SOFTWARE RELEASE NOTICE

1. SRN Number: PA-SRN-298

2. Project Title: TSPA & Technical Integration Code	Project No. 20.06002.01.113
3. SRN Title: TPA Version 5.0o	
4. Originator/Requestor: Gordon Wittmeyer	Date: 07/29/03

5. Summary of Actions

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

6. Validation Status

- ■ Validated
- ☐ Limited Validation
- ☐ Not Validated Explain: _____

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: 7/29/2003

9. Remarks: An 8mm tape containing FORTRAN source code for the TPA Version 5.0o code.

CNWRA Form TOP-6 (09/01)

SOFTWARE SUMMARY FORM

01. Summary Date: 07/29/03	02. Summary prepared by (Name and phone): Ron Janetzke (210) 522-3318	03. Summary Action: Modified
04. Software Date: 07/29/03	05. Short Title: TPA Version 5.0o	
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: Ronald Janetzke (210) 522-3318

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

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

22. Other Operational Requirements:

Uses system environment variables: TPA_TEST and TPA_DATA.

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

25.

Software Developer: Ron Janetzke Date: 7-29-03

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: 5.00
Demonstration workstation: Scratchy 2
Operating System: Solaris 5.9
Developer: R. Sanetzka / S. Mohanty

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

SRD Version: 5.0
SRD Approval Date: 12/7/01

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: This is a major revision, but SCRs were used to manage and test all of the changes.

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

SDP Version: 5.0
SDP (EM) Approval Date: 4/9/02

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: FORTRAN 77
Comments: Executive, numrecip.f, u2flow.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: Executive, numreciff, wrflow.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:

Comments: 458 for 5.00, many others since last release to 5.00d

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: 7/29/ 11:10:12/2003

Name/Version Displayed: TPA 5.00

Comments:

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

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

Yes: ☑ No: ☐ N/A: ☐

Comments: Executive & 2 modules were checked

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: Executive, numreciff, wrflow.f

Comments:

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

Yes: ☑ No: ☐ N/A: ☐

Comments: 8mm TAPE

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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.: _____

Comments:

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

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

Yes: ☑ No: ☐ N/A: ☐

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

Yes: ☑ No: ☐ N/A: ☐

Computer Platforms: SUN Operating Systems: Solaris 5.9

Location of Acceptance Test Results: SCRs

Comments:

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

Yes: ☑ No: ☐ N/A: ☐

Computer Platforms: SUN Operating Systems: SOLARIS 5.9

Location of Acceptance Test Results: On System other than Host Server where I

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: ☐

User's Manual Version and Date: 4.0 ,

Comments: User manual to be developed later. (5.0)

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

Yes: ☑ No: ☐ N/A: ☐

Location of Instructions: Gi v.4.0 Usermanual, Ch.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: 7-24-03

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: TAPE (ARCHIVE) & Secretary I

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: QA Records

Comments: 8mm tape

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-298

Comments:

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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 / 3/21/02

Date Reviewed and Approved via QAP-002: 3/27/02

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: will be prepared later.

Additional Comments:

Software Developer/Date 7-30-03

Software Custodian/Date 7/30/03

tpa50o/
tpa50o/CLEANUP
tpa50o/cleart
tpa50o/array.f
tpa50o/ashplumo.f
tpa50o/ashrmovo.f
tpa50o/condxyzt.f
tpa50o/coefkdeq.i
tpa50o/dcags.f
tpa50o/dcagw.f
tpa50o/dsfail.f
tpa50o/ebsfail.f
tpa50o/ebsrel.f
tpa50o/ebsrel1.i
tpa50o/exec.f
tpa50o/execa.i
tpa50o/execb.i
tpa50o/execc.i
tpa50o/execd.i
tpa50o/faulto.f
tpa50o/fileunit.f
tpa50o/fileutil.f
tpa50o/invent.f
tpa50o/iareader.f
tpa50o/ia.i
tpa50o/ia1.i
tpa50o/Makefile
tpa50o/mv.f
tpa50o/Makefile4.2
tpa50o/max500yr.i
tpa50o/maxchain.i
tpa50o/maxnnucl.i
tpa50o/maxclchn.i
tpa50o/maxclnuc.i
tpa50o/maxnsuba.i
tpa50o/maxntime.i
tpa50o/nfenv.f
tpa50o/nfenvadj.i
tpa50o/reflux2.i
tpa50o/nintv.i
tpa50o/notice.i
tpa50o/numrecip.f
tpa50o/path.i
tpa50o/peakfind.f
tpa50o/ran.f
tpa50o/reader.f
tpa50o/reader.i
tpa50o/reader1.i
tpa50o/reader2.i
tpa50o/reader3.i
tpa50o/reader4.i
tpa50o/driftsa.i
tpa50o/sampler.f
tpa50o/seismo2.f
tpa50o/seisadj.i
tpa50o/stop.i
tpa50o/subarea.f
tpa50o/szft.f
tpa50o/szft.i
tpa50o/tpa.inp

tpa50o/uzflow.f
tpa50o/uzft.f
tpa50o/uzszft.i
tpa50o/volcano.f
tpa50o/fu1.i
tpa50o/fu2.i
tpa50o/invent_.i
tpa50o/inventa.i
tpa50o/inventb.i
tpa50o/inventc.i
tpa50o/inventd.i
tpa50o/invente.i
tpa50o/inventf.i
tpa50o/inventg.i
tpa50o/inventh.i
tpa50o/inventi.i
tpa50o/inventj.i
tpa50o/inventk.i
tpa50o/inventl.i
tpa50o/inventm.i
tpa50o/inventn.i
tpa50o/invento.i
tpa50o/inventp.i
tpa50o/mva.i
tpa50o/mvb.i
tpa50o/mvc.i
tpa50o/mvd.i
tpa50o/mve.i
tpa50o/mvf.i
tpa50o/sampler0.i
tpa50o/sampler1.i
tpa50o/sampler2.i
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tpa50o/samplerc.i
tpa50o/samplerd.i
tpa50o/samplere.i
tpa50o/samplerf.i
tpa50o/samplerg.i
tpa50o/samplerh.i
tpa50o/sampleri.i
tpa50o/samplerj.i
tpa50o/samplerk.i
tpa50o/samplerl.i
tpa50o/samplerm.i
tpa50o/acopy.h
tpa50o/samplern.i
tpa50o/samplero.i
tpa50o/samplerp.i
tpa50o/samplerq.i
tpa50o/samplerr.i
tpa50o/samplers.i
tpa50o/samplert.i
tpa50o/sampleru.i
tpa50o/samplerv.i
tpa50o/samplerw.i
tpa50o/samplerx.i
tpa50o/samplery.i

tpa50o/samplerz.i
tpa50o/subareaa.i
tpa50o/subareab.i
tpa50o/subareac.i
tpa50o/subaread.i
tpa50o/subareae.i
tpa50o/subareaf.i
tpa50o/subareag.i
tpa50o/uz_climi.i
tpa50o/uz_climr.i
tpa50o/uz_climz.i
tpa50o/uz_flowi.i
tpa50o/uz_flowr.i
tpa50o/uz_flowz.i
tpa50o/uz_parms.i
tpa50o/zportunx.f
tpa50o/addbetapdf.h
tpa50o/addconstantpdf.h
tpa50o/addcorrel.h
tpa50o/addexpomentialpdf.h
tpa50o/addexponentialpdf.h
tpa50o/addfiniteexponentialpdf.h
tpa50o/addhazardcurve.h
tpa50o/addiconstantpdf.h
tpa50o/addiuniformpdf.h
tpa50o/addlogbetapdf.h
tpa50o/addlognormalpdf.h
tpa50o/addlogtriangularpdf.h
tpa50o/addloguniformpdf.h
tpa50o/addnormalpdf.h
tpa50o/addto.h
tpa50o/addtriangularpdf.h
tpa50o/adduniformpdf.h
tpa50o/adduserdiscreteempirical.h
tpa50o/addusersuppliedidiscrete.h
tpa50o/addusersuppliedpwisecdf.h
tpa50o/aftnefmks.h
tpa50o/ainterl.h
tpa50o/ashplume.h
tpa50o/ashplumo.h
tpa50o/ashrmovo.h
tpa50o/buildInputFiles.h
tpa50o/calc_kd.h
tpa50o/calc_mai.h
tpa50o/calc_rd.h
tpa50o/calc_wp.h
tpa50o/ccdfindexed.h
tpa50o/checkforduplicate.h
tpa50o/checkforduplicates.h
tpa50o/checkinorder.h
tpa50o/checklhsout.h
tpa50o/checknr.h
tpa50o/checknsa.h
tpa50o/checkspname.h
tpa50o/cleanupwd.h
tpa50o/clearchar.h
tpa50o/clidat_init.h
tpa50o/climate_init.h
tpa50o/climato.h
tpa50o/cond3dxyzt.h

tpa50o/copylines.h
tpa50o/cumfail.h
tpa50o/dcagw.h
tpa50o/demij_to_m.h
tpa50o/dget_from_name.h
tpa50o/dsfail.h
tpa50o/epaccdf.h
tpa50o/epaccdf_c.h
tpa50o/faulto.h
tpa50o/findpkmndose.h
tpa50o/gentodcf.h
tpa50o/gentpa.h
tpa50o/getThickness.h
tpa50o/get_climean.h
tpa50o/get_clinoise_set.h
tpa50o/get_data_file.h
tpa50o/getelements.h
tpa50o/getvertlayers.h
tpa50o/iabarrier.h
tpa50o/iacomponent.h
tpa50o/iaddconsmv.h
tpa50o/iafile.h
tpa50o/iaparameter.h
tpa50o/iasetup.h
tpa50o/iavalue.h
tpa50o/icheckforduplicates.h
tpa50o/iget_from_name.h
tpa50o/igetunitnumber.h
tpa50o/imvquery.h
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tpa50o/isconstant.h
tpa50o/isoneofset.h
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tpa50o/ispquerynostop.h
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tpa50o/ljs.h
tpa50o/ljs2.h
tpa50o/locadd_vector.h
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tpa50o/maptimeofevent.h
tpa50o/mget_from_name.h
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tpa50o/printtimesvalue.h
tpa50o/printtitlesmv.h
tpa50o/printtitlessp.h
tpa50o/printvaluesmv.h
tpa50o/printvaluessp.h
tpa50o/putfailwp.h

