP)
      ISTART = ISTART + 8 $ ISTOP = ISTOP + 8
  320 CONTINUE
      ISTART = 1 $ ISTOP = 8
      DO 330 I = 1,C2
      IF(ISTOP .GT. 40) STOP 171
      WRITE(5,1005) (COMM2(J),J=ISTART,ISTOP)
      ISTART = ISTART + 8 $ ISTOP = ISTOP + 8
  330 CONTINUE
      ISTART = 1 $ ISTOP = 8
      DO 195 I = 1,C3
      IF(ISTOP .GT. 40) STOP 172
      WRITE(6,1005) (COMM3(J),J=ISTART,ISTOP)
      ISTART = ISTART + 8 $ ISTOP = ISTOP + 8
  195 CONTINUE
      IC1(K) = C $ IC1(K) = C1
      IC2(K) = C2 $ IC2(K) = C3
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      IF(OUMP .NE. 1) GO TO 1205
      WRITE(2,1210)
      ISTART = 1 $ ISTOP = 8
      DO 1215 I = 1,C
      IF(ISTOP .GT. 401) STOP 173
      WRITE(2,1005) (COMMEN1(J),J=ISTART,ISTOP)
      ISTART = ISTART + 8 $ ISTOP = ISTOP + 8
 1215 CONTINUE
      WRITE(2,1220)
      ISTART = 1 $ ISTOP = 8
      DO 1225 I = 1,C1
      IF(ISTOP .GT. 401) STOP 174
      WRITE(2,1005) (COMM1(J),J=ISTART,ISTOP)
      ISTART = ISTART + 8 $ ISTOP = ISTOP + 8
 1225 CONTINUE
      WRITE(2,1230)
      ISTART = 1 $ ISTOP = 8
      DO 1235 I = 1,C2
      IF(ISTOP .GT. 401) STOP 175
      WRITE(2,1005) (COMM2(J),J=ISTART,ISTOP)
      ISTART = ISTART + 8 $ ISTOP = ISTOP + 8
 1235 CONTINUE
      WRITE(2,1240)
      ISTART = 1 $ ISTOP = 8
      DO 1245 I = 1,C3
      IF(ISTART .GT. 401 STOP 176
      WRITE(2,1005) (COMM3(J),J=ISTART,ISTOP)
      ISTART = ISTART + 8 $ ISTOP = ISTOP + 8
 1245 CONTINUE
 1205 CONTINUE
      IF(OUMP .NE. 1) GO TO 300
      WRITE(2,215T)
      GO TO 340
C
C     DETERMINING ORDER AND TYPES OF SORTS REQUESTED.
C
  205 CONTINUE
      PINSUM = K
      ISORT = 0
      DO 2315 I = 1,16
      SORTYPE(I) = 0
 2315 CONTINUE
      ITRACK = ITRACK + 1
      READ(1,-000) (SORTYPE(I),I =1,16)
      IF(EUF,1)10,20
   10 CONTINUE
      STOP 777
   20 CONTINUE
      DO 30 I = 1,16
      IF(SORTYPE(I) .LE. 0) GO TO 40
      IF(SORTYPE(I) .EQ. 01 STOP 52
      IF(SORTYPE(I) .EQ. 01 STOP 53
      IF(SORTYPE(I) .EQ. 101 STOP 54
      IF(SORTYPE(I) .GT. 211 STOP 165
      ISORT = ISORT + 1
      IF(ISORT .GT. 16) STOP 166
   30 CONTINUE
   40 CONTINUE
      IF(ISORT .EQ. 1) GO TO 350
      DO 255 I = 1,ISORT
      DO 255 K = 1,ISORT
      IF(I .EQ. K) GO TO 255
      IF(SORTYPE(I) .EQ. SORTYPE(K)) GO TO 265
  255 CONTINUE
      GO TO 350
  265 CONTINUE
      WRITE(2,3551 SORTYPE(I), SORTYPE(K)
      STOP 12
  350 CONTINUE
      READ(1,1005) (TITLE(I),I=1,8)
      IF(EUF,1)50,60
   50 CONTINUE
      STOP 1
   60 CONTINUE
      WRITE(2,1010) (TITLE(I),I=1,8)
      WRITE(2,1015)
      WRITE(2,1165) $ WRITE(2,1195)
      DO 1100 I = 1,ISORT
      SORT = SORTYPE(I)
      WRITE(2,1200) I, KEY(SORT)
 1100 CONTINUE
C
C     READING IN SORT PARAMETERS.
C
      ISUBV = 0
      IFU = IMICM35 = ICU = IMICM33 = IRMO = 0
      ILINPOW = ISM = ICLAO = ICOLO = I8 = IENCAP = ICLADUO = IWALLIK =
     1 ISUBASS = 0
      IS = IT = IN = 0
      ICLAIMA = ICLIMAA = ISTAVAL = 0
      WRITE(2,2215)
C     STARTING MAIN SORT PARAMETER READ LOOP.
      DO 1260 I = 1,ISORT
      IF(SORTYPE(I) .GT. 91 GO TO 1290
C
C     SORTYPE(I),I=1,3.
C
      IST = SORTYPE(I)
      GO TO(1265,1270,1280),IST
 1265 CONTINUE
      READ(1,1005) ISOUNCE
      IF(EUF,1)1350,1355
 1350 CONTINUE
      STOP 62
 1355 CONTINUE
      IS = IS + 1
      IF(IS .GT. 1) STOP 55
      WRITE(2,2220) I, ISOUNCE
      GO TO 1275
 1270 CONTINUE
      READ(1,1265) ITASK
      IF(EUF,1)1360,1365
 1360 CONTINUE
      STOP 63
 1365 CONTINUE
      IT = IT + 1
      IF(IT .GT. 1) STOP 56
      WRITE(2,2225) I, ITASK
      GO TO I 75
 1280 CONTINUE
      READ(1,2210) INUMBER,IOI
      IF(EUF,1)1370,1375
 1370 CONTINUE
      STOP 64
 1375 CONTINUE
      IN = IN + 1
      IF(IN .GT. 1) STOP 57
      WRITE(2,2230) I, INUMBER, IOI
 1275 CONTINUE
      ITOTAL = IS + IT + IN
      IF(ITOTAL .GT. 3) STOP 80
      GO TO 1260
C
C     SORTYPE(I),I=4,16.
C
 1290 CONTINUE
      IF(SORTYPE(I) .GT. 101 GO TO 1295
      IST = SORTYPE(I) - 9
      IF(IST .LT. 1 .OR. IST .GT. 7) STOP 125
      GO TO(1300,1305,1310,1315,1320,1325,1330),IST
 1300 CONTINUE
      READ(1,1265) IFUEL
      IF(EUF,1)1340,1345
 1340 CONTINUE
      STOP 61
 1345 CONTINUE
      IF(IFUEL .LT. 1 .OR. IFUEL .GT. 9) STOP 140
      IFU = IFU + 1
      IF(IFU .GT. 1) STOP 63
      WRITE(2,2225) I, IFUEL
      GO TO I 35
 1305 CONTINUE
      READ(1,1380) UCMAA, UCMIN
      IF(EUF,1)1385,1390
 1385 CONTINUE
      STOP 65
 1390 CONTINUE
      ICU = ICU + 1
      IF(ICU .GT. 1) STOP 74
      IF(UCMIN .LT. 0.00 .OR. UCMIN .GT. 100.01 STOP 141
      IF(UCMAA .LT. 0.00 .OR. UCMAX .GT. 100.01 STOP 142
      IF(UCMAX .EQ. UCMIN) GO TO 1400
      IF(UCMAX .GT. UCMIN) GO TO 1395
      UC1 = UCMAX
      UCMAX = UCMIN
      UCMIN = UC1
      GO TO 1395
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1310 CONTINUE
     READ(1,1300)MAX235,MIN235
     IF(EOF,1)1425,1430
1425 CONTINUE
     STOP 66
1430 CONTINUE
     IRICM35 = IRICM35 + 1
     IF(IRICM35 .GT. 1)STOP 73
     IF(MAX235 .NE. MIN235) GO TO 1435
     MAX235 = MAX235 + 0.001
     MIN235 = MIN235 - 0.0001
1435 CONTINUE
     IF(MIN235 .LT. MAX235) GO TO 1440
     RMAX35 = MAX235
     MAX235 = MIN235
     MIN235 = RMAX35
1440 CONTINUE
     IF(MAX235 .LT. 0.00 .OR. MAX235 .GT. 100.01 STOP 143
     IF(MIN235 .LT. 0.00 .OR. MIN235 .GT. 100.01 STOP 144
     WRITE(2,3001 I, MAX235, MIN235
     GO TO 1335
1315 CONTINUE
     READ(1,1300)RMAX233,RMIN233
     IF(EOF,1)1445,1450
1445 CONTINUE
     STOP 67
1450 CONTINUE
     IRICM33 = IRICM33 + 1
     IF(IRICM33 .GT. 1)STOP 75
     IF(RMAX233 .NE. RMIN233) GO TO 1455
     RMAX233 = RMAX233 + 0.0001
     RMIN233 = RMIN233 - 0.0001
1455 CONTINUE
     IF(RMIN233 .LT. RMAX233) GO TO 1460
     R233 = RMAX233
     RMAX233 = RMIN233
     RMIN233 = R233
1460 CONTINUE
     IF(RMAX233 .LT. 0.00 .OR. RMAX233 .GT. 100.01 STOP 145
     IF(RMIN233 .LT. 0.00 .OR. RMIN233 .GT. 100.01 STOP 146
     WRITE(2,3001 I, RMAX233, RMIN233
     GO TO 1 35
1320 CONTINUE
     STOP 71
1325 CONTINUE
     STOP 72
1330 CONTINUE
     READ(1,1300)RMOMAX,RMOMIN
     IF(EOF,1)1465,1470
1465 CONTINUE
     STOP 76
1470 CONTINUE
     IRMO = IRMO + 1
     IF(IRMO .GT. 1)STOP 76
     IF(RMOMAX .NE. RMOMIN)GO TO 1475
     RMOMAX = RMOMAX + 0.0001
     RMOMIN = RMOMIN - 0.0001
1475 CONTINUE
     IF(RMOMIN .LT. RMOMAX) GO TO 1480
     RMAX = RMOMAX
     RMOMAX = RMOMIN
     RMOMIN = RMAX
1480 CONTINUE
     IF(RMOMAX .LT. 0.00 .OR. RMOMAX .GT. 100.01 STOP 147
     IF(RMOMIN .LT. 0.00 .OR. RMOMIN .GT. 100.01 STOP 150
     WRITE(2,3001 I, RMOMAX, RMOMIN
     GO TO 1 35
1400 CONTINUE
     UCMAX = UCMAX + 0.0001
     UCMIN = UCMIN - 0.0001
1395 CONTINUE
     WRITE(2,3001 I, UCMAX, UCMIN
1335 CONTINUE
C
C    SORTYPE(1),I=1,20)
C
1295 CONTINUE
     IF(SORTYPE(I) .GT. 40) GO TO 2000
     IST = SORTYPE(I - 10
     IF(IST .LT. 1) GO TO 1200
     IF(IST .GT. 19) STOP 126
     GO TO(2005,2015,2020,2025,2030,2035,2040,2045,2050),IST
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2040 CONTINUE
     STOP 77
2045 CONTINUE
     READ(1,1300)SMEARMX,SMEARMI
     IF(EOF,1)2055,2060
2055 CONTINUE
     STOP 100
2060 CONTINUE
     ISM = ISM + 1
     IF(ISM .GT. 1) STOP 102
     SMAX = SMEARMX $ SMIN = SMEARMI
     IF(SMAX .NE. SMIN) GO TO 2065
     SMAX = SMAX + 0.001
     SMIN = SMIN - 0.0001
2065 CONTINUE
     IF(SMIN .LT. SMAX) GO TO 2070
     SSMAX = SMAX
     SMAX = SMIN
     SMIN = SSMAX
2070 CONTINUE
     IF(SMAX .LT. 0.00 .OR. SMAX .GT. 100.01 STOP 151
     IF(SMIN .LT. 0.00 .OR. SMIN .GT. 100.01 STOP 152
     WRITE(2,3001 I, SMAX, SMIN
     GO TO 1995
2010 READ(1,1035) CLAUVAL
     IF(EOF,1)2075,2080
2075 STOP 101
2080 ICLAU = ICLAU + 1                    $ IF(ICLAU .GT. 1) STOP 103
     WRITE(2,1075) I, CLAUVAL
     GO TO 1995
2015 READ(1,1300)COLOMAX,COLOMIN          $ IF(EOF,1)2085,2090
2085 STOP 104
2090 ICOLO = ICOLO + 1                    $ IF(ICOLO .GT. 1) STOP 105
     IF(COLOMAX .NE. COLOMIN)GO TO 2095
     COLOMAX = COLOMAX + 0.0001           $ COLOMIN = COLOMIN - 0.0001
2095 IF(COLOMIN .LT. COLOMAX)GO TO 2100
     COLO = COLOMAX                       $ COLOMAX = COLOMIN
     COLOMIN = COLO
2100 CONTINUE
     IF(COLOMAX .LT. 0.00 .OR. COLOMAX .GT. 100.01 STOP 153
     IF(COLOMIN .LT. 0.00 .OR. COLOMIN .GT. 100.01 STOP 154
     WRITE(2,3001 I, COLOMAX, COLOMIN
     GO TO 1995
2030 IB = IB + 1                          $ IF(IB .GT. 1) STOP 106
     READ(1,1285)IBONU                    $ IF(EOF,1)2105,2110
2105 STOP 111
2110 IF(IBONU .LT. 1 .OR. IBONU .GT. 2) STOP 107
     WRITE(2,2225) I, IBONU
     GO TO 1995
2035 IENCAP = IENCAP + 1                  $ IF(IENCAP .GT. 1) STOP 110
     READ(1,1285) IENCAPS
     IF(EOF,1)2115,2120
2115 STOP 112
2120 IF(IENCAPS .LT. 1 .OR. IENCAPS .GT. 2) STOP 113
     WRITE(2,2225) I, IENCAPS
     GO TO 1995
2020 ICLAUOU = ICLAUOU + 1                $ IF(ICLAUOU .GT. 1) STOP 114
     READ(1,1300)CLAUMAX,CLAUMIN          $ IF(EOF,1)2125,2130
2125 STOP 115
2130 IF(CLAUMAA .NE. CLAUMIN)GO TO 2135   $ CLAOMIN = CLAOMIN - 0.0001
2135 IF(CLAOMIN .LT. CLAUMAA)GO TO 2140
     CLAOM = CLAUMAX                      $ CLAOMAX = CLADMIN
     CLAOMIN = CLAOM
2140 CONTINUE
     IF(CLAOMAX .LT. 0.00 .OR. CLAOMAX .GT. 100.01 STOP 155
     IF(CLAUMIN .LT. 0.00 .OR. CLAOMIN .GT. 100.01 STOP 156
     WRITE(2,3001 I, CLAUMAX, CLAOMIN
     GO TO 1995
2025 IWALLTK = IWALLTK + 1                $ IF(IWALLTK .GT. 1) STOP 116
     READ(1,1300)WALLMAX,WALLMIN          $ IF(EOF,1)2145,2150
2145 STOP 117
2150 IF(WLLMAA .NE. WALLMIN)GO TO 2155
     WALLMAX = WALLMAA + 0.0001           $ WALLMIN = WALLMIN - 0.0001
2155 IF(WALLMIN .LT. WALLMAX)GO TO 2160
     WALLM = WALLMAX                      $ WALLMAX = WALLMIN
     WALLMIN = WALLM
2160 CONTINUE
     IF(WALLMAA .LT. 0.00 .OR. WALLMAX .GT. 100.01 STOP 157
     IF(WALLMIN .LT. 0.00 .OR. WALLMIN .GT. 100.01 STOP 160
     WRITE(2,3001 I, WALLMAA, WALLMIN
     GO TO 1995
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 2045 ISUBASS = ISUBASS + 1            $ IF(ISUBASS .GT. 1) STOP 120
      READ(1,1000) SUBVAL
      IF(EOF,1)2165,2170
 2165 STOP 121
 2170 CONTINUE
      WRITE(2,2220) I, SUBVAL
      GO TO 1-95
 2050 ILINPOW = ILINPOW + 1            $ IF(ILINPOW .GT. 1) STOP 122
      READ(1,1380)RLINMAX,RLINMIN      $ IF(EOF,1)2185,2190
 2185 STOP 123
 2190 IF(RLINMAX .NE. RLINMIN)GO TO 2195
      RLINMAX = RLINMAX + 0.0001       $ RLINMIN = RLINMIN - 0.0001
 2195 IF(RLINMIN .LT. RLINMAX)GO TO 22 0
      RLINM = RLINMAX                  $ RLINMAX = RLINMIN
      RLINMIN = RLINM
 2200 CONTINUE
      IF(RLINMAX .LT. 0.00 .OR. RLINMAX .GT. 100.0) STOP 163
      IF(RLINMIN .LT. 0.00 .OR. RLINMIN .GT. 100.0) STOP 164
      WRITE(2,3600) I, RLINMAX, RLINMIN
      GO TO 1995
 1995 CONTINUE
C
C     SORTYPE(1,I=21,23,
C
 2000 CONTINUE
      IF(SORTYPE(I) .GT. 23) GO TO 3000
      IST = SORTYPE(I) - 20
      IF(IST .LT. 1) GO TO 1200
      IF(IST .GT. 3) STOP 201
      GO TO(2325,2330,2335),IST
 2325 ICLADMX = ICLADMX + 1
      IF(ICLADMX .GT. 1)STOP 202
      READ(1,1380)CLADMX,CLADMI
      IF(EOF,1)2340,2345
 2340 STOP 203
 2345 CONTINUE
      IF(CLADMX .NE. CLADMI) GO TO 2350
      CLADMX = CLADMX + 0.0001
      CLADMI = CLADMI - 0.0001
 2350 IF(CLADMI .LT. CLADMX) GO TO 2355
      CLADTM = CLADMX
      CLADMX = CLADMI
      CLADMI = CLADTM
 2355 CONTINUE
      IF(CLADMX .LT. 0.00 .OR. CLADMX .GT. 2000.0) STOP 204
      IF(CLADMI .LT. 0.00 .OR. CLADMI .GT. 2000.0) STOP 205
      WRITE(2,3600) I, CLADMX, CLADMI
      GO TO 3.00
 2330 CONTINUE
      ICLTMAX = ICLTMAX + 1
      IF(ICLTMAX .GT. 1)STOP 206
      READ(1,1380)CLTMAX,CLTMIN
      IF(EOF,1)2360,2380
 2360 STOP 207
 2380 CONTINUE
      IF(CLTMAX .NE. CLTMIN)GO TO 2370
      CLTMAX = CLTMAX + 0.0 01
      CLTMIN = CLTMIN - 0.0000A
 2370 IF(CLTMIN .LT. CLTMAX)GO TO 2375
      CLTMU = CLTMAX
      CLTMAX = CLTMIN
      CLTMIN = CLTMU
 2375 CONTINUE
      IF(CLTMAX .LT. 0.00 .OR. CLTMAX .GT. 2000.0) STOP 210
      IF(CLTMIN .LT. 0.00 .OR. CLTMIN .GT. 2000.0) STOP 211
      WRITE(2,3600) I, CLTMAX, CLTMIN
      GO TO 3.00
 2335 CONTINUE
      ISTAVAL = ISTAVAL + 1
      IF(ISTAVAL .GT. 1)STOP 212
      READ(1,2300)STATVAL
      IF(EOF,1)2385,2390
 2385 STOP 213
 2390 CONTINUE
      IF(STATVAL .LT. 1 .OR. STATVAL .GT. 51 STOP 162
      WRITE(2,2225) I, STATVAL
 3000 CONTINUE
C
 1260 CONTINUE
```

