Rec'd 3/11/99
71-9255

TRANSNUCLEAR WEST

March 9, 1999
NUH05-99-521
RMG-99-012

Mr. Steven Baggett
Project Manager, Spent Fuel Project Office
U.S. Nuclear Regulatory Commission
11555 Rockville Pike
Rockville, MD 20852

SUBJECT: Amendment Application for NUHOMS®-MP187 Transportation Package (Docket No. 71-9255)

REFERENCE: S. Redeker letter to USNRC dated January 28, 1999, "(Docket No. 72-11) Rancho Seco Independent Spent Fuel Storage Installation Safety Analysis Report Revision 2."

Dear Mr. Baggett:

Transnuclear West Inc. (TN West) herewith submits a revised drawing for the NUHOMS®-MP187 package. TN West requests that Certificate 71-9255 be revised to incorporate this drawing change. A detailed description and technical justification for the change are provided in Attachment 1. The revised drawing, provided as Attachment 2, is:

NUH-05-4001, "NUHOMS®-MP187 Multi-Purpose Cask Main Assembly," Revision 11.

TN West will revise the NUHOMS®-MP187 SAR to include the revised drawings upon receiving NRC approval. TN West requests NRC approval of this Amendment no later than May 1999 in order to meet the Rancho Seco ISFSI fabrication and fuel load schedule given in the reference letter.

This submittal includes the proprietary version of the drawing, copies of which are segregated consistent with previous SAR submittals. The proprietary material may not be used for any purpose other than to support your staff's review of the Certificate of Compliance application. Attachment 4 is an affidavit specifically requesting that you withhold this proprietary information from public disclosure. The non-proprietary version of drawing NUH-05-4001 previously submitted to the NRC is not affected by this change.

Transnuclear West Inc.
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Phone: 510-795-9800 • Fax: 510-744-6002

NTOI
1/2

Please contact Mr. U. B. Chopra (510-744-6053) or me (510-744-6020) if you require any additional information in support of this submittal.

Sincerely,

Robert M. Grenier
President and Chief Operating Officer

Attachments:

1) Description and Justification for Proposed Changes
2) Computer Run Input
3) Revised Drawing - Six (6) copies of NUH-05-4001 (proprietary)
4) Affidavit Pursuant to 10 CFR 2.790

Docket 71-9255

cc: File NUH005.0003

APPLICATION DATED MARCH 9, 1999
TRANSNUCLEAR WEST INC.
DOCKET 71-9255

Description and Justification for Change

Description: The weld between the MP187 cask inner shell and top forging includes a 1/8 inch thick by 1.0 inch wide backing ring as shown at coordinate C5 on sheet 3 of drawing NUH-05-4001, Revision 10. This backing ring facilitates completion of this containment weld and remains a part of the completed cask. As shown on the revised drawing provided with this application (NUH-05-4001 Revision 11), TN West proposes to increase the size of this ring to 1/4 inch thick by 2.0 inches wide.

Reason for Change: The original size of the backing ring was selected to both minimize its impingement on the lead shielding present in the cask and to completely cover the root of the weld. The backing ring design was also consistent with the originally proposed inspection requirements for the weld - multi-layer dye-penetrant examination. However, in the final stages of cask licensing the examination requirements for this weld were revised to require volumetric examination by either radiographic or ultrasonic means. As shown in Figure 1, the edge of the existing backing ring will be visible in the volumetric examination and may appear as an indication or may mask the presence of indications. Revising the width of the ring to remove the edge from the area to be inspected will improve the quality of the volumetric examination.

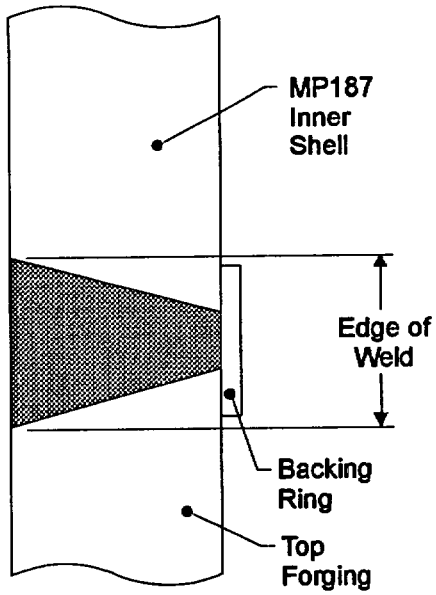

Figure 1, Inner Shell Closure Weld Geometry

Increasing the thickness of the backing ring from 1/8 inches to 1/4 inches will facilitate completion of this containment weld by reducing the potential for melt-through and distortion.

Justification: Changing the size of the backing ring has no impact on the structural, thermal, criticality, or containment analyses or on the use of the package. No credit is taken for the ring in the structural or containment analyses. The small size of the ring and its location outside of the active fuel region ensures that the proposed changes will not affect the thermal or criticality analyses. Because the ring displaces a portion of the cask's lead gamma shield, the impact of this change on the shielding analyses presented in Chapter 5 of the SAR is addressed below.

As shown on the drawings provided with this submittal, the inner shell weld and backing ring are 16.0 inches below the top of the cask. Based on the shielding models described in the MP187 SAR, the dose rates at this location assuming that no backing ring is present are 21.5 mrem/hr (surface of package and vehicle outer surface) and 4.91 mrem/hr (2 meters from vehicle outer surface). These results are shown in Table 2 (column labeled "Dose Rate w/o Ring").

The effect of the backing ring on the calculated dose rates is bounded using the "base case" 1-dimensional model described in Section 5.4.1.8.1 of the SAR and provided in Section 5.5.5.1 of the SAR. The neutron and gamma dose rates on the surface of the cask calculated by this model are shown in Table 1 (column labeled "1-D Base"). By modifying the 1-D model to replace either 1/8 inch or 1/4 inch of lead with steel over the entire length of the cask (infinite axial model), TN West bounds the effect of the steel backing ring. Using this model, TN West estimated the change in the package dose rates related to the presence of the existing ring as well as the proposed change. The 1-D results on the surface of the cask are provided in the Table 1 ("1-D for 1/8 in Ring" and "1-D for 1/4 in Ring"). Ratios relative to the base case are calculated for both the 1/8 in ring and the 1/4 in ring as shown in Table 1.

				Calculated Ratios		Ratios Used Below	
	1-D Base (mrem/hr)	1-D for 1/8 in Ring (mrem/hr)	1-D for 1/4 in Ring (mrem/hr)	1/8 in Ring	1/4 in Ring	1/8 in Ring	1/4 in Ring
Neutron	18.32	18.04	17.76	0.985	0.969	1.000	1.000
Gamma	24.24	26.04	27.98	1.074	1.154	1.074	1.154

Table 1, 1-D Shielding Results for Backing Ring

The dose rates on the package and vehicle surfaces (these are identical in the vicinity of the backing ring) and 2 meters from the vehicle surface in the region adjacent to the backing ring are estimated by multiplying the dose rate without the ring by the ratios shown in Table 1. As shown in Table 1, the presence of the ring actually reduces the neutron dose rate on the surface while increasing the gamma does rate locally. To bound the results the neutron dose rates are not adjusted (refer to column "Ratios Used Below" in Table 1). This is consistent with the fact that the steel ring is a better neutron shield than the lead it displaces and the lead is a better gamma shield than the steel.

The calculated dose rates on the package surface, vehicle outer surface, and 2-meters from the vehicle outer surface are shown in Table 2. The dose rates without the backing ring are taken directly from the MP187 shielding results presented in Chapter 5 of the SAR. The dose rates with the ring are bounded using the ratios from Table 1. The surface dose rates and the 2-meter dose rate increase slightly (less than 4% and 2% respectively), but remain well below the limits at these locations (200 and 10 mrem/hr respectively). The controlling dose rate 2-meters from the vehicle outer surface, 9.94 mrem/hr, is unaffected by this change. Copies of the computer run input are included in Attachment 2.

Based on these results, TN West concludes that the proposed change to the MP187 package will not affect the package's ability to satisfy the requirements of 10CFR71.47 for normal operations. Because the dose rates associated with the hypothetical accident conditions are dominated by postulated gaps in the lead shielding, the presence of the backing ring will not affect compliance with the limits specified in 10CFR71.51.

Location	Dose Rate w/o Ring (mrem/hr)	Dose Rate w/ 1/8 in Ring (mrem/hr)	Dose Rate w/ 1/4 in Ring (mrem/hr)
Package Surface			
Neutron	19.85	19.85	19.85
Gamma	1.69	1.82	1.95
Total	21.54	21.67	21.80
Vehicle Outer Surface			
Neutron	19.85	19.85	19.85
Gamma	1.69	1.82	1.95
Total	21.54	21.67	21.80
2 Meters from Vehicle Outer Surface			
Neutron	3.59	3.59	3.59
Gamma	1.32	1.42	1.52
Total	4.91	5.01	5.11

Table 2, Dose Rates Vicinity of the Closure Weld Backing Strip

APPLICATION DATED MARCH 9, 1999
TRANSNUCLEAR WEST INC.
DOCKET 71-9255

Computer Run Input

ANISN Input for 1/8 Inch Ring

```
MP187 CASK SHIELDING TRUNNION - FC-COR10.AI
'  Section taken through neutron shield, base case
'  FC average source term
'  Includes 1/8 in backing strip in lead
15$$
'       ID       ITH      ISCT      ISN      IGE
         1         0         3       16        2
'       IBL      IBR       IZM       IM     IEVT
         1         0        16       72        0
'       IGM      IHT       IHS      IHM      MS
        40         3         4       43      156
'       MCR      MTP        MT     IDFM     IPVT
        64         0       104        0        0
'       IQM      IPM       IPP      IIM      ID1
         1         0         0       20        0
'       ID2      ID3       ID4      ICM    IDAT1
         0         3         1       10        0
'      IDAT2      IFG      IFLU      IFN     IPRT
         0         0         0        1        1
'      IXTR
         0
16**
'       EV       EVM       EPS       BF       DY
       0.0       0.0    0.0001 1.420892  360.172
'       DZ      DFM1       XNF       PV      RYF
       0.0       0.0       0.0      0.0      0.5
'      XLAL       EQL      XNPM        T
     0.0002     F0.0                  T
'     CROSS SECTION DATA FROM THE CASK-81 LIBRARY
14*
Cross Section Data from Cask-81 Not Shown
  T
17**
'    Source for 40.0 GWd/MTU Fuel
      13R1.57E-01      59R0.00
      13R8.93E-01      59R0.00
      13R3.48E+00      59R0.00
      13R1.38E+01      59R0.00
      13R3.25E+01      59R0.00
      13R4.40E+01      59R0.00
      13R9.33E+01      59R0.00
      13R7.49E+01      59R0.00
      13R1.76E+01      59R0.00
      13R9.56E+01      59R0.00
      13R1.64E+02      59R0.00
      13R1.40E+02      59R0.00
      13R8.87E+01      59R0.00
      13R1.01E+01      59R0.00
      13R5.11E-02      59R0.00
      13R3.71E-03      59R0.00
```

```
      13R2.44E-04      59R0.00
      13R3.53E-05      59R0.00
      13R7.60E-06      59R0.00
      13R1.19E-06      59R0.00
      13R2.61E-07      59R0.00
      13R7.54E-08      59R0.00
      13R4.42E-01      59R0.00
      13R2.78E+00      59R0.00
      13R1.61E+01      59R0.00
      13R1.84E+01      59R0.00
      13R9.10E+01      59R0.00
      13R1.33E+03      59R0.00
      13R4.89E+03      59R0.00
      13R3.27E+06      59R0.00
      13R2.63E+08      59R0.00
      13R6.18E+08      59R0.00
      13R1.30E+08      59R0.00
      13R2.25E+09      59R0.00
      13R4.09E+09      59R0.00
      13R1.02E+08      59R0.00
      13R1.98E+08      59R0.00
      13R5.12E+08      59R0.00
      13R9.81E+08      59R0.00
      13R5.45E+09      59R0.00
       T
3**   13R1.0 F0.0
       T
1**
'      U235 FISSION SPECTRUM
       1.984E-04  1.064E-03  4.013E-03  1.559E-02  3.676E-02
       5.035E-02  1.093E-01  9.024E-02  2.149E-02  1.190E-01
       2.138E-01  1.928E-01  1.298E-01  1.549E-02  7.893E-05
       5.740E-06  3.775E-07  5.453E-08  1.176E-08  1.832E-09
       4.039E-10  1.166E-10  F0.0
4**
'     FINE MESH
        0.00       0.65       1.94       4.52       9.69
       21.59      35.56      40.20      50.54      60.87
       66.04      68.62      69.92      70.56      71.85
       74.44      76.20      79.93      82.47      83.74
       84.53      85.32      85.73      86.36      87.63
       88.87      89.54      89.87      90.20      90.54
       90.87      91.54      92.12      92.71      93.20
       94.35      95.69      96.36      97.16      97.69
       98.36      98.69      99.06      99.38      99.70
      100.97     101.60     102.24     104.22     105.44
      106.05     106.35     106.68     106.96     107.32
      107.95     108.48     109.09     109.86     110.40
      111.01     111.62     112.23     112.83     113.44
      114.05     114.65     115.36     116.06     116.67
      117.00     117.47     117.74

5**   F1.0
6**
' S16 CYLINDRICAL ANGULAR QUADRATURE WEIGHTS
     .0000000    .0135762    .0135762    .0000000    .0155634
     .0155634    .0155634    .0155634    .0000000    .0158598
     .0158598    .0158598    .0158598    .0158598    .0158598
     .0000000    .0155786    .0155786    .0155786    .0155786
     .0155786    .0155786    .0155786    .0155786    .0000000
```

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    .0149596    .0149596    .0149596    .0149596    .0149596
    .0149596    .0149596    .0149596    .0149596    .0149596
    .0000000    .0140964    .0140964    .0140964    .0140964
    .0140964    .0140964    .0140964    .0140964    .0140964
    .0140964    .0140964    .0140964    .0000000    .0130431
    .0130431    .0130431    .0130431    .0130431    .0130431
    .0130431    .0130431    .0130431    .0130431    .0130431
    .0130431    .0130431    .0130431    .0000000    .0118407
    .0118407    .0118407    .0118407    .0118407    .0118407
    .0118407    .0118407    .0118407    .0118407    .0118407
    .0118407    .0118407    .0118407    .0118407    .0118407
'
7**
' S16 CYLINDRICAL ANGULAR QUADRATURE COSINES
   -.1452095   -.1026786    .1026786   -.3282956   -.3033056
   -.1256333    .1256333    .3033056   -.5006822   -.4836218
   -.3540357   -.1295861    .1295861    .3540357    .4836218
   -.6552589   -.6426682   -.5448278   -.3640423   -.1278347
    .1278347    .3640423    .5448278    .6426682   -.7862754
   -.7765950   -.7005765   -.5559806   -.3569615   -.1230006
    .1230006    .3569615    .5559806    .7005765    .7765950
   -.8889435   -.8813385   -.8212767   -.7052463   -.5411545
   -.3401840   -.1160304    .1160304    .3401840    .5411545
    .7052463    .8212767    .8813385   -.9595308   -.9534975
   -.9056852   -.8124580   -.6784908   -.5105012   -.3169129
   -.1074334    .1074334    .3169129    .5105012    .6784908
    .8124580    .9056852    .9534975   -.9954761   -.9906826
   -.9526112   -.8779315   -.7695134   -.6315233   -.4692642
   -.2889715   -.0975737    .0975737    .2889715    .4692642
    .6315233    .7695134    .8779315    .9526112    .9906826
'
8$$     13R1 6R2  2R3  2R4   3R5   12R6 4R7  1R8 2R9
        1R10 1R11 3R12 8R13 12R14 1R15 1R16
9$$     69    81   85   81    85    89   89   89  85
        85    85   85   93    93    85   81
' FX91        1 2 3 4
' H           5 6 7 8
' B           9 10 11 12
' C           13 14 15 16
' N           17 18 19 20
' O           21 22 23 24
' AL          25 26 27 28
' SI          29 30 31 32
' CA          33 34 35 36
' CR          37 38 39 40
' FE          41 42 43 44
' NI          45 46 47 48
' ZR          49 50 51 52
' PB          53 54 55 56
' U235        57 58 59 60
' U238        61 62 63 64
' FLUXDOSIUM 65 66 67 68
' DRY FUEL    69 70 71 72
' FC TOP DRY 73 74 75 76
' BOTTOM      77 78 79 80
' AIR         81 82 83 84
' SS304       85 86 87 88
' LEAD        89 90 91 92
' BISCO NS3   93 94 95 96
' HONEYCOMB   97 98 99 100
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```
' FOAM        101 102 103 104
10$$
'     FLUXDOSIUM
      65 66 67 68
'     DRY FUEL
      69 70 71 72
      69 70 71 72
      69 70 71 72
      69 70 71 72
      69 70 71 72
      69 70 71 72
      69 70 71 72
      69 70 71 72
      69 70 71 72
      69 70 71 72
'     FC TOP DRY
      73 74 75 76
      73 74 75 76
      73 74 75 76
      73 74 75 76
'     BOTTOM
      77 78 79 80
      77 78 79 80
      77 78 79 80
'     AIR
      81 82 83 84
      81 82 83 84
'     SS304
      85 86 87 88
      85 86 87 88
      85 86 87 88
'     LEAD
      89 90 91 92
'     BISCO NS3
      93 94 95 96
      93 94 95 96
      93 94 95 96
      93 94 95 96
      93 94 95 96
      93 94 95 96
      93 94 95 96
      93 94 95 96
      93 94 95 96
      93 94 95 96
'     HONEYCOMB
      97 98 99 100
'     FOAM
      101 102 103 104
      101 102 103 104
      101 102 103 104
      101 102 103 104
11$$
'     FLUXDOSIUM
      1 2 3 4
'     DRY FUEL
      9 10 11 12
      13 14 15 16
      21 22 23 24
      25 26 27 28
      37 38 39 40
```

