Enclosure 14 to TN E-28034

Transnuclear, Inc. Calculation 10421-038 (associated with RAI 2-4)

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TRANSNUCLEAR AN AREVA COMPANY	Form 3.2-1 Calculation Cover Sheet	Calc. No.:	10421-38		
		Rev. No.:	0		
Calculation Title: Verification of ADOC Program for Windows XP Operating System		Page:	1	of	65
		Project No.:	10421		
		DCR No.:	N/A		

Project Name: TN-40 Transport Cask

Number of CDs attached: 1

If original issue, is Licensing Review per TIP 3.5 required?

☒ No (explain) ☐ Yes Licensing Review No._____

TN40 is under development for use as a transport cask and is not licensed for transport

Software utilized: ADOC Version: Rev.1

Calculation is complete

Originator's Signature: [signature] Date: 3/26/2006

Calculation has been checked for consistency, completeness, and correctness

Checker Signature: [signature] Date: 3/28/06

Calculation is approved for use

Project Engineer Signature: MIKE MASON for [signature] Date: 3/29/06

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Revision Summary

Rev. 0 Initial Issue

1.0 Purpose

The purpose of this calculation is to verify the ADOC program on the Windows XP operating system.

2.0 References

1. ADOC Test Plan for Apple and Texas Instruments Computers, TN document E-5138.
2. ADOC Test Report for Apple and Texas Instruments Computers, TN document E-10004.
3. In-Use Test of ADOC for Windows NT, TN document E-16676.

3.0 Assumptions and Methodology

The subject Computer Code is currently certified on the in-house Apple and Texas Instruments computers based on Test Plan E-5138 [1] and Test Report E-10004 [2], and Windows NT based on the in-use test of ADOC for Windows NT E-16676 [3].

The ADOC Computer Code has been reinstalled on PC computers running Windows XP operating system. Quality Assurance procedure 3.3, Rev. 2 (paragraph 4.1.3) requires in-use testing to be performed whenever significant hardware/operating system configuration changes are made. To comply with this requirement the ADOC Computer Code has been tested using the aforementioned test plan.

Quality Assurance procedure 3.3, Rev. 2 (paragraph 4.1.3 (d)) requires the following information.

- Computer program tested: ADOC.
- Computer hardware used: PC running Windows XP operating system.
- Test equipment and calibrations, where applicable: NA.
- Tester or data recorder: John Conklin.
- Acceptability: Yes, see results below.

4.0 Results and Conclusions

The following in-use test results are based on problems taken from test plan E-5138 [1].

Problem Number	ADOC (Apple & TI) Max. g-load	ADOC (Windows NT 4.0) Max. g-load	ADOC (Windows XP) Max. g-load
1	80	80	80
2	237	237	237
3	46	46	46
4	47	47	47
5	178	178	178
6	252	252	252

5.0 Conclusions

Since the results obtained from ADOC installed on the PC computer running Windows XP are identical to those obtained from ADOC installed on the Apple and TI computers and the results from ADOC installed on Windows NT 4.0, ADOC is now considered certified on TN's PC computers running Windows XP. The output data for the above six problems is attached.

6.0 Appendix – ADOC Data Sheets 1 through 6

1

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RUN NAME : __________  DATE RUN : ______  NO OF PAGES OUTPUT : ______

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PROJECT NAME : ____________________    BY : _______________

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                    TRANSNUCLEAR, INC.


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           AAAAA    DDDDD      OOOOO    CCCCC
          A     A   D    D    O     O  C     C
          A     A   D     D   O     O  C
          AAAAAAA   D     D   O     O  C
          A     A   D     D   O     O  C
          A     A   D    D    O     O  C     C
          A     A   DDDDD      OOOOO    CCCCC
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                    PROGRAM : ADOC (ACCEL DUE TO DROP ON COVERS)

                    REVISION : 1

                    COMPUTER : TEXAS INST PC

                    MANUALS : PROGRAM PACKAGE

                    REVISION : 1        DATE : 12-2-87

     ********************************************************************


1 VERIFICATION PROBLEM NO. 1 - END DROP - PERFECT PLASTIC  DATE:11/20/2005


     CASK LENGTH =   199.400  INCHES
     LOCATION OF CG =      .500  *LENGTH
     CASK WEIGHT =182000.000  POUNDS
     CASK ROTARY INERTIA =     .100E+05  POUND IN.SEC**2

     HEIGHT OF DROP =   360.000  INCHES
     ANGLE OF CASK CL WITH RESPECT TO HORIZ. =    90.000  DEG
     IMPACT VELOCITY =     .527E+03  IN./SEC


     MAX TIME =     .0250  SEC
     TIME STEP =    .00100  SEC
```

```
     PRINT EVERY     0  TIME STEPS

1
          C O V E R   P R O P E R T I E S

     OUTER RADIUS =    60.000 INCHES
     INNER RADIUS =    33.375 INCHES
     THICKNESS COVER 1 =    32.000 INCHES
     THICKNESS COVER 2 =    32.000 INCHES
     OUTER THICKNESS COVER 1 =    16.000 INCHES
     OUTER THICKNESS COVER 2 =    16.000 INCHES
     NUMBER OF SEGMENTS BOTTOM =   20
     NUMBER OF SEGMENTS SIDE =   10


          MATERIAL   1  PROPERTIES
     CRUSHING STRENGTH =  1300.000 PSI
     YIELD STRAIN =    .00260
     UNLOADING MODULUS =       .100E+02 PSI
     STRAIN LIMIT OF CRUSHING =    .80000
     LOCKING MODULUS =       .000E+00 PSI
     HARDER MAT CRUSH STRENGTH =  1300.000 PSI
     STRAIN FOR TRANSFER TO HARD MAT =    .00260

          MATERIAL   2  PROPERTIES
     CRUSHING STRENGTH =  1300.000 PSI
     YIELD STRAIN =    .00260
     UNLOADING MODULUS =       .100E+02 PSI
     STRAIN LIMIT OF CRUSHING =    .80000
     LOCKING MODULUS =       .000E+00 PSI
     HARDER MAT CRUSH STRENGTH =  1300.000 PSI
     STRAIN FOR TRANSFER TO HARD MAT =    .00260

          MATERIAL   3  PROPERTIES
     CRUSHING STRENGTH =  1300.000 PSI
     YIELD STRAIN =    .00260
     UNLOADING MODULUS =       .100E+02 PSI
     STRAIN LIMIT OF CRUSHING =    .80000
     LOCKING MODULUS =       .000E+00 PSI
```

HARDER MAT CRUSH STRENGTH = 1300.000 PSI
STRAIN FOR TRANSFER TO HARD MAT = .00260

FRICTION COEFFICIENT = .200

COUNT 1.000 TIMES NON BACKED UP FORCES

1

	DEFORMATIONS			BOTTOM COVER				TOP COVER			
TIME	VERTICAL	HORIZONTAL	ROTATION	MODE	DELTA	PHI	MAX STRAIN	MODE	DELTA	PHI	MAX STRN
.0000	.000E+00	.000E+00	.000E+00	0	.0000	.0000	.0000	0	.0000	.0000	.0000
.0010	.517E+00	-.377E-07	-.326E-09	1	.5172	.0000	.0323	0	.0000	.0000	.0000
.0020	.100E+01	-.188E-06	-.163E-08	1	1.0035	.0000	.0627	0	.0000	.0000	.0000
.0030	.146E+01	-.452E-06	-.391E-08	1	1.4588	.0000	.0912	0	.0000	.0000	.0000
.0040	.188E+01	-.829E-06	-.717E-08	1	1.8832	.0000	.1177	0	.0000	.0000	.0000
.0050	.228E+01	-.132E-05	-.114E-07	1	2.2767	.0000	.1423	0	.0000	.0000	.0000
.0060	.264E+01	-.192E-05	-.166E-07	1	2.6392	.0000	.1650	0	.0000	.0000	.0000
.0070	.297E+01	-.264E-05	-.228E-07	1	2.9708	.0000	.1857	0	.0000	.0000	.0000
.0080	.327E+01	-.347E-05	-.300E-07	1	3.2714	.0000	.2045	0	.0000	.0000	.0000
.0090	.354E+01	-.442E-05	-.382E-07	1	3.5412	.0000	.2213	0	.0000	.0000	.0000
.0100	.378E+01	-.548E-05	-.474E-07	1	3.7799	.0000	.2362	0	.0000	.0000	.0000
.0110	.399E+01	-.665E-05	-.575E-07	1	3.9878	.0000	.2492	0	.0000	.0000	.0000
.0120	.416E+01	-.794E-05	-.687E-07	1	4.1647	.0000	.2603	0	.0000	.0000	.0000
.0130	.431E+01	-.935E-05	-.808E-07	1	4.3107	.0000	.2694	0	.0000	.0000	.0000
.0140	.443E+01	-.109E-04	-.939E-07	1	4.4257	.0000	.2766	0	.0000	.0000	.0000
.0150	.451E+01	-.125E-04	-.108E-06	1	4.5098	.0000	.2819	0	.0000	.0000	.0000
.0160	.456E+01	-.143E-04	-.123E-06	1	4.5630	.0000	.2852	0	.0000	.0000	.0000
.0170	.459E+01	-.161E-04	-.139E-06	1	4.5852	.0000	.2866	0	.0000	.0000	.0000
.0180	.458E+01	-.181E-04	-.157E-06	1	4.5765	.0000	.2868	0	.0000	.0000	.0000
.0190	.454E+01	-.202E-04	-.175E-06	1	4.5369	.0000	.2868	0	.0000	.0000	.0000
.0200	.447E+01	-.225E-04	-.194E-06	1	4.4663	.0000	.2868	0	.0000	.0000	.0000
.0210	.436E+01	-.248E-04	-.214E-06	1	4.3648	.0000	.2868	0	.0000	.0000	.0000
.0220	.423E+01	-.273E-04	-.236E-06	1	4.2323	.0000	.2868	0	.0000	.0000	.0000
.0230	.407E+01	-.299E-04	-.258E-06	1	4.0690	.0000	.2868	0	.0000	.0000	.0000
.0240	.387E+01	-.326E-04	-.281E-06	1	3.8747	.0000	.2868	0	.0000	.0000	.0000

1 FORCE OUTPUT..UNITS KIPS, INCHES, GS

TIME	FORCE-1 DST TO CG	FORCE-2 DST TO CG	HOR FORCE	ACCEL VERTICAL	ACCEL HORIZONTAL	ACCEL ROTATION

