SOFTWARE RELEASE NOTICE

1. SRN Number: ~~292~~ 3/27/03 PA-SRN-292

2. Project Title: TSPA & Technical Integration Code	Project No. 20.06002.01.113
3. SRN Title: TPA Version 5.0	
4. Originator/Requestor: Gordon Wittmeyer	Date: 02/27/03

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: 2/27/2003

9. Remarks: An 8mm tape containing FORTRAN source code for the TPA Version 5.0 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: 02/27/03	02. Summary prepared by (Name and phone): Ron Janetzke (210) 522-3318	03. Summary Action: Modified
04. Software Date: 02/28/03	05. Short Title: TPA Version 5.0	
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 4.2 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: 2-27-03

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
Version: 5.0
Demonstration workstation: Scratchy-1
Operating System: Solaris 5.9
Developer: Ron Janetzke

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

SRD Version: 5.0
SRD Approval Date: Dec. 7, 2001

SRD and any changes thereto reviewed in accordance with QAP-002 requirements?

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's 344-349, 365-400, 408-428, 439-443

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

SDP Version: 5.0
SDP (EM) Approval Date: April 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: dsfail.f

Comments: invent.f
mechfail.f

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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: dsfail.f
invent.f
mechfail.f

Comments:

Is development of the code and informal module/subroutine-level testing documented in scientific notebook and/or SCR?

Yes: ☑ No: ☐ N/A: ☐

SCR's and/or Scientific Notebook(s) Reviewed: PA-SCR-344, 413, 428

Comments: Test plans & results included w/ SCRs.

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: Thu Feb 27 15:17:07 2003

Name/Version Displayed: TPA Version 5.0

Comments: See Enclosed output

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: See enclosed listing.

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: dsfail.f
invent.f
mechfail.f

Comments: Contract reference incorrect. SCR # 444 opened to track change.

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:

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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?

Yes: ☑ No: ☐ N/A: ☐

Documented in Scientific Notebook No.: PA-SCR. 413

Comments: Code walkthrough of ITYM/μZFLOW 11/4/02
Results not published - closed meeting

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: Sun Operating Systems: Solaris 5.8

Location of Acceptance Test Results: PA-SCR. 344, 413, 428.

Comments:

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

Yes: ☑ No: ☐ N/A: ☐

Computer Platforms: PC, Sun Operating Systems: Windows NT, Solaris 5.8

Location of Acceptance Test Results: PC. See enclosed TAR v5.0 CD.
Sun - See enclosed output file.

Comments:

User Documentation [TOP-018, Section 5.5.7]

Is there a Users' Manual for the software and is it up-to-date?

Yes: ☑ No: ☑ N/A: ☐ 2/27/03

User's Manual Version and Date: 4.0 Jan 2002

Comments: Scheduled to be updated by end CY03.

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

Yes: ☑ No: ☐ N/A: ☐

Location of Instructions: User's Guide Chapter 21

Comments:

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: 2/27/03

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

Yes: ☑ No: ☐ N/A: ☐

Comments:

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: Enclosed CD & Tape

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: Enclosed CD & Tape

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: PA-SRN-292

Comments:

CENTER FOR NUCLEAR WASTE REGULATORY ANALYSES
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: 5.0, 2/27/03

Date Reviewed and Approved via QAP-002: 2/27/03

Comments:

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: Scheduled to be validated July 2003

Additional Comments:

Software Developer/Date 2-2-03

Software Custodian/Date 2-27/03

Main Header File


```
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 02-97-009 — 02-02-012 ← Identified & tracked via SCR 444.
c                                                   Rudy 2/27/03
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 Revisions:
c                       3.1.1     includes SPCRs 101 through 205
c                       3.1.2     includes SPCRs 206 through 224
c                       3.1.3     includes SPCRs 225 through 227
c                       3.1.4     includes SPCRs 228 through 231
c                       3.2       includes SPCRs 232 through 252
c                       3.2.1     3.2PCbeta port of 3.2 to PC running NT4
c                       3.2.2     3.2PVMbeta mod of 3.2.1 to enable PVM
c                       3.2.3     includes SCRs  260 through 271
c                       3.3       includes SCRs  272 through 278
c                          and    includes SCRs  280 through 287
c                       4.0       includes SCRs  288 through 313
c                       4.1       includes SCR   321 through 326
c                       4.1c      includes SCR   331 peak mean dose
c                       4.1d      includes SCR   332 tpameans.out & tpa.inp
c                       4.1e      changes to ChlorideMultFactor in tpa.inp only.
c                       4.1f      includes SCR   334 EPA groundwater bug fix.
c                       4.1g      includes SCR   336 Add MAI loss mode in uzflow.
c                       4.1h      includes SCR   335 Add checkpoint/restart.
c                       4.1i      includes SCR   337 Bug fix for icheckpointinp.
c                       4.1j      includes SCR   338 Increase max correlated var.
c                       4.1k      includes SCR   344-part A; Improve checkpoint p
erformance.
c                       4.2       includes SCR   344-part B; Add user option for
checkpoint.
c                       4.2a      includes SCR   387 Add lhs user distributions.
c                       4.2b      includes SCR   393 Remove last write of check.p
nt for good runs.
c                       4.2c      includes SCR   376 Add streamtube width multipl
ier.
c                       4.2d      includes SCR   348 Add DSFAIL standalone code.
c                       4.2e      includes SCR   373 Sample CHnv thickness.
c                       4.2f      includes SCR   382 New mass load & occupancy fa
ctors.
c                       4.2g      includes SCR   365 Add weld corrosion to failt.
c                       4.2h      includes SCR   395 Add drip shield data to appe
nd files.
c                       4.2i      includes SCR   374 Split UZ flow into fracture
& matrix.
c                       4.2j      includes SCR   327 Remove U and scaled values f
rom groundwater protection output files.
c                       4.2k      includes SCR   397 Add checkpoint/restart logic
 to DSFAIL.
c                       4.2l      includes SCRs 367,369,370,&396 Glass,cladding,
anddiffusion in releaset.
c                       4.2m      includes SCR   381 Use GENII to get DCFs for gr
ound surface dose.
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c                       4.2n      includes SCR   389 Pathway specific dose output
.
c                       4.2o      includes SCR   385 New seismo and mechfail modu
les.
c                       4.2p      includes SCR   377 Add time dependent velocitie
s to szft.
c                       4.2q      includes SCR   379 Use new plume capture model.
c                       4.2r      includes SCR   385 Minor bug fix for PC.
c                       4.2s      includes SCR   384 Add ash redistribution model
.
c                       4.2t      includes SCR   375 Add variable dispersivity in
 uzft.
c                       4.2u      includes SCR   398 Add near field chemistry tem
perature epochs.
c                       4.2v      includes SCR   386 Add one WP/temperature_cell
option.
c                       4.2w      includes SCR 399&408 Time dependent dilution vo
lume and szft bug fix.
c                       4.2x      includes SCR   371 Add Kd equations.
c                       4.2y      includes SCR   385 Mechfail backfill & drift de
gradation.
c                       4.2z      includes SCR   368 Add colloids.
c                       4.3       continuation of SCR385, mechfail.f bug fix.
c                       4.3a      continuation of SCR371 Add partial read of coef
kdeq.dat.
c                       4.3b      includes SCR   390 New runoff data files.
c                       4.3c      includes SCR   346 spatial variance for infiltr
ation.
c                       5.0beta   includes SCR   409 Change EPA file column headi
ng.
c                       5.0betaA  includes SCRs 415 & 416 Remove automatic arrays
.
c                       5.0betaB  includes SCR   371 Limit check Kd and Rd values
.
c                       5.0betaC  includes SCR   392 LF90 compiler warnings resol
ved.
c                       5.0betaD  includes SCR 400&410 Redefine percinfil based o
n a repository area of just the subareas selected.
c                       5.0betaE  includes SCR 411&412 Remove ds_fail_time & add
Rd checks.
c                       5.0betaF  includes SCR   414 New dsfailt, mechfail, and s
eismo2 suite.
c                       5.0betaG  includes SCR   417 Updates for Importance Analy
sis.
c                       5.0betaH  includes SCR   413 New data files from ITYM.
c                       5.0betaI  includes SCR   394 Add WP fill time to releaset
.
c                       5.0betaJ  includes SCR   368 continued.  bug fix for ebsn
ef2.dat in ebsrel.
c                       5.0betaK  includes SCR   418 New Log10 names for colloid
Rds.
c                       5.0betaL  includes SCR   392 Bug fix for ebsfilt.inp nucl
ide names.
c                       5.0betaM  includes SCR 420&421 New ebsfilt, and Ja243 cha
in change.
c                       5.0betaN  includes SCR   392 Bug fix for first realizatio
ns not equal to 1, and new chemistry data files.
c                       5.0betaO  includes SCR   420 EBSFILT bug fix and Rd error
 checks.
c                       5.0betaP  includes SCR   368 implementation bug fix for c
olloid parents.
c                       5.0betaQ  includes SCR   423 Use WP temperature instead o
f repository in failt.f.
c                       5.0betaR  includes SCR   419 Add permanent-loss colloid f
ilters for the UZ.
```

```
c                       5.0betaS  includes SCR   425 Bug fix for dcags 'direct re
lease only' file handler.
c                       5.0betaT  includes SCR   428 Add user temperature referen
ce point.
c                       5.0betaU  includes SCR 346(continued) Sample mode 3 is no
w referenced as 2.
c                       5.0betaV  includes SCR 439 Bug fix for initial colloid in
ventories.
c                       5.0betaW  includes SCR 422 Add new output to relcum.out (
WP fill time).
c                       5.0betaX  This version ID (betaX) was not used.
c                       5.0betaY  includes SCR 424 Add reversible colloids.
c                       5.0betaZ  includes SCR 440 Bug fix for ebsrel when writin
g ebsfilt.inp.
c                       5.0betaZa includes SCR 441 & 443 Bug fixes for szft collo
id rd parameter names and ebsfilt & uzft colloid filter factor.
c                       5.0       2-26-03
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
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 S. Mohanty, R. Janetzke, R. Rice, A. Lozano
c    R. Manteufel (initial version)
c
c rwe - SCR 335 - 02/23/01  added logic for checkpoint/restart
c                           operation, including calls to flush.
c=======================================================================
      program exec
c=======================================================================
c Executive for TPA Version 5.0
c Contact Person: : S. Mohanty
```

```
c
cc        1         2         3         4         5         6         7
cc345678901234567890123456789012345678901234567890123456789012345678901234567890
c
```

```
=====================================================================
          exec: Welcome to TPA Version 5.0
        Job started: Thu Feb 27 15:17:07 2003 ← OUTPUT
=====================================================================
 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 =     11 at time =      0.0 yr
  *** failed WPs:   11  out of   1455 ***
 exec: calling ebsrel
       ebsrel: running spent fuel waste form
                   Highest release rates from Sub Area  1
              Tc99    2.6710E-01 [Ci/yr/SA] at  7.551E+03 yr
```

```
              Ni59     4.3772E-02 [Ci/yr/SA] at  7.551E+03 yr
              C14      1.0542E-02 [Ci/yr/SA] at  7.376E+03 yr
              Cs135    9.7904E-03 [Ci/yr/SA] at  7.551E+03 yr
              Pb210    2.9391E-03 [Ci/yr/SA] at  1.000E+04 yr
              I129     6.5341E-04 [Ci/yr/SA] at  7.551E+03 yr
 exec: calling uzft
                       Highest release rates from UZ
              Tc99     2.6707E-01 [Ci/yr/SA] at  7.551E+03 yr
              Ni59     4.3663E-02 [Ci/yr/SA] at  7.551E+03 yr
              Cs135    9.7660E-03 [Ci/yr/SA] at  7.551E+03 yr
              Pb210    2.9332E-03 [Ci/yr/SA] at  1.000E+04 yr
              I129     6.5334E-04 [Ci/yr/SA] at  7.551E+03 yr
              Se79     4.9264E-04 [Ci/yr/SA] at  7.551E+03 yr
 exec: calling szft
                       Highest release rates from SZ
              Tc99     2.5540E-01 [Ci/yr/SA] at  8.490E+03 yr
              I129     6.2605E-04 [Ci/yr/SA] at  8.490E+03 yr
              Ni59     2.8533E-04 [Ci/yr/SA] at  1.000E+04 yr
              Cl36     1.9029E-04 [Ci/yr/SA] at  8.490E+03 yr
              Se79     9.6015E-05 [Ci/yr/SA] at  1.000E+04 yr
              Np237    4.0995E-05 [Ci/yr/SA] at  1.000E+04 yr
-----------------------------------------------------------------------
     subarea   2 of  10           realization    1 of    1
-----------------------------------------------------------------------
 exec: calling uzflow
 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 =     12 at time =      0.0 yr
  *** failed WPs:   12  out of   1568 ***
  *** ejected WPs:   0
 exec: calling ebsrel
       ebsrel: running spent fuel waste form
                   Highest release rates from Sub Area  2
              Tc99     1.8746E-02 [Ci/yr/SA] at  4.093E+03 yr
              I129     4.4751E-05 [Ci/yr/SA] at  5.184E+03 yr
              Se79     3.4605E-05 [Ci/yr/SA] at  4.093E+03 yr
              C14      2.5836E-05 [Ci/yr/SA] at  1.000E+04 yr
              Cl36     1.4178E-05 [Ci/yr/SA] at  4.093E+03 yr
              Ni59     1.3519E-05 [Ci/yr/SA] at  1.000E+04 yr
 exec: calling uzft
                       Highest release rates from UZ
              Tc99     1.8746E-02 [Ci/yr/SA] at  4.093E+03 yr
              I129     4.4751E-05 [Ci/yr/SA] at  5.184E+03 yr
              Se79     3.4605E-05 [Ci/yr/SA] at  4.093E+03 yr
              Cl36     1.4178E-05 [Ci/yr/SA] at  4.093E+03 yr
              Ni59     1.3518E-05 [Ci/yr/SA] at  1.000E+04 yr
              Ja241    2.1356E-06 [Ci/yr/SA] at  8.564E+01 yr
 exec: calling szft
                       Highest release rates from SZ
              Tc99     1.8385E-02 [Ci/yr/SA] at  4.499E+03 yr
              I129     4.7873E-05 [Ci/yr/SA] at  5.564E+03 yr
              Cl36     1.3944E-05 [Ci/yr/SA] at  4.499E+03 yr
              Se79     9.9624E-06 [Ci/yr/SA] at  7.551E+03 yr
              Ni59     2.2758E-08 [Ci/yr/SA] at  1.000E+04 yr
              Pu239    6.0087E-11 [Ci/yr/SA] at  1.000E+04 yr
-----------------------------------------------------------------------
     subarea   3 of  10           realization    1 of    1
-----------------------------------------------------------------------
 exec: calling uzflow
```

```
 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 =      6 at time =      0.0 yr
  *** failed WPs:   6  out of   775 ***
 exec: calling ebsrel
       ebsrel: running spent fuel waste form
                  Highest release rates from Sub Area  3
              Tc99    3.4474E-02 [Ci/yr/SA] at  4.093E+03 yr
              Ni59    5.7446E-03 [Ci/yr/SA] at  4.093E+03 yr
              C14     2.0338E-03 [Ci/yr/SA] at  4.093E+03 yr
              Cs135   1.2597E-03 [Ci/yr/SA] at  4.093E+03 yr
              Pb210   9.7139E-04 [Ci/yr/SA] at  1.000E+04 yr
              I129    8.3999E-05 [Ci/yr/SA] at  4.093E+03 yr
 exec: calling uzft
                      Highest release rates from UZ
              Tc99    3.4327E-02 [Ci/yr/SA] at  4.093E+03 yr
              Ni59    5.7194E-03 [Ci/yr/SA] at  4.093E+03 yr
              Cs135   1.2542E-03 [Ci/yr/SA] at  4.093E+03 yr
              Pb210   9.6887E-04 [Ci/yr/SA] at  1.000E+04 yr
              I129    8.3642E-05 [Ci/yr/SA] at  4.093E+03 yr
              Ra226   6.6474E-05 [Ci/yr/SA] at  1.000E+04 yr
 exec: calling szft
                      Highest release rates from SZ
              Tc99    3.2767E-02 [Ci/yr/SA] at  5.434E+03 yr
              I129    7.9823E-05 [Ci/yr/SA] at  5.434E+03 yr
              Ni59    5.3734E-05 [Ci/yr/SA] at  1.000E+04 yr
              Cl36    2.4537E-05 [Ci/yr/SA] at  5.434E+03 yr
              Np237   1.8573E-05 [Ci/yr/SA] at  1.000E+04 yr
              Se79    1.5111E-05 [Ci/yr/SA] at  1.000E+04 yr
-----------------------------------------------------------------------
     subarea   4 of  10           realization    1 of    1
-----------------------------------------------------------------------
 exec: calling uzflow
 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 =      3 at time =      0.0 yr
  *** failed WPs:   3  out of   426 ***
 exec: calling ebsrel
       ebsrel: running spent fuel waste form
                  Highest release rates from Sub Area  4
              Tc99    5.0733E-03 [Ci/yr/SA] at  2.665E+03 yr
              I129    1.6833E-05 [Ci/yr/SA] at  9.543E+03 yr
              Se79    1.2874E-05 [Ci/yr/SA] at  7.914E+03 yr
              Cl36    5.1805E-06 [Ci/yr/SA] at  7.914E+03 yr
              Ja241   5.3460E-07 [Ci/yr/SA] at  8.564E+01 yr
              Jc245   1.1550E-07 [Ci/yr/SA] at  8.564E+01 yr
 exec: calling uzft
                      Highest release rates from UZ
              Tc99    5.0709E-03 [Ci/yr/SA] at  2.665E+03 yr
              I129    1.6837E-05 [Ci/yr/SA] at  9.543E+03 yr
              Se79    1.2886E-05 [Ci/yr/SA] at  7.914E+03 yr
              Cl36    5.1819E-06 [Ci/yr/SA] at  7.914E+03 yr
              Ja241   5.2839E-07 [Ci/yr/SA] at  8.564E+01 yr
```

```
              Jc245   1.1416E-07 [Ci/yr/SA] at  8.564E+01 yr
 exec: calling szft
                      Highest release rates from SZ
              Tc99    5.1282E-03 [Ci/yr/SA] at  3.466E+03 yr
              I129    1.7054E-05 [Ci/yr/SA] at  7.551E+03 yr
              Se79    6.1255E-06 [Ci/yr/SA] at  9.323E+03 yr
              Cl36    5.6387E-06 [Ci/yr/SA] at  7.551E+03 yr
              Pu239   1.4323E-11 [Ci/yr/SA] at  1.000E+04 yr
              Pu240   9.3236E-12 [Ci/yr/SA] at  1.000E+04 yr
-----------------------------------------------------------------------
     subarea   5 of  10          realization    1 of    1
-----------------------------------------------------------------------
 exec: calling uzflow
 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 =      6 at time =      0.0 yr
  *** failed WPs:   6  out of   760 ***
 exec: calling ebsrel
       ebsrel: running spent fuel waste form
                 Highest release rates from Sub Area  5
              Tc99    1.0597E-03 [Ci/yr/SA] at  1.048E+03 yr
              C14     4.0817E-04 [Ci/yr/SA] at  7.731E+01 yr
              Ja241   1.9449E-04 [Ci/yr/SA] at  7.731E+01 yr
              Am241   1.9449E-04 [Ci/yr/SA] at  7.731E+01 yr
              Ni59    1.7655E-04 [Ci/yr/SA] at  1.048E+03 yr
              Cs135   9.3380E-05 [Ci/yr/SA] at  7.731E+01 yr
 exec: calling uzft
                      Highest release rates from UZ
              Tc99    1.0536E-03 [Ci/yr/SA] at  1.048E+03 yr
              Ja241   1.9325E-04 [Ci/yr/SA] at  7.731E+01 yr
              Am241   1.9325E-04 [Ci/yr/SA] at  7.731E+01 yr
              Ni59    1.7544E-04 [Ci/yr/SA] at  1.048E+03 yr
              Cs135   9.2785E-05 [Ci/yr/SA] at  7.731E+01 yr
              Np237   2.3479E-05 [Ci/yr/SA] at  1.000E+04 yr
 exec: calling szft
                      Highest release rates from SZ
              Tc99    8.8508E-04 [Ci/yr/SA] at  1.854E+03 yr
              Np237   1.7126E-05 [Ci/yr/SA] at  1.000E+04 yr
              Ni59    2.3024E-06 [Ci/yr/SA] at  1.000E+04 yr
              I129    2.1740E-06 [Ci/yr/SA] at  1.854E+03 yr
              Cl36    6.9040E-07 [Ci/yr/SA] at  1.854E+03 yr
              Se79    4.7432E-07 [Ci/yr/SA] at  7.551E+03 yr
-----------------------------------------------------------------------
     subarea   6 of  10          realization    1 of    1
-----------------------------------------------------------------------
 exec: calling uzflow
 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 =      7 at time =      0.0 yr
  *** failed WPs:   7  out of   851 ***
 exec: calling ebsrel
       ebsrel: running spent fuel waste form
                 Highest release rates from Sub Area  6
```

```
              Tc99     1.2818E-02 [Ci/yr/SA] at  8.293E+03 yr
              Se79     2.3638E-05 [Ci/yr/SA] at  8.293E+03 yr
              Jc245    1.6424E-05 [Ci/yr/SA] at  1.000E+04 yr
              I129     1.1495E-05 [Ci/yr/SA] at  1.000E+04 yr
              Cl36     9.4731E-06 [Ci/yr/SA] at  8.293E+03 yr
              Ja243    4.7880E-06 [Ci/yr/SA] at  1.000E+04 yr
 exec: calling uzft
                       Highest release rates from UZ
              Tc99     1.2756E-02 [Ci/yr/SA] at  8.293E+03 yr
              Se79     2.3522E-05 [Ci/yr/SA] at  8.293E+03 yr
              Jc245    1.6401E-05 [Ci/yr/SA] at  1.000E+04 yr
              I129     1.1452E-05 [Ci/yr/SA] at  1.000E+04 yr
              Cl36     9.4266E-06 [Ci/yr/SA] at  8.293E+03 yr
              Ja243    4.7811E-06 [Ci/yr/SA] at  1.000E+04 yr
 exec: calling szft
                       Highest release rates from SZ
              Tc99     1.1624E-02 [Ci/yr/SA] at  8.691E+03 yr
              Cl36     8.5891E-06 [Ci/yr/SA] at  8.691E+03 yr
              I129     6.3791E-06 [Ci/yr/SA] at  1.000E+04 yr
              Se79     4.2452E-06 [Ci/yr/SA] at  1.000E+04 yr
              Pu239    1.9517E-09 [Ci/yr/SA] at  1.000E+04 yr
              Pu240    1.2684E-09 [Ci/yr/SA] at  1.000E+04 yr
-----------------------------------------------------------------------
     subarea   7 of  10           realization    1 of    1
-----------------------------------------------------------------------
 exec: calling uzflow
 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 =      3 at time =      0.0 yr
  *** failed WPs:   3  out of   323 ***
 exec: calling ebsrel
       ebsrel: running spent fuel waste form
                  Highest release rates from Sub Area  7
              Tc99     5.8041E-03 [Ci/yr/SA] at  9.543E+03 yr
              Se79     1.0857E-05 [Ci/yr/SA] at  9.543E+03 yr
              Jc245    6.2492E-06 [Ci/yr/SA] at  1.000E+04 yr
              Cl36     4.4047E-06 [Ci/yr/SA] at  9.543E+03 yr
              Ja243    1.8215E-06 [Ci/yr/SA] at  1.000E+04 yr
              I129     7.7808E-07 [Ci/yr/SA] at  8.293E+03 yr
 exec: calling uzft
                       Highest release rates from UZ
              Tc99     5.7778E-03 [Ci/yr/SA] at  9.543E+03 yr
              Se79     1.0809E-05 [Ci/yr/SA] at  9.543E+03 yr
              Jc245    6.2314E-06 [Ci/yr/SA] at  1.000E+04 yr
              Cl36     4.3848E-06 [Ci/yr/SA] at  9.543E+03 yr
              Ja243    1.8163E-06 [Ci/yr/SA] at  1.000E+04 yr
              I129     7.7842E-07 [Ci/yr/SA] at  8.293E+03 yr
 exec: calling szft
                       Highest release rates from SZ
              Tc99     5.2752E-03 [Ci/yr/SA] at  1.000E+04 yr
              Cl36     4.0011E-06 [Ci/yr/SA] at  1.000E+04 yr
              Se79     1.1293E-06 [Ci/yr/SA] at  1.000E+04 yr
              I129     8.1083E-07 [Ci/yr/SA] at  7.551E+03 yr
              Pu239    2.2307E-10 [Ci/yr/SA] at  1.000E+04 yr
              Pu240    1.3799E-10 [Ci/yr/SA] at  1.000E+04 yr
-----------------------------------------------------------------------
     subarea   8 of  10           realization    1 of    1
-----------------------------------------------------------------------
 exec: calling uzflow
```

```
 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 =      7 at time =      0.0 yr
  *** failed WPs:   7  out of   846 ***
 exec: calling ebsrel
       ebsrel: running spent fuel waste form
                  Highest release rates from Sub Area  8
               Tc99    1.0535E-01 [Ci/yr/SA] at  7.205E+03 yr
               Ni59    1.7052E-02 [Ci/yr/SA] at  7.730E+03 yr
               C14     4.2456E-03 [Ci/yr/SA] at  7.205E+03 yr
               Cs135   3.8450E-03 [Ci/yr/SA] at  7.205E+03 yr
               Pb210   1.3219E-03 [Ci/yr/SA] at  1.000E+04 yr
               I129    2.5659E-04 [Ci/yr/SA] at  7.205E+03 yr
 exec: calling uzft
                       Highest release rates from UZ
               Tc99    1.0535E-01 [Ci/yr/SA] at  7.205E+03 yr
               Ni59    1.7052E-02 [Ci/yr/SA] at  7.730E+03 yr
               Cs135   3.8449E-03 [Ci/yr/SA] at  7.205E+03 yr
               Pb210   1.3208E-03 [Ci/yr/SA] at  1.000E+04 yr
               I129    2.5659E-04 [Ci/yr/SA] at  7.205E+03 yr
               Se79    1.9393E-04 [Ci/yr/SA] at  7.205E+03 yr
 exec: calling szft
                       Highest release rates from SZ
               Tc99    9.8989E-02 [Ci/yr/SA] at  8.293E+03 yr
               I129    2.4167E-04 [Ci/yr/SA] at  8.293E+03 yr
               Ni59    1.2219E-04 [Ci/yr/SA] at  1.000E+04 yr
               Cl36    7.3172E-05 [Ci/yr/SA] at  8.101E+03 yr
               Se79    4.0263E-05 [Ci/yr/SA] at  1.000E+04 yr
               Np237   1.6810E-05 [Ci/yr/SA] at  1.000E+04 yr
-----------------------------------------------------------------------
     subarea   9 of  10           realization    1 of    1
-----------------------------------------------------------------------
 exec: calling uzflow
 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 =      8 at time =      0.0 yr
  *** failed WPs:   8  out of   977 ***
 exec: calling ebsrel
       ebsrel: running spent fuel waste form
                  Highest release rates from Sub Area  9
               Tc99    9.9143E-03 [Ci/yr/SA] at  1.562E+03 yr
               C14     8.5117E-04 [Ci/yr/SA] at  1.487E+03 yr
               Cs135   3.7482E-04 [Ci/yr/SA] at  1.524E+03 yr
               Ni59    1.2952E-04 [Ci/yr/SA] at  1.809E+02 yr
               I129    2.4977E-05 [Ci/yr/SA] at  1.524E+03 yr
               Se79    1.8940E-05 [Ci/yr/SA] at  1.524E+03 yr
 exec: calling uzft
       *** NEFTRAN is skipped for this UZ path since no layers have significant
ground water travel time. ***
                       Highest release rates from UZ
               Tc99    9.9143E-03 [Ci/yr/SA] at  1.562E+03 yr
               Cs135   3.7482E-04 [Ci/yr/SA] at  1.524E+03 yr
               Ni59    1.2952E-04 [Ci/yr/SA] at  1.809E+02 yr
```

```
              I129     2.4977E-05 [Ci/yr/SA] at  1.524E+03 yr
              Se79     1.8940E-05 [Ci/yr/SA] at  1.524E+03 yr
              Cl36     8.1962E-06 [Ci/yr/SA] at  1.524E+03 yr
 exec: calling szft
                       Highest release rates from SZ
              Tc99     9.3518E-03 [Ci/yr/SA] at  2.251E+03 yr
              I129     2.3565E-05 [Ci/yr/SA] at  2.198E+03 yr
              Cl36     7.7089E-06 [Ci/yr/SA] at  2.198E+03 yr
              Se79     3.7923E-06 [Ci/yr/SA] at  5.564E+03 yr
              Ni59     1.5924E-06 [Ci/yr/SA] at  1.000E+04 yr
              Cs135    6.8467E-07 [Ci/yr/SA] at  1.000E+04 yr
-----------------------------------------------------------------------
     subarea  10 of  10          realization    1 of    1
-----------------------------------------------------------------------
 exec: calling uzflow
 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 =      7 at time =      0.0 yr
  *** failed WPs:   7  out of   896 ***
 exec: calling ebsrel
       ebsrel: running spent fuel waste form
                   Highest release rates from Sub Area  10
              Tc99     1.0572E-02 [Ci/yr/SA] at  3.305E+03 yr
              C14      8.7477E-05 [Ci/yr/SA] at  1.000E+04 yr
              Ni59     3.0286E-05 [Ci/yr/SA] at  1.000E+04 yr
              I129     2.6232E-05 [Ci/yr/SA] at  4.499E+03 yr
              Se79     2.0116E-05 [Ci/yr/SA] at  3.635E+03 yr
              Cl36     8.3510E-06 [Ci/yr/SA] at  3.549E+03 yr
 exec: calling uzft
                       Highest release rates from UZ
              Tc99     1.0572E-02 [Ci/yr/SA] at  3.305E+03 yr
              Ni59     3.0285E-05 [Ci/yr/SA] at  1.000E+04 yr
              I129     2.6232E-05 [Ci/yr/SA] at  4.499E+03 yr
              Se79     2.0116E-05 [Ci/yr/SA] at  3.635E+03 yr
              Cl36     8.3510E-06 [Ci/yr/SA] at  3.549E+03 yr
              Ja241    1.2460E-06 [Ci/yr/SA] at  8.564E+01 yr
 exec: calling szft
                       Highest release rates from SZ
              Tc99     1.1217E-02 [Ci/yr/SA] at  3.549E+03 yr
              I129     2.5864E-05 [Ci/yr/SA] at  4.830E+03 yr
              Cl36     8.8032E-06 [Ci/yr/SA] at  3.549E+03 yr
              Se79     5.5931E-06 [Ci/yr/SA] at  7.551E+03 yr
              Ni59     8.6058E-08 [Ci/yr/SA] at  1.000E+04 yr
              Pu239    5.6533E-11 [Ci/yr/SA] at  1.000E+04 yr
 exec: calling dcagw
                       Highest annual dose GW pathway
              Tc99     2.5547E-01 [mrem/yr]  at  8.490E+03 yr
              Np237    1.7647E-01 [mrem/yr]  at  1.000E+04 yr
              I129     1.1741E-01 [mrem/yr]  at  8.293E+03 yr
              Pb210    1.0126E-03 [mrem/yr]  at  1.000E+04 yr
              Se79     7.0556E-04 [mrem/yr]  at  1.000E+04 yr
              Cl36     4.7996E-04 [mrem/yr]  at  8.490E+03 yr
            At end of TPI, annual dose GW pathway
              Tc99     2.2307E-01 [mrem/yr]
              Np237    1.7647E-01 [mrem/yr]
              I129     1.0319E-01 [mrem/yr]
              Pb210    1.0126E-03 [mrem/yr]
              Se79     7.0556E-04 [mrem/yr]
              Cl36     4.1383E-04 [mrem/yr]
```

```
                sum  5.0580E-01 [mrem/yr]
 exec: end realizations

 exec: Peak Mean Dose is 5.05800E-04 rem/yr at  10000.0 yr, based on     1 reali
zations.

 exec:  Run Successfully Completed
```

Installation test.
2/27/03
Rand Fuhl

```
tpa50/
tpa50/CLEANUP
tpa50/array.f
tpa50/ashplumo.f
tpa50/ashrmovo.f
tpa50/condxyzt.f
tpa50/coefkdeq.i
tpa50/dcags.f
tpa50/dcagw.f
tpa50/dsfail.f
tpa50/ebsfail.f
tpa50/ebsrel.f
tpa50/ebsrel1.i
tpa50/exec.f
tpa50/execа.i
tpa50/execb.i
tpa50/execc.i
tpa50/execd.i
tpa50/faulto.f
tpa50/fileunit.f
tpa50/findelev.f
tpa50/invent.f
tpa50/iareader.f
tpa50/ia.i
tpa50/ia1.i
tpa50/Makefile
tpa50/Makefile4.2
tpa50/max500yr.i
tpa50/maxchain.i
tpa50/maxnnucl.i
tpa50/maxclchn.i
tpa50/maxclnuc.i
tpa50/maxnsuba.i
tpa50/maxntime.i
tpa50/mv.f
tpa50/nfenv.f
tpa50/nfenvadj.i
tpa50/reflux2.i
tpa50/nintv.i
tpa50/notice.i
tpa50/numrecip.f
tpa50/path.i
tpa50/peakfind.f
tpa50/ran.f
tpa50/reader.f
tpa50/reader.i
tpa50/reader1.i
tpa50/reader2.i
tpa50/reader3.i
tpa50/reader4.i
tpa50/driftsa.i
tpa50/sampler.f
tpa50/seismo2.f
tpa50/seisadj.i
tpa50/stop.i
tpa50/subarea.f
tpa50/szft.f
tpa50/szft.i
tpa50/tpa.inp
tpa50/uzflow.f
tpa50/uzft.f
tpa50/uzszft.i
tpa50/volcano.f
tpa50/fu1.i
tpa50/fu2.i
```

```
tpa50/invent_.i
tpa50/inventa.i
tpa50/inventb.i
tpa50/inventc.i
tpa50/inventd.i
tpa50/invente.i
tpa50/inventf.i
tpa50/inventg.i
tpa50/inventh.i
tpa50/inventi.i
tpa50/inventj.i
tpa50/inventk.i
tpa50/inventl.i
tpa50/inventm.i
tpa50/inventn.i
tpa50/invento.i
tpa50/inventp.i
tpa50/mva.i
tpa50/mvb.i
tpa50/mvc.i
tpa50/mvd.i
tpa50/mve.i
tpa50/mvf.i
tpa50/sampler0.i
tpa50/sampler1.i
tpa50/sampler2.i
tpa50/sampler3.i
tpa50/sampler4.i
tpa50/samplera.i
tpa50/samplerb.i
tpa50/samplerc.i
tpa50/samplerd.i
tpa50/samplere.i
tpa50/samplerf.i
tpa50/samplerg.i
tpa50/samplerh.i
tpa50/sampleri.i
tpa50/samplerj.i
tpa50/samplerk.i
tpa50/samplerl.i
tpa50/samplerm.i
tpa50/codes/
tpa50/codes/Makefile
tpa50/codes/Makefile4.2
tpa50/codes/README
tpa50/codes/SIZES.INC
tpa50/codes/SIZES2.INC
tpa50/codes/ashplume.f
tpa50/codes/failt.f
tpa50/codes/failtadj.i
tpa50/codes/dsfailt.f
tpa50/codes/nefmks.f
tpa50/codes/releaset.f
tpa50/codes/snllhs.f
tpa50/codes/lhs1.i
tpa50/codes/lhs2.i
tpa50/codes/lhs3.i
tpa50/codes/lhs4.i
tpa50/codes/lhs5.i
tpa50/codes/lhs6.i
tpa50/codes/lhs7.i
tpa50/codes/lhs8.i
tpa50/codes/ebsfilt.f
tpa50/codes/integrt.f
tpa50/codes/linintrp.f
```

```
tpa50/codes/srchpos.f
tpa50/codes/weldfail.f
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SOFTWARE VALIDATION TEST PLAN FOR THE TOTAL-SYSTEM PERFORMANCE ASSESSMENT VERSION 5.0 CODE

Prepared for

U.S. Nuclear Regulatory Commission
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ABSTRACT

This software validation test plan describes functional tests that will be conducted to validate the executive module of the Total-system Performance Assessment (TPA) Version 5.0 code as well as a suite of system-level software validation tests that assess the ability of the TPA Version 5.0 code to correctly compute overall risk estimates for other high-level waste disposal systems. Although a certain level of software validation has been performed at the completion of each major revision of the TPA code, these validation efforts were not formalized. Because the TPA Version 5.0 code is likely to be used during the U.S. Nuclear Regulatory Commission (NRC) review of the U.S. Department of Energy license application for a potential repository at Yucca Mountain, this test plan describes both the formal process for systematically testing the validity of the software as well as a limited set of model validation tests whose successful completion will demonstrate that the TPA code is suited for its intended application.

Because there is no single, generally accepted approach for validating software, like the TPA code, which simulates diverse coupled natural processes over time periods of tens of thousands of years, the validation tests will be conducted in phases so that knowledge gained in the execution of earlier phases can be used to improve the robustness and utility of the tests performed in the later phases. Three different phases will be executed for the completion of the validation exercise. Phase I focuses primarily on tests that will provide confidence that the software computes correctly. Phase II involves function-level tests that provide confidence that the model provide reasonable results. Phase III involves comparison of system code with other system codes. All Phase I activities and most of the Phase II activities are expected to be completed by the time of the final delivery of the TPA Version 5.0 code to the NRC in July 2003. Phase III activities will be initiated after July 2003.

This plan also considers the software validation of computer codes that are used by various key technical issue staff to provide inputs to the TPA code and contains tests proposed by those key technical issue staff that were involved in the development of the abstracted models in the TPA Version 5.0 code.

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QUALITY OF DATA, ANALYSES, AND CODE DEVELOPMENT

DATA: No new data were used in the preparation of this document.

ANALYSES AND CODES: No computer codes were used in the preparation of this document.

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1 SCOPE OF VALIDATION

1.1 Introduction

The U.S. Nuclear Regulatory Commission (NRC) with assistance from the Center for Nuclear Waste Regulatory Analyses (CNWRA) has developed the Total-System Performance Assessment (TPA) Version 5.0 code to be used by the staff to assist their review of the license application for the disposal of high-level waste at Yucca Mountain, Nevada. Because of the important role played by the TPA code, it must be tested prior to the receipt of any license application to ensure that it is reliable and suitable for its intended use. This report presents a test plan whose successful execution will produce the information needed to demonstrate that the TPA Version 5.0 code functions properly and is suited for use in the NRC review of any license application for the Yucca Mountain high-level waste repository.

Software validation is a quality assurance process that ensures the ability of software to meet its intended function by demonstrating that results produced by the software are consistent with specified design requirements. Examples of software validation methods include inspection of source code and quantitative evaluation of implemented mathematical algorithms. The process generally involves the execution of a set of tests constructed and implemented by staff who were not directly involved with the development of the software. This independence helps to ensure that unstated, tacit assumptions made by the developers do not influence the evaluation of test results. A failed validation test may be indicative of problems with the software or with the documentation of the software or with both. A successful validation test, therefore, is one where (i) the software performs as intended and (ii) there are no ambiguities or deficiencies in the documentation of how the code was intended to function.

Several versions of the TPA code have been released since IPA Phase II (Wescott, et al., 1995). Major releases include TPA Versions 3.1.4 (Mohanty and McCartin, 1998a), 3.2 (Mohanty and McCartin, 1998b), 4.0 (Mohanty, et al., 2002a), and 5.0, which remains under development. Each major modification involved substantial changes to the fundamental conceptual models, algorithms implementing the conceptual models, and the sampling strategies used to propagate uncertainty and variability. Each version of the code was checked at the end of its development cycle for reasonableness and computational correctness before being used for system-level or process-level analyses. Subsequent to the completion of three major revisions to the TPA code since IPA Phase II, detailed sensitivity analysis activities were conducted that exercised most of the capabilities built into the TPA code. The TPA Version 3.1.4 code was used to conduct system-level as well as process-level sensitivity analyses (NRC, 1999), while the TPA Version 3.2 and TPA Version 4.1 codes were used only to conduct system-level analyses (Mohanty, et al., 1999; Mohanty, et al., 2002b). Several groups of staff from other key technical issues have exercised various versions of the TPA code to improve their understanding of the risk significance of specific features, events, and processes. In addition, sensitivity analyses conducted by Total System Performance Assessment Integration staff and staff from other key technical issues have used the TPA code to perform process-level sensitivity analyses and specialized analyses to support review comments on the Total System Performance Assessment–Viability Assessment (CRWMS M&O, 1998) and Total System Performance Assessment–Site Recommendation (CRWMS M&O, 2001). In addition, an external review group evaluated the models used in the TPA code Version 3.2 code and the corresponding sensitivity analysis

report. These activities in combination have effectively subjected the TPA code to a fairly stringent examination of the TPA code's ability to produce reasonable results for the conditions of interest at Yucca Mountain. Additional scrutiny of the TPA code has been received by publishing the results from these studies in conference proceedings and in peer-review journals. In spite of all these activities, the validation results have not been formally documented. The goal of the TPA code validation test plan is to formalize the tests that will permit formal documentation of results in a manner that make users and reviewers confident that the TPA code computes correctly and is suitable for its intended application.

Because there is no single, generally accepted approach for validating software, such as the TPA Version 5.0 code, which simulates complex coupled natural processes over periods of tens of thousands of years, the validation tests will be conducted in phases so that knowledge gained in the execution of earlier phases can be used to improve the robustness and utility of the tests performed in the later phases. Three different test phases will be conducted to complete the validation exercise. Phase I focuses primarily on function tests that will provide confidence that the software computes correctly. Phase II involves function-level tests that provide confidence that the models are providing sensible results. Phase III involves comparison of the overall results for the TPA Version 5.0 code with other system codes. All Phase I activities and most of Phase II activities will be completed by the time of the final delivery of the TPA Version 5.0 code to the NRC in July of 2003. Phase III activities will be initiated after July 2003.

1.2 Scope of Validation Tests

This plan outlines two broad classes of software validation tests: (i) function tests and (ii) system tests—the function tests are further divided into those for (i) the TPA executive, (ii) the consequence modules, and (iii) the stand-alone codes.

1.2.1 Function Tests

Function tests evaluate the major components of the TPA code to demonstrate that the selected components produce the correct output, given specified input. For instance, validation of an algorithm that simulates the equations for radionuclide ingrowth and decay would require data on half-lives and initial inventories of radionuclides and involve an independent computational method to determine whether time-dependent inventories are properly calculated in the TPA code.

The TPA Version 5.0 code consists of an executive with several general purpose utilities and a set of consequence modules, some of which spawn the execution of external codes used to simulate specific physical processes.

- The executive provides the probabilistic simulation framework. It samples values of input parameters from specified probability distributions, directs the transfer of these input values and other intermediate data to the consequence modules and controls the generation of output files. The executive also includes a set of utilities that perform functions, such as creating a sequence of input parameter values based on Latin Hypercube or Monte Carlo sampling strategies or calculating the intersection points of a line with a quadrilateral.

- The consequence modules simulate processes and events that could affect the performance of a disposal facility. They are invoked sequentially and use information supplied by the executive consisting of sampled values for input parameters and (possibly) intermediate data provided by a prior consequence module. The consequence modules also pass results back to the executive, such as information required by a subsequent module or estimates of total system performance.

- The TPA code makes use of several external or stand-alone codes that have been developed to simulate specialized processes, such as transport of radionuclides through variably saturated media. Each stand-alone code is invoked by a consequence module or the TPA executive but runs separately from TPA. Data are transferred through intermediate files. For example, a consequence module may first create a file containing the input data required by a stand-alone code and then read an output file created by the stand-alone code. Several stand-alone codes (e.g., NEFTRAN and GENII) are well-established computer codes. Other stand-alone codes were developed by the CNWRA and NRC staff. Some of these stand-alone codes have already undergone their own software validation tests and may not require additional testing. However, validation of the TPA Version 5.0 code will include examination of the modifications of the codes for TPA-specific applications. This many involve inspection of intermediate files to ensure their contents are as expected and that data are correctly transferred between the TPA code and the stand-alone codes.

1.2.2 System Tests

System tests deal with the software as a whole and combine traditional software validation with additional tests to assess the reasonableness of risk estimates obtained from the TPA code. The tests described here involve the use of TPA to replicate existing studies that have been thoroughly documented and reviewed. It is desirable to examine studies conducted by organizations in other countries to enhance the independent aspect of software validation. System tests will require adaptation of the input data for TPA to describe as closely as possible the conditions pertaining to an existing study. These conditions will be somewhat different from the conditions for which TPA has been developed; however, a successful software validation test will lend confidence in the ability of TPA to deal with safety assessments over long time frames.

1.2.3 Range of Input Data

TPA accounts for uncertainty in model parameters following a probabilistic approach. It simulates performance for multiple realizations in which a parameter may be assigned any value from its prescribed probability distribution function. Accordingly, function tests need to examine a full range of feasible input data to examine the robustness of the software as well as its accuracy.

In many instances, it may be sufficient to examine extreme and central values; however, parameter and state values that effect conditional states, which may invoke different internal algorithms, also need to be tested. Algorithms that rely on temporal or spatial discretization may need special care to ensure convergence occurs for all feasible combinations of input data.

In other instances, such as when an output variable is a function of many input parameters (some of which may be correlated), it may be necessary to examine a set of randomly sampled values. These cases include function tests of consequence modules which rely on results generated by one or more previous consequence modules. Such tests might need to examine random sets of results computed by the prior consequences modules.

Finally, the TPA Version 5.0 code will be tested to ensure that invalid data are properly identified and displayed. Some data values may be disallowed for physical reasons (e.g., negative half-lives for radionuclides), other data may be disallowed because of numerical restrictions imposed in the algorithm (e.g., time step size.)

1.3 Test Guidelines

1.3.1 Test Participants

To make the testing as objective as possible, validation tests should be defined by technically qualified staff who have not been not been directly involved with the development of the code being tested. Function tests will require participants with expertise in statistics, computer programming and numerical analysis. Function tests involving stand-alone codes may require specialists or access to specialized code or analytical tools. Each system test will require personnel familiar with the selected system studies. Staff familiar with the overall scope of the tests should review each test to ensure it is complete and comprehensive. These staff may also prepare summary reports.

1.3.2 Input Data and Simulation Results from TPA

All tests will require access to the input data used by TPA. Most tests will require access to intermediate or final results generated by TPA. TPA code simulation will be carried out by developers of the TPA code, following the specifications provided by those who developed the tests.

1.3.3 Documents Describing TPA

The primary source for the theoretical background and functional requirements, as well as the design of the TPA code is "Total-System Performance Assessment (TPA) Version 4.0 Code: Module Descriptions and User's Guide" (Mohanty, et al., 2002a). The Software Requirement Description (SRD) (Janetzke, et al., 2002) is the primary source of information on the changes made to the TPA Version 4.0 (Version 4.1j, in particular) which have led to the TPA Version 5.0 code. Other information may be taken from documents referenced in the user's guide.

In some instances, resolution of uncertainties and ambiguities might require direct examination of the TPA source code. Because this action may undermine the objectivity of the software validation test, it should be noted in the test report.

1.3.4 Acceptance Criteria

The credibility of a software validation test will be enhanced if criteria are defined a *priori* as to what constitutes success. A test will be considered successful if these criteria are met or if discrepancies can be fully explained.

Acceptance criteria may be qualitative or quantitative depending on the nature and purpose of the test. An example of a qualitative criterion is conformance of the source code to established good programming standards. An example of a quantitative criterion is the relative magnitude of the difference obtained by comparing the numerical results from an independent source to the results produced by the TPA code. For this software validation exercise, a difference of 10 percent or less is generally acceptable unless otherwise stated. This criterion may be relaxed if rounding errors in the calculated numbers from the independent source are excessive.

Most of the function tests will use quantitative criteria. The system tests will involve only qualitative criteria because of differences in waste disposal concepts and processes simulated, as well as in the associated codes used to assess the systems. Examples of qualitative criteria include (i) agreement in the relative effectiveness of the engineered barriers, (ii) typical time delays offered by the geosphere transport pathways and (iii) the identification of key radionuclides and important biosphere pathways.

1.3.5 Test Reports

Each test will be identified in a software test form and the results of the test will be described in a self-contained document, preferably following a common layout. These documents will be attached to the software test form and will be submitted to quality assurance records. Each test report will include the following items:

- The title of the test with date and participants
- Overall purpose with description of or reference to the underlying theory and reference to the sources of information used to conduct the test
- Overview of the scope of the test
- Description of (and justification for) the methodology used
- Statement on the expected results from TPA and criteria used to judge success
- Identification of input data used
- Detailed discussion of the implementation, analysis, and conclusions of the test

The conclusions should state clearly whether the test has met its criteria and whether additional testing is recommended. A summary report would provide an overview of the conclusions from the test reports.

1.3.6 Repetition of Tests

Tests with quantitative criteria should be designed to be easily repeatable to simplify retesting if an uncovered deficiency was subsequently corrected. In addition, repeatable tests will facilitate software validation of future versions of TPA.

A test can be made repeatable by augmenting the test report with a complete set of input data and results, copies of spreadsheets and related analytical tools, and references to other codes and their input files used in the test.

2 ENVIRONMENT

2.1 Software

The software to be tested in the validation procedure is the TPA Version 5.0 code, including the executive and all of its subroutines and function subprograms, as well as the following auxiliary codes: ASHPLUME, DSFAILT, EBSFILT, ENV, ENVIN, FAILT, MECHFAIL, NEFMKS, RELEASET, an SNLLHS. A complete listing of the executive subprograms appears in Appendix A. The programs will be compiled using the Sun Microsystems, Inc. SUNWspro FORTRAN Version 4.2 compiler.

The number of source code and include files used to construct the TPA Version 5.0 code exceeds 190 and the number of output files generated by the TPA Version 5.0 code and its associated auxiliary codes exceeds 45, therefore, the names of these files are not listed here. Each test participant will be provided with an addendum listing the names and locations of files relevant to the test that they are required to execute.

2.2 Hardware

All software validation tests will be performed on Sun Microsystems, Inc. computers using Sun Sparc processors running the SunOS Version 5.8 operating system. Specific computers to be used at the CNWRA include the Sun_Fire 280R system, which has 10 Sun ultra Sparc - III CPUs running at 750 MHz, and the Sun_Fire V880 system, which has 8 Sun ultra Sparc - IIIi CPUs running at 1000 MHz.

3 PREREQUISITES

All participants in this software validation procedure will be provided access to an official copy of the TPA Version 5.0 code. The test participant will compile the code using the make file supplied with the code, which invokes the Sun Microsystems, Inc. SUNWspro FORTRAN Version 4.2 compiler (*Makefile4.2*). The test participant must set the environment variables at the UNIX prompt as follows:

```
setenv TPA_DATA $HOME/current_code
setenv TPA_TEST $HOME/current_code
```

Where `current_code` is the directory containing the official copy of the TPA Version 5.0 code provided to the test participant.

4 ASSUMPTIONS AND CONSTRAINTS

There are a number of restrictions that all participants in the software validation testing will be required to adhere to. Currently, only four restrictions have been identified; however, it is likely that others will be identified once testing begins. Current software validation test restrictions include:

- TPA simulation times must be less than or equal to 100,000 years.
- Functional tests of utility and consequence modules will not be conducted in full Monte Carlo mode.
- Interface to the TPA code will be through ASCII text output files and not through graphs or plots.
- No software validation testing will be conducted using Intel-based personal computers.

5 TEST CASES

The function tests described in Sections 5.1, 5.2, and 5.3 and the system tests described in Section 5.4 below cover most aspects of the TPA Version 5.0 code. These tests address most potential software validation issues, but additional tests might be identified as the validation testing proceeds. Table 5-1 shows which tests will be conducted in each phase of the validation testing.

Table 5-1. Summary of Validation Tests

Test-Types		Validation Phases		
		Phase I	**Phase II**	**Phase III**
Function Tests	TPA Executive	Computational Correctness		
	Consequence Modules	Computational Correctness	Physical Reasonableness	
	Stand-Alone Codes	Computational Correctness	Physical Reasonableness	
System Tests				Physical Reasonableness

Each software validation test is focused on a specific function, but there are elements common to most tests. These common elements include:

- The TPA code consists of a main program and many subroutines with data transferred through intermediate files and FORTRAN CALL and FUNCTION statements. The software validation test of each function should include detailed examination of all data transfers. The tests should ensure that the expected format of intermediate files is consistent with modules that create, read or change the file, and that CALL and FUNCTION statements reference the desired subroutine and have the correct sequence of arguments.

- All assignment and logical statements should be examined for consistency of dimensions. For instance, in a simple assignment such as A = B × C, the dimension of A should equal the product of the dimensions of B and C.

- For improved coverage and efficiency, some software validation tests might require the development of simple code drivers called stubs that exercise particular functions or subfunctions. Stubs would typically consist of FORTRAN statements that call a TPA subroutine with a set of appropriate arguments. Values for these arguments might be varied to examine ranges and combinations of feasible values. For instance, stubs would be effective in testing the subroutines associated with the ARRAY utility.

5.1 Test Cases for the TPA Executive

The software validation tests described in this section will examine the main underlying functions of the executive. The TPA user's guide identifies six primary utilities (READER, SAMPLER, INVENT, MODULE VARIABLE, SUBAREA and ARRAY) and five secondary utilities (FILEUNIT, FINDELEV, NUMRECIP, PEAKFINDER and RAN) associated with the executive. The following discussion provides a brief description of the purpose of these modules and outlines the scope of software validation tests. Table A–1 in appendix A provides additional information on the details of these tests. Table 5-2 identifies whether the requirements are qualitative or quantitative.

Table 5-2. Validation Tests for the TPA Executive

Test ID	Test Description	Effort (Person—Months)	Criteria for Success
E1	READER • input checks • drift calculator	0.5	 qualitative quantitative
E2	SAMPLER • distribution sampling	0.25	 qualitative
E3	INVENT • data checks • inventory calculations	0.5	 qualitative quantitative

Table 5-2. Validation Tests for the TPA Executive			
Test ID	**Test Description**	**Effort (Person—Months)**	**Criteria for Success**
E4	MODULE VARIABLE • security features	0.25	qualitative
E5	SUBAREA • data checks • calculations	0.5	qualitative quantitative
E6	ARRAY • used correctly • calculations	0.75	qualitative quantitative
E7	FILEUNIT • inspect code	0.25	qualitative
E8	FINDELEV • calculations	0.25	quantitative
E9	NUMRECIP • calculations	0.25	quantitative
E10	PEAKFIND • peak dose time and magnitude	0.25	quantitative
E11	RAN • random numbers without cycling • extraneous code	0.25	quantitative qualitative
E12	IAREADER • overwrites sampled values	0.25	qualitative
E13	EXEC (CHECKPOINT RESTART) • maintenance check.pnt • execution resumed when required	0.25	qualitative qualitative

Most of these utilities have been carried over without change from Versions 3.1.4, 3.2, and 4.0 of TPA, and most have undergone a number of formal or informal tests, which are described in Appendix A. Consequently, it may not be necessary to devise new tests, but merely repeat and document the tests that were applied to earlier versions.

5.1.1 READER Primary Utility Module (E1)

READER is the only subroutine allowed to access the main input file, *tpa.inp*. READER examines the data in *tpa.inp* to trap potential errors and then stores the data into various target variables and arrays. READER also includes a drift calculator that computes the endpoint coordinates of the drifts in the repository. Sample software validation tests will ensure the following:

- Adequacy of error traps including those for global input variables
- Proper assignment of input data to intended targets
- Validity of probability density functions (e.g., ensure nonnegative lower bound for parameters physically limited to non-negative values)
- Accuracy of the drift calculator
- There are no assignment statements that could modify the input data assigned to the target variables and arrays

Most of these tests would likely involve inspection of code and execution of TPA with a variety of (valid and invalid) input data and the acceptance criteria would be qualitative. Tests of the drift calculator might involve use of a spreadsheet, and it is expected the acceptance criteria would be quantitative. These tests would require personnel with a background in FORTRAN coding, and a thorough testing could take approximately two weeks of effort.

5.1.2 SAMPLER Primary Utility Module (E2)

SAMPLER assigns sampled values to variables characterized by probability density functions for each realization. It supports Latin Hypercube and Monte Carlo sampling strategies for 13 different distribution functions. The Latin Hypercube strategy is based on a well-known code developed by Iman and Shortencarier (1984) and is invoked in TPA in a stand-alone subutility called *snllhs.f*.

The functions provided by SAMPLER are crucial to the probabilistic framework, and thorough software validation testing is warranted. The tests will ensure the following:

- Distribution functions have the correct attributes. (e.g., does a large number of realizations yield the expected probability curve for each distribution?)
- The correlation algorithm performs correctly for different combinations of distribution functions
- The correct input is provided to *snllhs.f*. (e.g., invalid cases are disallowed)
- *snllhs.f* produces the expected Latin Hypercube samples for all feasible combinations of the number of random variables and desired sample sizes
- The random number generator produces a sequence of random numbers with the desired properties and with a period that is sufficiently long to preclude the possibility of recycling

Many of these tests would involve independent implementation, using a spreadsheet for example, and the acceptance criteria would be quantitative. Some tests, such as examination of the output from *snllhs.f*, might involve visual examination of plots of sampled parameter values for various sample sizes. These tests will require personnel with a knowledge of statistics. Problems with SAMPLER have mostly been rectified during previously conducted sensitivity studies. Additional tests may take approximately one week of effort.

5.1.3 INVENT Primary Utility Module (E3)

INVENT computes and stores radionuclide-specific information for use throughout TPA. Section 3.3.2 in Mohanty, et al., (2002a) describes the governing equation and solution for computing inventories for 43 radionuclides of interest. Software validation tests will ensure the following:

- Correct association of radionuclide identity and radionuclide properties for different combinations of selected radionuclides
- Radionuclides can be selected in any order
- The same radionuclide can appear twice in two different chains
- Correct inventory calculation for all feasible combinations of half-lives
- Correct inclusion of colloidal radionuclides

Tests on input information can be made with runs of TPA using a modified input file, while inventory calculations can be made using conventional mathematical software. These tests should take approximately two weeks of effort by a numerical analyst.

5.1.4 MODULE VARIABLE Primary Utility Module (E4)

MODULE VARIABLE subroutine stores selected results computed by consequence modules into a database. The results are identified and accessed by a special index. Values can only be stored by the consequence module that generates the result although other consequence modules can scan the data.

Software validation tests will examine the measures used to ensure that these security functions operate as intended. Failure could occur if a consequence module uses an incorrect special index to store its own data or to retrieve data generated by itself or another consequence module. Failure could also occur if the database becomes corrupted by an invalid storage procedure.

Software validation tests will include code review of MODULE VARIABLE module and the consequence modules to determine whether the correct sequence of arguments and expected values of special indices are used throughout. Assignment statements affecting special indices will be checked to ensure that all new values are unique. Finally, the structure and integrity of the database will be evaluated to determine whether records can become corrupted, for instance, by overwriting part of an existing record.

Tests of MODULE VARIABLES is expected to require about one week of effort by an experienced FORTRAN programmer.

5.1.5 SUBAREA Primary Utility Module (E5)

SUBAREA has functions that involve calculation of repository subarea information for use in the consequence modules FAULTO, SZFT, READER and VOLCANO (Appendix C, Mohanty, et al., 2002a). The main input data is the number and coordinates of the subareas and a parameter describing the areal loading of waste packages.

Details concerning the data transformations must be determined. Software validation tests of SUBAREA will be qualitative and quantitative and take approximately two weeks of effort by a numerical analyst to ensure the following:

- The expected data are correctly provided by READER
- There are no unstated input data restrictions (e.g., coincidence of two lines defining the quadrilateral)
- Calculations are valid for all allowed input combinations (e.g., many small subareas)
- Calculations of elements (points, circles and lines) within a specified subarea are performed correctly.

5.1.6 ARRAY Primary Utility Module (E6)

ARRAY collects together 20 subroutines that perform various data transformations (Table C–2, Mohanty, et al., 2002a). Software validation tests of these subroutines will use stubs aimed at the specified functions performed. Development of the code and subsequent software validation tests would require approximately three weeks of effort by a programmer-analyst.

5.1.7 FILEUNIT Secondary Utility Module (E7)

FILEUNIT assigns unique unit numbers to all modules in TPA. Software validation tests will involve code review to ensure that all assignments are distinctive and reference the correct file name. In addition, tests will be conducted to ensure that code modules requesting a unit number are entitled to retrieve a unit number from FILEUNIT and that sufficient unit numbers are available for the code to execute. Approximately one week of effort is required by a programmer.

5.1.8 FINDELEV Secondary Utility Module (E8)

FINDELEV provides elevation of the ground surface for a specified set of universal transverse mercator coordinates. The governing equations must be determined, and software validation will involve independent calculations using a spreadsheet or development of stub code. Approximately one week of effort is required by a programmer-analyst.

5.1.9 NUMRECIP Secondary Utility Module (E9)

NUMRECIP is a collection of four numerical algorithms, taken from a well-known source, that have been adapted for use in TPA (Table C–3, Mohanty, et al., 2002a). Software validation will involve independent calculations using a spreadsheet or development of stub code, depending on the nature of the algorithm being tested. These tests will require one week of effort by a programmer-analyst.

5.1.10 PEAKFIND Secondary Utility Module (E10)

PEAKFIND determines the time and magnitude of peak doses for individual radionuclides and for the total dose summed over all radionuclides simulated, presumably from a set of dose-time points. Software validation will involve inspection of the dose-time data or curves or use of stub code. About one week of effort by an analyst is required.

5.1.11 RAN Secondary Utility Module (E11)

RAN, which is based on the same pseudo-random number used by SAMPLE, generates random values for use in generating Monte Carlo samples and a seismic hazard curve. The software validation test will ensure that the random number generator produces a sequence of random numbers with the desired properties and a period that is sufficiently long to preclude the possibility of recycling. About one week of effort by an analyst will be required.

5.1.12 IAREADER Secondary Utility Module (E12)

A suite of secondary utility modules (identified in the TPA code as ZPORTUNX/ZPORTPC) are designed to facilitate SunOS implementation. However, the personal computer implementation resulted in a substantial number of changes to the IAREADER module. This module reads the input file *ia.dat*. This input file controls the parameter values for importance analysis runs. The file *ia.dat* is only used when the importance analysis flag is set in the *tpa.inp* file. If this flag is set the sampled values from Latin hypercube sampling for a parameter are overwritten by the values in *ia.dat*. The tests will ensure the following:

- Detection of incorrectly formatted *ia.dat*. file
- Detection of illegal parameter names
- Detection of parameter values outside their physical limits
- Detection of duplicate names
- Input values are correctly written to the *lhs.out* file

Most of these tests would involve the execution of TPA with a variety of (valid and invalid) input data, and the acceptance criteria would be qualitative. Approximately one week of effort from a programmer-analyst will be required.

5.1.13 Checkpoint-Restart Module (E13)

Checkpoint-restart is a feature added to the EXEC module that allows the TPA execution to be interrupted and then subsequently resumed. Testing will be conducted to verify that the checkpoint-restart feature allows the code to be resumed when required. Much of the functionality associated

with the checkpoint restart feature is associated with writing a file, *check.pnt,* to disk. Testing will reveal any limitations this file places on the execution speed of the code along with any additional disk space requirements for code execution. Approximately one week of effort from a programmer-analyst will be required.

5.2 Test Cases for the Consequence Modules

This section describes a set of software validation tests designed to evaluate the computational correctness of the consequence modules. In addition, a limited number of model validation tests are defined for the consequence modules that will examine the reasonableness of the abstracted models. These tests are summarized by identification code in Table 5-3.

5.2.1 UZFLOW (C1)

UZFLOW simulates shallow infiltration at the land surface, and percolation of water to the repository horizon, where it affects the near-field environment of the repository. Some of the water that reaches the repository horizon may contact and promote corrosion of the drip shield and waste packages, and subsequently dissolve and transport radionuclides.

The UZFLOW module consists of three sub-models. The first sub-model employs a simple climate model to estimate how the mean annual temperature (MAT) and meal annual precipitation (MAP) vary as functions of time. The second sub-model estimates shallow mean annual infiltration (MAI) as a function of time and location using the time-varying MAT and MAP estimates provided by the first sub-model. The second sub-models also uses information on land surface elevation, soil depth, soil type, rock type, wind speed, and long-wave radiation that is provided by externally-generated input files. The third sub-model simply computes the spatial average of the MAI estimates provided by the second sub-model to produce the time-varying flow rate of infiltrating water moving toward the repository for each repository sub-area. This flow rate does not account for thermal effects from repository generated decay heat. Thermal effects are treated in the NFENV module. The deep percolation is assumed to be the average value of MAI within a subarea.

Software validation of the UZFLOW module will involve an independent implementation (e.g., spreadsheet calculation) of the module and the stand-alone code ITYM used in the second sub-model. Rudimentary model validation tests will compare infiltration estimates from the UZFLOW module to results from other well-established computer codes or field data.

5.2.1.1 Software Validation Tests

- Hand calucation checks will be made of the following: (i) time interpolation of the climate data supplied in the *climato2.dat* file; (ii) calculation of MAP and MAT from the climate function and input data; and (iii) perturbation calculations for MAP and MAT over one time interval. The hand calculation should match those values computed by UZFLOW (C1-1).

- Estimates produced by the infiltration response surface function, which is constructed and evaluated by the ITYM stand-alone pre-processor, will be compared to simulation results from the BREATH computer code (Stothoff, 1995), for several specific cases, including the base case modern climate. The BREATH computer code, which has already undergone formal software validation at the CNWRA (Fedors, 2002), will be used because simple analytical solutions are not readily available to implement the net infiltration conceptual

model used in the TPA code. For specified values of MAP and MAT, the infiltration response surface, when evaluated at a specific spatial location and time, should provide an estimate of MAI that is within 10 percent of that estimated by BREATH using long-term average climate values (C1-2).

- UZFLOW estimates subarea average net infiltration from ITYM output at various spatial resolutions (e.g., 30, 60, or 120-meter square pixels). Net infiltration maps with known subarea net infiltration values can be used to confirm the subarea-averaging process. Net infiltration estimates for each pixel within each subarea will be set to a uniform value with different values for each subarea. If the calculated subarea averages are the same as the uniform value specified at each pixel, the test will be considered successful (C1-3).

- The net infiltration results at large scale (i.e., mountain scale) will be compared against results from more general approaches, such as the Chloride Mass Balance method on analog watersheds. There are several analog watersheds in southern Nevada, such as the 3-springs watershed (Lichty, 1995), with data for which data is available. The test will be considered successful if the results will be within an order of magniture of the USGS results (C1-4).

UZFLOW validation tests will require about three weeks of effort.

5.2.2 NFENV (C2)

NFENV simulates the near field environment around the repository and waste packages for each subarea. It provides estimates of temperature, relative humidity, pH, and concentrations of chloride and carbonate and requires input from a variety of sources. The heat transfer calculations in NFENV yield estimates of the temperature rise in the rock above the repository, the temperature at the inner and outer surfaces of the waste package and the maximum temperature of the spent fuel. The relative humidity is determined from temperature estimates. NFENV also estimates the time-dependent infiltration rate of water in the near field. Most of these functions are relatively detached from each other, and it may be effective to perform several separate functions tests.

5.2.2.1 Software Validation Tests

- The governing equations used to calculate the temperature of the wall of the drift, the waste package outer surface and waste package inner surface temperatures, and the refluxing of water resulting from near-field thermohydrologic conditions will be compared to results using analytical solutions implemented in MATHCAD® or by Excel®. Conditions representing upper and lower limits of temperature and relative humidity will be used to test the thermal and reflux models. Computed results from the TPA code and the analytical solutions should differ by no more than 10 percent (C2-1).

- To investigate model adequacy, (i) the effect of the fixed repository surface boundary condition on the temperature estimates will be qualitatively verified using alternative boundary conditions in the detailed numerical model, (ii) the impact of hydrology coupling on the temperature estimates will be qualitatively investigated, and (iii) the repository edge temperature estimated by the abstracted model will be qualitatively compared with numerical simulation results (C2-2).

- Because temperatures are calculated separately from chemical species and liquid responses, the integration of the three will be evaluated. For example, the concentrated chloride environment at the waste package should not be diluted until temperatures reach a level that can support aqueous flow into the drift (C2-3).

- pH values provided by the NFENV module to EBSFAIL and EBSREL will be verified for consistent use in the latter two modules. The pH values will also be verified for consistency with the chemistry used in the determination of deliquescence relative humidity (C2-4).

NFENV validation tests will require approximately five weeks of effort.

5.2.3 EBSFAIL (C3)

The EBSFAIL module is used to compute the failure time of the waste package due to humid air corrosion, general corrosion, and localized corrosion. Inputs to the code are relative humidity, temperature and chloride concentration as functions of time and the failure time of the drip shield.

5.2.3.1 Software Validation Tests

- EBSFAIL prepares the input data used in the stand-alone code, FAILT, which performs most of the waste package degradation computations. The correctness of data transfer between EBSFAIL and FAILT will be verified (C3-1).

- The FAILT algorithm used to compute the penetration depth of the corrosion front and the failure time will be implemented using software such as Mathematica®. Values of the corrosion potential, critical potential for localized corrosion, and penetration depth of the corrosion front as functions of time computed with the TPA code (for one realization and one repository subarea) will be compared to computations in Mathematica®. The computation of the critical potential for localized corrosion will be checked to ensure that results are computationally correct. Synthetic input data will be used to verify that different degradation modes (i.e., humid air corrosion, general corrosion, and localized corrosion) are properly activated. Differences in the TPA and Mathematica® computations of penetration rate, failure time, erosion potential, and critical potential should be less than 10 percent (C3-2).

- For a Monte Carlo run of the TPA code where localized corrosion does not occur, the distribution of waste package failure times can be approximately computed by

$$t_i = \frac{d}{CR_i} \qquad [6\text{-}1]$$

where

d	—	thickness of the outer, corrosion resistant waste package wall
CR_i	—	general corrosion rate sampled for realization i

The general corrosion rate is an input parameter that is sampled within the TPA code from a specified distribution function. The ensemble of failure times computed using Eq. [6-1] should be comparable to the more complex method used within the TPA code to compute the distribution of failure times, provided that localized corrosion does not occur.

Comparison of the resulting failure time distributions (i.e., failure time CDFs) should not result in more than 5 percent difference at any quantile (C3-3).

- Parameters derived from experimental data for different materials such as Type 316 SS, and Alloys 825, 625 and 22 will be used to check if the repassivation potential computed by the TPA code follows the expected trend (C3-4).

- Potential versus pH diagrams will be prepared numerically that include the effects of variations in chloride concentrations, to define domains of localized corrosion and uniform corrosion. Variables such as oxygen partial pressure and temperature will be varied to verify that the expected degradation modes are properly identified by the TPA code (C3-5).

EBSFAIL validation tests will require about five weeks of effort.

5.2.4 DSFAIL (C4)

DSFAIL is used to compute the failure time of the drip shield by general corrosion. DSFAIL prepares the input file for the stand-alone code DSFAILT, which is used to perform drip shield corrosion computations for each subarea. Inputs to the code are the corrosion rate and fluoride concentration as a function of time. The computed drip shield thickness as a function of time is passed to the executive which, in turn, passes it to the SEISMO2 module.

The general corrosion model for the drip shield is straightforward. The failure time is computed as in Eq. [61], with an enhancing factor affecting the corrosion rate that is function of the fluoride concentration. Documentation on the effect of fluoride on Ti grade 7 corrosion rate has been documented elsewhere (e.g., Brossia et al., 2001).

5.2.4.1 Software Validation Tests

- Data transfers between DSFAIL, DSFAILT, the executive, and SEISMO2 will be verified (C4-1).

- The computational algorithm used in the stand-alone module DSFAILT will be implemented in Mathematica®. Synthetic input data (e.g. fluoride concentration versus time) will be used to test the response by DSFAILT to a variety of conditions. Differences between DSFAILT and Mathematica® computations for the failure time of the drip shield should be less than 10 percent (C4-2).

DSFAIL validation tests will require about two weeks of effort.

5.2.5 WELDFAIL (C5)

WELDFAIL is a subroutine invoked by the FAILT stand-alone module. WELDFAIL calculates the failure time of the closure weld area of the waste package due to humid air, general, and localized corrosion. WELDFAIL returns the weld failure time to FAILT which then passes it back to the TPA Executive.

5.2.5.1 Software Validation Tests

- Data transfers between WELDFAIL, FAILT, and the executive will be verified by code inspection (C5-1).

- The algorithm used by the WELDFAIL module to compute the failure time of the closure weld area is similar to the algorithm implemented in FAILT to address corrosion of the body of the waste package. The same test used to evaluate waste package corrosion (C3–2) computations will be used to evaluate corrosion computations of the closure weld area. An implementation in Mathematica® of the corrosion model will be used to evaluate the WELDFAIL implementation. Differences in the computed failure times should be less than 10%. Only a few tests will be performed to verify weld corrosion computations, given the similarity of WELDFAIL to FAILT (C-5).

WELDFAIL validation tests will require about two weeks of effort.

5.2.6 SEISMO (C6)

The SEISMO module calls the MECHFAIL stand-alone code, which currently estimates the number of drip shield failures caused by static and dynamic rock fall loads as well as by seismicity. MECHFAIL uses various abstractions to estimate (i) time varying static rockfall loads, (ii) size and fall height of discrete rock blocks dislodged from the drift ceiling during seismic events, (iii) time of occurrence and magnitude of seismic events, and (iv) the potential failure of the drip shield from static and dynamic rock fall loads.

Currently, the MECHFAIL module has place holders for the model abstractions that approximate the number of waste package failures caused by direct seismic shaking and potential interactions with the drip shield caused by rock fall loads. These abstractions for waste package failure[1], however, have yet to be developed and are, therefore, not part of the TPA Version 5.0 code.

Process-level tests have already demonstrated that the drift failure fraction and drip shield failure fraction calculated within the MECHFAIL module correspond to expected results. System-level tests that were performed verify that the MECHFAIL module will (i) return all drip shields failed over all time steps when the drip shield thickness calculated in DSFAIL is zero, (ii) return drift failure fractions that are reasonable (and passed onto the SEISMO and EXEC modules without error), and (iii) return the same results (i.e., drift failure fraction and drip shield failure fraction) for the first 10,000 years for simulation times of 10,000 and 100,000 yrs. No additional tests of the SEISMO/MECHFAIL module will be performed.

5.2.7 EBSREL (C7)

EBSREL simulates the release of radionuclides from failed waste packages. The stand-alone code RELEASET is interfaced with the TPA executive via EBSREL. EBSREL also controls execution of the EBSFILT stand-alone code used to simulate radionuclide transport through the invert upon

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[1]Gute, G.D., G. Ofoegbu, F. Thomassy, S. Hsiung, G. Adams, A. Ghosh, B. Dasgupta, A. Chowdhury, and S. Mohanty. "MECHFAIL: A Total-system Performance Assessment Code Module for Evaluating Engineered Barrier Performance Under Mechanical Loading Conditions." CNWRA 2003-06. San Antonio, Texas: CNWRA. 2003.

which the waste package rests. The input data to computations in RELEASET are the waste package temperature, relative humidity, water flow rates into the waste package, and radionuclide inventories and half-lives. Two water contact modes are considered in RELEASET (bathtub and flow-through) and four possible empirical rate equations (the user may select only one equation) to simulate the dissolution of spent nuclear fuel. Gap and grain boundary inventories are assumed to dissolve as soon as water contacts the spent fuel. A model for glass dissolution is also implemented in RELEASET.

5.2.7.1 Software Validation Tests

- Numerous data transfers occurs between EBSREL, RELEASET, and the NFENV module used to estimate temperatures and flow rates of water into the waste package. Transfer of data between these modules and the executive will be verified by code and file inspection (C7-1).

- Computations of release rates will be performed in Mathematica®, MathCad®, or Matlab® for simple cases (e.g., constant flow rates, constant exposed spent fuel surface area, large inventory, long-lived radionuclides) and the output release rates will be compared to RELEASET computations. Simplified computations will focus on verifying mass balance and faithfulness to equations described in the TPA 4.0 User's Guide (Mohanty, et al, 2002a) and will consider only one radionuclide at a time. Differences in estimated release rates should be less than 10 percent. (C7-2).

- The implementation of solubility constraints will be evaluated to ensure that radionuclide concentrations do not exceed the solubility limit. Calculations will also be performed to evaluate the release rate of radionuclides with low solubility (C7-3).

- Release rates from the engineered barrier subsystem will be computed using different decay chains from those specified in the TPA nominal case. Study of decay chains with several members, different half-lives, and inventory will highlight the response of EBSREL and RELEASET to various limiting cases. Qualitative correctness of release rate trends will be examined with respect to solubility limit, half life, inventory, and the radionuclide position in the decay chain (C7-4).

EBSREL validation tests will require about four weeks of effort.

5.2.8 EBSFILT (C8)

The EBSFILT stand-alone module is used to simulate radionuclide transport through the invert into the unsaturated zone below the repository. This code is interfaced with the TPA executive via EBSREL. EBSFILT uses a straight forward transfer function solution for one-dimensional advective-diffusive transport of radionuclides in a semi-infinite domain under steady-state flow conditions.

5.2.8.1 Software Validation Tests

- The principal input data to EBSFILT are the radionuclide release rates computed by RELEASET. Data transfer between EBSREL and EBSFILT will be verified by code inspection (C8-1).

- The transfer function approach will be implemented using software such as Mathematica. Release rates computed using Mathematica® will be compared to EBSFILT release rates. Differences in predicted outflow specific activities should not exceed 10 percent. Synthetic input release rates and parameters will be used to explore the behavior of EBSFILT under particular cases (e.g., high and low flow rates and diffusion coefficients, and short and long travel paths, short and long-live radionuclides, low and high retardation). Only one radionuclide at a time will be considered for these cases (C8-2).

- A mass conservation test will be conducted by integrating the input release and output release rates over time. If radionuclide decay is negligible, the total mass entering the invert must equal the total mass leaving the invert. If the decay rate is not negligible, the time integrals can be corrected to account for decay. Such tests will establish if there is any additional mass loss in the control volume. Only one radionuclide at a time will be considered in these tests. Mass differences should be less than 1 percent (C8-3).

EBSFILT validation tests will require about four weeks of effort.

5.2.9 UZFT (C9)

The UZFT module simulates the aqueous transport of radionuclides through the unsaturated zone from the repository to the water table for each repository subarea. The main function of UZFT is to perform simple data transformations, such as calculating retardation factors, and to prepare input files for use by the stand-alone code *nefmks*.

5.2.9.1 Software Validation Tests

- The algorithm used to compute transport velocities in the unsaturated zone will be checked using hand calculations or a Mathematica® script for several percolation rates that span the expected range. This test will be considered successful if the UZFT module correctly determines whether water flow is in the matrix or fracture continuum for each hydrostrati-graphic unit, if the saturation is computed correctly, and if the resulting velocity is correct computed (C9-1).

- Spreadsheet or similar calculations will be made to verify conversion from K_d data to R_d values used for retardation in the matrix. This test will be successful if the calculations are within 1 percent or less (C9-2).

- TPA colloid transport results will be compared against analytical results to test, for example, whether the abstracted model in the TPA code is consistent with (e.g., within ± 10 percent), or at least conservative with respect to, analytical model that account for non-equilibrium colloid attachment. TPA results will also be compared with available data from the DOE field (e.g., C-Wells for retardation factors) and laboratory experiments (e.g., LANL lab data

on Pu). Data used directly to develop analytical model or to derive parameters, will not be included in the validation test (C9-3).

UZFT validation will require about four weeks of effort.

5.2.10 SZFT (C10)

The SZFT module simulates the transport of radionuclides in groundwater through saturated zones between each repository subarea to the location of a potential receptor who could intercept contaminated groundwater. The main functions of SZFT are to perform simple data transformations, such as calculation of retardation factors, and to prepare input files for use by the stand-alone code *nefmks.*

5.2.10.1 Software Validation Tests

- Connections or links between the stand-alone data preparation code *nefmks* and the TPA code will be verified (C10-1).

- Spreadsheet or simple decay model calculations will be performed to bound reasonable activity levels of radionuclides for calculated transport times. A simple mass (or more accurately, activity) balance will be done for unretarded radionuclides. Activity levels should be within 10 percent, while mass balance should be within 1 percent (C10-2).

- To check that groundwater travel times from SZFT are correct, the porosity and streamtube width multiplier values will be varied in the input file to ensure that the groundwater travel times output changes proportionally (C10-3).

- The saturated zone streamtube approach will be verified against the three-dimensional site-scale numerical model using MODFLOW. The test is expected to provide a reasonable alternative conceptual model for saturated zone flow. A milestone report on the MODFLOW analysis of the abstracted SZ model in the TPA code will be delivered as an Unsaturated and Saturated Flow Under Isothermal Conditions Key Technical Issue deliverable in April 2003. In this effort, a set of *streamtube.dat* files have been developed that represent reasonable alternative conceptual models for saturated zone flow (C10-4).

- For colloid transport in saturated zone, tests similar to C9-4 for UZFT, will be carried out (C10-5).

SZFT validation will required about six weeks of effort.

5.2.11 DCAGW (C11)

DCAGW estimates the total effective dose equivalent to potential receptors who contact the contaminated water plume. The functions of DCAGW involve relatively modest data manipulations. The first step involves calculation of radionuclide concentrations in well water. These and other required data are passed to the stand-alone code GENTPA, which is derived from the quality-assured code called GENII (Napier, et al. 1988). GENTPA returns radionuclide-and pathway-specific annual intake rates, which DCAGW matches with radionuclide dose coefficients and concentrations to yield radionuclide-specific effective dose equivalents. Validation of the

GENII acquired software (Napier, et al. 1988) will be demonstrated using available documentation of benchmark and code comparison testing from peer reviewed journal articles and technical reports including an international model validation effort (International Atomic Energy Agency, 1995).

5.2.11.1 Software Validation Tests

- Verify that those portions of GENTPA that execute algorithms from the GENII code for DCAGW (i.e., *envin.exe* and *env.exe*) produce the same results as the acquired software (GENII code) (Napier, et al. 1988) when a similar set of input data relevant to the biosphere model implementation in the TPA code is used. Data manipulations in GENTPA that convert the results of the GENII based algorithms to dose will be verified by hand calculation, possibly using a spreadsheet. Another verification test for DCAGW involves inspection of code and examination of data transfers to GENTPA (C11-1).

These tests will require about four weeks of effort.

5.2.12 FAULTO (C12)

The FAULTO module performs a simple calculation of number of disrupted waste packages based on faults of fixed length occurring at sampled times, locations, and orientations with sampled widths and displacements.

5.2.12.1 Software Validation Tests

- For a given set of constant fault parameters (location, orientation, and width) the number of affected waste packages will be calculated by hand, using the repository geometry, and quantitatively compared to the module result. This test will be performed twice, once for a northwest orientation and once for a northeast orientation (C12-1).

FAULTO validation will require about two weeks of effort.

5.2.13 VOLCANO (C13)

VOLCANO determines effects associated with igneous events that disrupt the repository. An igneous event always involves an intrusion that leads to waste package failures in each subarea for use in EBSREL. An igneous event might also involve volcanic eruptions, which ejects a mass of high-level waste into the air for use by ASHPLUMO. The geometric model can be used to mechanistically estimate the number of waste packages entrained in the eruption, or the user can manually input a distributions for this quantity. The number of waste packages failed due to magma intrusion is specified directly by the input of a distribution for this parameter in *tpa.inp*. During the TPA calculation, VOLCANO passes information on the timing of a volcanic event, mass of waste ejected by a volcanic eruption, and number of waste packages failures resulting from igneous intrusion.

5.2.13.1 Software Validation Tests

- The timing of the igneous event is specified as a finite exponential distribution in *tpa.inp*. By describing the occurrence of an igneous event as a Poisson process, separate calculations for sampling the timing of igneous events will be compared to those values passed by VOLCANO. Histogram plots for 10 time bins within the compliance period will be visually inspected for qualitative agreement (C13-1).

- For a given set of constant igneous parameters (dike angle, dike length, dike width, volcanic cone diameter) using the geometric model for extrusive volcanism, the mass of waste ejected during an eruption will be calculated by hand and quantitatively compared to the result passed by VOLCANO. This test is passed if the numerical differences are less than 1 percent relative to the VOLCANO result. This test will be performed twice by simultaneously setting the aforementioned igneous parameters to constants: (1) at their minimum values in *tpa.inp* and then (2) at their maximum values in *tpa.inp* (C13-2).

- This test will verify that the number of waste packages failed due to magma intrusion is not dependent on the geometric model and its parameters (dike angle, dike length, dike width, volcanic cone diameter). Assuming the geometric model is selected and a constant is used for the TPA input parameter related to number of waste packages failed due to magma intrusion, the values of the dike angle, dike length, dike width, volcanic cone diameter will be varied. This test is passed if the number of waste packages failed due to magma intrusion produced by VOLCANO is not numerically affected (C13-3).

- Using the distribution model, the mass of waste ejected during an eruption is specified as a beta distribution in *tpa.inp*. Separate calculations for sampling the mass of waste ejected for extrusive volcanism will be compared to those values passed by VOLCANO. Histogram plots for 10 bins of the ejected mass will be visually inspected for qualitative agreement (C13-4).

- The number of waste packages failed due to magma intrusion is specified as a lognormal distribution in *tpa.inp*. Separate calculations for sampling the number of failed waste packages will be compared to those values passed by VOLCANO. Histogram plots for 10 bins of the number of failed waste packages will be visually inspected for qualitative agreement (C13-5).

- Subarea 2 is specified for the location of the igneous event in *tpa.inp*. This test focuses on extrusive volcanism, due to its greater risk-significance when compared to igneous intrusion. The sensitivity of the extrusive doses to the subarea of the eruption will be investigated. This test is passed if the difference in dose from an eruption in any of the remaining 9 subareas is within a factor of two relative to the dose for an eruption in Subarea 2 (C13-6).

VOLCANO validation will require about six weeks of effort.

5.2.14 ASHPLUMO (C14)

ASHPLUMO simulates the airborne transport of volcanic ash contaminated with high-level waste and the subsequent accumulation of deposited ash and high-level waste as a function of position on the earth's surface. These data pertain to a single volcanic extrusion event and are used in ASHRMOVO and DCAGS to estimate doses resulting from exposure to radionuclides on the earth's surface. ASHPLUMO uses the *ashplume* stand-alone code (Table 5-4). The model for the transport and deposition of volcanic ash has been validated against measured ash thicknesses from actual eruptions with good agreement (Hill et al., 1998). ASHPLUMO calculates the areal deposition of both ash and high-level waste at the receptor location.

5.2.14.1 Software Validation Tests

- Data transfer of those parameters from ASHPLUMO to the stand-alone code *ashplume* and the transfer of results from *ashplume.f* to ASHPLUMO will be checked for correctness (C14-1).

- Simplified calculations will be performed to show that the entire mass of the tephra eruption is being accounted for in the TPA calculations. The deposit thickness at the receptor location will be calculated by hand for a deposition whose thickness decreases exponentially from the eruption source. Given a uniform distribution throughout the deposit, the high-level waste concentration in tephra will be compared with calculated distribution in TPA code. A mass-balance verification of the high-level waste will be performed to determine if any mass is gained or lost .This test is passed if the numerical differences in total mass are less than 1 percent relative to the TPA result (C14-2).

- To test the behavior of the fuel incorporation model, a very high value for the incorporation ratio (greater than 0.9) will be entered to reduce the incorporation of high-level waste into ash and to reduce the areal deposition of high-level waste. This qualitative test is passed if the areal deposition of high-level waste (g cm^{-2}), as reported in *ashplumo.rlt*, is significantly reduced for the very high value of the incorporation ratio (C14-3).

- The relationship between the areal deposition of ash and high-level waste will be investigated. For a fixed time of eruption, it is expected that a simple relationship exists between areal deposition (g cm^{-2}) of ash and high-level waste. This qualitative test is passed if a simple relationship can describe the differences in the areal mass deposition of ash and waste as reported in *ashplumo.rlt* (C14-4).

ASHPLUMO validation will require about four weeks of effort.

5.2.15 ASHRMOVO (C15)

ASHRMOVO calculates areal radionuclide concentrations (radionuclide activity per unit surface area) at the compliance point. The initial concentrations are given by the deposited masses of ash and radionuclide computed by ASHPLUMO. ASHRMOVO takes into account subsequent radionuclide removal by leaching, erosion, and decay and subsequent radionuclide addition by erosion from other locations to yield time-dependent areal concentrations at the compliance point. The governing equations are equivalent to those available in the INVENT utility, but with a potential

leach rate limit. The leach rate calculation is the same as in the GENII code (Napier, et al., 1988) and TPA biosphere calculations.

5.2.15.1 Software Validation Tests

- Correctness of calculations will be verified using an analytical tool, such as MathCad®. Differences in computed areal concentration should be less than 10 percent (C15-1).

- Additional information for model validation will be obtained from published literature (models used in ASHRMOVO are common) and comparisons will be made with other available leaching and erosion models (C15-2).

ASHRMOVO validation will require about three weeks of effort.

5.2.16 DCAGS (C16)

DCAGS estimates dose to a potential receptor from exposure to radionuclides on the ground surfaces. Estimates of external exposure are given as the product of the areal concentration produced by ASHRMOVO and ground surface dose conversion factors. The external dose conversion factors account for the fraction of the year the receptor is exposed. For the inhalation and ingestion pathways as well as for the groundwater pathway, two sets of dose conversion factors are calculated for each realization, one for the current biosphere and one for the pluvial biosphere. The choice of dose conversion factor must be consistent with climate change factors simulated in UZFLOW.

Estimates of inhalation exposure also start from the deposited masses of ash and radionuclides produced by ASHRMOVO and use the mass loading model to estimate radionuclide concentration in the air above the contaminated ash. These estimates include factors to simulate radionuclide losses from wind transport and other processes. Inhalation dose is proportional to radionuclide concentrations in air, with the proportionality constant given by the product of breathing rate, fraction of the year the recipient is exposed to the air, and an inhalation dose conversion factor.

Estimates of ingestion exposure start from the deposited masses of ash and radionuclides produced by ASHRMOVO. The GENTPA code is then used to calculate the amount of each radionuclide that moves from the ground surface through various pathways and is eventually ingested by the receptor. The ingestion exposures are given as the product of the activity of ingested radionuclides and an ingestion dose conversion factor. Intake and exposure calculation algorithms (for all pathways except inhalation) in DCAGS are duplicated in DCAGW therefore similar types of tests are planned.

5.2.16.1 Software Validation Tests

- Verify that those portions of GENTPA that execute algorithms from the GENII code for DCAGS (i.e., *envin.exe* and *env.exe*) produce the same results as the acquired software (GENII code)(Napier, et al. 1988) when a similar set of input data relevant to the biosphere model implementation in the TPA code are used. Data manipulations in GENTPA that convert the results of the GENII based algorithms to dose will be verified by hand calculation, possibly using a spreadsheet. Another verification test for DCAGS involves inspection of code and examination of data transfers to GENTPA (C16-1).

- Verify that the inhalation doses calculated in DCAGS are the same as those obtained by simple hand calculation (C16-2).

- Model validation for GENTPA calculations will be supported by GENII code validation and additional tests including comparison of environmental transport and dose calculations from the TPA Version 5.0 code to results from the RESRAD Version 6.1 code (Yu, et al., 2001). For this comparison the results are not expected to match exactly, but should provide results that are within an order of magnitude of those produced using the TPA Version 5.0 code. The RESRAD family of codes has been in use or development for more than 15 years and comparison with it should provide confidence in the results being produced by the TPA Version 5.0 code. The RESRAD Version 6.1 code is scheduled to undergo separate formal validation under CNWRA TOP–018 procedure to qualify the code for use during licensing reviews, including that for the proposed Yucca Mountain high level waste repository, making comparison to the RESRAD Version 6.1 code meaningful (C16-3).

DCAGS validation will require about three weeks of effort.

Table 5-3. Tests for the TPA Consequence Modules

Test ID	Test Description	Effort (person-months)	Criteria for Success
C1	UZFLOW • Basic calculations • BREATH Computer code • Areal averaging of infiltration • Chloride mass balance	0.75	 quantitative quantitative quantitative qualitative
C2	NFENV • Temperature and RH • Boundary and edge effects • Heat, chemistry, and flow • pH consistency	1.25	 quantitative qualitative qualitative qualitative
C3	EBSFAIL • Data transfer • Corrosion penetration depth • Distribution of failure times • Re-passivation model • Effect of chemical environment	1.25	 quantitative quantitative quantitative qualitative qualitative
C4	DSFAIL • Data transfer • Effect of fluoride on failure	0.5	 quantitative quantitative
C5	WELDFAIL • Data transfer • Weld corrosion model • Failure times	0.5	 quantitative quantitative qualitative

Table 5-3. Tests for the TPA Consequence Modules			
Test ID	**Test Description**	**Effort (person-months)**	**Criteria for Success**
C6	SEISMO (No tests)	NA	NA
C7	EBSREL • Data transfer • Mass balance and release rates • Solubility models • Release models	1.0	 quantitative quantitative quantitative qualitative
C8	EBSFILT • Data transfer • Convolution and transfer function • Mass balance • Diffusive/advective limit cases	1.0	 quantitative quantitative quantitative qualitative
C9	UZFT • Calculating transport velocity • Calculating Rd • Colloid transport model	1.0	 quantitative quantitative qualitative
C10	SZFT • Data transformations for nefmks • Activity balance • Travel times • Streamtube to 3D • Colloid transport model	1.5	 quantitative quantitative quantitative qualitative qualitative
C11	DCAGW • Data transformations • Dose calculations	1.0	 quantitative quantitative
C12	FAULTO • Number of failed waste packages	0.5	 quantitative
C13	VOLCANO • Poisson process timing • Check of erupted mass • Number of WP failures • Distribution of mass ejected • Distribution of WP failed • Dose per subarea	1.5	 qualitative quantitative quantitative qualitative qualitative quantitative

Table 5-3. Tests for the TPA Consequence Modules (continued)			
Test ID	**Test Description**	**Effort (person-months)**	**Criteria for Success**
C14	ASHPLUMO • Data transfer • Mass balance • Waste incorporation test • Areal deposition test	1.0	 quantitative quantitative qualitative qualitative
C15	ASHRMOVO • Concentration calculations • Leaching and erosion models	0.75	 quantitative qualitative
C16	DCAGS • Replication by GENII • Hand calculation of inhalation dose • RESRAD Version 6.1 code	0.75	 quantitative quantitative quantitative

5.3 Test Cases for the Stand-Alone Codes

The input to TPA includes results from external codes such as MULTIFLO and ITYM, and it has been assumed that these external codes have been or will be verified by staff from the respective key technical issues.

During each realization, TPA may invoke the stand-alone codes listed in Table 5-4. Detailed validation of these stand-alone codes is considered to be beyond the scope of the software validation of the TPA code. However, some validation tests are required to ensure that data transfer is correct. Function tests of the stand-alone components of TPA will ensure the following:

- The input file created by the TPA consequence module adheres to the format required by the stand-alone code
- The output file created by the stand-alone code adheres to the format required by the TPA consequence model
- The output information supplied by the stand-alone code is appropriate for the needs of the TPA consequence modules
- There are no numerical convergence problems that could affect the correctness of the output supplied by the stand-alone codes

The first two software validation tests of the input and output files will require a programmer and involve inspection of the code for the consequence modules and for the stand-alone codes.

The last two tests are more involved and would require personnel experienced with the capabilities and limitations of each stand-alone code. It is particularly important to insure such personnel are

Table 5-4. Validation Tests for the TPA Stand-Alone Codes			
Test ID	**TPA Consequence Module and Referenced Stand-Alone Codes**	**Effort (Person—Months)**	**Criteria for Success**
S1	EBSFAIL • failt.f	0.25	qualitative
S2	EBSREL • *releaset.f* (time dependent fow, fmult, and flow multiplication factors) • *ebsfilt.f*	1	qualitative qualitative
S3	UZFT and SZFT • *nefmks.f*	0.5	qualitative
S4	DCAGS, DCAGW • GENTPA	0.5	qualitative
S5	ASHPLUMO • *ashplume.f*	0.75	qualitative
S6	SEISMO2 • *mechfail.f*	–	–
S7	DSFAIL • *dsfailt.f*	0.1	qualitative
S8	SAMPLER • *snllhs.f*	0.25	qualitative

aware of the ranges and combinations of input data that could be supplied. The estimated level of effort for testing the stand-alone codes has not yet been established.

5.4 Outline of System Tests

Three system tests have been identified for software validation of TPA (Table 5-5). Two tests involve using TPA to replicate recent safety assessment studies of nuclear waste disposal carried out in Canada. Both of these assessments have been fully documented and have undergone rigorous national and international peer review. The three test, provisional at this time, involves using the TPA code to replicate results for a generic Japanese repository.

5.4.1 Comparison with the Canadian Safety Assessment

The Canadian Nuclear Waste Management Program completed two safety assessments in 1994 and 1996 on the concept for disposal of nuclear fuel waste. The two assessments formed part of an Environmental Impact Statement submitted to a federal review panel for public and technical review. Technical reviews were conducted by an independent group of experts appointed by the panel, staff from the Canadian nuclear regulators (the Atomic Energy Control Board) and other federal agencies, and by a review team established by the Nuclear Energy Agency.

The concept involves deep geologic disposal in (saturated) crystalline rock in the Canadian Precambrian Shield. The concept also makes use of engineered barriers that include a durable UO_2 waste form, corrosion resistant containers and a surrounding layer of bentonite clay. Two safety assessments, the Environmental Impact Statement and Second Case Study, dealt with different hypothetical implementations.

1. The Environmental Impact Statement study was based on a geosphere which had groundwater transit times of about 10^4 years and an engineered barrier system which included titanium alloy containers emplaced in boreholes drilled in the floor of the repository drifts. The Environmental Impact Statement made use of the safety assessment code called SYVAC3-CC3 and its documentation (Goodwin, et al., 1994) includes extensive coverage of intermediate results from a deterministic simulation.

2. The Second Case Study examined a less effective geosphere where the groundwater transit times were as short as a few decades. The more robust engineered barrier system included copper containers emplaced within the repository drifts. The Second Case Study made use of the safety assessment code called SYVAC3-PR4. Its documentation (Goodwin, et al., 1996) is focused on probabilistic results.

The common component of the codes used in the Environmental Impact Statement and Second Case Study, SYVAC3, has capabilities similar to the TPA executive and its utilities. The CC3 and PR4 are system models that have many of the features found in the TPA consequence modules and stand-alone codes. There are also some important differences; for instance, the characteristics of the disposal site and the engineered barrier systems are quite dissimilar, such that the CC3 and PR4 models do not consider transport through unsaturated media or volcanism.

Two system software validation tests (S1 and S2 in Table 5-5) are suggested in which the input data for the TPA Version 5.0 code would be modified to replicate as closely as possible the conditions pertaining to the two Canadian studies. These two tests would be limited to a single deterministic simulation. However, consideration should be given at the end of these tests on the feasibility and benefits of a probabilistic comparison.

A preliminary consideration of the differences and similarities between the TPA consequence modules and the CC3 and PR4 models indicates two general classes of modifications would be required. The first is a simple change to existing input parameter values for a simulated process; the second involves adjustments to parameters values so as to bypass or ignore a simulated process. Examples include the following:

- UZFLOW—simple change to precipitation and subarea data to yield equivalent flow rates through different repository subareas.

- NFENV—simple change to heat transfer and groundwater composition data and adjustments to ignore the ventilation and boiling (reflux) transients.

- EBSFAIL—simple change to Type 1 failures and adjustments to mimic (for S1) or ignore (for S2) Types 2 and 3 failures (for S1, some Type 3 failures might only require a simple change).

- SEISMO, FAULTO, VOLCANO—adjustments to bypass these processes. UZFLOW—simple change to precipitation and subarea data to yield equivalent flow rates through different repository subareas.

- NFENV—simple change to heat transfer and groundwater composition data and adjustments to ignore the ventilation and boiling (reflux) transients.

- EBSFAIL—simple change to Type 1 failures and adjustments to mimic (for S1) or ignore (for S2) Types 2 and 3 failures (for S1, some Type 3 failures might only require a simple change).

- SEISMO, FAULTO, VOLCANO—adjustments to bypass these processes.

- EBSREL—simple changes to input parameters.

- UZFT, SZFT—simple changes to most input parameters with adjustments to ignore matrix diffusion

- DCAGW, DCAGS—simple changes to input parameters.

- ASHPLUMO, ASHRMOVO—adjustments to bypass these processes. Simple changes for these modules and for VOLCANO could be made to mimic the airborne exposure routes in CC3 and PR4, but those exposure routes are relatively unimportant in the Environmental Impact Statement and Second Case Study.

The S1 test could involve comparison of container failure rates (for uniform and crevice corrosion and for defective containers), radionuclide release rates from the waste package, disposal vault and saturated zone, and exposure routes affecting the critical group. The S2 test could involve comparison of radionuclide release rates from the disposal vault and saturated zone (the conditions for this saturated zone more closely resemble the conditions described in the TPA input file), and exposure routes affecting the critical group. The acceptance criteria for system tests S1 and S2 would be largely qualitative in nature. For instance, there should be agreement in the effect of the geosphere in delaying radionuclide transport and in the identity and exposure routes of radionuclides contributing to dose, quantitative comparisons might be feasible for some intermediate calculations such as radionuclide release from the invert.

Table 5-5. System Validation Tests

Test ID	Test Description	Effort (Person—Months)	Criteria for Success
S1	Modify TPA to replicate SYVAC3-CC3	2	qualitative
S2	Modify TPA to replicate SYVAC3-PR4	1	qualitative
S3	Modify TPA to replicate H12	1	qualitative

The system-level software validation tests described above requires personnel with a comprehensive understanding of the underlying premises and capabilities of both system codes. It is estimated that software validation test S1 will require approximately one month of effort by personnel with expertise in SYVAC3-CC3 and an equal amount of effort by personnel with expertise in TPA. The level of effort for the S2 test will be approximately half of the S1 test.

5.4.2 Comparison with the Japanese Safety Assessment

The Japan Nuclear Cycle development group recently completed a comprehensive safety assessment exercise called H12 (JNC, 2000). The Japan Nuclear Cycle H12 concept for nuclear waste disposal involves deep geologic disposal in saturated crystalline bedrock and an engineered barrier system that includes corrosion-resistant copper canisters containing vitrified high-level waste emplaced within repository drifts and surrounded by bentonite clay.

The collection of submodels in H12 share many features with the consequence modules in TPA. Important differences are largely associated with the characteristics of the disposal sites, the engineered barrier system, radionuclide inventory, and biosphere. The proposed system software validation test (S3) would involve the H12 base case, which will require a single base case simulation.

6 NOTES

The TPA software validation tests described above will require approximately one person year of effort from participants with a broad range of expertise. Priorities will be given to those models that are known to significantly influence risk, output uncertainty, and sensitivity. It is expected that once a modicum of experience is gained from conducting a few of the function and system-level validation tests, the remaining tests will be re-prioritized to ensure that resources are focused on the most important tests.

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APPENDIX A

APPENDIX A

The following tables are a summary of the work that has been accomplished as well as the work that needs to be completed for validation testing. The tables are organized as follows:

A. Module: Identifier associated with the module.

B. Validation Test or Test ID: Testing that needs to be completed for software validation.

C. Testing Phase: The Validation Test identifies testing for the code module. This testing falls into three categories:

   1. Phase 1: Check for functional correctness. Tests in this category include reasonableness checks, hand calculations, and summary calculations in an Excel® Spreadsheet.

   2. Phase 2: Model validation with analytical results. In this phase, module level output is compared to analytical results from packages such as Mathematica® or MathCad®.

   3. Phase 3: Model validation with outside system-level models. Verifies the code can generate results which are comparable to those generated by outside system-level models. Special input parameters may have to be used for such comparisons

D. Effort (Person-Months): An estimate of the additional time required to accomplish the validation tests.

Table A–1. Summary of Validation Tests for Primary and Secondary Utility Modules Associated with the TPA Executive			
Module	**Validation Test**	**Testing Phase**	**Effort (Person—Months)**
E1: READER	Verify that invalid parameter values for density functions will be trapped. Inspect the code to verify that input variables are actually being used and not overwritten. Also, verify the drift endpoint calculations with the repository design. May want to add checks on nuclide chains to include colloids to verify the chains specified in *tpa.inp* are supported.	I	0.5
E2: SAMPLER	Verify distribution sampling and selected mean values for all distributions but in particular to include new distributions such as User Supplied Piecewise CDF. This testing would verify that the expected probability curve is obtained for each distribution. Verification of beta, logbeta, and iuniform distributions will be required. And, verification that integer and floating point values are sampled to the required precision is needed. In addition, verify that LHS Mode 2 can be invoked and the code will execute correctly using a previously generated sampled parameter file.	I	0.25
E3: INVENT	Using data checks and inventory calculations, verify colloidal radionuclides have been correctly integrated.	I	0.25
	Verify that different combinations of chains and different ordering of radionuclides can be selected and that when these different combinations are selected, both the correct information from the *nuclides.dat* input file is retrieved and inventories are calculated correctly.	I	0.25

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Table A–1. Summary of Validation Tests for Primary and Secondary Utility Modules Associated with the TPA Executive (continued)			
Module	**Validation Test**	**Testing Phase**	**Effort (Person—Months)**
E4: MODULE-VARIABLE	Verify the security features are working properly. Specifically, verify that values can only be stored by the consequence module that generates the result. In addition, verify that no other module can overwrite and corrupt the corresponding MODULE-VARIABLE database.	I	0.25
E5: SUBAREA	The SUBAREA module contains a number of subarea specific utility routines that need to be verified in terms of the current repository subarea layout. For this verification, each utility module will have to be invoked with a set of test input. Afterwards, the output will have to be compared to expected values.	I	0.5
E6: ARRAY	Verify individual subroutines correctly perform the required data transformations. Should also verify that the calling routines are using the subroutine correctly. For example, is the caller trying to clear an array of integers or is it trying to clear an array of floating point values, and does the caller use the correct subroutine within ARRAY (In this case, Subroutine ZEROI for integers and Subroutine ZERO for floating point values).	I	0.75
E7: FILEUNIT	Inspect the code to verify that FILEUNIT functions correctly in assigning unique file numbers to individual code modules, that the code modules requesting a unit number are entitled to retrieve a unit number from FILEUNIT, and that sufficient unit numbers are available for the code to execute.	I	0.25
E8: FINDELEV	Perform independent calculations to verify the FINDELEV module returns the correct elevation for the coordinates provided.	I	0.25

Table A–1. Summary of Validation Tests for Primary and Secondary Utility Modules Associated with the TPA Executive (continued)			
Module	**Validation Test**	**Testing Phase**	**Effort (Person—Months)**
E9: NUMRECIP	Perform hand calculations to verify the individual numerical algorithms are returning the correct result.	I	0.25
E10: PEAKFIND	Verify the peak dose time and magnitudes in relation to dose-time data.	II	0.25
E11: RAN	Verify that random number generation has a sufficiently long cycle to ensure that serial correlation does occur.	I	0.25
E12: IAREADER	Verify that importance analysis information is transferred from *tpa.inp* and that input routines are retrieving the importance analysis information. IAREADER takes input information from the *ia.dat* file and overwrites sampled values. Therefore, testing will verify that IAREADER correctly overwrites sampled values for retrieval by other subroutines.	I	0.25
E13: EXEC (CHECKPOINT RESTART)	Verify that updated and new output files are appended correctly on restart. Verify the checkpoint file, *check.pnt,* is created, maintained, accessed, and deleted correctly and that execution can be resumed when required.	I	0.25

Table A–2. Summary of Validation Tests for Consequence Modules			
Module	**Test ID**	**Phase**	**Effort (Person—Months)**
C1: UZFLOW	C1-1	I	0.125
	C1-2	I	0.25
	C1-3	I	0.125
	C1-4	II	0.25
C2: NFENV	C2-1	I	0.25
	C2-2	II	0.25
	C2-3	II	0.25
	C2-4	II	0.50
C3: EBSFAIL	C3-1	I	0.125
	C3-2	I	0.25
	C3-3	I	0.25
	C3-4	II	0.125
	C3-5	II	0.5

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Table A–2. Summary of Validation Tests for Consequence Modules (continued)			
Module	**Test ID**	**Phase**	**Effort (Person—Months)**
C4: DSFAIL	C4-1	I	0.25
	C4-2	I	0.25
C5: WELDFAIL	C5-1	I	0.125
	C5-2	I	0.25
	C5-3	II	0.125
C6: SEISMO	No Tests	NA	
C7: EBSREL	C7-1	I	0.125
	C7-2	I	0.5
	C7-3	I	0.125
	C7-4	II	0.25
C8: EBSFILT	C8-1	I	0.125
	C8-2	I	0.375
	C8-3	I	0.25
	C8-4	II	0.25

Table A–2. Summary of Validation Tests for Consequence Modules (continued)			
Module	**Test ID**	**Phase**	**Effort (Person—Months)**
C9: UZFT	C9-1	I	0.375
	C9-2	I	0.125
	C9-3	I	0.5
C10: SZFT	C10-1	I	0.125
	C10-2	I	0.125
	C10-3	I	0.25
	C10-4	II	0.5
	C10-5	II	0.5
C11: DCAGW	C11-1	I	1.0
C12: FAULTO	C12-1	I	0.5
C13: VOLCANO	C13-1	I	0.25
	C13-2	I	0.25
	C13-3	I	0.25
	C13-4	I	0.25
	C13-5	I	0.25
	C13-6	I	0.25

Table A–2. Summary of Validation Tests for Consequence Modules (continued)			
Module0	**Test ID**	**Phase**	**Effort (Person—Months)**
C14: ASHPLUMO	C14-1	I	0.125
	C14-2	I	0.125
	C14-3	II	0.25
	C14-4	II	0.5
C15: ASHRMOVO	C15-1	I	0.25
	C15-2	II	0.5
C16: DCAGS	C16-1	I	0.25
	C16-2	I	0.25
	C16-3	II	0.25

Table A–3. Summary of Validation Tests for Stand-Alone Modules			
Module	**Validation Test**	**Testing Phase**	**Effort (Person—Months)**
S1: EBSFAIL to FAILT	Verify that data from WELDFAIL is correctly transferred back to EBSFAIL and subsequently to RELEASET.	I	0.0 (completed)
	Verify transfer of information to files for use by FAILT.	I	0.25
S2: EBSREL to RELEASET	Verify that the time dependent fow and fmult factors and the flow multipliers are implemented correctly.	II	0.25
	Verify transfer of information to files for use by RELEASET.	I	0.25
	Verify that information generated by EBSREL is passed through EBSFILT correctly. In addition, verify the composite information from the spent fuel and glass waste forms is correctly returned to EBSREL	I	0.5
S3: UZFT, SZFT to NEFMKS	Verify input data to NEFMKS to include colloid information. In addition, verify parameters such as immobile porosity.	I	0.5
S4: DCAGS, DCAGW to GENTPA	Verify transfer of information to and from GENTPA code.	I	0.5
S5: ASHPLUMO to ASHPLUME	Verify the transfer of information between ASHPLUMO and ASHPLUME	I	0.75
S6: SEISMO2	—	II	—

Table A–3. Summary of Validation Tests for Stand-Alone Modules (continued)			
Module	**Validation Test**	**Testing Phase**	**Effort (Person—Months)**
S7: DSFAIL to DSFAILT	Verify dryout chemistry is placed in file *fluoride.dat* for use by DSFAILT module	I	0.1
S8: SAMPLER to SNLLHS	Verify that for the distributions which may be defined in *tpa.inp*, and in particular the new distributions of: User Supplied Piecewise CDF, User Supplied Discrete, iuniform, and logbeta that the values for these distributions are correctly passed to SNLLHS. In addition, verify that invalid input information such as out of bound large sample sizes are trapped.	I	0.25

Table A–4. Summary of System Level Validation Tests			
Test-ID	**Validation Test**	**Testing Phase**	**Effort (Person—Months)**
S1	Replicate results from Canadian SYVAC-C03	III	2
S2	Replicate results from Canadian SYVAC-PR4	III	1
S3	Replicate results from Japanese H12 performance assessment	III	1

Software Change Reports

SOFTWARE CHANGE REPORT (SCR)

SCR No. (*Software Developer Assigns*): PA-SCR-444	**Software Title and Version:** TPA 5.0	**/Project No:** 20.06002.01.113

Affected Software Module(s), Description of Problem(s):

The TPA modules have an old contract number in the source header.

Change Requested by:	**Change Authorized by** (*Software Developer*):
R. Folck	R. Janetzke
Date: 2-26-03	Date: 2-28-03

Description of Change(s) or Problem Resolution (*If changes not implemented, please justify*):

The contract number was changed from NRC 02-97-009 to NRC 02-02-012.

Implemented by:	**Date:**
R. Janetzke	3-28-03

Description of Acceptance Tests:

This SCR requires documentation changes only, so no testing is required.

QA
4/8/2003

Tested by:	**Date:**

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SOFTWARE CHANGE REPORT (SCR)

SCR No. (*Software Developer Assigns*): PA-SCR-446	**Software Title and Version:** TPA 5.0a	**Project No:** 20.06002.01.113

Affected Software Module(s), Description of Problem(s): Failt.f, tpa.inp

The calculated values for *ecrit* and *ecorr* should be zero when the mode is dry oxidation in module FAILT. The *tpa.inp* file should be modified so that the new uniform distribution value is greater for CriticalRelativeHumidityAqueousCorrosion (currently 0.55) than that of CriticalRelativeHumidityHumidAirCorrosion (currently 0.401). Additionally, the mode is not properly printed in the output file *corrode.out*.

Change Requested by: O. Pensado Date: March 6, 2003	**Change Authorized by** (*Software Developer*): R. Janetzke Date: March 6, 2003

Description of Change(s) or Problem Resolution (*If changes not implemented, please justify*):

Module FAILT was modified to "zero out" the *ecrit* and *ecorr* values before printing. The mode parameter was added to the printing of the *corrode.out* values.

The *tpa.inp* value for CriticalRelativeHumidityHunidAirCorrosion was set to 0.2, and CriticalRelativeHumidityAqueousCorrosion was set to [0.242, 0.56] uniform.

Implemented by: G. Adams	**Date:** March 31, 2003

Description of Acceptance Tests:

See attachment.

Tested by: R. Janetzke	Date: April 2, 2003

Test Plan for TPA SCR# 446

Test Plan Name: Correct *ecrit* and *ecorr* values in module FAILT output files

Tested By: R. Janetzke **Date:** April 2, 2003

Host Machine: SUN Ultra-4 Server: spock **Host OS:** Solaris 5.8

Baseline Version: 5.0a **Test Version:** 5.0d

Process Level Tests

The process level tests identified in this section are designed to test the stand-alone module, FAILT. This module was modified as follows:

- The file was modified to "zero out" the *ecrit* and *ecorr* values when in dry or humid air oxidation. - Additionally, the distribution parameter for CriticalRelativeHumidityAqueousCorrosion was increased to exceed the CriticalRelativeHumidityHumidAirCorrosion value.

PL-1 Verification of Output Files

1.0 Path for Run Directory
/home/janetzke/scr446/plt1

2.0 Path for Archived Results
CD labeled SCR#446 Test Results

3.0 Environment Variables
TPA_TEST = /home/janetzke/tpa50d
TPA_DATA = /home/janetzke/tpa50d

4.0 Special Input Files or Modifications to Input Files Required:
4.1 The Set print option OutputMode to 1 in the *tpa.inp* file.
4.2 Set the number of realizations to 1 in *tpa.inp.*

5.0 Special Diagnostic Code Modifications Required: None

6.0 Program Modes to be Used
6.1 The FAILT preprocessor module is run with standard parameters.

7.0 Utility Scripts Needed to Perform the Test
None

8.0 Test Description

8.1 Objective:This test is designed to verify that the FAILT preprocessor module produces new values for *ecrit* and *ecorr*, which should be zero when in dry or humid air oxidation mode.
8.2 Assumptions: The relative humidity value in the *ebstrh.dat* file must go below the CriticalRelativeHumidityHumidAirCorrosion value of 0.2 as set in the *tpa.inp* file.
8.3 Constraints: none
8.4 Output Files: *corrode.out, echofail.out*, redirected screen output
8.5 Procedure:

```
> cp $TPA_TEST/tpa.inp .
> $TPA_TEST/tpa.e >tpa.out &
```

8.6 Pass/Fail Criteria:

1. For the *corrode.out* file the last column should contain the text 'dry oxd' for the dry air oxidation periods indicated by the humidity in *ebstrh.dat* file being less than the *humdc1* parameter in *echofail.dat*, and the last column should contain the text 'hmd oxd' for the humid air oxidation periods indicated by the humidity in *ebstrh.dat* file being greater than the *humdc1* parameter and less than the *humdc2* parameter in *echofail.dat.*

2. For the *corrode.out* file the values for *ecrit* and *ecorr* should be zero for either of the air oxidation periods. The values for general corrosion mode should be non-zero.

3. File *failt.out* should exhibit the same behavior as described for the *corrode.out* file above.

9.0 Test Results

9.1 Overall Test Status:

This test successfully **PASSED** the criteria above.

System Level Tests

None.

SOFTWARE CHANGE REPORT (SCR)

SCR No. (*Software Developer Assigns*): PA-SCR-445	**Software Title and Version:** **TPA 5.0 & TPA 5.0b**	**/Project No:** 20.06002.01.113

Affected Software Module(s), Description of Problem(s): uzft.f, and szft.f

TPA 5.0:
The TPA code aborts in NEFMKS TRACER with array overflows at realizations 277 (uzft), 562 (szft), and 914 (szft) out of 1024, when run for 100k years. These errors do not occur for runs of 20k years.
TPA 5.0b:
The TPA code aborts in NEFMKS TRACER with array overflows at realization 5 (szft) out of 1024, when run for 100k years.

Change Requested by: R. Janetzke Date: 3-3-03	**Change Authorized by** (*Software Developer*): R. Janetzke Date: 3-3-03 Ron Janetzke

Description of Change(s) or Problem Resolution (*If changes not implemented, please justify*):
TPA 5.0:
The maximum repository leg velocity in UZFT was increased from 0.2 m/yr to 1.0 m/yr.
The Rd for colloidal plutonium in a given SZFT NEFMKS leg was limited to be no more than 5 times its Rd value in the previous leg. Also the SAV leg for SZFT was limited to a minimum of 400 m. These are heuristic techniques based on the NEFMKS input files of the failed runs.
TPA 5.0b:
The Rd for colloidal americium in a given SZFT NEFMKS leg was limited to be no more than 5 times its Rd value in the following leg.

Implemented by: R. Janetzke Ron Janetzke	**Date:** **TPA 5.0** 3-22-03 RJ **TPA 5.0b** 3-27-03 RJ

Description of Acceptance Tests:

The software was tested in accordance with the Test Plan for TPA SCR #445. The software, test directories, and test results are contained on a CD labeled "TPA SCR #445 - Test Directories."

Tested by: Carol S. Scherer C. Scherer	**Date:** 4-01-03

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04/01/3

Test Plan/Report for TPA SCR #445

Test Plan Name: Heuristic Changes To Uzft and Szft To Prevent NEFMKS From Aborting

Tested By: Carol S. Scherer

Date: April 1, 2003

Host Machine: SUN Ultra-4 server: Spock

Host OS: Sun Solaris 5.8

Baseline Version: TPA 5.0
(4.2 solapps compiler)

Test Version: TPA 5.0c
(4.2 solapps compiler)

Code Modifications:

The following code modifications were made to **TPA** for SCR # 445:

1. Modified uzft.f: Maximum repository leg was increased from 0.2m/yr to 1.0 m/yr.

2. Modified szft.f: The Rd for colloidal plutonium in a given NEFMKS leg was limited to be no more than 5 times its Rd value in the previous leg. Also, the SAV leg was limited to a minimum of 400 m. The Rd for colloidal americium in a given NEFMKS leg was limited to be no more than 5 times its Rd value in the following leg.

NOTE: These are heuristic techniques based on the NEFMKS input files of the failed runs.

Testing Setup:

Directories/paths used for testing:

$HOME = /net/spock/home/cscherer
Path for base run directory: ***$HOME/tpatest/scr445/tpa50***
Path for testA run directory: ***$HOME/tpatest/scr445/tpa50a***
Path for testB run directory: ***$HOME/tpatest/scr445/tpa50b***
Path for testC run directory: ***$HOME/tpatest/scr445/tpa50c***

Environment variables:

for base runs:

TPA_TEST = $HOME*/tpatest/scr445/tpa50*
TPA_DATA = $HOME*/tpatest/scr445/tpa50*

for testA runs:

TPA_TEST = **$HOME/*tpatest/scr445/tpa50a***
TPA_DATA = **$HOME/*tpatest/scr445/tpa50a***

for testB runs:

TPA_TEST = **$HOME/*tpatest/scr445/tpa50b***
TPA_DATA = **$HOME/*tpatest/scr445/tpa50b***

for testC runs:

TPA_TEST = **$HOME/*tpatest/scr445/tpa50c***
TPA_DATA = **$HOME/*tpatest/scr445/tpa50c***

Disposition of documentation of results: All modified/new source code files, all executables used in testing, and all input/output files will be kept in the archive directories. The contents of the archive directories will be written out to a CD titled "*TPA SCR # 445 - Test Directories*" (attached).

Test preparation instructions:

1. In the directory **$HOME/*tpatest***, create the following subdirectory: ***scr445***.

2. In the directory ***scr445***, create the following subdirectories: ***tpa50, tpa50a, tpa50b*** and ***tpa50c***.

3. Copy **TPA** version 5.0 to ***tpa50***. Save a copy of *tpa.inp* as *tpa_orig.inp*. Compile **TPA** using *Makefile4.2*.

4. Copy **TPA** version 5.0a to ***tpa50a***. Save a copy of *tpa.inp* as *tpa_orig.inp*. Compile **TPA** using *Makefile4.2*.

5. Copy **TPA** version 5.0b to ***tpa50b***. Save a copy of *tpa.inp* as *tpa_orig.inp*. Compile **TPA** using *Makefile4.2*.

6. Copy **TPA** version 5.0c to ***tpa50c***. Save a copy of *tpa.inp* as *tpa_orig.inp*. Compile **TPA** using *Makefile4.2*.

Functional Level Tests:

None.

System Level Tests:

These tests are designed to demonstrate that the modified code affects overall **TPA** processing and output as planned with no unwanted side effects.

1. Name: Test Realization 277 out of 1024.

   Paths for archives of results: ***$HOME/tpatest/scr445/tpa50***
   $HOME/tpatest/scr445/tpa50a

   Special input files or modifications to input files required: none.

   Special diagnostic code modifications required: none.

   Program modes to be used: in both run directories, copy tpa_orig.inp to tpa_slt1.inp, and make the following modifications:

Set **MaximumTime**	to	1.0e05.
Set **NumberOfRealizations**	to	1024.
Set **StartAtRealization**	to	277.
Set **StopAtRealization**	to	277.

   Utility scripts needed to perform the test: none.

   Utility codes needed in the analysis of the test data: none.

   Test description:
   - objective: to show that the modified TPA will not abort at realization number 277 as the baseline TPA does.

   - assumptions: none.

   - constraints: the file *scr445_slt1.out* does not exist in either the base run or testA run directories.

   - output files to compare or examine: ***tpa50/****tpa_slt1.out* and ***tpa50a/****tpa_slt1.out*

   - step by step test procedure to be used:
     1. —> change directory to <<base run directory>>

2. copy *tpa_slt1.inp* to *tpa.inp*
3. run *tpa.e* using command "***tpa.e > scr445_slt1.out***"
4. —> change directory to <<testA run directory>>
5. copy *tpa_slt1.inp* to *tpa.inp*
6. run *tpa.e* using command "***tpa.e > scr445_slt1.out***"
7. look at files ***tpa50/****scr445_slt1.out* and ***tpa50a/****scr445_slt1.out*

- pass/fail criteria: the test passes if:

  1. ***tpa50/****scr445_slt1.out* shows that the **TPA** run aborts and ***tpa50a/****scr445_slt1.out* shows that the **TPA** run completes successfully.

Results of running test:

PASSED.

2. Name: Test Realization 562 out of 1024.

Paths for archives of results: ***$HOME/tpatest/scr445/tpa50***
$HOME/tpatest/scr445/tpa50a

Special input files or modifications to input files required: none.

Special diagnostic code modifications required: none.

Program modes to be used: in both run directories, copy tpa_orig.inp to tpa_slt2.inp, and make the following modifications:

Set **MaximumTime**	to	1.0e05.
Set **NumberOfRealizations**	to	1024.
Set **StartAtRealization**	to	562.
Set **StopAtRealization**	to	562.

Utility scripts needed to perform the test: none.

Utility codes needed in the analysis of the test data: none.

Test description:

- objective: to show that the modified TPA will not abort at realization number 562 as the baseline TPA does.

- assumptions: none.

- constraints: the file *scr445_slt2.out* does not exist in either the base run or testA run directories.

- output files to compare or examine: ***tpa50/****tpa_slt2.out* and ***tpa50a/****tpa_slt2.out*

- step by step test procedure to be used:
  1. —> change directory to <<base run directory>>
  2. copy *tpa_slt2.inp* to *tpa.inp*
  3. run *tpa.e* using command "***tpa.e > scr445_slt2.out***"
  4. —> change directory to <<test run directory>>
  5. copy *tpa_slt2.inp* to *tpa.inp*
  6. run *tpa.e* using command "***tpa.e > scr445_slt2.out***"
  7. look at files ***tpa50/****scr445_slt2.out* and ***tpa50a/****scr445_slt2.out*

- pass/fail criteria: the test passes if:

  1. ***tpa50/****scr445_slt2.out* shows that the **TPA** run aborts and ***tpa50a/****scr445_slt2.out* shows that the **TPA** run completes successfully.

Results of running test:

PASSED.

3. Name: Test Realization 914 out of 1024.

Paths for archives of results: ***$HOME/tpatest/scr445/tpa50***
$HOME/tpatest/scr445/tpa50a

Special input files or modifications to input files required: none.

Special diagnostic code modifications required: none.

Program modes to be used: in both run directories, copy tpa_orig.inp to tpa_slt3.inp, and make the following modifications:

Set **MaximumTime**	to	1.0e05.
Set **NumberOfRealizations**	to	1024.
Set **StartAtRealization**	to	914.
Set **StopAtRealization**	to	914.

Utility scripts needed to perform the test: none.

Utility codes needed in the analysis of the test data: none.

Test description:

- objective: to show that the modified TPA will not abort at realization number 914 as the baseline TPA does.

- assumptions: none.

- constraints: the file *scr445_slt3.out* does not exist in either the base run or testA run directories.

- output files to compare or examine: ***tpa50/****tpa_slt3.out* and ***tpa50a/****tpa_slt3.out*

- step by step test procedure to be used:
  1. —> change directory to <<base run directory>>
  2. copy *tpa_slt3.inp* to *tpa.inp*
  3. run *tpa.e* using command "***tpa.e > scr445_slt3.out***"
  4. —> change directory to <<test run directory>>
  5. copy *tpa_slt3.inp* to *tpa.inp*
  6. run *tpa.e* using command "***tpa.e > scr445_slt3.out***"
  7. look at files ***tpa50/****scr445_slt3.out* and ***tpa50a/****scr445_slt3.out*

- pass/fail criteria: the test passes if:

  1. ***tpa50/****scr445_slt3.out* shows that the **TPA** run aborts and ***tpa50a/****scr445_slt3.out* shows that the **TPA** run completes successfully.

Results of running test:

PASSED.

4. Name: Test Realization 5 out of 1024.

Paths for archives of results: ***$HOME/tpatest/scr445/tpa50b***
$HOME/tpatest/scr445/tpa50c

Special input files or modifications to input files required: none.

Special diagnostic code modifications required: none.

Program modes to be used: in both run directories, copy tpa_orig.inp to tpa_slt4.inp, and make the following modifications:

Set **MaximumTime**	to	1.0e05.
Set **NumberOfRealizations**	to	1024.
Set **StartAtRealization**	to	5.
Set **StopAtRealization**	to	5.

Utility scripts needed to perform the test: none.

Utility codes needed in the analysis of the test data: none.

Test description:

- objective: to show that the modified TPA will not abort at realization number 5 as TPA version 5.0b does.

- assumptions: none.

- constraints: the file *scr445_slt3.out* does not exist in either the testB run or testC run directories.

- output files to compare or examine: ***tpa50b/****tpa_slt4.out* and ***tpa50c/****tpa_slt4.out*

- step by step test procedure to be used:
  1. —> change directory to <<testb run directory>>
  2. copy *tpa_slt4.inp* to *tpa.inp*
  3. run *tpa.e* using command "***tpa.e > scr445_slt4.out***"
  4. —> change directory to <<testc run directory>>
  5. copy *tpa_slt4.inp* to *tpa.inp*
  6. run *tpa.e* using command "***tpa.e > scr445_slt4.out***"
  7. look at files ***tpa50b/****scr445_slt4.out* and ***tpa50c/****scr445_slt4.out*

- pass/fail criteria: the test passes if:

  1. ***tpa50b****/scr445_slt3.out* shows that the **TPA** run aborts and ***tpa50c****/scr445_slt3.out* shows that the **TPA** run completes successfully.

Results of running test:

PASSED.

NOTES:

1. A 1024-realization TPA run at 100,000 years (base case is 10,000) aborted when uzft called NEFTRAN at realization 277. A modification to the code was made and TPA aborted when szft called NEFTRAN at realization 562. Another modification to the code was made, but TPA now aborted when szft called NEFTRAN at realization 914. A third modification was made to TPA. No more runs aborted, and this version became TPA 5.0a. These original modifications are tested by System Level Tests 1 - 3.

2 After the first three test cases were run using TPA 5.0 and TPA 5.0a, another modification to the TPA code (5.0b) caused a similar failure when szft called NEFTRAN. This was corrected in TPA 5.0c. System Level Test 4 was added to test this correction.

3. The three original SLTs were also run using TPA 5.0c. They passed.

```
scr445:
total 34
drwxr-xr-x   7 cscherer sunuser       512 Apr  1 09:15 .
drwxr-xr-x   4 cscherer sunuser       512 Apr  1 15:08 ..
drwxr-xr-x   2 cscherer sunuser       512 Apr  1 13:40 docs
drwxr-xr-x   5 cscherer sunuser      7680 Mar 26 10:46 tpa50
drwxr-xr-x   6 cscherer sunuser      7680 Mar 31 10:50 tpa50a
drwxr-xr-x   5 cscherer sunuser      7168 Apr  1 09:58 tpa50b
drwxr-xr-x   5 cscherer sunuser      7680 Apr  1 15:07 tpa50c

scr445/docs:
total 113
drwxr-xr-x   2 cscherer sunuser       512 Apr  1 13:40 .
drwxr-xr-x   7 cscherer sunuser       512 Apr  1 09:15 ..
-rwxr--r--   1 cscherer sunuser     16722 Apr  1 10:52 scr_445.wpd
-rwxr--r--   1 cscherer sunuser     16566 Mar 25 13:22 scr_445a.wpd
-r-xr--r--   1 cscherer sunuser     17667 Mar 31 15:03 scr_445b.wpd
-rwxr--r--   1 cscherer sunuser     59537 Apr  1 13:44 tp_scr445.wpd

scr445/tpa50:
total 24290
drwxr-xr-x   5 cscherer sunuser      7680 Mar 26 10:46 .
drwxr-xr-x   7 cscherer sunuser       512 Apr  1 09:15 ..
-rwxr-xr-x   1 cscherer sunuser      2001 Sep 18  2002 CLEANUP
-rw-r--r--   1 cscherer sunuser    113552 Mar 25 11:22 Chain01
-rw-r--r--   1 cscherer sunuser    141936 Mar 25 11:22 Chain02
-rw-r--r--   1 cscherer sunuser    113552 Mar 25 11:22 Chain03
-rw-r--r--   1 cscherer sunuser     85168 Mar 25 11:22 Chain04
-rw-r--r--   1 cscherer sunuser    170320 Mar 25 11:22 Chain05
-rw-r--r--   1 cscherer sunuser     85168 Mar 25 11:22 Chain06
-rw-r--r--   1 cscherer sunuser     85168 Mar 25 11:22 Chain07
-rw-r--r--   1 cscherer sunuser     85168 Mar 25 11:22 Chain08
-rw-r--r--   1 cscherer sunuser     85168 Mar 25 11:22 Chain09
-rw-r--r--   1 cscherer sunuser     85168 Mar 25 11:22 Chain10
-rw-r--r--   1 cscherer sunuser     85168 Mar 25 11:22 Chain11
-rw-r--r--   1 cscherer sunuser     85168 Mar 25 11:22 Chain12
-rw-r--r--   1 cscherer sunuser     85168 Mar 25 11:22 Chain13
-rw-r--r--   1 cscherer sunuser     10552 Mar 25 11:22 Chain14
-rw-r--r--   1 cscherer sunuser    105200 Mar 25 11:22 Chain15
-rw-r--r--   1 cscherer sunuser      5104 Mar 25 11:22 Chain16
-rw-r--r--   1 cscherer sunuser         0 Mar 25 11:21 Chain17
-rw-r--r--   1 cscherer sunuser         0 Mar 25 11:21 Chain18
-rw-r--r--   1 cscherer sunuser       965 Feb 27 15:20 FILENAME.DAT
-rw-r--r--   1 cscherer sunuser       869 Nov 27 14:22 Makefile
-rw-rw-rw-   1 cscherer sunuser       961 Nov 27 14:24 Makefile4.2
-rw-r--r--   1 cscherer sunuser      2493 Mar 25 11:21 NEFII.VEL
-rw-r--r--   1 cscherer sunuser     69848 Mar 25 11:21 TAPE24
-rw-r--r--   1 cscherer sunuser      2007 Mar 25 11:22 airpkdos.res
-rw-r--r--   1 cscherer sunuser      2007 Mar 25 11:22 arpkds_c.res
-rw-r--r--   1 cscherer sunuser     29502 Feb 26 13:33 array.f
-rw-r--r--   1 cscherer sunuser       783 Mar 25 11:22 ashout.res
-rw-r--r--   1 cscherer sunuser     20686 Feb 26 13:33 ashplumo.f
-rw-r--r--   1 cscherer sunuser     37705 Feb 26 13:33 ashrmovo.f
-rw-r--r--   1 cscherer sunuser      1025 Mar 25 11:20 burnup.dat
drwxr-xr-x   2 cscherer sunuser       512 Feb 27 09:43 ccdf
-rwxrwxrwx   1 cscherer sunuser       154 Mar 25 11:12 ch_env
-rw-r--r--   1 cscherer sunuser      7547 Mar 25 11:21 chlrdmf.dat
```