```
      41 42 43 44
      45 46 47 48
      49 50 51 52
      57 58 59 60
      61 62 63 64
'     FC TOP DRY
      37 38 39 40
      41 42 43 44
      45 46 47 48
      49 50 51 52
'     BOTTOM
      37 38 39 40
      41 42 43 44
      45 46 47 48
'     AIR
      17 18 19 20
      21 22 23 24
'     SS304
      37 38 39 40
      41 42 43 44
      45 46 47 48
'     LEAD
      53 54 55 56
'     BISCO NS3 -
      5 6 7 8
      9 10 11 12
      13 14 15 16
      21 22 23 24
      25 26 27 28
      29 30 31 32
      33 34 35 36
      37 38 39 40
      41 42 43 44
      45 46 47 48
'     HONEYCOMB
      25 26 27 28
'     FOAM
      5 6 7 8
      13 14 15 16
      17 18 19 20
      21 22 23 24
12**
'     FLUXDOSIUM
      4R1.000E0
'     DRY FUEL
      4R8.137E-4
      4R2.033E-4
      4R9.994E-3
      4R8.656E-4
      4R8.658E-4
      4R2.923E-3
      4R4.648E-4
      4R3.255E-3
      4R4.301E-5
      4R4.953E-3
'     FC TOP DRY
      4R1.344E-3
      4R4.552E-3
      4R7.138E-4
      4R1.869E-3
```

```
'    BOTTOM
     4R2.244E-3
     4R7.345E-3
     4R1.379E-3
'    AIR
     4R3.587E-5
     4R9.534E-6
'    SS304
     4R1.728E-2
     4R6.073E-2
     4R7.447E-3
'    LEAD
     4R3.296E-2
'    BISCO NS3 2 W/O B4C
     4R4.180E-2
     4R7.131E-4
     4R7.871E-3
     4R3.442E-2
     4R8.528E-3
     4R1.155E-3
     4R1.351E-3
     4R6.104E-4
     4R2.242E-3
     4R2.631E-4
'    HONEYCOMB
     4R6.435E-3
'    FOAM
     4R9.378E-3
     4R6.746E-3
     4R7.713E-4
     4R2.026E-3
19$$ F3
22$$ F-1
23$$ 1 2 3
     T        T
```

ANISN Input for 1/4 Inch Ring

```
MP187 CASK SHIELDING TRUNNION - FC-COR10.AI
'  Section taken through neutron shield, base case
'  FC average source term
'  Includes 1/4 in backing strip in lead
15$$
'      ID      ITH     ISCT     ISN      IGE
        1       0        3      16        2
'      IBL     IBR      IZM     IM      IEVT
        1       0       16      72        0
'      IGM     IHT      IHS     IHM      MS
       40       3        4      43       156
'      MCR     MTP      MT     IDFM     IPVT
       64       0       104     0         0
'      IQM     IPM      IPP     IIM      ID1
        1       0        0      20        0
'      ID2     ID3      ID4     ICM     IDAT1
        0       3        1      10        0
'     IDAT2    IFG     IFLU     IFN     IPRT
        0       0        0      1         1
'     IXTR
        0
```

```
16**
'       EV        EVM       EPS       BF        DY
        0.0       0.0     0.0001  1.420892  360.172
'       DZ       DFM1       XNF       PV        RYF
        0.0       0.0       0.0       0.0       0.5
'      XLAL       EQL       XNPM       T
       0.0002    F0.0                  T
'     CROSS SECTION DATA FROM THE CASK-81 LIBRARY
14*
Cross Section Data from Cask-81 Not Shown
  T
17**
'    Source for 40.0 GWd/MTU Fuel
      13R1.57E-01      59R0.00
      13R8.93E-01      59R0.00
      13R3.48E+00      59R0.00
      13R1.38E+01      59R0.00
      13R3.25E+01      59R0.00
      13R4.40E+01      59R0.00
      13R9.33E+01      59R0.00
      13R7.49E+01      59R0.00
      13R1.76E+01      59R0.00
      13R9.56E+01      59R0.00
      13R1.64E+02      59R0.00
      13R1.40E+02      59R0.00
      13R8.87E+01      59R0.00
      13R1.01E+01      59R0.00
      13R5.11E-02      59R0.00
      13R3.71E-03      59R0.00
      13R2.44E-04      59R0.00
      13R3.53E-05      59R0.00
      13R7.60E-06      59R0.00
      13R1.19E-06      59R0.00
      13R2.61E-07      59R0.00
      13R7.54E-08      59R0.00
      13R4.42E-01      59R0.00
      13R2.78E+00      59R0.00
      13R1.61E+01      59R0.00
      13R1.84E+01      59R0.00
      13R9.10E+01      59R0.00
      13R1.33E+03      59R0.00
      13R4.89E+03      59R0.00
      13R3.27E+06      59R0.00
      13R2.63E+08      59R0.00
      13R6.18E+08      59R0.00
      13R1.30E+08      59R0.00
      13R2.25E+09      59R0.00
      13R4.09E+09      59R0.00
      13R1.02E+08      59R0.00
      13R1.98E+08      59R0.00
      13R5.12E+08      59R0.00
      13R9.81E+08      59R0.00
      13R5.45E+09      59R0.00
       T
3**    13R1.0 F0.0
       T
1**
'      U235 FISSION SPECTRUM
       1.984E-04  1.064E-03  4.013E-03  1.559E-02  3.676E-02
```

```
      5.035E-02  1.093E-01  9.024E-02  2.149E-02  1.190E-01
      2.138E-01  1.928E-01  1.298E-01  1.549E-02  7.893E-05
      5.740E-06  3.775E-07  5.453E-08  1.176E-08  1.832E-09
      4.039E-10  1.166E-10  F0.0
4**
'     FINE MESH
       0.00       0.65       1.94       4.52       9.69
      21.59      35.56      40.20      50.54      60.87
      66.04      68.62      69.92      70.56      71.85
      74.44      76.20      79.93      82.47      83.74
      84.53      85.32      85.73      86.36      87.63
      88.87      89.54      89.87      90.20      90.54
      90.87      91.54      92.12      92.71      93.20
      94.35      95.69      96.36      97.16      97.69
      98.36      98.69      99.06      99.38      99.70
     100.97     101.60     102.24     104.22     105.44
     106.05     106.35     106.68     106.96     107.32
     107.95     108.48     109.09     109.86     110.40
     111.01     111.62     112.23     112.83     113.44
     114.05     114.65     115.36     116.06     116.67
     117.00     117.47     117.74

5**   F1.0
6**
' S16 CYLINDRICAL ANGULAR QUADRATURE WEIGHTS
     .0000000   .0135762   .0135762   .0000000   .0155634
     .0155634   .0155634   .0155634   .0000000   .0158598
     .0158598   .0158598   .0158598   .0158598   .0158598
     .0000000   .0155786   .0155786   .0155786   .0155786
     .0155786   .0155786   .0155786   .0155786   .0000000
     .0149596   .0149596   .0149596   .0149596   .0149596
     .0149596   .0149596   .0149596   .0149596   .0149596
     .0000000   .0140964   .0140964   .0140964   .0140964
     .0140964   .0140964   .0140964   .0140964   .0140964
     .0140964   .0140964   .0140964   .0000000   .0130431
     .0130431   .0130431   .0130431   .0130431   .0130431
     .0130431   .0130431   .0130431   .0130431   .0130431
     .0130431   .0130431   .0130431   .0000000   .0118407
     .0118407   .0118407   .0118407   .0118407   .0118407
     .0118407   .0118407   .0118407   .0118407   .0118407
     .0118407   .0118407   .0118407   .0118407   .0118407
'
7**
' S16 CYLINDRICAL ANGULAR QUADRATURE COSINES
    -.1452095  -.1026786   .1026786  -.3282956  -.3033056
    -.1256333   .1256333   .3033056  -.5006822  -.4836218
    -.3540357  -.1295861   .1295861   .3540357   .4836218
    -.6552589  -.6426682  -.5448278  -.3640423  -.1278347
     .1278347   .3640423   .5448278   .6426682  -.7862754
    -.7765950  -.7005765  -.5559806  -.3569615  -.1230006
     .1230006   .3569615   .5559806   .7005765   .7765950
    -.8889435  -.8813385  -.8212767  -.7052463  -.5411545
    -.3401840  -.1160304   .1160304   .3401840   .5411545
     .7052463   .8212767   .8813385  -.9595308  -.9534975
    -.9056852  -.8124580  -.6784908  -.5105012  -.3169129
    -.1074334   .1074334   .3169129   .5105012   .6784908
     .8124580   .9056852   .9534975  -.9954761  -.9906826
    -.9526112  -.8779315  -.7695134  -.6315233  -.4692642
    -.2889715  -.0975737   .0975737   .2889715   .4692642
     .6315233   .7695134   .8779315   .9526112   .9906826
```

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'
8$$     13R1 6R2  2R3  2R4   3R5   12R6 4R7  2R8 1R9
        1R10 1R11 3R12 8R13 12R14 1R15 1R16
9$$     69    81   85   81    85    89   89   85  85
        85    85   85   93    93    85   81
' FX91         1 2 3 4
' H            5 6 7 8
' B            9 10 11 12
' C            13 14 15 16
' N            17 18 19 20
' O            21 22 23 24
' AL           25 26 27 28
' SI           29 30 31 32
' CA           33 34 35 36
' CR           37 38 39 40
' FE           41 42 43 44
' NI           45 46 47 48
' ZR           49 50 51 52
' PB           53 54 55 56
' U235         57 58 59 60
' U238         61 62 63 64
' FLUXDOSIUM 65 66 67 68
' DRY FUEL    69 70 71 72
' FC TOP DRY 73 74 75 76
' BOTTOM      77 78 79 80
' AIR         81 82 83 84
' SS304       85 86 87 88
' LEAD        89 90 91 92
' BISCO NS3   93 94 95 96
' HONEYCOMB   97 98 99 100
' FOAM        101 102 103 104
10$$
'     FLUXDOSIUM
      65 66 67 68
'     DRY FUEL
      69 70 71 72
      69 70 71 72
      69 70 71 72
      69 70 71 72
      69 70 71 72
      69 70 71 72
      69 70 71 72
      69 70 71 72
      69 70 71 72
      69 70 71 72
'     FC TOP DRY
      73 74 75 76
      73 74 75 76
      73 74 75 76
      73 74 75 76
'     BOTTOM
      77 78 79 80
      77 78 79 80
      77 78 79 80
'     AIR
      81 82 83 84
      81 82 83 84
'     SS304
      85 86 87 88
      85 86 87 88
```

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      85 86 87 88
'     LEAD
      89 90 91 92
'     BISCO NS3
      93 94 95 96
      93 94 95 96
      93 94 95 96
      93 94 95 96
      93 94 95 96
      93 94 95 96
      93 94 95 96
      93 94 95 96
      93 94 95 96
      93 94 95 96
'     HONEYCOMB
      97 98 99 100
'     FOAM
      101 102 103 104
      101 102 103 104
      101 102 103 104
      101 102 103 104
11$$
'     FLUXDOSIUM
      1 2 3 4
'     DRY FUEL
      9 10 11 12
      13 14 15 16
      21 22 23 24
      25 26 27 28
      37 38 39 40
      41 42 43 44
      45 46 47 48
      49 50 51 52
      57 58 59 60
      61 62 63 64
'     FC TOP DRY
      37 38 39 40
      41 42 43 44
      45 46 47 48
      49 50 51 52
'     BOTTOM
      37 38 39 40
      41 42 43 44
      45 46 47 48
'     AIR
      17 18 19 20
      21 22 23 24
'     SS304
      37 38 39 40
      41 42 43 44
      45 46 47 48
'     LEAD
      53 54 55 56
'     BISCO NS3 -
      5 6 7 8
      9 10 11 12
      13 14 15 16
      21 22 23 24
      25 26 27 28
      29 30 31 32
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      33 34 35 36
      37 38 39 40
      41 42 43 44
      45 46 47 48
'     HONEYCOMB
      25 26 27 28
'     FOAM
      5 6 7 8
      13 14 15 16
      17 18 19 20
      21 22 23 24
12**
'     FLUXDOSIUM
      4R1.000E0
'     DRY FUEL
      4R8.137E-4
      4R2.033E-4
      4R9.994E-3
      4R8.656E-4
      4R8.658E-4
      4R2.923E-3
      4R4.648E-4
      4R3.255E-3
      4R4.301E-5
      4R4.953E-3
'     FC TOP DRY
      4R1.344E-3
      4R4.552E-3
      4R7.138E-4
      4R1.869E-3
'     BOTTOM
      4R2.244E-3
      4R7.345E-3
      4R1.379E-3
'     AIR
      4R3.587E-5
      4R9.534E-6
'     SS304
      4R1.728E-2
      4R6.073E-2
      4R7.447E-3
'     LEAD
      4R3.296E-2
'     BISCO NS3 2 W/O B4C
      4R4.180E-2
      4R7.131E-4
      4R7.871E-3
      4R3.442E-2
      4R8.528E-3
      4R1.155E-3
      4R1.351E-3
      4R6.104E-4
      4R2.242E-3
      4R2.631E-4
'     HONEYCOMB
      4R6.435E-3
'     FOAM
      4R9.378E-3
      4R6.746E-3
      4R7.713E-4
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     4R2.026E-3
19$$ F3
22$$ F-1
23$$ 1 2 3
     T        T
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AFFIDAVIT PURSUANT TO 10 CFR 2.790

Transnuclear West Inc.)
State of California) SS.
County of Alameda)

I, Robert M. Grenier, depose and say that I am President and Chief Operating Officer of Transnuclear West Inc., duly authorized to make this affidavit, and have reviewed or caused to have reviewed the information which is identified as proprietary and referenced in the paragraph immediately below. I am submitting this affidavit in conformance with the provisions of 10 CFR 2.790 of the Commission's regulations for withholding this information.

The information for which proprietary treatment is sought is contained in the following document:

The drawings included in Attachment 3 of this submittal and identified as proprietary.
NUH-05-4001, Revision 11

This section of the document has been appropriately designated as proprietary.

I have personal knowledge of the criteria and procedures utilized by Transnuclear West Inc. in designating information as a trade secret, privileged or as confidential commercial or financial information.

Pursuant to the provisions of paragraph (b) (4) of Section 2.790 of the Commission's regulations, the following is furnished for consideration by the Commission in determining whether the information sought to be withheld from public disclosure, included in the above referenced document, should be withheld.

1) The information sought to be withheld from public disclosure are licensing drawings and calculations of a concrete modular storage and transportation system, which is owned and has been held in confidence by Transnuclear West Inc.

2) The information is of a type customarily held in confidence by Transnuclear West Inc. and not customarily disclosed to the public. Transnuclear West Inc. has a rational basis for determining the types of information customarily held in confidence by it.

3) The information is being transmitted to the Commission in confidence under the provisions of 10 CFR 2.790 with the understanding that it is to be received in confidence by the Commission.

4) The information, to the best of my knowledge and belief, is not available in public sources, and any disclosure to third parties has been made pursuant to regulatory provisions or proprietary agreements which provide for maintenance of the information in confidence.

5) Public disclosure of the information is likely to cause substantial harm to the competitive position of Transnuclear West Inc. because:

   a) A similar product is manufactured and sold by competitors of Transnuclear West Inc.

b) Development of this information by Transnuclear West Inc. required thousands of man-hours and hundreds of thousands of dollars. To the best of my knowledge and belief, a competitor would have to undergo similar expense in generating equivalent information.

c) In order to acquire such information, a competitor would also require considerable time and inconvenience related to the development of a design and analysis of a dry spent fuel storage system.

d) The information required significant effort and expense to obtain the licensing approvals necessary for application of the information. Avoidance of this expense would decrease a competitor's cost in applying the information and marketing the product to which the information is applicable.

e) The information consists of description of the design and analysis of a dry spent fuel storage and transportation system, the application of which provides a competitive economic advantage. The availability of such information to competitors would enable them to modify their product to better compete with Transnuclear West Inc., take marketing or other actions to improve their product's position or impair the position of Transnuclear West's product, and avoid developing similar data and analyses in support of their processes, methods or apparatus.

f) In pricing Transnuclear West's products and services, significant research, development, engineering, analytical, licensing, quality assurance and other costs and expenses must be included. The ability of Transnuclear West's competitors to utilize such information without similar expenditure of resources may enable them to sell at prices reflecting significantly lower costs.

Further the deponent sayeth not.

Robert M. Grenier
President and Chief Operating Officer
Transnuclear West Inc.

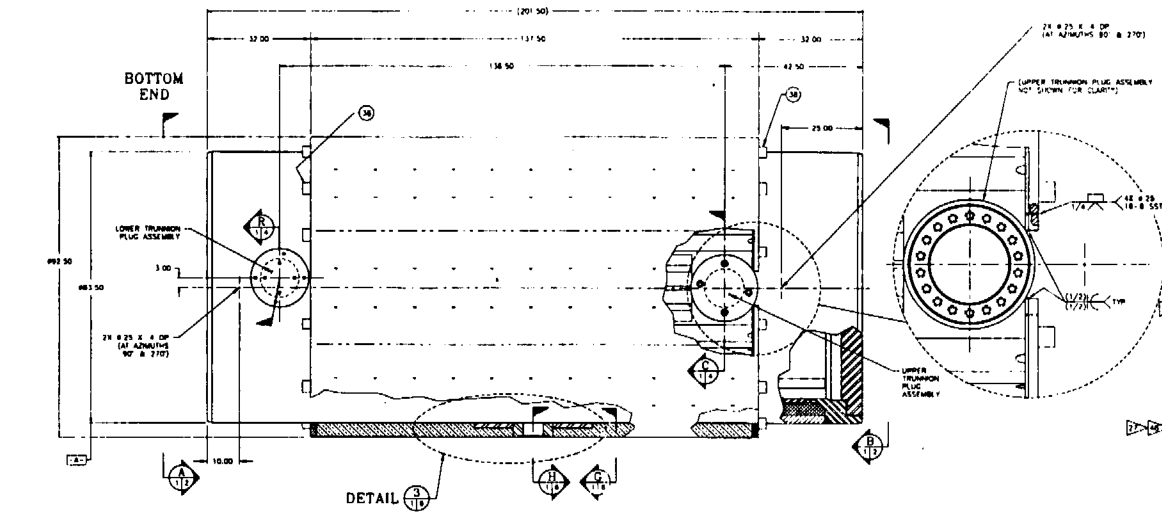
Subscribed and sworn to me before this 9th day of March, 1999, by Robert M. Grenier.