```
.0000       .00       .00       .00       .00       .00      .00000
            .000      .000
.0010  14753.29       .00      -.05    -80.06       .00     -.00000
           -.000      .000
.0020  14753.29       .00      -.05    -80.06       .00     -.00000
           -.000      .000
.0030       .00       .00       .00       .00       .00      .00000
            .000      .000
.0040  14753.29       .00      -.05    -80.06       .00     -.00000
           -.000      .000
.0050  14753.29       .00      -.05    -80.06       .00     -.00000
           -.000      .000
.0060  14753.29       .00      -.05    -80.06       .00     -.00000
           -.000      .000
.0070  14753.29       .00      -.05    -80.06       .00     -.00000
           -.000      .000
.0080  14753.29       .00      -.05    -80.06       .00     -.00000
           -.000      .000
.0090  14753.29       .00      -.05    -80.06       .00     -.00000
           -.000      .000
.0100  14753.29       .00      -.05    -80.06       .00     -.00000
           -.000      .000
.0110  14753.29       .00      -.05    -80.06       .00     -.00000
           -.000      .000
.0120  14753.29       .00      -.05    -80.06       .00     -.00000
           -.000      .000
.0130  14753.29       .00      -.05    -80.06       .00     -.00000
           -.000      .000
.0140  14753.29       .00      -.06    -80.06       .00     -.00000
           -.000      .000
.0150  14753.29       .00      -.06    -80.06       .00     -.00000
           -.000      .000
.0160  14753.29       .00      -.06    -80.06       .00     -.00000
           -.000      .000
.0170  14753.29       .00      -.06    -80.06       .00     -.00000
           -.000      .000
.0180  14753.20       .00      -.06    -80.06       .00     -.00000
           -.000      .000
.0190  14752.92       .00      -.06    -80.06       .00     -.00000
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            -.000       .000
 .0200  14752.42        .00       -.06     -80.06        .00      -.00000
            -.000       .000
 .0210  14751.70        .00       -.06     -80.05        .00      -.00000
            -.000       .000
 .0220  14750.76        .00       -.06     -80.05        .00      -.00000
            -.000       .000
 .0230  14749.60        .00       -.06     -80.04        .00      -.00000
            -.000       .000
 .0240  14748.22        .00       -.06     -80.03        .00      -.00000
            -.000       .000
 .0250  14746.62        .00       -.06     -80.03        .00      -.00000
            -.000       .000
1                                                  NORMAL ACCEL AT
 TIME        AXIAL ACCEL (G'S)   CENTER OF GRAV      TOP            BOTTOM

    .0000      -.100E+01      -.362E-05      -.362E-05      -.362E-05
    .0010       .801E+02      -.277E-05      -.255E-03       .249E-03
    .0020       .801E+02      -.277E-05      -.255E-03       .249E-03
    .0030       .801E+02      -.315E-05      -.256E-03       .249E-03
    .0040       .801E+02      -.392E-05      -.257E-03       .249E-03
    .0050       .801E+02      -.392E-05      -.257E-03       .249E-03
    .0060       .801E+02      -.512E-05      -.259E-03       .249E-03
    .0070       .801E+02      -.532E-05      -.260E-03       .249E-03
    .0080       .801E+02      -.533E-05      -.260E-03       .249E-03
    .0090       .801E+02      -.653E-05      -.262E-03       .249E-03
    .0100       .801E+02      -.654E-05      -.262E-03       .249E-03
    .0110       .801E+02      -.661E-05      -.262E-03       .249E-03
    .0120       .801E+02       .287E-05      -.253E-03       .258E-03
    .0130       .801E+02      -.189E-05      -.261E-03       .258E-03
    .0140       .801E+02      -.309E-05      -.264E-03       .258E-03
    .0150       .801E+02      -.316E-05      -.264E-03       .258E-03
    .0160       .801E+02      -.399E-05      -.265E-03       .257E-03
    .0170       .801E+02      -.502E-05      -.267E-03       .257E-03
    .0180       .801E+02      -.547E-05      -.268E-03       .257E-03
    .0190       .801E+02      -.959E-05      -.276E-03       .257E-03
    .0200       .801E+02      -.778E-06      -.268E-03       .266E-03
    .0210       .801E+02      -.130E-05      -.269E-03       .266E-03
    .0220       .800E+02      -.396E-05      -.274E-03       .266E-03
    .0230       .800E+02      -.553E-05      -.276E-03       .265E-03
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     .0240       .800E+02       -.778E-05       -.281E-03       .265E-03
     .0250       .800E+02        .133E-05       -.272E-03       .274E-03
                    MAXIMUM ACCELERATIONS
     MAX AXIAL =     80.062  G'S
     MAX TRANS CG =       .000       G'S
     MAX TRANS TOP =       .000  G'S
     MAX TRANS BOT =       .000  G'S
1          ACCELERATIONS (G'S)
     A = AXIAL ACC
     G = TRANS ACC CG
     T = TRANS ACC TOP
     B = TRANS ACC BOT
    -1.0      10.6      22.2      33.7      45.3      56.9      68.5      80.1
     ---------------------------------------------------------------------
     B         I         I         I         I         I         I         I
     B         I         I         I         I         I         I        AI
     B         I         I         I         I         I         I        AI
     B         I         I         I         I         I         I        AI
     B         I         I         I         I         I         I        AI
     B         I         I         I         I         I         I        AI
     B         I         I         I         I         I         I        AI
     B         I         I         I         I         I         I        AI
     B         I         I         I         I         I         I        AI
     B---------I---------I---------I---------I---------I---------I--------AITIME =    .0090
     B         I         I         I         I         I         I        AI
     B         I         I         I         I         I         I        AI
     B         I         I         I         I         I         I        AI
     B         I         I         I         I         I         I        AI
     B         I         I         I         I         I         I        AI
     B         I         I         I         I         I         I        AI
     B         I         I         I         I         I         I        AI
     B         I         I         I         I         I         I        AI
     B         I         I         I         I         I         I       A I
     B---------I---------I---------I---------I---------I---------I-------A-ITIME =    .0190
     B         I         I         I         I         I         I       A I
     B         I         I         I         I         I         I       A I
     B         I         I         I         I         I         I       A I
     B         I         I         I         I         I         I       A I
     B         I         I         I         I         I         I       A I
     B         I         I         I         I         I         I       A I
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          DEFORMED SHAPE OF COVER   2


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1
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    RUN NAME : __________  DATE RUN : ______  NO OF PAGES OUTPUT : ______

    CALCULATION TITLE : ____________________________________________________

    PROJECT NAME : ____________________    BY : ______________

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                        TRANSNUCLEAR, INC.


            ____________________________________________________


                 AAAAA    DDDDD      OOOOO    CCCCC
                A     A   D    D    O     O  C     C
                A     A   D     D   O     O  C
                AAAAAAA   D     D   O     O  C
                A     A   D     D   O     O  C
                A     A   D    D    O     O  C     C
```

```
                A     A   DDDDD      OOOOO    CCCCC



              ____________________________________________

                PROGRAM : ADOC (ACCEL DUE TO DROP ON COVERS)

                REVISION : 1

                COMPUTER : TEXAS INST PC

                MANUALS : PROGRAM PACKAGE

                REVISION : 1        DATE : 12-2-87

    ***********************************************************************



1 VERIFICATION PROBLEM NO. 2 - END DROP -    ELASTIC   DATE:11/20/2005


    CASK LENGTH =   199.400  INCHES
    LOCATION OF CG =      .500  *LENGTH
    CASK WEIGHT =182000.000  POUNDS
    CASK ROTARY INERTIA =     .100E+05  POUND IN.SEC**2

    HEIGHT OF DROP =   360.000  INCHES
    ANGLE OF CASK CL WITH RESPECT TO HORIZ. =    90.000  DEG
    IMPACT VELOCITY =     .527E+03  IN./SEC



    MAX TIME =     .0300  SEC
```

```
     TIME STEP =     .00100  SEC
     PRINT EVERY      0  TIME STEPS

1
          C O V E R   P R O P E R T I E S

     OUTER RADIUS =     60.000 INCHES
     INNER RADIUS =     33.375 INCHES
     THICKNESS COVER 1 =     32.000 INCHES
     THICKNESS COVER 2 =     32.000 INCHES
     OUTER THICKNESS COVER 1 =     16.000 INCHES
     OUTER THICKNESS COVER 2 =     16.000 INCHES
     NUMBER OF SEGMENTS BOTTOM =   20
     NUMBER OF SEGMENTS SIDE =   10



          MATERIAL   1  PROPERTIES
     CRUSHING STRENGTH = 10000.000 PSI
     YIELD STRAIN =     .50000
     UNLOADING MODULUS =        .100E+02 PSI
     STRAIN LIMIT OF CRUSHING =     .80000
     LOCKING MODULUS =        .100E+02 PSI
     HARDER MAT CRUSH STRENGTH = 10000.000 PSI
     STRAIN FOR TRANSFER TO HARD MAT =     .50000

          MATERIAL   2  PROPERTIES
     CRUSHING STRENGTH = 10000.000 PSI
     YIELD STRAIN =     .50000
     UNLOADING MODULUS =        .100E+02 PSI
     STRAIN LIMIT OF CRUSHING =     .80000
     LOCKING MODULUS =        .100E+02 PSI
     HARDER MAT CRUSH STRENGTH = 10000.000 PSI
     STRAIN FOR TRANSFER TO HARD MAT =     .50000