tpa50o/putgwtt.h
tpa50o/ran1.h
tpa50o/ran1seis.h
tpa50o/raneseis.h
tpa50o/runnefmks.h
tpa50o/samplehazardcurve.h
tpa50o/scale.h
tpa50o/scopy.h
tpa50o/set_iouzflow.h
tpa50o/setconsmv.h
tpa50o/setfiles.h
tpa50o/setran.h
tpa50o/setranseis.h
tpa50o/setupCommons.h
tpa50o/sortqr.h
tpa50o/tempgl.h
tpa50o/trapint.h
tpa50o/trim.h
tpa50o/ucljs.h
tpa50o/ucljsg.h
tpa50o/updatelhs.h
tpa50o/uzft.h
tpa50o/valueconsmv.h
tpa50o/valuesp.h
tpa50o/volcano.h
tpa50o/writedata.h
tpa50o/writeepaccdf.h
tpa50o/writehead.h
tpa50o/writehead2.h
tpa50o/writesnllhsinp.h
tpa50o/writesource.h
tpa50o/writevelocities.h
tpa50o/gauleg.h
tpa50o/xgauleg.h
tpa50o/yutok_in_ustr.h
tpa50o/zero.h
tpa50o/zeroi.h
tpa50o/zportctime.h
tpa50o/zportderf.h
tpa50o/zportfdate.h
tpa50o/zportfdatefun.h
tpa50o/zportieee_flags.h
tpa50o/zportieee_handler.h
tpa50o/zportparseunixfilenametodos.h
tpa50o/zportsh.h
tpa50o/zporttime.h
tpa50o/allchains.h
tpa50o/chains.h
tpa50o/chainsolver.h
tpa50o/decay43mol.h
tpa50o/decay43molglass.h
tpa50o/decayremove43mol.h
tpa50o/newinventdb.h
tpa50o/setage.h
tpa50o/checkin.h
tpa50o/fcn.h
tpa50o/gnsa.h
tpa50o/gsamtu.h
tpa50o/gsanwp.h
tpa50o/gsanwpglass.h

tpa50o/gsarea.h
tpa50o/gsaxy.h
tpa50o/gsaxym.h
tpa50o/linehitline.h
tpa50o/qchitsa.h
tpa50o/qlhitsa.h
tpa50o/qphitsa.h
tpa50o/quadrilateral.h
tpa50o/root.h
tpa50o/solve2x2.h
tpa50o/solvenxn.h
tpa50o/ssadb.h
tpa50o/ssadba.h
tpa50o/acopy.t
tpa50o/triangle.h
tpa50o/addbetapdf.t
tpa50o/addconstantpdf.t
tpa50o/addcorrel.t
tpa50o/addexponentialpdf.t
tpa50o/addfiniteexponentialpdf.t
tpa50o/addhazardcurve.t
tpa50o/addiconstantpdf.t
tpa50o/addiuniformpdf.t
tpa50o/addlogbetapdf.t
tpa50o/addlognormalpdf.t
tpa50o/addlogtriangularpdf.t
tpa50o/addloguniformpdf.t
tpa50o/addnormalpdf.t
tpa50o/addto.t
tpa50o/addtriangularpdf.t
tpa50o/adduniformpdf.t
tpa50o/adduserdiscreteempirical.t
tpa50o/aftnefmks.t
tpa50o/addusersuppliedddiscrete.t
tpa50o/addusersuppliedpwisecdf.t
tpa50o/allchains.t
tpa50o/ashplume.t
tpa50o/ashplumo.t
tpa50o/ashrmovo.t
tpa50o/buildInputFiles.t
tpa50o/calc_kd.t
tpa50o/calc_mai.t
tpa50o/calc_rd.t
tpa50o/calc_wp.t
tpa50o/ccdfindexed.t
tpa50o/chains.t
tpa50o/chainsolver.t
tpa50o/checkforduplicates.t
tpa50o/checkinorder.t
tpa50o/checklhsout.t
tpa50o/checknr.t
tpa50o/checknsa.t
tpa50o/checkspname.t
tpa50o/cleanupwd.t
tpa50o/clearchar.t
tpa50o/clidat_init.t
tpa50o/climate_init.t
tpa50o/climato.t
tpa50o/cond3dxyzt.t
tpa50o/cumfail.t

tpa50o/decay43mol.t
tpa50o/decay43molglass.t
tpa50o/decayremove43mol.t
tpa50o/demij_to_m.t
tpa50o/dsfail.t
tpa50o/epaccdf.t
tpa50o/epaccdf_c.t
tpa50o/faulto.t
tpa50o/findpkmndose.t
tpa50o/gauleg.t
tpa50o/get_climean.t
tpa50o/get_clinoise_set.t
tpa50o/get_data_file.t
tpa50o/getelements.t
tpa50o/getvertlayers.t
tpa50o/icheckforduplicates.t
tpa50o/initr.t
tpa50o/isoneofset.t
tpa50o/leachrate.t
tpa50o/lhsnew.t
tpa50o/maplist.t
tpa50o/maptimeofevent.t
tpa50o/newinventdb.t
tpa50o/newlhssm.t
tpa50o/newmvdb.t
tpa50o/newrealization.t
tpa50o/newspdb.t
tpa50o/opnfil.t
tpa50o/peakfinder.t
tpa50o/prenefmks.t
tpa50o/printfun.t
tpa50o/printtimesvalue.t
tpa50o/printtitlesmv.t
tpa50o/printtitlessp.t
tpa50o/printvaluesmv.t
tpa50o/printvaluessp.t
tpa50o/putfailwp.t
tpa50o/putgwtt.t
tpa50o/querystop.t
tpa50o/runnefmks.t
tpa50o/samplehazardcurve.t
tpa50o/scale.t
tpa50o/scopy.t
tpa50o/set_iouzflow.t
tpa50o/setage.t
tpa50o/setconsmv.t
tpa50o/setfiles.t
tpa50o/setran.t
tpa50o/setranseis.t
tpa50o/setupCommons.t
tpa50o/sortqr.t
tpa50o/touch.t
tpa50o/trapint.t
tpa50o/updatelhs.t
tpa50o/uzft.t
tpa50o/volcano.t
tpa50o/writedata.t
tpa50o/writeepaccdf.t
tpa50o/writehead.t
tpa50o/writehead2.t

tpa50o/writesnllhsinp.t
tpa50o/writesource.t
tpa50o/writevelocities.t
tpa50o/xgauleg.t
tpa50o/zero.t
tpa50o/zeroi.t
tpa50o/zportfdate.t
tpa50o/zportparseunixcmdtodos.t
tpa50o/zportparseunixfilenametodos.t
tpa50o/ainterl.t1
tpa50o/dget_from_name.t1
tpa50o/getThickness.t1
tpa50o/iaddconsmv.t1
tpa50o/iget_from_name.t1
tpa50o/igetunitnumber.t1
tpa50o/imvquery.t1
tpa50o/iranu.t1
tpa50o/isconstant.t1
tpa50o/ispquery.t1
tpa50o/ispquerynostop.t1
tpa50o/ivaluesp.t1
tpa50o/kstr2tok_and_val.t1
tpa50o/ljs.t1
tpa50o/ljs2.t1
tpa50o/locadd_vector.t1
tpa50o/mget_from_name.t1
tpa50o/ran1.t1
tpa50o/ran1seis.t1
tpa50o/raneseis.t1
tpa50o/sigfpe_abort.t1
tpa50o/tempgl.t1
tpa50o/ucljs.t1
tpa50o/valueconsmv.t1
tpa50o/valuesp.t1
tpa50o/yutok_in_ustr.t1
tpa50o/zportctime.t1
tpa50o/zportderf.t1
tpa50o/zportfdatefun.t1
tpa50o/zportieee_flags.t1
tpa50o/zportieee_handler.t1
tpa50o/zportsh.t1
tpa50o/zporttime.t1
tpa50o/ainterl.t2
tpa50o/dget_from_name.t2
tpa50o/getThickness.t2
tpa50o/iaddconsmv.t2
tpa50o/ljs.t2
tpa50o/iget_from_name.t2
tpa50o/igetunitnumber.t2
tpa50o/imvquery.t2
tpa50o/iranu.t2
tpa50o/isconstant.t2
tpa50o/ispquery.t2
tpa50o/ispquerynostop.t2
tpa50o/ivaluesp.t2
tpa50o/kstr2tok_and_val.t2
tpa50o/ljs2.t2
tpa50o/locadd_vector.t2
tpa50o/mget_from_name.t2
tpa50o/ran1.t2

tpa50o/ran1seis.t2
tpa50o/raneseis.t2
tpa50o/sigfpe_abort.t2
tpa50o/tempgl.t2
tpa50o/trim.t2
tpa50o/ucljs.t2
tpa50o/ucljsg.t2
tpa50o/valueconsmv.t2
tpa50o/valuesp.t2
tpa50o/zportctime.t2
tpa50o/yutok_in_ustr.t2
tpa50o/zportderf.t2
tpa50o/zportfdatefun.t2
tpa50o/zportieee_flags.t2
tpa50o/zportieee_handler.t2
tpa50o/zportsh.t2
tpa50o/zporttime.t2
tpa50o/codes/
tpa50o/codes/Makefile
tpa50o/codes/Makefile4.2
tpa50o/codes/README
tpa50o/codes/SIZES.INC
tpa50o/codes/SIZES2.INC
tpa50o/codes/ashplume.f
tpa50o/codes/failt.f
tpa50o/codes/failtadj.i
tpa50o/codes/dsfailt.f
tpa50o/codes/nefmks.f
tpa50o/codes/releaset.f
tpa50o/codes/snllhs.f
tpa50o/codes/lhs1.i
tpa50o/codes/lhs2.i
tpa50o/codes/lhs3.i
tpa50o/codes/lhs4.i
tpa50o/codes/lhs5.i
tpa50o/codes/lhs6.i
tpa50o/codes/lhs7.i
tpa50o/codes/lhs8.i
tpa50o/codes/ebsfilt.f
tpa50o/codes/integrt.f
tpa50o/codes/linintrp.f
tpa50o/codes/srchpos.f
tpa50o/codes/weldfail.f
tpa50o/codes/corrosn.f
tpa50o/codes/mechfail.f
tpa50o/codes/mechadj.i
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tpa50o/codes/gentpa/Mkenv.fig
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tpa50o/codes/gentpa/EXPALL.CMN