```
C
      CALL SORTASK(SORTYPE,ISORT,KOUNT,ISOURCE,ITASK,INUMBER,IUI,IFUEL,
     1UCMAX,UCMIN,MAX235,MIN235,RMAX233,RMIN233,RHOMAX,RHOMIN,SMEAMMX,
     2SMEAMMI,CLADVAL,CULOMAX,CULOMIN,CLADMAX,CLADMIN,WALLMAX,WALLMIN,
     3IBUNU,IENCAPS,SUBVAL,CLIMIN,RLINMAX,RLINMIN,CLADTMI,CLAUTMX,CLTMAX
     4,STATVAL)
      CALL STACK(ICOUNT,KOUNT,ISORT,SORTYPE)
      CALL TEATPI
      GO TO 205                                                    TEMP.
C
   15 FORMAT(5X, ERR=11,  INTERIM EXAMINATION.)
   25 FORMAT(5X, ERR=11,  PRE-IRRADIATION.)
   55 FORMAT(5X, IN PROCESS:  NON-DESTRUCTIVE TEST.)
   65 FORMAT(5X, IN PROCESS:  FABRICATION.)
   75 FORMAT(5X, IN PROCESS:  DESIGN.)
   85 FORMAT(5X, IN PROCESS:  ARCHIVE.)
  120 FORMAT(5X, SUBASSEMBLY NUMBER    =,A10
     1       , CURRENT BURNUP          =,F5.2,5X
     2       , DUAL BURNUP             =,F5.2)
  215 FORMAT(1/,---------------------------------------------------------
     1,---------------------------------------------------------
     2,----------,//)
  225 FORMAT(5X, STREAM DENSITY         =,F8.4,2X/)
  355 FORMAT(5X,SORTYPE(1)  =,I5,5X,SORTYPE(K)  =,I5)
  360 FORMAT(5X,I5,F20.10,10A,F20.10)
 1000 FORMAT(16I5)
 1005 FORMAT(8A10)
 1010 FORMAT(1H1///3X8A10)
 1015 FORMAT(//5X, ORDER AND TYPES OF SORTS REQUESTED.,///)
 1020 FORMAT(///)
 1025 FORMAT(A10,21(5X,I5),A5,I5)
 1030 FORMAT(4X,I1,6F10.0,3X,I2)
 1035 FORMAT(F10.0,A10,3F10.0,5(4X,I1))
 1040 FORMAT(A10,3F10.0,2(4X,I1))
 1045 FORMAT(3(3X,I2))
 1050 FORMAT(A10,2(5X,F5.0))
 1055 FORMAT(A10)
 1060 FORMAT(1A,13,1X,IDENTIFIER           =,A10,2I5,A5)
 1065 FORMAT(1H0,90XA10)
 1070 FORMAT(1H0,7(X, INCAL TEST NUMBER)
 1075 FORMAT(5X,I5,5X,A10)
 1080 FORMAT(1H0,70X, STATUS,5X,= IN STORAGE)
 1085 FORMAT(1H0,70X, STATUS,5X,= IN PROCESS)
 1100 FORMAT(5X, SUBASSEMBLY TYPE      =,A10
     1       , LINEAR NUMBER           =,F10.4
     2       , CLAD TEMPERATURE        =,F10.4
     3      /5X, FUEL CENTERLINE TMP   =,F10.4)
 1105 FORMAT(5X, NO SHROUD,//)
 1110 FORMAT(5X, SHROUD,//)
 1115 FORMAT(5X, NOT ENCAPSULATED)
 1120 FORMAT(5X, ENCAPSULATED)
 1125 FORMAT(1H0,70X, SODIUM BOND)
 1130 FORMAT(1H0,70X, HELIUM BOND)
 1135 FORMAT(1H0,37X
     1       , CLAD TYPE               =,A10
     2       , CULDHRS                 =,F8.4,2X
     3      /5X, CLADDING O.D.         =,F8.4,2X
     4       , WALL THICKNESS          =,F8.4,2X)
 1140 FORMAT(1H0,87X, NITRIDE FUEL)
 1145 FORMAT(5X, URANIUM COMPOSITION   =,F8.4,2X
     1       , U235 ENRICHMENT         =,F8.4,2X
     2       , U233 ENRICHMENT         =,F8.4,2X
     3      /5X, PU COMPOSITION        =,F8.4,2X
     4       , PU239 ENRICHMENT        =,F8.4,2X
     5       , FUEL DENSITY            =,F8.4,2X)
 1150 FORMAT(1/,3X,ECHO CHECKING ALL INPUT DATA.,//)
 1155 FORMAT(1H0,70X, CARBIDE FUEL)
 1165 FORMAT(5X, HOT-CELL:  NON-DESTRUCTIVE TEST.)
 1170 FORMAT(5X, HOT-CELL:  DESTRUCTIVE TEST.)
 1185 FORMAT(5X, NUMBER        TYPE OF)
 1195 FORMAT(5X, OF SORT       SORT REQUESTED,//)
 1200 FORMAT(11A,I4,10A,A4)
 1210 FORMAT(/5X, FUEL INFORMATION.)
 1220 FORMAT(/5X, CLADDING INFORMATION.)
 1230 FORMAT(/5X, COOLANT INFORMATION.)
 1240 FORMAT(/5X, GENERAL INFORMATION.)
 1255 FORMAT(1 A, REPORT NUMBER =,A10)
 1256 FORMAT(5X, REPORT IN PROCESS.)
 1285 FORMAT(5X,I5)
 1300 FORMAT(5X,2F10.0)
 2210 FORMAT(5X,I5,A5)
 2215 FORMAT(1////,5X, SORT PARAMETERS.,//)
```