          MATERIAL   3  PROPERTIES
     CRUSHING STRENGTH = 10000.000 PSI
     YIELD STRAIN =     .50000
     UNLOADING MODULUS =        .100E+02 PSI
     STRAIN LIMIT OF CRUSHING =     .80000
```

LOCKING MODULUS = .100E+02 PSI
HARDER MAT CRUSH STRENGTH = 10000.000 PSI
STRAIN FOR TRANSFER TO HARD MAT = .50000

FRICTION COEFFICIENT = .200

COUNT 1.000 TIMES NON BACKED UP FORCES

1

	DEFORMATIONS				BOTTOM COVER				TOP COVER		
TIME	VERTICAL	HORIZONTAL	ROTATION	MODE	DELTA	PHI	MAX STRAIN	MODE	DELTA	PHI	MAX STRN
.0000	.000E+00	.000E+00	.000E+00	0	.0000	.0000	.0000	0	.0000	.0000	.0000
.0010	.525E+00	-.956E-08	-.827E-10	1	.5250	.0000	.0328	0	.0000	.0000	.0000
.0020	.103E+01	-.760E-07	-.657E-09	1	1.0346	.0000	.0647	0	.0000	.0000	.0000
.0030	.151E+01	-.255E-06	-.220E-08	1	1.5135	.0000	.0946	0	.0000	.0000	.0000
.0040	.195E+01	-.598E-06	-.517E-08	1	1.9474	.0000	.1217	0	.0000	.0000	.0000
.0050	.232E+01	-.115E-05	-.997E-08	1	2.3231	.0000	.1452	0	.0000	.0000	.0000
.0060	.263E+01	-.196E-05	-.170E-07	1	2.6294	.0000	.1643	0	.0000	.0000	.0000
.0070	.286E+01	-.306E-05	-.264E-07	1	2.8571	.0000	.1786	0	.0000	.0000	.0000
.0080	.300E+01	-.446E-05	-.386E-07	1	2.9994	.0000	.1875	0	.0000	.0000	.0000
.0090	.305E+01	-.620E-05	-.536E-07	1	3.0519	.0000	.1907	0	.0000	.0000	.0000
.0100	.301E+01	-.827E-05	-.715E-07	1	3.0131	.0000	.1910	0	.0000	.0000	.0000
.0110	.288E+01	-.107E-04	-.923E-07	1	2.8842	.0000	.1910	0	.0000	.0000	.0000
.0120	.267E+01	-.134E-04	-.116E-06	1	2.6691	.0000	.1910	0	.0000	.0000	.0000
.0130	.237E+01	-.164E-04	-.142E-06	1	2.3741	.0000	.1910	0	.0000	.0000	.0000
.0140	.201E+01	-.197E-04	-.170E-06	1	2.0082	.0000	.1910	0	.0000	.0000	.0000
.0150	.158E+01	-.232E-04	-.201E-06	1	1.5824	.0000	.1910	0	.0000	.0000	.0000
.0160	.111E+01	-.269E-04	-.233E-06	1	1.1094	.0000	.1910	0	.0000	.0000	.0000
.0170	.603E+00	-.308E-04	-.266E-06	1	.6035	.0000	.1910	0	.0000	.0000	.0000
.0180	.798E-01	-.347E-04	-.300E-06	1	.0798	.0000	.1910	0	.0000	.0000	.0000
.0190	-.448E+00	-.386E-04	-.334E-06	0	.0798	.0000	.1910	0	.0000	.0000	.0000
.0200	-.975E+00	-.425E-04	-.367E-06	0	.0798	.0000	.1910	0	.0000	.0000	.0000
.0210	-.150E+01	-.464E-04	-.401E-06	0	.0798	.0000	.1910	0	.0000	.0000	.0000
.0220	-.203E+01	-.504E-04	-.435E-06	0	.0798	.0000	.1910	0	.0000	.0000	.0000
.0230	-.255E+01	-.543E-04	-.469E-06	0	.0798	.0000	.1910	0	.0000	.0000	.0000
.0240	-.308E+01	-.582E-04	-.503E-06	0	.0798	.0000	.1910	0	.0000	.0000	.0000
.0250	-.360E+01	-.621E-04	-.537E-06	0	.0798	.0000	.1910	0	.0000	.0000	.0000
.0260	-.413E+01	-.660E-04	-.571E-06	0	.0798	.0000	.1910	0	.0000	.0000	.0000
.0270	-.465E+01	-.699E-04	-.605E-06	0	.0798	.0000	.1910	0	.0000	.0000	.0000
.0280	-.518E+01	-.739E-04	-.638E-06	0	.0798	.0000	.1910	0	.0000	.0000	.0000

```
    .0290   -.570E+01   -.778E-04   -.672E-06     0     .0798     .0000     .1910     0     .0000     .0000     .0000
1                    FORCE OUTPUT..UNITS  KIPS, INCHES, GS

  TIME     FORCE-1     FORCE-2     HOR FORCE          ACCEL
         DST TO CG   DST TO CG              VERTICAL  HORIZONTAL  ROTATION


  .0000       .00        .00        .00        .00        .00       .00000
              .000       .000
  .0010   7447.56        .00       -.03     -39.92        .00      -.00000
             -.000       .000
  .0020  21470.69        .00       -.08    -116.97        .00      -.00000
             -.000       .000
  .0030       .00        .00        .00        .00        .00       .00000
              .000       .000
  .0040  27624.98        .00       -.10    -150.79        .00      -.00000
             -.000       .000
  .0050  32954.82        .00       -.12    -180.07        .00      -.00000
             -.000       .000
  .0060  37300.12        .00       -.14    -203.95        .00      -.00000
             -.000       .000
  .0070  40530.31        .00       -.15    -221.69        .00      -.00000
             -.000       .000
  .0080  42548.38        .00       -.16    -232.78        .00      -.00000
             -.000       .000
  .0090  43293.68        .00       -.16    -236.88        .00      -.00000
             -.000       .000
  .0100  42743.83        .00       -.16    -233.86        .00      -.00000
             -.000       .000
  .0110  40915.35        .00       -.15    -223.81        .00      -.00000
             -.000       .000
  .0120  37863.18        .00       -.14    -207.04        .00      -.00000
             -.000       .000
  .0130  33678.98        .00       -.13    -184.05        .00      -.00000
             -.000       .000
  .0140  28488.49        .00       -.11    -155.53        .00      -.00000
             -.000       .000
  .0150  22447.62        .00       -.09    -122.34        .00      -.00000
             -.000       .000
  .0160  15737.86        .00       -.06     -85.47        .00      -.00000
```

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            -.000       .000
  .0170   8560.77       .00       -.03     -46.04        .00      -.00000
            -.000       .000
  .0180   1131.98       .00       -.00      -5.22        .00       .00000
            -.000       .000
  .0190       .00       .00        .00       1.00        .00       .00000
             .000       .000
  .0200       .00       .00        .00       1.00        .00       .00000
             .000       .000
  .0210       .00       .00        .00       1.00        .00       .00000
             .000       .000
  .0220       .00       .00        .00       1.00        .00       .00000
             .000       .000
  .0230       .00       .00        .00       1.00        .00       .00000
             .000       .000
  .0240       .00       .00        .00       1.00        .00       .00000
             .000       .000
  .0250       .00       .00        .00       1.00        .00       .00000
             .000       .000
  .0260       .00       .00        .00       1.00        .00       .00000
             .000       .000
  .0270       .00       .00        .00       1.00        .00       .00000
             .000       .000
  .0280       .00       .00        .00       1.00        .00       .00000
             .000       .000
  .0290       .00       .00        .00       1.00        .00       .00000
             .000       .000
  .0300       .00       .00        .00       1.00        .00       .00000
             .000       .000
1                                                  NORMAL ACCEL AT
  TIME        AXIAL ACCEL (G'S)   CENTER OF GRAV      TOP              BOTTOM

     .0000      -.100E+01      -.362E-05      -.362E-05      -.362E-05
     .0010       .399E+02      -.338E-05      -.131E-03       .124E-03
     .0020       .796E+02      -.374E-05      -.255E-03       .248E-03
     .0030       .117E+03      -.211E-05      -.369E-03       .365E-03
     .0040       .151E+03      -.542E-05      -.480E-03       .470E-03
     .0050       .180E+03      -.302E-05      -.567E-03       .561E-03
     .0060       .204E+03      -.466E-05      -.645E-03       .636E-03
     .0070       .222E+03      -.868E-05      -.708E-03       .690E-03
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     .0080       .233E+03      -.130E-04      -.750E-03       .724E-03
     .0090       .237E+03      -.170E-04      -.771E-03       .737E-03
     .0100       .234E+03       .620E-05      -.742E-03       .754E-03
     .0110       .224E+03      -.691E-06      -.722E-03       .721E-03
     .0120       .207E+03      -.121E-06      -.667E-03       .667E-03
     .0130       .184E+03      -.616E-05      -.605E-03       .592E-03
     .0140       .156E+03      -.112E-04      -.522E-03       .500E-03
     .0150       .122E+03       .731E-06      -.405E-03       .407E-03
     .0160       .855E+02      -.293E-05      -.290E-03       .284E-03
     .0170       .460E+02      -.488E-05      -.162E-03       .152E-03
     .0180       .522E+01      -.362E-05      -.246E-04       .174E-04
     .0190      -.100E+01      -.398E-05      -.398E-05      -.398E-05
     .0200      -.100E+01      -.398E-05      -.398E-05      -.398E-05
     .0210      -.100E+01      -.398E-05      -.398E-05      -.398E-05
     .0220      -.100E+01      -.410E-05      -.410E-05      -.410E-05
     .0230      -.100E+01      -.410E-05      -.410E-05      -.410E-05
     .0240      -.100E+01      -.410E-05      -.410E-05      -.410E-05
     .0250      -.100E+01      -.422E-05      -.422E-05      -.422E-05
     .0260      -.100E+01      -.422E-05      -.422E-05      -.422E-05
     .0270      -.100E+01      -.422E-05      -.422E-05      -.422E-05
     .0280      -.100E+01      -.422E-05      -.422E-05      -.422E-05
     .0290      -.100E+01      -.434E-05      -.434E-05      -.434E-05
     .0300      -.100E+01      -.434E-05      -.434E-05      -.434E-05
                    MAXIMUM ACCELERATIONS
     MAX AXIAL =   236.877  G'S
     MAX TRANS CG =      .000       G'S
     MAX TRANS TOP =      .000  G'S
     MAX TRANS BOT =      .000  G'S
1          ACCELERATIONS (G'S)
     A = AXIAL ACC
     G = TRANS ACC CG
     T = TRANS ACC TOP
     B = TRANS ACC BOT
    -1.0      33.0      67.0      100.9     134.9     168.9     202.9     236.9
     ------------------------------------------------------------------------
     B         I         I         I         I         I         I         I
     B         IA        I         I         I         I         I         I
     B         I         I A       I         I         I         I         I
     B         I         I         I  A      I         I         I         I
     B         I         I         I         I  A      I         I         I
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     B         I         I         I         I         I A       I         I
     B         I         I         I         I         I        AI         I
     B         I         I         I         I         I         I   A     I
     B         I         I         I         I         I         I     A   I
     B---------I---------I---------I---------I---------I---------I-------A-ITIME =    .0090
     B         I         I         I         I         I         I       A I
     B         I         I         I         I         I         I    A    I
     B         I         I         I         I         I         A         I
     B         I         I         I         I         I  A      I         I
     B         I         I         I         I    A    I         I         I
     B         I         I         I    A    I         I         I         I
     B         I         I   A     I         I         I         I         I
     B         I A       I         I         I         I         I         I
     B         I         I         I         I         I         I         I
     B---------I---------I---------I---------I---------I---------I---------ITIME =    .0190
     B         I         I         I         I         I         I         I
     B         I         I         I         I         I         I         I
     B         I         I         I         I         I         I         I
     B         I         I         I         I         I         I         I
     B         I         I         I         I         I         I         I
     B         I         I         I         I         I         I         I
     B         I         I         I         I         I         I         I
     B         I         I         I         I         I         I         I
     B         I         I         I         I         I         I         I
     B---------I---------I---------I---------I---------I---------I---------ITIME =    .0290
     B         I         I         I         I         I         I         I
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          DEFORMED SHAPE OF COVER   1


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          DEFORMED SHAPE OF COVER   2


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    ***********************************************************************

    RUN NAME : __________  DATE RUN : ______  NO OF PAGES OUTPUT : ______

    CALCULATION TITLE : ____________________________________________________

    PROJECT NAME : ____________________    BY : ______________
```

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*********************************************************************

                    TRANSNUCLEAR, INC.