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tpa50o/codes/gentpa/INVIN.CMN
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tpa50o/codes/gentpa/blockd.f
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tpa50o/codes/gentpa/check.f
tpa50o/codes/gentpa/cronmod.f
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tpa50o/codes/gentpa/dkharv.f
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tpa50o/codes/gentpa/edrnon.f
tpa50o/codes/gentpa/edrres.f
tpa50o/codes/gentpa/env.f
tpa50o/codes/gentpa/envin.f
tpa50o/codes/gentpa/envlib.f
tpa50o/codes/gentpa/exposr.f
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tpa50o/codes/gentpa/makda2.f
tpa50o/codes/gentpa/Makefile
tpa50o/codes/gentpa/Makefile4.2
tpa50o/codes/gentpa/opnfil.f

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tpa50o/codes/gentpa/packag.f
tpa50o/codes/gentpa/plmriz.f
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tpa50o/codes/gentpa/prob.f
tpa50o/codes/gentpa/profile.f
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tpa50o/codes/gentpa/ritmed.f
tpa50o/codes/gentpa/ritqa.f
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tpa50o/codes/gentpa/xqcal.f
tpa50o/codes/gentpa/xqin.f
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tpa50o/codes/itym/makefile
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tpa50o/codes/itym/src/array.f
tpa50o/codes/itym/src/check_valid.f
tpa50o/codes/itym/src/estimator.f
tpa50o/codes/itym/src/init_itym.f
tpa50o/codes/itym/src/itym.f
tpa50o/codes/itym/src/itym.i
tpa50o/codes/itym/src/itymutils.f
tpa50o/codes/itym/src/path.i
tpa50o/codes/itym/src/preuzf.i
tpa50o/codes/itym/src/ran.f
tpa50o/codes/itym/src/strtokfunc.f
tpa50o/codes/itym/src/uncertain.f
tpa50o/codes/itym/src/uncertain.i
tpa50o/codes/itym/src/unctab.i
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tpa50o/data/climato2.dat
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tpa50o/data/ebsrel.def
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tpa50o/data/ia.dat
tpa50o/data/itym.dat
tpa50o/data/soildem.dat
tpa50o/data/elevdem.dat
tpa50o/data/bunitdem.dat
tpa50o/data/maswtbl.dat
tpa50o/data/sunitdem.dat
tpa50o/data/winddem.dat
tpa50o/data/maydtbl.dat
tpa50o/data/smaydtbl.dat

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tpa50o/data/ebsfilt.def
tpa50o/data/drythick.dat
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tpa50o/data/burnup.dat
tpa50o/data/wpflow.def
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tpa50o/data/gdefault.def
tpa50o/data/gdosinc2.dat
tpa50o/data/gftrans.def
tpa50o/data/ggamen.dat
tpa50o/data/ggenii.def
tpa50o/data/ggrdf.dat
tpa50o/data/gnewdf.dat
tpa50o/data/grmdlib.dat
tpa50o/data/maidtbl.dat
tpa50o/data/organdf.dat
tpa50o/data/fluoride.dat
tpa50o/data/dsfailt.def
tpa50o/data/gdefauls.def
tpa50o/data/gftranss.def
tpa50o/data/ggeniis.def
tpa50o/data/mechfail.def
tpa50o/data/seisbs1.dis
tpa50o/data/seisbs2.dis
tpa50o/data/cdepdem.dat
tpa50o/data/multifbe.dat
tpa50o/data/multifaf.dat
tpa50o/data/coefkdeq.dat
tpa50o/data/coefkdeqr.dat
tpa50o/data/reversibles.inp
tpa50o/data/basecase.inp
tpa50o/data/careadem.dat
tpa50o/data/tpa.inp
tpa50o/data/tpa_appendixB.inp
tpa50o/data/wpflow_appendixB.def
tpa50o/ccdf/
tpa50o/ccdf/tccdf.f
tpa50o/ccdf/tccdf.i
tpa50o/ccdf/tccdf.inp
tpa50o/ccdf/Makefile
tpa50o/calc_ainit.t
tpa50o/load1DTBL.t
tpa50o/loadDTBL.t
tpa50o/mapDTBL_to_SAs.t
tpa50o/uzflow.t
tpa50o/uzflow_init.t
tpa50o/checkin.t
tpa50o/fcn.t1
tpa50o/fcn.t2
tpa50o/gnsa.t
tpa50o/gsamtu.t
tpa50o/gsanwp.t
tpa50o/gsanwpglass.t
tpa50o/gsarea.t
tpa50o/gsaxy.t
tpa50o/gsaxym.t
tpa50o/linehitline.t

tpa50o/qchitsa.t
tpa50o/qlhitsa.t
tpa50o/qphitsa.t
tpa50o/quadrilateral.t
tpa50o/root.t
tpa50o/solve2x2.t
tpa50o/solvenxn.t
tpa50o/ssadb.t
tpa50o/ssadba.t
tpa50o/triangle.t

SOFTWARE CHANGE REPORT (SCR)

SCR No. (*Software Developer Assigns*): PA-SCR-426	**Software Title and Version:** TPA 5.0g	**/Project No:** 20-06002-01-113
Affected Software Module(s), Description of Problem(s): exec.f, seismo2.f, mechfail.f, nfenv.f, fileutil.f, tpa.inp, ebsfail.f, ebsfail.def, releaset.f For a descriptions of identified problems, please see the attachment, "Description of Problem(s)."		
Change Requested by: G. Adams, D. Gute, O. Pensado, L. Browning, A. Jank Date: 6-18-03	**Change Authorized by** (*Software Developer*): R. Janetzke Date: 6-18-03 Ron Janetzke	
Description of Change(s) or Problem Resolution (*If changes not implemented, please justify*): Please see the attachment, "Description of Change(s) or Problem Resolution" for a discussion of the changes.		
Implemented by: G. Adams	**Date:** 6-20-03	
Description of Acceptance Tests: Please see the attachment, "Description of Acceptance Tests" for a summary of the tests. Also reference the file "Test Plan PA-SCR-426.wpd" for the full tests with results on the CD labeled "Test Plan and Test Results for TPA SCR #426". All tests were **PASSED.**		
Tested by: A. Jank	**Date:** 7-15-03	

CNWRA Form TOP-5 (01/99)

Description of Problem(s)

During the operational period, the seismo module performs mechanical failure calculations. The seismo module will be modified to no longer perform mechanical failure calculations during the operational period.

The seismic hazard curve is sampled for each subarea. The EXEC module will be modified to sample the hazard curve for each realization instead of each subarea. In addition, the output to the seismo.ech file is confusing. This file contains information that remains the same for all realizations; other information that remains the same for all subareas within a realization, and finally, information that changes for each subarea of a realization. The EXEC module will be modified to display the three different types of information in seismo.ech. Also, within subroutine writeepaccdf, the parameter ikey was eliminated and replaced with a logical flag. In addition, a parameter iaml was used to store the index to module variable 'ArealMassLoading[MTU/acre].'

Within tpa.inp, the Indrift_Cl(Fl, pH, CO3)_PreTemperaturePeak, the Indrift_Cl(Fl, pH, CO3)_PostTemperaturePeak, Wastepackage_DeltaECrit_PreTemperaturePeak[VSHE], and Wastepackage_DeltaECrit_PostTemperaturePeak[VSHE] values are incorrect. The chemistry parameters for the pre and post temperature peak will be modified to reflect sample distributions instead of the constant parameters currently in the tpa.inp file. The DeltaECrit parameters will be changed to constants of 0.0. During the operational period, conditions of high waste package temperature (>97C) and relative humidity (> 0.56) contribute to early failures of the drip shield. The relative humidity during the operational period and the period immediately following will be modified to reflect the conditions in the drift during these periods.

Within module NFENV, for the call to subroutine cond3dxyzt, the z-direction location where the temperature increase is to be calculated is hard coded to 2.5. It should instead be the radius of the drift. This parameter will be modified to be one-half the value of tpa.inp sampled parameter, "EmplacementDriftDiameter[m]."

Module NFENV calls subroutine getIntegerValue which is the same subroutine as getIntegerFromFile in module SEISMO2. Therefore, a separate file utility module, FILEUTIL, will be created to contain the file utility routines needed by NFENV and SEISMO2.

For advective release during weld failures, it is necessary to account for the fraction of waste packages oriented correctly for water to flow into the surface of the weld. This change affects EBSFAIL and RELEASET. Also, there is an error in RELEASET in accounting for corrosive failure. Either the waste package or the weld could fail and cause corrosive failure. Currently, the code only accounts for corrosive failure of the waste package.

Description of Change(s) or Problem Resolution

TPA.INP:
Wastepackage_DeltaECrit_PreTemperaturePeak[VSHE] was modified from 0.1 to 0.0
Wastepackage_DeltaECrit_PostTemperaturePeak[VSHE] was modified from 0.2 to 0.0
Indrift_Cl_PreTemperaturePeak[mol/L] was changed from {constant: 4.47e-2 to loguniform: 2.0e-4, 10.0}
Indrift_Fl_PreTemperaturePeak[mol/L] was changed from {constant: 7.73e-3 to loguniform: 1.15e-4, 0.52}
Indrift_pH_PreTemperaturePeak[] was changed from {constant: 8.39 to uniform: 5.78, 11.0}
Indrift_CO3_PreTemperaturePeak[mol/L] was changed from {constant: 0.4162 to uniform: 0.0, 0.8324}
Indrift_Cl_PostTemperaturePeak[mol/L] was changed from {constant: 4.48e-2 to loguniform: 2.0e-4, 10.0}
Indrift_Fl_PostTemperaturePeak[mol/L] was changed from {constant: 7.74e-3 to loguniform: 1.15e-4, 0.52}
Indrift_pH_PostTemperaturePeak[] was changed from {constant: 8.40 to uniform: 5.78, 11.0}
Indrift_CO3_PostTemperaturePeak[mol/L] was changed from {constant: 0.4163 to uniform: 0.0, 0.8324}

Within the SEISMO section of the tpa.inp file, removed references to 'GridElement' and replaced with 'Subarea.' The mechfail analysis assigns two grid elements per subarea and each of the parameters is sampled on a subarea basis and not a grid element basis.

Parameter FractionWeldSurface[] was modified to WeldAdvectiveFraction[] to account for the fraction of the surface area from failed welds and used in the calculation of advective release from the waste package.

Thee parameters were added to the NFENV section of tpa.inp:
IndriftEvaporationTemperature[C] {constant: 80.0}
RelativeHumidityTransitionTimeAfterClosure[yr] {constant: 30.0}
RelativeHumidityForVentilatedAir[] {constant 0.3}

FILEUTIL.F:
Extracted file utility modules from SEISMO2.F and placed in this separate file. Module NFENV.F uses the utility getIntegerFromFile that is employed in SEISMO2.F.