```
 2220 FORMAT(5X,I5,A10)
 2225 FORMAT(5X,I5,5X,I5)
 2230 FORMAT(5X,I5,5X,I5,A5)
 2300 FORMAT(9X,II)
 2365 FORMAT(1H1,////)
      END
C*****************************************************************************
      SUBROUTINE SORTASK(SORTTPE,ISORT,KOUNT,ISOURCE,ITASK,INUMBER,IOI,
     1IFUEL,ULMAX,UCMIN,MAX235,MIN235,RMAX233,RMIN233,RHOMAX,RHOMIN,
     2SMEANMX,SMEANMI,CLAQUAL,CULOMAX,COLDMIN,CLAQMAX,CLAQMIN,WALLMAX,
     3WALLMIN,IBOND,IENCAPS,SUBVAL,CLTMIN,RLINMAX,RLINMIN,CLADIMI,CLADIM
     4X,CLIMAX,STATVAL)
C     PURPLE
C
C     EXTREME CARE MUST BE USED IN SETTING UP MAJOR IF TESTS.
C
      COMMON  IC(2501,      IL1(250),     IC2(250),     IC3(250),
     1        ISAVE(25),    SOURCES(250), TASKS(250),   NUMBERS(250),
     2        FUELS(250),   ULUMPS(250),  RICH35S(250), RICH33S(250),
     3        RHOS(250),    SMEARS(250),  CLAQS(250),   CULOMNS(250),
     4        CLAQUQS(250), WALLTKS(250), BONDS(250),   ENCAPS(250),
     5        SUBASSS(250), LINPOWS(250), CLAUTMS(250), FUELCLS(250),
     6        STATUSS(250), LOCATS(250),  DISPS(250),   SANDS(250),
     7        COMBUS(250),  QUALBUS(250), REPORTS(250), TESTNOS(250),
     8        IOS(25 )
      INTEGER SORTYPE(16),
     1        TASK,    FUEL,    C,       C1,      C2,      BOND,
     2        ENCAP,   SMOOUT,  STATUS,  C3,      PINSUM,  SORT,
     3        DISP,    DUMP,    PAR,     SOURCE,  STATVAL, SUBASSS,
     4        TASKS,   FUELS,   BONDS,   ENCAPS,  STATUSS, SUBASSM,
     5        SOURCES, SUBVAL
      REAL MAX235, MIN235, LINPOW, LINPOWS
      ITHACK = 1
C
C     SETTING UP SORT LOOP.
C
      DO 185 I = 1,ISORT
      IFLAG = 0
      IF(I .EQ. 1) GO TO 190
      KCOUNT = ICOUNT
      GO TO 205
  190 CONTINUE
      KCOUNT = 250
  205 CONTINUE
      ICOUNT = 0
      DO 10 K = 1,KCOUNT
      IF(I .EQ. 1) KK = K
      IF(I .NE. 1) KK = ISAVE(K)
      ISORTER = SORTYPE(I)
      IF(ISORTER .GT. 3) GO TO 195
C
C     SOURCE, TASK, NUMBER ELIMINATION.
C
      GO TO(20,25,30),ISORTER
   20 CONTINUE
      IF(ISOURCE .NE. SOURCES(KK)) GO TO 55
      GO TO 35
   25 CONTINUE
      IF(ITASK .NE. TASKS(KK)) GO TO 55
      GO TO 35
   30 CONTINUE
      IF(INUMBER .NE. NUMBERS(KK)) GO TO 55
      IF(IOI .NE. IOS(KK)) GO TO 55
C
C     SETTING UP MASTER SIGNAGE LOGIC FOR MULTIPLE ELIMINATIONS.
C
   35 CONTINUE
      ICOUNT = ICOUNT + 1
      ISAVE(ICOUNT) = KK
   55 CONTINUE
      IF(IFLAG .EQ. 1) GO TO 10
      IF(SORTYPE(I) .LT. 9) GO TO 10
C
C     FUEL, ULOMP, RICH235, RICH233, AND RHO ELIMINATIONS.
C
  195 CONTINUE
      IF(SORTYPE(I) .GT. 10) GO TO 60
      IFLAG = 1
      ISORTER = SORTYPE(I) - 5
      IF(ISORTER .LT. 1 .OR. ISORTER .GT. 7) STOP 130
      GO TO(65,70,75,80,85,90,95),ISORTER
   85 STOP 131
   90 STOP 132
   65 CONTINUE
      IF(IFUEL .NE. FUELS(KK)) GO TO 55
      GO TO 35
   70 CONTINUE
      IF(UCOMPS(KK) .GE. UCMIN .AND. UCOMPS(KK) .LE. UCMAX) GO TO 35
      GO TO 55
   75 CONTINUE
      IF(RICH35S(KK) .GE. MIN235 .AND. RICH35S(KK) .LE. MAX235) GO TO 35
      GO TO 55
   80 CONTINUE
      IF(RICH33S(KK) .GE. RMIN233 .AND. RICH33S(KK) .LE. RMAX233)GOTO35
      GO TO 55
   95 CONTINUE
      IF(RHOS(KK) .GE. RHOMIN .AND. RHOS(KK) .LE. RHOMAX) GO TO 35
      GO TO 55
C
C     SMEAR, CLAD, COLUMNX, CLADOD, AND WALLTK ELIMINATIONS.
C
   60 CONTINUE                              $    IF(SORTYPE(I).LT.11)GO TO 10
      IF(SORTYPE(I) .GT. 45)GO TO 100
      ISORTER = SORTYPE(I) - 30
      IFLAG = 1
      IF(ISORTER .LT. 1 .OR. ISORTER .GT. 5) STOP 133
      GO TO(105,110,115,120,125),ISORTER
  105 CONTINUE
      IF(SMEARS(KK) .GE. SMEARMI .AND. SMEARS(KK) .LE. SMEARMX) GO TO 35
      GO TO 55
  110 CONTINUE
      IF(CLAQS(KK) .NE. CLAQUAL) GO TO 55
      GO TO 35
  115 CONTINUE
      IF(CULOMNS(KK) .GE. CULOMIN .AND. COLOMNS(KK) .LE. COLOMAX) GO TO
     135
      GO TO 55
  120 CONTINUE
      IF(CLAQUQS(KK) .GE. CLAUMIN .AND. CLAUODS(KK) .LE. CLADMAX)GOTO35
      GO TO 55
  125 CONTINUE
      IF(WALLTKS(KK) .GE. WALLMIN .AND. WALLTKS(KK) .LE. WALLMAX) GOTO35
      GO TO 55
C
C     BOND, ENCAP, SUBASSM, AND LINPOW ELIMINATIONS.
C
  100 CONTINUE                              $    IF(SORTYPE(I).LT.16)GO TO 10
      IF(SORTYPE(I) .GT. 401GO TO 130
      IFLAG = 1
      ISORTER = SORTYPE(I) - 15
      IF(ISORTER .LT. 1 .OR. ISORTER .GT. 5) STOP 134
      GO TO(135,140,145,150,155),ISORTER
  145 STOP 135
  135 CONTINUE
      IF(IBOND .NE. BONDS(KK)) GO TO 55
      GO TO 35
  140 CONTINUE
      IF(IENCAPS .NE. ENCAPS(KK)) GO TO 55
      GO TO 35
  150 CONTINUE
      IF(SUBASSS(KK) .NE. SUBVAL) GO TO 55
      GO TO 35
  155 CONTINUE
      IF(LINPOWS(KK) .GE. RLINMIN .AND. LINPOWS .LE. RLINMAX) GO TO 35
      GO TO 55
C
C     CLADIMP, FUELCLI, AND STATUS ELIMINATIONS.
C
  130 CONTINUE
      IF(SORTYPE(I) .LT. 41) GO TO 10
      IF(SORTYPE(I) .GT. 43) GO TO 160
      IFLAG = 1
      ISORTER = SORTYPE(I) - 40
      IF(ISORTER .LT. 1 .OR. ISORTER .GT. 3) STOP 136
      GO TO(165,170,175),ISORTER
  165 CONTINUE
      IF(CLADIMS(KK) .GE. CLAUTMI .AND. CLADTMS(KK) .LE. CLADTMX) GO TO 35
      GO TO 55
  170 CONTINUE
      IF(FUELCLS(KK) .GE. CLTMIN .AND. FUELCLS(KK) .LE. CLTMAX) GOTO 35
      GO TO 55
  175 CONTINUE
      IF(STATVAL .NE. STATUSS(KK)) GO TO 55
      GO TO 35
  160 CONTINUE
CAUTION MUST BE USED ON LOCAT, DISP SORT BECAUSE OF INTERACTION.
```