Notary Public

KIM STONE
Commission # 1099021
Notary Public — California
Santa Clara County
My Comm. Expires May 28, 2000

REV	DESCRIPTION	DRAWN	ORIGINATED	VERIFIED	APPROVED	LICENSING
11	AMENDMENT APPLICATION	CML 03/09/99	3/9/99	3/9/99	3/9/99	3/9/99

TRANSNUCLEAR WEST
CONTROLLED COPY NO. 4



MAIN ASSEMBLY

NOTES:

1. ALL WELDING SHALL BE PERFORMED IN ACCORDANCE WITH NB-4300 AND SECTION IX WELDING PROCEDURES SHALL BE QUALIFIED IN ACCORDANCE WITH NB-4330 AND SECTION IX OF THE ASME CODE. WELDS SHOWN TO BE SMOOTH OR FLUSH SHALL HAVE A MAXIMUM REINFORCEMENT OF .03 INCHES AND HAVE A SMOOTH TRANSITION TO THE BASE MATERIAL SURFACE. FINISHED THICKNESS OF ALL GROUND OR MACHINED AREAS SHALL BE VERIFIED BY MECHANICAL OR ULTRASONIC MEASUREMENT.

2. ALTERNATIVE WELD JOINT PREPARATIONS (U, V, OR J GROOVES) MAY BE USED PROVIDED ALL ASME CODE CRITERIA ARE MET. THE SPECIFIED MINIMUM EFFECTIVE THROAT MUST BE MAINTAINED.

3. ALL WELDS SHALL BE LIQUID PENETRANT INSPECTED ON FINAL PASS IN ACCORDANCE WITH ASME CODE, SECTION III, DIVISION I, SUBSECTION NB, ARTICLE NB-5000 AND SECTION V, ARTICLE 6.

4. RADIOGRAPHIC INSPECTION SHALL BE PERFORMED IN ACCORDANCE WITH ASME CODE SECTION III, DIVISION I, SUBSECTION NB, ARTICLE NB-5000 AND SECTION V, ARTICLE 2. RADIOGRAPHIC INSPECTION SHALL BE PERFORMED ON THE FOLLOWING:
   (a) ALL LONGITUDINAL SEAM WELDS OF CASK INNER AND STRUCTURAL SHELLS.
   (b) ALL CIRCUMFERENTIAL SEAM WELDS OF CASK INNER AND STRUCTURAL SHELLS, EXCEPT END WELDS OF SHELL TO TOP & BOTTOM FORGINGS.

5. ALL WELDS SHALL BE VISUALLY EXAMINED IN ACCORDANCE WITH NB 4424 OF ASME CODE. VISUAL WELD INSPECTORS SHALL BE QUALIFIED PER ASME CODE.

6. INDICATED WELDS SHALL BE LIQUID PENETRANT INSPECTED ON ROOT AND FINAL PASSES IN ACCORDANCE WITH ASME CODE, SECTION III, DIVISION 1, SUBSECTION NB, ARTICLE NB-5000, AND SECTION V, ARTICLE 6.

7. WELD OVERLAY SHALL BE MADE USING ENiCrMo-3 OR ENiCrMo-3 ELECTRODE MEETING SFA 5.14 OR SFA 5.11, RESPECTIVELY.

8. CADMIUM PLATED.

9. OPTIONAL CADMIUM, CHROME OR NICKEL PLATE SURFACE TO A THICKNESS OF .0005 MIN/.001 MAX.

10. CUT NSP SUPPORT ANGLE ASSEMBLIES TO CLEAR SHEAR KEY AS REQUIRED. TRIM NSP SUPPORT ANGLE ASSEMBLIES ADJACENT TO UPPER TRUNNION SLEEVES.

12. LEAD TO BE CAST IN PLACE, CONFORMING TO ASTM B29.

13. LEAD SHIELDING INTEGRITY SHALL BE DETERMINED BY GAMMA SCAN, AFTER COOL DOWN TO AMBIENT TEMPERATURE. ACCEPTANCE CRITERIA PER SECTION 8.0 OF SAR.

14. NEUTRON SHIELD SUPPORT ANGLES (ITEMS 18 & 49) MAY BE FORMED AND INSTALLED AS SEPARATE PIECES. NO CONTROL OF CONTACT AREA IS REQUIRED. ALTERNATIVELY, MATERIALS MAY BE BONDED OR RIVETED TOGETHER AND PLACED AS A SINGLE ITEM.

15. FINAL STRUCTURAL SHELL TO FORGING WELD SHALL BE MADE AFTER LEAD POUR AND COOL DOWN. PREVENT LEAD INGRESS TO WELD DURING WELDING USING METHODS SUCH AS: CLOSE TOLERANCE JOINTS, SHIM STOCK, OR OTHER PROVEN MEANS. PRIOR TO WELDING, CLEAN AREA TO DEMONSTRATE THERE IS NO RESIDUAL LEAD CONTAMINATION.

16. LOCATION OF FULL PENETRATION LONGITUDINAL AND CIRCUMFERENTIAL SEAM WELDS IN INNER SHELL (ITEM 1), BOTTOM STRUCTURAL SHELL (ITEM 3), AND TOP STRUCTURAL SHELL (ITEM 4) MAY BE MADE AT FABRICATOR'S OPTION. LENGTH OF ITEM 4 MAY BE INCREASED TO ELIMINATE ADDITIONAL CIRCUMFERENTIAL WELD IN ITEM 3. ITEM 4 SHALL BE NOT LESS THAN 59.88 INCHES LONG.

17. DESIGN PRESSURE IS 50 psig. CASK CONTAINMENT BOUNDARIES SHALL BE SUBJECTED TO AN INTERNAL TEST PRESSURE EQUAL TO A MINIMUM OF 150% OF THE DESIGN PRESSURE PER 10 CFR 71.85(b).

18. CASK CONTAINMENT BOUNDARIES SHALL BE HELIUM LEAK TESTED TO DEMONSTRATE A LEAKAGE RATE NOT TO EXCEED 1×10^{-7} STANDARD CUBIC CENTIMETERS PER SECOND, IN ACCORDANCE WITH ANSI N14.5.

19. INDICATED HOLES ARE PROVIDED FOR THE INSTALLATION OF A LID HANDLING FIXTURE FOR LIFTING AND HANDLING OF THE LID. EACH LOCATION SHALL BE STENCILED OR OTHERWISE LABELED WITH THE FOLLOWING WARNING: "LID LIFT ONLY"

20. CASK INNER AND STRUCTURAL SHELLS SHALL COMPLY WITH THE TOLERANCE REQUIREMENTS OF ASME CODE, SECTION III, DIVISION I, SUBSECTION NE, ARTICLE NE-4220.

21. ALL SHELL JOINTS SHALL BE MADE IN ACCORDANCE WITH ASME CODE, SECTION III, DIVISION I, SUBSECTION NB, ARTICLE NB-4230.

22. ANY ADDITIONAL WELDS REQUIRED TO JOIN SHELL MATERIALS SHALL BE FULL PENETRATION WELDS INSPECTED PER NOTES 3, 4 & 5.

23. NOMINAL LEAD THICKNESS IS 4.0

24. OPTIONAL: WATER RELIEF HOLES SHALL BE PROVIDED AT EACH PIN AND BOLT HOLE (37 PLCS). HOLES SHALL BE ⌀.25 AND SHALL BE DRILLED TO MEET BOTTOM OF HOLE AS SHOWN. RELIEF HOLES SHALL BE TAPPED 3/8-16UNC-2B X .50 DP.

25. RAILS MAY BE FABRICATED FROM SHORTER MATERIAL. FULL PENETRATION BUTT WELDS WITH SURFACE GROUND FLUSH SHALL BE PROVIDED TO FORM A CONTINUOUS RAIL. RAILS SHALL BE FORMED TO PROVIDE AT LEAST 50% SURFACE CONTACT WITH INNER SHELL (ITEM 1). MAXIMUM GAP SHALL NOT EXCEED .02. SLIDING SURFACE OF RAILS SHALL HAVE A 64μ INCH RMS FINISH, AND SHALL BE COATED WITH E/M CORPORATION PERMASLIK RN OR EQUIVALENT DRY FILM LUBRICANT.

26. STITCH WELD MAY BE CONTINUOUS TO AVOID CRUD TRAPS OR CAULK BETWEEN STITCH WELDS AND AT BOTTOM END OF RAIL (ITEM 21) USING GE-RTV-106 OR EQUIVALENT.

27. SEAL MATERIAL METALLIC HELICOFLEX HN SERIES WITH ALUMINUM JACKET INCONEL LINER AND INCONEL SPRING.

28. ELASTOMERIC SEALS FOR CASK SECONDARY SEALS SHALL HAVE A CROSS-SECTIONAL DIAMETER OF .275 (ITEM 28).

29. UPPER CASK TRUNNION SLEEVE TO SHELL WELDS SHALL BE LOAD TESTED TO 150% THE MAXIMUM DESIGN LOAD PRIOR TO JOINING INNER AND STRUCTURAL SHELLS.

30. ALL EXPOSED WELDS MAY BE GROUND SMOOTH TO ENHANCE CASK DECONTAMINATION.

31. RAIL MATERIAL: NITRONIC 60, SHEET, COLD REDUCED, ASTM A240, GRADE UNS S21800, RC 29-35, OR EQUIVALENT.

32. MATERIAL FOR ITEM 45 MAY BE 18-8 STAINLESS STEEL OR ASTM A564 GR 630; ITEM 48 MAY BE 18-8 SST OR ASTM A240 TYPE 304.

33. INDICATED WELD SHALL BE LIQUID PENETRANT INSPECTED ON ROOT PASS, FINAL PASS, AND EACH LAYER OF WELD DEPOSITION, IN ACCORDANCE WITH ASME CODE, SECTION III, DIVISION 1, SUBSECTION NB, ARTICLE NB-5000, AND SECTION V ARTICLE 6. RADIOGRAPHIC OR ULTRASONIC EXAMINATION MAY BE SUBTITUTED FOR SPECIFIED PT PROVIDED ALL ASME CODE CRITERIA ARE MET.

34. ADDITIONAL NEUTRON SHIELD POUR HOLES MAY BE ADDED TO ITEMS 14 & 15 AND CLOSED PER SECTION DD WITHOUT ITEM 38.

35. FABRICATOR MAY ELECT TO USE POUR HOLES IN FACE TO PLACE NS3. WELD PLUG AFTER NS3 HAS SET AT LEAST 48 HOURS. PROVIDE ⌀1/2" VENT HOLE IN CENTER OF PLATE AS PERMANENT VENT.

36. FOR ON-SITE FUEL TRANSFER OPERATIONS PERFORMED UNDER 10CFR72 REQUIREMENTS, O-RINGS ARE NOT REQUIRED TO BE INSTALLED. FOR ON-SITE FUEL STORAGE MODE PER 10CFR72 REQUIREMENTS, ALL O-RINGS SHALL BE METALLIC. FOR PART 71 TRANSPORTATION, METALLIC SEALS SHALL BE USED FOR ALL PRIMARY CONTAINMENT SEALS. EITHER METALLIC OR ELASTOMERIC MATERIAL MAY BE USED FOR SECONDARY SEALS AS DESCRIBED IN THE PARTS LIST.

37. BACKING BAR MAY BE FORMED BY MACHINING A RECESS IN ITEMS 12 & 13 NOT TO EXCEED .50" WIDE.

38. A ONE SIDED FULL PENETRATION BEVEL WELD WITH 3/8" MAX ROOT GAP PLUS 1/2" FILLET MAY BE SUBSTITUTED FOR DOUBLE BEVEL WELD.

39. ASME SA-182, TYPE FXM-19 FORGINGS MAY BE SUBSTITUTED FOR SPECIFIED PLATE MATERIAL.

40. LONGITUDINAL WELD IN TOP STRUCTURAL SHELL MAY BE MADE WITH ELECTRODE COMPATIBLE WITH TYPE 304 MATERIALS PROVIDED IT IS LOCATED AT 90° ±15° FROM UPPER TRUNNION SLEEVE CENTERLINE.

41. IMPACT LIMITER ATTACHMENT BLOCKS (ITEM 38) SHALL BE JOINED TO NSP SUPPORT RINGS (ITEMS 14 AND 15) WITH FULL PENETRATION WELDS. ALTERNATIVELY, THE ATTACHMENT BLOCKS AND SUPPORT RINGS MAY BE MACHINED FROM PLATE OR BAR.

42. SILVER PLATED STAINLESS STEEL TUBULAR O-RING CROSS-SECTION ⌀.082 INCH PRECOMPRESSED TO ⌀.052 INCH, PRIOR TO PLATING.

43. SUPPORT RINGS, ITEM 14 AND 15, MAY BE FABRICATED FROM SEGMENTS JOINED BY FULL PENETRATION WELDS, WITH SURFACE PT EXAMINATION.

(NOTES CONTINUED ON SHEET 3)

ITEM NO.	QTY REQD	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	MATERIAL SPECIFICATION
53	8		TUBE, I.D. SIZED TO FIT ITEMS 33 & 34 (⌀1 1/2" SCHED 40 OR SIMILAR)	STAINLESS STEEL
52	A/R		10 GA SHEET	ASTM A240 TYPE 304
51	36		SCREW THREAD INSERT 2-12UN-2B X 5.50 LG X (2.27) OD	AMS7245 STAINLESS STEEL
50	84		SCREW THREAD INSERT 1-8UNC-2B X 2.00 LG X (1.18) OD	AMS7245 STAINLESS STEEL
49	24		NSP SUPPORT ANGLE, INNER	ALUMINUM
48	2		SPACER WASHER	STAINLESS
47	16		SCREW, FLAT HD CAP SCREW 1/2-13UNC-2A X 1.0 LG	ASTM A320
46	2		LOWER TRUNNION PLUG SHIELDING BLOCK	ASTM A240 TY
45	2		LOWER TRUNNION PLUG COVER PLATE	ASTM A564 GR 6
44	1		TAPERED PIN	ASTM A193 GR B7
43	2		TEST PORT, PLUG	ASME SA 479 TYPE 304
42	2		VENT/DRAIN PORT, PLUG	ASME SA 479 TYPE 304
41	4		TEST/VENT/DRAIN PORT THREADED INSERT	ASME SA 479 TYPE 304
40	2		TEST PORT SEAL	METALLIC OR ELASTOMERIC
39	2		VENT/DRAIN PORT SEAL	METALLIC
38	24		IMPACT LIMITER ATTACHMENT BLOCK	ASTM A240 OR A479 TYPE 304
37	4		O-RING (2.0 ID) VENT/DRAIN/TEST PLUG	ELASTOMERIC OR METALLIC
36	2		VENT/DRAIN PORT SCREW, CAP HEX HD 3/4-10UNC-2A X 1 3/4" LG	ASTM A320 GR L43
35	2		TEST PORT SCREW, CAP HEX HD 3/4-10UNC-2A X 1 3/4" LG	ASTM A320 GR L43
34	8		SCREW, CAP HD SOC, 1-8UNC-2A 5.0 LG	ASTM A320 GR L43
33	12		HARDENED WASHER,1.5 OD X .177 THK MAX	ASTM F436
32	36		HARDENED WASHER,3.0 OD X .28 THK MAX	ASTM F436
31	4		FILLER PLATE	ASTM A240 TYPE 304
30	12		SCREW, CAP HD SOC, 1-8UNC-2A 4.5 LG	ASME SA 320 GR L43
29	1		O-RING (17.5 ID), RAM CLOSURE PLATE CROSS-SECTION .425"	METALLIC
28	1		O-RING (19.4 ID), RAM CLOSURE PLATE CROSS SECTION .248"	METALLIC OR ELASTOMERIC
27	36		SCREW, CAP HD SOC, 2-12UN-2A X 8.18 LG	ASME SA-320 GR L43
26	1		O-RING (71.4 ID), TOP CLOSURE PLATE CROSS-SECTION .425"	METALLIC
25	1		O-RING (69.6 ID), TOP CLOSURE PLATE CROSS-SECTION .425"	METALLIC
24	1		TOP CLOSURE PLATE	ASME SA 240, TY 304
23	1		RAM CLOSURE PLATE	ASME SA 240, TY XM-19
22	A/R		CASTABLE NEUTRON SHIELDING MATERIAL	NS-3
21	2		RAILS, .120 THK X 4.0 WIDE	
20	2		UPPER TRUNNION PLUG BOTTOM PLATE	ASTM A240, TY 304
19	A/R		NEUTRON SHIELD SHELL	ASTM A240 TYPE 304
18	12		PLUGS	ASTM A240, TY 304
17	12		RUPTURE PLUG .036 (20 GA) THK	ASTM A240, TY 304
16	24		NSP SUPPORT ANGLE, OUTER	ASTM A240 TYPE 304
15	1		NSP BOTTOM SUPPORT RING, PLATE	ASTM A240 OR A479 TYPE 304
14	2		NSP TOP SUPPORT RING, PLATE	ASTM A240 OR A479 TYPE 304
13	2		TIE BAR	ASME SA-240 TYPE XM-19
12	2		BEARING BLOCK	ASME SA-240 TYPE XM-19
11	1		PAD PLATE	ASME SA-240 TY
10	2		LOWER TRUNNION SLEEVE	ASME SA-182 T
9	2		UPPER TRUNNION SLEEVE	ASME SA-182 T
8	2		UPPER TRUNNION PLUG SIDE PLATE	ASTM A240,
7	2		UPPER TRUNNION PLUG COVER PLATE	ASTM A240, TY
6	A/R		GAMMA SHIELD	ASTM B29 LEAD
5	1		TOP FLANGE, MACHINED RING FORGING	ASME SA-182, GRADE F304, F304H OR F304N
4	1		TOP STRUCTURAL SHELL, ROLLED PLATE	ASME SA 240 TYPE XM-19
3	1		BOTTOM STRUCTURAL SHELL, ROLLED PLATE	ASME SA-240 TYPE 304
2	1		BOTTOM END CLOSURE, MACHINED FORGING	ASME SA 182, GRADE F304, F304H OR F304N
1	1		INNER SHELL, ROLLED PLATE	ASME SA-240, TYPE 304 AND TYPE XM-19

