SOFTWARE RELEASE NOTICE

1. SRN Number: 294

2. Project Title: TSPA & Technical Integration Code	Project No. 20.06002.01.113
3. SRN Title: TPA Version 5.0d	
4. Originator/Requestor: Gordon Wittmeyer	Date: 04/04/03

5. Summary of Actions

- ☐ Release of new software
- ☐ Change of access software
- ■ Release of modified software:
  - ■ Enhancements made
  - ■ Corrections made
- ☐ Software Retirement

6. Validation Status

- ☐ Validated
- ☐ Limited Validation
- ■ Not Validated — Explain: To be validated by July 2003.

7. Persons Authorized Access

Name	Read Only/Read-Write	Addition/Change/Delete
Sitakanta Mohanty	RW	
Ron Janetzke	RW	
David Esh (NRC)	RW	
Tim McCartin (NRC)	RW	
Chris Grossman (NRC)	RW	
Others (NRC/CNWRA)	RO	

8. Element Manager Approval: Gordon Wittmeyer Date: 4/7/2003

9. Remarks: An 8mm tape containing FORTRAN source code for the TPA Version 5.0d code, 4 CDs containing source and binary executable files for the PC/Windows NT platform, and one CD containing executable files only were sent to NRC.

CNWRA Form TOP-6 (09/01)

SOFTWARE SUMMARY FORM

01. Summary Date: 04/04/03	02. Summary prepared by (Name and phone): Ron Janetzke (210) 522-3318	03. Summary Action: Modified
04. Software Date: 04/04/03	05. Short Title: TPA Version 5.0d	
06. Software Title: TPA - System Performance Assessment Computer Code, Version 5.0		07. Internal Software ID: None

08. Software Type: ☐ Automated Data System ■ Computer Program ☐ Subroutine/Module	09. Processing Mode: ☐ Interactive ■ Batch ☐ Combination	10. Application Area: a. General: ☐ Scientific/Engineering ☐ Auxiliary Analyses ■ Total System PA ☐ Subsystem PA ☐ Other b. Specific:
11. Submitting Organization and Address: CNWRA/SwRI 6220 Culebra Road San Antonio, TX 78228		12. Technical Contact(s) and Phone: Sitakanta Mohanty (210) 522-5185

13. Software Application: The TPA Code consists of the following modules: UZFLOW, NFENV, EBSREL, UZFT, SZFT, DCAGW, FAULTO, SEISMO2, VOLCANO, ASHPLUMO, ASHRMVO, DCAGS, SNLLHS, EXEC, DSFAIL, MECHFAIL

14. Computer Platform: SUN Workstation PC	15. Computer Operating System: Solaris 5.8 Windows NT 4.0	16. Programming Language(s): SUN FORTRAN 77 V4.2 Lahey LF90 V4.5	17. Number of Source Program Statements: Approx. 56,000 lines w/o stand alone codes
18. Computer Memory Requirements: 165 Mb	19. Tape Drives: None	20. Disk Units: N/A	21. Graphics: N/A

22. Other Operational Requirements:

Uses system environment variables: TPA_TEST and TPA_DATA.

23. Software Availability: ■ Available ☐ Limited ☐ In-House ONLY	24. Documentation Availability: ☐ Available ☐ Preliminary ■ In-House ONLY

25.

Software Developer: Ron Janetzke Date: 4-4-03

CNWRA Form TOP-4-1 (05/98)

CENTER FOR NUCLEAR WASTE REGULATORY ANALYSES
QA VERIFICATION REPORT
FOR
→DEVELOPED OR ACQUIRED TO BE MODIFIED SOFTWARE←

Software Title/Name: TPA Code
Version: 5.0d
Demonstration workstation: SCRATCHY 1
Operating System: SOLARIS
Developer: Mohanty/Janetzke, et. al.