```
C
C     ISAVE VECTOR AND EXIT LOGIC:
C
C
 10 CONTINUE
    IF(I .EQ. ISURT) GO TO 185
    IF(I .EQ. 1) WRITE(6,180)
563      WRITE(2,45) (ISAVE(I),I=1,ICOUNT)
576   185 CONTINUE
601   200 CONTINUE
      C
      C     ELEMENTS OF ISAVE AFTER ELIMINATIONS:
      C
      C
601       WRITE(2,225)
605       WRITE(2,40)
614       IF(ICOUNT .LT. 1) GO TO 210
622       GO TO 215
623   210 CONTINUE
623       WRITE(2,220)
627       RETURN
630   215 CONTINUE
630       WRITE(2,45) (ISAVE(I),I=1,ICOUNT)
      C
         40 FORMAT(5X,'(SAVE(I) VALUES AFTER ELIMINATIONS COMPLETED:'/)
         45 FORMAT(6X,2015)
         50 FORMAT(1H1,////)
        180 FORMAT(////,5X,'ISAVE(I) VALUES AFTER PARTIAL ELIMINATIONS:'/)
        220 FORMAT(5X,'RETURNING TO MAIN PROGRAM WITH ICOUNT .LT. 1')
        225 FORMAT(///)
643       RETURN
644       END
C*****************************************************************************
```

```
      SUBROUTINE STACK(ICOUNT,KOUNT,ISORT,SORTYPE)
C     GREEN
      INTEGER SORTYPE(16)
C     UPDATE COMMON BLOCK TO MATCH THAT USED EARLIER:
      RETURN
      END
C*****************************************************************************



      SUBROUTINE TEXIP(
C     PURPLE
      RETURN
      END
C*****************************************************************************
```

# APPENDIX B

## SAMPLE OUTPUT

```
ECHO CHECKING ALL INPUT DATA.
1 IDENTIFIER          =        K    I   428                        CARBIDE FUEL

   URANIUM COMPOSITION  = 70.0000   U235 ENRICHMENT     = 91.0000   U233 ENRICHMENT     = 90.0200
   PU COMPOSITION       = 90.0300   PU239 ENRICHMENT    = 90.0400   FUEL DENSITY        = 90.0500
   SMEAR DENSITY        = 90.0000

   ENCAPSULATED                     CLAD TYPE           =    317SS  COLDWORK            =  1.0000
   CLADDING O.D.        =   .3900   WALL THICKNESS      =   .0100   HELIUM BOND
   SHROUD

   SUBASSEMBLY TYPE     =      A-19 LINEAR POWER        =  30.0000  CLAD TEMPERATURE    =  675.0000
   FUEL CENTERLINE TMP  = 1050.0000                                 STATUS              = IN PROCESS
   IN PROCESS.  NON-DESTRUCTIVE TEST.