```
-rw-r--r--   1 cscherer sunuser    850000 Mar 25 11:21 climato1.dat
-rw-r--r--   1 cscherer sunuser      2200 Mar 25 11:21 climato2.dat
drwxr-xr-x   4 cscherer sunuser      1024 Mar 26 10:46 codes
-rw-r--r--   1 cscherer sunuser      6219 Mar 25 11:21 coefkdeq.dat
-rw-r--r--   1 cscherer sunuser       735 Feb 18 18:46 coefkdeq.i
-rw-r--r--   1 cscherer sunuser     10207 Feb 26 13:33 condxyzt.f
-rw-r--r--   1 cscherer sunuser     18056 Mar 25 11:21 corrode.out
-rw-r--r--   1 cscherer sunuser     79222 Mar 25 11:22 cp.tpa
-rw-r--r--   1 cscherer sunuser       687 Mar 25 11:22 cumrel.res
-rw-r--r--   1 cscherer sunuser       687 Mar 25 11:22 cumrel_c.res
-rw-r--r--   1 cscherer sunuser     69680 Mar 25 11:21 cumrelse.out
drwxr-xr-x   2 cscherer sunuser      1536 Feb 27 09:43 data
-rw-r--r--   1 cscherer sunuser    124149 Feb 26 13:33 dcags.f
-rw-r--r--   1 cscherer sunuser    157666 Feb 26 13:33 dcagw.f
-rw-r--r--   1 cscherer sunuser      9993 Mar 25 11:21 deltaec.inp
-rw-r--r--   1 cscherer sunuser     14700 Mar 25 11:21 diagnose.out
-rw-r--r--   1 cscherer sunuser      2200 Feb 27 15:20 dilution.dat
-rw-r--r--   1 cscherer sunuser      3870 Mar 25 11:20 drifts.dat
-rw-r--r--   1 cscherer sunuser       190 Sep 20  2002 driftsa.i
-rw-r--r--   1 cscherer sunuser       519 Mar 25 11:21 drythick.dat
-rw-r--r--   1 cscherer sunuser     25470 Feb 26 11:04 dsfail.f
-rw-r--r--   1 cscherer sunuser       776 Mar 25 11:22 dsfail.res
-rw-r--r--   1 cscherer sunuser      2545 Mar 25 11:21 dsfailt.dat
-rw-r--r--   1 cscherer sunuser       791 Mar 25 11:21 dsfailt.def
-rwxr-xr-x   1 cscherer sunuser     43168 Mar 25 11:21 dsfailt.e
-rw-r--r--   1 cscherer sunuser       610 Mar 25 11:21 dsfailt.inp
-rw-r--r--   1 cscherer sunuser         0 Mar 25 11:21 dsfailt.out
-rw-r--r--   1 cscherer sunuser     65260 Mar 25 11:21 ebscld.out
-rw-r--r--   1 cscherer sunuser      5973 Mar 25 11:21 ebsfail.def
-rw-r--r--   1 cscherer sunuser     49153 Feb 26 13:33 ebsfail.f
-rw-r--r--   1 cscherer sunuser      5734 Mar 25 11:21 ebsfail.inp
-rw-r--r--   1 cscherer sunuser       790 Mar 25 11:21 ebsfilt.def
-rwxr-xr-x   1 cscherer sunuser     46524 Mar 25 11:21 ebsfilt.e
-rw-r--r--   1 cscherer sunuser      2554 Mar 25 11:21 ebsfilt.inp
-rw-r--r--   1 cscherer sunuser       239 Mar 25 11:21 ebsfilt.out
-rw-r--r--   1 cscherer sunuser     20929 Mar 25 11:21 ebsflo.dat
-rw-r--r--   1 cscherer sunuser    251401 Mar 25 11:21 ebsnef.dat
-rw-r--r--   1 cscherer sunuser    186252 Mar 25 11:21 ebsnef.out
-rw-r--r--   1 cscherer sunuser    658449 Mar 25 11:21 ebsnef2.dat
-rw-r--r--   1 cscherer sunuser      1883 Mar 25 11:21 ebspac.nuc
-rw-r--r--   1 cscherer sunuser      5459 Mar 25 11:21 ebsrel.def
-rw-r--r--   1 cscherer sunuser     87035 Feb 26 13:33 ebsrel.f
-rw-r--r--   1 cscherer sunuser     11110 Mar 25 11:21 ebsrel.inp
-rw-r--r--   1 cscherer sunuser       149 Sep 25  2002 ebsrel1.i
-rw-r--r--   1 cscherer sunuser    186203 Mar 25 11:21 ebssf.dat
-rw-r--r--   1 cscherer sunuser     25497 Mar 25 11:21 ebstrh.dat
-rw-r--r--   1 cscherer sunuser     18435 Mar 25 11:21 ebstrhc.inp
-rw-r--r--   1 cscherer sunuser      2647 Mar 25 11:21 echofail.dat
-rw-r--r--   1 cscherer sunuser    667001 Mar 25 11:21 echofilt.dat
-rwxr-xr-x   1 cscherer sunuser    196696 Feb 27 15:20 env.e
-rwxr-xr-x   1 cscherer sunuser    284384 Feb 27 15:20 envin.e
-rw-r--r--   1 cscherer sunuser       958 Mar 25 11:22 epa_ave.out
-rw-r--r--   1 cscherer sunuser      1336 Mar 25 11:22 epapktim.out
-rw-r--r--   1 cscherer sunuser    389673 Feb 26 13:33 exec.f
-rw-r--r--   1 cscherer sunuser      2385 Sep 21  2002 execa.i
-rw-r--r--   1 cscherer sunuser       486 Sep  3  1997 execb.i
-rw-r--r--   1 cscherer sunuser       269 May 29  2002 execc.i
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-rw-r--r--   1 cscherer sunuser       104 Feb  6 14:32 execd.i
-rwxr-xr-x   1 cscherer sunuser    136672 Mar 25 11:21 failt.e
-rw-r--r--   1 cscherer sunuser     21614 Mar 25 11:21 failt.out
-rw-r--r--   1 cscherer sunuser      8503 Feb 26 13:33 faulto.f
-rw-r--r--   1 cscherer sunuser      6656 Feb 26 13:33 fileunit.f
-rw-r--r--   1 cscherer sunuser      5784 Feb 26 13:33 findelev.f
-rw-r--r--   1 cscherer sunuser      9381 Mar 25 11:21 fluoride.dat
-rw-r--r--   1 cscherer sunuser     69680 Mar 25 11:21 frac_rel.out
-rw-r--r--   1 cscherer sunuser        60 Aug 16  1997 fu1.i
-rw-r--r--   1 cscherer sunuser       609 Sep  4  2002 fu2.i
-rw-r--r--   1 cscherer sunuser      2359 Mar 10 14:05 func.out
-rw-r--r--   1 cscherer sunuser      6513 Feb 27 15:20 gbioac1.dat
-rw-r--r--   1 cscherer sunuser      3383 Feb 27 15:20 gdefault.def
-rw-r--r--   1 cscherer sunuser      3387 Feb 27 15:20 gdefault.inp
-rw-r--r--   1 cscherer sunuser        64 Feb 27 15:20 gdosinc2.dat
-rw-r--r--   1 cscherer sunuser         0 Feb 27 15:20 gentoo.out
-rw-r--r--   1 cscherer sunuser     35173 Feb 27 15:20 genv.in
-rw-r--r--   1 cscherer sunuser     18393 Feb 27 15:20 genv.out
-rw-r--r--   1 cscherer sunuser      7011 Feb 27 15:20 gftrans.def
-rw-r--r--   1 cscherer sunuser      7142 Feb 27 15:20 gftrans.inp
-rw-r--r--   1 cscherer sunuser     15214 Feb 27 15:20 ggamen.dat
-rw-r--r--   1 cscherer sunuser     13855 Feb 27 15:20 ggenii.def
-rw-r--r--   1 cscherer sunuser     13164 Feb 27 15:20 ggenii.inp
-rw-r--r--   1 cscherer sunuser     10074 Feb 27 15:20 ggenii.out
-rw-r--r--   1 cscherer sunuser      5351 Feb 27 15:20 ggrdf.dat
-rw-r--r--   1 cscherer sunuser      5673 Feb 27 15:20 gmedia.out
-rw-r--r--   1 cscherer sunuser      9897 Feb 27 15:20 gnewdf.dat
-rw-r--r--   1 cscherer sunuser     13200 Feb 27 15:20 grmdlib.dat
-rw-r--r--   1 cscherer sunuser       567 Feb 27 15:21 gsccdf.res
-rw-r--r--   1 cscherer sunuser       567 Feb 27 15:21 gsccdf_c.res
-rw-r--r--   1 cscherer sunuser      3561 Feb 27 15:20 gw_cb_ad.dat
-rw-r--r--   1 cscherer sunuser      1264 Feb 27 15:20 gw_cb_ci.dat
-rw-r--r--   1 cscherer sunuser      3557 Feb 27 15:20 gw_pb_ad.dat
-rw-r--r--   1 cscherer sunuser      1261 Feb 27 15:20 gw_pb_ci.dat
-rw-r--r--   1 cscherer sunuser       567 Feb 27 15:21 gwccdf.res
-rw-r--r--   1 cscherer sunuser       567 Feb 27 15:21 gwccdf_c.res
-rw-r--r--   1 cscherer sunuser         9 Feb 27 15:20 gwork.buf
-rw-r--r--   1 cscherer sunuser      1335 Mar 25 11:22 gwpkdos.res
-rw-r--r--   1 cscherer sunuser      1335 Mar 25 11:22 gwpkds_c.res
-rw-r--r--   1 cscherer sunuser      1623 Mar 25 11:22 gwttuzsz.res
-rw-r--r--   1 cscherer sunuser      1229 Jul 22  1999 ia.i
-rw-r--r--   1 cscherer sunuser       956 Sep 26  2000 ia1.i
-rw-r--r--   1 cscherer sunuser     21238 Feb 26 13:33 iareader.f
-rw-r--r--   1 cscherer sunuser       687 Mar 25 11:22 infilper.res
-rw-r--r--   1 cscherer sunuser      1102 Mar 25 11:21 inv1000.out
-rw-r--r--   1 cscherer sunuser     69562 Feb 26 13:33 invent.f
-rw-r--r--   1 cscherer sunuser        33 Sep 25  2002 invent_.i
-rw-r--r--   1 cscherer sunuser        57 Aug 16  1997 inventa.i
-rw-r--r--   1 cscherer sunuser       182 Sep 25  2002 inventb.i
-rw-r--r--   1 cscherer sunuser       344 Sep 25  2002 inventc.i
-rw-r--r--   1 cscherer sunuser       124 Sep 25  2002 inventd.i
-rw-r--r--   1 cscherer sunuser       131 Sep 25  2002 invente.i
-rw-r--r--   1 cscherer sunuser       130 Sep 25  2002 inventf.i
-rw-r--r--   1 cscherer sunuser       128 Sep 25  2002 inventg.i
-rw-r--r--   1 cscherer sunuser       127 Sep 25  2002 inventh.i
-rw-r--r--   1 cscherer sunuser        75 Aug 16  1997 inventi.i
-rw-r--r--   1 cscherer sunuser       288 Sep 25  2002 inventj.i
```

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-rw-r--r--   1 cscherer sunuser       332 Sep 25  2002 inventk.i
-rw-r--r--   1 cscherer sunuser       150 Dec  6 14:29 inventl.i
-rw-r--r--   1 cscherer sunuser       315 Dec 11 09:33 inventm.i
-rw-r--r--   1 cscherer sunuser       175 Sep 25  2002 inventn.i
-rw-r--r--   1 cscherer sunuser       249 Jan 29  2000 invento.i
-rw-r--r--   1 cscherer sunuser       267 Sep 25  2002 inventp.i
-rw-r--r--   1 cscherer sunuser         0 Feb 27 15:17 lhs.csv
-rw-r--r--   1 cscherer sunuser     47014 Mar 25 11:20 lhs.inp
-rw-r--r--   1 cscherer sunuser   5867520 Mar 25 11:21 lhs.out
-rw-r--r--   1 cscherer sunuser     78602 Mar 25 11:21 lhse.out
-rw-r--r--   1 cscherer sunuser        78 Aug 16  1997 max500yr.i
-rw-r--r--   1 cscherer sunuser        99 Sep 25  2002 maxchain.i
-rw-r--r--   1 cscherer sunuser       149 Sep 25  2002 maxclchn.i
-rw-r--r--   1 cscherer sunuser       144 Sep 25  2002 maxclnuc.i
-rw-r--r--   1 cscherer sunuser       508 Sep 25  2002 maxnnucl.i
-rw-r--r--   1 cscherer sunuser       299 Jul 10  1998 maxnsuba.i
-rw-r--r--   1 cscherer sunuser       206 May 28  1999 maxntime.i
-rw-r--r--   1 cscherer sunuser      1095 Mar 25 11:21 maxrel.dat
-rwxr-xr-x   1 cscherer sunuser    943775 Mar 25 11:21 maydtbl.dat
-rw-r--r--   1 cscherer sunuser     47368 Mar 25 11:21 mechfail.dat
-rw-r--r--   1 cscherer sunuser      9729 Mar 25 11:21 mechfail.def
-rwxr-xr-x   1 cscherer sunuser     87652 Mar 25 11:21 mechfail.e
-rw-r--r--   1 cscherer sunuser     28103 Mar 25 11:21 mechfail.inp
-rw-r--r--   1 cscherer sunuser         0 Mar 25 11:21 mechfail.out
-rw-r--r--   1 cscherer sunuser      1251 Mar 25 11:21 multifaf.dat
-rw-r--r--   1 cscherer sunuser      1252 Mar 25 11:21 multifbe.dat
-rw-r--r--   1 cscherer sunuser     11850 Feb 26 13:33 mv.f
-rw-r--r--   1 cscherer sunuser       532 Mar 25 11:22 mv.tpa
-rw-r--r--   1 cscherer sunuser       111 Sep  4  1997 mva.i
-rw-r--r--   1 cscherer sunuser        56 Aug 16  1997 mvb.i
-rw-r--r--   1 cscherer sunuser        57 Aug 16  1997 mvc.i
-rw-r--r--   1 cscherer sunuser       101 Aug 16  1997 mvd.i
-rw-r--r--   1 cscherer sunuser        72 Aug 16  1997 mve.i
-rw-r--r--   1 cscherer sunuser        72 Aug 16  1997 mvf.i
-rw-r--r--   1 cscherer sunuser       687 Mar 25 11:22 nearfld.res
-rw-r--r--   1 cscherer sunuser       125 Mar 25 11:22 nefii.dis
-rw-r--r--   1 cscherer sunuser     11320 Mar 25 11:21 nefii.inp
-rw-r--r--   1 cscherer sunuser   2157455 Mar 25 11:22 nefii.out
-rw-r--r--   1 cscherer sunuser       603 Mar 25 11:21 nefii.rel
-rw-r--r--   1 cscherer sunuser     28253 Feb 27 15:20 nefiisz.dis
-rw-r--r--   1 cscherer sunuser     10104 Feb 27 15:20 nefiisz.inp
-rw-r--r--   1 cscherer sunuser    164022 Feb 27 15:20 nefiisz.out
-rw-r--r--   1 cscherer sunuser    174414 Feb 27 15:20 nefiisz.src
-rw-r--r--   1 cscherer sunuser       450 Feb 27 15:20 nefiisz.vel
-rw-r--r--   1 cscherer sunuser    245829 Mar 25 11:21 nefiiuz.dis
-rw-r--r--   1 cscherer sunuser     10100 Mar 25 11:21 nefiiuz.inp
-rw-r--r--   1 cscherer sunuser    413356 Mar 25 11:21 nefiiuz.out
-rw-r--r--   1 cscherer sunuser    313886 Mar 25 11:21 nefiiuz.src
-rw-r--r--   1 cscherer sunuser       543 Mar 25 11:21 nefiiuz.vel
-rwxr-xr-x   1 cscherer sunuser    402472 Mar 25 11:21 nefmks.e
-rw-r--r--   1 cscherer sunuser       120 Mar 25 11:21 nefmks.log
-rw-r--r--   1 cscherer sunuser    113027 Feb 26 13:33 nfenv.f
-rw-r--r--   1 cscherer sunuser       326 Nov 17 18:24 nfenvadj.i
-rw-r--r--   1 cscherer sunuser        94 Aug 16  1997 nintv.i
-rw-r--r--   1 cscherer sunuser      1502 Jun 11  1997 notice.i
-rw-r--r--   1 cscherer sunuser      1847 Mar 25 11:22 npkdoset.res
-rw-r--r--   1 cscherer sunuser      1847 Mar 25 11:22 npkdst_c.res
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-rw-r--r--   1 cscherer sunuser      7152 Mar 25 11:20 nuclides.dat
-rw-r--r--   1 cscherer sunuser      6579 Feb 26 13:33 numrecip.f
-rw-r--r--   1 cscherer sunuser      7111 Feb 27 15:20 organdf.dat
-rw-r--r--   1 cscherer sunuser       259 Aug 16  1997 path.i
-rw-r--r--   1 cscherer sunuser      6584 Feb 26 13:33 peakfind.f
-rw-r--r--   1 cscherer sunuser       698 Feb 27 15:21 pkmndose.out
-rw-r--r--   1 cscherer sunuser      1239 Mar 25 11:22 pkreltim.res
-rw-r--r--   1 cscherer sunuser      1239 Mar 25 11:22 pkrltm_c.res
-rw-r--r--   1 cscherer sunuser     46322 Feb 26 13:33 ran.f
-rw-r--r--   1 cscherer sunuser    148524 Feb 26 13:33 reader.f
-rw-r--r--   1 cscherer sunuser       185 May 21  1998 reader.i
-rw-r--r--   1 cscherer sunuser       106 Aug 27  1999 reader1.i
-rw-r--r--   1 cscherer sunuser        58 Aug 27  1999 reader2.i
-rw-r--r--   1 cscherer sunuser       102 Aug 27  1999 reader3.i
-rw-r--r--   1 cscherer sunuser        89 Aug 27  1999 reader4.i
-rw-r--r--   1 cscherer sunuser        58 Aug 16  1997 reflux2.i
-rw-r--r--   1 cscherer sunuser       899 Mar 25 11:21 rel_flow.out
-rw-r--r--   1 cscherer sunuser       567 Feb 27 15:21 relccdf.res
-rw-r--r--   1 cscherer sunuser      2883 Mar 25 11:21 relcum.out
-rwxr-xr-x   1 cscherer sunuser    122584 Mar 25 11:21 releaset.e
-rw-r--r--   1 cscherer sunuser       415 Mar 25 11:21 releaset.out
-rw-r--r--   1 cscherer sunuser       773 Mar 25 11:21 relfrac.out
-rw-r--r--   1 cscherer sunuser       655 Mar 25 11:22 relgwgs.res
-rw-r--r--   1 cscherer sunuser       548 Mar 25 11:20 repdes.dat
-rw-r--r--   1 cscherer sunuser       692 Mar 25 11:22 rgwna.tpa
-rw-r--r--   1 cscherer sunuser       692 Mar 25 11:22 rgwnapani.tpa
-rw-r--r--   1 cscherer sunuser       692 Mar 25 11:22 rgwnapdw.tpa
-rw-r--r--   1 cscherer sunuser       692 Mar 25 11:22 rgwnapext.tpa
-rw-r--r--   1 cscherer sunuser       692 Mar 25 11:22 rgwnapinh.tpa
-rw-r--r--   1 cscherer sunuser       692 Mar 25 11:22 rgwnapmlk.tpa
-rw-r--r--   1 cscherer sunuser       692 Mar 25 11:22 rgwnappla.tpa
-rw-r--r--   1 cscherer sunuser       692 Mar 25 11:22 rgwnr.tpa
-rw-r--r--   1 cscherer sunuser       532 Mar 25 11:22 rgwsa.tpa
-rw-r--r--   1 cscherer sunuser       532 Mar 25 11:22 rgwsap.tpa
-rw-r--r--   1 cscherer sunuser       532 Mar 25 11:22 rgwsr.tpa
-rw-r--r--   1 cscherer sunuser       567 Feb 27 15:21 rlccdf_c.res
-rw-r--r--   1 cscherer sunuser       655 Mar 25 11:22 rlgwgs_c.res
-rw-r--r--   1 cscherer sunuser     95694 Feb 26 13:33 sampler.f
-rw-r--r--   1 cscherer sunuser        62 Aug 16  1997 sampler0.i
-rw-r--r--   1 cscherer sunuser        79 Aug 16  1997 sampler1.i
-rw-r--r--   1 cscherer sunuser        62 Aug 16  1997 sampler2.i
-rw-r--r--   1 cscherer sunuser       178 Apr  3  1998 sampler3.i
-rw-r--r--   1 cscherer sunuser       145 Sep 19  2000 sampler4.i
-rw-r--r--   1 cscherer sunuser        62 Aug 16  1997 samplera.i
-rw-r--r--   1 cscherer sunuser        62 Aug 16  1997 samplerb.i
-rw-r--r--   1 cscherer sunuser        62 Aug 16  1997 samplerc.i
-rw-r--r--   1 cscherer sunuser        68 Aug 16  1997 samplerd.i
-rw-r--r--   1 cscherer sunuser       133 Aug 16  1997 samplere.i
-rw-r--r--   1 cscherer sunuser       111 Aug 16  1997 samplerf.i
-rw-r--r--   1 cscherer sunuser        84 Aug 16  1997 samplerg.i
-rw-r--r--   1 cscherer sunuser        68 Aug 16  1997 samplerh.i
-rw-r--r--   1 cscherer sunuser        83 Aug 16  1997 sampleri.i
-rw-r--r--   1 cscherer sunuser        61 Aug 16  1997 samplerj.i
-rw-r--r--   1 cscherer sunuser       208 Aug 16  1997 samplerk.i
-rw-r--r--   1 cscherer sunuser       104 Aug 16  1997 samplerl.i
-rw-r--r--   1 cscherer sunuser        63 Aug 16  1997 samplerm.i
-rw-r--r--   1 cscherer sunuser        79 Aug 16  1997 samplern.i
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-rw-r--r--   1 cscherer sunuser        63 Aug 16  1997 samplero.i
-rw-r--r--   1 cscherer sunuser       260 Mar 14  2002 samplerp.i
-rw-r--r--   1 cscherer sunuser       103 Aug 16  1997 samplerq.i
-rw-r--r--   1 cscherer sunuser       176 Aug 16  1997 samplerr.i
-rw-r--r--   1 cscherer sunuser       336 Apr  3  1998 samplers.i
-rw-r--r--   1 cscherer sunuser        70 Aug 16  1997 samplert.i
-rw-r--r--   1 cscherer sunuser        69 Aug 16  1997 sampleru.i
-rw-r--r--   1 cscherer sunuser        62 Aug 16  1997 samplerv.i
-rw-r--r--   1 cscherer sunuser        60 Aug 16  1997 samplerw.i
-rw-r--r--   1 cscherer sunuser       406 Feb 22 16:36 samplerx.i
-rw-r--r--   1 cscherer sunuser       299 Apr 30  2001 samplery.i
-rw-r--r--   1 cscherer sunuser        60 Aug 16  1997 samplerz.i
-rw-r--r--   1 cscherer sunuser      3862 Mar 25 11:20 samplpar.abb
-rw-r--r--   1 cscherer sunuser     29762 Mar 25 11:20 samplpar.hdr
-rw-r--r--   1 cscherer sunuser       641 Mar 25 11:22 samplpar.res
-rw-r--r--   1 cscherer sunuser       322 Nov 17 18:24 seisadj.i
-rwxr-xr-x   1 cscherer sunuser    130758 Mar 25 11:21 seisbs1.dis
-rwxr-xr-x   1 cscherer sunuser    130758 Mar 25 11:21 seisbs2.dis
-rw-r--r--   1 cscherer sunuser     74226 Feb 26 13:23 seismo2.f
-rwxrwxrwx   1 cscherer sunuser        30 Sep 12  2002 show_env
-rwxr-xr-x   1 cscherer sunuser    943788 Mar 25 11:21 smaydtbl.dat
-rwxr-xr-x   1 cscherer sunuser    251756 Mar 25 11:20 snllhs.e
-rw-r--r--   1 cscherer sunuser    309782 Mar 25 11:21 sotnef.dat
-rw-r--r--   1 cscherer sunuser     23123 Mar 25 11:22 sp.tpa
-rw-r--r--   1 cscherer sunuser       144 Sep  3  1997 stop.i
-rw-r--r--   1 cscherer sunuser      4506 Mar 25 11:21 strmtube.dat
-rw-r--r--   1 cscherer sunuser     11106 Mar 10 14:04 sub.out
-rw-r--r--   1 cscherer sunuser     38339 Feb 26 13:33 subarea.f
-rw-r--r--   1 cscherer sunuser       255 Feb  4  2000 subareaa.i
-rw-r--r--   1 cscherer sunuser        79 Aug 16  1997 subareab.i
-rw-r--r--   1 cscherer sunuser        82 Aug 16  1997 subareac.i
-rw-r--r--   1 cscherer sunuser        81 Aug 16  1997 subaread.i
-rw-r--r--   1 cscherer sunuser        77 Aug 16  1997 subareae.i
-rw-r--r--   1 cscherer sunuser        60 Feb  3  2000 subareaf.i
-rw-r--r--   1 cscherer sunuser        64 Feb  2  2000 subareag.i
-rw-r--r--   1 cscherer sunuser    117211 Feb 26 13:57 szft.f
-rw-r--r--   1 cscherer sunuser       264 Nov 17 18:23 szft.i
-rw-r--r--   1 cscherer sunuser       655 Mar 25 11:22 totdos_c.res
-rw-r--r--   1 cscherer sunuser       655 Mar 25 11:22 totdose.res
-rwxr-xr-x   1 cscherer sunuser   2528108 Mar 24 12:30 tpa.e
-rw-r--r--   1 cscherer sunuser     91432 Mar 25 11:08 tpa.inp
-rw-r--r--   1 cscherer sunuser     22841 Feb 27 15:21 tpa.out
-rw-r--r--   1 cscherer sunuser     91425 Feb 26 13:33 tpa_orig.inp
-rw-r--r--   1 cscherer sunuser     91432 Mar 25 11:07 tpa_slt1.inp
-rw-r--r--   1 cscherer sunuser      3480 Mar 25 11:14 tpa_slt1.out
-rw-r--r--   1 cscherer sunuser     91432 Mar 25 11:08 tpa_slt2.inp
-rw-r--r--   1 cscherer sunuser      3919 Mar 25 11:16 tpa_slt2.out
-rw-r--r--   1 cscherer sunuser     91432 Mar 25 11:08 tpa_slt3.inp
-rw-r--r--   1 cscherer sunuser      4073 Mar 25 11:22 tpa_slt3.out
-rw-r--r--   1 cscherer sunuser     92339 Mar 25 11:20 tpameans.out
-rw-r--r--   1 cscherer sunuser    101499 Mar 25 11:20 tpanames.dbs
-rw-r--r--   1 cscherer sunuser    240359 Mar 25 11:21 trelease.out
-rw-r--r--   1 cscherer sunuser       314 Aug 16  1997 uz_climi.i
-rw-r--r--   1 cscherer sunuser      1219 Sep  6  2002 uz_climr.i
-rw-r--r--   1 cscherer sunuser       341 Aug 16  1997 uz_climz.i
-rw-r--r--   1 cscherer sunuser      1323 Sep 26  2002 uz_flowi.i
-rw-r--r--   1 cscherer sunuser      1170 Sep 26  2002 uz_flowr.i
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-rw-r--r--   1 cscherer sunuser       176 Aug 16  1997 uz_flowz.i
-rw-r--r--   1 cscherer sunuser      3225 Sep 26  2002 uz_parms.i
-rw-r--r--   1 cscherer sunuser     72514 Feb 26 13:33 uzflow.f
-rw-r--r--   1 cscherer sunuser    128024 Feb 26 13:33 uzft.f
-rw-r--r--   1 cscherer sunuser       755 Nov 17 18:23 uzszft.i
-rw-r--r--   1 cscherer sunuser     14215 Feb 26 13:33 volcano.f
-rw-r--r--   1 cscherer sunuser       992 Mar 10 13:40 wc.out
-rw-r--r--   1 cscherer sunuser       992 Mar 10 13:41 wc.sort
-rw-r--r--   1 cscherer sunuser     20694 Mar 25 11:21 weldfail.out
-rw-r--r--   1 cscherer sunuser       291 Mar 25 11:22 wpfillstats.out
-rw-r--r--   1 cscherer sunuser     13105 Mar 25 11:21 wpflow.dat
-rw-r--r--   1 cscherer sunuser     17410 Mar 25 11:21 wpflow.def
-rw-r--r--   1 cscherer sunuser       719 Mar 25 11:22 wpsfail.res
-rw-r--r--   1 cscherer sunuser     11721 Feb 26 13:33 zportunx.f

scr445/tpa50/ccdf:
total 35
drwxr-xr-x   2 cscherer sunuser       512 Feb 27 09:43 .
drwxr-xr-x   5 cscherer sunuser      7680 Mar 26 10:46 ..
-rw-r--r--   1 cscherer sunuser       267 Mar 14  2000 Makefile
-rw-r--r--   1 cscherer sunuser     23390 Jul 22  1999 tccdf.f
-rw-r--r--   1 cscherer sunuser        66 Aug  1  1997 tccdf.i
-rw-r--r--   1 cscherer sunuser       640 Jan 29  2001 tccdf.inp

scr445/tpa50/codes:
total 2972
drwxr-xr-x   4 cscherer sunuser      1024 Mar 26 10:46 .
drwxr-xr-x   5 cscherer sunuser      7680 Mar 26 10:46 ..
-rw-r--r--   1 cscherer sunuser      1299 Feb 21 21:10 Makefile
-rw-r--r--   1 cscherer sunuser      1673 Feb 21 21:12 Makefile4.2
-rw-r--r--   1 cscherer sunuser       499 Jun  2  1997 README
-rw-r--r--   1 cscherer sunuser      2320 May 28  1998 SIZES.INC
-rw-r--r--   1 cscherer sunuser       164 Feb 17  1998 SIZES2.INC
-rwxr-xr-x   1 cscherer sunuser    161700 Feb 27 15:09 ashplume.e
-rw-r--r--   1 cscherer sunuser     95611 Feb 26 10:53 ashplume.f
-rw-r--r--   1 cscherer sunuser     25361 Feb 26 10:53 corrosn.f
-rwxr-xr-x   1 cscherer sunuser     43168 Mar 24 12:30 dsfailt.e
-rw-r--r--   1 cscherer sunuser     23303 Feb 26 10:53 dsfailt.f
-rwxr-xr-x   1 cscherer sunuser     46524 Feb 27 15:10 ebsfilt.e
-rw-r--r--   1 cscherer sunuser     17872 Feb 26 10:53 ebsfilt.f
-rwxr-xr-x   1 cscherer sunuser    191304 Mar 24 12:32 env.e
-rwxr-xr-x   1 cscherer sunuser    282872 Mar 24 12:31 envin.e
-rwxr-xr-x   1 cscherer sunuser    136672 Mar 24 12:30 failt.e
-rw-r--r--   1 cscherer sunuser    103353 Feb 26 10:53 failt.f
-r--r--r--   1 cscherer sunuser       450 Nov 17 18:03 failtadj.i
drwxr-xr-x   2 cscherer sunuser      3072 Mar 26 10:46 gentpa
-rwxr-xr-x   1 cscherer sunuser      4635 Feb 26 10:53 integrt.f
drwxr-xr-x   3 cscherer sunuser       512 Feb 27 09:43 itym
-r--r--r--   1 cscherer sunuser       868 Dec 17 16:59 lhs1.i
-r--r--r--   1 cscherer sunuser      1308 Mar 14  2002 lhs2.i
-r--r--r--   1 cscherer sunuser       438 Mar 14  2002 lhs3.i
-r--r--r--   1 cscherer sunuser       437 Mar 14  2002 lhs4.i
-r--r--r--   1 cscherer sunuser       374 Mar 14  2002 lhs5.i
-r--r--r--   1 cscherer sunuser       450 Mar 14  2002 lhs6.i
-r--r--r--   1 cscherer sunuser       464 Mar 14  2002 lhs7.i
-r--r--r--   1 cscherer sunuser       431 Mar 14  2002 lhs8.i
-rwxr-xr-x   1 cscherer sunuser      5224 Feb 26 10:53 linintrp.f
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-r--r--r--   1 cscherer sunuser       331 Nov 17 18:03 mechadj.i
-rwxr-xr-x   1 cscherer sunuser     87652 Feb 27 15:08 mechfail.e
-rw-r--r--   1 cscherer sunuser    127038 Feb 26 10:53 mechfail.f
-rwxr-xr-x   1 cscherer sunuser    402472 Feb 27 15:08 nefmks.e
-rw-r--r--   1 cscherer sunuser    308005 Feb 26 10:50 nefmks.f
-rwxr-xr-x   1 cscherer sunuser    122584 Feb 27 15:09 releaset.e
-rw-r--r--   1 cscherer sunuser    177497 Feb 26 10:51 releaset.f
-rwxr-xr-x   1 cscherer sunuser    251756 Feb 27 15:10 snllhs.e
-rw-r--r--   1 cscherer sunuser    225283 Feb 27 09:01 snllhs.f
-rwxr-xr-x   1 cscherer sunuser      4295 Feb 26 10:53 srchpos.f
-rwxr-xr-x   1 cscherer sunuser     19959 Feb 26 10:53 weldfail.f

scr445/tpa50/codes/gentpa:
total 413
drwxr-xr-x   2 cscherer sunuser      3072 Mar 26 10:46 .
drwxr-xr-x   4 cscherer sunuser      1024 Mar 26 10:46 ..
-rw-r--r--   1 cscherer sunuser       543 Feb 11  2000 AFPPAR.CMN
-rw-r--r--   1 cscherer sunuser      1044 Feb 11  2000 AIRPAR.CMN
-rw-r--r--   1 cscherer sunuser       872 Feb 11  2000 ANMPAR.CMN
-rw-r--r--   1 cscherer sunuser       615 Feb 11  2000 AQUPAR.CMN
-rw-r--r--   1 cscherer sunuser      1089 Feb 11  2000 CONC.CMN
-rw-r--r--   1 cscherer sunuser       461 Feb 11  2000 DAYPC.CMN
-rw-r--r--   1 cscherer sunuser       400 Feb 11  2000 DECAY.CMN
-rw-r--r--   1 cscherer sunuser       571 Feb 11  2000 DFPAR.CMN
-rw-r--r--   1 cscherer sunuser      1359 Feb 11  2000 DOSALL.CMN
-rw-r--r--   1 cscherer sunuser       574 Feb 11  2000 ENVPAR.CMN
-rw-r--r--   1 cscherer sunuser       310 Feb 11  2000 EXPALL.CMN
-rw-r--r--   1 cscherer sunuser       637 Feb 11  2000 EXTPAR.CMN
-rw-r--r--   1 cscherer sunuser       327 Feb 11  2000 FILES.CMN
-rw-r--r--   1 cscherer sunuser       814 Feb 11  2000 FODPAR.CMN
-rw-r--r--   1 cscherer sunuser       438 Feb 11  2000 INVIN.CMN
-rw-r--r--   1 cscherer sunuser       569 Feb 11  2000 LABELS.CMN
-rw-r--r--   1 cscherer sunuser      1161 Feb 11  2000 MTBPAR.CMN
-rw-r--r--   1 cscherer sunuser      1688 Feb 28  2000 Make.bat
-rw-r--r--   1 cscherer sunuser      1849 Feb 24  2000 Makefile
-rw-rw-rw-   1 cscherer sunuser      1938 Nov 27 14:12 Makefile4.2
-rw-r--r--   1 cscherer sunuser      1746 Feb 11  2000 Mkenv.fig
-rw-r--r--   1 cscherer sunuser      1548 Feb 11  2000 Mkenvin.fig
-rw-r--r--   1 cscherer sunuser      2762 Feb 11  2000 OPT.CMN
-rw-r--r--   1 cscherer sunuser       444 Feb 11  2000 ORGMAS.CMN
-rw-r--r--   1 cscherer sunuser       728 Feb 11  2000 ORGPAR.CMN
-rw-r--r--   1 cscherer sunuser       589 Feb 11  2000 RAD.CMN
-rw-r--r--   1 cscherer sunuser       788 Feb 11  2000 RADIN.CMN
-rw-r--r--   1 cscherer sunuser       722 Feb 11  2000 RMD.CMN
-rw-r--r--   1 cscherer sunuser       489 Feb 11  2000 RMD2.CMN
-rw-r--r--   1 cscherer sunuser       891 Feb 11  2000 SOLPAR.CMN
-rw-r--r--   1 cscherer sunuser       489 Feb 11  2000 SWPAR.CMN
-rw-r--r--   1 cscherer sunuser       586 Feb 11  2000 TIMES.CMN
-rw-r--r--   1 cscherer sunuser       316 Feb 11  2000 TITL.CMN
-rw-r--r--   1 cscherer sunuser     12777 Feb 11  2000 accmod.f
-rw-r--r--   1 cscherer sunuser     10094 Feb 11  2000 acute1.f
-rw-r--r--   1 cscherer sunuser      9579 Feb 11  2000 acutea.f
-rw-r--r--   1 cscherer sunuser      7118 Feb 11  2000 acutec.f
-rw-r--r--   1 cscherer sunuser      8669 Feb 11  2000 aircal.f
-rw-r--r--   1 cscherer sunuser      8383 Feb 11  2000 anmcal.f
-rw-r--r--   1 cscherer sunuser      2043 Feb 11  2000 aqucal.f
-rw-r--r--   1 cscherer sunuser      1217 Feb 11  2000 biocal.f
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-rw-r--r--   1 cscherer sunuser      4174 Feb 11  2000 blockd.f
-rw-r--r--   1 cscherer sunuser      1405 Feb 11  2000 bsort.f
-rw-r--r--   1 cscherer sunuser     13008 Feb 11  2000 candh.f
-rw-r--r--   1 cscherer sunuser      6653 Feb 11  2000 chain.f
-rw-r--r--   1 cscherer sunuser     23921 Feb 11  2000 check.f
-rw-r--r--   1 cscherer sunuser     10189 Feb 11  2000 cronmod.f
-rw-r--r--   1 cscherer sunuser      5153 Feb 11  2000 crpcal.f
-rw-r--r--   1 cscherer sunuser      3842 Feb 11  2000 dkharv.f
-rw-r--r--   1 cscherer sunuser      5426 Feb 11  2000 dose.f
-rw-r--r--   1 cscherer sunuser      2398 Feb 11  2000 drfbiv.f
-rw-r--r--   1 cscherer sunuser      6728 Feb 11  2000 drfsec.f
-rw-r--r--   1 cscherer sunuser      1877 Feb 11  2000 drkcal.f
-rw-r--r--   1 cscherer sunuser      1325 Feb 11  2000 dumred.f
-rw-r--r--   1 cscherer sunuser      3958 Feb 11  2000 edranm.f
-rw-r--r--   1 cscherer sunuser      3567 Feb 11  2000 edrcrp.f
-rw-r--r--   1 cscherer sunuser      2525 Feb 11  2000 edrnon.f
-rw-r--r--   1 cscherer sunuser      2853 Feb 11  2000 edrres.f
-rw-r--r--   1 cscherer sunuser     10581 Feb 11  2000 env.f
-rw-r--r--   1 cscherer sunuser      4885 Feb 11  2000 envin.f
-rw-r--r--   1 cscherer sunuser      4561 Feb 11  2000 envlib.f
-rw-r--r--   1 cscherer sunuser      1912 Feb 11  2000 exposr.f
-rw-r--r--   1 cscherer sunuser      6774 Feb 11  2000 extcal.f
-rw-r--r--   1 cscherer sunuser      1489 Feb 11  2000 filerr.f
-rw-r--r--   1 cscherer sunuser      1986 Feb 11  2000 fntdrf.f
-rw-r--r--   1 cscherer sunuser      3003 Feb 11  2000 headng.f
-rw-r--r--   1 cscherer sunuser      2203 Feb 11  2000 idnuc.f
-rw-r--r--   1 cscherer sunuser      2842 Feb 11  2000 inhcal.f
-rw-r--r--   1 cscherer sunuser      2392 Feb 11  2000 initnv.f
-rw-r--r--   1 cscherer sunuser      1841 Feb 11  2000 intpol.f
-rw-r--r--   1 cscherer sunuser      1348 Feb 11  2000 invmol.f
-rw-r--r--   1 cscherer sunuser       677 Feb 11  2000 makda2.f
-rw-r--r--   1 cscherer sunuser      5870 Feb 11  2000 opnfil.f
-rw-r--r--   1 cscherer sunuser      4217 Feb 11  2000 order.f
-rw-r--r--   1 cscherer sunuser      2325 Feb 11  2000 packag.f
-rw-r--r--   1 cscherer sunuser      3366 Feb 11  2000 plmriz.f
-rw-r--r--   1 cscherer sunuser      1861 Feb 11  2000 prior.f
-rw-r--r--   1 cscherer sunuser      4080 Feb 11  2000 prob.f
-rw-r--r--   1 cscherer sunuser      2079 Feb 11  2000 profile.f
-rw-r--r--   1 cscherer sunuser     11351 Feb 11  2000 readin.f
-rw-r--r--   1 cscherer sunuser      6174 Feb 11  2000 redcas.f
-rw-r--r--   1 cscherer sunuser      3867 Feb 11  2000 redcha.f
-rw-r--r--   1 cscherer sunuser      8483 Feb 11  2000 redflt.f
-rw-r--r--   1 cscherer sunuser      1694 Feb 11  2000 redist.f
-rw-r--r--   1 cscherer sunuser      8548 Feb 11  2000 ritenv.f
-rw-r--r--   1 cscherer sunuser      4371 Feb 11  2000 ritexp.f
-rw-r--r--   1 cscherer sunuser      2584 Feb 11  2000 ritmed.f
-rw-r--r--   1 cscherer sunuser     27222 Feb 11  2000 ritqa.f
-rw-r--r--   1 cscherer sunuser      4346 Feb 11  2000 rlibin.f
-rw-r--r--   1 cscherer sunuser      4399 Feb 11  2000 rwake.f
-rw-r--r--   1 cscherer sunuser      2396 Feb 11  2000 sigma.f
-rw-r--r--   1 cscherer sunuser      8387 Feb 11  2000 swcal.f
-rw-r--r--   1 cscherer sunuser      1894 Feb 11  2000 trnspt.f
-rw-r--r--   1 cscherer sunuser      1771 Feb 11  2000 ustar.f
-rw-r--r--   1 cscherer sunuser      9276 Feb 11  2000 xqcal.f
-rw-r--r--   1 cscherer sunuser      5277 Feb 11  2000 xqin.f

scr445/tpa50/codes/itym:
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```
total 4
drwxr-xr-x   3 cscherer sunuser       512 Feb 27 09:43 .
drwxr-xr-x   4 cscherer sunuser      1024 Mar 26 10:46 ..
-rw-r--r--   1 cscherer sunuser       596 Oct  1  2002 makefile
drwxr-xr-x   2 cscherer sunuser       512 Feb 27 09:43 src

scr445/tpa50/codes/itym/src:
total 328
drwxr-xr-x   2 cscherer sunuser       512 Feb 27 09:43 .
drwxr-xr-x   3 cscherer sunuser       512 Feb 27 09:43 ..
-rw-r--r--   1 cscherer sunuser     29776 Mar 22  2000 array.f
-rw-r--r--   1 cscherer sunuser     15856 Mar 22  2000 check_valid.f
-rw-r--r--   1 cscherer sunuser     60931 Dec 30 19:29 estimator.f
-rw-r--r--   1 cscherer sunuser      5384 Dec 30 19:31 init_itym.f
-rw-r--r--   1 cscherer sunuser      9420 Sep 25  2002 itym.f
-rw-r--r--   1 cscherer sunuser     11640 Dec 30 19:31 itym.i
-rw-r--r--   1 cscherer sunuser     26752 Sep 26  2002 itymutils.f
-rw-r--r--   1 cscherer sunuser       261 Mar 22  2000 path.i
-rw-r--r--   1 cscherer sunuser        55 Mar 22  2000 preuzf.i
-rw-r--r--   1 cscherer sunuser     42671 Mar 22  2000 ran.f
-rw-r--r--   1 cscherer sunuser     38406 Sep 26  2002 strtokfunc.f
-rw-r--r--   1 cscherer sunuser     60346 Sep 26  2002 uncertain.f
-rw-r--r--   1 cscherer sunuser     12265 Mar 22  2000 uncertain.i
-rw-r--r--   1 cscherer sunuser        55 Mar 22  2000 unctab.i
-rw-r--r--   1 cscherer sunuser     10904 Mar 22  2000 zportunx.f

scr445/tpa50/data:
total 7434
drwxr-xr-x   2 cscherer sunuser      1536 Feb 27 09:43 .
drwxr-xr-x   5 cscherer sunuser      7680 Mar 26 10:46 ..
-rw-r--r--   1 cscherer sunuser       965 Feb 11  2000 FILENAME.DAT
-rw-r--r--   1 cscherer sunuser     91434 Feb 27 08:50 basecase.inp
-rw-r--r--   1 cscherer sunuser    121789 Mar 22  2000 bunitdem.dat
-rw-r--r--   1 cscherer sunuser      1025 Mar 29  2000 burnup.dat
-rwxr-xr-x   1 cscherer sunuser    468925 Sep 25  2002 careadem.dat
-rwxr-xr-x   1 cscherer sunuser    515693 Sep 25  2002 cdepdem.dat
-rw-r--r--   1 cscherer sunuser    850000 Aug 15  1997 climato1.dat
-rw-r--r--   1 cscherer sunuser      2200 Feb  1  1999 climato2.dat
-rw-r--r--   1 cscherer sunuser      6219 Feb 19 10:46 coefkdeq.dat
-rw-r--r--   1 cscherer sunuser      6219 Feb 22 16:33 coefkdeqr.dat
-rw-r--r--   1 cscherer sunuser      2200 Dec 19 13:50 dilution.dat
-rw-r--r--   1 cscherer sunuser       519 Oct 19  2000 drythick.dat
-rw-r--r--   1 cscherer sunuser       791 Jul 23  2002 dsfailt.def
-rw-r--r--   1 cscherer sunuser      5973 Feb 14 19:57 ebsfail.def
-rw-r--r--   1 cscherer sunuser       790 May 28  1998 ebsfilt.def
-rw-r--r--   1 cscherer sunuser      5459 Jan  7 11:17 ebsrel.def
-rw-r--r--   1 cscherer sunuser    298679 Mar 22  2000 elevdem.dat
-rw-r--r--   1 cscherer sunuser      9381 May 29  2002 fluoride.dat
-rw-r--r--   1 cscherer sunuser      6513 Feb 11  2000 gbioac1.dat
-rw-r--r--   1 cscherer sunuser      3383 Sep  4  2002 gdefauls.def
-rw-r--r--   1 cscherer sunuser      3383 Feb 11  2000 gdefault.def
-rw-r--r--   1 cscherer sunuser        64 Feb 11  2000 gdosinc2.dat
-rw-r--r--   1 cscherer sunuser      7011 Feb 11  2000 gftrans.def
-rw-r--r--   1 cscherer sunuser      7011 Sep  4  2002 gftranss.def
-rw-r--r--   1 cscherer sunuser     15214 Feb 11  2000 ggamen.dat
-rw-r--r--   1 cscherer sunuser     13855 Feb 11  2000 ggenii.def
-rw-r--r--   1 cscherer sunuser     13173 Sep  4  2002 ggeniis.def
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-rw-r--r--   1 cscherer sunuser      5351 Feb 11  2000 ggrdf.dat
-rw-r--r--   1 cscherer sunuser      9897 Mar 29  2000 gnewdf.dat
-rw-r--r--   1 cscherer sunuser     13200 Mar 20  2000 grmdlib.dat
-rw-r--r--   1 cscherer sunuser      3048 Sep 15  2000 gs_cb_ad.dat
-rw-r--r--   1 cscherer sunuser      2487 Jun  4  1998 gs_cb_ci.dat
-rw-r--r--   1 cscherer sunuser      3045 Sep 15  2000 gs_pb_ad.dat
-rw-r--r--   1 cscherer sunuser      2487 Jun  4  1998 gs_pb_ci.dat
-rw-r--r--   1 cscherer sunuser      8247 Feb 22 16:39 ia.dat
-rw-r--r--   1 cscherer sunuser     20698 Dec 30 19:26 itym.dat
-rw-r--r--   1 cscherer sunuser    943774 Mar 29  2000 maidtbl.dat
-rw-r--r--   1 cscherer sunuser     10978 Mar 22  2000 maswtbl.dat
-rwxr-xr-x   1 cscherer sunuser    943775 Dec 30 19:18 maydtbl.dat
-rw-r--r--   1 cscherer sunuser      9729 Dec 17 17:31 mechfail.def
-rw-r--r--   1 cscherer sunuser      1251 Feb  6 14:39 multifaf.dat
-rw-r--r--   1 cscherer sunuser      1252 Feb  6 14:39 multifbe.dat
-rw-r--r--   1 cscherer sunuser    116965 Jul 17  2002 multiflo.dat
-rw-r--r--   1 cscherer sunuser      7152 Feb 21 21:14 nuclides.dat
-rw-r--r--   1 cscherer sunuser      7111 Sep 24  2000 organdf.dat
-rw-r--r--   1 cscherer sunuser       548 Sep 21  2000 repdes.dat
-rw-r--r--   1 cscherer sunuser    242353 Feb 23 18:09 reversibles.inp
-rwxr-xr-x   1 cscherer sunuser    130758 Dec 17 17:31 seisbs1.dis
-rwxr-xr-x   1 cscherer sunuser    130758 Dec 17 17:31 seisbs2.dis
-rwxr-xr-x   1 cscherer sunuser    943788 Dec 30 19:18 smaydtbl.dat
-rw-r--r--   1 cscherer sunuser    489858 Mar 22  2000 soildem.dat
-rw-r--r--   1 cscherer sunuser      4506 Feb  7  2000 strmtube.dat
-rw-r--r--   1 cscherer sunuser    119673 Mar 22  2000 sunitdem.dat
-rw-r--r--   1 cscherer sunuser    162404 May  8  2000 tefkti.inp
-rw-r--r--   1 cscherer sunuser    101499 Feb 19 10:43 tpanames.dbs
-rw-r--r--   1 cscherer sunuser    471041 Mar 22  2000 winddem.dat
-rw-r--r--   1 cscherer sunuser     17410 Feb  2  2000 wpflow.def

scr445/tpa50a:
total 194099
drwxr-xr-x   6 cscherer sunuser      7680 Mar 31 10:50 .
drwxr-xr-x   7 cscherer sunuser       512 Apr  1 09:15 ..
-rwxr-xr-x   1 cscherer sunuser      2001 Sep 18  2002 CLEANUP
-rw-r--r--   1 cscherer sunuser       965 Mar 25 12:45 FILENAME.DAT
-rw-r--r--   1 cscherer sunuser       869 Nov 27 14:22 Makefile
-rw-rw-rw-   1 cscherer sunuser       961 Nov 27 14:24 Makefile4.2
-rw-r--r--   1 cscherer sunuser      1305 Mar 30 07:36 NEFII.VEL
-rw-r--r--   1 cscherer sunuser    753624 Mar 30 07:37 airpkdos.res
-rw-r--r--   1 cscherer sunuser    753624 Mar 30 07:37 arpkds_c.res
-rw-r--r--   1 cscherer sunuser     29502 Feb 26 13:33 array.f
-rw-r--r--   1 cscherer sunuser    129808 Mar 30 07:36 ashout.res
-rw-r--r--   1 cscherer sunuser     20686 Feb 26 13:33 ashplumo.f
-rw-r--r--   1 cscherer sunuser     37705 Feb 26 13:33 ashrmovo.f
-rw-r--r--   1 cscherer sunuser      1025 Mar 25 12:40 burnup.dat
drwxr-xr-x   2 cscherer sunuser       512 Mar 24 12:22 ccdf
-rwxrwxrwx   1 cscherer sunuser       156 Mar 25 11:29 ch_env
-rw-r--r--   1 cscherer sunuser      7547 Mar 30 07:36 chlrdmf.dat
-rw-r--r--   1 cscherer sunuser    850000 Mar 25 12:40 climato1.dat
-rw-r--r--   1 cscherer sunuser      2200 Mar 25 12:40 climato2.dat
drwxr-xr-x   4 cscherer sunuser      1024 Mar 26 10:46 codes
-rw-r--r--   1 cscherer sunuser      6219 Mar 25 12:41 coefkdeq.dat
-rw-r--r--   1 cscherer sunuser       735 Feb 18 18:46 coefkdeq.i
-rw-r--r--   1 cscherer sunuser     10207 Feb 26 13:33 condxyzt.f
-rw-r--r--   1 cscherer sunuser     19334 Mar 30 07:36 corrode.out
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-rw-r--r--   1 cscherer sunuser     79223 Mar 30 07:37 cp.tpa
-rw-r--r--   1 cscherer sunuser   1598128 Mar 30 07:37 cumrel.res
-rw-r--r--   1 cscherer sunuser   1598128 Mar 30 07:37 cumrel_c.res
-rw-r--r--   1 cscherer sunuser     69680 Mar 30 07:36 cumrelse.out
drwxr-xr-x   2 cscherer sunuser      1536 Mar 24 12:22 data
-rw-r--r--   1 cscherer sunuser    124149 Feb 26 13:33 dcags.f
-rw-r--r--   1 cscherer sunuser    157666 Feb 26 13:33 dcagw.f
-rw-r--r--   1 cscherer sunuser      9993 Mar 30 07:36 deltaec.inp
-rw-r--r--   1 cscherer sunuser     14700 Mar 30 07:36 diagnose.out
-rw-r--r--   1 cscherer sunuser      2200 Mar 25 12:45 dilution.dat
-rw-r--r--   1 cscherer sunuser      3870 Mar 25 12:40 drifts.dat
-rw-r--r--   1 cscherer sunuser       190 Sep 20  2002 driftsa.i
-rw-r--r--   1 cscherer sunuser       519 Mar 25 12:40 drythick.dat
-rw-r--r--   1 cscherer sunuser     25470 Feb 26 11:04 dsfail.f
-rw-r--r--   1 cscherer sunuser   1732719 Mar 30 07:37 dsfail.res
-rw-r--r--   1 cscherer sunuser      2626 Mar 30 07:36 dsfailt.dat
-rw-r--r--   1 cscherer sunuser       791 Mar 25 12:40 dsfailt.def
-rwxr-xr-x   1 cscherer sunuser     43172 Mar 25 12:40 dsfailt.e
-rw-r--r--   1 cscherer sunuser       610 Mar 30 07:36 dsfailt.inp
-rw-r--r--   1 cscherer sunuser         0 Mar 25 12:40 dsfailt.out
-rw-r--r--   1 cscherer sunuser     65260 Mar 30 07:36 ebscld.out
-rw-r--r--   1 cscherer sunuser      5973 Mar 25 12:40 ebsfail.def
-rw-r--r--   1 cscherer sunuser     49153 Feb 26 13:33 ebsfail.f
-rw-r--r--   1 cscherer sunuser      5734 Mar 30 07:36 ebsfail.inp
-rw-r--r--   1 cscherer sunuser       790 Mar 25 12:41 ebsfilt.def
-rwxr-xr-x   1 cscherer sunuser     46596 Mar 25 12:41 ebsfilt.e
-rw-r--r--   1 cscherer sunuser      2554 Mar 30 07:36 ebsfilt.inp
-rw-r--r--   1 cscherer sunuser       239 Mar 30 07:36 ebsfilt.out
-rw-r--r--   1 cscherer sunuser     20929 Mar 30 07:36 ebsflo.dat
-rw-r--r--   1 cscherer sunuser    251401 Mar 30 07:36 ebsnef.dat
-rw-r--r--   1 cscherer sunuser    186252 Mar 30 07:36 ebsnef.out
-rw-r--r--   1 cscherer sunuser    658449 Mar 30 07:36 ebsnef2.dat
-rw-r--r--   1 cscherer sunuser      1883 Mar 30 07:36 ebspac.nuc
-rw-r--r--   1 cscherer sunuser      5459 Mar 25 12:41 ebsrel.def
-rw-r--r--   1 cscherer sunuser     87035 Feb 26 13:33 ebsrel.f
-rw-r--r--   1 cscherer sunuser     11110 Mar 30 07:36 ebsrel.inp
-rw-r--r--   1 cscherer sunuser       149 Sep 25  2002 ebsrel1.i
-rw-r--r--   1 cscherer sunuser    186203 Mar 30 07:36 ebssf.dat
-rw-r--r--   1 cscherer sunuser     25515 Mar 30 07:36 ebstrh.dat
-rw-r--r--   1 cscherer sunuser     18435 Mar 30 07:36 ebstrhc.inp
-rw-r--r--   1 cscherer sunuser      2647 Mar 30 07:36 echofail.dat
-rw-r--r--   1 cscherer sunuser    667001 Mar 30 07:36 echofilt.dat
-rwxr-xr-x   1 cscherer sunuser    191340 Mar 25 12:45 env.e
-rwxr-xr-x   1 cscherer sunuser    282904 Mar 25 12:45 envin.e
-rw-r--r--   1 cscherer sunuser     39350 Mar 30 07:36 epa_ave.out
-rw-r--r--   1 cscherer sunuser    376121 Mar 30 07:36 epapktim.out
-rw-r--r--   1 cscherer sunuser    389771 Mar 22 21:17 exec.f
-rw-r--r--   1 cscherer sunuser      2385 Sep 21  2002 execa.i
-rw-r--r--   1 cscherer sunuser       486 Sep  3  1997 execb.i
-rw-r--r--   1 cscherer sunuser       269 May 29  2002 execc.i
-rw-r--r--   1 cscherer sunuser       104 Feb  6 14:32 execd.i
-rwxr-xr-x   1 cscherer sunuser    136680 Mar 25 12:40 failt.e
-rw-r--r--   1 cscherer sunuser     23089 Mar 30 07:36 failt.out
-rw-r--r--   1 cscherer sunuser      8503 Feb 26 13:33 faulto.f
-rw-r--r--   1 cscherer sunuser      6656 Feb 26 13:33 fileunit.f
-rw-r--r--   1 cscherer sunuser      5784 Feb 26 13:33 findelev.f
-rw-r--r--   1 cscherer sunuser      9381 Mar 30 07:36 fluoride.dat
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-rw-r--r--   1 cscherer sunuser     69680 Mar 30 07:36 frac_rel.out
-rw-r--r--   1 cscherer sunuser        60 Aug 16  1997 fu1.i
-rw-r--r--   1 cscherer sunuser       609 Sep  4  2002 fu2.i
-rw-r--r--   1 cscherer sunuser      6513 Mar 25 12:45 gbioac1.dat
-rw-r--r--   1 cscherer sunuser      3383 Mar 25 12:45 gdefault.def
-rw-r--r--   1 cscherer sunuser      3387 Mar 30 07:36 gdefault.inp
-rw-r--r--   1 cscherer sunuser        64 Mar 25 12:45 gdosinc2.dat
-rw-r--r--   1 cscherer sunuser         0 Mar 30 07:36 gentoo.out
-rw-r--r--   1 cscherer sunuser     35173 Mar 30 07:36 genv.in
-rw-r--r--   1 cscherer sunuser     18393 Mar 30 07:36 genv.out
-rw-r--r--   1 cscherer sunuser      7011 Mar 25 12:45 gftrans.def
-rw-r--r--   1 cscherer sunuser      7142 Mar 30 07:36 gftrans.inp
-rw-r--r--   1 cscherer sunuser     15214 Mar 25 12:45 ggamen.dat
-rw-r--r--   1 cscherer sunuser     13855 Mar 25 12:45 ggenii.def
-rw-r--r--   1 cscherer sunuser     13164 Mar 30 07:36 ggenii.inp
-rw-r--r--   1 cscherer sunuser     10074 Mar 30 07:36 ggenii.out
-rw-r--r--   1 cscherer sunuser      5351 Mar 25 12:45 ggrdf.dat
-rw-r--r--   1 cscherer sunuser      5673 Mar 30 07:36 gmedia.out
-rw-r--r--   1 cscherer sunuser      9897 Mar 25 12:45 gnewdf.dat
-rw-r--r--   1 cscherer sunuser     13200 Mar 25 12:45 grmdlib.dat
-rw-r--r--   1 cscherer sunuser       568 Mar 30 07:36 gsccdf.res
-rw-r--r--   1 cscherer sunuser       568 Mar 30 07:36 gsccdf_c.res
-rw-r--r--   1 cscherer sunuser      3561 Mar 30 07:36 gw_cb_ad.dat
-rw-r--r--   1 cscherer sunuser      1264 Mar 30 07:36 gw_cb_ci.dat
-rw-r--r--   1 cscherer sunuser      3557 Mar 30 07:36 gw_pb_ad.dat
-rw-r--r--   1 cscherer sunuser      1261 Mar 30 07:36 gw_pb_ci.dat
-rw-r--r--   1 cscherer sunuser     36198 Mar 30 07:36 gwccdf.res
-rw-r--r--   1 cscherer sunuser     33993 Mar 30 07:36 gwccdf_c.res
-rw-r--r--   1 cscherer sunuser         9 Mar 30 07:36 gwork.buf
-rw-r--r--   1 cscherer sunuser    408888 Mar 30 07:36 gwpkdos.res
-rw-r--r--   1 cscherer sunuser    408888 Mar 30 07:36 gwpkds_c.res
-rw-r--r--   1 cscherer sunuser    556632 Mar 30 07:36 gwttuzsz.res
-rw-r--r--   1 cscherer sunuser      1229 Jul 22  1999 ia.i
-rw-r--r--   1 cscherer sunuser       956 Sep 26  2000 ia1.i
-rw-r--r--   1 cscherer sunuser     21238 Feb 26 13:33 iareader.f
-rw-r--r--   1 cscherer sunuser   2476720 Mar 30 07:36 infilper.res
-rw-r--r--   1 cscherer sunuser      1102 Mar 30 07:36 inv1000.out
-rw-r--r--   1 cscherer sunuser     69562 Feb 26 13:33 invent.f
-rw-r--r--   1 cscherer sunuser        33 Sep 25  2002 invent_.i
-rw-r--r--   1 cscherer sunuser        57 Aug 16  1997 inventa.i
-rw-r--r--   1 cscherer sunuser       182 Sep 25  2002 inventb.i
-rw-r--r--   1 cscherer sunuser       344 Sep 25  2002 inventc.i
-rw-r--r--   1 cscherer sunuser       124 Sep 25  2002 inventd.i
-rw-r--r--   1 cscherer sunuser       131 Sep 25  2002 invente.i
-rw-r--r--   1 cscherer sunuser       130 Sep 25  2002 inventf.i
-rw-r--r--   1 cscherer sunuser       128 Sep 25  2002 inventg.i
-rw-r--r--   1 cscherer sunuser       127 Sep 25  2002 inventh.i
-rw-r--r--   1 cscherer sunuser        75 Aug 16  1997 inventi.i
-rw-r--r--   1 cscherer sunuser       288 Sep 25  2002 inventj.i
-rw-r--r--   1 cscherer sunuser       332 Sep 25  2002 inventk.i
-rw-r--r--   1 cscherer sunuser       150 Dec  6 14:29 inventl.i
-rw-r--r--   1 cscherer sunuser       315 Dec 11 09:33 inventm.i
-rw-r--r--   1 cscherer sunuser       175 Sep 25  2002 inventn.i
-rw-r--r--   1 cscherer sunuser       249 Jan 29  2000 invento.i
-rw-r--r--   1 cscherer sunuser       267 Sep 25  2002 inventp.i
-rw-r--r--   1 cscherer sunuser         0 Mar 25 11:29 lhs.csv
-rw-r--r--   1 cscherer sunuser     47014 Mar 25 12:40 lhs.inp
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-rw-r--r--   1 cscherer sunuser   5867520 Mar 25 12:40 lhs.out
-rw-r--r--   1 cscherer sunuser     78602 Mar 25 12:40 lhse.out
-rw-r--r--   1 cscherer sunuser        78 Aug 16  1997 max500yr.i
-rw-r--r--   1 cscherer sunuser        99 Sep 25  2002 maxchain.i
-rw-r--r--   1 cscherer sunuser       149 Sep 25  2002 maxclchn.i
-rw-r--r--   1 cscherer sunuser       144 Sep 25  2002 maxclnuc.i
-rw-r--r--   1 cscherer sunuser       508 Sep 25  2002 maxnnucl.i
-rw-r--r--   1 cscherer sunuser       299 Jul 10  1998 maxnsuba.i
-rw-r--r--   1 cscherer sunuser       206 May 28  1999 maxntime.i
-rw-r--r--   1 cscherer sunuser      1095 Mar 30 07:36 maxrel.dat
-rwxr-xr-x   1 cscherer sunuser    943775 Mar 25 12:40 maydtbl.dat
-rw-r--r--   1 cscherer sunuser     47368 Mar 30 07:36 mechfail.dat
-rw-r--r--   1 cscherer sunuser      9729 Mar 25 12:40 mechfail.def
-rwxr-xr-x   1 cscherer sunuser     79836 Mar 25 12:40 mechfail.e
-rw-r--r--   1 cscherer sunuser     26711 Mar 30 07:36 mechfail.inp
-rw-r--r--   1 cscherer sunuser         0 Mar 30 07:36 mechfail.out
-rw-r--r--   1 cscherer sunuser      1251 Mar 25 12:40 multifaf.dat
-rw-r--r--   1 cscherer sunuser      1252 Mar 25 12:40 multifbe.dat
-rw-r--r--   1 cscherer sunuser     11850 Feb 26 13:33 mv.f
-rw-r--r--   1 cscherer sunuser  18185728 Mar 30 07:36 mv.tpa
-rw-r--r--   1 cscherer sunuser       111 Sep  4  1997 mva.i
-rw-r--r--   1 cscherer sunuser        56 Aug 16  1997 mvb.i
-rw-r--r--   1 cscherer sunuser        57 Aug 16  1997 mvc.i
-rw-r--r--   1 cscherer sunuser       101 Aug 16  1997 mvd.i
-rw-r--r--   1 cscherer sunuser        72 Aug 16  1997 mve.i
-rw-r--r--   1 cscherer sunuser        72 Aug 16  1997 mvf.i
-rw-r--r--   1 cscherer sunuser   2476720 Mar 30 07:36 nearfld.res
-rw-r--r--   1 cscherer sunuser    685698 Mar 30 07:36 nefii.dis
-rw-r--r--   1 cscherer sunuser     11320 Mar 30 07:36 nefii.inp
-rw-r--r--   1 cscherer sunuser   1048639 Mar 30 07:36 nefii.out
-rw-r--r--   1 cscherer sunuser       603 Mar 30 07:36 nefii.rel
-rw-r--r--   1 cscherer sunuser    685698 Mar 30 07:36 nefiisz.dis
-rw-r--r--   1 cscherer sunuser     11320 Mar 30 07:36 nefiisz.inp
-rw-r--r--   1 cscherer sunuser   1048639 Mar 30 07:36 nefiisz.out
-rw-r--r--   1 cscherer sunuser    303850 Mar 30 07:36 nefiisz.src
-rw-r--r--   1 cscherer sunuser      1305 Mar 30 07:36 nefiisz.vel
-rw-r--r--   1 cscherer sunuser    153653 Mar 30 07:35 nefiiuz.dis
-rw-r--r--   1 cscherer sunuser     10100 Mar 30 07:35 nefiiuz.inp
-rw-r--r--   1 cscherer sunuser    414346 Mar 30 07:35 nefiiuz.out
-rw-r--r--   1 cscherer sunuser    306191 Mar 30 07:35 nefiiuz.src
-rw-r--r--   1 cscherer sunuser       822 Mar 30 07:35 nefiiuz.vel
-rwxr-xr-x   1 cscherer sunuser    408048 Mar 25 12:41 nefmks.e
-rw-r--r--   1 cscherer sunuser     83735 Mar 30 07:36 nefmks.log
-rw-r--r--   1 cscherer sunuser    113027 Feb 26 13:33 nfenv.f
-rw-r--r--   1 cscherer sunuser       326 Nov 17 18:24 nfenvadj.i
-rw-r--r--   1 cscherer sunuser        94 Aug 16  1997 nintv.i
-rw-r--r--   1 cscherer sunuser      1502 Jun 11  1997 notice.i
-rw-r--r--   1 cscherer sunuser    671544 Mar 30 07:37 npkdoset.res
-rw-r--r--   1 cscherer sunuser    671544 Mar 30 07:37 npkdst_c.res
-rw-r--r--   1 cscherer sunuser      7152 Mar 25 12:40 nuclides.dat
-rw-r--r--   1 cscherer sunuser      6579 Feb 26 13:33 numrecip.f
-rw-r--r--   1 cscherer sunuser      7111 Mar 25 12:45 organdf.dat
-rw-r--r--   1 cscherer sunuser       259 Aug 16  1997 path.i
-rw-r--r--   1 cscherer sunuser      6584 Feb 26 13:33 peakfind.f
-rw-r--r--   1 cscherer sunuser     47756 Mar 30 07:37 pkmndose.out
-rw-r--r--   1 cscherer sunuser   7169240 Mar 30 07:36 pkreltim.res
-rw-r--r--   1 cscherer sunuser   7169240 Mar 30 07:36 pkrltm_c.res
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drwxr-xr-x   2 cscherer sunuser      6656 Mar 31 10:55 r1024
-rw-r--r--   1 cscherer sunuser     46322 Feb 26 13:33 ran.f
-rw-r--r--   1 cscherer sunuser    148524 Feb 26 13:33 reader.f
-rw-r--r--   1 cscherer sunuser       185 May 21  1998 reader.i
-rw-r--r--   1 cscherer sunuser       106 Aug 27  1999 reader1.i
-rw-r--r--   1 cscherer sunuser        58 Aug 27  1999 reader2.i
-rw-r--r--   1 cscherer sunuser       102 Aug 27  1999 reader3.i
-rw-r--r--   1 cscherer sunuser        89 Aug 27  1999 reader4.i
-rw-r--r--   1 cscherer sunuser        58 Aug 16  1997 reflux2.i
-rw-r--r--   1 cscherer sunuser       899 Mar 30 07:36 rel_flow.out
-rw-r--r--   1 cscherer sunuser     36198 Mar 30 07:36 relccdf.res
-rw-r--r--   1 cscherer sunuser      2883 Mar 30 07:36 relcum.out
-rwxr-xr-x   1 cscherer sunuser    122652 Mar 25 12:41 releaset.e
-rw-r--r--   1 cscherer sunuser       415 Mar 30 07:36 releaset.out
-rw-r--r--   1 cscherer sunuser       773 Mar 30 07:36 relfrac.out
-rw-r--r--   1 cscherer sunuser     64144 Mar 30 07:36 relgwgs.res
-rw-r--r--   1 cscherer sunuser       548 Mar 25 12:40 repdes.dat
-rw-r--r--   1 cscherer sunuser     70757 Mar 30 07:36 rgwna.tpa
-rw-r--r--   1 cscherer sunuser     70757 Mar 30 07:36 rgwnapani.tpa
-rw-r--r--   1 cscherer sunuser     70757 Mar 30 07:36 rgwnapdw.tpa
-rw-r--r--   1 cscherer sunuser     70757 Mar 30 07:36 rgwnapext.tpa
-rw-r--r--   1 cscherer sunuser     70757 Mar 30 07:36 rgwnapinh.tpa
-rw-r--r--   1 cscherer sunuser     70757 Mar 30 07:36 rgwnapmlk.tpa
-rw-r--r--   1 cscherer sunuser     70757 Mar 30 07:36 rgwnappla.tpa
-rw-r--r--   1 cscherer sunuser  71746229 Mar 30 07:36 rgwnr.tpa
-rw-r--r--   1 cscherer sunuser      7433 Mar 30 07:36 rgwsa.tpa
-rw-r--r--   1 cscherer sunuser     23933 Mar 30 07:36 rgwsap.tpa
-rw-r--r--   1 cscherer sunuser   7113237 Mar 30 07:36 rgwsr.tpa
-rw-r--r--   1 cscherer sunuser     33993 Mar 30 07:36 rlccdf_c.res
-rw-r--r--   1 cscherer sunuser     64144 Mar 30 07:36 rlgwgs_c.res
-rw-r--r--   1 cscherer sunuser     95694 Feb 26 13:33 sampler.f
-rw-r--r--   1 cscherer sunuser        62 Aug 16  1997 sampler0.i
-rw-r--r--   1 cscherer sunuser        79 Aug 16  1997 sampler1.i
-rw-r--r--   1 cscherer sunuser        62 Aug 16  1997 sampler2.i
-rw-r--r--   1 cscherer sunuser       178 Apr  3  1998 sampler3.i
-rw-r--r--   1 cscherer sunuser       145 Sep 19  2000 sampler4.i
-rw-r--r--   1 cscherer sunuser        62 Aug 16  1997 samplera.i
-rw-r--r--   1 cscherer sunuser        62 Aug 16  1997 samplerb.i
-rw-r--r--   1 cscherer sunuser        62 Aug 16  1997 samplerc.i
-rw-r--r--   1 cscherer sunuser        68 Aug 16  1997 samplerd.i
-rw-r--r--   1 cscherer sunuser       133 Aug 16  1997 samplere.i
-rw-r--r--   1 cscherer sunuser       111 Aug 16  1997 samplerf.i
-rw-r--r--   1 cscherer sunuser        84 Aug 16  1997 samplerg.i
-rw-r--r--   1 cscherer sunuser        68 Aug 16  1997 samplerh.i
-rw-r--r--   1 cscherer sunuser        83 Aug 16  1997 sampleri.i
-rw-r--r--   1 cscherer sunuser        61 Aug 16  1997 samplerj.i
-rw-r--r--   1 cscherer sunuser       208 Aug 16  1997 samplerk.i
-rw-r--r--   1 cscherer sunuser       104 Aug 16  1997 samplerl.i
-rw-r--r--   1 cscherer sunuser        63 Aug 16  1997 samplerm.i
-rw-r--r--   1 cscherer sunuser        79 Aug 16  1997 samplern.i
-rw-r--r--   1 cscherer sunuser        63 Aug 16  1997 samplero.i
-rw-r--r--   1 cscherer sunuser       260 Mar 14  2002 samplerp.i
-rw-r--r--   1 cscherer sunuser       103 Aug 16  1997 samplerq.i
-rw-r--r--   1 cscherer sunuser       176 Aug 16  1997 samplerr.i
-rw-r--r--   1 cscherer sunuser       336 Apr  3  1998 samplers.i
-rw-r--r--   1 cscherer sunuser        70 Aug 16  1997 samplert.i
-rw-r--r--   1 cscherer sunuser        69 Aug 16  1997 sampleru.i
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-rw-r--r--   1 cscherer sunuser        62 Aug 16  1997 samplerv.i
-rw-r--r--   1 cscherer sunuser        60 Aug 16  1997 samplerw.i
-rw-r--r--   1 cscherer sunuser       406 Feb 22 16:36 samplerx.i
-rw-r--r--   1 cscherer sunuser       299 Apr 30  2001 samplery.i
-rw-r--r--   1 cscherer sunuser        60 Aug 16  1997 samplerz.i
-rw-r--r--   1 cscherer sunuser      3863 Mar 25 12:40 samplpar.abb
-rw-r--r--   1 cscherer sunuser     29763 Mar 25 12:40 samplpar.hdr
-rw-r--r--   1 cscherer sunuser   5868162 Mar 30 07:36 samplpar.res
-rw-r--r--   1 cscherer sunuser       322 Nov 17 18:24 seisadj.i
-rwxr-xr-x   1 cscherer sunuser    130758 Mar 25 12:40 seisbs1.dis
-rwxr-xr-x   1 cscherer sunuser    130758 Mar 25 12:40 seisbs2.dis
-rw-r--r--   1 cscherer sunuser     74226 Feb 26 13:23 seismo2.f
-rwxrwxrwx   1 cscherer sunuser        30 Sep 12  2002 show_env
-rwxr-xr-x   1 cscherer sunuser    943788 Mar 25 12:40 smaydtbl.dat
-rwxr-xr-x   1 cscherer sunuser    243548 Mar 25 12:40 snllhs.e
-rw-r--r--   1 cscherer sunuser    303850 Mar 30 07:36 sotnef.dat
-rw-r--r--   1 cscherer sunuser   8001108 Mar 30 07:36 sp.tpa
-rw-r--r--   1 cscherer sunuser       144 Sep  3  1997 stop.i
-rw-r--r--   1 cscherer sunuser      4506 Mar 25 12:41 strmtube.dat
-rw-r--r--   1 cscherer sunuser     38339 Feb 26 13:33 subarea.f
-rw-r--r--   1 cscherer sunuser       255 Feb  4  2000 subareaa.i
-rw-r--r--   1 cscherer sunuser        79 Aug 16  1997 subareab.i
-rw-r--r--   1 cscherer sunuser        82 Aug 16  1997 subareac.i
-rw-r--r--   1 cscherer sunuser        81 Aug 16  1997 subaread.i
-rw-r--r--   1 cscherer sunuser        77 Aug 16  1997 subareae.i
-rw-r--r--   1 cscherer sunuser        60 Feb  3  2000 subareaf.i
-rw-r--r--   1 cscherer sunuser        64 Feb  2  2000 subareag.i
-rw-r--r--   1 cscherer sunuser    117938 Mar 22 21:16 szft.f
-rw-r--r--   1 cscherer sunuser       264 Nov 17 18:23 szft.i
-rw-r--r--   1 cscherer sunuser  12761744 Mar 30 07:36 totdos_c.res
-rw-r--r--   1 cscherer sunuser  19110544 Mar 30 07:36 totdose.res
-rwxr-xr-x   1 cscherer sunuser   2528744 Mar 24 13:13 tpa.e
-rw-r--r--   1 cscherer sunuser     91428 Mar 25 12:37 tpa.inp
-rw-r--r--   1 cscherer sunuser     91425 Feb 26 13:33 tpa_orig.inp
-rw-r--r--   1 cscherer sunuser     91428 Mar 25 12:37 tpa_r1024.inp
-rw-r--r--   1 cscherer sunuser     91432 Mar 25 11:07 tpa_slt1.inp
-rw-r--r--   1 cscherer sunuser     24714 Mar 25 11:35 tpa_slt1.out
-rw-r--r--   1 cscherer sunuser     91432 Mar 25 11:08 tpa_slt2.inp
-rw-r--r--   1 cscherer sunuser     24817 Mar 25 12:08 tpa_slt2.out
-rw-r--r--   1 cscherer sunuser     91432 Mar 25 11:08 tpa_slt3.inp
-rw-r--r--   1 cscherer sunuser     26831 Mar 25 12:35 tpa_slt3.out
-rw-r--r--   1 cscherer sunuser     92335 Mar 25 12:40 tpameans.out
-rw-r--r--   1 cscherer sunuser    101499 Mar 25 12:40 tpanames.dbs
-rw-r--r--   1 cscherer sunuser    242179 Mar 30 07:36 trelease.out
-rw-r--r--   1 cscherer sunuser       314 Aug 16  1997 uz_climi.i
-rw-r--r--   1 cscherer sunuser      1219 Sep  6  2002 uz_climr.i
-rw-r--r--   1 cscherer sunuser       341 Aug 16  1997 uz_climz.i
-rw-r--r--   1 cscherer sunuser      1323 Sep 26  2002 uz_flowi.i
-rw-r--r--   1 cscherer sunuser      1170 Sep 26  2002 uz_flowr.i
-rw-r--r--   1 cscherer sunuser       176 Aug 16  1997 uz_flowz.i
-rw-r--r--   1 cscherer sunuser      3225 Sep 26  2002 uz_parms.i
-rw-r--r--   1 cscherer sunuser     72514 Feb 26 13:33 uzflow.f
-rw-r--r--   1 cscherer sunuser    128158 Mar 22 21:15 uzft.f
-rw-r--r--   1 cscherer sunuser       755 Nov 17 18:23 uzszft.i
-rw-r--r--   1 cscherer sunuser     14215 Feb 26 13:33 volcano.f
-rw-r--r--   1 cscherer sunuser     21032 Mar 30 07:36 weldfail.out
-rw-r--r--   1 cscherer sunuser   1024191 Mar 30 07:37 wpfillstats.out
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-rw-r--r--   1 cscherer sunuser     13105 Mar 25 12:41 wpflow.dat
-rw-r--r--   1 cscherer sunuser     17410 Mar 25 12:41 wpflow.def
-rw-r--r--   1 cscherer sunuser    139746 Mar 30 07:36 wpsfail.res
-rw-r--r--   1 cscherer sunuser     11721 Feb 26 13:33 zportunx.f

scr445/tpa50a/ccdf:
total 35
drwxr-xr-x   2 cscherer sunuser       512 Mar 24 12:22 .
drwxr-xr-x   6 cscherer sunuser      7680 Mar 31 10:50 ..
-rw-r--r--   1 cscherer sunuser       267 Mar 14  2000 Makefile
-rw-r--r--   1 cscherer sunuser     23390 Jul 22  1999 tccdf.f
-rw-r--r--   1 cscherer sunuser        66 Aug  1  1997 tccdf.i
-rw-r--r--   1 cscherer sunuser       640 Jan 29  2001 tccdf.inp

scr445/tpa50a/codes:
total 2964
drwxr-xr-x   4 cscherer sunuser      1024 Mar 26 10:46 .
drwxr-xr-x   6 cscherer sunuser      7680 Mar 31 10:50 ..
-rw-r--r--   1 cscherer sunuser      1299 Feb 21 21:10 Makefile
-rw-r--r--   1 cscherer sunuser      1673 Feb 21 21:12 Makefile4.2
-rw-r--r--   1 cscherer sunuser       499 Jun  2  1997 README
-rw-r--r--   1 cscherer sunuser      2320 May 28  1998 SIZES.INC
-rw-r--r--   1 cscherer sunuser       164 Feb 17  1998 SIZES2.INC
-rwxr-xr-x   1 cscherer sunuser    165136 Mar 24 13:15 ashplume.e
-rw-r--r--   1 cscherer sunuser     95611 Feb 26 10:53 ashplume.f
-rw-r--r--   1 cscherer sunuser     25361 Feb 26 10:53 corrosn.f
-rwxr-xr-x   1 cscherer sunuser     43172 Mar 24 13:16 dsfailt.e
-rw-r--r--   1 cscherer sunuser     23303 Feb 26 10:53 dsfailt.f
-rwxr-xr-x   1 cscherer sunuser     46596 Mar 24 13:16 ebsfilt.e
-rw-r--r--   1 cscherer sunuser     17872 Feb 26 10:53 ebsfilt.f
-rwxr-xr-x   1 cscherer sunuser    191340 Mar 24 13:17 env.e
-rwxr-xr-x   1 cscherer sunuser    282904 Mar 24 13:16 envin.e
-rwxr-xr-x   1 cscherer sunuser    136680 Mar 24 13:14 failt.e
-rw-r--r--   1 cscherer sunuser    103353 Feb 26 10:53 failt.f
-r--r--r--   1 cscherer sunuser       450 Nov 17 18:03 failtadj.i
drwxr-xr-x   2 cscherer sunuser      3072 Mar 26 10:46 gentpa
-rwxr-xr-x   1 cscherer sunuser      4635 Feb 26 10:53 integrt.f
drwxr-xr-x   3 cscherer sunuser       512 Mar 24 12:22 itym
-r--r--r--   1 cscherer sunuser       868 Dec 17 16:59 lhs1.i
-r--r--r--   1 cscherer sunuser      1308 Mar 14  2002 lhs2.i
-r--r--r--   1 cscherer sunuser       438 Mar 14  2002 lhs3.i
-r--r--r--   1 cscherer sunuser       437 Mar 14  2002 lhs4.i
-r--r--r--   1 cscherer sunuser       374 Mar 14  2002 lhs5.i
-r--r--r--   1 cscherer sunuser       450 Mar 14  2002 lhs6.i
-r--r--r--   1 cscherer sunuser       464 Mar 14  2002 lhs7.i
-r--r--r--   1 cscherer sunuser       431 Mar 14  2002 lhs8.i
-rwxr-xr-x   1 cscherer sunuser      5224 Feb 26 10:53 linintrp.f
-r--r--r--   1 cscherer sunuser       331 Nov 17 18:03 mechadj.i
-rwxr-xr-x   1 cscherer sunuser     79836 Mar 24 13:13 mechfail.e
-rw-r--r--   1 cscherer sunuser    127038 Feb 26 10:53 mechfail.f
-rwxr-xr-x   1 cscherer sunuser    408048 Mar 24 13:14 nefmks.e
-rw-r--r--   1 cscherer sunuser    308005 Feb 26 10:50 nefmks.f
-rwxr-xr-x   1 cscherer sunuser    122652 Mar 24 13:14 releaset.e
-rw-r--r--   1 cscherer sunuser    177497 Feb 26 10:51 releaset.f
-rwxr-xr-x   1 cscherer sunuser    243548 Mar 24 13:15 snllhs.e
-rw-r--r--   1 cscherer sunuser    225283 Feb 27 09:01 snllhs.f
-rwxr-xr-x   1 cscherer sunuser      4295 Feb 26 10:53 srchpos.f
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-rwxr-xr-x   1 cscherer sunuser     19959 Feb 26 10:53 weldfail.f

scr445/tpa50a/codes/gentpa:
total 413
drwxr-xr-x   2 cscherer sunuser      3072 Mar 26 10:46 .
drwxr-xr-x   4 cscherer sunuser      1024 Mar 26 10:46 ..
-rw-r--r--   1 cscherer sunuser       543 Feb 11  2000 AFPPAR.CMN
-rw-r--r--   1 cscherer sunuser      1044 Feb 11  2000 AIRPAR.CMN
-rw-r--r--   1 cscherer sunuser       872 Feb 11  2000 ANMPAR.CMN
-rw-r--r--   1 cscherer sunuser       615 Feb 11  2000 AQUPAR.CMN
-rw-r--r--   1 cscherer sunuser      1089 Feb 11  2000 CONC.CMN
-rw-r--r--   1 cscherer sunuser       461 Feb 11  2000 DAYPC.CMN
-rw-r--r--   1 cscherer sunuser       400 Feb 11  2000 DECAY.CMN
-rw-r--r--   1 cscherer sunuser       571 Feb 11  2000 DFPAR.CMN
-rw-r--r--   1 cscherer sunuser      1359 Feb 11  2000 DOSALL.CMN
-rw-r--r--   1 cscherer sunuser       574 Feb 11  2000 ENVPAR.CMN
-rw-r--r--   1 cscherer sunuser       310 Feb 11  2000 EXPALL.CMN
-rw-r--r--   1 cscherer sunuser       637 Feb 11  2000 EXTPAR.CMN
-rw-r--r--   1 cscherer sunuser       327 Feb 11  2000 FILES.CMN
-rw-r--r--   1 cscherer sunuser       814 Feb 11  2000 FODPAR.CMN
-rw-r--r--   1 cscherer sunuser       438 Feb 11  2000 INVIN.CMN
-rw-r--r--   1 cscherer sunuser       569 Feb 11  2000 LABELS.CMN
-rw-r--r--   1 cscherer sunuser      1161 Feb 11  2000 MTBPAR.CMN
-rw-r--r--   1 cscherer sunuser      1688 Feb 28  2000 Make.bat
-rw-r--r--   1 cscherer sunuser      1849 Feb 24  2000 Makefile
-rw-rw-rw-   1 cscherer sunuser      1938 Nov 27 14:12 Makefile4.2
-rw-r--r--   1 cscherer sunuser      1746 Feb 11  2000 Mkenv.fig
-rw-r--r--   1 cscherer sunuser      1548 Feb 11  2000 Mkenvin.fig
-rw-r--r--   1 cscherer sunuser      2762 Feb 11  2000 OPT.CMN
-rw-r--r--   1 cscherer sunuser       444 Feb 11  2000 ORGMAS.CMN
-rw-r--r--   1 cscherer sunuser       728 Feb 11  2000 ORGPAR.CMN
-rw-r--r--   1 cscherer sunuser       589 Feb 11  2000 RAD.CMN
-rw-r--r--   1 cscherer sunuser       788 Feb 11  2000 RADIN.CMN
-rw-r--r--   1 cscherer sunuser       722 Feb 11  2000 RMD.CMN
-rw-r--r--   1 cscherer sunuser       489 Feb 11  2000 RMD2.CMN
-rw-r--r--   1 cscherer sunuser       891 Feb 11  2000 SOLPAR.CMN
-rw-r--r--   1 cscherer sunuser       489 Feb 11  2000 SWPAR.CMN
-rw-r--r--   1 cscherer sunuser       586 Feb 11  2000 TIMES.CMN
-rw-r--r--   1 cscherer sunuser       316 Feb 11  2000 TITL.CMN
-rw-r--r--   1 cscherer sunuser     12777 Feb 11  2000 accmod.f
-rw-r--r--   1 cscherer sunuser     10094 Feb 11  2000 acute1.f
-rw-r--r--   1 cscherer sunuser      9579 Feb 11  2000 acutea.f
-rw-r--r--   1 cscherer sunuser      7118 Feb 11  2000 acutec.f
-rw-r--r--   1 cscherer sunuser      8669 Feb 11  2000 aircal.f
-rw-r--r--   1 cscherer sunuser      8383 Feb 11  2000 anmcal.f
-rw-r--r--   1 cscherer sunuser      2043 Feb 11  2000 aqucal.f
-rw-r--r--   1 cscherer sunuser      1217 Feb 11  2000 biocal.f
-rw-r--r--   1 cscherer sunuser      4174 Feb 11  2000 blockd.f
-rw-r--r--   1 cscherer sunuser      1405 Feb 11  2000 bsort.f
-rw-r--r--   1 cscherer sunuser     13008 Feb 11  2000 candh.f
-rw-r--r--   1 cscherer sunuser      6653 Feb 11  2000 chain.f
-rw-r--r--   1 cscherer sunuser     23921 Feb 11  2000 check.f
-rw-r--r--   1 cscherer sunuser     10189 Feb 11  2000 cronmod.f
-rw-r--r--   1 cscherer sunuser      5153 Feb 11  2000 crpcal.f
-rw-r--r--   1 cscherer sunuser      3842 Feb 11  2000 dkharv.f
-rw-r--r--   1 cscherer sunuser      5426 Feb 11  2000 dose.f
-rw-r--r--   1 cscherer sunuser      2398 Feb 11  2000 drfbiv.f
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-rw-r--r--   1 cscherer sunuser      6728 Feb 11  2000 drfsec.f
-rw-r--r--   1 cscherer sunuser      1877 Feb 11  2000 drkcal.f
-rw-r--r--   1 cscherer sunuser      1325 Feb 11  2000 dumred.f
-rw-r--r--   1 cscherer sunuser      3958 Feb 11  2000 edranm.f
-rw-r--r--   1 cscherer sunuser      3567 Feb 11  2000 edrcrp.f
-rw-r--r--   1 cscherer sunuser      2525 Feb 11  2000 edrnon.f
-rw-r--r--   1 cscherer sunuser      2853 Feb 11  2000 edrres.f
-rw-r--r--   1 cscherer sunuser     10581 Feb 11  2000 env.f
-rw-r--r--   1 cscherer sunuser      4885 Feb 11  2000 envin.f
-rw-r--r--   1 cscherer sunuser      4561 Feb 11  2000 envlib.f
-rw-r--r--   1 cscherer sunuser      1912 Feb 11  2000 exposr.f
-rw-r--r--   1 cscherer sunuser      6774 Feb 11  2000 extcal.f
-rw-r--r--   1 cscherer sunuser      1489 Feb 11  2000 filerr.f
-rw-r--r--   1 cscherer sunuser      1986 Feb 11  2000 fntdrf.f
-rw-r--r--   1 cscherer sunuser      3003 Feb 11  2000 headng.f
-rw-r--r--   1 cscherer sunuser      2203 Feb 11  2000 idnuc.f
-rw-r--r--   1 cscherer sunuser      2842 Feb 11  2000 inhcal.f
-rw-r--r--   1 cscherer sunuser      2392 Feb 11  2000 initnv.f
-rw-r--r--   1 cscherer sunuser      1841 Feb 11  2000 intpol.f
-rw-r--r--   1 cscherer sunuser      1348 Feb 11  2000 invmol.f
-rw-r--r--   1 cscherer sunuser       677 Feb 11  2000 makda2.f
-rw-r--r--   1 cscherer sunuser      5870 Feb 11  2000 opnfil.f
-rw-r--r--   1 cscherer sunuser      4217 Feb 11  2000 order.f
-rw-r--r--   1 cscherer sunuser      2325 Feb 11  2000 packag.f
-rw-r--r--   1 cscherer sunuser      3366 Feb 11  2000 plmriz.f
-rw-r--r--   1 cscherer sunuser      1861 Feb 11  2000 prior.f
-rw-r--r--   1 cscherer sunuser      4080 Feb 11  2000 prob.f
-rw-r--r--   1 cscherer sunuser      2079 Feb 11  2000 profile.f
-rw-r--r--   1 cscherer sunuser     11351 Feb 11  2000 readin.f
-rw-r--r--   1 cscherer sunuser      6174 Feb 11  2000 redcas.f
-rw-r--r--   1 cscherer sunuser      3867 Feb 11  2000 redcha.f
-rw-r--r--   1 cscherer sunuser      8483 Feb 11  2000 redflt.f
-rw-r--r--   1 cscherer sunuser      1694 Feb 11  2000 redist.f
-rw-r--r--   1 cscherer sunuser      8548 Feb 11  2000 ritenv.f
-rw-r--r--   1 cscherer sunuser      4371 Feb 11  2000 ritexp.f
-rw-r--r--   1 cscherer sunuser      2584 Feb 11  2000 ritmed.f
-rw-r--r--   1 cscherer sunuser     27222 Feb 11  2000 ritqa.f
-rw-r--r--   1 cscherer sunuser      4346 Feb 11  2000 rlibin.f
-rw-r--r--   1 cscherer sunuser      4399 Feb 11  2000 rwake.f
-rw-r--r--   1 cscherer sunuser      2396 Feb 11  2000 sigma.f
-rw-r--r--   1 cscherer sunuser      8387 Feb 11  2000 swcal.f
-rw-r--r--   1 cscherer sunuser      1894 Feb 11  2000 trnspt.f
-rw-r--r--   1 cscherer sunuser      1771 Feb 11  2000 ustar.f
-rw-r--r--   1 cscherer sunuser      9276 Feb 11  2000 xqcal.f
-rw-r--r--   1 cscherer sunuser      5277 Feb 11  2000 xqin.f

scr445/tpa50a/codes/itym:
total 4
drwxr-xr-x   3 cscherer sunuser       512 Mar 24 12:22 .
drwxr-xr-x   4 cscherer sunuser      1024 Mar 26 10:46 ..
-rw-r--r--   1 cscherer sunuser       596 Oct  1  2002 makefile
drwxr-xr-x   2 cscherer sunuser       512 Mar 24 12:22 src

scr445/tpa50a/codes/itym/src:
total 328
drwxr-xr-x   2 cscherer sunuser       512 Mar 24 12:22 .
drwxr-xr-x   3 cscherer sunuser       512 Mar 24 12:22 ..
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-rw-r--r--   1 cscherer sunuser     29776 Mar 22  2000 array.f
-rw-r--r--   1 cscherer sunuser     15856 Mar 22  2000 check_valid.f
-rw-r--r--   1 cscherer sunuser     60931 Dec 30 19:29 estimator.f
-rw-r--r--   1 cscherer sunuser      5384 Dec 30 19:31 init_itym.f
-rw-r--r--   1 cscherer sunuser      9420 Sep 25  2002 itym.f
-rw-r--r--   1 cscherer sunuser     11640 Dec 30 19:31 itym.i
-rw-r--r--   1 cscherer sunuser     26752 Sep 26  2002 itymutils.f
-rw-r--r--   1 cscherer sunuser       261 Mar 22  2000 path.i
-rw-r--r--   1 cscherer sunuser        55 Mar 22  2000 preuzf.i
-rw-r--r--   1 cscherer sunuser     42671 Mar 22  2000 ran.f
-rw-r--r--   1 cscherer sunuser     38406 Sep 26  2002 strtokfunc.f
-rw-r--r--   1 cscherer sunuser     60346 Sep 26  2002 uncertain.f
-rw-r--r--   1 cscherer sunuser     12265 Mar 22  2000 uncertain.i
-rw-r--r--   1 cscherer sunuser        55 Mar 22  2000 unctab.i
-rw-r--r--   1 cscherer sunuser     10904 Mar 22  2000 zportunx.f

scr445/tpa50a/data:
total 7434
drwxr-xr-x   2 cscherer sunuser      1536 Mar 24 12:22 .
drwxr-xr-x   6 cscherer sunuser      7680 Mar 31 10:50 ..
-rw-r--r--   1 cscherer sunuser       965 Feb 11  2000 FILENAME.DAT
-rw-r--r--   1 cscherer sunuser     91434 Feb 27 08:50 basecase.inp
-rw-r--r--   1 cscherer sunuser    121789 Mar 22  2000 bunitdem.dat
-rw-r--r--   1 cscherer sunuser      1025 Mar 29  2000 burnup.dat
-rwxr-xr-x   1 cscherer sunuser    468925 Sep 25  2002 careadem.dat
-rwxr-xr-x   1 cscherer sunuser    515693 Sep 25  2002 cdepdem.dat
-rw-r--r--   1 cscherer sunuser    850000 Aug 15  1997 climato1.dat
-rw-r--r--   1 cscherer sunuser      2200 Feb  1  1999 climato2.dat
-rw-r--r--   1 cscherer sunuser      6219 Feb 19 10:46 coefkdeq.dat
-rw-r--r--   1 cscherer sunuser      6219 Feb 22 16:33 coefkdeqr.dat
-rw-r--r--   1 cscherer sunuser      2200 Dec 19 13:50 dilution.dat
-rw-r--r--   1 cscherer sunuser       519 Oct 19  2000 drythick.dat
-rw-r--r--   1 cscherer sunuser       791 Jul 23  2002 dsfailt.def
-rw-r--r--   1 cscherer sunuser      5973 Feb 14 19:57 ebsfail.def
-rw-r--r--   1 cscherer sunuser       790 May 28  1998 ebsfilt.def
-rw-r--r--   1 cscherer sunuser      5459 Jan  7 11:17 ebsrel.def
-rw-r--r--   1 cscherer sunuser    298679 Mar 22  2000 elevdem.dat
-rw-r--r--   1 cscherer sunuser      9381 May 29  2002 fluoride.dat
-rw-r--r--   1 cscherer sunuser      6513 Feb 11  2000 gbioac1.dat
-rw-r--r--   1 cscherer sunuser      3383 Sep  4  2002 gdefauls.def
-rw-r--r--   1 cscherer sunuser      3383 Feb 11  2000 gdefault.def
-rw-r--r--   1 cscherer sunuser        64 Feb 11  2000 gdosinc2.dat
-rw-r--r--   1 cscherer sunuser      7011 Feb 11  2000 gftrans.def
-rw-r--r--   1 cscherer sunuser      7011 Sep  4  2002 gftranss.def
-rw-r--r--   1 cscherer sunuser     15214 Feb 11  2000 ggamen.dat
-rw-r--r--   1 cscherer sunuser     13855 Feb 11  2000 ggenii.def
-rw-r--r--   1 cscherer sunuser     13173 Sep  4  2002 ggeniis.def
-rw-r--r--   1 cscherer sunuser      5351 Feb 11  2000 ggrdf.dat
-rw-r--r--   1 cscherer sunuser      9897 Mar 29  2000 gnewdf.dat
-rw-r--r--   1 cscherer sunuser     13200 Mar 20  2000 grmdlib.dat
-rw-r--r--   1 cscherer sunuser      3048 Sep 15  2000 gs_cb_ad.dat
-rw-r--r--   1 cscherer sunuser      2487 Jun  4  1998 gs_cb_ci.dat
-rw-r--r--   1 cscherer sunuser      3045 Sep 15  2000 gs_pb_ad.dat
-rw-r--r--   1 cscherer sunuser      2487 Jun  4  1998 gs_pb_ci.dat
-rw-r--r--   1 cscherer sunuser      8247 Feb 22 16:39 ia.dat
-rw-r--r--   1 cscherer sunuser     20698 Dec 30 19:26 itym.dat
-rw-r--r--   1 cscherer sunuser    943774 Mar 29  2000 maidtbl.dat
```