The following subroutines were separated from SEISMO2.F and placed in module, FILEUTIL.F:
getRealArray
setRealArray
setStringValue
setRealValue
setIntegerArray
setIntegerValue

Calls to subroutine getIntegerFromFile were replaced with getIntegerValue within SEISMO2. Subroutine getIntegerValue from module NFENV was placed in module, FILEUTIL.F.

MECHFAIL.F:
Modified the code to use the time that backfill is emplaced as the end of the operational period and skip mechanical failure calculations until the operational period has ended. With this change, drift degradation does not start until after the operational period and any effects due to seismicity are ignored until after the operational period. The major change in the code was to skip any calls to subroutine processElements until after the operational period.

SEISMO2.F:
Replaced references in sampled parameters to 'GridElement' with 'Subarea.' The mechfail analysis assigns two grid elements per subarea and each of the parameters is sampled on a subarea basis and not a grid element basis.

EXEC.F:
Modified the code to sample the hazard curve once per realization instead of once per subarea. Also modified the module to reformat the seismo.ech file. This file includes information applicable to all subareas and realizations (the analysis times), applicable to all subareas for a realization (the seismic event history), and applicable to each subarea (the drip shield thickness versus time analysis). In addition, modified the subroutine writeepaccdf to eliminate the ikey parameter, change the return parameter for the module variable query on 'ArealMassLoading[MTU/acre] to iaml, and moved this query into the one-time block.

NFENV.F:
Removed the hard-coded value for z-direction of 2.5 to and replaced with the calculated value of (drift diameter / 2)

Modified the calculation for relative humidity at the waste package to include the relative humidity at the drift wall. The relative humidity at the drift wall varies from a value retrieved from tpa.inp (RelativeHumidityForVentilatedAir[]) to 1.0 beginning with the first tpa time step after closure.

EBSFAIL.F/EBSFAIL.DEF
Modified to use tpa.inp parameter WeldAdvectiveFraction[] instead of FractionWeldSurface[].

RELEASET.F
Modified to pass parameter ftilt (the fraction of the waste packages tilted in the correct orientation for diffusion) to subroutine getWeldWPFactor. If ftilt is positive, the resulting factor is set to FractionWeldSurface[]; otherwise, the resulting factor is set to zero.

Corrected the code to use the corrosive failure time of either the waste package or the weld.

Description of Acceptance Tests

Process Level Tests:

1. Verify the results of the MECHFAIL standalone module with hand calculated values.

System Level Tests:

1. Verify that the MECHFAIL module will return all drip shields failed over all time steps when the drip shield thickness is zero.

2. Verify that the drift failure fractions generated by MECHFAIL, retrieved by module SEISMO and returned to the executive (EXEC) are representative of the input distributions.

3. Verify that the drift failure fractions generated by MECHFAIL, retrieved by module SEISMO and returned to the executive (EXEC) are representative of the input distributions.

4. Verify the first 10,000 years generates the same results for End of Simulation at 10,000 years or 100,000 total simulation time.

5. Verify that the seismic hazard curve information remains unchanged from subarea to subarea within a realization.

6. Verify that the SEISMO module will pass the drip shield failure information on during the operational period.

7.Verify that the tpa code calculates the correct relative humidity and chemistry values during the operational period and immediately following the operational period.

Test Plan for TPA SCR # 426

Test Plan Name: SEISMO/MECHFAIL

Tested By: Andrew Jank

Date: July 15, 2003

Host Machine: SUN Ultra-4 Server: spock

Host OS: Solaris 5.8

Baseline Version: 5.0g

Test Version: 5.0j

Process Level Tests

The process level test is designed to verify the standalone MECHFAIL module generates expected results.

PL-1 Verification of Mechanical Failure with Hand Calculations

1.0 Path for Run Directory

<<Run Directory>> = $HOME/PA-SCR-426/test/pltest/pl-1

<<Run Directory Standalone>> = $HOME/PA-SCR-426/test/pltest/pl-1/standalone

2.0 Path for Archived Results

<<Run Directory>>, <<Run Directory Standalone>>

3.0 Environment Variables

TPA_TEST = $HOME/PA-SCR-426/tpa50j

TPA_DATA = $HOME/PA-SCR-426/tpa50j

4.0 Special Input Files or Modifications to Input Files Required

4.1 The file, mechfail.inp is required from a mean case run with the following modifications to tpa.inp:

Parameter	Value
Indrift_Fl_PreTemperaturePeak[mol/L]	{constant, 1.0E-5}
Indrift_Fl_PostTemperaturePeak[mol/L]	{constant, 1.0E-5}
DripShieldCorrosionRate[m/yr]	{constant, 1.0E-10}
StopAtSubarea	1

4.2 Copy the seisbs1.dis and seisbs2.dis files from the data directory to the <<Run Directory Standalone>>.

5.0 Special Diagnostic Code Modifications Required: None

6.0 Program Modes to be Used

6.1 Input files are modified in accordance with Sections 4.0.

6.2 Mechfail is built with the debug flag set to true. This flag allows debug information to be generated and allows hand calculations to be checked.

7.0 Utility Scripts Needed to Perform the Test

None

8.0 Test Description

8.1 Objective: This test is designed to verify the results of the MECHFAIL standalone module with hand calculated values.

8.2 Assumptions: none

8.3 Constraints: none

8.4 Output Files: mechfail.dat

8.5 Procedure:

1. Copy the tpa.e and tpa.inp from the $TPA_TEST to the <<Run Directory>>. At the command prompt from the <<Run Directory>> with the modifications noted in 4.1 to the tpa.inp file and the modifications to mechfail.f noted in 6.2, perform a standard tpa run by typing "tpa.e".

2. Copy tpa.inp to tpa.inp_orig for preservation purposes.

3. Copy tpameans.out to tpa.inp to prepare for a mean case run.

4. At the command prompt from the <<Run Directory>> perform the mean case run by typing "tpa.e"

5. Copy the files into the <<Run Directory Standalone>> as noted in 4.1 and 4.2, along with the mechfail.e and the mechfail.inp from the mean case run (from the <<Run Directory>>).

6. At the command prompt from the <<Run Directory Standalone>> with the mechfail.inp file from the mean tpa run, type the following:, "mechfail.e > PA-SCR-426_PL1.out." The screen output will be captured to file PA-SCR-426_PL1.out.

7. Using hand calculations, determine the times for drift failure and drip shield failure for one grid element and compare to the failure information generated to mechfail.dat.

8.6 Pass/Fail Criteria: The code runs to completion and generates output information corresponding to that expected in section 8.5.

9.0 Test Results

9.1 All files will be archived on a CD labeled, "Test Plan and Test Results for TPA SCR #426."

9.2 Criterion 1: Verify the MECHFAIL module produces output failure information that compares to hand calculations.

9.3 Overall Test Status:

The test results are included in an Excel Spreadsheet file titled, "PA-SCR-426_PL1.xls." This file shows that the drift failure fraction and drip shield failure fraction correspond to those values obtained in mechfail.dat for grid element 1 of subarea 1.

In mechfail.dat 100% of the drifts fail at 790.5 years.

In PA-SCR-426_PL1.xls, the drift fails for grid element 1 of subarea 1 at 790.5 years. This is the point where the drift failure height exceeds the maximum drift height.

In mechfail.dat 75% of the drip shields fail due to buckling at 770.159 years. Since the value is 75%, this would be grid element 1. The calculations in PA-SCR-426_PL1.xls show that at 761.84 years, the drip shield buckles and fails. This time corresponds to the seismic event at that time, and therefore, the next tpa time step in mechfail.dat(770.159 years) shows the drip shield in grid element one having failed.

The hand calculated results in PA-SCR-426_PL1.xls compare to those in mechfail.dat.

This test successfully **PASSED** the criterion above for test PL-1.

System Level Tests

The system level tests are designed to verify the integration of the MECHFAIL module within the TPA code. The TPA code is responsible for generating the input file for stand-alone module MECHFAIL.

SL-1 Zero Drip Shield Thickness

1.0 Path for Run Directory

<<Run Directory>> = $HOME/PA-SCR-426/test/sltest/sl-1

2.0 Path for Archived Results

<<Run Directory>>

3.0 Environment Variables

TPA_TEST = $HOME/PA-SCR-426/tpa50j

TPA_DATA = $HOME/PA-SCR-426/tpa50j

4.0 Special Input Files or Modifications to Input Files Required

4.1 Set the values in TPA.INP in accordance with the following table:

Parameter	Value
DripShieldThickness[m]	0.0
OutputMode	1
SelectAppendFiles	0
NumberOfRealizations	2

5.0 Special Diagnostic Code Modifications Required: None

6.0 Program Modes to be Used

6.1 Input files are modified in accordance with Section 4.0.

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 MECHFAIL module will return all drip shields failed over all time steps when the drip shield thickness is zero.

8.2 Assumptions: none

8.3 Constraints: none

8.4 Output Files: TPA.INP is modified to generate all output files

8.5 Procedure:

1. Copy the tpa.e and tpa.inp from the $TPA_TEST to the <<Run Directory>> and perform the modifications to the tpa.inp file as noted in 4.1.

2. At the command prompt from the <<Run Directory>>, type the following:, "tpa.e > PA-SCR-426_SL1.out." The screen output will be captured to file PA-SCR-426_SL1.out.

3. Verify that for each subarea, the messages, "exec: calling dsfail" and "exec: calling seismo" appear.

4. Open file seismo.rlt. Verify that for all time steps, the Drip Shield, Drip Shield Buckling, Drip Shield Plate, and Drip Shield Bulkhead fractions are equal to 1.0.

8.6 Pass/Fail Criteria: The code runs to completion and generates screen output and file output information corresponding to that expected in section 8.5.

9.0 Test Results

9.1 Output and Supporting Files: All files are archived to a CD labeled, "Test Plan and Test Results for TPA SCR #426."

9.2 Criterion 1: Verify the output screen values are displayed in accordance with Section 8.5, Step 3.

9.3 Criterion 2: Verify the output file contains the correct failure information in accordance with Section 8.5, Step 4.

9.4 Overall Test Status:

For each subarea, the messages, "exec: calling dsfail" and "exec: calling seismo" appear.

Within file seismo.rlt, the Drip Shield, Drip Shield Buckling, Drip Shield Plate, and Drip Shield Bulkhead fractions are equal to 1.0 for all time steps and realizations.

This test successfully **PASSED** the criterion above for test SL-1.