     AAAAA     DDDDD       OOOOO     CCCCC
    A     A    D    D     O     O   C     C
    A     A    D     D    O     O   C
    AAAAAAA    D     D    O     O   C
    A     A    D     D    O     O   C
    A     A    D    D     O     O   C     C
    A     A    DDDDD       OOOOO     CCCCC

PROGRAM : ADOC (ACCEL DUE TO DROP ON COVERS)

REVISION : 1
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                    COMPUTER : TEXAS INST PC

                    MANUALS : PROGRAM PACKAGE

                    REVISION : 1        DATE : 12-2-87

     ********************************************************************



1 VERIFICATION PROBLEM NO. 3 - SIDE DROP                DATE:11/20/2005


     CASK LENGTH =   199.200  INCHES
     LOCATION OF CG =      .500  *LENGTH
     CASK WEIGHT =182000.000  POUNDS
     CASK ROTARY INERTIA =     .844E+06  POUND IN.SEC**2

     HEIGHT OF DROP =   360.000  INCHES
     ANGLE OF CASK CL WITH RESPECT TO HORIZ. =      .000  DEG
     IMPACT VELOCITY =     .527E+03  IN./SEC



     MAX TIME =     .0600  SEC
     TIME STEP =    .00200  SEC
     PRINT EVERY     0  TIME STEPS

1
          C O V E R   P R O P E R T I E S

     OUTER RADIUS =    60.000 INCHES
     INNER RADIUS =    33.375 INCHES
     THICKNESS COVER 1 =    32.000 INCHES
     THICKNESS COVER 2 =    32.000 INCHES
     OUTER THICKNESS COVER 1 =    16.000 INCHES
     OUTER THICKNESS COVER 2 =    16.000 INCHES
     NUMBER OF SEGMENTS BOTTOM =   20
     NUMBER OF SEGMENTS SIDE =   10
```

```
     MATERIAL   1  PROPERTIES
CRUSHING STRENGTH =   195.000 PSI
YIELD STRAIN =     .00060
UNLOADING MODULUS =        .480E+05 PSI
STRAIN LIMIT OF CRUSHING =     .80000
LOCKING MODULUS =        .480E+05 PSI
HARDER MAT CRUSH STRENGTH =   195.000 PSI
STRAIN FOR TRANSFER TO HARD MAT =     .00060

     MATERIAL   2  PROPERTIES
CRUSHING STRENGTH =   195.000 PSI
YIELD STRAIN =     .00060
UNLOADING MODULUS =        .480E+05 PSI
STRAIN LIMIT OF CRUSHING =     .80000
LOCKING MODULUS =        .480E+05 PSI
HARDER MAT CRUSH STRENGTH =   195.000 PSI
STRAIN FOR TRANSFER TO HARD MAT =     .00060

     MATERIAL   3  PROPERTIES
CRUSHING STRENGTH =  4500.000 PSI
YIELD STRAIN =     .00040
UNLOADING MODULUS =        .124E+07 PSI
STRAIN LIMIT OF CRUSHING =     .80000
LOCKING MODULUS =        .124E+07 PSI
HARDER MAT CRUSH STRENGTH =  4500.000 PSI
STRAIN FOR TRANSFER TO HARD MAT =     .00040

FRICTION COEFFICIENT =       .200


COUNT     1.000 TIMES NON BACKED UP FORCES
1                      DEFORMATIONS                    BOTTOM COVER                          TOP COVER
   TIME     VERTICAL  HORIZONTAL    ROTATION    MODE  DELTA        PHI     MAX STRAIN  MODE  DELTA        PHI     MAX STRN

   .0000    .000E+00    .000E+00    .000E+00     0     .0000     .0000      .0000      0     .0000     .0000      .0000
   .0020    .106E+01    .000E+00    .000E+00     3    1.0557    1.5708      .0000      3    1.0557    1.5708      .0000
   .0040    .211E+01    .000E+00    .000E+00     3    2.1129    1.5708      .0000      3    2.1129    1.5708      .0000
```

.0060	.317E+01	.000E+00	.000E+00	3	3.1717	1.5708	.0064	3	3.1717	1.5708	.0064
.0080	.420E+01	-.360E-09	-.601E-11	3	4.2018	1.5708	.0451	3	4.2018	1.5708	.0451
.0100	.519E+01	.327E-03	.545E-05	3	5.1878	1.5708	.0822	3	5.1891	1.5708	.0822
.0120	.613E+01	.980E-03	.163E-04	3	6.1296	1.5708	.1175	3	6.1334	1.5708	.1177
.0140	.703E+01	.196E-02	.327E-04	3	7.0272	1.5708	.1513	3	7.0348	1.5708	.1515
.0160	.789E+01	.327E-02	.545E-04	3	7.8806	1.5708	.1833	3	7.8932	1.5708	.1838
.0180	.870E+01	.458E-02	.763E-04	3	8.6908	1.5708	.2137	3	8.7085	1.5708	.2144
.0200	.946E+01	.589E-02	.982E-04	3	9.4500	1.5708	.2423	3	9.4727	1.5708	.2431
.0220	.102E+02	.671E-02	.112E-03	3	10.1444	1.5708	.2683	3	10.1702	1.5708	.2693
.0240	.108E+02	.653E-02	.109E-03	3	10.7752	1.5708	.2920	3	10.8004	1.5708	.2930
.0260	.114E+02	.585E-02	.974E-04	3	11.3411	1.5708	.3133	3	11.3636	1.5708	.3141
.0280	.119E+02	.517E-02	.862E-04	3	11.8415	1.5708	.3321	3	11.8614	1.5708	.3328
.0300	.123E+02	.400E-02	.666E-04	3	12.2778	1.5705	.3484	3	12.2932	1.5708	.3490
.0320	.127E+02	.233E-02	.388E-04	3	12.6501	1.5705	.3624	3	12.6591	1.5708	.3628
.0340	.130E+02	.427E-03	.707E-05	3	12.9577	1.5708	.3740	3	12.9594	1.5708	.3741
.0360	.132E+02	-.134E-02	-.224E-04	3	13.1995	1.5708	.3831	3	13.1944	1.5708	.3829
.0380	.134E+02	-.311E-02	-.520E-04	3	13.3759	1.5708	.3897	3	13.3639	1.5708	.3893
.0400	.135E+02	-.489E-02	-.815E-04	3	13.4867	1.5708	.3939	3	13.4679	1.5708	.3932
.0420	.135E+02	-.666E-02	-.111E-03	3	13.5322	1.5708	.3956	3	13.5065	1.5708	.3946
.0440	.135E+02	-.868E-02	-.145E-03	3	13.5128	1.5708	.3958	3	13.4793	1.5708	.3947
.0460	.134E+02	-.989E-02	-.165E-03	3	13.4466	1.5708	.3958	3	13.4085	1.5708	.3947
.0480	.134E+02	-.106E-01	-.144E-03	3	13.3679	1.5705	.3958	3	13.3346	1.5708	.3947
.0500	.133E+02	-.113E-01	-.122E-03	3	13.2906	1.5708	.3958	3	13.2623	1.5705	.3947
.0520	.132E+02	-.120E-01	-.101E-03	3	13.2149	1.5708	.3958	3	13.1915	1.5708	.3947
.0540	.131E+02	-.127E-01	-.800E-04	3	13.1408	1.5708	.3958	3	13.1223	1.5708	.3947
.0560	.131E+02	-.134E-01	-.587E-04	3	13.0682	1.5705	.3958	3	13.0546	1.5708	.3947
.0580	.130E+02	-.141E-01	-.375E-04	3	12.9972	1.5708	.3958	3	12.9885	1.5708	.3947

1 FORCE OUTPUT..UNITS KIPS, INCHES, GS

TIME	FORCE-1 DST TO CG	FORCE-2 DST TO CG	HOR FORCE	VERTICAL	ACCEL HORIZONTAL	ROTATION
.0000	.00	.00	.00	.00	.00	.00000
	.000	.000				
.0020	.00	.00	.00	1.00	.00	.00000
	.000	.000				
.0040	2742.57	2742.57	.00	-29.14	.00	.00000
	92.265	-92.265				
.0060	.00	.00	.00	.00	.00	.00000