Software Requirements Description (SRD) [TOP-018, Section 5.3]

SRD Version: TPA 5.0
SRD Approval Date: 12/7/2001

SRD and any changes thereto reviewed in accordance with QAP-002 requirements?
No changes, but QA has document in files. Yes: ☒ No: ☐ N/A: ☐

Is a Software Change Report(s) (SCR) used for minor modifications (i.e., acquired code), problems or changes to a configured version of software?
Yes: ☒ No: ☐ N/A: ☐

Comments: SCR 444, 445, 446 all used for TPA V. 5.0d (3 modules affected)

Software Development Plan (SDP) [TOP-018, Section 5.4]

SDP Version: 0
SDP (EM) Approval Date: 4/9/2002

The SDP addresses applicable sections of TOP-018, Appendix B, SDP Template?
Yes: ☒ No: ☐ N/A: ☐

Is the waiver (if used) in accordance with specified guidelines?
Yes: ☐ No: ☐ N/A: ☒

Comments:

Design and Development [TOP-018, Section 5.5.1 - 5.5.4]

Is code development in accordance with the conventions (i.e., coding conventions)described in the SDP/SCR?
Yes: ☒ No: ☐ N/A: ☐

Module(s) Reviewed: UZFT.f, SZFT.f, FAILT.f

Comments:

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Is code internally documented to allow a user to understand the function(s) being performed and to follow the flow of execution of individual routines?

Yes: ☒ No: ☐ N/A: ☐

Module(s) Reviewed: UZFT.f
SZFT.f
Comments: FAILT.f

Is development of the code and informal module/subroutine-level testing documented in scientific notebook and/or SCR? Testing is in the SCR, S/Notebook has development history. Yes: ☒ No: ☐ N/A: ☐

SCR's and/or Scientific Notebook(s) Reviewed: S/N #170 ; SCRs 444
445
446
Comments:

Software designed so that individual runs are uniquely identified by date, time, name of software and version?

Yes: ☒ No: ☐ N/A: ☐

Date and Time Displayed: Apr 8 15:46:29 2003

Name/Version Displayed: TPA Version 5.0d

Comments:

Medium and Header Documentation [TOP-018, Section 5.5.6]

A program title block of main program contains: Program Title, Customer Name, Customer Office/Division, Customer Contact(s), Customer Phone Number, Associated Documentation, Software Developer and Phone Number, Date, and Disclaimer Notice?

Yes: ☒ No: ☐ N/A: ☐

Comments: Only contract number was changed

Source code module headers contain: Program Name, Client Name, Contract reference, Revision Number, Revision History, and Reference to SRD/SCR requirement(s)?

Yes: ☒ No: ☐ N/A: ☐

Module(s) Reviewed: UZFT.f

Comments:

The physical labeling of software medium (tapes, disks, etc.) contains: Program Name, Module/Name/Title, Module Revision, File type (ASCII, OBJ, EXE), Recording Date, and Operating System(s)?

Yes: ☒ No: ☐ N/A: ☐

Comments: Revised CD being presented to QA.

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Code Reviews [TOP-018, Section 5.5.6]

Are code reviews (if implemented) documented in a scientific notebook or in another format that allows others to understand the code review process and results?
in 2 SCRs, minor documentation in S/N No. 170. Yes: ☒ No: ☐ N/A: ☐

Documented in Scientific Notebook No.: _____

Comments:

Acceptance and Installation Testing [TOP-018, Section 5.6]

Does *acceptance testing* demonstrate whether or not requirements in the SRD and/or SCR(s) have been fulfilled?

Yes: ☒ No: ☐ N/A: ☐

Has *acceptance testing* been conducted for each intended computer platform and operating system?

Yes: ☒ No: ☐ N/A: ☐

Computer Platforms: Scratchy 1 - UNIX, Alby - Windows — Solaris Operating Systems: Windows NT

Location of Acceptance Test Results: CNWRA QA Records Room.

Comments:

Has *installation testing* been conducted for each intended computer platform and operating system?

Yes: ☒ No: ☐ N/A: ☐

Computer Platforms: Scratchy 1, Alby Operating Systems: Solaris, Windows NT

Location of Acceptance Test Results: CNWRA QA Records Room.

Comments:

User Documentation [TOP-018, Section 5.5.7]

Is there a Users' Manual for the software and is it up-to-date? → NOT up TO THIS VERSION yet.
Yes: ☒ No: ☐ N/A: ☐

User's Manual Version and Date: January 2002

Comments:

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Are there basic instructions for the *installation* and *use* of the software?

Yes: ☒ No: ☐ N/A: ☐

Location of Instructions: Users' Manual -

Comments: copy with developer and in QA Records Room.