   FUEL INFORMATION.
   FUEL INFORMATION ON FIRST TEST PROBLEM INSERTED HERE.

   CLADDING INFORMATION.
   CLAD INFORMATION ON FIRST TEST PROBLEM INSERTED HERE.

   BOND INFORMATION.
   BOND INFORMATION ON FIRST TEST PROBLEM INSERTED HERE.

   GENERAL INFORMATION.
   GENERAL INFORMATION ON TEST PROBLEM NUMBER ONE.
-------------------------------------------------------------------------------------------------
ECHO CHECKING ALL INPUT DATA.
2 IDENTIFIER          =        K    2   422                        CARBIDE FUEL

      URANIUM COMPOSITION  = 80.0000   U235 ENRICHMENT     = 92.0000   U233 ENRICHMENT     = 90.0200
      PU COMPOSITION       = 90.0300   PU239 ENRICHMENT    = 90.0400   FUEL DENSITY        = 90.0500
      SMEAR DENSITY        = 90.0000

      NOT ENCAPSULATED                 CLAD TYPE           =    316SS  COLDWORK            =  2.0000
      CLADDING O.D.        =   .4500   WALL THICKNESS      =   .0100   HELIUM BOND
      SHROUD

      SUBASSEMBLY TYPE     =      A-19 LINEAR POWER        =  30.0000  CLAD TEMPERATURE    =  675.0000
      FUEL CENTERLINE TMP  = 1050.0000                                 STATUS              = IN PROCESS
      IN PROCESS.  NON-DESTRUCTIVE TEST.

      FUEL INFORMATION.

      CLADDING INFORMATION.

      BOND INFORMATION.