```
            .000      .000
.0080   2742.57   2742.57       .00    -29.14       .00      .00000
          92.265   -92.265
.0100   2741.08   2742.57     -1.52    -29.13      -.00     -.00014
          92.265   -92.264
.0120   2742.57   2742.57       .06    -29.14       .00      .00000
          92.265   -92.264
.0140   2742.57   2742.57       .11    -29.14       .00      .00001
          92.266   -92.263
.0160   2742.57   2742.57       .19    -29.14       .00      .00002
          92.268   -92.261
.0180   2742.57   2742.57       .27    -29.14       .00      .00002
          92.269   -92.260
.0200   4197.11   4197.11       .50    -45.12       .00      .00005
          92.270   -92.259
.0220   4197.11   4197.11       .57    -45.12       .00      .00005
          92.271   -92.258
.0240   4197.11   4197.11       .56    -45.12       .00      .00005
          92.271   -92.259
.0260   4197.11   4197.11       .50    -45.12       .00      .00005
          92.270   -92.259
.0280   4197.11   4197.11       .44    -45.12       .00      .00004
          92.269   -92.260
.0300   4197.11   4197.11       .34    -45.12       .00      .00003
          92.268   -92.261
.0320   3939.22   4197.11   -259.62    -43.71     -1.43     -.02378
          92.380   -92.262
.0340   4197.11   4197.11       .04    -45.12       .00      .00000
          92.265   -92.264
.0360   4197.11   4197.11      -.12    -45.12       .00     -.00001
          92.263   -92.266
.0380   4197.11   4197.11      -.27    -45.12      -.00     -.00002
          92.262   -92.267
.0400   4197.11   4197.11      -.42    -45.12      -.00     -.00004
          92.260   -92.269
.0420   4197.11   4197.11      -.57    -45.12      -.00     -.00005
          92.258   -92.271
.0440   3070.83   2902.23    172.43    -31.82       .95      .01579
          92.282   -92.303
.0460    209.53     11.95     41.91      -.22       .23      .04845
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          93.555  -107.609
 .0480      .00       .00       .00       1.00       .00       .00000
            .000      .000
 .0500      .00       .00       .00       1.00       .00       .00000
            .000      .000
 .0520      .00       .00       .00       1.00       .00       .00000
            .000      .000
 .0540      .00       .00       .00       1.00       .00       .00000
            .000      .000
 .0560      .00       .00       .00       1.00       .00       .00000
            .000      .000
 .0580      .00       .00       .00       1.00       .00       .00000
            .000      .000
 .0600      .00       .00       .00       1.00       .00       .00000
            .000      .000
1                                                NORMAL ACCEL AT
 TIME        AXIAL ACCEL (G'S)   CENTER OF GRAV      TOP            BOTTOM

    .0000       .000E+00       .100E+01       .100E+01       .100E+01
    .0020       .000E+00       .100E+01       .100E+01       .100E+01
    .0040       .000E+00       .100E+01       .100E+01       .100E+01
    .0060      -.104E-06      -.291E+02      -.291E+02      -.291E+02
    .0080      -.104E-06      -.291E+02      -.291E+02      -.291E+02
    .0100      -.849E-02      -.291E+02      -.291E+02      -.291E+02
    .0120      -.163E-03      -.291E+02      -.291E+02      -.291E+02
    .0140      -.327E-03      -.291E+02      -.291E+02      -.291E+02
    .0160      -.547E-03      -.291E+02      -.291E+02      -.291E+02
    .0180      -.765E-03      -.291E+02      -.291E+02      -.291E+02
    .0200      -.166E-02      -.451E+02      -.451E+02      -.451E+02
    .0220      -.189E-02      -.451E+02      -.451E+02      -.451E+02
    .0240      -.184E-02      -.451E+02      -.451E+02      -.451E+02
    .0260      -.165E-02      -.451E+02      -.451E+02      -.451E+02
    .0280      -.146E-02      -.451E+02      -.451E+02      -.451E+02
    .0300      -.113E-02      -.451E+02      -.451E+02      -.451E+02
    .0320      -.143E+01      -.437E+02      -.461E+02      -.413E+02
    .0340      -.121E-03      -.451E+02      -.451E+02      -.451E+02
    .0360       .379E-03      -.451E+02      -.451E+02      -.451E+02
    .0380       .880E-03      -.451E+02      -.451E+02      -.451E+02
    .0400       .138E-02      -.451E+02      -.451E+02      -.451E+02
    .0420       .188E-02      -.451E+02      -.451E+02      -.451E+02
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     .0440       .952E+00      -.318E+02      -.302E+02      -.334E+02
     .0460       .230E+00      -.217E+00       .461E+01      -.504E+01
     .0480      -.144E-03       .100E+01       .100E+01       .100E+01
     .0500      -.122E-03       .100E+01       .100E+01       .100E+01
     .0520      -.101E-03       .100E+01       .100E+01       .100E+01
     .0540      -.800E-04       .100E+01       .100E+01       .100E+01
     .0560      -.587E-04       .100E+01       .100E+01       .100E+01
     .0580      -.375E-04       .100E+01       .100E+01       .100E+01
     .0600      -.163E-04       .100E+01       .100E+01       .100E+01
                    MAXIMUM ACCELERATIONS
     MAX AXIAL =     1.428  G'S
     MAX TRANS CG =    45.122       G'S
     MAX TRANS TOP =    46.073  G'S
     MAX TRANS BOT =    45.127  G'S
1          ACCELERATIONS (G'S)
     A = AXIAL ACC
     G = TRANS ACC CG
     T = TRANS ACC TOP
     B = TRANS ACC BOT
   -46.1     -38.8     -31.6     -24.4     -17.1      -9.9      -2.6       4.6
     ------------------------------------------------------------------------
     I         I         I         I         I         I         I A B     I
     I         I         I         I         I         I         I A B     I
     I         I         I         I         I         I         I A B     I
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     I         I         I B       I         I         I         I A       I
     I         I         I B       I         I         I         I A       I
     I         I         I B       I         I         I         I A       I
     I         I         I B       I         I         I         I A       I
     I         I         I B       I         I         I         I A       I
     I---------I---------I-B-------I---------I---------I---------I-A-------ITIME =    .0180
     B         I         I         I         I         I         I A       I
     B         I         I         I         I         I         I A       I
     B         I         I         I         I         I         I A       I
     B         I         I         I         I         I         I A       I
     B         I         I         I         I         I         I A       I
     B         I         I         I         I         I         I A       I
     T G  B    I         I         I         I         I         A         I
     B         I         I         I         I         I         I A       I
     B         I         I         I         I         I         I A       I
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     B---------I---------I---------I---------I---------I---------I-A-------ITIME =    .0380
     B         I         I         I         I         I         I A       I
     B         I         I         I         I         I         I A       I
     I         I     B G T         I         I         I         I  A      I
     I         I         I         I         I         I    B    I G     T I
     I         I         I         I         I         I         I A B     I
     I         I         I         I         I         I         I A B     I
     I         I         I         I         I         I         I A B     I
     I         I         I         I         I         I         I A B     I
     I         I         I         I         I         I         I A B     I
     I---------I---------I---------I---------I---------I---------I-A-B-----ITIME =    .0580
     I         I         I         I         I         I         I A B     I
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          DEFORMED SHAPE OF COVER   1


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*********************************************************************

RUN NAME : __________  DATE RUN : ______  NO OF PAGES OUTPUT : ______

CALCULATION TITLE : ____________________________________________

PROJECT NAME : ____________________   BY : ______________

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TRANSNUCLEAR, INC.

```
 AAAAA    DDDDD      OOOOO    CCCCC
A     A   D    D    O     O  C     C
A     A   D     D   O     O  C
AAAAAAA   D     D   O     O  C
A     A   D     D   O     O  C
A     A   D    D    O     O  C     C
A     A   DDDDD      OOOOO    CCCCC
```

PROGRAM : ADOC (ACCEL DUE TO DROP ON COVERS)