PARTS LIST

ALL DIMENSIONS ARE APPLICABLE AT 68°F AND ALL TOLERANCING APPLIES AFTER WELDING AND FINAL MACHINING UNLESS NOTED OTHERWISE

DIMENSIONS ARE IN INCHES AND DEGREES UNLESS NOTED OTHERWISE. DIMENSIONING AND TOLERANCING IN ACCORDANCE WITH ANSI Y14.5M-1982. UNLESS NOTED OTHERWISE, TOLERANCES SHALL BE AS FOLLOWS: DIMENSIONS LESS THAN 6.00 ± .06; 6.00 TO 48.00 ± .13; GREATER THAN 48.00 ± .25; ANGLES ± 1°

BREAK AND DEBURR ALL SHARP EDGES

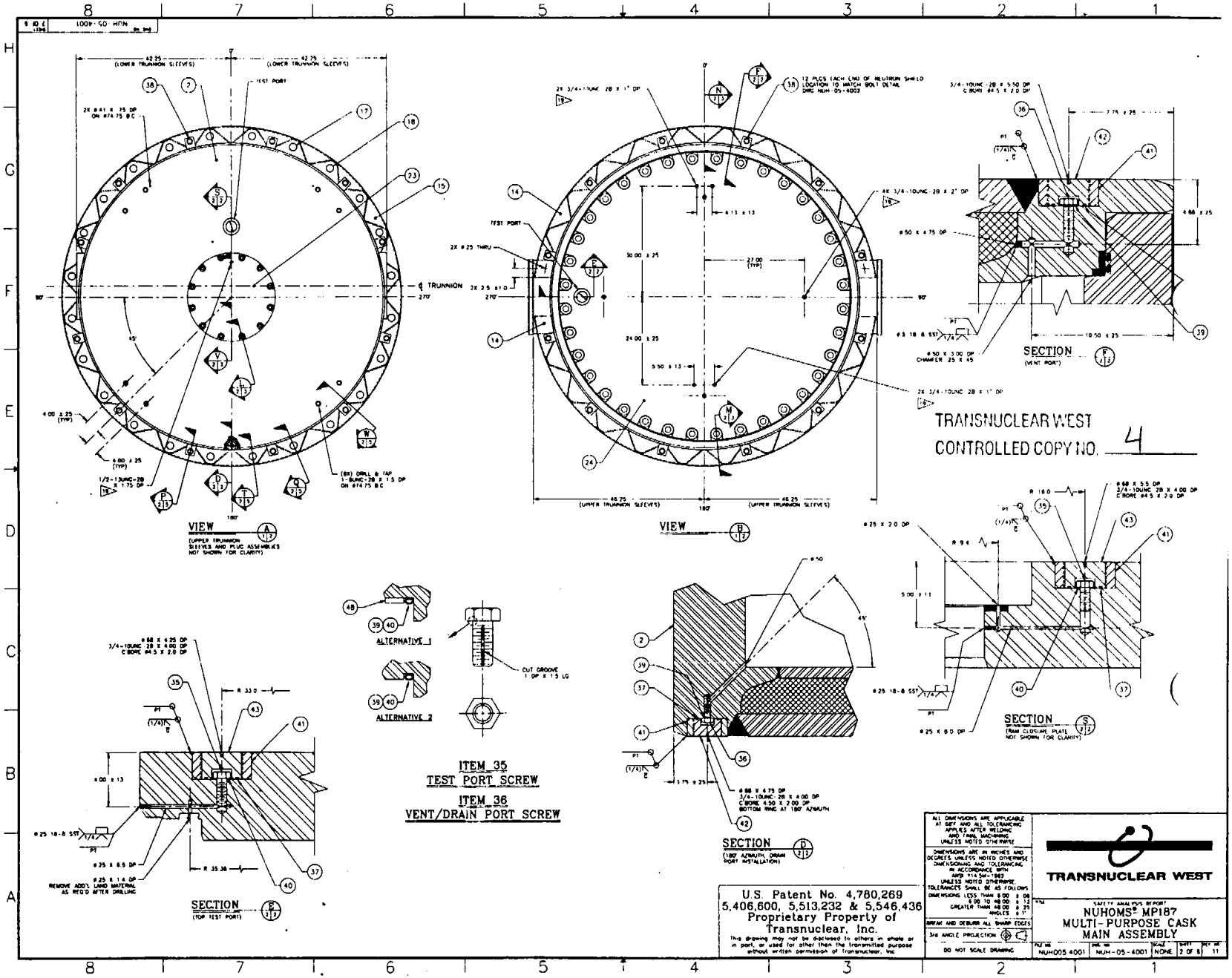
3rd ANGLE PROJECTION

DO NOT SCALE DRAWING

TRANSNUCLEAR WEST

SAFETY ANALYSIS REPORT
NUHOMS®-MP187
MULTI-PURPOSE CASK
MAIN ASSEMBLY

FILE NO	DWG NO	SCALE	SHEET	REV
NUH005.4001	NUH-05-4001	NONE	1 OF 6	11



ITEM 35
TEST PORT SCREW

ITEM 36
VENT/DRAIN PORT SCREW

ALL DIMENSIONS ARE APPLICABLE AT 68°F AND ALL TOLERANCING APPLIES AFTER WELDING AND FINAL MACHINING UNLESS NOTED OTHERWISE

DIMENSIONS ARE IN INCHES AND DECIMALS UNLESS NOTED OTHERWISE. DIMENSIONING AND TOLERANCING IN ACCORDANCE WITH ANSI Y14.5M-1982. UNLESS NOTED OTHERWISE, TOLERANCES SHALL BE AS FOLLOWS:

DIMENSIONS	
LESS THAN 6.00	± .06
6.00 TO 48.00	± .12
GREATER THAN 48.00	± .25
ANGLES	± 1°

BREAK AND DEBURR ALL SHARP EDGES

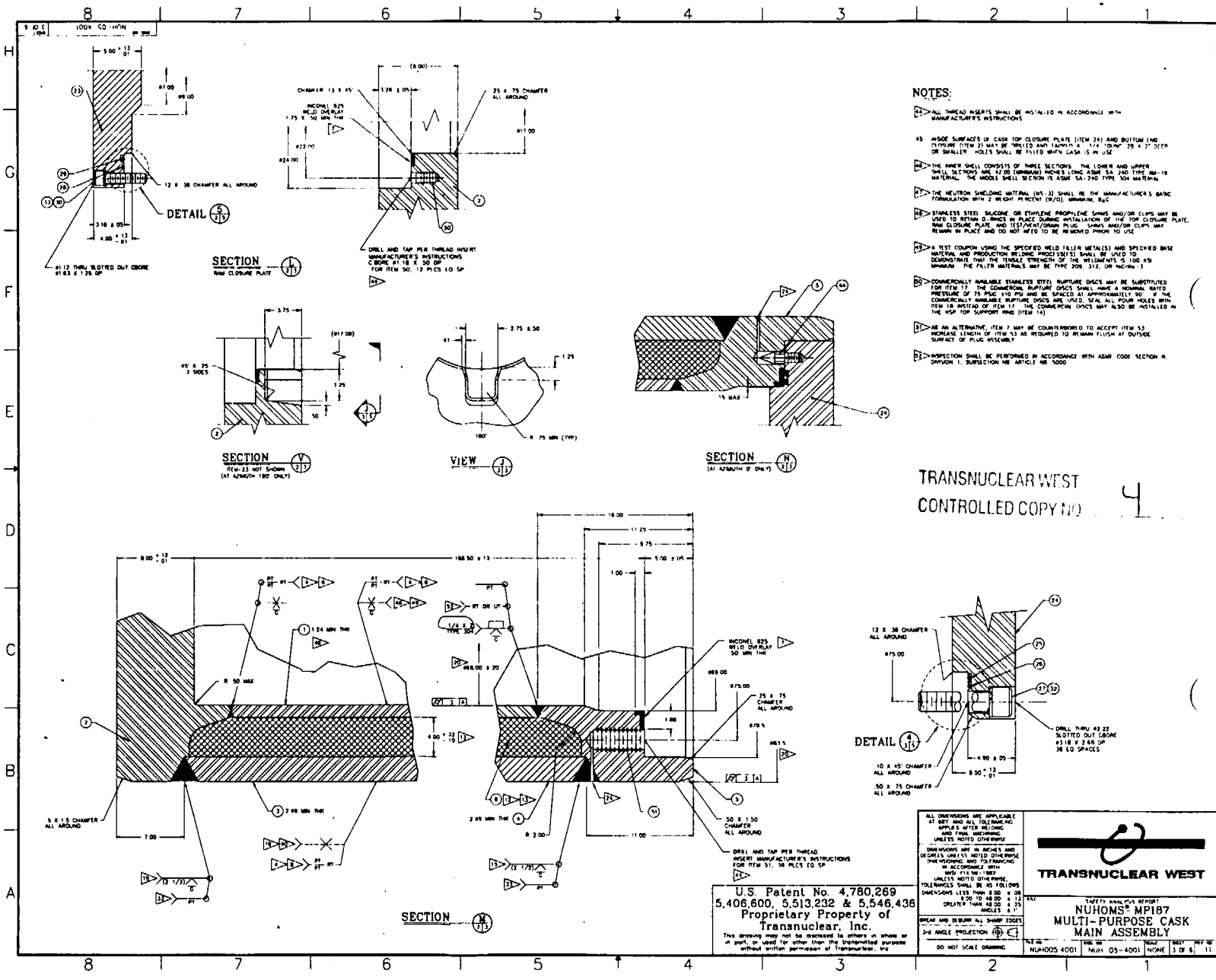
3rd ANGLE PROJECTION

DO NOT SCALE DRAWING

TRANSNUCLEAR WEST

TITLE: SAFETY ANALYSIS REPORT
NUHOMS® MP187
MULTI-PURPOSE CASK
MAIN ASSEMBLY

DRAWING NO.	REV. NO.	SCALE	SHEET	REV. NO.
NUH005.4001	NUH-05-4001	NONE	2 OF 8	11



NOTES:

24. ALL THREAD INSERTS SHALL BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS

45. INSIDE SURFACES OF CASK TOP CLOSURE PLATE (ITEM 24) AND BOTTOM END CLOSURE (ITEM 2) MAY BE DRILLED AND TAPPED 4 - 1/4 - 20 UNC 2B X .3" DEEP OR SMALLER. HOLES SHALL BE FILLED WHEN CASK IS IN USE

46. THE INNER SHELL CONSISTS OF THREE SECTIONS. THE LOWER AND UPPER SHELL SECTIONS ARE 47.00 (MINIMUM) INCHES LONG ASME SA 240 TYPE XM-19 MATERIAL. THE MIDDLE SHELL SECTION IS ASME SA-240 TYPE 304 MATERIAL

47. THE NEUTRON SHIELDING MATERIAL (NS-3) SHALL BE THE MANUFACTURER'S BASIC FORMULATION WITH 2 WEIGHT PERCENT (B_4C) MINIMUM, B_4C

48. STAINLESS STEEL SILICONE OR ETHYLENE PROPYLENE SHIMS AND/OR CLIPS MAY BE USED TO RETAIN O-RINGS IN PLACE DURING INSTALLATION OF THE TOP CLOSURE PLATE, RAM CLOSURE PLATE AND TEST/VENT/DRAIN PLUG. SHIMS AND/OR CLIPS MAY REMAIN IN PLACE AND DO NOT NEED TO BE REMOVED PRIOR TO USE

49. A TEST COUPON USING THE SPECIFIED WELD FILLER METAL(S) AND SPECIFIED BASE MATERIAL AND PRODUCTION WELDING PROCESS(ES) SHALL BE USED TO DEMONSTRATE THAT THE TENSILE STRENGTH OF THE WELDMENTS IS 100 KSI MINIMUM. THE FILLER MATERIALS MAY BE TYPE 309, 312, OR NICHRO-3

50. COMMERCIALLY AVAILABLE STAINLESS STEEL RUPTURE DISCS MAY BE SUBSTITUTED FOR ITEM 17. THE COMMERCIAL RUPTURE DISCS SHALL HAVE A NOMINAL RATED PRESSURE OF 75 PSIG ±10 PSI AND BE SPACED AT APPROXIMATELY 90°. IF THE COMMERCIALLY AVAILABLE RUPTURE DISCS ARE USED, SEAL ALL FOUR HOLES WITH ITEM 18 INSTEAD OF ITEM 17. THE COMMERCIAL DISCS MAY ALSO BE INSTALLED IN THE MSP TOP SUPPORT RING (ITEM 14)

51. AS AN ALTERNATIVE, ITEM 7 MAY BE COUNTERBORED TO ACCEPT ITEM 53. INCREASE LENGTH OF ITEM 53 AS REQUIRED TO REMAIN FLUSH AT OUTSIDE SURFACE OF PLUG ASSEMBLY

52. INSPECTION SHALL BE PERFORMED IN ACCORDANCE WITH ASME CODE SECTION III, DIVISION 1, SUBSECTION NB ARTICLE NB-5000

TRANSNUCLEAR WEST
CONTROLLED COPY NO 4

U.S. Patent No. 4,780,269
5,406,600, 5,513,232 & 5,546,436
Proprietary Property of
Transnuclear, Inc.

ALL DIMENSIONS ARE APPLICABLE AT 68°F AND ALL TOLERANCING APPLIES AFTER WELDING AND FINAL MACHINING UNLESS NOTED OTHERWISE

DIMENSIONS ARE IN INCHES AND DEGREES UNLESS NOTED OTHERWISE TOLERANCING AND FORMATTING IN ACCORDANCE WITH ANSI Y14.5M-1982 UNLESS NOTED OTHERWISE, TOLERANCES SHALL BE AS FOLLOWS

DIMENSIONS	
0.00 TO 4.00	± .05
4.00 TO 48.00	± .13
GREATER THAN 48.00	± .25
ANGLES	± 1°

BREAK AND DEBURR ALL SHARP EDGES

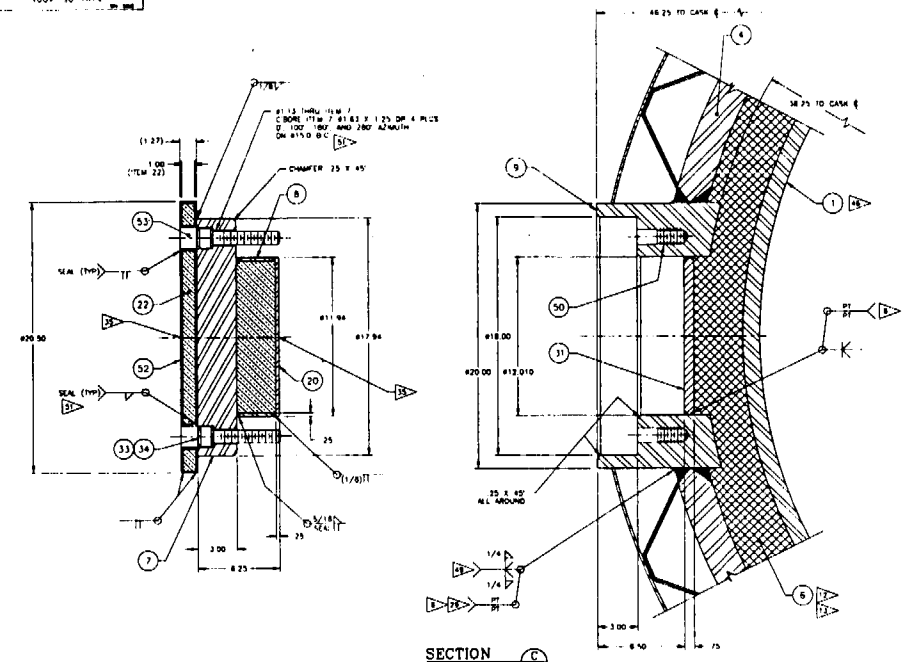
3rd ANGLE PROJECTION

DO NOT SCALE DRAWING

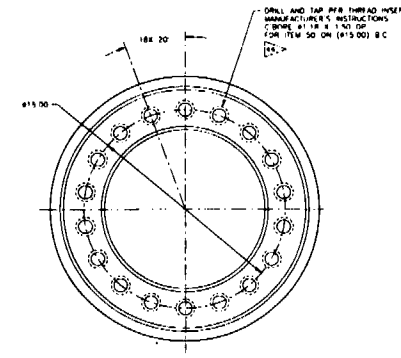
TRANSNUCLEAR WEST

SAFETY ANALYSIS REPORT
NUHOMS® MP187
MULTI-PURPOSE CASK
MAIN ASSEMBLY

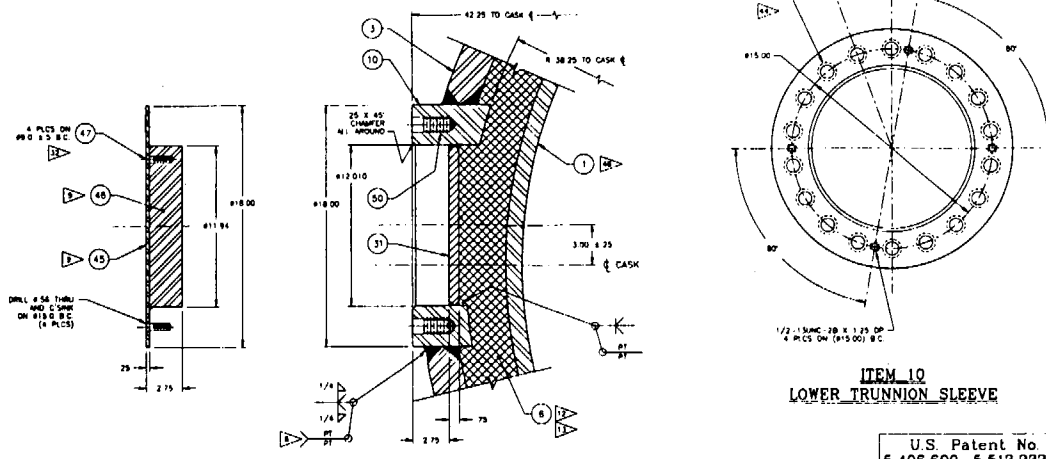
PART NO.	DWG NO.	SCALE	SHEET	REV NO.
NUH005.4001	NUH-05-4001	NONE	3 OF 5	11