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-rw-r--r--   1 cscherer sunuser     10978 Mar 22  2000 maswtbl.dat
-rwxr-xr-x   1 cscherer sunuser    943775 Dec 30 19:18 maydtbl.dat
-rw-r--r--   1 cscherer sunuser      9729 Dec 17 17:31 mechfail.def
-rw-r--r--   1 cscherer sunuser      1251 Feb  6 14:39 multifaf.dat
-rw-r--r--   1 cscherer sunuser      1252 Feb  6 14:39 multifbe.dat
-rw-r--r--   1 cscherer sunuser    116965 Jul 17  2002 multiflo.dat
-rw-r--r--   1 cscherer sunuser      7152 Feb 21 21:14 nuclides.dat
-rw-r--r--   1 cscherer sunuser      7111 Sep 24  2000 organdf.dat
-rw-r--r--   1 cscherer sunuser       548 Sep 21  2000 repdes.dat
-rw-r--r--   1 cscherer sunuser    242353 Feb 23 18:09 reversibles.inp
-rwxr-xr-x   1 cscherer sunuser    130758 Dec 17 17:31 seisbs1.dis
-rwxr-xr-x   1 cscherer sunuser    130758 Dec 17 17:31 seisbs2.dis
-rwxr-xr-x   1 cscherer sunuser    943788 Dec 30 19:18 smaydtbl.dat
-rw-r--r--   1 cscherer sunuser    489858 Mar 22  2000 soildem.dat
-rw-r--r--   1 cscherer sunuser      4506 Feb  7  2000 strmtube.dat
-rw-r--r--   1 cscherer sunuser    119673 Mar 22  2000 sunitdem.dat
-rw-r--r--   1 cscherer sunuser    162404 May  8  2000 tefkti.inp
-rw-r--r--   1 cscherer sunuser    101499 Feb 19 10:43 tpanames.dbs
-rw-r--r--   1 cscherer sunuser    471041 Mar 22  2000 winddem.dat
-rw-r--r--   1 cscherer sunuser     17410 Feb  2  2000 wpflow.def