      GENERAL INFORMATION.
      GENERAL INFO FOR TEST PR. 2.
      IDENTICAL TO PR. 1 EXCEPT FOR TASK AND NUMBER.
      NO FUEL, CLAD, OR BOND COMMENTS.
-------------------------------------------------------------------------------------------------
```

ECHO CHECKING ALL INPUT DATA.

3 IDENTIFIER = L I 42C CARBIDE FUEL

URANIUM COMPOSITION = 90.0000 U235 ENRICHMENT = 90.0100 U233 ENRICHMENT = 90.0200
PU COMPOSITION = 90.0300 PU239 ENRICHMENT = 90.0400 FUEL DENSITY = 90.0500
SMEAR DENSITY = 90.0000

NOT ENCAPSULATED CLAD TYPE = 316SS COLDWORK = 3.0000
CLADDING O.D. = .3000 WALL THICKNESS = .0100 HELIUM BOND
SHROUD

SUBASSEMBLY TYPE = A-19 LINEAR POWER = 30.0000 CLAD TEMPERATURE = 675.0000
FUEL CENTERLINE TMP = 1050.0000 STATUS = IN PROCESS
IN PROCESS. NON-DESTRUCTIVE TEST.

FUEL INFORMATION.

CLADDING INFORMATION.

BOND INFORMATION.

GENERAL INFORMATION.
GENERAL INFO. FOR TEST PR. 3.
IDENTICAL TO PR. 1 EXCEPT FOR SOURCE.
NO FUEL. CLAD. OR BOND COMMENTS.

---

ECHO CHECKING ALL INPUT DATA.

4 IDENTIFIER = L 2 422 CARBIDE FUEL

URANIUM COMPOSITION = 90.0000 U235 ENRICHMENT = 90.0100 U233 ENRICHMENT = 90.0200
PU COMPOSITION = 90.0300 PU239 ENRICHMENT = 90.0400 FUEL DENSITY = 90.0500
SMEAR DENSITY = 90.0000

ENCAPSULATED CLAD TYPE = 316SS COLDWORK = 4.0000

CLADDING O.D. = .3000 WALL THICKNESS = .0200 HELIUM BOND
SHROUD

SUBASSEMBLY TYPE = A-19 LINEAR POWER = 30.0000 CLAD TEMPERATURE = 675.0000
FUEL CENTERLINE TMP = 1050.0000 STATUS = IN PROCESS
IN PROCESS. NON-DESTRUCTIVE TEST.

FUEL INFORMATION.

CLADDING INFORMATION.

BOND INFORMATION.

GENERAL INFORMATION.
GENERAL INFO. FOR TEST PR. 4.
VIRTUALLY IDENTICAL TO PR. 2 EXCEPT FOR SOURCE.

---

ECHO CHECKING ALL INPUT DATA.

5 IDENTIFIER = K 2 42B NITRIDE FUEL

| | | | | | |
|---|---|---|---|---|---|
| URANIUM COMPOSITION | = 50.0000 | U235 ENRICHMENT | = 93.0000 | U233 ENRICHMENT | = 90.0200 |
| PU COMPOSITION | = 90.0300 | PU239 ENRICHMENT | = 90.0400 | FUEL DENSITY | = 90.0500 |
| SMEAR DENSITY | = 90.0000 | | | | |
| ENCAPSULATED | | CLAD TYPE | = 316SS | COLDWORK | = 5.0000 |
| CLADDING O.D. | = .3001 | WALL THICKNESS | = .0100 | SODIUM BOND | |
| SHROUD | | | | | |
| SUBASSEMBLY TYPE | = A-19 | LINEAR POWER | = 30.0000 | CLAD TEMPERATURE | = 675.0000 |
| FUEL CENTERLINE TMP | = 1050.0000 | | | STATUS | = IN STORAGE |
| EBR-II. INTERIM EXAMINATION. | | | | | |
| SUBASSEMBLY NUMBER | = KLW123 | CURRENT BURNUP | = .05 | GOAL BURNUP | = .05 |
| REPORT NUMBER = LA-ZZZ12 | | | | | |

FUEL INFORMATION.
FUEL INFORMATION IDENTICAL TO PROBLEM ONE.

CLADDING INFORMATION.
CLADDING O.D. 0.0001 LARGER THAN PROBLEM ONE.

BOND INFORMATION.
BOND INFORMATION IDENTICAL TO PROBLEM ONE.

GENERAL INFORMATION.
STATUS, CLADDING O.D., LOCAT, DISP, AND IREPORT
ALL DIFFER FROM PROBLEM ONE VALUES.

---

ECHO CHECKING ALL INPUT DATA.

6 IDENTIFIER = K 2 42B NITRIDE FUEL

| | | | | | |
|---|---|---|---|---|---|
| URANIUM COMPOSITION | = 90.0000 | U235 ENRICHMENT | = 90.0100 | U233 ENRICHMENT | = 90.0200 |
| PU COMPOSITION | = 90.0300 | PU239 ENRICHMENT | = 90.0400 | FUEL DENSITY | = 90.0600 |
| SMEAR DENSITY | = 90.0000 | | | | |
| ENCAPSULATED | | CLAD TYPE | = 316SS | COLDWORK | = 0.0000 |
| CLADDING O.D. | = .3001 | WALL THICKNESS | = .0100 | HELIUM BOND | |
| SHROUD | | | | | |
| SUBASSEMBLY TYPE | = A-19 | LINEAR POWER | = 30.0000 | CLAD TEMPERATURE | = 675.0000 |
| FUEL CENTERLINE TMP | = 1050.0000 | | | STATUS | [illegible] |
| REPORT NUMBER = 1A2R3C40 | | | | | |

FUEL INFORMATION.

CLADDING INFORMATION.

BOND INFORMATION.

GENERAL INFORMATION.
DIFFERS FROM PRECEEDING PROBLEMS ONLY IN COMMENT CARDS AND
LOCAT PARAMETER.

---

ECHO CHECKING ALL INPUT DATA.

7 IDENTIFIER = K 2 42B CARBIDE FUEL

| | | | | | |
|---|---|---|---|---|---|
| URANIUM COMPOSITION | = 90.0000 | U235 ENRICHMENT | = 90.0100 | U233 ENRICHMENT | = 90.0500 |
| PU COMPOSITION | = 90.0300 | PU239 ENRICHMENT | = 90.0400 | FUEL DENSITY | = 90.0600 |
| SMEAR DENSITY | = 90.0000 | | | | |
| ENCAPSULATED | | CLAD TYPE | = 316SS | COLDWORK | = 0.0000 |
| CLADDING O.D. | = .3001 | WALL THICKNESS | = .0100 | HELIUM BOND | |
| SHROUD | | | | | |
| SUBASSEMBLY TYPE | = A-19 | LINEAR POWER | = 30.0000 | CLAD TEMPERATURE | = 675.0000 |
| FUEL CENTERLINE TMP | = 1050.0000 | | | STATUS | = AVERAGE |
| REPORT NUMBER = 1A283C40 | | | | | |

FUEL INFORMATION.

CLADDING INFORMATION.

BOND INFORMATION.

GENERAL INFORMATION.
DIFFERS FROM PRECEDING PROBLEM ONLY IN VALUE ASSIGNED TO RHO PARAMETER.

---

ECHO CHECKING ALL INPUT DATA.

8 IDENTIFIER = L 1 42C CARBIDE FUEL

| | | | | | |
|---|---|---|---|---|---|
| URANIUM COMPOSITION | = 90.0000 | U235 ENRICHMENT | = 90.0300 | U233 ENRICHMENT | = 90.0200 |
| PU COMPOSITION | = 90.0300 | PU239 ENRICHMENT | = 90.0400 | FUEL DENSITY | = 90.0500 |
| SMEAR DENSITY | = 91.0000 | | | | |
| ENCAPSULATED | | CLAD TYPE | = 316SS | COLDWORK | = 0.0000 |
| CLADDING O.D. | = .3000 | WALL THICKNESS | = .0100 | HELIUM BOND | |
| SHROUD | | | | | |
| SUBASSEMBLY TYPE | = A-19 | LINEAR POWER | = 30.0000 | CLAD TEMPERATURE | = 675.0000 |
| FUEL CENTERLINE TMP | = 1050.0000 | | | STATUS | = IN PROCESS |
| IN PROCESS. NON-DESTRUCTIVE TEST. | | | | | |

FUEL INFORMATION.

CLADDING INFORMATION.

BOND INFORMATION.

GENERAL INFORMATION.
GENERAL INFO. FOR TEST PR. 3.
IDENTICAL TO PR. 1 EXCEPT FOR SOURCE.
NO FUEL. CLAD. OR BOND COMMENTS.

---

ECHO CHECKING ALL INPUT DATA.

9 IDENTIFIER = K 2 42B NITRIDE FUEL

URANIUM COMPOSITION = 90.0000 U235 ENRICHMENT = 94.0000 U233 ENRICHMENT = 90.0200
PU COMPOSITION = 90.0300 PU239 ENRICHMENT = 90.0400 FUEL DENSITY = 90.0600
SMEAR DENSITY = 90.0000

UNIT ENCAPSULATED CLAD TYPE = 316SS COLDWORK = 0.0000
CLADDING O.D. = .3001 WALL THICKNESS = .0100 HELIUM BOND
SHROUD

SUBASSEMBLY TYPE = A-19 LINEAR POWER = 30.0000 CLAD TEMPERATURE = 675.0000
FUEL CENTERLINE TMP = 1050.0000 STATUS [illegible]STORAGE
REPORT NUMBER = 1A2B3C40

FUEL INFORMATION.

CLADDING INFORMATION.

BOND INFORMATION.

GENERAL INFORMATION.
DIFFERS FROM PRECEEDING PROBLEMS ONLY IN COMMENT CARDS AND
LOCAT PARAMETER.

---

ECHO CHECKING ALL INPUT DATA.

10 IDENTIFIER = L 1 42C CARRIDE FUEL

URANIUM COMPOSITION = 90.0000 U235 ENRICHMENT = 90.0100 U233 ENRICHMENT = 90.0200
PU COMPOSITION = 90.0300 PU239 ENRICHMENT = 90.0400 FUEL DENSITY = 90.0500
SMEAR DENSITY = 90.0000

ENCAPSULATED CLAD TYPE = 316SS COLDWORK = 3.0000
CLADDING O.D. = .3000 WALL THICKNESS = .0100 HELIUM BOND
SHROUD

SUBASSEMBLY TYPE = A-19 LINEAR POWER = 30.0000 CLAD TEMPERATURE = 675.0000
FUEL CENTERLINE TMP = 1050.0000 STATUS = IN STORAGE
IN PROCESS. NON-DESTRUCTIVE TEST.

FUEL INFORMATION.

CLADDING INFORMATION.

BOND INFORMATION.

GENERAL INFORMATION.

---

ECHO CHECKING ALL INPUT DATA.

11 IDENTIFIER = L 1 42C CARRIDE FUEL

| | | | | | |
|---|---|---|---|---|---|
| URANIUM COMPOSITION | = 90.0000 | U235 ENRICHMENT | = 90.0100 | U233 ENRICHMENT | = 90.0200 |
| PU COMPOSITION | = 90.0300 | PU239 ENRICHMENT | = 90.0400 | FUEL DENSITY | = 90.0500 |
| SMEAR DENSITY | = 90.0000 | | | | |
| ENCAPSULATED | | CLAD TYPE | = 316SS | COLDWORK | = 3.0000 |
| CLADDING O.D. | = .3000 | WALL THICKNESS | = .0100 | HELIUM BOND | |
| SHROUD | | | | | |
| SUBASSEMBLY TYPE | = A-19 | LINEAR POWER | = 25.0000 | CLAD TEMPERATURE | = 675.0000 |
| FUEL CENTERLINE TMP | = 1050.0000 | | | STATUS | = IN PROCESS |

IN PROCESS. NON-DESTRUCTIVE TEST.

FUEL INFORMATION.

CLADDING INFORMATION.

BOND INFORMATION.

GENERAL INFORMATION.