REVISION : 1

COMPUTER : TEXAS INST PC

MANUALS : PROGRAM PACKAGE

REVISION : 1 DATE : 12-2-87

****

1 VERIFICATION PROBLEM NO. 4 - CORNER DROP DATE:11/20/2005

```
     CASK LENGTH =   199.200  INCHES
     LOCATION OF CG =       .500  *LENGTH
     CASK WEIGHT =182000.000  POUNDS
     CASK ROTARY INERTIA =     .844E+06  POUND IN.SEC**2

     HEIGHT OF DROP =   360.000  INCHES
     ANGLE OF CASK CL WITH RESPECT TO HORIZ. =    75.000  DEG
     IMPACT VELOCITY =     .527E+03  IN./SEC


     MAX TIME =     .0600  SEC
     TIME STEP =    .00200  SEC
     PRINT EVERY     0  TIME STEPS

1
          C O V E R   P R O P E R T I E S

     OUTER RADIUS =    60.000 INCHES
     INNER RADIUS =    33.375 INCHES
     THICKNESS COVER 1 =    32.000 INCHES
     THICKNESS COVER 2 =    32.000 INCHES
     OUTER THICKNESS COVER 1 =    20.000 INCHES
     OUTER THICKNESS COVER 2 =    20.000 INCHES
     NUMBER OF SEGMENTS BOTTOM =   20
     NUMBER OF SEGMENTS SIDE =   10


          MATERIAL   1  PROPERTIES
     CRUSHING STRENGTH =  1300.000 PSI
     YIELD STRAIN =    .00040
     UNLOADING MODULUS =       .100E+05 PSI
     STRAIN LIMIT OF CRUSHING =    .90000
     LOCKING MODULUS =       .100E+05 PSI
     HARDER MAT CRUSH STRENGTH =  1300.000 PSI
     STRAIN FOR TRANSFER TO HARD MAT =    .00040

          MATERIAL   2  PROPERTIES
     CRUSHING STRENGTH =  1300.000 PSI
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YIELD STRAIN =     .00040
UNLOADING MODULUS =        .100E+05 PSI
STRAIN LIMIT OF CRUSHING =     .90000
LOCKING MODULUS =        .100E+05 PSI
HARDER MAT CRUSH STRENGTH =  1300.000 PSI
STRAIN FOR TRANSFER TO HARD MAT =     .00040

     MATERIAL   3  PROPERTIES
CRUSHING STRENGTH =  1300.000 PSI
YIELD STRAIN =     .00040
UNLOADING MODULUS =        .100E+05 PSI
STRAIN LIMIT OF CRUSHING =     .90000
LOCKING MODULUS =        .100E+05 PSI
HARDER MAT CRUSH STRENGTH =  1300.000 PSI
STRAIN FOR TRANSFER TO HARD MAT =     .00040

FRICTION COEFFICIENT =       .200


COUNT    1.000 TIMES NON BACKED UP FORCES
1                    DEFORMATIONS                    BOTTOM COVER                          TOP COVER
   TIME    VERTICAL  HORIZONTAL    ROTATION    MODE  DELTA        PHI    MAX STRAIN  MODE  DELTA        PHI    MAX STRN

   .0000    .000E+00    .000E+00    .000E+00     0     .0000     .0000     .0000     0     .0000     .0000     .0000
   .0020    .106E+01    .000E+00    .000E+00     2    1.0929     .2618     .0084     0     .0000     .0000     .0000
   .0040    .211E+01   -.266E-03   -.203E-05     2    2.1857     .2618     .0403     0     .0000     .0000     .0000
   .0060    .316E+01   -.110E-02   -.841E-05     2    3.2761     .2618     .0721     0     .0000     .0000     .0000
   .0080    .421E+01   -.287E-02   -.219E-04     2    4.3611     .2618     .1037     0     .0000     .0000     .0000
   .0100    .525E+01   -.589E-02   -.450E-04     2    5.4369     .2618     .1351     0     .0000     .0000     .0000
   .0120    .628E+01   -.104E-01   -.795E-04     2    6.4997     .2617     .1661     0     .0000     .0000     .0000
   .0140    .729E+01   -.167E-01   -.127E-03     2    7.5451     .2617     .1966     0     .0000     .0000     .0000
   .0160    .828E+01   -.247E-01   -.188E-03     2    8.5684     .2616     .2264     0     .0000     .0000     .0000
   .0180    .925E+01   -.344E-01   -.263E-03     2    9.5650     .2615     .2555     0     .0000     .0000     .0000
   .0200    .102E+02   -.458E-01   -.349E-03     2   10.5301     .2614     .2837     0     .0000     .0000     .0000
   .0220    .111E+02   -.584E-01   -.446E-03     2   11.4583     .2614     .3108     0     .0000     .0000     .0000
   .0240    .119E+02   -.722E-01   -.551E-03     2   12.3470     .2612     .3367     0     .0000     .0000     .0000
   .0260    .128E+02   -.866E-01   -.661E-03     2   13.1913     .2611     .3614     0     .0000     .0000     .0000
   .0280    .135E+02   -.101E+00   -.774E-03     2   13.9881     .2610     .3846     0     .0000     .0000     .0000
   .0300    .143E+02   -.116E+00   -.884E-03     2   14.7322     .2609     .4064     0     .0000     .0000     .0000
   .0320    .149E+02   -.130E+00   -.988E-03     2   15.4210     .2608     .4348     0     .0000     .0000     .0000
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.0340	.155E+02	-.142E+00	-.108E-02	2	16.0493	.2607	.4626	0	.0000	.0000	.0000
.0360	.161E+02	-.151E+00	-.115E-02	2	16.6145	.2606	.4875	0	.0000	.0000	.0000
.0380	.166E+02	-.158E+00	-.121E-02	2	17.1140	.2606	.5096	0	.0000	.0000	.0000
.0400	.170E+02	-.161E+00	-.123E-02	2	17.5423	.2606	.5285	0	.0000	.0000	.0000
.0420	.173E+02	-.161E+00	-.123E-02	2	17.9004	.2606	.5444	0	.0000	.0000	.0000
.0440	.176E+02	-.159E+00	-.121E-02	2	18.1903	.2606	.5572	0	.0000	.0000	.0000
.0460	.178E+02	-.155E+00	-.118E-02	2	18.4118	.2606	.5671	0	.0000	.0000	.0000
.0480	.180E+02	-.147E+00	-.112E-02	2	18.5601	.2607	.5737	0	.0000	.0000	.0000
.0500	.180E+02	-.135E+00	-.103E-02	2	18.6328	.2608	.5770	0	.0000	.0000	.0000
.0520	.180E+02	-.119E+00	-.906E-03	2	18.6298	.2609	.5778	0	.0000	.0000	.0000
.0540	.179E+02	-.985E-01	-.751E-03	2	18.5519	.2610	.5778	0	.0000	.0000	.0000
.0560	.178E+02	-.743E-01	-.566E-03	2	18.4011	.2612	.5778	0	.0000	.0000	.0000
.0580	.176E+02	-.464E-01	-.354E-03	2	18.1816	.2614	.5778	0	.0000	.0000	.0000

1 FORCE OUTPUT..UNITS KIPS, INCHES, GS

TIME	FORCE-1 DST TO CG	FORCE-2 DST TO CG	HOR FORCE	VERTICAL	ACCEL HORIZONTAL	ROTATION
.0000	.00	.00	.00	.00	.00	.00000
	.000	.000				
.0020	282.31	.00	-47.02	-.55	-.26	-.00197
	-24.103	.000				
.0040	758.58	.00	-107.27	-3.17	-.59	-.00450
	-20.466	.000				
.0060	.00	.00	.00	.00	.00	.00000
	.000	.000				
.0080	1395.90	.00	-165.65	-6.67	-.91	-.00695
	-17.175	.000				
.0100	1395.90	.00	-165.68	-6.67	-.91	-.00695
	-17.178	.000				
.0120	2103.83	.00	-200.36	-10.56	-1.10	-.00840
	-13.783	.000				
.0140	2898.24	.00	-212.22	-14.92	-1.17	-.00890
	-10.597	.000				
.0160	2898.26	.00	-212.38	-14.92	-1.17	-.00890
	-10.605	.000				
.0180	3720.38	.00	-186.86	-19.44	-1.03	-.00783
	-7.269	.000				
.0200	4627.50	.00	-134.87	-24.43	-.74	-.00566

	-4.218	.000				
.0220	4638.59	.00	-135.80	-24.49	-.75	-.00569
	-4.237	.000				
.0240	5528.79	.00	-38.40	-29.38	-.21	-.00161
	-1.005	.000				
.0260	5558.15	.00	-41.93	-29.54	-.23	-.00176
	-1.092	.000				
.0280	6491.47	.00	87.18	-34.67	.48	.00366
	1.944	.000				
.0300	6509.04	.00	86.18	-34.76	.47	.00361
	1.916	.000				
.0320	7412.32	.00	260.03	-39.73	1.43	.01090
	5.076	.000				
.0340	7431.80	.00	258.34	-39.83	1.42	.01083
	5.030	.000				
.0360	7461.08	.00	254.69	-39.99	1.40	.01068
	4.939	.000				
.0380	8406.84	.00	457.62	-45.19	2.51	.01919
	7.877	.000				
.0400	8408.81	.00	457.76	-45.20	2.52	.01920
	7.877	.000				
.0420	8029.53	.00	247.80	-43.12	1.36	.01039
	4.465	.000				
.0440	8030.88	.00	246.04	-43.13	1.35	.01032
	4.433	.000				
.0460	8924.97	.00	490.41	-48.04	2.69	.02057
	7.951	.000				
.0480	8924.82	.00	490.78	-48.04	2.70	.02058
	7.957	.000				
.0500	8924.61	.00	491.35	-48.04	2.70	.02060
	7.967	.000				
.0520	8853.46	.00	486.42	-47.65	2.67	.02040
	7.950	.000				
.0540	8597.39	.00	467.74	-46.24	2.57	.01961
	7.873	.000				
.0560	8118.14	.00	433.03	-43.61	2.38	.01816
	7.719	.000				
.0580	7428.30	.00	383.07	-39.81	2.10	.01606
	7.463	.000				
.0600	6546.38	.00	320.54	-34.97	1.76	.01344

7.086 .000

1

TIME	AXIAL ACCEL (G'S)	NORMAL ACCEL AT CENTER OF GRAV	TOP	BOTTOM
.0000	-.966E+00	.259E+00	.259E+00	.259E+00
.0020	.465E+00	-.392E+00	-.589E+00	-.196E+00
.0040	.466E+00	-.392E+00	-.589E+00	-.196E+00
.0060	.291E+01	-.139E+01	-.184E+01	-.941E+00
.0080	.621E+01	-.261E+01	-.330E+01	-.191E+01
.0100	.621E+01	-.261E+01	-.330E+01	-.191E+01
.0120	.992E+01	-.380E+01	-.463E+01	-.296E+01
.0140	.141E+02	-.499E+01	-.587E+01	-.410E+01
.0160	.141E+02	-.499E+01	-.587E+01	-.410E+01
.0180	.185E+02	-.602E+01	-.680E+01	-.524E+01
.0200	.234E+02	-.703E+01	-.759E+01	-.647E+01
.0220	.235E+02	-.705E+01	-.761E+01	-.648E+01
.0240	.283E+02	-.779E+01	-.795E+01	-.763E+01
.0260	.285E+02	-.785E+01	-.802E+01	-.767E+01
.0280	.336E+02	-.848E+01	-.812E+01	-.885E+01
.0300	.337E+02	-.851E+01	-.815E+01	-.887E+01
.0320	.388E+02	-.886E+01	-.778E+01	-.995E+01
.0340	.389E+02	-.890E+01	-.782E+01	-.998E+01
.0360	.390E+02	-.895E+01	-.789E+01	-.100E+02
.0380	.443E+02	-.921E+01	-.730E+01	-.111E+02
.0400	.443E+02	-.922E+01	-.730E+01	-.111E+02
.0420	.420E+02	-.979E+01	-.876E+01	-.108E+02
.0440	.420E+02	-.980E+01	-.878E+01	-.108E+02
.0460	.471E+02	-.977E+01	-.773E+01	-.118E+02
.0480	.471E+02	-.978E+01	-.773E+01	-.118E+02
.0500	.471E+02	-.978E+01	-.772E+01	-.118E+02
.0520	.467E+02	-.971E+01	-.768E+01	-.117E+02
.0540	.453E+02	-.945E+01	-.750E+01	-.114E+02
.0560	.427E+02	-.896E+01	-.715E+01	-.108E+02
.0580	.390E+02	-.826E+01	-.666E+01	-.986E+01
.0600	.342E+02	-.735E+01	-.601E+01	-.868E+01

MAXIMUM ACCELERATIONS

MAX AXIAL = 47.110 G'S
MAX TRANS CG = 9.805 G'S
MAX TRANS TOP = 8.777 G'S
MAX TRANS BOT = 11.829 G'S