SL-2 Expected Results for Drift Failure

1.0 Path for Run Directory

Test Case A: <<Run Directory>> = $HOME/PA-SCR-426/test/sltest/sl-2/testA

Test Case B: <<Run Directory>> = $HOME/PA-SCR-426/test/sltest/sl-2/testB

2.0 Path for Archived Results

<<Run Directory>>

3.0 Environment Variables

TPA_TEST = $HOME/PA-SCR-426/tpa50j

TPA_DATA = $HOME/PA-SCR-426/tpa50j

4.0 Special Input Files or Modifications to Input Files Required

4.1 Set the values in TPA.INP in accordance with the following tables:

Test Case A

Parameter	Value
OutputMode	1
SelectAppendFiles	4
NumberOfRealizations	10
SeismicDisruptiveScenarioFlag(yes=1,no=0)	0

Test Case B

Parameter	Value
OutputMode	1
SelectAppendFiles	4
NumberOfRealizations	10
TimeOfBackfillemplaced[yr]	80
SeismicDisruptiveScenarioFlag(yes=1,no=0)	0
DegradationTimeRockTypeOne{Two}Subarea_1{2..10}	{beta 250. 2000.0, 3.25842, 1.82124}

5.0 Special Diagnostic Code Modifications Required: None

6.0 Program Modes to be Used

6.1 Input files are modified in accordance with Sections 4.0.

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 drift failure fractions generated by MECHFAIL, retrieved by module SEISMO and returned to the executive (EXEC) are representative of the input distributions.

8.2 Assumptions: none

8.3 Constraints: none

8.4 Output Files: seismo.rlt, dsfail.res

8.5 Procedure:

1. Copy the tpa.e and tpa.inp from the $TPA_TEST directory to the <<Run Directory>> for Test Case A and perform the modifications to the tpa.inp file as noted in 4.1.

2. For Test Case A, at the command prompt from the <<Run Directory>>, type the following:, "tpa.e > PA-SCR-426_SL2-A.out." The screen output will be captured to file PA-SCR-426_SL2-A.out.

3. Verify that for each subarea of each realization, the messages, "exec: calling dsfail" and "exec: calling seismo" appear.

4. Plot the Beta Distribution defined for drift degradation in tpa.inp. The input parameters are: alpha = 3.25842, beta = 1.82124, min = 250, max = 1000; however, plot the shifted distribution: alpha = 3.25842, beta = 1.82124, min = 300, max = 1050 to account for the operational period.

5. Using seismo.rlt, plot the drift failure fraction and compare the plotted values to the shifted curve calculated directly in step 3.

6. From dsfail.res, verify that 100% of the drifts fail by the first tpa time step at or after 1050 years (1000 years + operational period of 50 years).

7. Copy the tpa.e and tpa.inp from the $TPA_TEST directory to the <<Run Directory>> for Test Case B and perform the modifications to the tpa.inp file as noted in 4.1.

8. For Test Case B, at the command prompt from the <<Run Directory>>, type the following:, "tpa.e > PA-SCR-426_SL2-B.out." The screen output will be captured to file PA-SCR-426_SL2-B.out.

9. Verify that for each subarea of each realization, the messages, "exec: calling dsfail" and "exec: calling seismo" appear.

10. Plot the Beta Distribution defined for drift degradation in tpa.inp. The input parameters are: alpha = 3.25842, beta = 1.82124, min = 250, max = 2000; however, plot the shifted distribution: alpha = 3.25842, beta = 1.82124, min = 330, max = 2080 to account for the operational period.

11. Using seismo.rlt, plot the drift failure fraction and compare the plotted values to the shifted curve calculated directly in step 8.

12. From dsfail.res, verify that 100% of the drifts fail by the first tpa time step at or after 2080 years (2000 years + operational period of 80 years).

8.6 Pass/Fail Criteria: The code runs to completion and generates screen output and file output information corresponding to that expected in section 8.5.

9.0 Test Results

9.1 All files will be archived on a CD labeled, "Test Plan and Test Results for TPA SCR #426."

9.2 Criterion 1: Verify the output screen values are displayed in accordance with Section 8.5, Steps 3 and 9.

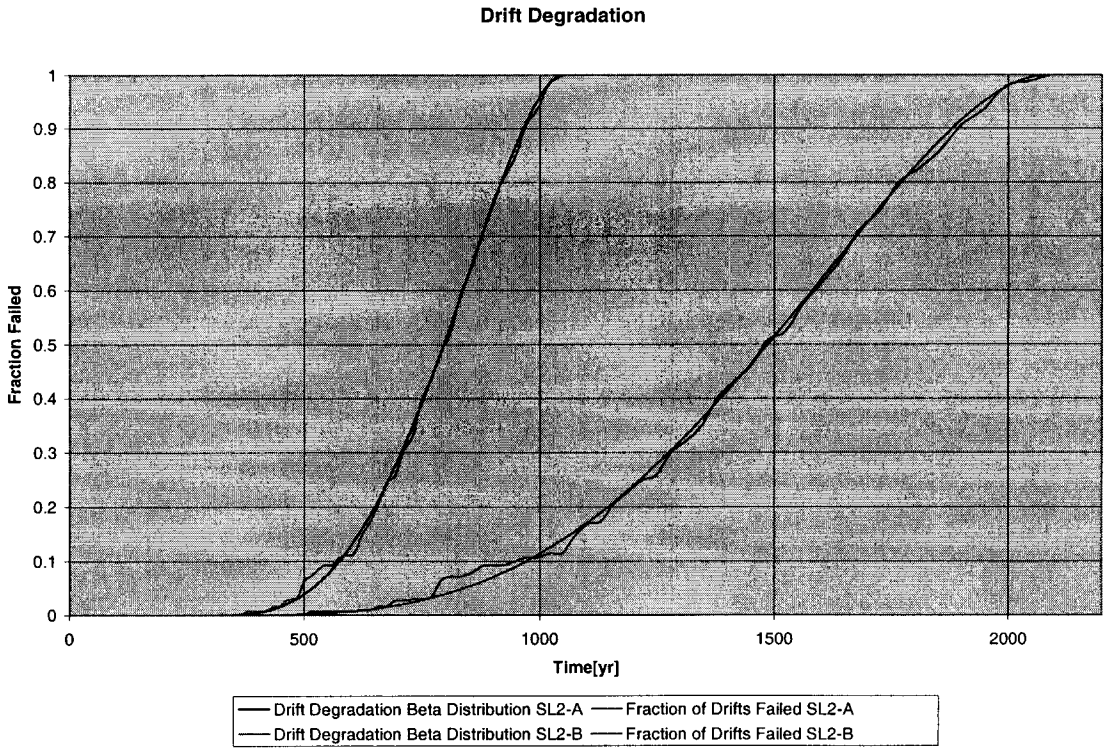
9.3 Criterion 2: Verify that the drift failure fraction distribution approximates the shifted drift degradation beta distributions for Test Cases A and B.

9.4 Criterion 3: Verify that 100% of the drifts fail by the first tpa time step at or after 1050 years for Test Case A and 100% of the drifts fail by the first tpa time step at or after 2080 years for Test Case B.

9.5 Overall Test Status:

For each subarea, the messages, "exec: calling dsfail" and "exec: calling seismo" appear.

Results from seismo.rlt files for Test Cases A and B were plotted against a Beta Distribution. The average values from seismo.rlt approximate the shifted drift degradation beta distributions.



The results in dsfail.res show that 100% of the drifts fail by the first tpa time step after 1050 years for Test Case A and 100% of the drifts fail by the first tpa time step after 2080 years for Test Case B.

This test successfully **PASSED** the criterion above for test SL-2.

SL-3 Verify the first 10,000 years generates the same results for End of Simulation at 10,000 years or 100,000 years of Total Simulation Time

1.0 Path for Run Directory

For Test Case A: <<Run Directory>> = $HOME/PA-SCR-426/test/sltest/sl-3/testA

For Test Case B: <<Run Directory>> = $HOME/PA-SCR-426/test/sltest/sl-3/testB

2.0 Path for Archived Results

<<Run Directory>>

3.0 Environment Variables

TPA_TEST = $HOME/PA-SCR-426/tpa50j

TPA_DATA = $HOME/PA-SCR-426/tpa50j

4.0 Special Input Files or Modifications to Input Files Required

4.1 Set the values in TPA.INP in accordance with the following table:

Test Case A

Parameter	Value
OutputMode	1
SelectAppendFiles	0
NumberOfRealizations	2
MaximumTime[yr]	1.0e4

Test Case B

Parameter	Value
OutputMode	1
SelectAppendFiles	0
NumberOfRealizations	2
MaximumTime[yr]	1.0e5

5.0 Special Diagnostic Code Modifications Required: None

6.0 Program Modes to be Used

6.1 Input files are modified in accordance with Sections 4.0.

7.0 Utility Scripts Needed to Perform the Test

None

8.0 Test Description

8.1 Objective: This test is designed to verify that mechanical failure will produce the same test results for the first 10,000 years whether the end of simulation time is 10,000 years or 100,000 years.

8.2 Assumptions: none

8.3 Constraints: none

8.4 Output Files: seismo.rlt, dsfail.res

8.5 Procedure:

1. Copy the tpa.e and tpa.inp from the $TPA_TEST directory to the <<Run Directory>> for Test Case A and perform the modifications to the tpa.inp file as noted in 4.1.

2. Copy the tpa.e and tpa.inp from the $TPA_TEST directory to the <<Run Directory>> for Test Case B and perform the modifications to the tpa.inp file as noted in 4.1.

3. For Test Case A, at the command prompt from the <<Run Directory>>, type the following:, "tpa.e > PA-SCR-426_SL3-A.out." The screen output will be captured to file PA-SCR-426_SL3-A.out.

4. For Test Case B, at the command prompt from the <<Run Directory>>, type the following:, "tpa.e > PA-SCR-426_SL3-B.out." The screen output will be captured to file PA-SCR-426_SL3-B.out.

5. Compare the differences in files seismo.rlt and dsfail.res for Test Cases A and B. Verify that the same information is generated at or before 10,000 years regardless of the end of simulation time.

8.6 Pass/Fail Criteria: The code runs to completion and generates screen output and file output information corresponding to that expected in section 8.5.

9.0 Test Results

9.1 All files will be archived on a CD labeled, "Test Plan and Test Results for TPA SCR #426."

9.2 Criterion 1: Verify that the mechanical failure code generates the same output information regardless of end of simulation time.