scr445/tpa50a/r1024:
total 213956
drwxr-xr-x   2 cscherer sunuser      6656 Mar 31 10:55 .
drwxr-xr-x   6 cscherer sunuser      7680 Mar 31 10:50 ..
-rwxr-xr-x   1 cscherer sunuser      2001 Sep 18  2002 CLEANUP
-rw-r--r--   1 cscherer sunuser       965 Mar 25 12:45 FILENAME.DAT
-rw-r--r--   1 cscherer sunuser       869 Nov 27 14:22 Makefile
-rw-rw-rw-   1 cscherer sunuser       961 Nov 27 14:24 Makefile4.2
-rw-r--r--   1 cscherer sunuser      1305 Mar 30 07:36 NEFII.VEL
-rw-r--r--   1 cscherer sunuser    753624 Mar 30 07:37 airpkdos.res
-rw-r--r--   1 cscherer sunuser    753624 Mar 30 07:37 arpkds_c.res
-rw-r--r--   1 cscherer sunuser    129808 Mar 30 07:36 ashout.res
-rw-r--r--   1 cscherer sunuser      1025 Mar 25 12:40 burnup.dat
-rwxrwxrwx   1 cscherer sunuser       156 Mar 25 11:29 ch_env
-rw-r--r--   1 cscherer sunuser      7547 Mar 30 07:36 chlrdmf.dat
-rw-r--r--   1 cscherer sunuser    850000 Mar 25 12:40 climato1.dat
-rw-r--r--   1 cscherer sunuser      2200 Mar 25 12:40 climato2.dat
-rw-r--r--   1 cscherer sunuser      6219 Mar 25 12:41 coefkdeq.dat
-rw-r--r--   1 cscherer sunuser     19334 Mar 30 07:36 corrode.out
-rw-r--r--   1 cscherer sunuser     79223 Mar 30 07:37 cp.tpa
-rw-r--r--   1 cscherer sunuser   1598128 Mar 30 07:37 cumrel.res
-rw-r--r--   1 cscherer sunuser   1598128 Mar 30 07:37 cumrel_c.res
-rw-r--r--   1 cscherer sunuser     69680 Mar 30 07:36 cumrelse.out
-rw-r--r--   1 cscherer sunuser      9993 Mar 30 07:36 deltaec.inp
-rw-r--r--   1 cscherer sunuser     14700 Mar 30 07:36 diagnose.out
-rw-r--r--   1 cscherer sunuser      2200 Mar 25 12:45 dilution.dat
-rw-r--r--   1 cscherer sunuser      3870 Mar 25 12:40 drifts.dat
-rw-r--r--   1 cscherer sunuser       519 Mar 25 12:40 drythick.dat
-rw-r--r--   1 cscherer sunuser   1732719 Mar 30 07:37 dsfail.res
-rw-r--r--   1 cscherer sunuser      2626 Mar 30 07:36 dsfailt.dat
-rw-r--r--   1 cscherer sunuser       791 Mar 25 12:40 dsfailt.def
-rw-r--r--   1 cscherer sunuser       610 Mar 30 07:36 dsfailt.inp
-rw-r--r--   1 cscherer sunuser         0 Mar 25 12:40 dsfailt.out
-rw-r--r--   1 cscherer sunuser     65260 Mar 30 07:36 ebscld.out
-rw-r--r--   1 cscherer sunuser      5973 Mar 25 12:40 ebsfail.def
-rw-r--r--   1 cscherer sunuser      5734 Mar 30 07:36 ebsfail.inp
```

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-rw-r--r--   1 cscherer sunuser       790 Mar 25 12:41 ebsfilt.def
-rw-r--r--   1 cscherer sunuser      2554 Mar 30 07:36 ebsfilt.inp
-rw-r--r--   1 cscherer sunuser       239 Mar 30 07:36 ebsfilt.out
-rw-r--r--   1 cscherer sunuser     20929 Mar 30 07:36 ebsflo.dat
-rw-r--r--   1 cscherer sunuser    251401 Mar 30 07:36 ebsnef.dat
-rw-r--r--   1 cscherer sunuser    186252 Mar 30 07:36 ebsnef.out
-rw-r--r--   1 cscherer sunuser    658449 Mar 30 07:36 ebsnef2.dat
-rw-r--r--   1 cscherer sunuser      1883 Mar 30 07:36 ebspac.nuc
-rw-r--r--   1 cscherer sunuser      5459 Mar 25 12:41 ebsrel.def
-rw-r--r--   1 cscherer sunuser     11110 Mar 30 07:36 ebsrel.inp
-rw-r--r--   1 cscherer sunuser    186203 Mar 30 07:36 ebssf.dat
-rw-r--r--   1 cscherer sunuser     25515 Mar 30 07:36 ebstrh.dat
-rw-r--r--   1 cscherer sunuser     18435 Mar 30 07:36 ebstrhc.inp
-rw-r--r--   1 cscherer sunuser      2647 Mar 30 07:36 echofail.dat
-rw-r--r--   1 cscherer sunuser    667001 Mar 30 07:36 echofilt.dat
-rw-r--r--   1 cscherer sunuser     39350 Mar 30 07:36 epa_ave.out
-rw-r--r--   1 cscherer sunuser    376121 Mar 30 07:36 epapktim.out
-rw-r--r--   1 cscherer sunuser     23089 Mar 30 07:36 failt.out
-rw-r--r--   1 cscherer sunuser      9381 Mar 30 07:36 fluoride.dat
-rw-r--r--   1 cscherer sunuser     69680 Mar 30 07:36 frac_rel.out
-rw-r--r--   1 cscherer sunuser      6513 Mar 25 12:45 gbioac1.dat
-rw-r--r--   1 cscherer sunuser      3383 Mar 25 12:45 gdefault.def
-rw-r--r--   1 cscherer sunuser      3387 Mar 30 07:36 gdefault.inp
-rw-r--r--   1 cscherer sunuser        64 Mar 25 12:45 gdosinc2.dat
-rw-r--r--   1 cscherer sunuser         0 Mar 30 07:36 gentoo.out
-rw-r--r--   1 cscherer sunuser     35173 Mar 30 07:36 genv.in
-rw-r--r--   1 cscherer sunuser     18393 Mar 30 07:36 genv.out
-rw-r--r--   1 cscherer sunuser      7011 Mar 25 12:45 gftrans.def
-rw-r--r--   1 cscherer sunuser      7142 Mar 30 07:36 gftrans.inp
-rw-r--r--   1 cscherer sunuser     15214 Mar 25 12:45 ggamen.dat
-rw-r--r--   1 cscherer sunuser     13855 Mar 25 12:45 ggenii.def
-rw-r--r--   1 cscherer sunuser     13164 Mar 30 07:36 ggenii.inp
-rw-r--r--   1 cscherer sunuser     10074 Mar 30 07:36 ggenii.out
-rw-r--r--   1 cscherer sunuser      5351 Mar 25 12:45 ggrdf.dat
-rw-r--r--   1 cscherer sunuser      5673 Mar 30 07:36 gmedia.out
-rw-r--r--   1 cscherer sunuser      9897 Mar 25 12:45 gnewdf.dat
-rw-r--r--   1 cscherer sunuser     13200 Mar 25 12:45 grmdlib.dat
-rw-r--r--   1 cscherer sunuser       568 Mar 30 07:36 gsccdf.res
-rw-r--r--   1 cscherer sunuser       568 Mar 30 07:36 gsccdf_c.res
-rw-r--r--   1 cscherer sunuser      3561 Mar 30 07:36 gw_cb_ad.dat
-rw-r--r--   1 cscherer sunuser      1264 Mar 30 07:36 gw_cb_ci.dat
-rw-r--r--   1 cscherer sunuser      3557 Mar 30 07:36 gw_pb_ad.dat
-rw-r--r--   1 cscherer sunuser      1261 Mar 30 07:36 gw_pb_ci.dat
-rw-r--r--   1 cscherer sunuser     36198 Mar 30 07:36 gwccdf.res
-rw-r--r--   1 cscherer sunuser     33993 Mar 30 07:36 gwccdf_c.res
-rw-r--r--   1 cscherer sunuser         9 Mar 30 07:36 gwork.buf
-rw-r--r--   1 cscherer sunuser    408888 Mar 30 07:36 gwpkdos.res
-rw-r--r--   1 cscherer sunuser    408888 Mar 30 07:36 gwpkds_c.res
-rw-r--r--   1 cscherer sunuser    556632 Mar 30 07:36 gwttuzsz.res
-rw-r--r--   1 cscherer sunuser   2476720 Mar 30 07:36 infilper.res
-rw-r--r--   1 cscherer sunuser      1102 Mar 30 07:36 inv1000.out
-rw-r--r--   1 cscherer sunuser         0 Mar 25 11:29 lhs.csv
-rw-r--r--   1 cscherer sunuser     47014 Mar 25 12:40 lhs.inp
-rw-r--r--   1 cscherer sunuser   5867520 Mar 25 12:40 lhs.out
-rw-r--r--   1 cscherer sunuser     78602 Mar 25 12:40 lhse.out
-rw-r--r--   1 cscherer sunuser      1095 Mar 30 07:36 maxrel.dat
-rwxr-xr-x   1 cscherer sunuser    943775 Mar 25 12:40 maydtbl.dat
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-rw-r--r--   1 cscherer sunuser     47368 Mar 30 07:36 mechfail.dat
-rw-r--r--   1 cscherer sunuser      9729 Mar 25 12:40 mechfail.def
-rw-r--r--   1 cscherer sunuser     26711 Mar 30 07:36 mechfail.inp
-rw-r--r--   1 cscherer sunuser         0 Mar 30 07:36 mechfail.out
-rw-r--r--   1 cscherer sunuser      1251 Mar 25 12:40 multifaf.dat
-rw-r--r--   1 cscherer sunuser      1252 Mar 25 12:40 multifbe.dat
-rw-r--r--   1 cscherer sunuser  18185728 Mar 30 07:36 mv.tpa
-rw-r--r--   1 cscherer sunuser   2476720 Mar 30 07:36 nearfld.res
-rw-r--r--   1 cscherer sunuser    685698 Mar 30 07:36 nefii.dis
-rw-r--r--   1 cscherer sunuser     11320 Mar 30 07:36 nefii.inp
-rw-r--r--   1 cscherer sunuser   1048639 Mar 30 07:36 nefii.out
-rw-r--r--   1 cscherer sunuser       603 Mar 30 07:36 nefii.rel
-rw-r--r--   1 cscherer sunuser    685698 Mar 30 07:36 nefiisz.dis
-rw-r--r--   1 cscherer sunuser     11320 Mar 30 07:36 nefiisz.inp
-rw-r--r--   1 cscherer sunuser   1048639 Mar 30 07:36 nefiisz.out
-rw-r--r--   1 cscherer sunuser    303850 Mar 30 07:36 nefiisz.src
-rw-r--r--   1 cscherer sunuser      1305 Mar 30 07:36 nefiisz.vel
-rw-r--r--   1 cscherer sunuser    153653 Mar 30 07:35 nefiiuz.dis
-rw-r--r--   1 cscherer sunuser     10100 Mar 30 07:35 nefiiuz.inp
-rw-r--r--   1 cscherer sunuser    414346 Mar 30 07:35 nefiiuz.out
-rw-r--r--   1 cscherer sunuser    306191 Mar 30 07:35 nefiiuz.src
-rw-r--r--   1 cscherer sunuser       822 Mar 30 07:35 nefiiuz.vel
-rw-r--r--   1 cscherer sunuser     83735 Mar 30 07:36 nefmks.log
-rw-r--r--   1 cscherer sunuser    671544 Mar 30 07:37 npkdoset.res
-rw-r--r--   1 cscherer sunuser    671544 Mar 30 07:37 npkdst_c.res
-rw-r--r--   1 cscherer sunuser      7152 Mar 25 12:40 nuclides.dat
-rw-r--r--   1 cscherer sunuser      7111 Mar 25 12:45 organdf.dat
-rw-r--r--   1 cscherer sunuser     47756 Mar 30 07:37 pkmndose.out
-rw-r--r--   1 cscherer sunuser   7169240 Mar 30 07:36 pkreltim.res
-rw-r--r--   1 cscherer sunuser   7169240 Mar 30 07:36 pkrltm_c.res
-rw-r--r--   1 cscherer sunuser       899 Mar 30 07:36 rel_flow.out
-rw-r--r--   1 cscherer sunuser     36198 Mar 30 07:36 relccdf.res
-rw-r--r--   1 cscherer sunuser      2883 Mar 30 07:36 relcum.out
-rw-r--r--   1 cscherer sunuser       415 Mar 30 07:36 releaset.out
-rw-r--r--   1 cscherer sunuser       773 Mar 30 07:36 relfrac.out
-rw-r--r--   1 cscherer sunuser     64144 Mar 30 07:36 relgwgs.res
-rw-r--r--   1 cscherer sunuser       548 Mar 25 12:40 repdes.dat
-rw-r--r--   1 cscherer sunuser     70757 Mar 30 07:36 rgwna.tpa
-rw-r--r--   1 cscherer sunuser     70757 Mar 30 07:36 rgwnapani.tpa
-rw-r--r--   1 cscherer sunuser     70757 Mar 30 07:36 rgwnapdw.tpa
-rw-r--r--   1 cscherer sunuser     70757 Mar 30 07:36 rgwnapext.tpa
-rw-r--r--   1 cscherer sunuser     70757 Mar 30 07:36 rgwnapinh.tpa
-rw-r--r--   1 cscherer sunuser     70757 Mar 30 07:36 rgwnapmlk.tpa
-rw-r--r--   1 cscherer sunuser     70757 Mar 30 07:36 rgwnappla.tpa
-rw-r--r--   1 cscherer sunuser  71746229 Mar 30 07:36 rgwnr.tpa
-rw-r--r--   1 cscherer sunuser      7433 Mar 30 07:36 rgwsa.tpa
-rw-r--r--   1 cscherer sunuser     23933 Mar 30 07:36 rgwsap.tpa
-rw-r--r--   1 cscherer sunuser   7113237 Mar 30 07:36 rgwsr.tpa
-rw-r--r--   1 cscherer sunuser     33993 Mar 30 07:36 rlccdf_c.res
-rw-r--r--   1 cscherer sunuser     64144 Mar 30 07:36 rlgwgs_c.res
-rw-r--r--   1 cscherer sunuser      3863 Mar 25 12:40 samplpar.abb
-rw-r--r--   1 cscherer sunuser     29763 Mar 25 12:40 samplpar.hdr
-rw-r--r--   1 cscherer sunuser   5868162 Mar 30 07:36 samplpar.res
-rwxr-xr-x   1 cscherer sunuser    130758 Mar 25 12:40 seisbs1.dis
-rwxr-xr-x   1 cscherer sunuser    130758 Mar 25 12:40 seisbs2.dis
-rwxrwxrwx   1 cscherer sunuser        30 Sep 12  2002 show_env
-rwxr-xr-x   1 cscherer sunuser    943788 Mar 25 12:40 smaydtbl.dat
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-rw-r--r--   1 cscherer sunuser    303850 Mar 30 07:36 sotnef.dat
-rw-r--r--   1 cscherer sunuser   8001108 Mar 30 07:36 sp.tpa
-rw-r--r--   1 cscherer sunuser      4506 Mar 25 12:41 strmtube.dat
-rw-r--r--   1 cscherer sunuser  12761744 Mar 30 07:36 totdos_c.res
-rw-r--r--   1 cscherer sunuser  19110544 Mar 30 07:36 totdose.res
-rwxr-xr-x   1 cscherer sunuser   2528744 Mar 24 13:13 tpa.e
-rw-r--r--   1 cscherer sunuser     91428 Mar 25 12:37 tpa.inp
-rw-r--r--   1 cscherer sunuser     91425 Feb 26 13:33 tpa_orig.inp
-rw-r--r--   1 cscherer sunuser     91428 Mar 25 12:37 tpa_r1024.inp
-rw-r--r--   1 cscherer sunuser  24068643 Mar 30 07:37 tpa_r1024.out
-rw-r--r--   1 cscherer sunuser     91432 Mar 25 11:07 tpa_slt1.inp
-rw-r--r--   1 cscherer sunuser     24714 Mar 25 11:35 tpa_slt1.out
-rw-r--r--   1 cscherer sunuser     91432 Mar 25 11:08 tpa_slt2.inp
-rw-r--r--   1 cscherer sunuser     24817 Mar 25 12:08 tpa_slt2.out
-rw-r--r--   1 cscherer sunuser     91432 Mar 25 11:08 tpa_slt3.inp
-rw-r--r--   1 cscherer sunuser     26831 Mar 25 12:35 tpa_slt3.out
-rw-r--r--   1 cscherer sunuser     92335 Mar 25 12:40 tpameans.out
-rw-r--r--   1 cscherer sunuser    101499 Mar 25 12:40 tpanames.dbs
-rw-r--r--   1 cscherer sunuser    242179 Mar 30 07:36 trelease.out
-rw-r--r--   1 cscherer sunuser     21032 Mar 30 07:36 weldfail.out
-rw-r--r--   1 cscherer sunuser   1024191 Mar 30 07:37 wpfillstats.out
-rw-r--r--   1 cscherer sunuser     13105 Mar 25 12:41 wpflow.dat
-rw-r--r--   1 cscherer sunuser     17410 Mar 25 12:41 wpflow.def
-rw-r--r--   1 cscherer sunuser    139746 Mar 30 07:36 wpsfail.res

scr445/tpa50b:
total 30711
drwxr-xr-x   5 cscherer sunuser      7168 Apr  1 09:58 .
drwxr-xr-x   7 cscherer sunuser       512 Apr  1 09:15 ..
-rwxr-xr-x   1 cscherer sunuser      2001 Sep 18  2002 CLEANUP
-rw-r--r--   1 cscherer sunuser    257200 Apr  1 09:58 Chain01
-rw-r--r--   1 cscherer sunuser     42496 Apr  1 09:58 Chain02
-rw-r--r--   1 cscherer sunuser     34000 Apr  1 09:58 Chain03
-rw-r--r--   1 cscherer sunuser     25504 Apr  1 09:58 Chain04
-rw-r--r--   1 cscherer sunuser    385792 Apr  1 09:58 Chain05
-rw-r--r--   1 cscherer sunuser     25504 Apr  1 09:58 Chain06
-rw-r--r--   1 cscherer sunuser    233392 Apr  1 09:58 Chain07
-rw-r--r--   1 cscherer sunuser    233392 Apr  1 09:58 Chain08
-rw-r--r--   1 cscherer sunuser     25504 Apr  1 09:58 Chain09
-rw-r--r--   1 cscherer sunuser    233392 Apr  1 09:58 Chain10
-rw-r--r--   1 cscherer sunuser     25504 Apr  1 09:58 Chain11
-rw-r--r--   1 cscherer sunuser     25504 Apr  1 09:58 Chain12
-rw-r--r--   1 cscherer sunuser    233392 Apr  1 09:58 Chain13
-rw-r--r--   1 cscherer sunuser    174184 Apr  1 09:58 Chain14
-rw-r--r--   1 cscherer sunuser    232240 Apr  1 09:58 Chain15
-rw-r--r--   1 cscherer sunuser        16 Apr  1 09:58 Chain16
-rw-r--r--   1 cscherer sunuser         0 Apr  1 09:58 Chain17
-rw-r--r--   1 cscherer sunuser         0 Apr  1 09:58 Chain18
-rw-r--r--   1 cscherer sunuser       965 Apr  1 09:39 FILENAME.DAT
-rw-r--r--   1 cscherer sunuser       869 Nov 27 14:22 Makefile
-rw-rw-rw-   1 cscherer sunuser       961 Nov 27 14:24 Makefile4.2
-rw-r--r--   1 cscherer sunuser      1833 Apr  1 09:58 NEFII.VEL
-rw-r--r--   1 cscherer sunuser     69848 Apr  1 09:58 TAPE24
-rw-r--r--   1 cscherer sunuser      2008 Apr  1 09:58 airpkdos.res
-rw-r--r--   1 cscherer sunuser      2008 Apr  1 09:58 arpkds_c.res
-rw-r--r--   1 cscherer sunuser     29502 Mar 24 16:19 array.f
-rw-r--r--   1 cscherer sunuser     51372 Apr  1 09:18 array.o
```

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-rw-r--r--   1 cscherer sunuser       784 Apr  1 09:58 ashout.res
-rw-r--r--   1 cscherer sunuser     20686 Mar 24 16:19 ashplumo.f
-rw-r--r--   1 cscherer sunuser     45556 Apr  1 09:18 ashplumo.o
-rw-r--r--   1 cscherer sunuser     37705 Mar 24 16:19 ashrmovo.f
-rw-r--r--   1 cscherer sunuser     46804 Apr  1 09:18 ashrmovo.o
-rw-r--r--   1 cscherer sunuser      1025 Apr  1 09:57 burnup.dat
drwxr-xr-x   2 cscherer sunuser       512 Mar 24 16:29 ccdf
-rwxrwxrwx   1 cscherer sunuser       156 Apr  1 09:35 ch_env
-rw-r--r--   1 cscherer sunuser      7547 Apr  1 09:57 chlrdmf.dat
-rw-r--r--   1 cscherer sunuser    850000 Apr  1 09:57 climato1.dat
-rw-r--r--   1 cscherer sunuser      2200 Apr  1 09:57 climato2.dat
drwxr-xr-x   4 cscherer sunuser      1024 Apr  1 09:24 codes
-rw-r--r--   1 cscherer sunuser      6219 Apr  1 09:57 coefkdeq.dat
-rw-r--r--   1 cscherer sunuser       735 Feb 18 18:46 coefkdeq.i
-rw-r--r--   1 cscherer sunuser     10207 Mar 24 16:19 condxyzt.f
-rw-r--r--   1 cscherer sunuser      3412 Apr  1 09:21 condxyzt.o
-rw-r--r--   1 cscherer sunuser     24306 Apr  1 09:57 corrode.out
-rw-r--r--   1 cscherer sunuser     79137 Apr  1 09:58 cp.tpa
-rw-r--r--   1 cscherer sunuser       688 Apr  1 09:58 cumrel.res
-rw-r--r--   1 cscherer sunuser       688 Apr  1 09:58 cumrel_c.res
-rw-r--r--   1 cscherer sunuser     69680 Apr  1 09:57 cumrelse.out
drwxr-xr-x   2 cscherer sunuser      1536 Mar 24 16:29 data
-rw-r--r--   1 cscherer sunuser    124149 Mar 24 16:19 dcags.f
-rw-r--r--   1 cscherer sunuser    255948 Apr  1 09:19 dcags.o
-rw-r--r--   1 cscherer sunuser    157666 Mar 24 16:19 dcagw.f
-rw-r--r--   1 cscherer sunuser    335496 Apr  1 09:18 dcagw.o
-rw-r--r--   1 cscherer sunuser      9993 Apr  1 09:57 deltaec.inp
-rw-r--r--   1 cscherer sunuser     14700 Apr  1 09:57 diagnose.out
-rw-r--r--   1 cscherer sunuser      2200 Apr  1 09:39 dilution.dat
-rw-r--r--   1 cscherer sunuser      3870 Apr  1 09:57 drifts.dat
-rw-r--r--   1 cscherer sunuser       190 Sep 20  2002 driftsa.i
-rw-r--r--   1 cscherer sunuser       519 Apr  1 09:57 drythick.dat
-rw-r--r--   1 cscherer sunuser     25470 Mar 24 16:19 dsfail.f
-rw-r--r--   1 cscherer sunuser     28508 Apr  1 09:19 dsfail.o
-rw-r--r--   1 cscherer sunuser       777 Apr  1 09:58 dsfail.res
-rw-r--r--   1 cscherer sunuser      2761 Apr  1 09:57 dsfailt.dat
-rw-r--r--   1 cscherer sunuser       791 Apr  1 09:57 dsfailt.def
-rwxr-xr-x   1 cscherer sunuser     43172 Apr  1 09:57 dsfailt.e
-rw-r--r--   1 cscherer sunuser       610 Apr  1 09:57 dsfailt.inp
-rw-r--r--   1 cscherer sunuser         0 Apr  1 09:57 dsfailt.out
-rw-r--r--   1 cscherer sunuser     65260 Apr  1 09:57 ebscld.out
-rw-r--r--   1 cscherer sunuser      5973 Apr  1 09:57 ebsfail.def
-rw-r--r--   1 cscherer sunuser     49153 Mar 24 16:19 ebsfail.f
-rw-r--r--   1 cscherer sunuser      5734 Apr  1 09:57 ebsfail.inp
-rw-r--r--   1 cscherer sunuser    117604 Apr  1 09:19 ebsfail.o
-rw-r--r--   1 cscherer sunuser       790 Apr  1 09:57 ebsfilt.def
-rwxr-xr-x   1 cscherer sunuser     46596 Apr  1 09:57 ebsfilt.e
-rw-r--r--   1 cscherer sunuser      2554 Apr  1 09:57 ebsfilt.inp
-rw-r--r--   1 cscherer sunuser       239 Apr  1 09:57 ebsfilt.out
-rw-r--r--   1 cscherer sunuser     20929 Apr  1 09:57 ebsflo.dat
-rw-r--r--   1 cscherer sunuser    251401 Apr  1 09:57 ebsnef.dat
-rw-r--r--   1 cscherer sunuser    186252 Apr  1 09:57 ebsnef.out
-rw-r--r--   1 cscherer sunuser    658449 Apr  1 09:57 ebsnef2.dat
-rw-r--r--   1 cscherer sunuser      1883 Apr  1 09:57 ebspac.nuc
-rw-r--r--   1 cscherer sunuser      5459 Apr  1 09:57 ebsrel.def
-rw-r--r--   1 cscherer sunuser     87035 Mar 24 16:19 ebsrel.f
-rw-r--r--   1 cscherer sunuser     11110 Apr  1 09:57 ebsrel.inp
```

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-rw-r--r--   1 cscherer sunuser    214992 Apr  1 09:19 ebsrel.o
-rw-r--r--   1 cscherer sunuser       149 Sep 25  2002 ebsrel1.i
-rw-r--r--   1 cscherer sunuser    186203 Apr  1 09:57 ebssf.dat
-rw-r--r--   1 cscherer sunuser     25515 Apr  1 09:57 ebstrh.dat
-rw-r--r--   1 cscherer sunuser     18435 Apr  1 09:57 ebstrhc.inp
-rw-r--r--   1 cscherer sunuser      2647 Apr  1 09:57 echofail.dat
-rw-r--r--   1 cscherer sunuser    667001 Apr  1 09:57 echofilt.dat
-rwxr-xr-x   1 cscherer sunuser    191340 Apr  1 09:39 env.e
-rwxr-xr-x   1 cscherer sunuser    282904 Apr  1 09:39 envin.e
-rw-r--r--   1 cscherer sunuser       959 Apr  1 09:58 epa_ave.out
-rw-r--r--   1 cscherer sunuser      1337 Apr  1 09:58 epapktim.out
-rw-r--r--   1 cscherer sunuser    389871 Mar 24 16:27 exec.f
-rw-r--r--   1 cscherer sunuser   1107432 Apr  1 09:21 exec.o
-rw-r--r--   1 cscherer sunuser      2385 Sep 21  2002 execa.i
-rw-r--r--   1 cscherer sunuser       486 Sep  3  1997 execb.i
-rw-r--r--   1 cscherer sunuser       269 May 29  2002 execc.i
-rw-r--r--   1 cscherer sunuser       104 Feb  6 14:32 execd.i
-rwxr-xr-x   1 cscherer sunuser    136892 Apr  1 09:57 failt.e
-rw-r--r--   1 cscherer sunuser     25384 Apr  1 09:57 failt.out
-rw-r--r--   1 cscherer sunuser      8503 Mar 24 16:19 faulto.f
-rw-r--r--   1 cscherer sunuser     10832 Apr  1 09:19 faulto.o
-rw-r--r--   1 cscherer sunuser      6656 Mar 24 16:19 fileunit.f
-rw-r--r--   1 cscherer sunuser      8592 Apr  1 09:21 fileunit.o
-rw-r--r--   1 cscherer sunuser      5784 Mar 24 16:19 findelev.f
-rw-r--r--   1 cscherer sunuser      9712 Apr  1 09:21 findelev.o
-rw-r--r--   1 cscherer sunuser      9381 Apr  1 09:57 fluoride.dat
-rw-r--r--   1 cscherer sunuser     69680 Apr  1 09:57 frac_rel.out
-rw-r--r--   1 cscherer sunuser        60 Aug 16  1997 fu1.i
-rw-r--r--   1 cscherer sunuser       609 Sep  4  2002 fu2.i
-rw-r--r--   1 cscherer sunuser      6513 Apr  1 09:39 gbioac1.dat
-rw-r--r--   1 cscherer sunuser      3383 Apr  1 09:39 gdefault.def
-rw-r--r--   1 cscherer sunuser      3387 Apr  1 09:39 gdefault.inp
-rw-r--r--   1 cscherer sunuser        64 Apr  1 09:39 gdosinc2.dat
-rw-r--r--   1 cscherer sunuser         0 Apr  1 09:39 gentoo.out
-rw-r--r--   1 cscherer sunuser     35173 Apr  1 09:39 genv.in
-rw-r--r--   1 cscherer sunuser     18393 Apr  1 09:39 genv.out
-rw-r--r--   1 cscherer sunuser      7011 Apr  1 09:39 gftrans.def
-rw-r--r--   1 cscherer sunuser      7142 Apr  1 09:39 gftrans.inp
-rw-r--r--   1 cscherer sunuser     15214 Apr  1 09:39 ggamen.dat
-rw-r--r--   1 cscherer sunuser     13855 Apr  1 09:39 ggenii.def
-rw-r--r--   1 cscherer sunuser     13164 Apr  1 09:39 ggenii.inp
-rw-r--r--   1 cscherer sunuser     10074 Apr  1 09:39 ggenii.out
-rw-r--r--   1 cscherer sunuser      5351 Apr  1 09:39 ggrdf.dat
-rw-r--r--   1 cscherer sunuser      5673 Apr  1 09:39 gmedia.out
-rw-r--r--   1 cscherer sunuser      9897 Apr  1 09:39 gnewdf.dat
-rw-r--r--   1 cscherer sunuser     13200 Apr  1 09:39 grmdlib.dat
-rw-r--r--   1 cscherer sunuser       568 Apr  1 09:39 gsccdf.res
-rw-r--r--   1 cscherer sunuser       568 Apr  1 09:39 gsccdf_c.res
-rw-r--r--   1 cscherer sunuser      3561 Apr  1 09:39 gw_cb_ad.dat
-rw-r--r--   1 cscherer sunuser      1264 Apr  1 09:39 gw_cb_ci.dat
-rw-r--r--   1 cscherer sunuser      3557 Apr  1 09:39 gw_pb_ad.dat
-rw-r--r--   1 cscherer sunuser      1261 Apr  1 09:39 gw_pb_ci.dat
-rw-r--r--   1 cscherer sunuser       603 Apr  1 09:39 gwccdf.res
-rw-r--r--   1 cscherer sunuser       603 Apr  1 09:39 gwccdf_c.res
-rw-r--r--   1 cscherer sunuser         9 Apr  1 09:39 gwork.buf
-rw-r--r--   1 cscherer sunuser      1336 Apr  1 09:58 gwpkdos.res
-rw-r--r--   1 cscherer sunuser      1336 Apr  1 09:58 gwpkds_c.res
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-rw-r--r--   1 cscherer sunuser      1624 Apr  1 09:58 gwttuzsz.res
-rw-r--r--   1 cscherer sunuser      1229 Jul 22  1999 ia.i
-rw-r--r--   1 cscherer sunuser       956 Sep 26  2000 ia1.i
-rw-r--r--   1 cscherer sunuser     21238 Mar 24 16:19 iareader.f
-rw-r--r--   1 cscherer sunuser     37268 Apr  1 09:19 iareader.o
-rw-r--r--   1 cscherer sunuser       688 Apr  1 09:58 infilper.res
-rw-r--r--   1 cscherer sunuser      1102 Apr  1 09:57 inv1000.out
-rw-r--r--   1 cscherer sunuser     69562 Mar 24 16:19 invent.f
-rw-r--r--   1 cscherer sunuser     86700 Apr  1 09:19 invent.o
-rw-r--r--   1 cscherer sunuser        33 Sep 25  2002 invent_.i
-rw-r--r--   1 cscherer sunuser        57 Aug 16  1997 inventa.i
-rw-r--r--   1 cscherer sunuser       182 Sep 25  2002 inventb.i
-rw-r--r--   1 cscherer sunuser       344 Sep 25  2002 inventc.i
-rw-r--r--   1 cscherer sunuser       124 Sep 25  2002 inventd.i
-rw-r--r--   1 cscherer sunuser       131 Sep 25  2002 invente.i
-rw-r--r--   1 cscherer sunuser       130 Sep 25  2002 inventf.i
-rw-r--r--   1 cscherer sunuser       128 Sep 25  2002 inventg.i
-rw-r--r--   1 cscherer sunuser       127 Sep 25  2002 inventh.i
-rw-r--r--   1 cscherer sunuser        75 Aug 16  1997 inventi.i
-rw-r--r--   1 cscherer sunuser       288 Sep 25  2002 inventj.i
-rw-r--r--   1 cscherer sunuser       332 Sep 25  2002 inventk.i
-rw-r--r--   1 cscherer sunuser       150 Dec  6 14:29 inventl.i
-rw-r--r--   1 cscherer sunuser       315 Dec 11 09:33 inventm.i
-rw-r--r--   1 cscherer sunuser       175 Sep 25  2002 inventn.i
-rw-r--r--   1 cscherer sunuser       249 Jan 29  2000 invento.i
-rw-r--r--   1 cscherer sunuser       267 Sep 25  2002 inventp.i
-rw-r--r--   1 cscherer sunuser         0 Apr  1 09:35 lhs.csv
-rw-r--r--   1 cscherer sunuser     47123 Apr  1 09:57 lhs.inp
-rw-r--r--   1 cscherer sunuser   5884928 Apr  1 09:57 lhs.out
-rw-r--r--   1 cscherer sunuser     78753 Apr  1 09:57 lhse.out
-rw-r--r--   1 cscherer sunuser      5352 Apr  1 09:21 linintrp.o
-rw-r--r--   1 cscherer sunuser        78 Aug 16  1997 max500yr.i
-rw-r--r--   1 cscherer sunuser        99 Sep 25  2002 maxchain.i
-rw-r--r--   1 cscherer sunuser       149 Sep 25  2002 maxclchn.i
-rw-r--r--   1 cscherer sunuser       144 Sep 25  2002 maxclnuc.i
-rw-r--r--   1 cscherer sunuser       508 Sep 25  2002 maxnnucl.i
-rw-r--r--   1 cscherer sunuser       299 Jul 10  1998 maxnsuba.i
-rw-r--r--   1 cscherer sunuser       206 May 28  1999 maxntime.i
-rw-r--r--   1 cscherer sunuser      1095 Apr  1 09:57 maxrel.dat
-rwxr-xr-x   1 cscherer sunuser    943775 Apr  1 09:57 maydtbl.dat
-rw-r--r--   1 cscherer sunuser     47368 Apr  1 09:57 mechfail.dat
-rw-r--r--   1 cscherer sunuser      9729 Apr  1 09:57 mechfail.def
-rwxr-xr-x   1 cscherer sunuser     79836 Apr  1 09:57 mechfail.e
-rw-r--r--   1 cscherer sunuser     28007 Apr  1 09:57 mechfail.inp
-rw-r--r--   1 cscherer sunuser         0 Apr  1 09:57 mechfail.out
-rw-r--r--   1 cscherer sunuser      1251 Apr  1 09:57 multifaf.dat
-rw-r--r--   1 cscherer sunuser      1252 Apr  1 09:57 multifbe.dat
-rw-r--r--   1 cscherer sunuser     11850 Mar 24 16:19 mv.f
-rw-r--r--   1 cscherer sunuser     19428 Apr  1 09:20 mv.o
-rw-r--r--   1 cscherer sunuser       533 Apr  1 09:58 mv.tpa
-rw-r--r--   1 cscherer sunuser       111 Sep  4  1997 mva.i
-rw-r--r--   1 cscherer sunuser        56 Aug 16  1997 mvb.i
-rw-r--r--   1 cscherer sunuser        57 Aug 16  1997 mvc.i
-rw-r--r--   1 cscherer sunuser       101 Aug 16  1997 mvd.i
-rw-r--r--   1 cscherer sunuser        72 Aug 16  1997 mve.i
-rw-r--r--   1 cscherer sunuser        72 Aug 16  1997 mvf.i
-rw-r--r--   1 cscherer sunuser       688 Apr  1 09:58 nearfld.res
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-rw-r--r--   1 cscherer sunuser       125 Apr  1 09:58 nefii.dis
-rw-r--r--   1 cscherer sunuser     11320 Apr  1 09:58 nefii.inp
-rw-r--r--   1 cscherer sunuser   2799904 Apr  1 09:58 nefii.out
-rw-r--r--   1 cscherer sunuser       603 Apr  1 09:58 nefii.rel
-rw-r--r--   1 cscherer sunuser    243055 Apr  1 09:39 nefiisz.dis
-rw-r--r--   1 cscherer sunuser     10104 Apr  1 09:39 nefiisz.inp
-rw-r--r--   1 cscherer sunuser    409433 Apr  1 09:39 nefiisz.out
-rw-r--r--   1 cscherer sunuser    343864 Apr  1 09:39 nefiisz.src
-rw-r--r--   1 cscherer sunuser       543 Apr  1 09:39 nefiisz.vel
-rw-r--r--   1 cscherer sunuser    616189 Apr  1 09:58 nefiiuz.dis
-rw-r--r--   1 cscherer sunuser     10100 Apr  1 09:58 nefiiuz.inp
-rw-r--r--   1 cscherer sunuser    875644 Apr  1 09:58 nefiiuz.out
-rw-r--r--   1 cscherer sunuser    310295 Apr  1 09:58 nefiiuz.src
-rw-r--r--   1 cscherer sunuser       822 Apr  1 09:58 nefiiuz.vel
-rwxr-xr-x   1 cscherer sunuser    408048 Apr  1 09:58 nefmks.e
-rw-r--r--   1 cscherer sunuser        90 Apr  1 09:58 nefmks.log
-rw-r--r--   1 cscherer sunuser    113027 Mar 24 16:19 nfenv.f
-rw-r--r--   1 cscherer sunuser     97284 Apr  1 09:20 nfenv.o
-rw-r--r--   1 cscherer sunuser       326 Nov 17 18:24 nfenvadj.i
-rw-r--r--   1 cscherer sunuser        94 Aug 16  1997 nintv.i
-rw-r--r--   1 cscherer sunuser      1502 Jun 11  1997 notice.i
-rw-r--r--   1 cscherer sunuser      1848 Apr  1 09:58 npkdoset.res
-rw-r--r--   1 cscherer sunuser      1848 Apr  1 09:58 npkdst_c.res
-rw-r--r--   1 cscherer sunuser      7152 Apr  1 09:57 nuclides.dat
-rw-r--r--   1 cscherer sunuser      6579 Mar 24 16:19 numrecip.f
-rw-r--r--   1 cscherer sunuser      4752 Apr  1 09:21 numrecip.o
-rw-r--r--   1 cscherer sunuser      7111 Apr  1 09:39 organdf.dat
-rw-r--r--   1 cscherer sunuser       259 Aug 16  1997 path.i
-rw-r--r--   1 cscherer sunuser      6584 Mar 24 16:19 peakfind.f
-rw-r--r--   1 cscherer sunuser      6340 Apr  1 09:21 peakfind.o
-rw-r--r--   1 cscherer sunuser       882 Apr  1 09:39 pkmndose.out
-rw-r--r--   1 cscherer sunuser      1240 Apr  1 09:58 pkreltim.res
-rw-r--r--   1 cscherer sunuser      1240 Apr  1 09:58 pkrltm_c.res
-rw-r--r--   1 cscherer sunuser     46322 Mar 24 16:19 ran.f
-rw-r--r--   1 cscherer sunuser     87600 Apr  1 09:21 ran.o
-rw-r--r--   1 cscherer sunuser    148524 Mar 24 16:19 reader.f
-rw-r--r--   1 cscherer sunuser       185 May 21  1998 reader.i
-rw-r--r--   1 cscherer sunuser    432580 Apr  1 09:21 reader.o
-rw-r--r--   1 cscherer sunuser       106 Aug 27  1999 reader1.i
-rw-r--r--   1 cscherer sunuser        58 Aug 27  1999 reader2.i
-rw-r--r--   1 cscherer sunuser       102 Aug 27  1999 reader3.i
-rw-r--r--   1 cscherer sunuser        89 Aug 27  1999 reader4.i
-rw-r--r--   1 cscherer sunuser        58 Aug 16  1997 reflux2.i
-rw-r--r--   1 cscherer sunuser       682 Apr  1 09:57 rel_flow.out
-rw-r--r--   1 cscherer sunuser       603 Apr  1 09:39 relccdf.res
-rw-r--r--   1 cscherer sunuser      2883 Apr  1 09:57 relcum.out
-rwxr-xr-x   1 cscherer sunuser    122652 Apr  1 09:57 releaset.e
-rw-r--r--   1 cscherer sunuser       414 Apr  1 09:57 releaset.out
-rw-r--r--   1 cscherer sunuser       773 Apr  1 09:57 relfrac.out
-rw-r--r--   1 cscherer sunuser       656 Apr  1 09:58 relgwgs.res
-rw-r--r--   1 cscherer sunuser       548 Apr  1 09:57 repdes.dat
-rw-r--r--   1 cscherer sunuser       693 Apr  1 09:58 rgwna.tpa
-rw-r--r--   1 cscherer sunuser       693 Apr  1 09:58 rgwnapani.tpa
-rw-r--r--   1 cscherer sunuser       693 Apr  1 09:58 rgwnapdw.tpa
-rw-r--r--   1 cscherer sunuser       693 Apr  1 09:58 rgwnapext.tpa
-rw-r--r--   1 cscherer sunuser       693 Apr  1 09:58 rgwnapinh.tpa
-rw-r--r--   1 cscherer sunuser       693 Apr  1 09:58 rgwnapmlk.tpa
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-rw-r--r--   1 cscherer sunuser       693 Apr  1 09:58 rgwnappla.tpa
-rw-r--r--   1 cscherer sunuser       693 Apr  1 09:58 rgwnr.tpa
-rw-r--r--   1 cscherer sunuser       533 Apr  1 09:58 rgwsa.tpa
-rw-r--r--   1 cscherer sunuser       533 Apr  1 09:58 rgwsap.tpa
-rw-r--r--   1 cscherer sunuser       533 Apr  1 09:58 rgwsr.tpa
-rw-r--r--   1 cscherer sunuser       603 Apr  1 09:39 rlccdf_c.res
-rw-r--r--   1 cscherer sunuser       656 Apr  1 09:58 rlgwgs_c.res
-rw-r--r--   1 cscherer sunuser     95694 Mar 24 16:19 sampler.f
-rw-r--r--   1 cscherer sunuser    165660 Apr  1 09:21 sampler.o
-rw-r--r--   1 cscherer sunuser        62 Aug 16  1997 sampler0.i
-rw-r--r--   1 cscherer sunuser        79 Aug 16  1997 sampler1.i
-rw-r--r--   1 cscherer sunuser        62 Aug 16  1997 sampler2.i
-rw-r--r--   1 cscherer sunuser       178 Apr  3  1998 sampler3.i
-rw-r--r--   1 cscherer sunuser       145 Sep 19  2000 sampler4.i
-rw-r--r--   1 cscherer sunuser        62 Aug 16  1997 samplera.i
-rw-r--r--   1 cscherer sunuser        62 Aug 16  1997 samplerb.i
-rw-r--r--   1 cscherer sunuser        62 Aug 16  1997 samplerc.i
-rw-r--r--   1 cscherer sunuser        68 Aug 16  1997 samplerd.i
-rw-r--r--   1 cscherer sunuser       133 Aug 16  1997 samplere.i
-rw-r--r--   1 cscherer sunuser       111 Aug 16  1997 samplerf.i
-rw-r--r--   1 cscherer sunuser        84 Aug 16  1997 samplerg.i
-rw-r--r--   1 cscherer sunuser        68 Aug 16  1997 samplerh.i
-rw-r--r--   1 cscherer sunuser        83 Aug 16  1997 sampleri.i
-rw-r--r--   1 cscherer sunuser        61 Aug 16  1997 samplerj.i
-rw-r--r--   1 cscherer sunuser       208 Aug 16  1997 samplerk.i
-rw-r--r--   1 cscherer sunuser       104 Aug 16  1997 samplerl.i
-rw-r--r--   1 cscherer sunuser        63 Aug 16  1997 samplerm.i
-rw-r--r--   1 cscherer sunuser        79 Aug 16  1997 samplern.i
-rw-r--r--   1 cscherer sunuser        63 Aug 16  1997 samplero.i
-rw-r--r--   1 cscherer sunuser       260 Mar 14  2002 samplerp.i
-rw-r--r--   1 cscherer sunuser       103 Aug 16  1997 samplerq.i
-rw-r--r--   1 cscherer sunuser       176 Aug 16  1997 samplerr.i
-rw-r--r--   1 cscherer sunuser       336 Apr  3  1998 samplers.i
-rw-r--r--   1 cscherer sunuser        70 Aug 16  1997 samplert.i
-rw-r--r--   1 cscherer sunuser        69 Aug 16  1997 sampleru.i
-rw-r--r--   1 cscherer sunuser        62 Aug 16  1997 samplerv.i
-rw-r--r--   1 cscherer sunuser        60 Aug 16  1997 samplerw.i
-rw-r--r--   1 cscherer sunuser       406 Feb 22 16:36 samplerx.i
-rw-r--r--   1 cscherer sunuser       299 Apr 30  2001 samplery.i
-rw-r--r--   1 cscherer sunuser        60 Aug 16  1997 samplerz.i
-rw-r--r--   1 cscherer sunuser      3872 Apr  1 09:57 samplpar.abb
-rw-r--r--   1 cscherer sunuser     29842 Apr  1 09:57 samplpar.hdr
-rw-r--r--   1 cscherer sunuser       642 Apr  1 09:58 samplpar.res
-rw-r--r--   1 cscherer sunuser       322 Nov 17 18:24 seisadj.i
-rwxr-xr-x   1 cscherer sunuser    130758 Apr  1 09:57 seisbs1.dis
-rwxr-xr-x   1 cscherer sunuser    130758 Apr  1 09:57 seisbs2.dis
-rw-r--r--   1 cscherer sunuser     74226 Mar 24 16:19 seismo2.f
-rw-r--r--   1 cscherer sunuser     73908 Apr  1 09:21 seismo2.o
-rwxrwxrwx   1 cscherer sunuser        30 Sep 12  2002 show_env
-rwxr-xr-x   1 cscherer sunuser    943788 Apr  1 09:57 smaydtbl.dat
-rwxr-xr-x   1 cscherer sunuser    243548 Apr  1 09:57 snllhs.e
-rw-r--r--   1 cscherer sunuser    306324 Apr  1 09:58 sotnef.dat
-rw-r--r--   1 cscherer sunuser     23185 Apr  1 09:58 sp.tpa
-rw-r--r--   1 cscherer sunuser      1952 Apr  1 09:21 srchpos.o
-rw-r--r--   1 cscherer sunuser       144 Sep  3  1997 stop.i
-rw-r--r--   1 cscherer sunuser      4506 Apr  1 09:58 strmtube.dat
-rw-r--r--   1 cscherer sunuser     38339 Mar 24 16:19 subarea.f
```