---

ECHO CHECKING ALL INPUT DATA.

12 IDENTIFIER = L 1 42C CARBIDE FUEL

| | | | | | |
|---|---|---|---|---|---|
| URANIUM COMPOSITION | = 90.0000 | U235 ENRICHMENT | = 90.0100 | U233 ENRICHMENT | = 90.0200 |
| PU COMPOSITION | = 90.0300 | PU239 ENRICHMENT | = 90.0400 | FUEL DENSITY | = 90.0500 |
| SMEAR DENSITY | = 90.0000 | | | | |
| ENCAPSULATED | | CLAD TYPE | = 316SS | COLDWORK | = 3.0000 |
| CLADDING O.D. | = .3000 | WALL THICKNESS | = .0100 | HELIUM BOND | |
| SHROUD | | | | | |
| SUBASSEMBLY TYPE | = A-19 | LINEAR POWER | = 30.0000 | CLAD TEMPERATURE | = 675.0000 |
| FUEL CENTERLINE TMP | = 950.0000 | | | STATUS | = IN PROCESS |

IN PROCESS. NON-DESTRUCTIVE TEST.

FUEL INFORMATION.

CLADDING INFORMATION.

BOND INFORMATION

GENERAL INFORMATION.

---

ECHO CHECKING ALL INPUT DATA.

13 IDENTIFIER = L I 42C CARBIDE FUEL

| | | | | | |
|---|---|---|---|---|---|
| URANIUM COMPOSITION | = 90.0000 | U235 ENRICHMENT | = 90.0100 | U233 ENRICHMENT | = 90.0200 |
| PU COMPOSITION | = 90.0300 | PU239 ENRICHMENT | = 90.0400 | FUEL DENSITY | = 90.0500 |
| SMEAR DENSITY | = 90.0000 | | | | |
| ENCAPSULATED | | CLAD TYPE | = 316SS | COLDWORK | = 3.0000 |
| CLADDING O.D. | = .3000 | WALL THICKNESS | = .0100 | HELIUM BOND | |
| SHROUD | | | | | |
| SUBASSEMBLY TYPE | = A-19 | LINEAR POWER | = 30.0000 | CLAD TEMPERATURE | = 500.0000 |
| FUEL CENTERLINE TMP | = 1050.0000 | | | STATUS | = IN PROCESS |

IN PROCESS. NON-DESTRUCTIVE TEST.

FUEL INFORMATION.

CLADDING INFORMATION.

BOND INFORMATION.

GENERAL INFORMATION.

---

ECHO CHECKING ALL INPUT DATA.

14 IDENTIFIER = L I 42C CARBIDE FUEL

| | | | | | |
|---|---|---|---|---|---|
| URANIUM COMPOSITION | = 90.0000 | U235 ENRICHMENT | = 90.0100 | U233 ENRICHMENT | = 90.0200 |
| PU COMPOSITION | = 90.0300 | PU239 ENRICHMENT | = 90.0400 | FUEL DENSITY | = 90.0500 |
| SMEAR DENSITY | = 90.0000 | | | | |
| ENCAPSULATED | | CLAD TYPE | = 316SS | COLDWORK | = 3.0000 |
| CLADDING O.D. | = .3000 | WALL THICKNESS | = .0100 | HELIUM BOND | |
| SHROUD | | | | | |
| SUBASSEMBLY TYPE | = A-18 | LINEAR POWER | = 30.0000 | CLAD TEMPERATURE | = 675.0000 |
| FUEL CENTERLINE TMP | = 1050.0000 | | | STATUS | = IN PROCESS |

IN PROCESS. NON-DESTRUCTIVE TEST.

FUEL INFORMATION.

CLADDING INFORMATION.

BOND INFORMATION.

GENERAL INFORMATION.

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ECHO CHECKING ALL INPUT DATA.

15 IDENTIFIER          =        K   1   42B                    CARBIDE FUEL


   URANIUM COMPOSITION = 70.0000   U235 ENRICHMENT    = 91.0000   U233 ENRICHMENT    = 90.0200
   PU COMPOSITION      = 90.0300   PU239 ENRICHMENT   = 90.0400   FUEL DENSITY       = 90.0500
   SMEAR DENSITY       = 90.0000

   ENCAPSULATED                    CLAD TYPE          =    317SS  COLDWORK           =  1.0000
   CLADDING O.D.       =   .3300   WALL THICKNESS     =   .0100   HELIUM BOND
   SHROUD


   SUBASSEMBLY TYPE    =      A-19 LINEAR POWER      =  30.0000  CLAD TEMPERATURE   =  675.0000
   FUEL CENTERLINE TMP = 1050.0000                                STATUS             = IN PROCESS
   IN PROCESS.  NON-DESTRUCTIVE TEST.

   FUEL INFORMATION.
   FUEL INFORMATION ON FIRST TEST PROBLEM INSERTED HERE.

   CLADDING INFORMATION.
   CLAD INFORMATION ON FIRST TEST PROBLEM INSERTED HERE.

   BOND INFORMATION.
   BOND INFORMATION ON FIRST TEST PROBLEM INSERTED HERE.

   GENERAL INFORMATION.
   GENERAL INFORMATION ON TEST PROBLEM NUMBER ONE.

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ECHO CHECKING ALL INPUT DATA.

16 IDENTIFIER          =        K   2   42Z                    CARBIDE FUEL


   URANIUM COMPOSITION = 80.0000   U235 ENRICHMENT    = 92.0000   U233 ENRICHMENT    = 90.0200
   PU COMPOSITION      = 90.0300   PU239 ENRICHMENT   = 90.0400   FUEL DENSITY       = 90.0500
   SMEAR DENSITY       = 90.0000

   NOT ENCAPSULATED                CLAD TYPE          =    316SS  COLDWORK           =  2.0000
   CLADDING O.D.       =   .4500   WALL THICKNESS     =   .0100   HELIUM BOND
   SHROUD


   SUBASSEMBLY TYPE    =      A-19 LINEAR POWER      =  30.0000  CLAD TEMPERATURE   =  675.0000
   FUEL CENTERLINE TMP = 1050.0000                                STATUS             = IN PROCESS
   IN PROCESS.  NON-DESTRUCTIVE TEST.

   FUEL INFORMATION.


   CLADDING INFORMATION.


   BOND INFORMATION.


   GENERAL INFORMATION.
   GENERAL INFO FOR TEST PR. 2.
   IDENTICAL TO PR. 1 EXCEPT FOR TASK AND NUMBER.
   NO FUEL, CLAD, OR BOND COMMENTS.

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ECHO CHECKING ALL INPUT DATA.

I7 IDENTIFIER = L I 42C CARBIDE FUEL

| | | | | | |
|---|---|---|---|---|---|
| URANIUM COMPOSITION | = 90.0000 | U235 ENRICHMENT | = 90.0100 | U233 ENRICHMENT | = 90.0200 |
| PU COMPOSITION | = 90.0300 | PU239 ENRICHMENT | = 90.0400 | FUEL DENSITY | = 90.0500 |
| SMEAR DENSITY | = 90.0000 | | | | |
| ENCAPSULATED | | CLAD TYPE | = 316SS | COLDWORK | = 3.0000 |
| CLADDING O.D. | = .3000 | WALL THICKNESS | = .0100 | HELIUM BOND | |
| SHROUD | | | | | |
| SUBASSEMBLY TYPE | = A-19 | LINEAR POWER | = 30.0000 | CLAD TEMPERATURE | = 675.0000 |
| FUEL CENTERLINE TMP | = 1050.0000 | | | STATUS | = IN PROCESS |

IN PROCESS. NON-DESTRUCTIVE TEST.

FUEL INFORMATION.

CLADDING INFORMATION.

BOND INFORMATION.

GENERAL INFORMATION.
GENERAL INFO. FOR TEST PR. 3.
IDENTICAL TO PR. 1 EXCEPT FOR SOURCE.
NO FUEL, CLAD, OR BOND COMMENTS.

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ECHO CHECKING ALL INPUT DATA.

I8 IDENTIFIER = L 2 422 CARBIDE FUEL

| | | | | | |
|---|---|---|---|---|---|
| URANIUM COMPOSITION | = 90.0000 | U235 ENRICHMENT | = 90.0100 | U233 ENRICHMENT | = 90.0200 |
| PU COMPOSITION | = 90.0300 | PU239 ENRICHMENT | = 90.0400 | FUEL DENSITY | = 90.0500 |
| SMEAR DENSITY | = 90.0000 | | | | |
| ENCAPSULATED | | CLAD TYPE | = 316SS | COLDWORK | = 4.0000 |
| CLADDING O.D. | = .3000 | WALL THICKNESS | = .0200 | HELIUM BOND | |
| SHROUD | | | | | |
| SUBASSEMBLY TYPE | = A-19 | LINEAR POWER | = 30.0000 | CLAD TEMPERATURE | = 675.0000 |
| FUEL CENTERLINE TMP | = 1050.0000 | | | STATUS | = IN PROCESS |

IN PROCESS. NON-DESTRUCTIVE TEST.

FUEL INFORMATION.

CLADDING INFORMATION.

BOND INFORMATION.

GENERAL INFORMATION.
GENERAL INFO. FOR TEST PR. 4.
VIRTUALLY IDENTICAL TO PR. 2 EXCEPT FOR SOURCE.

---

ECHO CHECKING ALL INPUT DATA.

I9 IDENTIFIER = K 2 42B NITRIDE FUEL

| | | | | | |
|---|---|---|---|---|---|
| URANIUM COMPOSITION | = 50.0000 | U235 ENRICHMENT | = 93.0000 | U233 ENRICHMENT | = 90.0200 |
| PU COMPOSITION | = 90.0300 | $PU^{239}$ ENRICHMENT | = 90.0400 | FUEL DENSITY | = 90.0500 |
| SMEAR DENSITY | = 90.0000 | | | | |
| ENCAPSULATED | | CLAD TYPE | = 316SS | COLDWORK | = 5.0000 |
| CLADDING O.D. | = .3001 | WALL THICKNESS | = .0100 | SODIUM BOND | |
| SHROUD | | | | | |
| SUBASSEMBLY TYPE | = A-19 | LINEAR POWER | = 30.0000 | CLAD TEMPERATURE | = 675.0000 |
| FUEL CENTERLINE TMP | = 1050.0000 | | | STATUS | = IN STORAGE |
| EBR-II. INTERIM EXAMINATION. | | | | | |
| SUBASSEMBLY NUMBER | = KLW123 | CURRENT BURNUP | = .05 | GOAL BURNUP | = .05 |
| REPORT NUMBER = LA-ZZZ12 | | | | | |

FUEL INFORMATION.
FUEL INFORMATION IDENTICAL TO PROBLEM ONE.

CLADDING INFORMATION.
CLADDING O.D. 0.0001 LARGER THAN PROBLEM ONE.

BOND INFORMATION.
BOND INFORMATION IDENTICAL TO PROBLEM ONE.

GENERAL INFORMATION.
STATUS. CLADDING O.D.. LOCAT. DISP. AND IREPORT
ALL DIFFER FROM PROBLEM ONE VALUES.