Configuration Control [TOP-018, Section 5.7, 5.9.3]

Is the Software Summary Form (Form TOP-4-1) completed and signed?

Yes: ☒ No: ☐ N/A: ☐

Date of Approval: 4/7/2003

Is the list of files attached to the Software Summary Form complete and accurate?

Yes: ☒ No: ☐ N/A: ☐

Comments: See block 13 on SSF

Is the source code available or, is the executable code available in the case of (acquired/commercial codes)?

Yes: ☒ No: ☐ N/A: ☐

Location of Source Code: Software File, QA Records Room

Comments:

Have all the script/make files and executable files been submitted to the Software Custodian?

Yes: ☒ No: ☐ N/A: ☐

Location of script/make files: in TPA Version 5.0d Software folder in the CNWRA QA Records Room

Comments:

Software Release [TOP-018, Section 5.9]

Upon acceptance of the software as verified above, has a Software Release Notice (SRN), Form TOP-6 been issued and does the version number of the software match the documentation?

Yes: ☒ No: ☐ N/A: ☐

SRN Number: 294

Comments:

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QA VERIFICATION REPORT
FOR
→ DEVELOPED OR ACQUIRED TO BE MODIFIED SOFTWARE ←

Software Validation [TOP-018, Section 5.10]

Has a Software Validation Test Plan (SVTP) been prepared for the range of application of the software?

Yes: ☒ No: ☐ N/A: ☐

Version and Date of SVTP: Rev 0, dated February 2003

Date Reviewed and Approved via QAP-002: Feb 2003 – NRC approved the initial Software Validation Test Plan for TPA Version 5.0.

Comments: A more complete SVTP has been sent to NRC recently.

Has a Software Validation Test Report (SVTR) been prepared that documents the results of the validation cases, interpretation of the results, and determination if the software has been validated?

Yes: ☐ No: ☒ N/A: ☐

Version and Date of SVTR: —

Date Reviewed and Approved via QAP-002: —

Comments: The Software Validation Test Report is due to be completed by the end of July 2003.

Additional Comments:

4-8-03
Software Developer/Date

4/8/2003
Software Custodian/Date

```
c Program Name:         TPA - Total-System Performance Assessment Code
c File Name:            %M%
c File Date:            %G%
c Release Version:      5.0
c
c Client Name:          USNRC
c                       U. S. Nuclear Regulatory Commission
c                       NRC Office of Nuclear Material Safety and Safeguards
c                       Division of Waste Management
c Contract Number:      NRC 02-02-012
c
c NRC Contact           Tim McCartin (301) 415-6681
c
c CNWRA Contact:        Sitakanta Mohanty (210) 522-5185
c                       Center for Nuclear Waste Regulatory Analyses
c                       San Antonio, Texas 78238-5166
c                       smohanty@swri.edu
c
c Documentation:        Predecisional "Total-System Performance Assessment
c                       (TPA) Version 4.0 Code: Module Description and
c                       User's Guide", Center for Nuclear Waste Regulatory
c                       Analyses
c NUREG-Series Designator: N/A
cccccccccccccccccccccccccccccccccccccccccccccccccccccccccccccccccccccccccc
c
c = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = =
c
c                        D I S C L A I M E R
c
c = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = =
c
c     "This computer code/material was prepared as an account of work
c performed by the Center for Nuclear Waste Regulatory Analyses (CNWRA)
c for the Division of Waste Management of the Nuclear Regulatory
c Commission (NRC), an independent agency of the United States
c Government.  Neither the developer(s) of the code nor any of their
c sponsors make any warranty, expressed or implied, or assume any legal
c liability or responsibility for the accuracy, completeness, or
c usefulness of any information, apparatus, product or process
c disclosed, or represent that its use would not infringe on privately-
c owned rights."
c
c     "In no event unless required by applicable law will the sponsors
c or those who have written or modified this code, be liable for
c damages, including any lost profits, lost monies, or other special,
c incidental or consequential damages arising out of the use or
c inability to use the program (including but not limited to loss of
c data or data being rendered inaccurate or losses sustained by third
c parties or a failure of the program to operate with other programs),
c even if you have been advised of the possibility of such damages or
c for any claim by any other party."
c
c = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = =
c
c by T. McCartin
c    modified byS. Mohanty, R. Janetzke, R. Rice, A. Lozano
c
c css - 6/17/02 - SCR #374:  add ciperyrinsaintouzfracture argument
c       as an output argument from prenefmks
c rlr 8-8-02  SCR381 Split dcf.cum into dcfgw.cum and dcfgs.cum
c css - 11-12-2002; SCR #416:  include szft.i which contains maxlayers
c                              uzszft.i no longer contains maxlayers
c=====================================================================
      subroutine uzft( ir, isa, mxntime, mxnnucl,  ntim_c,
     &                 ntim, tim, nnucl, names,
```

```
cc rwj 9-24-02 SCR368
     &                 numclnuc, numclchn, cldnames,
     &                 qm3peryrinsa,
     &                 ciperyrinsaintoloweruz,
     &                 qm3peryrinsafromuz,
     &                 ciperyrinsafromuz, tavgwtt )
```

```
c rwj 3-13-03; SCR 445 Ja and Jp filter.
      if (nefleg .gt.1) then
        do ii=1,numelm

c rwj 3-25-03; SCR 445 Ja filter.
          if (elementlist(ii) .eq . 'Ja' ) then
            do kk=2,nefleg
              if (rd(ii,kk) .gt. 5.0d0*rd(ii,kk-1)) then
                  rd(ii,kk)  =   5.0d0*rd(ii,kk-1)
c                 print *, 'Ja Rd = ',(rd(ii,k445),k445=1,nefleg)
              end if
            end do
          end if

          if (elementlist(ii) .eq . 'Jp' ) then
            do kk=2,nefleg
              if (rd(ii,kk-1) .gt. 5.0d0*rd(ii,kk)) then
                  rd(ii,kk-1)  =   5.0d0*rd(ii,kk)
c                 print *, 'Jp Rd = ',(rd(ii,k445),k445=1,nefleg)
              end if
            end do
          end if

        end do
      end if
c end of change SCR 445.
```

```
c --------------------begin reading input data------------------------

c       top18 requirements:

        write (*, *)
     & 'ebspac (engineering barrier system performance assessment code)'
        write (*, *)
     &      'this is the part of the code that computes wp failure time'
        write (*, *) 'version= 1.0'
        write(*, *) zportfdatefun()

c       prepare and read input data including temperature rel. hum. history

        call input

c       - Added close statements to decreaset the number of open files

        close (9)
        close (22)

c       AJANK PA-SCR-423 02-04-03: Removed parameter iflagtpa.
c       Deprecated the need for a calculated nhista parameter
c        print*, 'iflagtpa=',iflagtpa
c        nhista = int(tend/timintv)

c       OPENSADO PA-SCR-365 4-23-02: Added parameter pHvec
c       call temphstry (iflag, iflagtpa,nset, timr, tcan, tavg, humd,
c    &           tend, nhist, nhista, timintv)

c       AJANK PA-SCR-423 02-04-03:  Removed the iflagtpa parameter
c       from the temphstry procedure call. 1 is the only valid value
c       for this procedure call.

c       AJANK PA-SCR-423 02-10-03:  Removed the unuset nset parameter
c       from the procedure call.  Deprecated timintv and requirement
c       for nhista to be calculated.
```

```
=====================================================================
        exec: Welcome to TPA Version 5.0d
      Job started: Tue Apr  8 15:46:29 2003
=====================================================================