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-rw-r--r--   1 cscherer sunuser     59664 Apr  1 09:21 subarea.o
-rw-r--r--   1 cscherer sunuser       255 Feb  4  2000 subareaa.i
-rw-r--r--   1 cscherer sunuser        79 Aug 16  1997 subareab.i
-rw-r--r--   1 cscherer sunuser        82 Aug 16  1997 subareac.i
-rw-r--r--   1 cscherer sunuser        81 Aug 16  1997 subaread.i
-rw-r--r--   1 cscherer sunuser        77 Aug 16  1997 subareae.i
-rw-r--r--   1 cscherer sunuser        60 Feb  3  2000 subareaf.i
-rw-r--r--   1 cscherer sunuser        64 Feb  2  2000 subareag.i
-rw-r--r--   1 cscherer sunuser    117938 Mar 24 16:19 szft.f
-rw-r--r--   1 cscherer sunuser       264 Nov 17 18:23 szft.i
-rw-r--r--   1 cscherer sunuser    193196 Apr  1 09:20 szft.o
-rw-r--r--   1 cscherer sunuser       656 Apr  1 09:58 totdos_c.res
-rw-r--r--   1 cscherer sunuser       656 Apr  1 09:58 totdose.res
-rwxr-xr-x   1 cscherer sunuser   2528744 Apr  1 09:21 tpa.e
-rw-r--r--   1 cscherer sunuser     91300 Apr  1 09:56 tpa.inp
-rw-r--r--   1 cscherer sunuser     91297 Mar 24 16:22 tpa_orig.inp
-rw-r--r--   1 cscherer sunuser     91300 Apr  1 09:56 tpa_slt4.inp
-rw-r--r--   1 cscherer sunuser      3738 Apr  1 09:58 tpa_slt4.out
-rw-r--r--   1 cscherer sunuser     92216 Apr  1 09:57 tpameans.out
-rw-r--r--   1 cscherer sunuser    101499 Apr  1 09:57 tpanames.dbs
-rw-r--r--   1 cscherer sunuser    241083 Apr  1 09:57 trelease.out
-rw-r--r--   1 cscherer sunuser       314 Aug 16  1997 uz_climi.i
-rw-r--r--   1 cscherer sunuser      1219 Sep  6  2002 uz_climr.i
-rw-r--r--   1 cscherer sunuser       341 Aug 16  1997 uz_climz.i
-rw-r--r--   1 cscherer sunuser      1323 Sep 26  2002 uz_flowi.i
-rw-r--r--   1 cscherer sunuser      1170 Sep 26  2002 uz_flowr.i
-rw-r--r--   1 cscherer sunuser       176 Aug 16  1997 uz_flowz.i
-rw-r--r--   1 cscherer sunuser      3225 Sep 26  2002 uz_parms.i
-rw-r--r--   1 cscherer sunuser     72514 Mar 24 16:19 uzflow.f
-rw-r--r--   1 cscherer sunuser     59816 Apr  1 09:21 uzflow.o
-rw-r--r--   1 cscherer sunuser    128158 Mar 24 16:19 uzft.f
-rw-r--r--   1 cscherer sunuser    203848 Apr  1 09:21 uzft.o
-rw-r--r--   1 cscherer sunuser       755 Nov 17 18:23 uzszft.i
-rw-r--r--   1 cscherer sunuser     14215 Mar 24 16:19 volcano.f
-rw-r--r--   1 cscherer sunuser     17476 Apr  1 09:21 volcano.o
-rw-r--r--   1 cscherer sunuser     21032 Apr  1 09:57 weldfail.out
-rw-r--r--   1 cscherer sunuser       291 Apr  1 09:58 wpfillstats.out
-rw-r--r--   1 cscherer sunuser     13105 Apr  1 09:57 wpflow.dat
-rw-r--r--   1 cscherer sunuser     17410 Apr  1 09:57 wpflow.def
-rw-r--r--   1 cscherer sunuser       720 Apr  1 09:58 wpsfail.res
-rw-r--r--   1 cscherer sunuser     11721 Mar 24 16:19 zportunx.f
-rw-r--r--   1 cscherer sunuser      1940 Apr  1 09:21 zportunx.o

scr445/tpa50b/ccdf:
total 34
drwxr-xr-x   2 cscherer sunuser       512 Mar 24 16:29 .
drwxr-xr-x   5 cscherer sunuser      7168 Apr  1 09:58 ..
-rw-r--r--   1 cscherer sunuser       267 Mar 14  2000 Makefile
-rw-r--r--   1 cscherer sunuser     23390 Jul 22  1999 tccdf.f
-rw-r--r--   1 cscherer sunuser        66 Aug  1  1997 tccdf.i
-rw-r--r--   1 cscherer sunuser       640 Jan 29  2001 tccdf.inp

scr445/tpa50b/codes:
total 3004
drwxr-xr-x   4 cscherer sunuser      1024 Apr  1 09:24 .
drwxr-xr-x   5 cscherer sunuser      7168 Apr  1 09:58 ..
-rw-r--r--   1 cscherer sunuser      1299 Feb 21 21:10 Makefile
```

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-rw-r--r--   1 cscherer sunuser      1673 Feb 21 21:12 Makefile4.2
-rw-r--r--   1 cscherer sunuser       499 Jun  2  1997 README
-rw-r--r--   1 cscherer sunuser      2320 May 28  1998 SIZES.INC
-rw-r--r--   1 cscherer sunuser       164 Feb 17  1998 SIZES2.INC
-rwxr-xr-x   1 cscherer sunuser    165136 Apr  1 09:23 ashplume.e
-rw-r--r--   1 cscherer sunuser     95611 Mar 24 16:15 ashplume.f
-rw-r--r--   1 cscherer sunuser     25361 Mar 24 16:15 corrosn.f
-rw-r--r--   1 cscherer sunuser     22388 Apr  1 09:22 corrosn.o
-rwxr-xr-x   1 cscherer sunuser     43172 Apr  1 09:23 dsfailt.e
-rw-r--r--   1 cscherer sunuser     23303 Mar 24 16:15 dsfailt.f
-rwxr-xr-x   1 cscherer sunuser     46596 Apr  1 09:23 ebsfilt.e
-rw-r--r--   1 cscherer sunuser     17872 Mar 24 16:15 ebsfilt.f
-rwxr-xr-x   1 cscherer sunuser    191340 Apr  1 09:24 env.e
-rwxr-xr-x   1 cscherer sunuser    282904 Apr  1 09:24 envin.e
-rwxr-xr-x   1 cscherer sunuser    136892 Apr  1 09:22 failt.e
-rw-r--r--   1 cscherer sunuser    103902 Mar 24 16:15 failt.f
-r--r--r--   1 cscherer sunuser       450 Nov 17 18:03 failtadj.i
drwxr-xr-x   2 cscherer sunuser      3072 Apr  1 09:24 gentpa
-rwxr-xr-x   1 cscherer sunuser      4635 Mar 24 16:15 integrt.f
-rw-r--r--   1 cscherer sunuser      2080 Apr  1 09:22 integrt.o
drwxr-xr-x   3 cscherer sunuser       512 Mar 24 16:30 itym
-r--r--r--   1 cscherer sunuser       868 Dec 17 16:59 lhs1.i
-r--r--r--   1 cscherer sunuser      1308 Mar 14  2002 lhs2.i
-r--r--r--   1 cscherer sunuser       438 Mar 14  2002 lhs3.i
-r--r--r--   1 cscherer sunuser       437 Mar 14  2002 lhs4.i
-r--r--r--   1 cscherer sunuser       374 Mar 14  2002 lhs5.i
-r--r--r--   1 cscherer sunuser       450 Mar 14  2002 lhs6.i
-r--r--r--   1 cscherer sunuser       464 Mar 14  2002 lhs7.i
-r--r--r--   1 cscherer sunuser       431 Mar 14  2002 lhs8.i
-rwxr-xr-x   1 cscherer sunuser      5224 Mar 24 16:15 linintrp.f
-rw-r--r--   1 cscherer sunuser      3280 Apr  1 09:22 linintrp.o
-r--r--r--   1 cscherer sunuser       331 Nov 17 18:03 mechadj.i
-rwxr-xr-x   1 cscherer sunuser     79836 Apr  1 09:21 mechfail.e
-rw-r--r--   1 cscherer sunuser    127038 Mar 24 16:15 mechfail.f
-rwxr-xr-x   1 cscherer sunuser    408048 Apr  1 09:22 nefmks.e
-rw-r--r--   1 cscherer sunuser    308005 Feb 26 10:50 nefmks.f
-rwxr-xr-x   1 cscherer sunuser    122652 Apr  1 09:22 releaset.e
-rw-r--r--   1 cscherer sunuser    177497 Feb 26 10:51 releaset.f
-rwxr-xr-x   1 cscherer sunuser    243548 Apr  1 09:23 snllhs.e
-rw-r--r--   1 cscherer sunuser    225283 Feb 27 09:01 snllhs.f
-rwxr-xr-x   1 cscherer sunuser      4295 Mar 24 16:15 srchpos.f
-rw-r--r--   1 cscherer sunuser      1304 Apr  1 09:22 srchpos.o
-rwxr-xr-x   1 cscherer sunuser     19959 Mar 24 16:15 weldfail.f
-rw-r--r--   1 cscherer sunuser      9356 Apr  1 09:22 weldfail.o

scr445/tpa50b/codes/gentpa:
total 1064
drwxr-xr-x   2 cscherer sunuser      3072 Apr  1 09:24 .
drwxr-xr-x   4 cscherer sunuser      1024 Apr  1 09:24 ..
-rw-r--r--   1 cscherer sunuser       543 Feb 11  2000 AFPPAR.CMN
-rw-r--r--   1 cscherer sunuser      1044 Feb 11  2000 AIRPAR.CMN
-rw-r--r--   1 cscherer sunuser       872 Feb 11  2000 ANMPAR.CMN
-rw-r--r--   1 cscherer sunuser       615 Feb 11  2000 AQUPAR.CMN
-rw-r--r--   1 cscherer sunuser      1089 Feb 11  2000 CONC.CMN
-rw-r--r--   1 cscherer sunuser       461 Feb 11  2000 DAYPC.CMN
-rw-r--r--   1 cscherer sunuser       400 Feb 11  2000 DECAY.CMN
-rw-r--r--   1 cscherer sunuser       571 Feb 11  2000 DFPAR.CMN
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-rw-r--r--   1 cscherer sunuser      1359 Feb 11  2000 DOSALL.CMN
-rw-r--r--   1 cscherer sunuser       574 Feb 11  2000 ENVPAR.CMN
-rw-r--r--   1 cscherer sunuser       310 Feb 11  2000 EXPALL.CMN
-rw-r--r--   1 cscherer sunuser       637 Feb 11  2000 EXTPAR.CMN
-rw-r--r--   1 cscherer sunuser       327 Feb 11  2000 FILES.CMN
-rw-r--r--   1 cscherer sunuser       814 Feb 11  2000 FODPAR.CMN
-rw-r--r--   1 cscherer sunuser       438 Feb 11  2000 INVIN.CMN
-rw-r--r--   1 cscherer sunuser       569 Feb 11  2000 LABELS.CMN
-rw-r--r--   1 cscherer sunuser      1161 Feb 11  2000 MTBPAR.CMN
-rw-r--r--   1 cscherer sunuser      1688 Feb 28  2000 Make.bat
-rw-r--r--   1 cscherer sunuser      1849 Feb 24  2000 Makefile
-rw-rw-rw-   1 cscherer sunuser      1938 Nov 27 14:12 Makefile4.2
-rw-r--r--   1 cscherer sunuser      1746 Feb 11  2000 Mkenv.fig
-rw-r--r--   1 cscherer sunuser      1548 Feb 11  2000 Mkenvin.fig
-rw-r--r--   1 cscherer sunuser      2762 Feb 11  2000 OPT.CMN
-rw-r--r--   1 cscherer sunuser       444 Feb 11  2000 ORGMAS.CMN
-rw-r--r--   1 cscherer sunuser       728 Feb 11  2000 ORGPAR.CMN
-rw-r--r--   1 cscherer sunuser       589 Feb 11  2000 RAD.CMN
-rw-r--r--   1 cscherer sunuser       788 Feb 11  2000 RADIN.CMN
-rw-r--r--   1 cscherer sunuser       722 Feb 11  2000 RMD.CMN
-rw-r--r--   1 cscherer sunuser       489 Feb 11  2000 RMD2.CMN
-rw-r--r--   1 cscherer sunuser       891 Feb 11  2000 SOLPAR.CMN
-rw-r--r--   1 cscherer sunuser       489 Feb 11  2000 SWPAR.CMN
-rw-r--r--   1 cscherer sunuser       586 Feb 11  2000 TIMES.CMN
-rw-r--r--   1 cscherer sunuser       316 Feb 11  2000 TITL.CMN
-rw-r--r--   1 cscherer sunuser     12777 Feb 11  2000 accmod.f
-rw-r--r--   1 cscherer sunuser     24104 Apr  1 09:23 accmod.o
-rw-r--r--   1 cscherer sunuser     10094 Feb 11  2000 acute1.f
-rw-r--r--   1 cscherer sunuser     16204 Apr  1 09:24 acute1.o
-rw-r--r--   1 cscherer sunuser      9579 Feb 11  2000 acutea.f
-rw-r--r--   1 cscherer sunuser     11196 Apr  1 09:24 acutea.o
-rw-r--r--   1 cscherer sunuser      7118 Feb 11  2000 acutec.f
-rw-r--r--   1 cscherer sunuser      8496 Apr  1 09:24 acutec.o
-rw-r--r--   1 cscherer sunuser      8669 Feb 11  2000 aircal.f
-rw-r--r--   1 cscherer sunuser     11240 Apr  1 09:24 aircal.o
-rw-r--r--   1 cscherer sunuser      8383 Feb 11  2000 anmcal.f
-rw-r--r--   1 cscherer sunuser     12724 Apr  1 09:24 anmcal.o
-rw-r--r--   1 cscherer sunuser      2043 Feb 11  2000 aqucal.f
-rw-r--r--   1 cscherer sunuser      3992 Apr  1 09:24 aqucal.o
-rw-r--r--   1 cscherer sunuser      1217 Feb 11  2000 biocal.f
-rw-r--r--   1 cscherer sunuser      1952 Apr  1 09:24 biocal.o
-rw-r--r--   1 cscherer sunuser      4174 Feb 11  2000 blockd.f
-rw-r--r--   1 cscherer sunuser      6672 Apr  1 09:23 blockd.o
-rw-r--r--   1 cscherer sunuser      1405 Feb 11  2000 bsort.f
-rw-r--r--   1 cscherer sunuser      1208 Apr  1 09:24 bsort.o
-rw-r--r--   1 cscherer sunuser     13008 Feb 11  2000 candh.f
-rw-r--r--   1 cscherer sunuser     10428 Apr  1 09:24 candh.o
-rw-r--r--   1 cscherer sunuser      6653 Feb 11  2000 chain.f
-rw-r--r--   1 cscherer sunuser      5376 Apr  1 09:24 chain.o
-rw-r--r--   1 cscherer sunuser     23921 Feb 11  2000 check.f
-rw-r--r--   1 cscherer sunuser     48608 Apr  1 09:24 check.o
-rw-r--r--   1 cscherer sunuser     10189 Feb 11  2000 cronmod.f
-rw-r--r--   1 cscherer sunuser     22460 Apr  1 09:23 cronmod.o
-rw-r--r--   1 cscherer sunuser      5153 Feb 11  2000 crpcal.f
-rw-r--r--   1 cscherer sunuser      8564 Apr  1 09:24 crpcal.o
-rw-r--r--   1 cscherer sunuser      3842 Feb 11  2000 dkharv.f
-rw-r--r--   1 cscherer sunuser      6128 Apr  1 09:24 dkharv.o
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-rw-r--r--   1 cscherer sunuser      5426 Feb 11  2000 dose.f
-rw-r--r--   1 cscherer sunuser      2398 Feb 11  2000 drfbiv.f
-rw-r--r--   1 cscherer sunuser      2636 Apr  1 09:24 drfbiv.o
-rw-r--r--   1 cscherer sunuser      6728 Feb 11  2000 drfsec.f
-rw-r--r--   1 cscherer sunuser      5256 Apr  1 09:24 drfsec.o
-rw-r--r--   1 cscherer sunuser      1877 Feb 11  2000 drkcal.f
-rw-r--r--   1 cscherer sunuser      2284 Apr  1 09:24 drkcal.o
-rw-r--r--   1 cscherer sunuser      1325 Feb 11  2000 dumred.f
-rw-r--r--   1 cscherer sunuser      3608 Apr  1 09:24 dumred.o
-rw-r--r--   1 cscherer sunuser      3958 Feb 11  2000 edranm.f
-rw-r--r--   1 cscherer sunuser      7252 Apr  1 09:24 edranm.o
-rw-r--r--   1 cscherer sunuser      3567 Feb 11  2000 edrcrp.f
-rw-r--r--   1 cscherer sunuser      7660 Apr  1 09:24 edrcrp.o
-rw-r--r--   1 cscherer sunuser      2525 Feb 11  2000 edrnon.f
-rw-r--r--   1 cscherer sunuser      4704 Apr  1 09:24 edrnon.o
-rw-r--r--   1 cscherer sunuser      2853 Feb 11  2000 edrres.f
-rw-r--r--   1 cscherer sunuser      4144 Apr  1 09:24 edrres.o
-rw-r--r--   1 cscherer sunuser     10581 Feb 11  2000 env.f
-rw-r--r--   1 cscherer sunuser      4885 Feb 11  2000 envin.f
-rw-r--r--   1 cscherer sunuser      4561 Feb 11  2000 envlib.f
-rw-r--r--   1 cscherer sunuser      8716 Apr  1 09:23 envlib.o
-rw-r--r--   1 cscherer sunuser      1912 Feb 11  2000 exposr.f
-rw-r--r--   1 cscherer sunuser      2244 Apr  1 09:24 exposr.o
-rw-r--r--   1 cscherer sunuser      6774 Feb 11  2000 extcal.f
-rw-r--r--   1 cscherer sunuser      7580 Apr  1 09:24 extcal.o
-rw-r--r--   1 cscherer sunuser      1489 Feb 11  2000 filerr.f
-rw-r--r--   1 cscherer sunuser      3868 Apr  1 09:23 filerr.o
-rw-r--r--   1 cscherer sunuser      1986 Feb 11  2000 fntdrf.f
-rw-r--r--   1 cscherer sunuser      2008 Apr  1 09:24 fntdrf.o
-rw-r--r--   1 cscherer sunuser      3003 Feb 11  2000 headng.f
-rw-r--r--   1 cscherer sunuser      5748 Apr  1 09:24 headng.o
-rw-r--r--   1 cscherer sunuser      2203 Feb 11  2000 idnuc.f
-rw-r--r--   1 cscherer sunuser      3008 Apr  1 09:24 idnuc.o
-rw-r--r--   1 cscherer sunuser      2842 Feb 11  2000 inhcal.f
-rw-r--r--   1 cscherer sunuser      5712 Apr  1 09:24 inhcal.o
-rw-r--r--   1 cscherer sunuser      2392 Feb 11  2000 initnv.f
-rw-r--r--   1 cscherer sunuser      2764 Apr  1 09:24 initnv.o
-rw-r--r--   1 cscherer sunuser      1841 Feb 11  2000 intpol.f
-rw-r--r--   1 cscherer sunuser      3732 Apr  1 09:24 intpol.o
-rw-r--r--   1 cscherer sunuser      1348 Feb 11  2000 invmol.f
-rw-r--r--   1 cscherer sunuser      1168 Apr  1 09:24 invmol.o
-rw-r--r--   1 cscherer sunuser       677 Feb 11  2000 makda2.f
-rw-r--r--   1 cscherer sunuser      1056 Apr  1 09:23 makda2.o
-rw-r--r--   1 cscherer sunuser      5870 Feb 11  2000 opnfil.f
-rw-r--r--   1 cscherer sunuser     11756 Apr  1 09:23 opnfil.o
-rw-r--r--   1 cscherer sunuser      4217 Feb 11  2000 order.f
-rw-r--r--   1 cscherer sunuser      5740 Apr  1 09:23 order.o
-rw-r--r--   1 cscherer sunuser      2325 Feb 11  2000 packag.f
-rw-r--r--   1 cscherer sunuser      3488 Apr  1 09:24 packag.o
-rw-r--r--   1 cscherer sunuser      3366 Feb 11  2000 plmriz.f
-rw-r--r--   1 cscherer sunuser      2192 Apr  1 09:24 plmriz.o
-rw-r--r--   1 cscherer sunuser      1861 Feb 11  2000 prior.f
-rw-r--r--   1 cscherer sunuser      2244 Apr  1 09:24 prior.o
-rw-r--r--   1 cscherer sunuser      4080 Feb 11  2000 prob.f
-rw-r--r--   1 cscherer sunuser      2116 Apr  1 09:24 prob.o
-rw-r--r--   1 cscherer sunuser      2079 Feb 11  2000 profile.f
-rw-r--r--   1 cscherer sunuser      1620 Apr  1 09:24 profile.o
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-rw-r--r--   1 cscherer sunuser     11351 Feb 11  2000 readin.f
-rw-r--r--   1 cscherer sunuser     47528 Apr  1 09:23 readin.o
-rw-r--r--   1 cscherer sunuser      6174 Feb 11  2000 redcas.f
-rw-r--r--   1 cscherer sunuser     24428 Apr  1 09:24 redcas.o
-rw-r--r--   1 cscherer sunuser      3867 Feb 11  2000 redcha.f
-rw-r--r--   1 cscherer sunuser      9256 Apr  1 09:24 redcha.o
-rw-r--r--   1 cscherer sunuser      8483 Feb 11  2000 redflt.f
-rw-r--r--   1 cscherer sunuser     35396 Apr  1 09:23 redflt.o
-rw-r--r--   1 cscherer sunuser      1694 Feb 11  2000 redist.f
-rw-r--r--   1 cscherer sunuser      1800 Apr  1 09:24 redist.o
-rw-r--r--   1 cscherer sunuser      8548 Feb 11  2000 ritenv.f
-rw-r--r--   1 cscherer sunuser     37160 Apr  1 09:24 ritenv.o
-rw-r--r--   1 cscherer sunuser      4371 Feb 11  2000 ritexp.f
-rw-r--r--   1 cscherer sunuser     10948 Apr  1 09:24 ritexp.o
-rw-r--r--   1 cscherer sunuser      2584 Feb 11  2000 ritmed.f
-rw-r--r--   1 cscherer sunuser      7308 Apr  1 09:24 ritmed.o
-rw-r--r--   1 cscherer sunuser     27222 Feb 11  2000 ritqa.f
-rw-r--r--   1 cscherer sunuser     93716 Apr  1 09:23 ritqa.o
-rw-r--r--   1 cscherer sunuser      4346 Feb 11  2000 rlibin.f
-rw-r--r--   1 cscherer sunuser     10200 Apr  1 09:23 rlibin.o
-rw-r--r--   1 cscherer sunuser      4399 Feb 11  2000 rwake.f
-rw-r--r--   1 cscherer sunuser      3400 Apr  1 09:24 rwake.o
-rw-r--r--   1 cscherer sunuser      2396 Feb 11  2000 sigma.f
-rw-r--r--   1 cscherer sunuser      1840 Apr  1 09:24 sigma.o
-rw-r--r--   1 cscherer sunuser      8387 Feb 11  2000 swcal.f
-rw-r--r--   1 cscherer sunuser      5876 Apr  1 09:24 swcal.o
-rw-r--r--   1 cscherer sunuser      1894 Feb 11  2000 trnspt.f
-rw-r--r--   1 cscherer sunuser      2056 Apr  1 09:24 trnspt.o
-rw-r--r--   1 cscherer sunuser      1771 Feb 11  2000 ustar.f
-rw-r--r--   1 cscherer sunuser      1508 Apr  1 09:24 ustar.o
-rw-r--r--   1 cscherer sunuser      9276 Feb 11  2000 xqcal.f
-rw-r--r--   1 cscherer sunuser     17136 Apr  1 09:24 xqcal.o
-rw-r--r--   1 cscherer sunuser      5277 Feb 11  2000 xqin.f
-rw-r--r--   1 cscherer sunuser     12480 Apr  1 09:24 xqin.o

scr445/tpa50b/codes/itym:
total 4
drwxr-xr-x   3 cscherer sunuser       512 Mar 24 16:30 .
drwxr-xr-x   4 cscherer sunuser      1024 Apr  1 09:24 ..
-rw-r--r--   1 cscherer sunuser       596 Oct  1  2002 makefile
drwxr-xr-x   2 cscherer sunuser       512 Mar 24 16:30 src

scr445/tpa50b/codes/itym/src:
total 328
drwxr-xr-x   2 cscherer sunuser       512 Mar 24 16:30 .
drwxr-xr-x   3 cscherer sunuser       512 Mar 24 16:30 ..
-rw-r--r--   1 cscherer sunuser     29776 Mar 22  2000 array.f
-rw-r--r--   1 cscherer sunuser     15856 Mar 22  2000 check_valid.f
-rw-r--r--   1 cscherer sunuser     60931 Mar 24 16:10 estimator.f
-rw-r--r--   1 cscherer sunuser      5384 Dec 30 19:31 init_itym.f
-rw-r--r--   1 cscherer sunuser      9420 Mar 24 16:10 itym.f
-rw-r--r--   1 cscherer sunuser     11640 Dec 30 19:31 itym.i
-rw-r--r--   1 cscherer sunuser     26752 Mar 24 16:10 itymutils.f
-rw-r--r--   1 cscherer sunuser       261 Mar 22  2000 path.i
-rw-r--r--   1 cscherer sunuser        55 Mar 22  2000 preuzf.i
-rw-r--r--   1 cscherer sunuser     42671 Mar 22  2000 ran.f
-rw-r--r--   1 cscherer sunuser     38406 Sep 26  2002 strtokfunc.f
```

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-rw-r--r--   1 cscherer sunuser     60346 Sep 26  2002 uncertain.f
-rw-r--r--   1 cscherer sunuser     12265 Mar 22  2000 uncertain.i
-rw-r--r--   1 cscherer sunuser        55 Mar 22  2000 unctab.i
-rw-r--r--   1 cscherer sunuser     10904 Mar 22  2000 zportunx.f

scr445/tpa50b/data:
total 7433
drwxr-xr-x   2 cscherer sunuser      1536 Mar 24 16:29 .
drwxr-xr-x   5 cscherer sunuser      7168 Apr  1 09:58 ..
-rw-r--r--   1 cscherer sunuser       965 Feb 11  2000 FILENAME.DAT
-rw-r--r--   1 cscherer sunuser     91434 Feb 27 08:50 basecase.inp
-rw-r--r--   1 cscherer sunuser    121789 Mar 22  2000 bunitdem.dat
-rw-r--r--   1 cscherer sunuser      1025 Mar 29  2000 burnup.dat
-rwxr-xr-x   1 cscherer sunuser    468925 Sep 25  2002 careadem.dat
-rwxr-xr-x   1 cscherer sunuser    515693 Sep 25  2002 cdepdem.dat
-rw-r--r--   1 cscherer sunuser    850000 Aug 15  1997 climato1.dat
-rw-r--r--   1 cscherer sunuser      2200 Feb  1  1999 climato2.dat
-rw-r--r--   1 cscherer sunuser      6219 Feb 19 10:46 coefkdeq.dat
-rw-r--r--   1 cscherer sunuser      6219 Feb 22 16:33 coefkdeqr.dat
-rw-r--r--   1 cscherer sunuser      2200 Dec 19 13:50 dilution.dat
-rw-r--r--   1 cscherer sunuser       519 Oct 19  2000 drythick.dat
-rw-r--r--   1 cscherer sunuser       791 Jul 23  2002 dsfailt.def
-rw-r--r--   1 cscherer sunuser      5973 Feb 14 19:57 ebsfail.def
-rw-r--r--   1 cscherer sunuser       790 May 28  1998 ebsfilt.def
-rw-r--r--   1 cscherer sunuser      5459 Jan  7 11:17 ebsrel.def
-rw-r--r--   1 cscherer sunuser    298679 Mar 22  2000 elevdem.dat
-rw-r--r--   1 cscherer sunuser      9381 May 29  2002 fluoride.dat
-rw-r--r--   1 cscherer sunuser      6513 Feb 11  2000 gbioac1.dat
-rw-r--r--   1 cscherer sunuser      3383 Sep  4  2002 gdefauls.def
-rw-r--r--   1 cscherer sunuser      3383 Feb 11  2000 gdefault.def
-rw-r--r--   1 cscherer sunuser        64 Feb 11  2000 gdosinc2.dat
-rw-r--r--   1 cscherer sunuser      7011 Feb 11  2000 gftrans.def
-rw-r--r--   1 cscherer sunuser      7011 Sep  4  2002 gftranss.def
-rw-r--r--   1 cscherer sunuser     15214 Feb 11  2000 ggamen.dat
-rw-r--r--   1 cscherer sunuser     13855 Feb 11  2000 ggenii.def
-rw-r--r--   1 cscherer sunuser     13173 Sep  4  2002 ggeniis.def
-rw-r--r--   1 cscherer sunuser      5351 Feb 11  2000 ggrdf.dat
-rw-r--r--   1 cscherer sunuser      9897 Mar 29  2000 gnewdf.dat
-rw-r--r--   1 cscherer sunuser     13200 Mar 20  2000 grmdlib.dat
-rw-r--r--   1 cscherer sunuser      3048 Sep 15  2000 gs_cb_ad.dat
-rw-r--r--   1 cscherer sunuser      2487 Jun  4  1998 gs_cb_ci.dat
-rw-r--r--   1 cscherer sunuser      3045 Sep 15  2000 gs_pb_ad.dat
-rw-r--r--   1 cscherer sunuser      2487 Jun  4  1998 gs_pb_ci.dat
-rw-r--r--   1 cscherer sunuser      8247 Feb 22 16:39 ia.dat
-rw-r--r--   1 cscherer sunuser     20698 Dec 30 19:26 itym.dat
-rw-r--r--   1 cscherer sunuser    943774 Mar 29  2000 maidtbl.dat
-rw-r--r--   1 cscherer sunuser     10978 Mar 22  2000 maswtbl.dat
-rwxr-xr-x   1 cscherer sunuser    943775 Dec 30 19:18 maydtbl.dat
-rw-r--r--   1 cscherer sunuser      9729 Dec 17 17:31 mechfail.def
-rw-r--r--   1 cscherer sunuser      1251 Feb  6 14:39 multifaf.dat
-rw-r--r--   1 cscherer sunuser      1252 Feb  6 14:39 multifbe.dat
-rw-r--r--   1 cscherer sunuser    116965 Jul 17  2002 multiflo.dat
-rw-r--r--   1 cscherer sunuser      7152 Feb 21 21:14 nuclides.dat
-rw-r--r--   1 cscherer sunuser      7111 Sep 24  2000 organdf.dat
-rw-r--r--   1 cscherer sunuser       548 Sep 21  2000 repdes.dat
-rw-r--r--   1 cscherer sunuser    242353 Feb 23 18:09 reversibles.inp
-rwxr-xr-x   1 cscherer sunuser    130758 Dec 17 17:31 seisbs1.dis
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-rwxr-xr-x   1 cscherer sunuser    130758 Dec 17 17:31 seisbs2.dis
-rwxr-xr-x   1 cscherer sunuser    943788 Dec 30 19:18 smaydtbl.dat
-rw-r--r--   1 cscherer sunuser    489858 Mar 22  2000 soildem.dat
-rw-r--r--   1 cscherer sunuser      4506 Feb  7  2000 strmtube.dat
-rw-r--r--   1 cscherer sunuser    119673 Mar 22  2000 sunitdem.dat
-rw-r--r--   1 cscherer sunuser    162404 May  8  2000 tefkti.inp
-rw-r--r--   1 cscherer sunuser    101499 Feb 19 10:43 tpanames.dbs
-rw-r--r--   1 cscherer sunuser    471041 Mar 22  2000 winddem.dat
-rw-r--r--   1 cscherer sunuser     17410 Feb  2  2000 wpflow.def