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ECHO CHECKING ALL INPUT DATA.

20 IDENTIFIER = K 2 42B NITRIDE FUEL

| | | | | | |
|---|---|---|---|---|---|
| URANIUM COMPOSITION | = 90.0000 | U235 ENRICHMENT | = 90.0100 | U233 ENRICHMENT | = 90.0200 |
| PU COMPOSITION | = 90.0300 | $PU^{239}$ ENRICHMENT | = 90.0400 | FUEL DENSITY | = 90.0600 |
| SMEAR DENSITY | = 90.0000 | | | | |
| ENCAPSULATED | | CLAD TYPE | = 316SS | COLDWORK | = 0.0000 |
| CLADDING O.D. | = .3001 | WALL THICKNESS | = .0100 | HELIUM BOND | |
| SHROUD | | | | | |
| SUBASSEMBLY TYPE | = A-19 | LINEAR POWER | = 30.0000 | CLAD TEMPERATURE | = 675.0000 |
| FUEL CENTERLINE TMP | = 1050.0000 | | | STATUS | = IN STORAGE |
| REPORT NUMBER = IA2B3C40 | | | | | |

FUEL INFORMATION.

CLADDING INFORMATION.

BOND INFORMATION.

GENERAL INFORMATION.
DIFFERS FROM PRECEEDING PROBLEMS ONLY IN COMMENT CARDS AND
LOCAT PARAMETER.

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ECHO CHECKING ALL INPUT DATA.

21 IDENTIFIER = K 2 42B CARBIDE FUEL

URANIUM COMPOSITION = 90.0000 U235 ENRICHMENT = 90.0100 U233 ENRICHMENT = 90.0500
PU COMPOSITION = 90.0300 PU239 ENRICHMENT = 90.0400 FUEL DENSITY = 90.0600
SMEAR DENSITY = 90.0000

ENCAPSULATED CLAD TYPE = 316SS COLDWORK = 0.0000
CLADDING O.D. = .3001 WALL THICKNESS = .0100 HELIUM BOND
SHROUD

SUBASSEMBLY TYPE = A-19 LINEAR POWER = 30.0000 CLAD TEMPERATURE = 675.0000
FUEL CENTERLINE TMP = 1050.0000 STATUS [illegible]
REPORT NUMBER = 1A283C4D

FUEL INFORMATION.

CLADDING INFORMATION.

BOND INFORMATION.

GENERAL INFORMATION.
DIFFERS FROM PRECEEDING PROBLEM ONLY IN VALUE ASSIGNED TO RHO PARAMETER.

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ECHO CHECKING ALL INPUT DATA.

22 IDENTIFIER = L I 42C CARBIDE FUEL

URANIUM COMPOSITION = 90.0000 U235 ENRICHMENT = 90.0300 U233 ENRICHMENT = 90.0200
PU COMPOSITION = 90.0300 PU239 ENRICHMENT = 90.0400 FUEL DENSITY = 90.0500
SMEAR DENSITY = 91.0000

ENCAPSULATED CLAD TYPE = 316SS COLDWORK = 0.0000
CLADDING O.D. = .3000 WALL THICKNESS = .0100 HELIUM BOND
SHROUD

SUBASSEMBLY TYPE = A-19 LINEAR POWER = 30.0000 CLAD TEMPERATURE = 675.0000
FUEL CENTERLINE TMP = 1050.0000 STATUS = IN PROCESS
IN PROCESS. NON-DESTRUCTIVE TEST.

FUEL INFORMATION.

CLADDING INFORMATION.

BOND INFORMATION.

GENERAL INFORMATION.
GENERAL INFO. FOR TEST PR. 3.
IDENTICAL TO PR. I EXCEPT FOR SOURCE.
NO FUEL, CLAD, OR BOND COMMENTS.

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ECHO CHECKING ALL INPUT DATA.

23 IDENTIFIER = K 2 42B NITRIDE FUEL

URANIUM COMPOSITION = 90.0000 U235 ENRICHMENT = 94.0000 U233 ENRICHMENT = 90.0200
PU COMPOSITION = 90.0300 PU239 ENRICHMENT = 90.0400 FUEL DENSITY = 90.0600
SMEAR DENSITY = 90.0000

NOT ENCAPSULATED CLAD TYPE = 316SS COLDWORK = 0.0000
CLADDING O.D. = .3001 WALL THICKNESS = .0100 HELIUM BOND
SHROUD

SUBASSEMBLY TYPE = A-19 LINEAR POWER = 30.0000 CLAD TEMPERATURE = 675.0000
FUEL CENTERLINE TMP = 1050.0000 STATUS [illegible]
REPORT NUMBER = IA2R3C40

FUEL INFORMATION.

CLADDING INFORMATION.

BOND INFORMATION.

GENERAL INFORMATION.
DIFFERS FROM PRECEEDING PROBLEMS ONLY IN COMMENT CARDS AND
LOCAT PARAMETER.

---

ECHO CHECKING ALL INPUT DATA.

24 IDENTIFIER = L I 42C CARBIDE FUEL

URANIUM COMPOSITION = 90.0000 U235 ENRICHMENT = 90.0100 U233 ENRICHMENT = 90.0200
PU COMPOSITION = 90.0300 PU239 ENRICHMENT = 90.0400 FUEL DENSITY = 90.0500
SMEAR DENSITY = 90.0000

ENCAPSULATED CLAD TYPE = 316SS COLDWORK = 3.0000
CLADDING O.D. = .3000 WALL THICKNESS = .0100 HELIUM BOND
SHROUD

SUBASSEMBLY TYPE = A-19 LINEAR POWER = 30.0000 CLAD TEMPERATURE = 675.0000
FUEL CENTERLINE TMP = 1050.0000 STATUS = IN STORAGE
IN PROCESS. NON-DESTRUCTIVE TEST.

FUEL INFORMATION.

CLADDING INFORMATION.

BOND INFORMATION.

GENERAL INFORMATION.

---

ECHO CHECKING ALL INPUT DATA.

25 IDENTIFIER = L I 42C CARBIDE FUEL

| | | | | | |
|---|---|---|---|---|---|
| URANIUM COMPOSITION | = 90.0000 | U235 ENRICHMENT | = 90.0100 | U233 ENRICHMENT | = 90.0200 |
| PU COMPOSITION | = 90.0300 | PU239 ENRICHMENT | = 90.0400 | FUEL DENSITY | = 90.0500 |
| SMEAR DENSITY | = 90.0000 | | | | |
| ENCAPSULATED | | CLAD TYPE | = 316SS | COLDWORK | = 3.0000 |
| CLADDING O.D. | = .3000 | WALL THICKNESS | = .0100 | HELIUM BOND | |
| SHROUD | | | | | |
| SUBASSEMBLY TYPE | = A-19 | LINEAR POWER | = 25.0000 | CLAD TEMPERATURE | = 675.0000 |
| FUEL CENTERLINE TMP | = 1050.0000 | | | STATUS | = IN PROCESS |

IN PROCESS. NON-DESTRUCTIVE TEST.

FUEL INFORMATION.

CLADDING INFORMATION.

BOND INFORMATION.

GENERAL INFORMATION.

EXTENDED MULTIPLE SORT(INTEGER TYPE).

ORDER AND TYPES OF SORTS REQUESTED.

| NUMBER OF SORT | TYPE OF SORT REQUESTED |
|---|---|
| 1 | SOURCE |
| 2 | TASK |
| 3 | NUMBER |
| 4 | FUEL |
| 5 | BOND |

SORT PARAMETERS.

| | |
|---|---|
| 1 | K |
| 2 | 2 |
| 3 | 428 |
| 4 | 2 |
| 5 | 1 |

ISAVE(I) VALUES AFTER PARTIAL ELIMINATIONS.

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 5 | 6 | 7 | 9 | 15 | 16 | 19 | 20 | 21 | 23 |
| 2 | 5 | 6 | 7 | 9 | 16 | 19 | 20 | 21 | 23 | | |
| 5 | 6 | 7 | 9 | 19 | 20 | 21 | 23 | | | | |
| 5 | 6 | 9 | 19 | 20 | 23 | | | | | | |

ISAVE(I) VALUES AFTER ELIMINATIONS COMPLETED.

6 9 20 23

EXTENDED FLOATING POINT MIXED SORT.

ORDER AND TYPES OF SORTS REQUESTED.

| NUMBER OF SORT | TYPE OF SORT REQUESTED |
|---|---|
| 1 | UCOMP |
| 2 | RICH235 |
| 3 | RICH233 |
| 4 | ENCAP |

SORT PARAMETERS.

| | | |
|---|---|---|
| 1 | 91.0000000000 | 89.0000000000 |
| 2 | 90.0300000000 | 90.0000000000 |
| 3 | 90.0300000000 | 90.0100000000 |
| 4 | 2 | |

ISAVE(I) VALUES AFTER PARTIAL ELIMINATIONS.

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3 | 4 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 17 | 18 | 20 | 21 | 22 | 23 | 24 | 25 |
| 3 | 4 | 6 | 7 | 8 | 10 | 11 | 12 | 13 | 14 | 17 | 18 | 20 | 21 | 22 | 24 | 25 | | |
| 3 | 4 | 6 | 8 | 10 | 11 | 12 | 13 | 14 | 17 | 18 | 20 | 22 | 24 | 25 | | | | |

ISAVE(I) VALUES AFTER ELIMINATIONS COMPLETED.

3

SECOND EXTENDED FLOATING POINT AND A FIELD SORT.

ORDER AND TYPES OF SORTS REQUESTED.

| NUMBER OF SORT | TYPE OF SORT REQUESTED |
|---|---|
| 1 | RHO |
| 2 | SMEAR |
| 3 | COLDWRK |
| 4 | CLADOD |
| 5 | WALLTK |
| 6 | CLAD |
| 7 | LINPOW |
| 8 | CLADTMP |
| 9 | FUELCLT |
| 10 | STATUS |
| 11 | SUBASSM |

SORT PARAMETERS.

| | | |
|---|---|---|
| 1 | 90.0600000000 | 90.0400000000 |
| 2 | 90.0000000000 | 89.0000000000 |
| 3 | 4.0000000000 | 1.0000000000 |
| 4 | .3500000000 | .2500000000 |
| 5 | .0150000000 | .0050000000 |
| 6 | 316SS | |
| 7 | 30.0000000000 | 29.0000000000 |
| 8 | 675.0001000000 | 674.9999000000 |
| 9 | 1050.0001000000 | 1049.9999000000 |
| 10 | 1 | |
| 11 | A-18 | |

ISAVE(I) VALUES AFTER PARTIAL ELIMINATIONS.

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 8 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 22 | 24 | 25 |
| 1 | 2 | 3 | 4 | 5 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 24 | 25 | | |
| 1 | 2 | 3 | 4 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 24 | 25 | | | | |
| 1 | 3 | 4 | 10 | 11 | 12 | 13 | 14 | 15 | 17 | 18 | 24 | 25 | | | | | | |
| 1 | 3 | 10 | 11 | 12 | 13 | 14 | 15 | 17 | 24 | 25 | | | | | | | | |
| 3 | 10 | 11 | 12 | 13 | 14 | 17 | 24 | 25 | | | | | | | | | | |
| 3 | 10 | 12 | 13 | 14 | 17 | 24 | | | | | | | | | | | | |
| 3 | 10 | 12 | 14 | 17 | 24 | | | | | | | | | | | | | |
| 3 | 10 | 14 | 17 | 24 | | | | | | | | | | | | | | |
| 3 | 14 | 17 | | | | | | | | | | | | | | | | |

ISAVE(I) VALUES AFTER ELIMINATIONS COMPLETED.

14