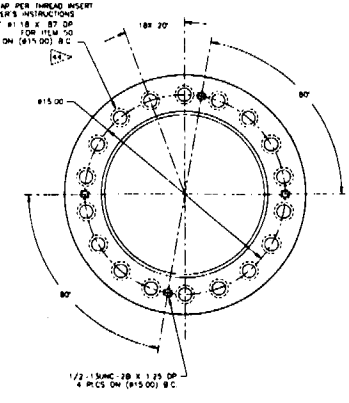
SECTION C
UPPER TRUNNION PLUG ASSEMBLY
(ITEM 22 NOT SHOWN FOR CLARITY)



ITEM 9
UPPER TRUNNION SLEEVE



SECTION R
LOWER TRUNNION PLUG ASSEMBLY



ITEM 10
LOWER TRUNNION SLEEVE

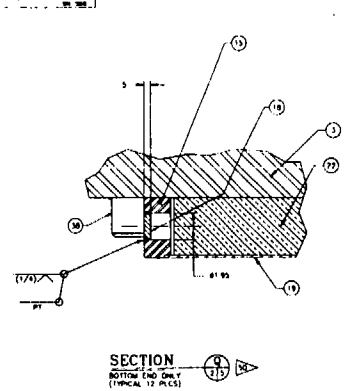
TRANSNUCLEAR WEST
CONTROLLED COPY NO. 4

ALL DIMENSIONS ARE APPLICABLE AT 68°F AND ALL TOLERANCING APPLIES AFTER WELDING AND FINAL MACHINING UNLESS NOTED OTHERWISE.
DIMENSIONS ARE IN INCHES AND DECIMALS UNLESS NOTED OTHERWISE. MACHINING AND TOLERANCING IN ACCORDANCE WITH ANSI Y14.5M 1982.
UNLESS NOTED OTHERWISE, TOLERANCES SHALL BE AS FOLLOWS
DIMENSIONS LESS THAN 6.00 ± .06
6.00 TO 48.00 ± .12
GREATER THAN 48.00 ± .25
ANGLES ± 1°
BREAK AND DEBURR ALL SHARP EDGES
3rd ANGLE PROJECTION
DO NOT SCALE DRAWING

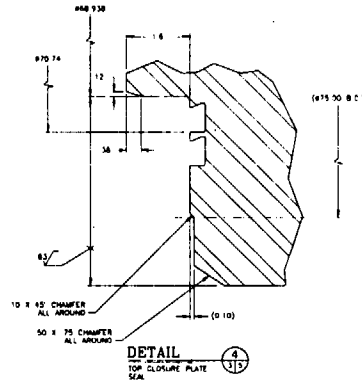
TRANSNUCLEAR WEST

SAFETY ANALYSIS REPORT
NUHOMS®-MP187
MULTI-PURPOSE CASK
MAIN ASSEMBLY

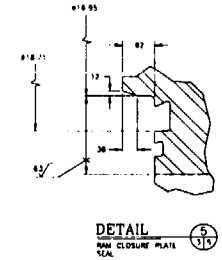
FILE NO.	DRG NO.	SCALE	SHEET	REV NO.
NUH005.4001	NUH-05-4001	NONE	4 OF 8	11



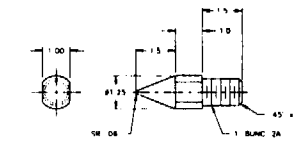
SECTION (Q/5)
BOTTOM END ONLY
(TYPICAL 12 PLCS)



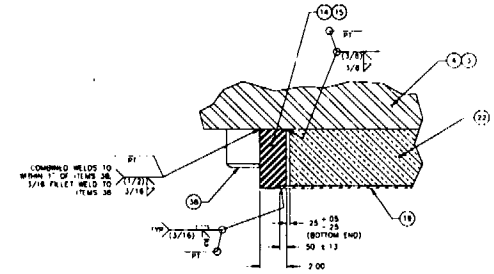
DETAIL (4/5)
TOP CLOSURE PLATE SEAL



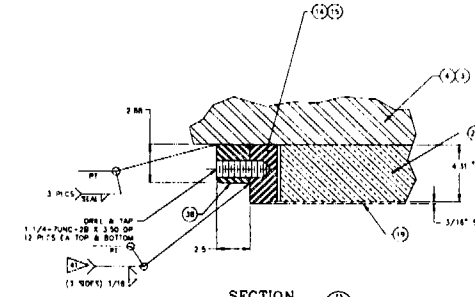
DETAIL (5/5)
RAM CLOSURE PLATE SEAL



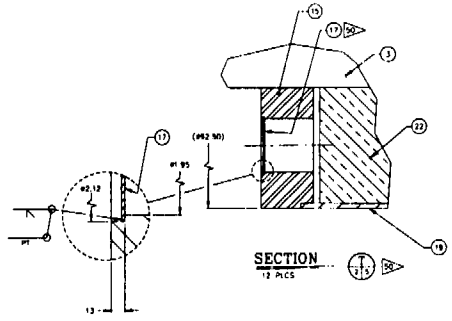
ITEM 44
TAPERED PIN



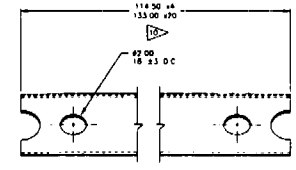
SECTION (W/5)
(TYPICAL FOR TOP AND BOTTOM NEUTRON SHIELD RING EXCEPT AS NOTED, ROTATED FOR CLARITY)

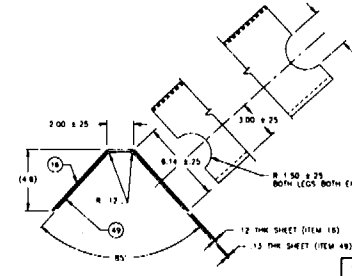


SECTION (P/5)
(TYPICAL FOR TOP AND BOTTOM NEUTRON SHIELD RING)



SECTION (T/5)
12 PLCS





NSP SUPPORT ANGLE ASSEMBLY (1)
TYPICAL

TRANSNUCLEAR WEST
CONTROLLED COPY NO 4

U.S. Patent No. 4,780,269
5,406,600, 5,513,232 & 5,546,436
Proprietary Property of
Transnuclear, Inc.

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DIMENSIONS ARE IN INCHES AND DECIMALS UNLESS NOTED OTHERWISE DIMENSIONING AND TOLERANCING IN ACCORDANCE WITH ANSI Y14.5M-1982 UNLESS NOTED OTHERWISE TOLERANCES SHALL BE AS FOLLOWS

DIMENSIONS LESS THAN 8.00	± .06
8.00 TO 48.00	± .13
GREATER THAN 48.00	± .25
ANGLES	± 1°

BREAK AND DEBURR ALL SHARP EDGES

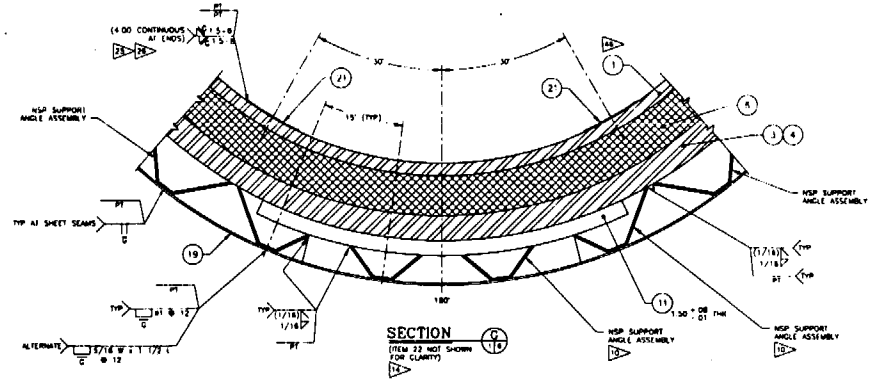
3rd ANGLE PROJECTION

DO NOT SCALE DRAWING

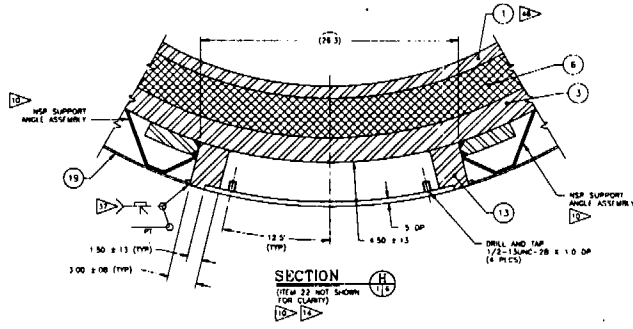
TRANSNUCLEAR WEST

SAFETY ANALYSIS REPORT
NUHOMS-MP187
MULTI-PURPOSE CASK
MAIN ASSEMBLY

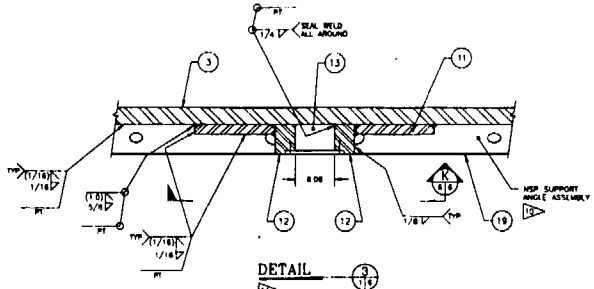
FILE NO	DRG NO	SCALE	SHEET	REV NO
NUH005.4001	NUH-05-4001	NONE	5 OF 6	11



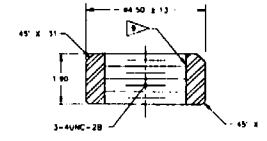
SECTION (G/16)
(ITEM 22 NOT SHOWN FOR CLARITY)



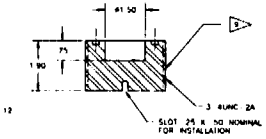
SECTION (H/16)
(ITEM 22 NOT SHOWN FOR CLARITY)



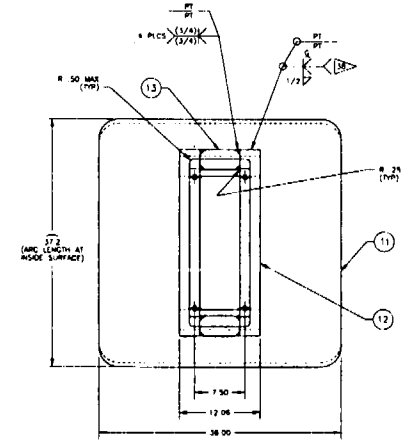
DETAIL (J/16)
(ITEM 22 NOT SHOWN FOR CLARITY)



ITEM 41
THREADED INSERT



ITEM 43
ITEM 42
PLUG



VIEW (K/16)

TRANSNUCLEAR WEST
CONTROLLED COPY NO 4

U.S. Patent No. 4,780,269
5,406,600, 5,513,232 & 5,546,436
Proprietary Property of
Transnuclear, Inc.
This drawing may not be disclosed to others in whole or in part, or used for other than the transmitted purpose without written permission of Transnuclear, Inc.

ALL DIMENSIONS ARE APPLICABLE AT SET AND ALL TOLERANCING APPLIES AFTER WELDING AND FINAL MACHINING UNLESS NOTED OTHERWISE

DIMENSIONS ARE IN INCHES AND DEGREES UNLESS NOTED OTHERWISE
DIMENSIONING AND TOLERANCING IN ACCORDANCE WITH ANSI Y14.5M-1982
UNLESS NOTED OTHERWISE, TOLERANCES SHALL BE AS FOLLOWS:
DIMENSIONS LESS THAN 6.00 ± .06
6.00 TO 48.00 ± .12
GREATER THAN 48.00 ± .25
ANGLES ± 1°

BREAK AND DEBURR ALL SHARP EDGES

3rd ANGLE PROJECTION

DO NOT SCALE DRAWING

TRANSNUCLEAR WEST

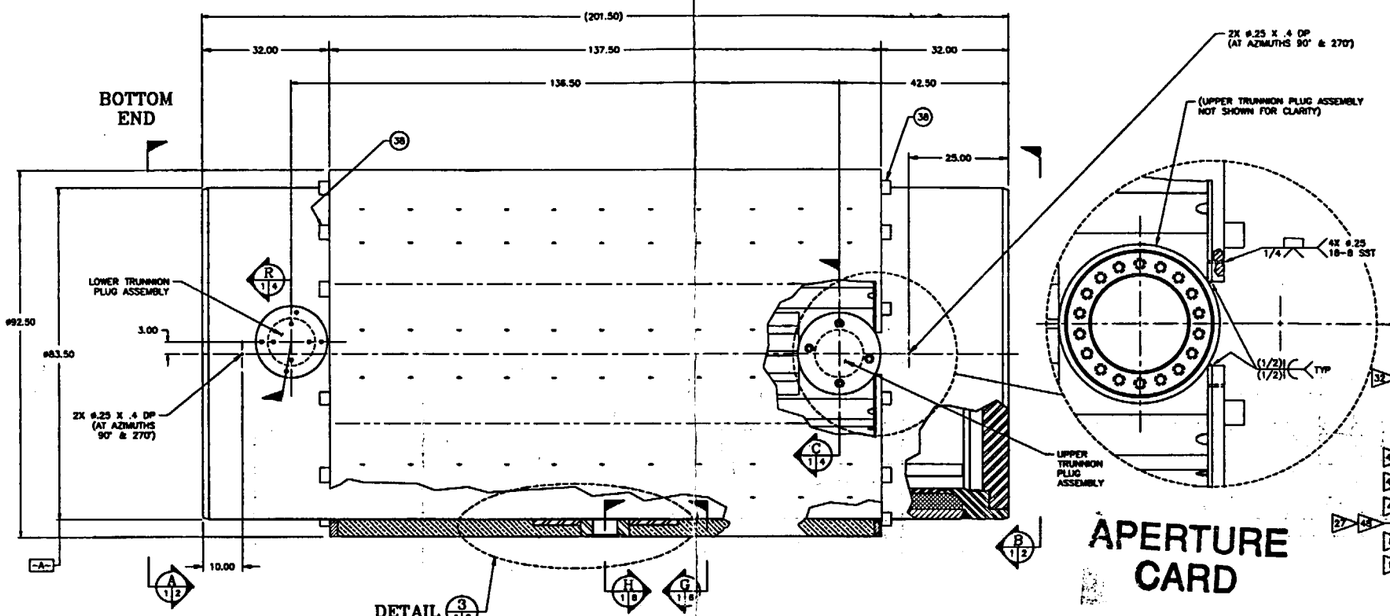
TITLE
SAFETY ANALYSIS REPORT
NUHOMS® MP187
MULTI PURPOSE CASK
MAIN ASSEMBLY

DRAWING NO	REV	SCALE	SHEET	REV
NUH005.4001	NUH-05-4001	NONE	16 OF 16	11

REV	DESCRIPTION:	DRAWN:	ORIGINATED:	VERIFIED:	APPROVED:	LICENSING:
11	AMENDMENT APPLICATION	CML 03/09/99	3/9/99	3/9/99	3/9/99	3/9/99