scr445/tpa50c:
total 43444
drwxr-xr-x   5 cscherer sunuser      7680 Apr  1 15:07 .
drwxr-xr-x   7 cscherer sunuser       512 Apr  1 09:15 ..
-rwxr-xr-x   1 cscherer sunuser      2001 Sep 18  2002 CLEANUP
-rw-r--r--   1 cscherer sunuser     40960 Apr  1 15:07 Chain01
-rw-r--r--   1 cscherer sunuser     49152 Apr  1 15:07 Chain02
-rw-r--r--   1 cscherer sunuser     40960 Apr  1 15:07 Chain03
-rw-r--r--   1 cscherer sunuser     24576 Apr  1 15:07 Chain04
-rw-r--r--   1 cscherer sunuser     65536 Apr  1 15:07 Chain05
-rw-r--r--   1 cscherer sunuser     24576 Apr  1 15:07 Chain06
-rw-r--r--   1 cscherer sunuser    188416 Apr  1 15:07 Chain07
-rw-r--r--   1 cscherer sunuser    188416 Apr  1 15:07 Chain08
-rw-r--r--   1 cscherer sunuser     24576 Apr  1 15:07 Chain09
-rw-r--r--   1 cscherer sunuser    188416 Apr  1 15:07 Chain10
-rw-r--r--   1 cscherer sunuser     24576 Apr  1 15:07 Chain11
-rw-r--r--   1 cscherer sunuser     24576 Apr  1 15:07 Chain12
-rw-r--r--   1 cscherer sunuser    188416 Apr  1 15:07 Chain13
-rw-r--r--   1 cscherer sunuser    139264 Apr  1 15:08 Chain14
-rw-r--r--   1 cscherer sunuser     57344 Apr  1 15:08 Chain15
-rw-r--r--   1 cscherer sunuser         0 Apr  1 15:07 Chain16
-rw-r--r--   1 cscherer sunuser         0 Apr  1 15:07 Chain17
-rw-r--r--   1 cscherer sunuser         0 Apr  1 15:07 Chain18
-rw-r--r--   1 cscherer sunuser       965 Apr  1 13:47 FILENAME.DAT
-rw-r--r--   1 cscherer sunuser       869 Nov 27 14:22 Makefile
-rw-rw-rw-   1 cscherer sunuser       961 Nov 27 14:24 Makefile4.2
-rw-r--r--   1 cscherer sunuser      1041 Apr  1 15:07 NEFII.VEL
-rw-r--r--   1 cscherer sunuser     69848 Apr  1 15:07 TAPE24
-rw-r--r--   1 cscherer sunuser         0 Apr  1 13:43 airpkdos.res
-rw-r--r--   1 cscherer sunuser         0 Apr  1 13:43 arpkds_c.res
-rw-r--r--   1 cscherer sunuser     29502 Mar 24 16:19 array.f
-rw-r--r--   1 cscherer sunuser     51372 Apr  1 08:43 array.o
-rw-r--r--   1 cscherer sunuser      1540 Apr  1 14:56 ashout.res
-rw-r--r--   1 cscherer sunuser     20686 Mar 24 16:19 ashplumo.f
-rw-r--r--   1 cscherer sunuser     45556 Apr  1 08:43 ashplumo.o
-rw-r--r--   1 cscherer sunuser     37705 Mar 24 16:19 ashrmovo.f
-rw-r--r--   1 cscherer sunuser     46804 Apr  1 08:43 ashrmovo.o
-rw-r--r--   1 cscherer sunuser      1025 Apr  1 13:43 burnup.dat
drwxr-xr-x   2 cscherer sunuser       512 Apr  1 08:42 ccdf
-rwxrwxrwx   1 cscherer sunuser       156 Apr  1 10:09 ch_env
-rw-r--r--   1 cscherer sunuser      7547 Apr  1 15:07 chlrdmf.dat
-rw-r--r--   1 cscherer sunuser    850000 Apr  1 13:43 climato1.dat
-rw-r--r--   1 cscherer sunuser      2200 Apr  1 13:43 climato2.dat
drwxr-xr-x   4 cscherer sunuser      1024 Apr  1 08:50 codes
-rw-r--r--   1 cscherer sunuser      6219 Apr  1 13:43 coefkdeq.dat
-rw-r--r--   1 cscherer sunuser       735 Feb 18 18:46 coefkdeq.i
-rw-r--r--   1 cscherer sunuser     10207 Mar 24 16:19 condxyzt.f
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-rw-r--r--   1 cscherer sunuser      3412 Apr  1 08:47 condxyzt.o
-rw-r--r--   1 cscherer sunuser     22386 Apr  1 15:07 corrode.out
-rw-r--r--   1 cscherer sunuser     73728 Apr  1 13:43 cp.tpa
-rw-r--r--   1 cscherer sunuser         0 Apr  1 13:43 cumrel.res
-rw-r--r--   1 cscherer sunuser         0 Apr  1 13:43 cumrel_c.res
-rw-r--r--   1 cscherer sunuser     69680 Apr  1 15:07 cumrelse.out
drwxr-xr-x   2 cscherer sunuser      1536 Apr  1 08:42 data
-rw-r--r--   1 cscherer sunuser    124149 Mar 24 16:19 dcags.f
-rw-r--r--   1 cscherer sunuser    255948 Apr  1 08:44 dcags.o
-rw-r--r--   1 cscherer sunuser    157666 Mar 24 16:19 dcagw.f
-rw-r--r--   1 cscherer sunuser    335496 Apr  1 08:44 dcagw.o
-rw-r--r--   1 cscherer sunuser      9993 Apr  1 15:07 deltaec.inp
-rw-r--r--   1 cscherer sunuser     14700 Apr  1 15:07 diagnose.out
-rw-r--r--   1 cscherer sunuser      2200 Apr  1 13:47 dilution.dat
-rw-r--r--   1 cscherer sunuser      3870 Apr  1 13:43 drifts.dat
-rw-r--r--   1 cscherer sunuser       190 Sep 20  2002 driftsa.i
-rw-r--r--   1 cscherer sunuser       519 Apr  1 13:43 drythick.dat
-rw-r--r--   1 cscherer sunuser     25470 Mar 24 16:19 dsfail.f
-rw-r--r--   1 cscherer sunuser     28508 Apr  1 08:44 dsfail.o
-rw-r--r--   1 cscherer sunuser      8192 Apr  1 14:48 dsfail.res
-rw-r--r--   1 cscherer sunuser      2572 Apr  1 15:06 dsfailt.dat
-rw-r--r--   1 cscherer sunuser       791 Apr  1 13:43 dsfailt.def
-rwxr-xr-x   1 cscherer sunuser     43172 Apr  1 13:43 dsfailt.e
-rw-r--r--   1 cscherer sunuser       610 Apr  1 15:06 dsfailt.inp
-rw-r--r--   1 cscherer sunuser         0 Apr  1 13:43 dsfailt.out
-rw-r--r--   1 cscherer sunuser     65260 Apr  1 15:07 ebscld.out
-rw-r--r--   1 cscherer sunuser      5973 Apr  1 13:43 ebsfail.def
-rw-r--r--   1 cscherer sunuser     49153 Mar 24 16:19 ebsfail.f
-rw-r--r--   1 cscherer sunuser      5734 Apr  1 15:07 ebsfail.inp
-rw-r--r--   1 cscherer sunuser    117604 Apr  1 08:45 ebsfail.o
-rw-r--r--   1 cscherer sunuser       790 Apr  1 13:43 ebsfilt.def
-rwxr-xr-x   1 cscherer sunuser     46596 Apr  1 13:43 ebsfilt.e
-rw-r--r--   1 cscherer sunuser      2554 Apr  1 15:07 ebsfilt.inp
-rw-r--r--   1 cscherer sunuser       239 Apr  1 15:07 ebsfilt.out
-rw-r--r--   1 cscherer sunuser     20929 Apr  1 15:07 ebsflo.dat
-rw-r--r--   1 cscherer sunuser    251401 Apr  1 15:07 ebsnef.dat
-rw-r--r--   1 cscherer sunuser    186252 Apr  1 15:07 ebsnef.out
-rw-r--r--   1 cscherer sunuser    658449 Apr  1 15:07 ebsnef2.dat
-rw-r--r--   1 cscherer sunuser      1883 Apr  1 15:07 ebspac.nuc
-rw-r--r--   1 cscherer sunuser      5459 Apr  1 13:43 ebsrel.def
-rw-r--r--   1 cscherer sunuser     87035 Mar 24 16:19 ebsrel.f
-rw-r--r--   1 cscherer sunuser     11110 Apr  1 15:07 ebsrel.inp
-rw-r--r--   1 cscherer sunuser    214992 Apr  1 08:45 ebsrel.o
-rw-r--r--   1 cscherer sunuser       149 Sep 25  2002 ebsrel1.i
-rw-r--r--   1 cscherer sunuser    186203 Apr  1 15:07 ebssf.dat
-rw-r--r--   1 cscherer sunuser     25515 Apr  1 15:07 ebstrh.dat
-rw-r--r--   1 cscherer sunuser     18435 Apr  1 15:07 ebstrhc.inp
-rw-r--r--   1 cscherer sunuser      2647 Apr  1 15:07 echofail.dat
-rw-r--r--   1 cscherer sunuser    667001 Apr  1 15:07 echofilt.dat
-rwxr-xr-x   1 cscherer sunuser    191340 Apr  1 13:47 env.e
-rwxr-xr-x   1 cscherer sunuser    282904 Apr  1 13:47 envin.e
-rw-r--r--   1 cscherer sunuser         0 Apr  1 13:43 epa_ave.out
-rw-r--r--   1 cscherer sunuser         0 Apr  1 13:43 epapktim.out
-rw-r--r--   1 cscherer sunuser    389960 Mar 28 16:29 exec.f
-rw-r--r--   1 cscherer sunuser   1107432 Apr  1 08:47 exec.o
-rw-r--r--   1 cscherer sunuser      2385 Sep 21  2002 execa.i
-rw-r--r--   1 cscherer sunuser       486 Sep  3  1997 execb.i
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-rw-r--r--   1 cscherer sunuser       269 May 29  2002 execc.i
-rw-r--r--   1 cscherer sunuser       104 Feb  6 14:32 execd.i
-rwxr-xr-x   1 cscherer sunuser    136892 Apr  1 13:43 failt.e
-rw-r--r--   1 cscherer sunuser     23729 Apr  1 15:07 failt.out
-rw-r--r--   1 cscherer sunuser      8503 Mar 24 16:19 faulto.f
-rw-r--r--   1 cscherer sunuser     10832 Apr  1 08:45 faulto.o
-rw-r--r--   1 cscherer sunuser      6656 Mar 24 16:19 fileunit.f
-rw-r--r--   1 cscherer sunuser      8592 Apr  1 08:47 fileunit.o
-rw-r--r--   1 cscherer sunuser      5784 Mar 24 16:19 findelev.f
-rw-r--r--   1 cscherer sunuser      9712 Apr  1 08:47 findelev.o
-rw-r--r--   1 cscherer sunuser      9381 Apr  1 15:06 fluoride.dat
-rw-r--r--   1 cscherer sunuser     69680 Apr  1 15:07 frac_rel.out
-rw-r--r--   1 cscherer sunuser        60 Aug 16  1997 fu1.i
-rw-r--r--   1 cscherer sunuser       609 Sep  4  2002 fu2.i
-rw-r--r--   1 cscherer sunuser      6513 Apr  1 13:47 gbioac1.dat
-rw-r--r--   1 cscherer sunuser      3383 Apr  1 13:47 gdefault.def
-rw-r--r--   1 cscherer sunuser      3387 Apr  1 14:56 gdefault.inp
-rw-r--r--   1 cscherer sunuser        64 Apr  1 13:47 gdosinc2.dat
-rw-r--r--   1 cscherer sunuser         0 Apr  1 14:56 gentoo.out
-rw-r--r--   1 cscherer sunuser     35173 Apr  1 14:56 genv.in
-rw-r--r--   1 cscherer sunuser     18393 Apr  1 14:56 genv.out
-rw-r--r--   1 cscherer sunuser      7011 Apr  1 13:47 gftrans.def
-rw-r--r--   1 cscherer sunuser      7142 Apr  1 14:56 gftrans.inp
-rw-r--r--   1 cscherer sunuser     15214 Apr  1 13:47 ggamen.dat
-rw-r--r--   1 cscherer sunuser     13855 Apr  1 13:47 ggenii.def
-rw-r--r--   1 cscherer sunuser     13164 Apr  1 14:56 ggenii.inp
-rw-r--r--   1 cscherer sunuser     10074 Apr  1 14:56 ggenii.out
-rw-r--r--   1 cscherer sunuser      5351 Apr  1 13:47 ggrdf.dat
-rw-r--r--   1 cscherer sunuser      5673 Apr  1 14:56 gmedia.out
-rw-r--r--   1 cscherer sunuser      9897 Apr  1 13:47 gnewdf.dat
-rw-r--r--   1 cscherer sunuser     13200 Apr  1 13:47 grmdlib.dat
-rw-r--r--   1 cscherer sunuser       568 Apr  1 13:38 gsccdf.res
-rw-r--r--   1 cscherer sunuser       568 Apr  1 13:38 gsccdf_c.res
-rw-r--r--   1 cscherer sunuser      3561 Apr  1 14:56 gw_cb_ad.dat
-rw-r--r--   1 cscherer sunuser      1264 Apr  1 14:56 gw_cb_ci.dat
-rw-r--r--   1 cscherer sunuser      3557 Apr  1 14:56 gw_pb_ad.dat
-rw-r--r--   1 cscherer sunuser      1261 Apr  1 14:56 gw_pb_ci.dat
-rw-r--r--   1 cscherer sunuser       603 Apr  1 13:38 gwccdf.res
-rw-r--r--   1 cscherer sunuser       603 Apr  1 13:38 gwccdf_c.res
-rw-r--r--   1 cscherer sunuser         9 Apr  1 14:56 gwork.buf
-rw-r--r--   1 cscherer sunuser      3724 Apr  1 14:56 gwpkdos.res
-rw-r--r--   1 cscherer sunuser      3724 Apr  1 14:56 gwpkds_c.res
-rw-r--r--   1 cscherer sunuser      4876 Apr  1 14:56 gwttuzsz.res
-rw-r--r--   1 cscherer sunuser      1229 Jul 22  1999 ia.i
-rw-r--r--   1 cscherer sunuser       956 Sep 26  2000 ia1.i
-rw-r--r--   1 cscherer sunuser     21238 Mar 24 16:19 iareader.f
-rw-r--r--   1 cscherer sunuser     37268 Apr  1 08:45 iareader.o
-rw-r--r--   1 cscherer sunuser     15196 Apr  1 14:56 infilper.res
-rw-r--r--   1 cscherer sunuser      1102 Apr  1 15:07 inv1000.out
-rw-r--r--   1 cscherer sunuser     69562 Mar 24 16:19 invent.f
-rw-r--r--   1 cscherer sunuser     86700 Apr  1 08:45 invent.o
-rw-r--r--   1 cscherer sunuser        33 Sep 25  2002 invent_.i
-rw-r--r--   1 cscherer sunuser        57 Aug 16  1997 inventa.i
-rw-r--r--   1 cscherer sunuser       182 Sep 25  2002 inventb.i
-rw-r--r--   1 cscherer sunuser       344 Sep 25  2002 inventc.i
-rw-r--r--   1 cscherer sunuser       124 Sep 25  2002 inventd.i
-rw-r--r--   1 cscherer sunuser       131 Sep 25  2002 invente.i
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-rw-r--r--   1 cscherer sunuser       130 Sep 25  2002 inventf.i
-rw-r--r--   1 cscherer sunuser       128 Sep 25  2002 inventg.i
-rw-r--r--   1 cscherer sunuser       127 Sep 25  2002 inventh.i
-rw-r--r--   1 cscherer sunuser        75 Aug 16  1997 inventi.i
-rw-r--r--   1 cscherer sunuser       288 Sep 25  2002 inventj.i
-rw-r--r--   1 cscherer sunuser       332 Sep 25  2002 inventk.i
-rw-r--r--   1 cscherer sunuser       150 Dec  6 14:29 inventl.i
-rw-r--r--   1 cscherer sunuser       315 Dec 11 09:33 inventm.i
-rw-r--r--   1 cscherer sunuser       175 Sep 25  2002 inventn.i
-rw-r--r--   1 cscherer sunuser       249 Jan 29  2000 invento.i
-rw-r--r--   1 cscherer sunuser       267 Sep 25  2002 inventp.i
-rw-r--r--   1 cscherer sunuser         0 Apr  1 10:10 lhs.csv
-rw-r--r--   1 cscherer sunuser     47123 Apr  1 13:43 lhs.inp
-rw-r--r--   1 cscherer sunuser   5884928 Apr  1 13:43 lhs.out
-rw-r--r--   1 cscherer sunuser     78753 Apr  1 13:43 lhse.out
-rw-r--r--   1 cscherer sunuser      5352 Apr  1 08:47 linintrp.o
-rw-r--r--   1 cscherer sunuser        78 Aug 16  1997 max500yr.i
-rw-r--r--   1 cscherer sunuser        99 Sep 25  2002 maxchain.i
-rw-r--r--   1 cscherer sunuser       149 Sep 25  2002 maxclchn.i
-rw-r--r--   1 cscherer sunuser       144 Sep 25  2002 maxclnuc.i
-rw-r--r--   1 cscherer sunuser       508 Sep 25  2002 maxnnucl.i
-rw-r--r--   1 cscherer sunuser       299 Jul 10  1998 maxnsuba.i
-rw-r--r--   1 cscherer sunuser       206 May 28  1999 maxntime.i
-rw-r--r--   1 cscherer sunuser      1095 Apr  1 15:07 maxrel.dat
-rwxr-xr-x   1 cscherer sunuser    943775 Apr  1 13:43 maydtbl.dat
-rw-r--r--   1 cscherer sunuser     47368 Apr  1 15:07 mechfail.dat
-rw-r--r--   1 cscherer sunuser      9729 Apr  1 13:43 mechfail.def
-rwxr-xr-x   1 cscherer sunuser     79836 Apr  1 13:43 mechfail.e
-rw-r--r--   1 cscherer sunuser     27623 Apr  1 15:07 mechfail.inp
-rw-r--r--   1 cscherer sunuser         0 Apr  1 15:07 mechfail.out
-rw-r--r--   1 cscherer sunuser      1251 Apr  1 13:43 multifaf.dat
-rw-r--r--   1 cscherer sunuser      1252 Apr  1 13:43 multifbe.dat
-rw-r--r--   1 cscherer sunuser     11850 Mar 24 16:19 mv.f
-rw-r--r--   1 cscherer sunuser     19428 Apr  1 08:45 mv.o
-rw-r--r--   1 cscherer sunuser    149822 Apr  1 14:56 mv.tpa
-rw-r--r--   1 cscherer sunuser       111 Sep  4  1997 mva.i
-rw-r--r--   1 cscherer sunuser        56 Aug 16  1997 mvb.i
-rw-r--r--   1 cscherer sunuser        57 Aug 16  1997 mvc.i
-rw-r--r--   1 cscherer sunuser       101 Aug 16  1997 mvd.i
-rw-r--r--   1 cscherer sunuser        72 Aug 16  1997 mve.i
-rw-r--r--   1 cscherer sunuser        72 Aug 16  1997 mvf.i
-rw-r--r--   1 cscherer sunuser     15196 Apr  1 14:56 nearfld.res
-rw-r--r--   1 cscherer sunuser         0 Apr  1 15:07 nefii.dis
-rw-r--r--   1 cscherer sunuser     11320 Apr  1 15:07 nefii.inp
-rw-r--r--   1 cscherer sunuser   1630208 Apr  1 15:08 nefii.out
-rw-r--r--   1 cscherer sunuser       603 Apr  1 15:07 nefii.rel
-rw-r--r--   1 cscherer sunuser   1504058 Apr  1 15:06 nefiisz.dis
-rw-r--r--   1 cscherer sunuser     11320 Apr  1 15:06 nefiisz.inp
-rw-r--r--   1 cscherer sunuser   1789343 Apr  1 15:06 nefiisz.out
-rw-r--r--   1 cscherer sunuser    317192 Apr  1 15:06 nefiisz.src
-rw-r--r--   1 cscherer sunuser      1041 Apr  1 15:06 nefiisz.vel
-rw-r--r--   1 cscherer sunuser   6124534 Apr  1 15:07 nefiiuz.dis
-rw-r--r--   1 cscherer sunuser     10100 Apr  1 15:07 nefiiuz.inp
-rw-r--r--   1 cscherer sunuser   6320574 Apr  1 15:07 nefiiuz.out
-rw-r--r--   1 cscherer sunuser    313886 Apr  1 15:07 nefiiuz.src
-rw-r--r--   1 cscherer sunuser       636 Apr  1 15:07 nefiiuz.vel
-rwxr-xr-x   1 cscherer sunuser    408048 Apr  1 13:43 nefmks.e
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-rw-r--r--   1 cscherer sunuser       990 Apr  1 15:07 nefmks.log
-rw-r--r--   1 cscherer sunuser    113027 Mar 24 16:19 nfenv.f
-rw-r--r--   1 cscherer sunuser     97284 Apr  1 08:45 nfenv.o
-rw-r--r--   1 cscherer sunuser       326 Nov 17 18:24 nfenvadj.i
-rw-r--r--   1 cscherer sunuser        94 Aug 16  1997 nintv.i
-rw-r--r--   1 cscherer sunuser      1502 Jun 11  1997 notice.i
-rw-r--r--   1 cscherer sunuser         0 Apr  1 13:43 npkdoset.res
-rw-r--r--   1 cscherer sunuser         0 Apr  1 13:43 npkdst_c.res
-rw-r--r--   1 cscherer sunuser      7152 Apr  1 13:43 nuclides.dat
-rw-r--r--   1 cscherer sunuser      6579 Mar 24 16:19 numrecip.f
-rw-r--r--   1 cscherer sunuser      4752 Apr  1 08:47 numrecip.o
-rw-r--r--   1 cscherer sunuser      7111 Apr  1 13:47 organdf.dat
-rw-r--r--   1 cscherer sunuser       259 Aug 16  1997 path.i
-rw-r--r--   1 cscherer sunuser      6584 Mar 24 16:19 peakfind.f
-rw-r--r--   1 cscherer sunuser      6340 Apr  1 08:47 peakfind.o
-rw-r--r--   1 cscherer sunuser     42696 Apr  1 13:38 pkmndose.out
-rw-r--r--   1 cscherer sunuser         0 Apr  1 13:43 pkreltim.res
-rw-r--r--   1 cscherer sunuser         0 Apr  1 13:43 pkrltm_c.res
-rw-r--r--   1 cscherer sunuser     46322 Mar 24 16:19 ran.f
-rw-r--r--   1 cscherer sunuser     87600 Apr  1 08:47 ran.o
-rw-r--r--   1 cscherer sunuser    148524 Mar 24 16:19 reader.f
-rw-r--r--   1 cscherer sunuser       185 May 21  1998 reader.i
-rw-r--r--   1 cscherer sunuser    432580 Apr  1 08:46 reader.o
-rw-r--r--   1 cscherer sunuser       106 Aug 27  1999 reader1.i
-rw-r--r--   1 cscherer sunuser        58 Aug 27  1999 reader2.i
-rw-r--r--   1 cscherer sunuser       102 Aug 27  1999 reader3.i
-rw-r--r--   1 cscherer sunuser        89 Aug 27  1999 reader4.i
-rw-r--r--   1 cscherer sunuser        58 Aug 16  1997 reflux2.i
-rw-r--r--   1 cscherer sunuser       899 Apr  1 15:07 rel_flow.out
-rw-r--r--   1 cscherer sunuser       603 Apr  1 13:38 relccdf.res
-rw-r--r--   1 cscherer sunuser      2883 Apr  1 15:07 relcum.out
-rwxr-xr-x   1 cscherer sunuser    122652 Apr  1 13:43 releaset.e
-rw-r--r--   1 cscherer sunuser       414 Apr  1 15:07 releaset.out
-rw-r--r--   1 cscherer sunuser       773 Apr  1 15:07 relfrac.out
-rw-r--r--   1 cscherer sunuser      1028 Apr  1 14:56 relgwgs.res
-rw-r--r--   1 cscherer sunuser       548 Apr  1 13:43 repdes.dat
-rw-r--r--   1 cscherer sunuser         0 Apr  1 13:43 rgwna.tpa
-rw-r--r--   1 cscherer sunuser         0 Apr  1 13:43 rgwnapani.tpa
-rw-r--r--   1 cscherer sunuser         0 Apr  1 13:43 rgwnapdw.tpa
-rw-r--r--   1 cscherer sunuser         0 Apr  1 13:43 rgwnapext.tpa
-rw-r--r--   1 cscherer sunuser         0 Apr  1 13:43 rgwnapinh.tpa
-rw-r--r--   1 cscherer sunuser         0 Apr  1 13:43 rgwnapmlk.tpa
-rw-r--r--   1 cscherer sunuser         0 Apr  1 13:43 rgwnappla.tpa
-rw-r--r--   1 cscherer sunuser    421077 Apr  1 14:56 rgwnr.tpa
-rw-r--r--   1 cscherer sunuser         0 Apr  1 13:43 rgwsa.tpa
-rw-r--r--   1 cscherer sunuser         0 Apr  1 13:43 rgwsap.tpa
-rw-r--r--   1 cscherer sunuser     42209 Apr  1 14:56 rgwsr.tpa
-rw-r--r--   1 cscherer sunuser       603 Apr  1 13:38 rlccdf_c.res
-rw-r--r--   1 cscherer sunuser      1028 Apr  1 14:56 rlgwgs_c.res
-rw-r--r--   1 cscherer sunuser     95694 Mar 24 16:19 sampler.f
-rw-r--r--   1 cscherer sunuser    165660 Apr  1 08:46 sampler.o
-rw-r--r--   1 cscherer sunuser        62 Aug 16  1997 sampler0.i
-rw-r--r--   1 cscherer sunuser        79 Aug 16  1997 sampler1.i
-rw-r--r--   1 cscherer sunuser        62 Aug 16  1997 sampler2.i
-rw-r--r--   1 cscherer sunuser       178 Apr  3  1998 sampler3.i
-rw-r--r--   1 cscherer sunuser       145 Sep 19  2000 sampler4.i
-rw-r--r--   1 cscherer sunuser        62 Aug 16  1997 samplera.i
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-rw-r--r--   1 cscherer sunuser        62 Aug 16  1997 samplerb.i
-rw-r--r--   1 cscherer sunuser        62 Aug 16  1997 samplerc.i
-rw-r--r--   1 cscherer sunuser        68 Aug 16  1997 samplerd.i
-rw-r--r--   1 cscherer sunuser       133 Aug 16  1997 samplere.i
-rw-r--r--   1 cscherer sunuser       111 Aug 16  1997 samplerf.i
-rw-r--r--   1 cscherer sunuser        84 Aug 16  1997 samplerg.i
-rw-r--r--   1 cscherer sunuser        68 Aug 16  1997 samplerh.i
-rw-r--r--   1 cscherer sunuser        83 Aug 16  1997 sampleri.i
-rw-r--r--   1 cscherer sunuser        61 Aug 16  1997 samplerj.i
-rw-r--r--   1 cscherer sunuser       208 Aug 16  1997 samplerk.i
-rw-r--r--   1 cscherer sunuser       104 Aug 16  1997 samplerl.i
-rw-r--r--   1 cscherer sunuser        63 Aug 16  1997 samplerm.i
-rw-r--r--   1 cscherer sunuser        79 Aug 16  1997 samplern.i
-rw-r--r--   1 cscherer sunuser        63 Aug 16  1997 samplero.i
-rw-r--r--   1 cscherer sunuser       260 Mar 14  2002 samplerp.i
-rw-r--r--   1 cscherer sunuser       103 Aug 16  1997 samplerq.i
-rw-r--r--   1 cscherer sunuser       176 Aug 16  1997 samplerr.i
-rw-r--r--   1 cscherer sunuser       336 Apr  3  1998 samplers.i
-rw-r--r--   1 cscherer sunuser        70 Aug 16  1997 samplert.i
-rw-r--r--   1 cscherer sunuser        69 Aug 16  1997 sampleru.i
-rw-r--r--   1 cscherer sunuser        62 Aug 16  1997 samplerv.i
-rw-r--r--   1 cscherer sunuser        60 Aug 16  1997 samplerw.i
-rw-r--r--   1 cscherer sunuser       406 Feb 22 16:36 samplerx.i
-rw-r--r--   1 cscherer sunuser       299 Apr 30  2001 samplery.i
-rw-r--r--   1 cscherer sunuser        60 Aug 16  1997 samplerz.i
-rw-r--r--   1 cscherer sunuser      3872 Apr  1 13:43 samplpar.abb
-rw-r--r--   1 cscherer sunuser     29842 Apr  1 13:43 samplpar.hdr
-rw-r--r--   1 cscherer sunuser     35124 Apr  1 14:56 samplpar.res
-rw-r--r--   1 cscherer sunuser       322 Nov 17 18:24 seisadj.i
-rwxr-xr-x   1 cscherer sunuser    130758 Apr  1 13:43 seisbs1.dis
-rwxr-xr-x   1 cscherer sunuser    130758 Apr  1 13:43 seisbs2.dis
-rw-r--r--   1 cscherer sunuser     74226 Mar 24 16:19 seismo2.f
-rw-r--r--   1 cscherer sunuser     73908 Apr  1 08:46 seismo2.o
-rwxrwxrwx   1 cscherer sunuser        30 Sep 12  2002 show_env
-rwxr-xr-x   1 cscherer sunuser    943788 Apr  1 13:43 smaydtbl.dat
-rwxr-xr-x   1 cscherer sunuser    243548 Apr  1 13:43 snllhs.e
-rw-r--r--   1 cscherer sunuser    309782 Apr  1 15:07 sotnef.dat
-rw-r--r--   1 cscherer sunuser     70057 Apr  1 14:56 sp.tpa
-rw-r--r--   1 cscherer sunuser      1952 Apr  1 08:47 srchpos.o
-rw-r--r--   1 cscherer sunuser       144 Sep  3  1997 stop.i
-rw-r--r--   1 cscherer sunuser      4506 Apr  1 13:43 strmtube.dat
-rw-r--r--   1 cscherer sunuser     38339 Mar 24 16:19 subarea.f
-rw-r--r--   1 cscherer sunuser     59664 Apr  1 08:46 subarea.o
-rw-r--r--   1 cscherer sunuser       255 Feb  4  2000 subareaa.i
-rw-r--r--   1 cscherer sunuser        79 Aug 16  1997 subareab.i
-rw-r--r--   1 cscherer sunuser        82 Aug 16  1997 subareac.i
-rw-r--r--   1 cscherer sunuser        81 Aug 16  1997 subaread.i
-rw-r--r--   1 cscherer sunuser        77 Aug 16  1997 subareae.i
-rw-r--r--   1 cscherer sunuser        60 Feb  3  2000 subareaf.i
-rw-r--r--   1 cscherer sunuser        64 Feb  2  2000 subareag.i
-rw-r--r--   1 cscherer sunuser    118298 Mar 28 16:34 szft.f
-rw-r--r--   1 cscherer sunuser       264 Nov 17 18:23 szft.i
-rw-r--r--   1 cscherer sunuser    193260 Apr  1 08:46 szft.o
-rw-r--r--   1 cscherer sunuser     75428 Apr  1 14:56 totdos_c.res
-rw-r--r--   1 cscherer sunuser    112628 Apr  1 14:56 totdose.res
-rwxr-xr-x   1 cscherer sunuser   2528772 Apr  1 08:47 tpa.e
-rw-r--r--   1 cscherer sunuser     91300 Apr  1 13:42 tpa.inp
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-rw-r--r--   1 cscherer sunuser     91296 Mar 28 16:34 tpa_orig.inp
-rw-r--r--   1 cscherer sunuser     91300 Apr  1 13:42 tpa_r1024.inp
-rw-r--r--   1 cscherer sunuser    157380 Apr  1 15:06 tpa_r1024.out
-rw-r--r--   1 cscherer sunuser     91304 Apr  1 10:09 tpa_slt1.inp
-rw-r--r--   1 cscherer sunuser     23673 Apr  1 12:59 tpa_slt1.out
-rw-r--r--   1 cscherer sunuser     91304 Apr  1 10:09 tpa_slt2.inp
-rw-r--r--   1 cscherer sunuser     24314 Apr  1 13:08 tpa_slt2.out
-rw-r--r--   1 cscherer sunuser     91304 Apr  1 10:09 tpa_slt3.inp
-rw-r--r--   1 cscherer sunuser     24207 Apr  1 13:38 tpa_slt3.out
-rw-r--r--   1 cscherer sunuser     91300 Apr  1 09:56 tpa_slt4.inp
-rw-r--r--   1 cscherer sunuser     23017 Apr  1 11:24 tpa_slt4.out
-rw-r--r--   1 cscherer sunuser     92216 Apr  1 13:43 tpameans.out
-rw-r--r--   1 cscherer sunuser    101499 Apr  1 13:43 tpanames.dbs
-rw-r--r--   1 cscherer sunuser    248503 Apr  1 15:07 trelease.out
-rw-r--r--   1 cscherer sunuser       314 Aug 16  1997 uz_climi.i
-rw-r--r--   1 cscherer sunuser      1219 Sep  6  2002 uz_climr.i
-rw-r--r--   1 cscherer sunuser       341 Aug 16  1997 uz_climz.i
-rw-r--r--   1 cscherer sunuser      1323 Sep 26  2002 uz_flowi.i
-rw-r--r--   1 cscherer sunuser      1170 Sep 26  2002 uz_flowr.i
-rw-r--r--   1 cscherer sunuser       176 Aug 16  1997 uz_flowz.i
-rw-r--r--   1 cscherer sunuser      3225 Sep 26  2002 uz_parms.i
-rw-r--r--   1 cscherer sunuser     72514 Mar 24 16:19 uzflow.f
-rw-r--r--   1 cscherer sunuser     59816 Apr  1 08:47 uzflow.o
-rw-r--r--   1 cscherer sunuser    128158 Mar 24 16:19 uzft.f
-rw-r--r--   1 cscherer sunuser    203848 Apr  1 08:47 uzft.o
-rw-r--r--   1 cscherer sunuser       755 Nov 17 18:23 uzszft.i
-rw-r--r--   1 cscherer sunuser     14215 Mar 24 16:19 volcano.f
-rw-r--r--   1 cscherer sunuser     17476 Apr  1 08:47 volcano.o
-rw-r--r--   1 cscherer sunuser     21032 Apr  1 15:07 weldfail.out
-rw-r--r--   1 cscherer sunuser         0 Apr  1 13:43 wpfillstats.out
-rw-r--r--   1 cscherer sunuser     13105 Apr  1 13:43 wpflow.dat
-rw-r--r--   1 cscherer sunuser     17410 Apr  1 13:43 wpflow.def
-rw-r--r--   1 cscherer sunuser      1378 Apr  1 14:56 wpsfail.res
-rw-r--r--   1 cscherer sunuser     11721 Mar 24 16:19 zportunx.f
-rw-r--r--   1 cscherer sunuser      1940 Apr  1 08:47 zportunx.o

scr445/tpa50c/ccdf:
total 35
drwxr-xr-x   2 cscherer sunuser       512 Apr  1 08:42 .
drwxr-xr-x   5 cscherer sunuser      7680 Apr  1 15:07 ..
-rw-r--r--   1 cscherer sunuser       267 Mar 14  2000 Makefile
-rw-r--r--   1 cscherer sunuser     23390 Jul 22  1999 tccdf.f
-rw-r--r--   1 cscherer sunuser        66 Aug  1  1997 tccdf.i
-rw-r--r--   1 cscherer sunuser       640 Jan 29  2001 tccdf.inp

scr445/tpa50c/codes:
total 3005
drwxr-xr-x   4 cscherer sunuser      1024 Apr  1 08:50 .
drwxr-xr-x   5 cscherer sunuser      7680 Apr  1 15:07 ..
-rw-r--r--   1 cscherer sunuser      1299 Feb 21 21:10 Makefile
-rw-r--r--   1 cscherer sunuser      1673 Feb 21 21:12 Makefile4.2
-rw-r--r--   1 cscherer sunuser       499 Jun  2  1997 README
-rw-r--r--   1 cscherer sunuser      2320 May 28  1998 SIZES.INC
-rw-r--r--   1 cscherer sunuser       164 Feb 17  1998 SIZES2.INC
-rwxr-xr-x   1 cscherer sunuser    165136 Apr  1 08:48 ashplume.e
-rw-r--r--   1 cscherer sunuser     95611 Mar 24 16:15 ashplume.f
-rw-r--r--   1 cscherer sunuser     25361 Mar 24 16:15 corrosn.f
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-rw-r--r--   1 cscherer sunuser     22388 Apr  1 08:48 corrosn.o
-rwxr-xr-x   1 cscherer sunuser     43172 Apr  1 08:49 dsfailt.e
-rw-r--r--   1 cscherer sunuser     23303 Mar 24 16:15 dsfailt.f
-rwxr-xr-x   1 cscherer sunuser     46596 Apr  1 08:49 ebsfilt.e
-rw-r--r--   1 cscherer sunuser     17872 Mar 24 16:15 ebsfilt.f
-rwxr-xr-x   1 cscherer sunuser    191340 Apr  1 08:50 env.e
-rwxr-xr-x   1 cscherer sunuser    282904 Apr  1 08:49 envin.e
-rwxr-xr-x   1 cscherer sunuser    136892 Apr  1 08:48 failt.e
-rw-r--r--   1 cscherer sunuser    103902 Mar 28 16:15 failt.f
-r--r--r--   1 cscherer sunuser       450 Nov 17 18:03 failtadj.i
drwxr-xr-x   2 cscherer sunuser      3072 Apr  1 08:50 gentpa
-rwxr-xr-x   1 cscherer sunuser      4635 Mar 24 16:15 integrt.f
-rw-r--r--   1 cscherer sunuser      2080 Apr  1 08:48 integrt.o
drwxr-xr-x   3 cscherer sunuser       512 Apr  1 08:42 itym
-r--r--r--   1 cscherer sunuser       868 Dec 17 16:59 lhs1.i
-r--r--r--   1 cscherer sunuser      1308 Mar 14  2002 lhs2.i
-r--r--r--   1 cscherer sunuser       438 Mar 14  2002 lhs3.i
-r--r--r--   1 cscherer sunuser       437 Mar 14  2002 lhs4.i
-r--r--r--   1 cscherer sunuser       374 Mar 14  2002 lhs5.i
-r--r--r--   1 cscherer sunuser       450 Mar 14  2002 lhs6.i
-r--r--r--   1 cscherer sunuser       464 Mar 14  2002 lhs7.i
-r--r--r--   1 cscherer sunuser       431 Mar 14  2002 lhs8.i
-rwxr-xr-x   1 cscherer sunuser      5224 Mar 24 16:15 linintrp.f
-rw-r--r--   1 cscherer sunuser      3280 Apr  1 08:48 linintrp.o
-r--r--r--   1 cscherer sunuser       331 Nov 17 18:03 mechadj.i
-rwxr-xr-x   1 cscherer sunuser     79836 Apr  1 08:47 mechfail.e
-rw-r--r--   1 cscherer sunuser    127038 Mar 24 16:15 mechfail.f
-rwxr-xr-x   1 cscherer sunuser    408048 Apr  1 08:48 nefmks.e
-rw-r--r--   1 cscherer sunuser    308005 Feb 26 10:50 nefmks.f
-rwxr-xr-x   1 cscherer sunuser    122652 Apr  1 08:48 releaset.e
-rw-r--r--   1 cscherer sunuser    177497 Feb 26 10:51 releaset.f
-rwxr-xr-x   1 cscherer sunuser    243548 Apr  1 08:49 snllhs.e
-rw-r--r--   1 cscherer sunuser    225283 Feb 27 09:01 snllhs.f
-rwxr-xr-x   1 cscherer sunuser      4295 Mar 24 16:15 srchpos.f
-rw-r--r--   1 cscherer sunuser      1304 Apr  1 08:48 srchpos.o
-rwxr-xr-x   1 cscherer sunuser     19959 Mar 24 16:15 weldfail.f
-rw-r--r--   1 cscherer sunuser      9356 Apr  1 08:48 weldfail.o

scr445/tpa50c/codes/gentpa:
total 1064
drwxr-xr-x   2 cscherer sunuser      3072 Apr  1 08:50 .
drwxr-xr-x   4 cscherer sunuser      1024 Apr  1 08:50 ..
-rw-r--r--   1 cscherer sunuser       543 Feb 11  2000 AFPPAR.CMN
-rw-r--r--   1 cscherer sunuser      1044 Feb 11  2000 AIRPAR.CMN
-rw-r--r--   1 cscherer sunuser       872 Feb 11  2000 ANMPAR.CMN
-rw-r--r--   1 cscherer sunuser       615 Feb 11  2000 AQUPAR.CMN
-rw-r--r--   1 cscherer sunuser      1089 Feb 11  2000 CONC.CMN
-rw-r--r--   1 cscherer sunuser       461 Feb 11  2000 DAYPC.CMN
-rw-r--r--   1 cscherer sunuser       400 Feb 11  2000 DECAY.CMN
-rw-r--r--   1 cscherer sunuser       571 Feb 11  2000 DFPAR.CMN
-rw-r--r--   1 cscherer sunuser      1359 Feb 11  2000 DOSALL.CMN
-rw-r--r--   1 cscherer sunuser       574 Feb 11  2000 ENVPAR.CMN
-rw-r--r--   1 cscherer sunuser       310 Feb 11  2000 EXPALL.CMN
-rw-r--r--   1 cscherer sunuser       637 Feb 11  2000 EXTPAR.CMN
-rw-r--r--   1 cscherer sunuser       327 Feb 11  2000 FILES.CMN
-rw-r--r--   1 cscherer sunuser       814 Feb 11  2000 FODPAR.CMN
-rw-r--r--   1 cscherer sunuser       438 Feb 11  2000 INVIN.CMN
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-rw-r--r--   1 cscherer sunuser       569 Feb 11  2000 LABELS.CMN
-rw-r--r--   1 cscherer sunuser      1161 Feb 11  2000 MTBPAR.CMN
-rw-r--r--   1 cscherer sunuser      1688 Feb 28  2000 Make.bat
-rw-r--r--   1 cscherer sunuser      1849 Feb 24  2000 Makefile
-rw-rw-rw-   1 cscherer sunuser      1938 Nov 27 14:12 Makefile4.2
-rw-r--r--   1 cscherer sunuser      1746 Feb 11  2000 Mkenv.fig
-rw-r--r--   1 cscherer sunuser      1548 Feb 11  2000 Mkenvin.fig
-rw-r--r--   1 cscherer sunuser      2762 Feb 11  2000 OPT.CMN
-rw-r--r--   1 cscherer sunuser       444 Feb 11  2000 ORGMAS.CMN
-rw-r--r--   1 cscherer sunuser       728 Feb 11  2000 ORGPAR.CMN
-rw-r--r--   1 cscherer sunuser       589 Feb 11  2000 RAD.CMN
-rw-r--r--   1 cscherer sunuser       788 Feb 11  2000 RADIN.CMN
-rw-r--r--   1 cscherer sunuser       722 Feb 11  2000 RMD.CMN
-rw-r--r--   1 cscherer sunuser       489 Feb 11  2000 RMD2.CMN
-rw-r--r--   1 cscherer sunuser       891 Feb 11  2000 SOLPAR.CMN
-rw-r--r--   1 cscherer sunuser       489 Feb 11  2000 SWPAR.CMN
-rw-r--r--   1 cscherer sunuser       586 Feb 11  2000 TIMES.CMN
-rw-r--r--   1 cscherer sunuser       316 Feb 11  2000 TITL.CMN
-rw-r--r--   1 cscherer sunuser     12777 Feb 11  2000 accmod.f
-rw-r--r--   1 cscherer sunuser     24104 Apr  1 08:49 accmod.o
-rw-r--r--   1 cscherer sunuser     10094 Feb 11  2000 acute1.f
-rw-r--r--   1 cscherer sunuser     16204 Apr  1 08:50 acute1.o
-rw-r--r--   1 cscherer sunuser      9579 Feb 11  2000 acutea.f
-rw-r--r--   1 cscherer sunuser     11196 Apr  1 08:50 acutea.o
-rw-r--r--   1 cscherer sunuser      7118 Feb 11  2000 acutec.f
-rw-r--r--   1 cscherer sunuser      8496 Apr  1 08:50 acutec.o
-rw-r--r--   1 cscherer sunuser      8669 Feb 11  2000 aircal.f
-rw-r--r--   1 cscherer sunuser     11240 Apr  1 08:50 aircal.o
-rw-r--r--   1 cscherer sunuser      8383 Feb 11  2000 anmcal.f
-rw-r--r--   1 cscherer sunuser     12724 Apr  1 08:50 anmcal.o
-rw-r--r--   1 cscherer sunuser      2043 Feb 11  2000 aqucal.f
-rw-r--r--   1 cscherer sunuser      3992 Apr  1 08:50 aqucal.o
-rw-r--r--   1 cscherer sunuser      1217 Feb 11  2000 biocal.f
-rw-r--r--   1 cscherer sunuser      1952 Apr  1 08:50 biocal.o
-rw-r--r--   1 cscherer sunuser      4174 Feb 11  2000 blockd.f
-rw-r--r--   1 cscherer sunuser      6672 Apr  1 08:49 blockd.o
-rw-r--r--   1 cscherer sunuser      1405 Feb 11  2000 bsort.f
-rw-r--r--   1 cscherer sunuser      1208 Apr  1 08:49 bsort.o
-rw-r--r--   1 cscherer sunuser     13008 Feb 11  2000 candh.f
-rw-r--r--   1 cscherer sunuser     10428 Apr  1 08:50 candh.o
-rw-r--r--   1 cscherer sunuser      6653 Feb 11  2000 chain.f
-rw-r--r--   1 cscherer sunuser      5376 Apr  1 08:50 chain.o
-rw-r--r--   1 cscherer sunuser     23921 Feb 11  2000 check.f
-rw-r--r--   1 cscherer sunuser     48608 Apr  1 08:49 check.o
-rw-r--r--   1 cscherer sunuser     10189 Feb 11  2000 cronmod.f
-rw-r--r--   1 cscherer sunuser     22460 Apr  1 08:49 cronmod.o
-rw-r--r--   1 cscherer sunuser      5153 Feb 11  2000 crpcal.f
-rw-r--r--   1 cscherer sunuser      8564 Apr  1 08:50 crpcal.o
-rw-r--r--   1 cscherer sunuser      3842 Feb 11  2000 dkharv.f
-rw-r--r--   1 cscherer sunuser      6128 Apr  1 08:50 dkharv.o
-rw-r--r--   1 cscherer sunuser      5426 Feb 11  2000 dose.f
-rw-r--r--   1 cscherer sunuser      2398 Feb 11  2000 drfbiv.f
-rw-r--r--   1 cscherer sunuser      2636 Apr  1 08:49 drfbiv.o
-rw-r--r--   1 cscherer sunuser      6728 Feb 11  2000 drfsec.f
-rw-r--r--   1 cscherer sunuser      5256 Apr  1 08:49 drfsec.o
-rw-r--r--   1 cscherer sunuser      1877 Feb 11  2000 drkcal.f
-rw-r--r--   1 cscherer sunuser      2284 Apr  1 08:50 drkcal.o
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-rw-r--r--   1 cscherer sunuser      1325 Feb 11  2000 dumred.f
-rw-r--r--   1 cscherer sunuser      3608 Apr  1 08:49 dumred.o
-rw-r--r--   1 cscherer sunuser      3958 Feb 11  2000 edranm.f
-rw-r--r--   1 cscherer sunuser      7252 Apr  1 08:50 edranm.o
-rw-r--r--   1 cscherer sunuser      3567 Feb 11  2000 edrcrp.f
-rw-r--r--   1 cscherer sunuser      7660 Apr  1 08:50 edrcrp.o
-rw-r--r--   1 cscherer sunuser      2525 Feb 11  2000 edrnon.f
-rw-r--r--   1 cscherer sunuser      4704 Apr  1 08:50 edrnon.o
-rw-r--r--   1 cscherer sunuser      2853 Feb 11  2000 edrres.f
-rw-r--r--   1 cscherer sunuser      4144 Apr  1 08:50 edrres.o
-rw-r--r--   1 cscherer sunuser     10581 Feb 11  2000 env.f
-rw-r--r--   1 cscherer sunuser      4885 Feb 11  2000 envin.f
-rw-r--r--   1 cscherer sunuser      4561 Feb 11  2000 envlib.f
-rw-r--r--   1 cscherer sunuser      8716 Apr  1 08:49 envlib.o
-rw-r--r--   1 cscherer sunuser      1912 Feb 11  2000 exposr.f
-rw-r--r--   1 cscherer sunuser      2244 Apr  1 08:50 exposr.o
-rw-r--r--   1 cscherer sunuser      6774 Feb 11  2000 extcal.f
-rw-r--r--   1 cscherer sunuser      7580 Apr  1 08:50 extcal.o
-rw-r--r--   1 cscherer sunuser      1489 Feb 11  2000 filerr.f
-rw-r--r--   1 cscherer sunuser      3868 Apr  1 08:49 filerr.o
-rw-r--r--   1 cscherer sunuser      1986 Feb 11  2000 fntdrf.f
-rw-r--r--   1 cscherer sunuser      2008 Apr  1 08:49 fntdrf.o
-rw-r--r--   1 cscherer sunuser      3003 Feb 11  2000 headng.f
-rw-r--r--   1 cscherer sunuser      5748 Apr  1 08:49 headng.o
-rw-r--r--   1 cscherer sunuser      2203 Feb 11  2000 idnuc.f
-rw-r--r--   1 cscherer sunuser      3008 Apr  1 08:49 idnuc.o
-rw-r--r--   1 cscherer sunuser      2842 Feb 11  2000 inhcal.f
-rw-r--r--   1 cscherer sunuser      5712 Apr  1 08:50 inhcal.o
-rw-r--r--   1 cscherer sunuser      2392 Feb 11  2000 initnv.f
-rw-r--r--   1 cscherer sunuser      2764 Apr  1 08:49 initnv.o
-rw-r--r--   1 cscherer sunuser      1841 Feb 11  2000 intpol.f
-rw-r--r--   1 cscherer sunuser      3732 Apr  1 08:50 intpol.o
-rw-r--r--   1 cscherer sunuser      1348 Feb 11  2000 invmol.f
-rw-r--r--   1 cscherer sunuser      1168 Apr  1 08:49 invmol.o
-rw-r--r--   1 cscherer sunuser       677 Feb 11  2000 makda2.f
-rw-r--r--   1 cscherer sunuser      1056 Apr  1 08:49 makda2.o
-rw-r--r--   1 cscherer sunuser      5870 Feb 11  2000 opnfil.f
-rw-r--r--   1 cscherer sunuser     11756 Apr  1 08:49 opnfil.o
-rw-r--r--   1 cscherer sunuser      4217 Feb 11  2000 order.f
-rw-r--r--   1 cscherer sunuser      5740 Apr  1 08:49 order.o
-rw-r--r--   1 cscherer sunuser      2325 Feb 11  2000 packag.f
-rw-r--r--   1 cscherer sunuser      3488 Apr  1 08:50 packag.o
-rw-r--r--   1 cscherer sunuser      3366 Feb 11  2000 plmriz.f
-rw-r--r--   1 cscherer sunuser      2192 Apr  1 08:49 plmriz.o
-rw-r--r--   1 cscherer sunuser      1861 Feb 11  2000 prior.f
-rw-r--r--   1 cscherer sunuser      2244 Apr  1 08:50 prior.o
-rw-r--r--   1 cscherer sunuser      4080 Feb 11  2000 prob.f
-rw-r--r--   1 cscherer sunuser      2116 Apr  1 08:49 prob.o
-rw-r--r--   1 cscherer sunuser      2079 Feb 11  2000 profile.f
-rw-r--r--   1 cscherer sunuser      1620 Apr  1 08:49 profile.o
-rw-r--r--   1 cscherer sunuser     11351 Feb 11  2000 readin.f
-rw-r--r--   1 cscherer sunuser     47528 Apr  1 08:49 readin.o
-rw-r--r--   1 cscherer sunuser      6174 Feb 11  2000 redcas.f
-rw-r--r--   1 cscherer sunuser     24428 Apr  1 08:50 redcas.o
-rw-r--r--   1 cscherer sunuser      3867 Feb 11  2000 redcha.f
-rw-r--r--   1 cscherer sunuser      9256 Apr  1 08:50 redcha.o
-rw-r--r--   1 cscherer sunuser      8483 Feb 11  2000 redflt.f
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-rw-r--r--   1 cscherer sunuser     35396 Apr  1 08:49 redflt.o
-rw-r--r--   1 cscherer sunuser      1694 Feb 11  2000 redist.f
-rw-r--r--   1 cscherer sunuser      1800 Apr  1 08:50 redist.o
-rw-r--r--   1 cscherer sunuser      8548 Feb 11  2000 ritenv.f
-rw-r--r--   1 cscherer sunuser     37160 Apr  1 08:49 ritenv.o
-rw-r--r--   1 cscherer sunuser      4371 Feb 11  2000 ritexp.f
-rw-r--r--   1 cscherer sunuser     10948 Apr  1 08:49 ritexp.o
-rw-r--r--   1 cscherer sunuser      2584 Feb 11  2000 ritmed.f
-rw-r--r--   1 cscherer sunuser      7308 Apr  1 08:50 ritmed.o
-rw-r--r--   1 cscherer sunuser     27222 Feb 11  2000 ritqa.f
-rw-r--r--   1 cscherer sunuser     93716 Apr  1 08:49 ritqa.o
-rw-r--r--   1 cscherer sunuser      4346 Feb 11  2000 rlibin.f
-rw-r--r--   1 cscherer sunuser     10200 Apr  1 08:49 rlibin.o
-rw-r--r--   1 cscherer sunuser      4399 Feb 11  2000 rwake.f
-rw-r--r--   1 cscherer sunuser      3400 Apr  1 08:49 rwake.o
-rw-r--r--   1 cscherer sunuser      2396 Feb 11  2000 sigma.f
-rw-r--r--   1 cscherer sunuser      1840 Apr  1 08:49 sigma.o
-rw-r--r--   1 cscherer sunuser      8387 Feb 11  2000 swcal.f
-rw-r--r--   1 cscherer sunuser      5876 Apr  1 08:49 swcal.o
-rw-r--r--   1 cscherer sunuser      1894 Feb 11  2000 trnspt.f
-rw-r--r--   1 cscherer sunuser      2056 Apr  1 08:50 trnspt.o
-rw-r--r--   1 cscherer sunuser      1771 Feb 11  2000 ustar.f
-rw-r--r--   1 cscherer sunuser      1508 Apr  1 08:49 ustar.o
-rw-r--r--   1 cscherer sunuser      9276 Feb 11  2000 xqcal.f
-rw-r--r--   1 cscherer sunuser     17136 Apr  1 08:50 xqcal.o
-rw-r--r--   1 cscherer sunuser      5277 Feb 11  2000 xqin.f
-rw-r--r--   1 cscherer sunuser     12480 Apr  1 08:49 xqin.o

scr445/tpa50c/codes/itym:
total 4
drwxr-xr-x   3 cscherer sunuser       512 Apr  1 08:42 .
drwxr-xr-x   4 cscherer sunuser      1024 Apr  1 08:50 ..
-rw-r--r--   1 cscherer sunuser       596 Oct  1  2002 makefile
drwxr-xr-x   2 cscherer sunuser       512 Apr  1 08:42 src

scr445/tpa50c/codes/itym/src:
total 328
drwxr-xr-x   2 cscherer sunuser       512 Apr  1 08:42 .
drwxr-xr-x   3 cscherer sunuser       512 Apr  1 08:42 ..
-rw-r--r--   1 cscherer sunuser     29776 Mar 28 16:09 array.f
-rw-r--r--   1 cscherer sunuser     15856 Mar 22  2000 check_valid.f
-rw-r--r--   1 cscherer sunuser     60931 Mar 24 16:10 estimator.f
-rw-r--r--   1 cscherer sunuser      5384 Dec 30 19:31 init_itym.f
-rw-r--r--   1 cscherer sunuser      9420 Mar 24 16:10 itym.f
-rw-r--r--   1 cscherer sunuser     11640 Dec 30 19:31 itym.i
-rw-r--r--   1 cscherer sunuser     26752 Mar 24 16:10 itymutils.f
-rw-r--r--   1 cscherer sunuser       261 Mar 22  2000 path.i
-rw-r--r--   1 cscherer sunuser        55 Mar 22  2000 preuzf.i
-rw-r--r--   1 cscherer sunuser     42671 Mar 28 16:10 ran.f
-rw-r--r--   1 cscherer sunuser     38406 Sep 26  2002 strtokfunc.f
-rw-r--r--   1 cscherer sunuser     60346 Sep 26  2002 uncertain.f
-rw-r--r--   1 cscherer sunuser     12265 Mar 22  2000 uncertain.i
-rw-r--r--   1 cscherer sunuser        55 Mar 22  2000 unctab.i
-rw-r--r--   1 cscherer sunuser     10904 Mar 28 16:15 zportunx.f

scr445/tpa50c/data:
total 7524
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drwxr-xr-x   2 cscherer sunuser      1536 Apr  1 08:42 .
drwxr-xr-x   5 cscherer sunuser      7680 Apr  1 15:07 ..
-rw-r--r--   1 cscherer sunuser       965 Feb 11  2000 FILENAME.DAT
-rw-r--r--   1 cscherer sunuser     91434 Feb 27 08:50 basecase.inp
-rw-r--r--   1 cscherer sunuser    121789 Mar 22  2000 bunitdem.dat
-rw-r--r--   1 cscherer sunuser      1025 Mar 29  2000 burnup.dat
-rwxr-xr-x   1 cscherer sunuser    468925 Sep 25  2002 careadem.dat
-rwxr-xr-x   1 cscherer sunuser    515693 Sep 25  2002 cdepdem.dat
-rw-r--r--   1 cscherer sunuser    850000 Aug 15  1997 climato1.dat
-rw-r--r--   1 cscherer sunuser      2200 Feb  1  1999 climato2.dat
-rw-r--r--   1 cscherer sunuser      6219 Feb 19 10:46 coefkdeq.dat
-rw-r--r--   1 cscherer sunuser      6219 Feb 22 16:33 coefkdeqr.dat
-rw-r--r--   1 cscherer sunuser      2200 Dec 19 13:50 dilution.dat
-rw-r--r--   1 cscherer sunuser       519 Oct 19  2000 drythick.dat
-rw-r--r--   1 cscherer sunuser       791 Jul 23  2002 dsfailt.def
-rw-r--r--   1 cscherer sunuser      5973 Feb 14 19:57 ebsfail.def
-rw-r--r--   1 cscherer sunuser       790 May 28  1998 ebsfilt.def
-rw-r--r--   1 cscherer sunuser      5459 Jan  7 11:17 ebsrel.def
-rw-r--r--   1 cscherer sunuser    298679 Mar 22  2000 elevdem.dat
-rw-r--r--   1 cscherer sunuser      9381 May 29  2002 fluoride.dat
-rw-r--r--   1 cscherer sunuser      6513 Feb 11  2000 gbioac1.dat
-rw-r--r--   1 cscherer sunuser      3383 Sep  4  2002 gdefauls.def
-rw-r--r--   1 cscherer sunuser      3383 Feb 11  2000 gdefault.def
-rw-r--r--   1 cscherer sunuser        64 Feb 11  2000 gdosinc2.dat
-rw-r--r--   1 cscherer sunuser      7011 Feb 11  2000 gftrans.def
-rw-r--r--   1 cscherer sunuser      7011 Sep  4  2002 gftranss.def
-rw-r--r--   1 cscherer sunuser     15214 Feb 11  2000 ggamen.dat
-rw-r--r--   1 cscherer sunuser     13855 Feb 11  2000 ggenii.def
-rw-r--r--   1 cscherer sunuser     13173 Sep  4  2002 ggeniis.def
-rw-r--r--   1 cscherer sunuser      5351 Feb 11  2000 ggrdf.dat
-rw-r--r--   1 cscherer sunuser      9897 Mar 29  2000 gnewdf.dat
-rw-r--r--   1 cscherer sunuser     13200 Mar 20  2000 grmdlib.dat
-rw-r--r--   1 cscherer sunuser      3048 Sep 15  2000 gs_cb_ad.dat
-rw-r--r--   1 cscherer sunuser      2487 Jun  4  1998 gs_cb_ci.dat
-rw-r--r--   1 cscherer sunuser      3045 Sep 15  2000 gs_pb_ad.dat
-rw-r--r--   1 cscherer sunuser      2487 Jun  4  1998 gs_pb_ci.dat
-rw-r--r--   1 cscherer sunuser      8247 Feb 22 16:39 ia.dat
-rw-r--r--   1 cscherer sunuser     20698 Dec 30 19:26 itym.dat
-rw-r--r--   1 cscherer sunuser    943774 Mar 29  2000 maidtbl.dat
-rw-r--r--   1 cscherer sunuser     10978 Mar 22  2000 maswtbl.dat
-rwxr-xr-x   1 cscherer sunuser    943775 Dec 30 19:18 maydtbl.dat
-rw-r--r--   1 cscherer sunuser      9729 Dec 17 17:31 mechfail.def
-rw-r--r--   1 cscherer sunuser      1251 Feb  6 14:39 multifaf.dat
-rw-r--r--   1 cscherer sunuser      1252 Feb  6 14:39 multifbe.dat
-rw-r--r--   1 cscherer sunuser    116965 Jul 17  2002 multiflo.dat
-rw-r--r--   1 cscherer sunuser      7152 Feb 21 21:14 nuclides.dat
-rw-r--r--   1 cscherer sunuser      7111 Sep 24  2000 organdf.dat
-rw-r--r--   1 cscherer sunuser       548 Sep 21  2000 repdes.dat
-rw-r--r--   1 cscherer sunuser    242149 Mar 28 16:24 reversibles.inp
-rwxr-xr-x   1 cscherer sunuser    130758 Dec 17 17:31 seisbs1.dis
-rwxr-xr-x   1 cscherer sunuser    130758 Dec 17 17:31 seisbs2.dis
-rwxr-xr-x   1 cscherer sunuser    943788 Dec 30 19:18 smaydtbl.dat
-rw-r--r--   1 cscherer sunuser    489858 Mar 22  2000 soildem.dat
-rw-r--r--   1 cscherer sunuser      4506 Feb  7  2000 strmtube.dat
-rw-r--r--   1 cscherer sunuser    119673 Mar 22  2000 sunitdem.dat
-rw-r--r--   1 cscherer sunuser    162404 May  8  2000 tefkti.inp
-rw-r--r--   1 cscherer sunuser     91296 Mar 28 16:34 tpa.inp
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-rw-r--r--   1 cscherer sunuser    101499 Feb 19 10:43 tpanames.dbs
-rw-r--r--   1 cscherer sunuser    471041 Mar 22  2000 winddem.dat
-rw-r--r--   1 cscherer sunuser     17410 Feb  2  2000 wpflow.def
```