```
1          ACCELERATIONS (G'S)
     A = AXIAL ACC
     G = TRANS ACC CG
     T = TRANS ACC TOP
     B = TRANS ACC BOT
   -11.8      -3.4       5.0       13.4      21.9      30.3      38.7      47.1
     ---------------------------------------------------------------------------
     I         IA B      I         I         I         I         I         I
     I         I BA      I         I         I         I         I         I
     I         I BA      I         I         I         I         I         I
     I         TB    A   I         I         I         I         I         I
     I        TB         A         I         I         I         I         I
     I        TB         A         I         I         I         I         I
     I      TGBI         I   A     I         I         I         I         I
     I     TGB I         I        AI         I         I         I         I
     I     TGB I         I        AI         I         I         I         I
     I---TGB---I---------I---------I----A----I---------I---------I---------ITIME =    .0180
     I   TB    I         I         I         A         I         I         I
     I   TB    I         I         I         A         I         I         I
     I  B      I         I         I         I    A    I         I         I
     I  B      I         I         I         I    A    I         I         I
     I BT      I         I         I         I         I A       I         I
     I BT      I         I         I         I         I  A      I         I
     IBGT      I         I         I         I         I        AI         I
     IBGT      I         I         I         I         I        AI         I
     IBGT      I         I         I         I         I        AI         I
     B-G-T-----I---------I---------I---------I---------I---------I----A----ITIME =    .0380
     B G T     I         I         I         I         I         I    A    I
     BGT       I         I         I         I         I         I A       I
     BGT       I         I         I         I         I         I A       I
     BG T      I         I         I         I         I         I        AI
     BG T      I         I         I         I         I         I       A I
     BG T      I         I         I         I         I         I       A I
     BG T      I         I         I         I         I         I       A I
     BG  T     I         I         I         I         I         I     A   I
     B G T     I         I         I         I         I         I  A      I
     IB-G-T----I---------I---------I---------I---------I--------AI---------ITIME =    .0580
     I B GT    I         I         I         I         I  A      I         I
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          DEFORMED SHAPE OF COVER   1
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1
          DEFORMED SHAPE OF COVER   2


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RUN NAME : __________  DATE RUN : ______  NO OF PAGES OUTPUT : ______

CALCULATION TITLE : ____________________________________________

PROJECT NAME : ____________________    BY : _______________

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                    TRANSNUCLEAR, INC.


          ____________________________________________


           AAAAA    DDDDD      OOOOO    CCCCC
          A     A   D    D    O     O  C     C
          A     A   D     D   O     O  C
          AAAAAAA   D     D   O     O  C
          A     A   D     D   O     O  C
          A     A   D    D    O     O  C     C
          A     A   DDDDD      OOOOO    CCCCC
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                    PROGRAM : ADOC (ACCEL DUE TO DROP ON COVERS)

                    REVISION : 1

                    COMPUTER : TEXAS INST PC

                    MANUALS : PROGRAM PACKAGE

                    REVISION : 1        DATE : 12-2-87

     ********************************************************************


1 VERIFICATION PROBLEM NO. 5 - THIRD SCALE TEST 2       DATE:11/20/2005


     CASK LENGTH =     76.300  INCHES
     LOCATION OF CG =       .500  *LENGTH
     CASK WEIGHT =  8386.000  POUNDS
     CASK ROTARY INERTIA =     .100E+04  POUND IN.SEC**2

     HEIGHT OF DROP =   354.300  INCHES
     ANGLE OF CASK CL WITH RESPECT TO HORIZ. =    77.000  DEG
     IMPACT VELOCITY =     .523E+03  IN./SEC


     MAX TIME =     .0300  SEC
     TIME STEP =    .00200  SEC
     PRINT EVERY     0  TIME STEPS

1
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     C O V E R   P R O P E R T I E S

OUTER RADIUS =     14.500 INCHES
INNER RADIUS =     10.770 INCHES
THICKNESS COVER 1 =      5.710 INCHES
THICKNESS COVER 2 =      5.710 INCHES
OUTER THICKNESS COVER 1 =      3.310 INCHES
OUTER THICKNESS COVER 2 =      3.310 INCHES
NUMBER OF SEGMENTS BOTTOM =   20
NUMBER OF SEGMENTS SIDE =   10


     MATERIAL   1  PROPERTIES
CRUSHING STRENGTH =  3200.000 PSI
YIELD STRAIN =    .00040
UNLOADING MODULUS =       .100E+05 PSI
STRAIN LIMIT OF CRUSHING =    .90000
LOCKING MODULUS =       .100E+05 PSI
HARDER MAT CRUSH STRENGTH =  3200.000 PSI
STRAIN FOR TRANSFER TO HARD MAT =    .00040

     MATERIAL   2  PROPERTIES
CRUSHING STRENGTH =  3200.000 PSI
YIELD STRAIN =    .00040
UNLOADING MODULUS =       .100E+05 PSI
STRAIN LIMIT OF CRUSHING =    .90000
LOCKING MODULUS =       .100E+05 PSI
HARDER MAT CRUSH STRENGTH =  3200.000 PSI
STRAIN FOR TRANSFER TO HARD MAT =    .00040

     MATERIAL   3  PROPERTIES
CRUSHING STRENGTH =  3200.000 PSI
YIELD STRAIN =    .00040
UNLOADING MODULUS =       .100E+05 PSI
STRAIN LIMIT OF CRUSHING =    .90000
LOCKING MODULUS =       .100E+05 PSI
HARDER MAT CRUSH STRENGTH =  3200.000 PSI
STRAIN FOR TRANSFER TO HARD MAT =    .00040
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FRICTION COEFFICIENT = .200

COUNT 1.000 TIMES NON BACKED UP FORCES

1

	DEFORMATIONS			BOTTOM COVER				TOP COVER			
TIME	VERTICAL	HORIZONTAL	ROTATION	MODE	DELTA	PHI	MAX STRAIN	MODE	DELTA	PHI	MAX STRN
.0000	.000E+00	.000E+00	.000E+00	0	.0000	.0000	.0000	0	.0000	.0000	.0000
.0020	.104E+01	-.485E-03	-.111E-04	2	1.0679	.2269	.1497	0	.0000	.0000	.0000
.0040	.204E+01	-.254E-02	-.583E-04	2	2.0914	.2268	.3599	0	.0000	.0000	.0000
.0060	.293E+01	-.332E-02	-.760E-04	2	3.0070	.2268	.6226	0	.0000	.0000	.0000
.0080	.365E+01	.507E-02	.116E-03	2	3.7509	.2270	.8357	0	.0000	.0000	.0000
.0100	.417E+01	.299E-01	.684E-03	2	4.2791	.2276	.9863	0	.0000	.0000	.0000
.0120	.442E+01	.794E-01	.182E-02	2	4.5509	.2287	1.0624	0	.0000	.0000	.0000
.0140	.441E+01	.158E+00	.362E-02	2	4.5453	.2305	1.0809	0	.0000	.0000	.0000
.0160	.412E+01	.268E+00	.613E-02	2	4.2676	.2330	1.0809	0	.0000	.0000	.0000
.0180	.365E+01	.397E+00	.909E-02	2	3.8002	.2360	1.0809	0	.0000	.0000	.0000
.0200	.311E+01	.530E+00	.121E-01	2	3.2573	.2390	1.0809	0	.0000	.0000	.0000
.0220	.256E+01	.664E+00	.152E-01	2	2.7019	.2421	1.0809	0	.0000	.0000	.0000
.0240	.200E+01	.797E+00	.183E-01	2	2.1457	.2451	1.0809	0	.0000	.0000	.0000
.0260	.145E+01	.930E+00	.213E-01	2	1.5898	.2482	1.0809	0	.0000	.0000	.0000
.0280	.898E+00	.106E+01	.244E-01	2	1.0342	.2512	1.0809	0	.0000	.0000	.0000

1 FORCE OUTPUT..UNITS KIPS, INCHES, GS

TIME	FORCE-1 DST TO CG	FORCE-2 DST TO CG	HOR FORCE	ACCEL VERTICAL	ACCEL HORIZONTAL	ACCEL ROTATION
.0000	.00	.00	.00	.00	.00	.00000
	.000	.000				
.0020	200.36	.00	-10.70	-22.89	-1.28	-.02921
	-2.387	.000				
.0040	930.11	.00	49.01	-109.91	5.84	.13386
	2.356	.000				
.0060	.00	.00	.00	.00	.00	.00000
	.000	.000				
.0080	1164.21	.00	82.56	-137.83	9.84	.22549
	3.171	.000				
.0100	1443.97	.00	147.39	-171.19	17.58	.40253
	4.564	.000				

.0120	1484.65	.00	147.88	-176.04	17.63	.40383
	4.455	.000				
.0140	1498.90	.00	173.56	-177.74	20.70	.47385
	5.179	.000				
.0160	1006.96	.00	96.86	-119.08	11.55	.26438
	4.304	.000				
.0180	369.89	.00	17.08	-43.11	2.04	.04661
	2.067	.000				
.0200	59.08	.00	-2.44	-6.05	-.29	-.00667
	-1.852	.000				
.0220	.00	.00	.00	1.00	.00	.00000
	.000	.000				
.0240	.00	.00	.00	1.00	.00	.00000
	.000	.000				
.0260	.00	.00	.00	1.00	.00	.00000
	.000	.000				
.0280	.00	.00	.00	1.00	.00	.00000
	.000	.000				
.0300	.00	.00	.00	1.00	.00	.00000
	.000	.000				

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TIME	AXIAL ACCEL (G'S)	NORMAL ACCEL AT CENTER OF GRAV	TOP	BOTTOM
.0000	-.974E+00	.225E+00	.225E+00	.225E+00
.0020	.220E+02	-.639E+01	-.751E+01	-.528E+01
.0040	.617E+02	-.142E+02	-.142E+02	-.142E+02
.0060	.108E+03	-.190E+02	-.139E+02	-.241E+02
.0080	.137E+03	-.214E+02	-.128E+02	-.300E+02
.0100	.171E+03	-.215E+02	-.614E+01	-.369E+02
.0120	.175E+03	-.227E+02	-.733E+01	-.381E+02
.0140	.178E+03	-.205E+02	-.238E+01	-.385E+02
.0160	.119E+03	-.163E+02	-.617E+01	-.263E+02
.0180	.424E+02	-.810E+01	-.632E+01	-.988E+01
.0200	.580E+01	-.171E+01	-.197E+01	-.146E+01
.0220	-.971E+00	.240E+00	.240E+00	.240E+00
.0240	-.970E+00	.243E+00	.243E+00	.243E+00
.0260	-.969E+00	.246E+00	.246E+00	.246E+00
.0280	-.969E+00	.249E+00	.249E+00	.249E+00
.0300	-.968E+00	.252E+00	.252E+00	.252E+00