9.3 Overall Test Status:

For test case A, the seismo.rlt and dsfail.res files were copied to the "sltest/sl-3/compare" subdirectory as seismo-A.rlt and dsfail-A.res, respectively. For test case B, the seismo.rlt and dsfail.res files were copied to the "sltest/sl-3/compare" subdirectory as seismo-B.rlt and dsfail-B.res, respectively. The difference between the dsfail.res files was generated and stored in file dsfail.dif and the difference between the seismo.rlt files was generated and stored in file seismo.dif. The two difference files (dsfail.dif and seismo.dif) show that there is no difference in the output information at time steps at or below 10,000 years.

This test successfully **PASSED** the criterion above for test SL-3.

SL-4 Verify the same seismic hazard information remains the same for each subarea of a realization

1.0 Path for Run Directory

<<Run Directory>> = $HOME/PA-SCR-426/test/sltest/sl-4

2.0 Path for Archived Results

<<Run Directory>>

3.0 Environment Variables

TPA_TEST = $HOME/PA-SCR-426/tpa50j

TPA_DATA = $HOME/PA-SCR-426/tpa50j

4.0 Special Input Files or Modifications to Input Files Required

4.1 Set the values in TPA.INP in accordance with the following table:

Parameter	Value
OutputMode	1
SelectAppendFiles	0
NumberOfRealizations	2

5.0 Special Diagnostic Code Modifications Required: None

6.0 Program Modes to be Used

6.1 Input files are modified in accordance with Sections 4.0.

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 seismic hazard curve information remains unchanged from subarea to subarea within a realization.

8.2 Assumptions: none

8.3 Constraints: none

8.4 Output Files: seismo.rlt, dsfail.res

8.5 Procedure:

1. Copy the tpa.e and tpa.inp from the $TPA_TEST directory to the <<Run Directory>> and perform the modifications to the tpa.inp file as noted in 4.1.

2. At the command prompt from the <<Run Directory>>, type the following:, "tpa.e."

3. Abort code execution after the seismo code executes for realization 1, subarea 2. Copy file mechfail.inp to mechfail_1_2.inp.

4. At the command prompt from the <<Run Directory>>, type the following:, "tpa.e."

5. Abort code execution after the seismo code executes for realization 1, subarea 4. Copy file mechfail.inp to mechfail_1_4.inp.

6. At the command prompt from the <<Run Directory>>, type the following:, "tpa.e."

7. Abort code execution after the seismo code executes for realization 2, subarea 1. Copy file mechfail.inp to mechfail_2_1.inp.

8. At the command prompt from the <<Run Directory>>, type the following:, "tpa.e."

9. Abort code execution after the seismo code executes for realization 2, subarea 9. copy file mechfail.inp to mechfail_2_9.inp.

10. Compare the seismic history in the mechfail.inp files for each of the tests. The seismic information for different subareas within a realization should be the same.

8.6 Pass/Fail Criteria: The seismic history information will be unchanged from subarea to subarea within a realization.

9.0 Test Results

9.1 All files will be archived on a CD labeled, "Test Plan and Test Results for TPA SCR #426."

9.2 Criterion 1: Verify that the mechfail.inp information has the same seismic history regardless of subarea within a realization.

9.3 Overall Test Status:

The seismic histories for the four tests were extracted from the mechfail.inp files and placed in the spreadsheet, PA-SCR-426_SL4.xls. The spreadsheet shows that within a realization there is no difference in the seismic history for times of seismic events or types of seismic events.

This test successfully **PASSED** the criterion above for test SL-4.

SL-5 Drip Shield Corrosive Failure During the Operational Period

1.0 Path for Run Directory

<<Run Directory>> = $HOME/PA-SCR-426/test/sltest/sl-5

2.0 Path for Archived Results

<<Run Directory>>

3.0 Environment Variables

TPA_TEST = $HOME/PA-SCR-426/tpa50j

TPA_DATA = $HOME/PA-SCR-426/tpa50j

4.0 Special Input Files or Modifications to Input Files Required

4.1 Set the values in TPA.INP in accordance with the following table:

Parameter	Value
OutputMode	1
SelectAppendFiles	0
NumberOfRealizations	2
DripShieldCorrosionRate[m/yr]	{constant, 4.3e-6}
UseFluorideEnhancingFactor(0=no,1=yes)	1
Indrift_Fl_PreTemperaturePeak[mol/L]	{constant, 0.52}
Indrift_Fl_PostTemperaturePeak[mol/L]	{constant, 0.52}

5.0 Special Diagnostic Code Modifications Required: None

6.0 Program Modes to be Used

6.1 Input files are modified in accordance with Sections 4.0.

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 seismo module will pass the drip shield failure information on during the operational period.

8.2 Assumptions: none

8.3 Constraints: none

8.4 Output Files: seismo.rlt, dsfail.rlt

8.5 Procedure:

1. Copy the tpa.e and tpa.inp from the $TPA_TEST directory to the <<Run Directory>> and perform the modifications to the tpa.inp file as noted in 4.1.

2. At the command prompt from the <<Run Directory>>, type the following:, "tpa.e > PA-SCR-426_SL5.out."

3. Verify the drip shield failure fractions in seismo.rlt with the failure information in dsfail.rlt. Even though failures are not generated by the seismo module during the 50-year operational period. The drip shield failure fractions should be passed from the dsfail module through the seismo module.

8.6 Pass/Fail Criteria: The seismo module should pass failure of the drip shields through during the operational period.

9.0 Test Results

9.1 All files will be archived on a CD labeled, "Test Plan and Test Results for TPA SCR #426."

9.2 Criterion 1: Verify that drip shield failure information during the operational period that appears in dsfail.rlt is passed through seismo and appears in file seismo.rlt.

9.3 Overall Test Status:

In realization 1 - Subarea 7, the drip shield fails within the operational period as identified in the dsfail.rlt output file at 40.8 years. The file, seismo.rlt, displays the Drip Shield, Drip Shield Buckling, Drip Shield Plate, and Drip Shield Bulkhead fractions are equal to 1.0 for all time steps, beginning with the first time step at or after the corrosive failure time passed from module dsfail, which happens to be 41.157 years.

This test successfully **PASSED** the criterion above for test SL-5.

SL-6 Verification of Weld Failure Fraction for Advective Release

1.0 Path for Run Directory

For Test Case A: <<Run Directory>> = $HOME/PA-SCR-426/test/sltest/sl-6/testA

For Test Case B: <<Run Directory>> = $HOME/PA-SCR-426/test/sltest/sl-6/testB

2.0 Path for Archived Results

<<Run Directory>>

3.0 Environment Variables

TPA_TEST = $HOME/PA-SCR-426/tpa50j

TPA_DATA = $HOME/PA-SCR-426/tpa50j

4.0 Special Input Files or Modifications to Input Files Required

4.1 Set the values in TPA.INP in accordance with the following table:

Test A

Parameter	Value
OutputMode	1
SelectAppendFiles	0
NumberOfRealizations	2
WPWeldThickness[m]	1.0e-5
FractionOfWPsWithDiffusionTilt[]	0.1

Test B

Parameter	Value
OutputMode	1
SelectAppendFiles	0
NumberOfRealizations	2
WPWeldThickness[m]	1.0e-5
FractionOfWPsWithDiffusionTilt[]	0.0

5.0 Special Diagnostic Code Modifications Required: None

6.0 Program Modes to be Used

6.1 Input files are modified in accordance with Sections 4.0.

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 weld-waste package factor is calculated correctly.

8.2 Assumptions: none

8.3 Constraints: none

8.4 Output Files: ebsrel.cum

8.5 Procedure:

1. Copy the tpa.e and tpa.inp from the $TPA_TEST directory to the <<Run Directory>> for Test Case A and perform the modifications to the tpa.inp file as noted in 4.1.

2. Copy the tpa.e and tpa.inp from the $TPA_TEST directory to the <<Run Directory>> for Test Case B and perform the modifications to the tpa.inp file as noted in 4.1.

3. For Test Case A, at the command prompt from the <<Run Directory>>, type the following:, "tpa.e > PA-SCR-426_SL6-A.out."

4. For Test Case B, at the command prompt from the <<Run Directory>>, type the following:, "tpa.e > PA-SCR-426_SL6-B.out."

5. Verify within file ebsrel.cum, that for failure type 8, with weld failure time less than corrosive failure time, that in Test Case A, the weld-waste package factor equals the WeldAdvectiveFraction[] specified in tpa.inp and in Test Case B, the weld waste package factor equals zero.

8.6 Pass/Fail Criteria: The correct value is displayed for weld-waste package factor displayed in ebsrel.cum in accordance with Section 8.5, Step 3.

9.0 Test Results

9.1 All files will be archived on a CD labeled, "Test Plan and Test Results for TPA SCR #426."

9.2 Criterion 1: Verify the correct values for weld-waste package factor in accordance with Section 8.5, Step 3.

9.3 Overall Test Status:

For Test Case A, for type 8 (corrosive) failures, the WeldAdvectiveFraction[] is used for the Weld-Waste Package Factor (WeldWPFactor) as shown in ebsrel.cum starting at the time of weld failure. For Test Case B, for type 8 (corrosive) failures, the Weld-Waste Package Factor remained zero at the time of weld failure as expected.

This test successfully **PASSED** the criterion above for test SL-6.

SL-7 Verification of Relative Humidity and Chemistry

1.0 Path for Run Directory

<<Run Directory>> = $HOME/PA-SCR-426/test/sltest/sl-7

2.0 Path for Archived Results

<<Run Directory>>

3.0 Environment Variables

TPA_TEST = $HOME/PA-SCR-426/tpa50j

TPA_DATA = $HOME/PA-SCR-426/tpa50j

4.0 Special Input Files or Modifications to Input Files Required

4.1 Set the values in TPA.INP in accordance with the following table:

Parameter	Value
OutputMode	1
SelectAppendFiles	0
NumberOfRealizations	1
StopAtSubarea	1

5.0 Special Diagnostic Code Modifications Required: None

6.0 Program Modes to be Used

6.1 Input files are modified in accordance with Sections 4.0.

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 tpa code calculates the correct relative humidity and chemistry values during the operational period and immediately following the operational period.

8.2 Assumptions: none

8.3 Constraints: none

8.4 Output Files: nfenv.rlt

8.5 Procedure:

1. Copy the tpa.e and tpa.inp from the $TPA_TEST directory to the <<Run Directory>> and perform the modifications to the tpa.inp file as noted in 4.1.