TRANSNUCLEAR WEST
CONTROLLED COPY NO. 4

9906160084-01



APERTURE CARD

Also Available on Aperture Card

ITEM NO.	QTY	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	MATERIAL SPECIFICATION
53	8		TUBE, I.D. SIZED TO FIT ITEMS 33 & 34 (ø1 1/2" SCHED 40 OR SIMILAR)	STAINLESS STEEL
52	A/R		10 GA SHEET	ASTM A240 TYPE 304
51	36		SCREW THREAD INSERT 2-12UN-2B X 5.50 LG X (2.27) OD	AMS7245 STAINLESS STEEL
50	84		SCREW THREAD INSERT 1-8UNC-2B X 2.00 LG X (1.18) OD	AMS7245 STAINLESS STEEL
49	24		NSP SUPPORT ANGLE, INNER	ALUMINUM
48	2		SPACER WASHER	STAINLESS STEEL
47	16		SCREW, FLAT HD CAP SCREW 1/2-13UNC-2A X 1.0 LG	ASTM A320 GR L43
46	2		LOWER TRUNNION PLUG SHIELDING BLOCK	ASTM A240 TYPE 304
45	2		LOWER TRUNNION PLUG COVER PLATE	ASTM A564 GR 630
44	1		TAPERED PIN	ASTM A193 GR B7
43	2		TEST PORT, PLUG	ASME SA-479 TYPE 304
42	2		VENT/DRAIN PORT, PLUG	ASME SA-479 TYPE 304
41	4		TEST/VENT/DRAIN PORT, THREADED INSERT	ASME SA-479 TYPE 304
40	2		TEST PORT SEAL	METALLIC OR ELASTOMERIC
39	2		VENT/DRAIN PORT SEAL	METALLIC
38	24		IMPACT LIMITER ATTACHMENT BLOCK	ASTM A240 OR A479 TYPE 304
37	4		O-RING (2.0 ID) VENT/DRAIN/TEST PLUG	ELASTOMERIC OR METALLIC
36	2		VENT/DRAIN PORT SCREW, CAP HEX HD 3/4-10UNC-2A X 1 3/4" LG	ASTM A320 GR L43
35	2		TEST PORT SCREW, CAP HEX HD 3/4-10UNC-2A X 1 3/4" LG	ASTM A320 GR L43
34	8		SCREW, CAP HD SOC, 1-8UNC-2A 5.0 LG	ASTM A320 GR L43
33	12		HARDENED WASHER,1.5 OD X.177 THK MAX	ASTM F436
32	36		HARDENED WASHER,3.0 OD X.28 THK MAX	ASTM F436
31	4		FILLER PLATE	ASTM A240 TYPE 304
30	12		SCREW, CAP HD SOC, 1-8UNC-2A 4.5 LG	ASME SA-320 GR L43
29	1		O-RING (17.3 ID); RAM CLOSURE PLATE: CROSS-SECTION .425"	METALLIC
28	1		O-RING (19.4 ID); RAM CLOSURE PLATE: CROSS-SECTION .246"	METALLIC OR ELASTOMERIC
27	36		SCREW, CAP HD SOC, 2-12UN-2A X 8.18 LG	ASME SA-320 GR L43
26	1		O-RING (71.6 ID); TOP CLOSURE PLATE: CROSS-SECTION .425"	METALLIC
25	1		O-RING (69.6 ID); TOP CLOSURE PLATE: CROSS-SECTION .425"	METALLIC
24	1		TOP CLOSURE PLATE	ASME SA-240, TY. 304
23	1		RAM CLOSURE PLATE	ASME SA-240, TY. XM-19
22	A/R		CASTABLE NEUTRON SHIELDING MATERIAL	NS-3
21	2		RAILS, .120 THK X 4.0 WIDE	
20	2		UPPER TRUNNION PLUG BOTTOM PLATE	ASTM A240, TY. 304
19	A/R		NEUTRON SHIELD SHELL	ASTM A240 TYPE 304
18	12		PLUGS	ASTM A240, TY. 304
17	12		RUPTURE PLUG .036 (20 GA) THK	ASTM A240, TY. 304
16	24		NSP SUPPORT ANGLE, OUTER	ASTM A240 TYPE 304
15	1		NSP BOTTOM SUPPORT RING, PLATE	ASTM A240 OR A479 TYPE 304
14	2		NSP TOP SUPPORT RING, PLATE	ASTM A240 OR A479 TYPE 304
13	2		TIE BAR	ASME SA-240 TYPE XM-19
12	2		BEARING BLOCK	ASME SA-240 TYPE XM-19
11	1		PAD PLATE	ASME SA-240 TYPE XM-19
10	2		LOWER TRUNNION SLEEVE	ASME SA-182 TYPE FXM-19
9	2		UPPER TRUNNION SLEEVE	ASME SA-182 TYPE FXM-19
8	2		UPPER TRUNNION PLUG SIDE PLATE	ASTM A240, TY. 304
7	2		UPPER TRUNNION PLUG COVER PLATE	ASTM A240, TY. 304
6	A/R		GAMMA SHIELD	ASTM B29 LEAD
5	1		TOP FLANGE, MACHINED RING FORGING	ASME SA-182, GRADE F304, F304H OR F304HN
4	1		TOP STRUCTURAL SHELL, ROLLED PLATE	ASME SA-240 TYPE XM-19
3	1		BOTTOM STRUCTURAL SHELL, ROLLED PLATE	ASME SA-240 TYPE 304
2	1		BOTTOM END CLOSURE, MACHINED FORGING	ASME SA-182, GRADE F304, F304H OR F304HN
1	1		INNER SHELL, ROLLED PLATE	ASME SA-240, TYPE 304 AND TYPE XM-19

PARTS LIST

NOTES:

1. ALL WELDING SHALL BE PERFORMED IN ACCORDANCE WITH NB-4300 AND SECTION IX. WELDING PROCEDURES SHALL BE QUALIFIED IN ACCORDANCE WITH NB-4330 AND SECTION IX OF THE ASME CODE. WELDS SHOWN TO BE SMOOTH OR FLUSH SHALL HAVE A MAXIMUM REINFORCEMENT OF .03 INCHES AND HAVE A SMOOTH TRANSITION TO THE BASE MATERIAL SURFACE. FINISHED THICKNESS OF ALL GROUND OR MACHINED AREAS SHALL BE VERIFIED BY MECHANICAL OR ULTRASONIC MEASUREMENT.
2. ALTERNATIVE WELD JOINT PREPARATIONS (U, V, OR J GROOVES) MAY BE USED PROVIDED ALL ASME CODE CRITERIA ARE MET. THE SPECIFIED MINIMUM EFFECTIVE THROAT MUST BE MAINTAINED.
3. ALL WELDS SHALL BE LIQUID PENETRANT INSPECTED ON FINAL PASS IN ACCORDANCE WITH ASME CODE, SECTION III, DIVISION I, SUBSECTION NB, ARTICLE NB-5000 AND SECTION V, ARTICLE 6.
4. RADIOGRAPHIC INSPECTION SHALL BE PERFORMED IN ACCORDANCE WITH ASME CODE SECTION III, DIVISION I, SUBSECTION NB, ARTICLE NB-5000 AND SECTION V, ARTICLE 2. RADIOGRAPHIC INSPECTION SHALL BE PERFORMED ON THE FOLLOWING:
   (a) ALL LONGITUDINAL SEAM WELDS OF CASK INNER AND STRUCTURAL SHELLS.
   (b) ALL CIRCUMFERENTIAL SEAM WELDS OF CASK INNER AND STRUCTURAL SHELLS, EXCEPT END WELDS OF SHELL TO TOP & BOTTOM FORGINGS.
5. ALL WELDS SHALL BE VISUALLY EXAMINED IN ACCORDANCE WITH NB 4424 OF ASME CODE. VISUAL WELD INSPECTORS SHALL BE QUALIFIED PER ASME CODE.
6. INDICATED WELDS SHALL BE LIQUID PENETRANT INSPECTED ON ROOT AND FINAL PASSES IN ACCORDANCE WITH ASME CODE, SECTION III, DIVISION 1, SUBSECTION NB, ARTICLE NB-5000, AND SECTION V, ARTICLE 6.
7. WELD OVERLAY SHALL BE MADE USING ERNiCrMo-3 OR ENiCrMo-3 ELECTRODE MEETING SFA 5.14 OR SFA 5.11, RESPECTIVELY.
8. CADMIUM PLATED.
9. OPTIONAL CADMIUM, CHROME OR NICKEL PLATE SURFACE TO A THICKNESS OF .0005 MIN/.001 MAX.
10. CUT NSP SUPPORT ANGLE ASSEMBLIES TO CLEAR SHEAR KEY AS REQUIRED. TRIM NSP SUPPORT ANGLE ASSEMBLIES ADJACENT TO UPPER TRUNNION SLEEVES.
12. LEAD TO BE CAST IN PLACE, CONFORMING TO ASTM B29.
13. LEAD SHIELDING INTEGRITY SHALL BE DETERMINED BY GAMMA SCAN, AFTER COOL DOWN TO AMBIENT TEMPERATURE. ACCEPTANCE CRITERIA PER SECTION 8.0 OF SAR.
14. NEUTRON SHIELD SUPPORT ANGLES (ITEMS 16 & 49) MAY BE FORMED AND INSTALLED AS SEPARATE PIECES. NO CONTROL OF CONTACT AREA IS REQUIRED. ALTERNATIVELY, MATERIALS MAY BE BONDED OR RIVETED TOGETHER AND PLACED AS A SINGLE ITEM.
15. FINAL STRUCTURAL SHELL TO FORGING WELD SHALL BE MADE AFTER LEAD POUR AND COOL DOWN. PREVENT LEAD INGRESS TO WELD DURING WELDING USING METHODS SUCH AS: CLOSE TOLERANCE JOINTS, SHIM STOCK, OR OTHER PROVEN MEANS. PRIOR TO WELDING, CLEAN AREA TO DEMONSTRATE THERE IS NO RESIDUAL LEAD CONTAMINATION.
16. LOCATION OF FULL PENETRATION LONGITUDINAL AND CIRCUMFERENTIAL SEAM WELDS IN INNER SHELL (ITEM 1), BOTTOM STRUCTURAL SHELL (ITEM 3), AND TOP STRUCTURAL SHELL (ITEM 4) MAY BE MADE AT FABRICATOR'S OPTION. LENGTH OF ITEM 4 MAY BE INCREASED TO ELIMINATE ADDITIONAL CIRCUMFERENTIAL WELD IN ITEM 3. ITEM 4 SHALL BE NOT LESS THAN 59.88 INCHES LONG.
17. DESIGN PRESSURE IS 50 psig. CASK CONTAINMENT BOUNDARIES SHALL BE SUBJECTED TO AN INTERNAL TEST PRESSURE EQUAL TO A MINIMUM OF 150% OF THE DESIGN PRESSURE PER 10 CFR 71.85(b).
18. CASK CONTAINMENT BOUNDARIES SHALL BE HELIUM LEAK TESTED TO DEMONSTRATE A LEAKAGE RATE NOT TO EXCEED 1 X 10^{-7} STANDARD CUBIC CENTIMETERS PER SECOND, IN ACCORDANCE WITH ANSI N14.5.
19. INDICATED HOLES ARE PROVIDED FOR THE INSTALLATION OF A LID HANDLING FIXTURE FOR LIFTING AND HANDLING OF THE LID. EACH LOCATION SHALL BE STENCILED OR OTHERWISE LABELED WITH THE FOLLOWING WARNING: "LID LIFT ONLY".
20. CASK INNER AND STRUCTURAL SHELLS SHALL COMPLY WITH THE TOLERANCE REQUIREMENTS OF ASME CODE, SECTION III, DIVISION I, SUBSECTION NE, ARTICLE NE-4220.
21. ALL SHELL JOINTS SHALL BE MADE IN ACCORDANCE WITH ASME CODE, SECTION III, DIVISION I, SUBSECTION NB, ARTICLE NB-4230.
22. ANY ADDITIONAL WELDS REQUIRED TO JOIN SHELL MATERIALS SHALL BE FULL PENETRATION WELDS INSPECTED PER NOTES 3, 4 & 5.
23. NOMINAL LEAD THICKNESS IS 4.0.
24. OPTIONAL: WATER RELIEF HOLES SHALL BE PROVIDED AT EACH PIN AND BOLT HOLE (37 PLCS). HOLES SHALL BE ø.25 AND SHALL BE DRILLED TO MEET BOTTOM OF HOLE AS SHOWN. RELIEF HOLES SHALL BE TAPPED 3/8-16UNC-2B X .50 DP.
25. RAILS MAY BE FABRICATED FROM SHORTER MATERIAL. FULL PENETRATION BUTT WELDS WITH SURFACE GROUND FLUSH SHALL BE PROVIDED TO FORM A CONTINUOUS RAIL. RAILS SHALL BE FORMED TO PROVIDE AT LEAST 50% SURFACE CONTACT WITH INNER SHELL (ITEM 1). MAXIMUM GAP SHALL NOT EXCEED .02. SLIDING SURFACE OF RAILS SHALL HAVE A 64 μin RMS FINISH, AND SHALL BE COATED WITH E/M CORPORATION PERMA-SLIK RN OR EQUIVALENT DRY FILM LUBRICANT.
26. STITCH WELD MAY BE CONTINUOUS TO AVOID CRUD TRAPS OR CAULK BETWEEN STITCH WELDS AND AT BOTTOM END OF RAIL (ITEM 21) USING GE-RTV-108 OR EQUIVALENT.
27. SEAL MATERIAL METALLIC HELICOFLEX HN SERIES WITH ALUMINUM JACKET INCONEL LINER AND INCONEL SPRING.
28. ELASTOMERIC SEALS FOR CASK SECONDARY SEALS SHALL HAVE A CROSS-SECTIONAL DIAMETER OF .275 (ITEM 26).
29. UPPER CASK TRUNNION SLEEVE TO SHELL WELDS SHALL BE LOAD TESTED TO 150% THE MAXIMUM DESIGN LOAD PRIOR TO JOINING INNER AND STRUCTURAL SHELLS.
30. ALL EXPOSED WELDS MAY BE GROUND SMOOTH TO ENHANCE CASK DECONTAMINATION.
31. RAIL MATERIAL: NITRONIC 60, SHEET, COLD REDUCED, ASTM A240, GRADE UNS S21800, RC 29-35, OR EQUIVALENT.
32. MATERIAL FOR ITEM 45 MAY BE 18-8 STAINLESS STEEL OR ASTM A564 GR 630; ITEM 46 MAY BE 18-8 SST OR ASTM A240 TYPE 304.
33. INDICATED WELD SHALL BE LIQUID PENETRANT INSPECTED ON ROOT PASS, FINAL PASS, AND EACH LAYER OF WELD DEPOSITION, IN ACCORDANCE WITH ASME CODE, SECTION III, DIVISION 1, SUBSECTION NB, ARTICLE NB-5000, AND SECTION V ARTICLE 6. RADIOGRAPHIC OR ULTRASONIC EXAMINATION MAY BE SUBSTITUTED FOR SPECIFIED PT PROVIDED ALL ASME CODE CRITERIA ARE MET.
34. ADDITIONAL NEUTRON SHIELD POUR HOLES MAY BE ADDED TO ITEMS 14 & 15 AND CLOSED PER SECTION QQ WITHOUT ITEM 38.
35. FABRICATOR MAY ELECT TO USE POUR HOLES IN FACE TO PLACE NS3. WELD PLUG AFTER NS3 HAS SET AT LEAST 48 HOURS. PROVIDE ø1/2" VENT HOLE IN CENTER OF PLATE AS PERMANENT VENT.
36. FOR ON-SITE FUEL TRANSFER OPERATIONS PERFORMED UNDER 10CFR72 REQUIREMENTS, O-RINGS ARE NOT REQUIRED TO BE INSTALLED. FOR ON-SITE FUEL STORAGE MODE PER 10CFR72 REQUIREMENTS, ALL O-RINGS SHALL BE METALLIC. FOR PART 71 TRANSPORTATION, METALLIC SEALS SHALL BE USED FOR ALL PRIMARY CONTAINMENT SEALS. EITHER METALLIC OR ELASTOMERIC MATERIAL MAY BE USED FOR SECONDARY SEALS AS DESCRIBED IN THE PARTS LIST.
37. BACKING BAR MAY BE FORMED BY MACHINING A RECESS IN ITEMS 12 & 13 NOT TO EXCEED .50" WIDE.
38. A ONE SIDED FULL PENETRATION BEVEL WELD WITH 3/8" MAX ROOT GAP PLUS 1/2" FILLET MAY BE SUBSTITUTED FOR DOUBLE BEVEL WELD.
39. ASME SA-182, TYPE FXM-19 FORGINGS MAY BE SUBSTITUTED FOR SPECIFIED PLATE MATERIAL.
40. LONGITUDINAL WELD IN TOP STRUCTURAL SHELL MAY BE MADE WITH ELECTRODE COMPATIBLE WITH TYPE 304 MATERIALS PROVIDED IT IS LOCATED AT 90° ±15° FROM UPPER TRUNNION SLEEVE CENTERLINE.
41. IMPACT LIMITER ATTACHMENT BLOCKS (ITEM 38) SHALL BE JOINED TO NSP SUPPORT RINGS (ITEMS 14 AND 15) WITH FULL PENETRATION WELDS. ALTERNATIVELY, THE ATTACHMENT BLOCKS AND SUPPORT RINGS MAY BE MACHINED FROM PLATE OR BAR.
42. SILVER PLATED STAINLESS STEEL TUBULAR O-RING CROSS-SECTION ø.062 INCH PRECOMPRESSED TO ø.052 INCH, PRIOR TO PLATING.
43. SUPPORT RINGS, ITEM 14 AND 15, MAY BE FABRICATED FROM SEGMENTS JOINED BY FULL PENETRATION WELDS, WITH SURFACE PT EXAMINATION.

(NOTES CONTINUED ON SHEET 3)

ALL DIMENSIONS ARE APPLICABLE AT 68°F AND ALL TOLERANCING APPLIES AFTER WELDING AND FINAL MACHINING UNLESS NOTED OTHERWISE.