 REPOSITORY DESIGN INFORMATION
 Subarea   Area       Waste   Number of WP
    #     [m^2]       [MTU]
    1    723591.3    11479.9        1455
    2    784763.0    12371.5        1568
    3    390372.0     6114.8         775
    4    207581.3     3361.1         426
    5    378972.8     5996.4         760
    6    424872.5     6714.4         851
    7    163938.3     2548.5         323
    8    393468.9     6674.9         846
    9    660785.5     7708.5         977
   10    589497.1     7069.4         896

 Total Area [acre]          =     1165.7629779961
 Total Buried Waste [MTU]   =     70039.530000000
 Repository AML [MTU/acre]  =     60.080420567478

 Specified Global Parameters:

                Compliance Period =  10000.0 (yr)
           Maximum Simulation Time =  10000.0 (yr)
            Number Of Realizations =      1
                Number Of Subareas =     10
                Volcanism scenario =      0 (yes=1, no=0)
                 Faulting scenario =      0 (yes=1, no=0)
      Mechanical failure scenarios:
                       Seismicity =      1 (yes=1, no=0)
                 Drift Degradation =      1 (yes=1, no=0)
       Distance to Receptor Group =     18.0 (km)

 **>>> CAUTION: CHECKING OF NUCLIDES AND CHAINS IS DISABLED <<<**
 **>>> You may not be using the standard chains specified   <<<**
 **>>> in the invent module.                                <<<**
 **>>> (see "CheckNuclidesAndChains(yes=1,no=0)" in tpa.inp)<<<**

 The specified path for data  = $TPA_DATA/
 The specified path for codes = $TPA_TEST/

 **To modify global parameters or the path, stop code execution using control-C*
*
---------------------------------------------------------------------
     subarea   1 of  10           realization    1 of    1
---------------------------------------------------------------------
 exec: calling uzflow
 UZFLOW: Uncertainty parameter:    0.0000E+00
         Mean Annual Infiltration at Start(AAI0):    9.7117E+00
 exec: calling nfenv
 exec: calling dsfail
 exec: calling seismo
    <<WARNING>> DRIP SHIELD CORROSIVE FAILURE:  4.3000E+01 [yr]
    (OCCURRED PRIOR TO MECHANICAL FAILURE)
 exec: calling ebsfail
      ebsfail: No Weld Failure
      *** No Corrosion WP Failure ***
 exec: failed WPs from INITIAL   event =     13 at time =      0.0 yr
  *** failed WPs:   13  out of   1455 ***
 exec: calling ebsrel
       ebsrel: running spent fuel waste form
                  Highest release rates from Sub Area  1
             Tc99    3.0857E-03 [Ci/yr/SA] at  2.796E+03 yr
```

```
              C14      1.8541E-03 [Ci/yr/SA] at  2.796E+03 yr
              Cs135    5.8723E-04 [Ci/yr/SA] at  2.796E+03 yr
              Am243    2.0471E-04 [Ci/yr/SA] at  7.038E+03 yr
              Ja243    2.0471E-04 [Ci/yr/SA] at  7.038E+03 yr
              Pu239    1.9090E-04 [Ci/yr/SA] at  1.000E+04 yr
              Jp239    1.9090E-04 [Ci/yr/SA] at  1.000E+04 yr
 exec: calling uzft
                       Highest release rates from UZ
              Tc99     3.0775E-03 [Ci/yr/SA] at  2.796E+03 yr
              Cs135    5.8562E-04 [Ci/yr/SA] at  2.796E+03 yr
              Ja243    2.0466E-04 [Ci/yr/SA] at  7.038E+03 yr
              Am243    2.0433E-04 [Ci/yr/SA] at  7.038E+03 yr
              Jp239    1.9087E-04 [Ci/yr/SA] at  1.000E+04 yr
              Pu239    1.9062E-04 [Ci/yr/SA] at  1.000E+04 yr
 exec: calling szft
                       Highest release rates from SZ
              Tc99     1.8851E-03 [Ci/yr/SA] at  3.997E+03 yr
              Pu239    1.5898E-04 [Ci/yr/SA] at  1.000E+04 yr
              Pu240    9.6776E-05 [Ci/yr/SA] at  1.000E+04 yr
              I129     2.3583E-05 [Ci/yr/SA] at  3.997E+03 yr
              Cl36     1.4761E-05 [Ci/yr/SA] at  3.997E+03 yr
              Np237    1.0458E-05 [Ci/yr/SA] at  8.293E+03 yr
 exec: calling dcagw
                       Highest annual dose GW pathway
              Pu239    2.2262E-01 [mrem/yr]  at  1.000E+04 yr
              Pu240    1.3552E-01 [mrem/yr]  at  1.000E+04 yr
              Np237    1.8740E-02 [mrem/yr]  at  8.293E+03 yr
              I129     4.5649E-03 [mrem/yr]  at  3.997E+03 yr
              Tc99     1.2447E-03 [mrem/yr]  at  3.997E+03 yr
              Am243    1.3509E-04 [mrem/yr]  at  1.000E+04 yr
            At end of TPI, annual dose GW pathway
              Pu239    2.2262E-01 [mrem/yr]
              Pu240    1.3552E-01 [mrem/yr]
              Np237    1.8088E-02 [mrem/yr]
              Am243    1.3509E-04 [mrem/yr]
              I129     9.0892E-05 [mrem/yr]
              Tc99     7.0625E-05 [mrem/yr]
                 sum   3.7652E-01 [mrem/yr]
 exec: end realizations

 exec: Peak Mean Dose is 3.76520E-04 rem/yr at  10000.0 yr, based on     1 reali
zations.

 exec:  Run Successfully Completed
```

```
tpa50d/
tpa50d/CLEANUP
tpa50d/array.f
tpa50d/ashplumo.f
tpa50d/ashrmovo.f
tpa50d/condxyzt.f
tpa50d/coefkdeq.i
tpa50d/dcags.f
tpa50d/dcagw.f
tpa50d/dsfail.f
tpa50d/ebsfail.f
tpa50d/ebsrel.f
tpa50d/ebsrel1.i
tpa50d/exec.f
tpa50d/execa.i
tpa50d/execb.i
tpa50d/execc.i
tpa50d/execd.i
tpa50d/faulto.f
tpa50d/fileunit.f
tpa50d/findelev.f
tpa50d/invent.f
tpa50d/iareader.f
tpa50d/ia.i
tpa50d/ia1.i
tpa50d/Makefile
tpa50d/Makefile4.2
tpa50d/max500yr.i
tpa50d/maxchain.i
tpa50d/maxnnucl.i
tpa50d/maxclchn.i
tpa50d/maxclnuc.i
tpa50d/maxnsuba.i
tpa50d/maxntime.i
tpa50d/mv.f
tpa50d/nfenv.f
tpa50d/nfenvadj.i
tpa50d/reflux2.i
tpa50d/nintv.i
tpa50d/notice.i
tpa50d/numrecip.f
tpa50d/path.i
tpa50d/peakfind.f
tpa50d/ran.f
tpa50d/reader.f
tpa50d/reader.i
tpa50d/reader1.i
tpa50d/reader2.i
tpa50d/reader3.i
tpa50d/reader4.i
tpa50d/driftsa.i
tpa50d/sampler.f
tpa50d/seismo2.f
tpa50d/seisadj.i
tpa50d/stop.i
tpa50d/subarea.f
tpa50d/szft.f
tpa50d/szft.i
tpa50d/tpa.inp
tpa50d/uzflow.f
```