2. At the command prompt from the <<Run Directory>>, type the following:, "tpa.e > PA-SCR-426_SL7.out."

3. Verify the correct relative humidity and chemistry values are placed in nfenv.rlt.

8.6 Pass/Fail Criteria: The correct relative humidity and chemistry values are placed in nfenv.rlt.

9.0 Test Results

9.1 All files will be archived on a CD labeled, "Test Plan and Test Results for TPA SCR #426."

9.2 Criterion 1: Verify the correct values for relative humidity and chemistry are placed in nfenv.rlt.

9.3 Overall Test Status:

The relative humidity values were calculated in spreadsheet PA-SCR-426_SL7.xls. The calculated relative humidity values compared to the tpa generated values to within 0.02%.

Different time points were selected in file nfenv.rlt to analyze the chemistry.

At time = 2.3102 years, tempwp = 77.994 C, relhumwp =0.17534, critialrelativehumidityaqueous corrosion = 0.3359104 (taken from sp.tpa)

The expected values for chemistry should come from multifbe.dat.

CL: 6.65e-3(expected), 6.65e-3(generated)

F: 4.08e-4(expected), 4.08e-4(generated)

CO3: 2.11e-3(expected), 2.11e-3(generated)

pH: 8.37(expected), 8.37(generated)

del_ecrit: 0(expected), 0(generated)

At time = 4.6744 years, tempwp = 87.179 C, relhumwp = 0.19187, critialrelativehumidityaqueous corrosion = 0.3359104 (taken from sp.tpa)

The expected values for chemistry should come from dryout values.

CL: 0(expected), 0(generated)

F: 0(expected), 0(generated)

CO3: 0(expected), 0(generated)

pH: 7.0(expected), 7.0(generated)

del_ecrit: 0(expected), 0(generated)

At time = 515.35 years, tempwp = 129.81 C, relhumwp =0.33823, critialrelativehumidityaqueous corrosion = 0.3359104 (taken from sp.tpa)

The expected values for chemistry should come from epoch2.

CL: 4.5879e-3(expected from sp.tpa), 4.5879e-3(generated)

F: 9.896948e-3(expected from sp.tpa), 9.8969e-3(generated)

CO3: 0.2558447(expected from sp.tpa), 2.5584e-1(generated)

pH: 8.862823(expected from sp.tpa), 8.8628(generated)

del_ecrit: 0(expected), 0(generated)

The expected values for the three regions analyzed correspond to the actual values generated to nfenv.rlt.

This test successfully **PASSED** the criterion above for test SL-7.

SOFTWARE CHANGE REPORT (SCR)

SCR No. (*Software Developer Assigns*): PA-SCR-447	**Software Title and Version:** TPA 5.0d	**/Project No:** 20-06002-01.113

Affected Software Module(s), Description of Problem(s): szft.f, uzft.f, exec.f, ashplumo.f, ebsfail.f, ebsrel.f

Colloid release data is not available for each subarea after the szft module.

Change Requested by:	**Change Authorized by** (*Software Developer*):
O. Povetko Date: 4-3-03	R. Janetzke Date: 5-16-03

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

The files nefiisz.out & nefiisz.cum are created in a manner similar to the nefiiuz.out & nefiiuz.cum files.

Implemented by:	**Date:**
R. Janetzke	5-26-03

Description of Acceptance Tests:

The test plan for TPA SCR #447 consists of one system level test designed to verify that colloid release data is generated on a subarea basis by the SZFT module. The system level test verified that select append file options could be set to generate the required nefiisz.cum file and that this file contained radionuclide discharge rates to include those for colloidal radionuclides.

The software successfully passed the system level test in accordance with the Test Plan for TPA SCR #447. The test plan and test results are included on a CD labeled, "Test Plan and Test Results for TPA SCR #447."

Tested by:	**Date:**
G. Adams and B. Winfrey	7-14-03

Test Plan for TPA SCR # 447

Test Plan Name: SZFT OUTPUT FILES

Tested By: George Adams

Date: June 26, 2003

Host Machine: SUN Ultra-4 Server: spock

Host OS: Solaris 5.8

Baseline Version: 5.0d

Test Version: 5.0h

System Level Tests

The system level test is designed to verify that the SZFT module will correctly generate output files nefiisz.cum and nefiisz.out.

SL-1 Generate Output Files

1.0 Path for Run Directory

For Test Case A: <<Run Directory>> = $HOME/PA-SCR-447/test/sltest/sl-1/testA

For Test Case B: <<Run Directory>> = $HOME/PA-SCR-447/test/sltest/sl-1/testB

2.0 Path for Archived Results

<<Run Directory>>

3.0 Environment Variables

TPA_TEST = $HOME/PA-SCR-447/code50h

TPA_DATA = $HOME/PA-SCR-447/code50h

4.0 Special Input Files or Modifications to Input Files Required

4.1 Set the values in TPA.INP in accordance with the following table:

Test A

Parameter	Value
OutputMode	1
SelectAppendFiles	0
NumberOfRealizations	2
MaximumTime[yr]	1.0e5

Test B

Parameter	Value
OutputMode	1
SelectAppendFiles	16
NumberOfRealizations	2
MaximumTime[yr]	1.0e5

5.0 Special Diagnostic Code Modifications Required: None

6.0 Program Modes to be Used

6.1 Input files are modified in accordance with Section 4.0.

7.0 Utility Scripts Needed to Perform the Test

None

8.0 Test Description

8.1 Objective: This test is designed to verify that module SZFT will correctly generate files nefiisz.cum and nefiisz.out.

8.2 Assumptions: none

8.3 Constraints: none

8.4 Output Files: nefiiuz.cum, nefiisz.cum, nefiiuz.out, nefiisz.out

8.5 Procedure:

1. At the command prompt from the <<Run Directory>>, type the following:, "tpa.e > PA-SCR-447_SL1-A.out." The screen output will be captured to file PA-SCR-447_SL1-A.out.

2. At the command prompt from the <<Run Directory>>, type the following:, "tpa.e > PA-SCR-447_SL1-B.out." The screen output will be captured to file PA-SCR-447_SL1-B.out.

3. Compare file nefiiuz.out to nefiisz.out. Compare file nefiiuz.cum to file nefiisz.cum. Verify that these files are created in a similar manner and that nefiisz.cum contains colloid release data.

8.6 Pass/Fail Criteria: The code runs to completion and generates file output information in accordance with Section 8.5, Step 3.

9.0 Test Results

9.1 Output and Supporting Files: All files are archived to a CD labeled, "Test Plan and Test Results for TPA SCR #447."

9.2 Criterion 1: Verify the nefiiuz.cum and nefiisz.cum files are similar in format and contain the required information in accordance with Section 8.5, Step 3.

9.3 Overall Test Status:

This test successfully **PASSED** the criterion above for test SL-1.

The files nefiiuz.cum, nefiiuz.out, nefiisz.cum, and nefiisz.out were generated for both test cases with the select append files option (SelectAppendFiles) set to 0 to generate all files or set to 16 to generate the nefiiuz.cum and nefiisz.cum files.

The file, nefiisz.cum is similar in format and organization to nefiiuz.cum. The file nefiisz.cum contains radionuclide discharge rates to include those for colloidal radionuclides. For example, an analysis of JP240 and JT230 discharge data from nefiisz.cum and szft.rlt shows data for these colloidal radionuclides that compare well between the two files for subarea 1 of realization 1 in one case and subarea 10 of realization 2 in the other case.

```
Subarea 1 of Realization 1
Values from nefiisz.cum
      YEAR      JP240
5.4386E+04  0.0000E+00
```

5.7895E+04	1.6801E-22
6.1404E+04	3.0125E-19
6.4912E+04	2.9751E-18
6.8421E+04	1.5643E-17
7.1930E+04	5.8123E-17
7.5439E+04	1.7116E-16
7.8947E+04	4.2485E-16
8.2456E+04	9.2350E-16
8.5965E+04	1.8037E-15
8.9474E+04	3.2235E-15
9.2982E+04	5.3435E-15
9.6491E+04	8.3015E-15
1.0000E+05	1.2186E-14

Values from szft.rlt:

	time	Ja243	Jp239	Jp240	Jt230	Ra226
254	5.7700E+04	1.4763E-14	2.0320E-13	1.5867E-22	3.1913E-13	4.3993E-16
255	5.8600E+04	1.9221E-14	2.7978E-13	6.0659E-20	8.8338E-13	1.2829E-15
256	5.9500E+04	2.4201E-14	3.6833E-13	1.3788E-19	2.2811E-12	3.4796E-15
297	9.6400E+04	5.8404E-12	6.9577E-10	8.2248E-15	3.0531E-06	1.3017E-08
298	9.7300E+04	6.2047E-12	7.8261E-10	9.1971E-15	3.2965E-06	1.4223E-08
299	9.8200E+04	6.5700E-12	8.7043E-10	1.0193E-14	3.5414E-06	1.5455E-08
300	9.9100E+04	6.9453E-12	9.7458E-10	1.1190E-14	3.7864E-06	1.6705E-08
301	1.0000E+05	7.3210E-12	1.0793E-09	1.2186E-14	4.0305E-06	1.7967E-08

Subarea 10 of Realization 2:

Values from szft.rlt:

	time	Ja243	Jp239	Jp240	Jt230	Ra226
293	9.2800E+04	1.6978E-12	2.5549E-08	2.9334E-11	2.0636E-10	3.7074E-14
294	9.3700E+04	1.5689E-12	2.4801E-08	2.6569E-11	2.0858E-10	3.7491E-14
295	9.4600E+04	1.4496E-12	2.4083E-08	2.4066E-11	2.1078E-10	3.7905E-14
296	9.5500E+04	1.3396E-12	2.3394E-08	2.1810E-11	2.1296E-10	3.8316E-14
297	9.6400E+04	1.2380E-12	2.2734E-08	1.9776E-11	2.1512E-10	3.8724E-14
298	9.7300E+04	1.1439E-12	2.2105E-08	1.7936E-11	2.1724E-10	3.9128E-14
299	9.8200E+04	1.0572E-12	2.1503E-08	1.6279E-11	2.1933E-10	3.9527E-14
300	9.9100E+04	9.7700E-13	2.0928E-08	1.4781E-11	2.2141E-10	3.9921E-14
301	1.0000E+05	9.0274E-13	2.0379E-08	1.3425E-11	2.2345E-10	4.0312E-14

Values from nefiisz.cum:

RADIONUCLIDE DISCHARGE RATE (CI/Y)

YEAR	JT230	RA226	PB210

9.8522E+04	2.2007E-10	3.9668E-14	2.9600E-14
9.8670E+04	2.2041E-10	3.9733E-14	2.9648E-14
9.8817E+04	2.2075E-10	3.9798E-14	2.9696E-14
9.8965E+04	2.2110E-10	3.9862E-14	2.9744E-14
9.9113E+04	2.2144E-10	3.9927E-14	2.9793E-14
9.9261E+04	2.2178E-10	3.9991E-14	2.9841E-14
9.9409E+04	2.2211E-10	4.0056E-14	2.9889E-14
9.9557E+04	2.2245E-10	4.0120E-14	2.9937E-14
9.9704E+04	2.2279E-10	4.0184E-14	2.9985E-14
9.9852E+04	2.2312E-10	4.0248E-14	3.0032E-14
1.0000E+05	2.2345E-10	4.0312E-14	3.0080E-14
1.0015E+05	2.2378E-10	4.0375E-14	3.0127E-14

SOFTWARE CHANGE REPORT (SCR)

SCR No. (*Software Developer Assigns*): PA-SCR-449	**Software Title and Version:** **TPA 5.0e**	**/Project No:** 20.06002.01.113

Affected Software Module(s), Description of Problem(s): Input file strmtube.dat

An update of the stream tube data file is desired, since more realistic models are available via 3D tools in MODFLOW and MODPATH.