DIMENSIONS ARE IN INCHES AND DEGREES UNLESS NOTED OTHERWISE. DIMENSIONING AND TOLERANCING IN ACCORDANCE WITH ANSI Y14.5M-1992. UNLESS NOTED OTHERWISE, TOLERANCES SHALL BE AS FOLLOWS: DIMENSIONS LESS THAN 6.00: ± .05; 6.00 TO 48.00: ± .13; GREATER THAN 48.00: ± .25; ANGLES: ± 1°

BREAK AND DEBURR ALL SHARP EDGES

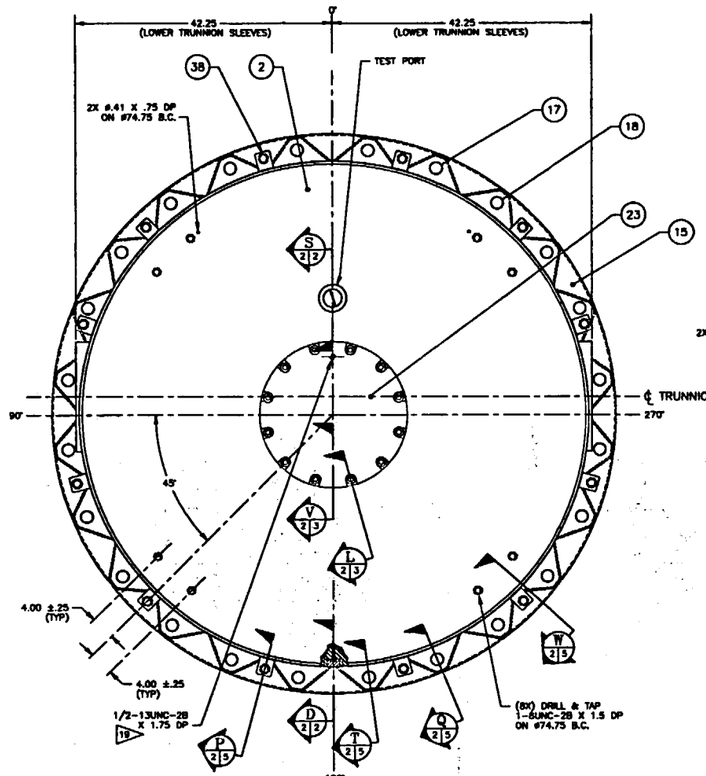
3rd ANGLE PROJECTION

DO NOT SCALE DRAWING

TRANSNUCLEAR WEST

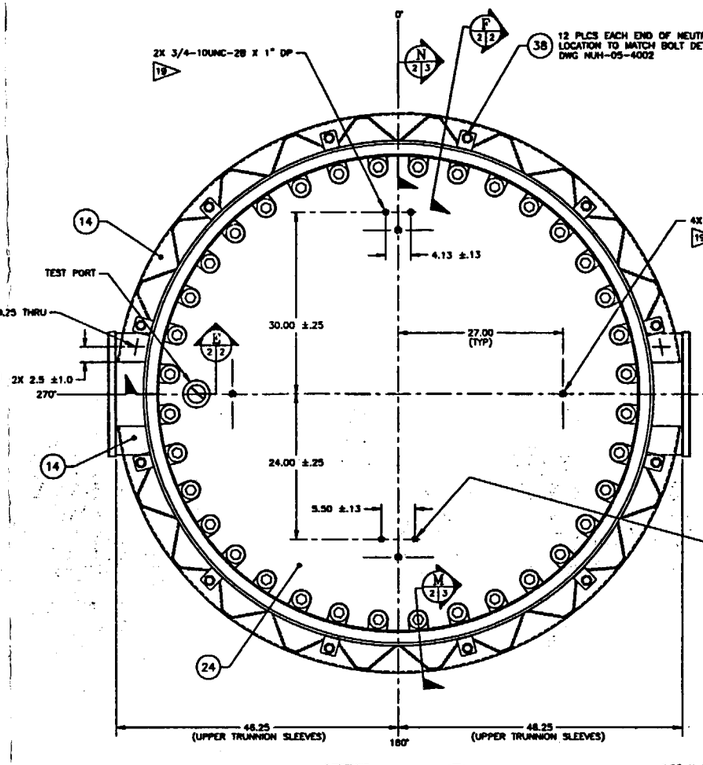
TITLE: SAFETY ANALYSIS REPORT
NUHOMS®-MP187
MULTI-PURPOSE CASK
MAIN ASSEMBLY

FILE NO.	DWG. NO.	SCALE	SHEET	REV. NO.
NUH005.4001	NUH-05-4001	NONE	1 OF 6	11

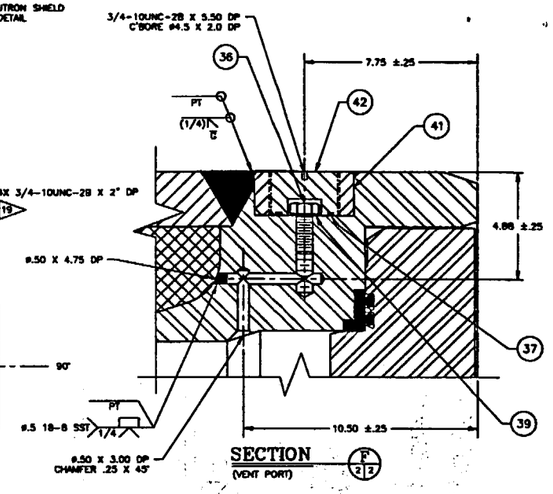


VIEW (A 1/2)

(UPPER TRUNNION SLEEVES AND PLUG ASSEMBLIES NOT SHOWN FOR CLARITY)



VIEW (B 1/2)



SECTION (F 2/2) (VENT PORT)

TRANSNUCLEAR WEST

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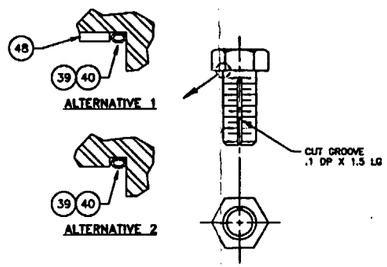
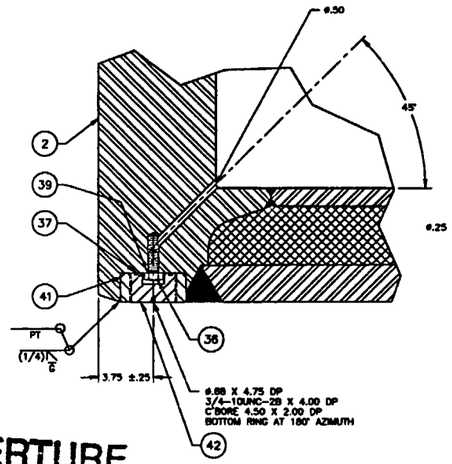
SECTION (E 2/2) (TDP TEST PORT)

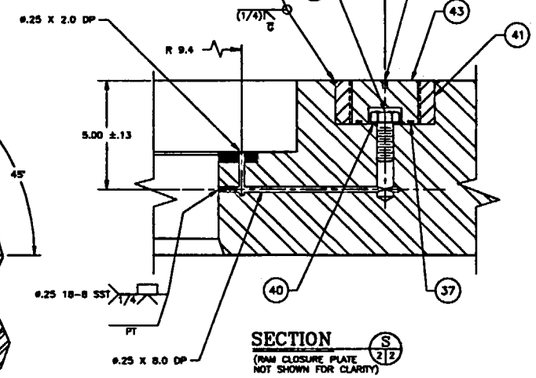


ITEM 35
TEST PORT SCREW

ITEM 36
VENT/DRAIN PORT SCREW



SECTION (D 2/2) (180° AZIMUTH, DRAIN PORT INSTALLATION)



SECTION (S 2/2) (RAM CLOSURE PLATE NOT SHOWN FOR CLARITY)

9906160084-02

APERTURE CARD

Also Available on Aperture Card

ALL DIMENSIONS ARE APPLICABLE AT EBT AND ALL TOLERANCING APPLIES AFTER WELDING AND FINAL MACHINING UNLESS NOTED OTHERWISE.

DIMENSIONS ARE IN INCHES AND DEGREES UNLESS NOTED OTHERWISE. DIMENSIONING AND TOLERANCING IN ACCORDANCE WITH ANSI Y14.5M-1982. UNLESS NOTED OTHERWISE, TOLERANCES SHALL BE AS FOLLOWS:
DIMENSIONS LESS THAN 6.00: ± .06
6.00 TO 48.00: ± .13
GREATER THAN 48.00: ± .25
ANGLES: ± 1°

BREAK AND DEBURR ALL SHARP EDGES

3rd ANGLE PROJECTION

DO NOT SCALE DRAWING

TRANSNUCLEAR WEST

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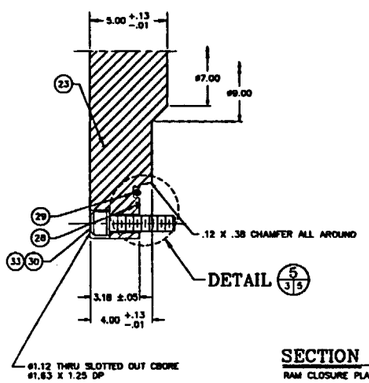
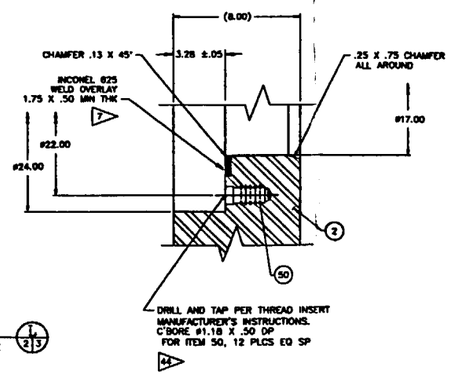
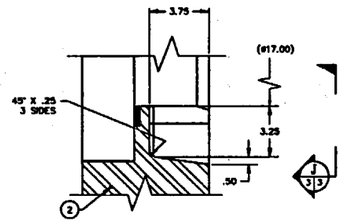
FILE NO.	DWG. NO.	SCALE	SHEET	REV. NO.
NUH005.4001	NUH-05-4001	NONE	2 OF 6	11

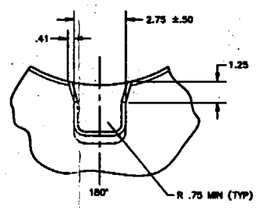




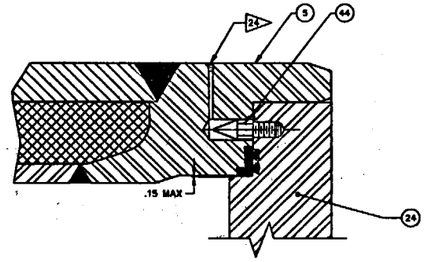
SECTION — RAM CLOSURE PLATE (1/3)



SECTION — ITEM 23 NOT SHOWN (AT AZIMUTH 180° ONLY) (V 2/3)



VIEW (J 3/3)



SECTION — (AT AZIMUTH 0° ONLY) (N 2/3)

NOTES:

42. ALL THREAD INSERTS SHALL BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.

45. INSIDE SURFACES OF CASK TOP CLOSURE PLATE (ITEM 24) AND BOTTOM END CLOSURE (ITEM 2) MAY BE DRILLED AND TAPPED 4– 3/4–10UNC–2B X 2" DEEP, OR SMALLER. HOLES SHALL BE FILLED WHEN CASK IS IN USE.

46. THE INNER SHELL CONSISTS OF THREE SECTIONS. THE LOWER AND UPPER SHELL SECTIONS ARE 42.00 (MINIMUM) INCHES LONG ASME SA–240 TYPE XM–19 MATERIAL. THE MIDDLE SHELL SECTION IS ASME SA–240 TYPE 304 MATERIAL.

47. THE NEUTRON SHIELDING MATERIAL (NS–3) SHALL BE THE MANUFACTURER'S BASIC FORMULATION WITH 2 WEIGHT PERCENT (W/O), MINIMUM, B_4C.

48. STAINLESS STEEL, SILICONE, OR ETHYLENE PROPYLENE SHIMS AND/OR CLIPS MAY BE USED TO RETAIN O–RINGS IN PLACE DURING INSTALLATION OF THE TOP CLOSURE PLATE, RAM CLOSURE PLATE, AND TEST/VENT/DRAIN PLUG. SHIMS AND/OR CLIPS MAY REMAIN IN PLACE AND DO NOT NEED TO BE REMOVED PRIOR TO USE.

49. A TEST COUPON USING THE SPECIFIED WELD FILLER METAL(S) AND SPECIFIED BASE MATERIAL AND PRODUCTION WELDING PROCESS(ES) SHALL BE USED TO DEMONSTRATE THAT THE TENSILE STRENGTH OF THE WELDMENTS IS 100 KSI MINIMUM. THE FILLER MATERIALS MAY BE TYPE 308, 312, OR NiCrMo–3.

50. COMMERCIALLY AVAILABLE STAINLESS STEEL RUPTURE DISCS MAY BE SUBSTITUTED FOR ITEM 17. THE COMMERCIAL RUPTURE DISCS SHALL HAVE A NOMINAL RATED PRESSURE OF 75 PSIG ±10 PSI AND BE SPACED AT APPROXIMATELY 90°. IF THE COMMERCIALLY AVAILABLE RUPTURE DISCS ARE USED, SEAL ALL FOUR HOLES WITH ITEM 18 INSTEAD OF ITEM 17. THE COMMERCIAL DISCS MAY ALSO BE INSTALLED IN THE NSP TOP SUPPORT RING (ITEM 14).

51. AS AN ALTERNATIVE, ITEM 7 MAY BE COUNTERBORED TO ACCEPT ITEM 53. INCREASE LENGTH OF ITEM 53 AS REQUIRED TO REMAIN FLUSH AT OUTSIDE SURFACE OF PLUG ASSEMBLY.

52. INSPECTION SHALL BE PERFORMED IN ACCORDANCE WITH ASME CODE SECTION III, DIVISION 1, SUBSECTION NB, ARTICLE NB–5000.

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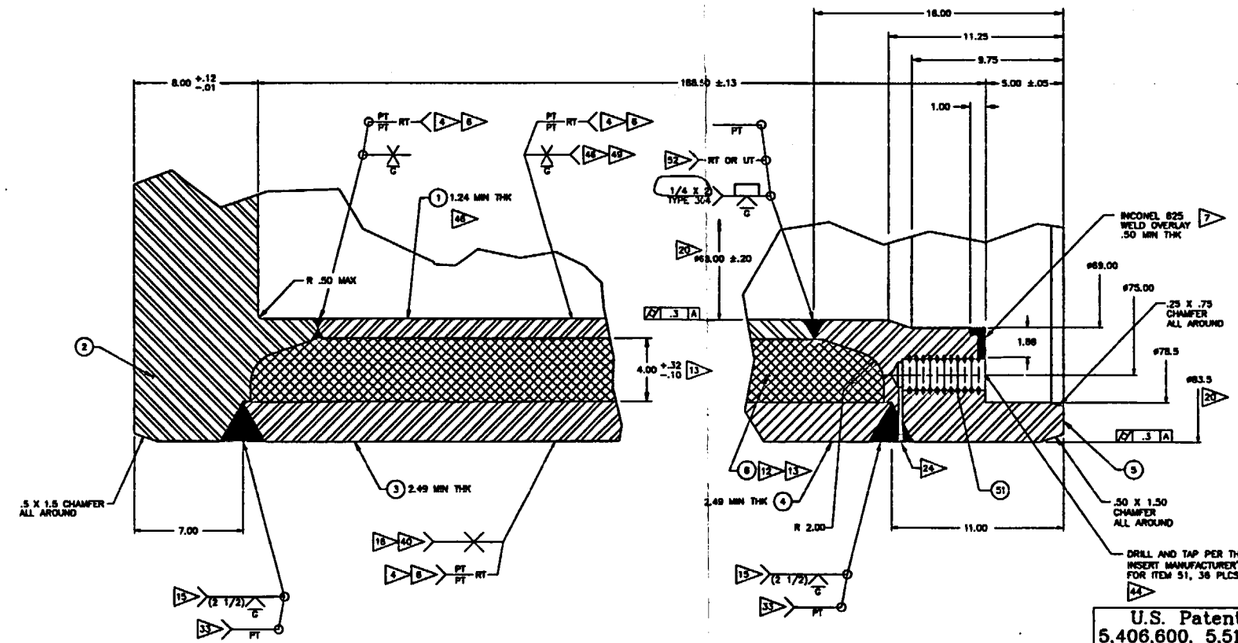
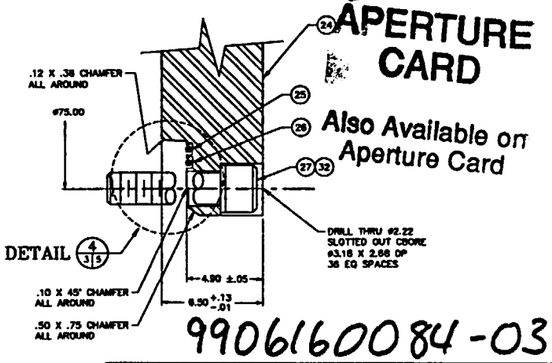


SECTION (M 2/3)



9906160084-03

ALL DIMENSIONS ARE APPLICABLE AT 68°F AND ALL TOLERANCING APPLIES AFTER WELDING AND FINAL MACHINING UNLESS NOTED OTHERWISE.