tpa50d/uzft.f
tpa50d/uzszft.i
tpa50d/volcano.f
tpa50d/fu1.i
tpa50d/fu2.i
tpa50d/invent_.i
tpa50d/inventa.i
tpa50d/inventb.i
tpa50d/inventc.i
tpa50d/inventd.i
tpa50d/invente.i
tpa50d/inventf.i
tpa50d/inventg.i
tpa50d/inventh.i
tpa50d/inventi.i
tpa50d/inventj.i
tpa50d/inventk.i
tpa50d/inventl.i
tpa50d/inventm.i
tpa50d/inventn.i
tpa50d/invento.i
tpa50d/inventp.i
tpa50d/mva.i
tpa50d/mvb.i
tpa50d/mvc.i
tpa50d/mvd.i
tpa50d/mve.i
tpa50d/mvf.i
tpa50d/sampler0.i
tpa50d/sampler1.i
tpa50d/sampler2.i
tpa50d/sampler3.i
tpa50d/sampler4.i
tpa50d/samplera.i
tpa50d/samplerb.i
tpa50d/samplerc.i
tpa50d/samplerd.i
tpa50d/samplere.i
tpa50d/samplerf.i
tpa50d/samplerg.i
tpa50d/samplerh.i
tpa50d/sampleri.i
tpa50d/samplerj.i
tpa50d/samplerk.i
tpa50d/samplerl.i
tpa50d/samplerm.i
tpa50d/codes/
tpa50d/codes/Makefile
tpa50d/codes/Makefile4.2
tpa50d/codes/README
tpa50d/codes/SIZES.INC
tpa50d/codes/SIZES2.INC
tpa50d/codes/ashplume.f
tpa50d/codes/failt.f
tpa50d/codes/failtadj.i
tpa50d/codes/dsfailt.f
tpa50d/codes/nefmks.f
tpa50d/codes/releaset.f
tpa50d/codes/snllhs.f
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