MAXIMUM ACCELERATIONS

```
     MAX AXIAL =   177.766  G'S
     MAX TRANS CG =    22.736       G'S
     MAX TRANS TOP =    14.189  G'S
     MAX TRANS BOT =    38.537  G'S
1          ACCELERATIONS (G'S)
     A = AXIAL ACC
     G = TRANS ACC CG
     T = TRANS ACC TOP
     B = TRANS ACC BOT
   -38.5      -7.6      23.3      54.2      85.1     116.0     146.9     177.8
     ---------------------------------------------------------------------
     I         IB        I         I         I         I         I         I
     I        BI       A I         I         I         I         I         I
     I     B   I         I         IA        I         I         I         I
     I  B GT   I         I         I         I     A   I         I         I
     IB  G  T  I         I         I         I         I    A    I         I
     B   G    TI         I         I         I         I         I     A   I
     B   G    TI         I         I         I         I         I       A I
     B   G     T         I         I         I         I         I        AI
     I B   G  TI         I         I         I        AI         I         I
     I-------BTI---------I----A----I---------I---------I---------I---------ITIME =    .0180
     I         B  A      I         I         I         I         I         I
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     I         IB        I         I         I         I         I         I
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PROJECT NAME : _____ BY : _____

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TRANSNUCLEAR, INC.

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A     A   D     D   O     O  C
AAAAAAA   D     D   O     O  C
A     A   D     D   O     O  C
A     A   D    D    O     O  C     C
A     A   DDDDD      OOOOO    CCCCC
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PROGRAM : ADOC (ACCEL DUE TO DROP ON COVERS)

```
                REVISION : 1

                COMPUTER : TEXAS INST PC

                MANUALS : PROGRAM PACKAGE

                REVISION : 1        DATE : 12-2-87

     ********************************************************************



1 VERIFICATION PROBLEM NO. 6 - THIRD SCALE TEST 5       DATE: 11/20/2005


     CASK LENGTH =    76.300  INCHES
     LOCATION OF CG =      .500  *LENGTH
     CASK WEIGHT =  8386.000  POUNDS
     CASK ROTARY INERTIA =     .100E+04  POUND IN.SEC**2

     HEIGHT OF DROP =    54.300  INCHES
     ANGLE OF CASK CL WITH RESPECT TO HORIZ. =    90.000  DEG
     IMPACT VELOCITY =     .205E+03  IN./SEC



     MAX TIME =     .0300  SEC
     TIME STEP =    .00200  SEC
     PRINT EVERY     0  TIME STEPS

1
          C O V E R   P R O P E R T I E S

     OUTER RADIUS =    14.500 INCHES
     INNER RADIUS =    10.770 INCHES
     THICKNESS COVER 1 =     5.710 INCHES
     THICKNESS COVER 2 =     5.710 INCHES
     OUTER THICKNESS COVER 1 =     3.310 INCHES
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     OUTER THICKNESS COVER 2 =     3.310 INCHES
     NUMBER OF SEGMENTS BOTTOM =   20
     NUMBER OF SEGMENTS SIDE =   10



          MATERIAL   1  PROPERTIES
     CRUSHING STRENGTH =  3200.000 PSI
     YIELD STRAIN =    .00040
     UNLOADING MODULUS =       .100E+05 PSI
     STRAIN LIMIT OF CRUSHING =    .90000
     LOCKING MODULUS =       .100E+05 PSI
     HARDER MAT CRUSH STRENGTH =  3200.000 PSI
     STRAIN FOR TRANSFER TO HARD MAT =    .00040

          MATERIAL   2  PROPERTIES
     CRUSHING STRENGTH =  3200.000 PSI
     YIELD STRAIN =    .00040
     UNLOADING MODULUS =       .100E+05 PSI
     STRAIN LIMIT OF CRUSHING =    .90000
     LOCKING MODULUS =       .100E+05 PSI
     HARDER MAT CRUSH STRENGTH =  3200.000 PSI
     STRAIN FOR TRANSFER TO HARD MAT =    .00040

          MATERIAL   3  PROPERTIES
     CRUSHING STRENGTH =  3200.000 PSI
     YIELD STRAIN =    .00040
     UNLOADING MODULUS =       .100E+05 PSI
     STRAIN LIMIT OF CRUSHING =    .90000
     LOCKING MODULUS =       .100E+05 PSI
     HARDER MAT CRUSH STRENGTH =  3200.000 PSI
     STRAIN FOR TRANSFER TO HARD MAT =    .00040

     FRICTION COEFFICIENT =      .200


     COUNT    1.000 TIMES NON BACKED UP FORCES
1                       DEFORMATIONS                    BOTTOM COVER                          TOP COVER
    TIME    VERTICAL  HORIZONTAL    ROTATION    MODE  DELTA        PHI    MAX STRAIN  MODE  DELTA        PHI    MAX STRN
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.0000	.000E+00	.000E+00	.000E+00	0	.0000	.0000	.0000	0	.0000	.0000	.0000
.0020	.280E+00	-.459E-06	-.111E-07	1	.2802	.0000	.0846	0	.0000	.0000	.0000
.0040	.177E+00	.242E-04	.583E-06	1	.1767	.0000	.0975	0	.0000	.0000	.0000
.0060	-.210E+00	.154E-03	.371E-05	0	.0349	.0000	.0975	0	.0000	.0000	.0000
.0080	-.643E+00	.310E-03	.747E-05	0	.0349	.0000	.0975	0	.0000	.0000	.0000
.0100	-.107E+01	.466E-03	.112E-04	0	.0349	.0000	.0975	0	.0000	.0000	.0000
.0120	-.150E+01	.622E-03	.150E-04	0	.0349	.0000	.0975	0	.0000	.0000	.0000
.0140	-.193E+01	.778E-03	.188E-04	0	.0349	.0000	.0975	0	.0000	.0000	.0000
.0160	-.236E+01	.934E-03	.225E-04	0	.0349	.0000	.0975	0	.0000	.0000	.0000
.0180	-.279E+01	.109E-02	.263E-04	0	.0349	.0000	.0975	0	.0000	.0000	.0000
.0200	-.321E+01	.125E-02	.300E-04	0	.0349	.0000	.0975	0	.0000	.0000	.0000
.0220	-.363E+01	.140E-02	.338E-04	0	.0349	.0000	.0975	0	.0000	.0000	.0000
.0240	-.405E+01	.156E-02	.376E-04	0	.0349	.0000	.0975	0	.0000	.0000	.0000
.0260	-.447E+01	.171E-02	.413E-04	0	.0349	.0000	.0975	0	.0000	.0000	.0000
.0280	-.489E+01	.187E-02	.451E-04	0	.0349	.0000	.0975	0	.0000	.0000	.0000

1 FORCE OUTPUT..UNITS KIPS, INCHES, GS

TIME	FORCE-1 DST TO CG	FORCE-2 DST TO CG	HOR FORCE	VERTICAL	ACCEL HORIZONTAL	ROTATION
.0000	.00	.00	.00	.00	.00	.00000
	.000	.000				
.0020	2120.94	.00	-.00	-251.91	.00	-.00002
	-.000	.000				
.0040	.00	.00	.00	1.00	.00	.00000
	.000	.000				
.0060	.00	.00	.00	.00	.00	.00000
	.000	.000				
.0080	.00	.00	.00	1.00	.00	.00000
	.000	.000				
.0100	.00	.00	.00	1.00	.00	.00000
	.000	.000				
.0120	.00	.00	.00	1.00	.00	.00000
	.000	.000				
.0140	.00	.00	.00	1.00	.00	.00000
	.000	.000				
.0160	.00	.00	.00	1.00	.00	.00000
	.000	.000				
.0180	.00	.00	.00	1.00	.00	.00000

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              .000      .000
  .0200       .00       .00       .00       1.00       .00       .00000
              .000      .000
  .0220       .00       .00       .00       1.00       .00       .00000
              .000      .000
  .0240       .00       .00       .00       1.00       .00       .00000
              .000      .000
  .0260       .00       .00       .00       1.00       .00       .00000
              .000      .000
  .0280       .00       .00       .00       1.00       .00       .00000
              .000      .000
  .0300       .00       .00       .00       1.00       .00       .00000
              .000      .000
1                                                NORMAL ACCEL AT
  TIME        AXIAL ACCEL (G'S)   CENTER OF GRAV      TOP            BOTTOM

     .0000      -.100E+01      -.362E-05      -.362E-05      -.362E-05
     .0020       .252E+03       .183E-04      -.804E-03       .841E-03
     .0040       .218E+03       .103E+00       .197E+00       .881E-02
     .0060      -.100E+01       .755E-07       .755E-07       .755E-07
     .0080      -.100E+01       .389E-05       .389E-05       .389E-05
     .0100      -.100E+01       .759E-05       .759E-05       .759E-05
     .0120      -.100E+01       .114E-04       .114E-04       .114E-04
     .0140      -.100E+01       .151E-04       .151E-04       .151E-04
     .0160      -.100E+01       .189E-04       .189E-04       .189E-04
     .0180      -.100E+01       .227E-04       .227E-04       .227E-04
     .0200      -.100E+01       .264E-04       .264E-04       .264E-04
     .0220      -.100E+01       .302E-04       .302E-04       .302E-04
     .0240      -.100E+01       .339E-04       .339E-04       .339E-04
     .0260      -.100E+01       .377E-04       .377E-04       .377E-04
     .0280      -.100E+01       .414E-04       .414E-04       .414E-04
     .0300      -.100E+01       .453E-04       .453E-04       .453E-04
                    MAXIMUM ACCELERATIONS
     MAX AXIAL =   251.915  G'S
     MAX TRANS CG =      .103       G'S
     MAX TRANS TOP =      .197  G'S
     MAX TRANS BOT =      .009  G'S
1          ACCELERATIONS (G'S)
     A = AXIAL ACC
     G = TRANS ACC CG
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     T = TRANS ACC TOP
     B = TRANS ACC BOT
    -1.0      35.1      71.3      107.4     143.5     179.7     215.8     251.9
     ---------------------------------------------------------------------------
     B         I         I         I         I         I         I         I
     B         I         I         I         I         I         I        AI
     B         I         I         I         I         I        AI         I
     B         I         I         I         I         I         I         I
     B         I         I         I         I         I         I         I
     B         I         I         I         I         I         I         I
     B         I         I         I         I         I         I         I
     B         I         I         I         I         I         I         I
     B         I         I         I         I         I         I         I
     B---------I---------I---------I---------I---------I---------I---------ITIME =    .0180
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     B         I         I         I         I         I         I         I
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          DEFORMED SHAPE OF COVER    1


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          DEFORMED SHAPE OF COVER   2


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