DIMENSIONS ARE IN INCHES AND DEGREES UNLESS NOTED OTHERWISE. DIMENSIONING AND TOLERANCING IN ACCORDANCE WITH ANSI Y14.5M–1982. UNLESS NOTED OTHERWISE, TOLERANCES SHALL BE AS FOLLOWS:
DIMENSIONS LESS THAN 6.00: ± .06
6.00 TO 48.00: ± .13
GREATER THAN 48.00: ± .25
ANGLES: ± 1°

BREAK AND DEBURR ALL SHARP EDGES

3rd ANGLE PROJECTION

DO NOT SCALE DRAWING

TRANSNUCLEAR WEST

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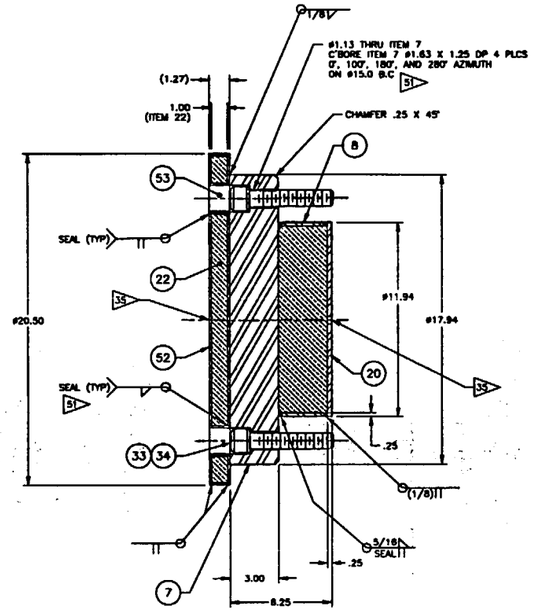
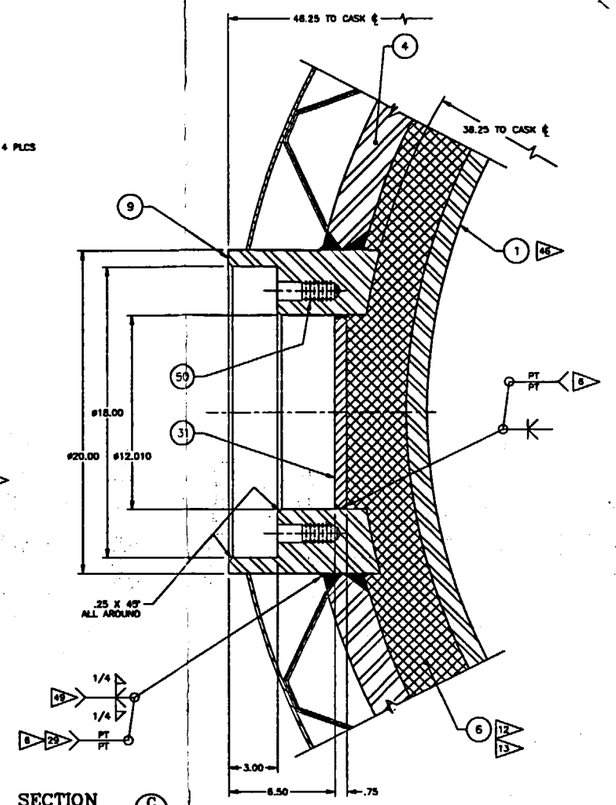
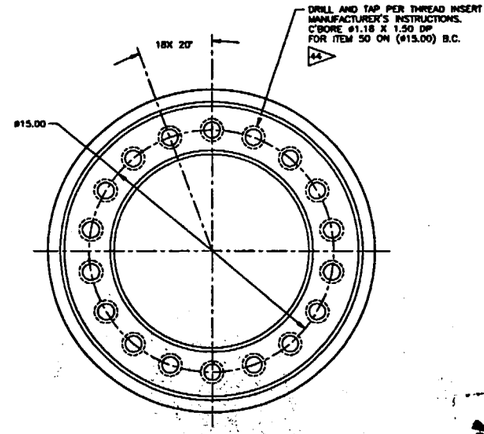
MULTI–PURPOSE CASK
MAIN ASSEMBLY

FILE NO.	DWG. NO.	SCALE	SHEET	REV. NO.
NUH005.4001	NUH–05–4001	NONE	3 OF 6	11

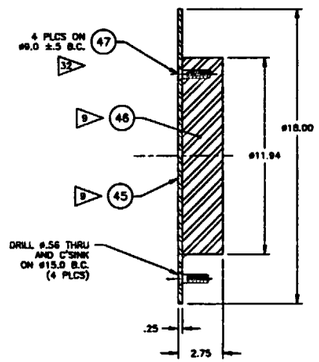


SECTION C 1/4
UPPER TRUNNION PLUG ASSEMBLY
(ITEM 22 NOT SHOWN FOR CLARITY)

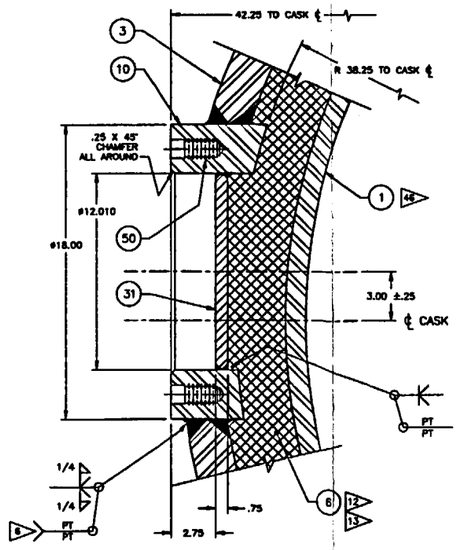


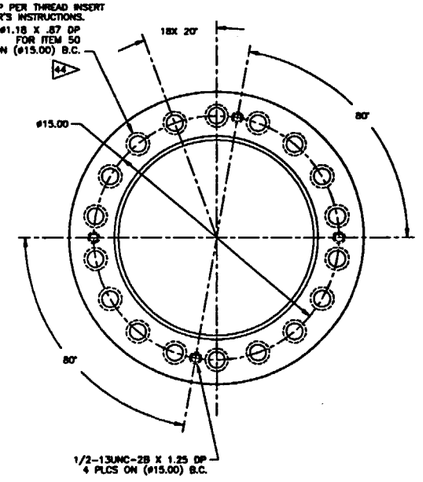


ITEM 9
UPPER TRUNNION SLEEVE



SECTION R 1/4
LOWER TRUNNION PLUG ASSEMBLY





ITEM 10
LOWER TRUNNION SLEEVE

TRANSNUCLEAR WEST
CONTROLLED COPY NO. 4

9906160084-04

ALL DIMENSIONS ARE APPLICABLE AT 68°F AND ALL TOLERANCING APPLIES AFTER WELDING AND FINAL MACHINING UNLESS NOTED OTHERWISE.

DIMENSIONS ARE IN INCHES AND DEGREES UNLESS NOTED OTHERWISE. DIMENSIONING AND TOLERANCING IN ACCORDANCE WITH ANSI Y14.5M-1982. UNLESS NOTED OTHERWISE, TOLERANCES SHALL BE AS FOLLOWS:
DIMENSIONS LESS THAN 6.00: ± .06
6.00 TO 48.00: ± .13
GREATER THAN 48.00: ± .25
ANGLES: ± 1°

BREAK AND DEBURR ALL SHARP EDGES

3rd ANGLE PROJECTION

DO NOT SCALE DRAWING

TRANSNUCLEAR WEST

TITLE: SAFETY ANALYSIS REPORT
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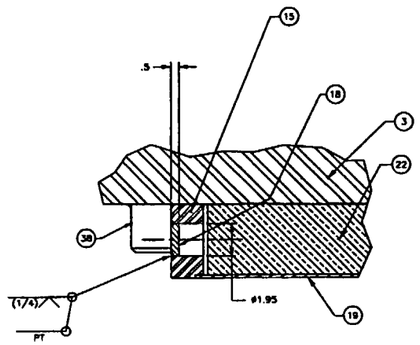
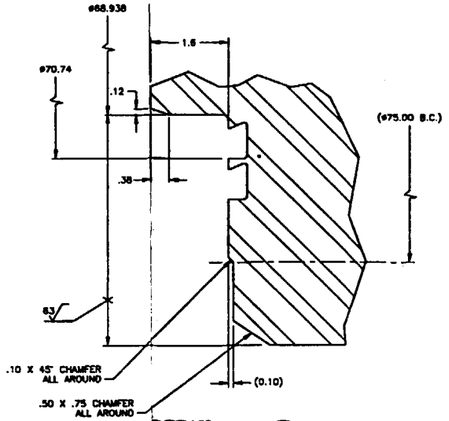
MULTI-PURPOSE CASK
MAIN ASSEMBLY

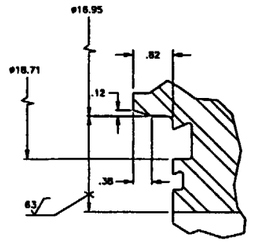
FILE NO.	DWG. NO.	SCALE	SHEET	REV. NO.
NUH005.4001	NUH-05-4001	NONE	4 OF 6	11



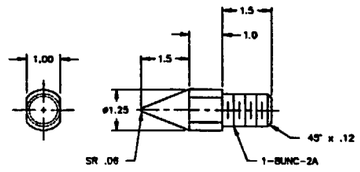
SECTION Q 2|5 50
BOTTOM END ONLY
(TYPICAL 12 PLCS)



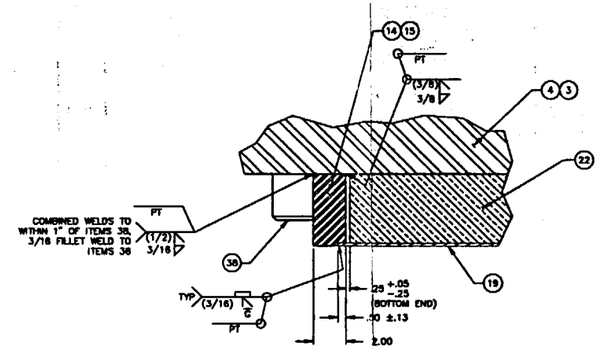
DETAIL 4 3|5
TOP CLOSURE PLATE SEAL



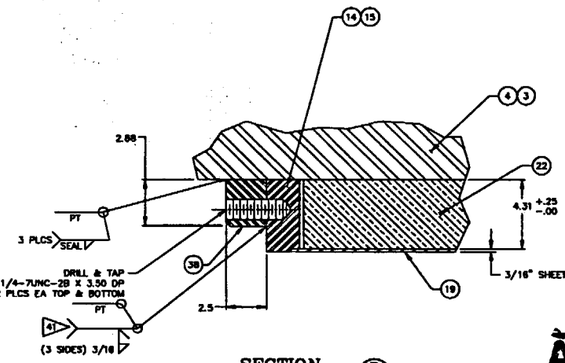
DETAIL 5 3|5
RAM CLOSURE PLATE SEAL



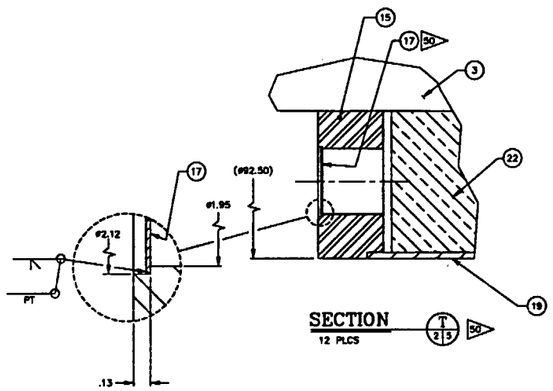
ITEM 44
TAPERED PIN



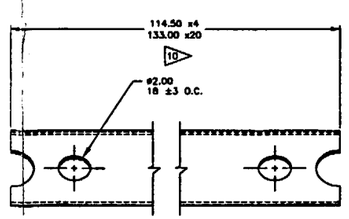
SECTION W 2|5
(TYPICAL FOR TOP AND BOTTOM NEUTRON SHIELD RING EXCEPT AS NOTED, ROTATED FOR CLARITY)

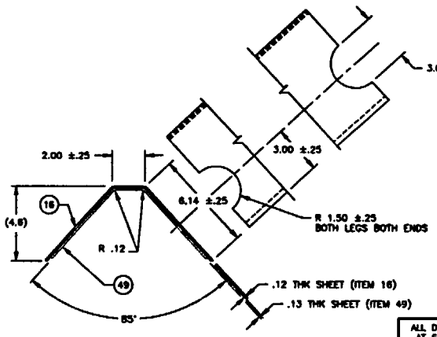


SECTION P 2|5
(TYPICAL FOR TOP AND BOTTOM NEUTRON SHIELD RING)



SECTION T 2|5 50
12 PLCS





NSP SUPPORT ANGLE ASSEMBLY 14
TYPICAL

APERTURE CARD

Also Available on Aperture Card

TRANSNUCLEAR WEST
CONTROLLED COPY NO. 4

99061600084-05

ALL DIMENSIONS ARE APPLICABLE AT 68°F AND ALL TOLERANCING APPLIES AFTER WELDING AND FINAL MACHINING UNLESS NOTED OTHERWISE.

DIMENSIONS ARE IN INCHES AND DEGREES UNLESS NOTED OTHERWISE. DIMENSIONING AND TOLERANCING IN ACCORDANCE WITH ANSI Y14.5M-1982. UNLESS NOTED OTHERWISE, TOLERANCES SHALL BE AS FOLLOWS:
DIMENSIONS LESS THAN 6.00: ±.08
6.00 TO 48.00: ±.13
GREATER THAN 48.00: ±.25
ANGLES: ±1°

BREAK AND DEBURR ALL SHARP EDGES

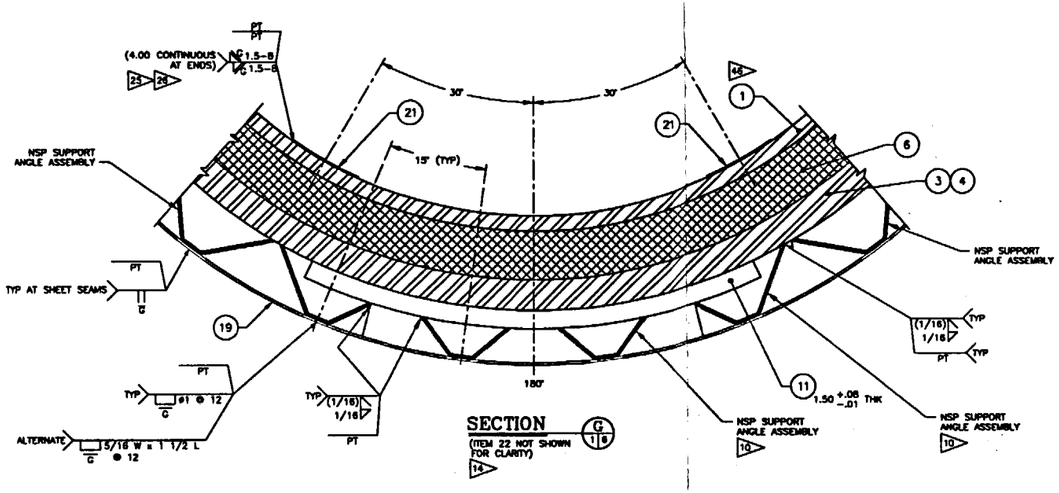
3rd ANGLE PROJECTION

DO NOT SCALE DRAWING

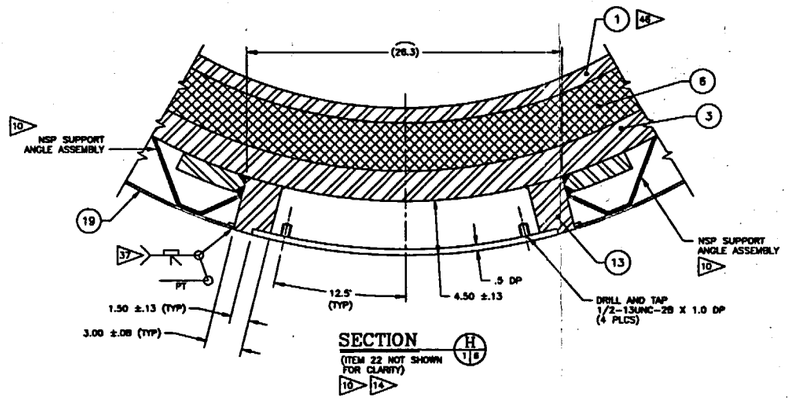
TRANSNUCLEAR WEST

TITLE: SAFETY ANALYSIS REPORT
NUHOMS®-MP187
MULTI-PURPOSE CASK
MAIN ASSEMBLY

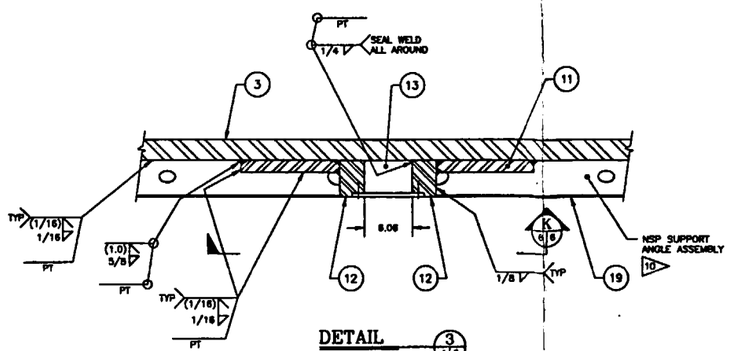
FILE NO.	DWG. NO.	SCALE	SHEET	REV. NO.
NUH005.4001	NUH-05-4001	NONE	5 OF 6	11



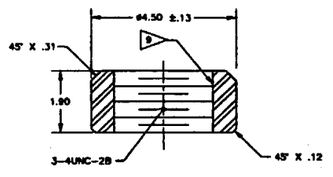
SECTION G (ITEM 22 NOT SHOWN FOR CLARITY)



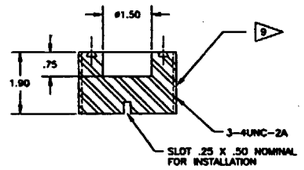
SECTION H (ITEM 22 NOT SHOWN FOR CLARITY)



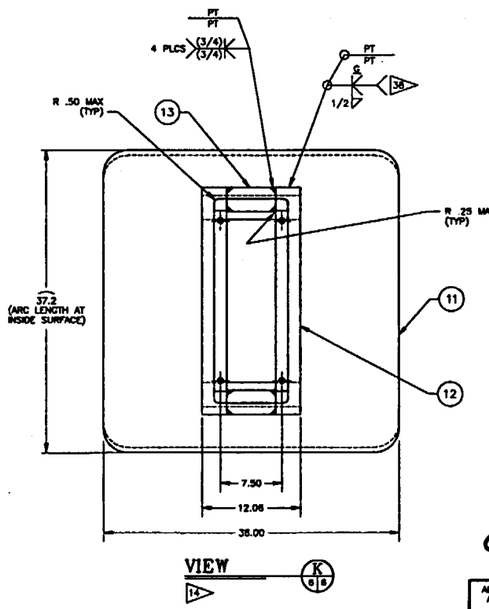
DETAIL 3 (ITEM 22 NOT SHOWN FOR CLARITY)



ITEM 41
THREADED INSERT



ITEM 43
ITEM 42
PLUG



VIEW K (ITEM 22 NOT SHOWN FOR CLARITY)

TRANSNUCLEAR WEST
CONTROLLED COPY NO. 4

9906160084-06

ALL DIMENSIONS ARE APPLICABLE AT 68°F AND ALL TOLERANCING APPLIES AFTER WELDING AND FINAL MACHINING UNLESS NOTED OTHERWISE.

DIMENSIONS ARE IN INCHES AND DEGREES UNLESS NOTED OTHERWISE. DIMENSIONING AND TOLERANCING PI ACCORDANCE WITH ANSI Y14.5M-1982. UNLESS NOTED OTHERWISE, TOLERANCES SHALL BE AS FOLLOWS:
DIMENSIONS LESS THAN 6.00: ± .06
6.00 TO 48.00: ± .13
GREATER THAN 48.00: ± .25
ANGLES: ± 1°

BREAK AND DEBURR ALL SHARP EDGES

3rd ANGLE PROJECTION

DO NOT SCALE DRAWING

TRANSNUCLEAR WEST

TITLE: SAFETY ANALYSIS REPORT
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FILE NO.	DWG. NO.	SCALE	SHEET	REV. NO.
NUH005.4001	NUH-05-4001	NONE	6 OF 6	11