Change Requested by:	**Change Authorized by** (*Software Developer*):
J. Winterle Date: 5-8-03	R. Janetzke Date: 5-8-03

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

Summary of changes to strmtube.dat file.

1. Change line with distances to receptor group 10. , 18. (it was 10., 20)

2. Revise flow centerlines under repository area so that they pick up the desired subareas as described in the scientific notebook 170e-21.

3. Revised the streamtube segment geometries for the three streamtubes based on the process model results.

Implemented by:	**Date:**
R. Janetzke	5-29-03

Description of Acceptance Tests:

Perform a code review of file *strmtube.dat* to verify modifications were implemented. Review output file *gwttuzsz.res* to verify it contains the correct SZ travel time results.

The software successfully passed the process level test in accordance with the Test Plan for TPA SCR #449. The test plan and test results are included on a CD labeled, "Test Plan and Test Results for TPA SCR #449."

Tested by:	**Date:**
B. Winfrey	July 15, 2003

SOFTWARE CHANGE REPORT (SCR)

SCR No. (*Software Developer Assigns*): PA-SCR-451	**Software Title and Version:** **TPA 5.0f**	**/Project No:** 20.06002.01.113

Affected Software Module(s), Description of Problem(s): *releaset.f, seismo2.f, tpa.inp, repdes.dat, exec.f,* and *drythick.dat, dcagw.f.*

The file *trelease.out* contains non-zero release values when the flow values in *ebsflo.dat* are all 0.0.
Invalid input integers are not error checked in the BuildCharacterString subroutine.
The availability of the pluvial dilution model switch in tpa.inp is inconsistent with the dcagw.f code.
The **cleanupwd** subroutine in *exec.f* does not remove all of the **.res* files.

Change Requested by:	**Change Authorized by** (*Software Developer*):
G. Wittmeyer/P. LaPlante Date: 6-6-03	R. Janetzke Date: 6-6-03

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

See attachment 1.

Implemented by:	**Date:**
R. Janetzke	6-13-03

Description of Acceptance Tests:

The test plan for TPA SCR #451 consists of two process level tests and two system level tests. The process levels tests are designed to verify that i) the dcagw.f code file and the data files (tpa.inp, repdes.dat, and drythick.dat) modified under this scr contain the correct information and ii) the releaset code no longer generates release values when the flow values in ebsflo.dat are all zero. The system level tests are designed to verify that i) subroutine buildCharacterString performs error checking and ii) subroutine cleanupwd removes the required files.

The software successfully passed the process level tests and the system level tests in accordance with the Test Plan for TPA SCR #451. The test plan and test results are included on a CD labeled, "Test Plan and Test Results for TPA SCR #451."

Tested by:	**Date:**
G. Adams	7-21-03

Attachment 1

Description of Change(s) or Problem Resolution

releaset.f:
Add line:

```
      tfirstflow = tflo(ntflo) + 1.0d0
```

before the line:

```
  201 continue
```

seismo2.f:
Added error checks for the length of the output string to be sufficient to hold both input strings.
Added error checks for the value of the input integer to be between 0 and 9999.

dcagw.f:
Comment out the handler for the 'PluvialDilutionModel(1=UserDefined,2=PumpingRate)' flag.

tpa.inp:
Point 1 of subarea 5 was corrected to be the same as point 4 of subarea 3.

repdes.dat:
Points 1, 2, and 15 were changed to straighten the north border of the repository.
1=547732.82,4080960.00
2=548664.55,4080675.00
15=547732.82,4080960.00

drythick.dat:
The value in the first line was changed from 17 to 18.

exec.f:
The following files were added to the list of deleted files in subroutine **cleanupwd**.
arpkds_c.res, cumrel_c.res, gsccdf.res, gsccdf_c.res, gwccdf.res, gwccdf_c.res, gwpkds_c.res, npkdst_c.res, pkrltm_c.res, relccdf.res, relgwgs.res, rlccdf_c.res, rlgwgs_c.res, totdos_c.res.

Test Plan for TPA SCR # 451

Test Plan Name: SCR 451 Test Plan

Tested By: George Adams

Date: July 16, 21, 2003

Host Machine: SUN Ultra-4 Server: spock

Host OS: Solaris 5.8

Baseline Version: 5.0F

Test Version: 5.0M

Process Level Tests

The process level tests are designed to verify that i) the dcagw.f code file and the data files modified under this SCR contain the correct information, ii) the releaset code no longer generates release values when the flow values in ebsflo.dat are all zero

PL-1 Data/Code Files Contain the Correct Information

1.0 Path for Data File Inspection Directory

<<TPA.INP Directory>> = $HOME/PA-SCR-451/tpa50m

<<Data Directory>> = $HOME/PA-SCR-451/tpa50m/data

2.0 Path for Archived Results

$HOME/PA-SCR-451/test/pltest/pl-1

3.0 Environment Variables

None (file inspection only)

4.0 Special Input Files or Modifications to Input Files Required

None

5.0 Special Diagnostic Code Modifications Required

None

6.0 Program Modes to be Used

None

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 following files contain the updated information in accordance with this SCR: repdes.dat, tpa.inp, drythick.dat, and dcagw.f.

8.2 Assumptions: none

8.3 Constraints: none

8.4 Inspected Files: tpa.inp, drythick.dat, repdes.dat, dcagw.f

8.5 Procedure:

1. Within file repdes.dat, verify the following information for points 1, 2, and 15:

point 1: 547732.82, 4080960.00

point 2: 548664.55, 4080675.00

point 15: 547732.82, 4080960.00

2. Within file drythick.dat, verify the first line contains the actual number of rows of data and this value is 18.

3. Within tpa.inp under the section, "edaii 3-cw," verify that point 4 is the same as point 1 under the section, "edaii 5-cw."

4. Within dcagw.f, verify that references to PluvialDilutionModel(1=UserDefined,2=PumpingRate) and pbdilflg (the return value for Pluvial Dilution Model) are commented out.

8.6 Pass/Fail Criteria: The updated files identified in Section 8.4 contain the required information in accordance with Section 8.5.

9.0 Test Results

9.1 Output and Supporting Files: All files are archived to a CD labeled, "Test Plan and Test Results for TPA SCR #451."

9.2 Criterion 1: Verify the repdes.dat, drythick.dat, tpa.inp, and dcagw.f files contain the required information in accordance with Section 8.5.

9.3 Overall Test Status:

This test successfully **PASSED** the criterion above for test PL-1.

Information extracted from repdes.dat. Point 1 contains the value 547732.82, 4080960.00 as required, point 2 contains the value 548664.55, 4080675.00 as required, and point 15 contains the value 547732.82, 4080960.00 as required.

```
547732.82,4080960.00
548664.55,4080675.00
548588.98,4079377.55
548569.32,4078981.
548504.06,4077664.24
548479.71,4077173.06
548455.  ,4076674.51
548155.7 ,4075962.63
547897.79,4076045.46
547655.97,4076123.07
547474.7 ,4077281.6
547370.95,4077922.04
547514.88,4079310.61
547645.27,4079656.06
547732.82,4080960.00
```

Information extracted from drythick.dat. The first line contains the value 18 designating 18 rows of data and 18 rows of data exist.

```
18
1    1.0    0.0
2   10.0    0.1
3   20.0    1.0
4   30.0    1.5
5   40.0    1.7
6   50.0    1.6
```

```
 7   60.0    1.5
 8   70.0    1.8
 9   80.0    2.9
10  100.0    4.6
11  200.0    7.3
12  300.0    7.4
13  500.0    6.6
14  600.0    5.6
15  700.0    4.7
16  800.0    3.8
17  900.0    2.7
18 1000.0    0.0
```

Information extracted from tpa.inp. The value for point 4 under edaii 3-cw is the same as the value for point 1 under edaii 5-cw.

```
edaii 3-cw
547370.95,4077922.04
547847.3,4077816.2
548322.7,4077192.2
547474.7,4077281.6
547370.95,4077922.04

edaii 5-cw
547474.7,4077281.6
547887.3,4077238.1
547897.79,4076045.46
547655.97,4076123.07
547474.7,4077281.6
```

Information extracted from dcagw.f.

References to pbdilflg and PluvialDilutionModel(1=UserDefined,2=PumpingRate) have been commented out as shown below:

```
cc      This flag is disabled, but is reserved for future use.
cc    integer pbdilflg
~~~~~~~~~~~~~~~~~~
cc      This flag is disabled, but is reserved for future use.
cc      call clearchar( 60, name )
cc      name = 'PluvialDilutionModel(1=UserDefined,2=PumpingRate)'
cc      ipbdilflg = ispquery( name )
cc      pbdilflg  = ivaluesp(ipbdilflg)
cc      if (pbdilflg .lt. 1 .or. pbdilflg .gt. 2) then
cc         print *, ' ***>>> Error in DCAGW <<<*** '
cc         print *, ' Pluvial dilution model can be'
cc         print *, ' 1 or 2.'
cc         print *, ' pbdilflg = ', pbdilflg
cc         STOP
cc      end if
```

PL-2 Zero Release for All Zero Flow

1.0 Path for Run Directory

<<Run Directory TPA>> = $HOME/PA-SCR-451/test/pltest/pl-2

<<Run Directory 5.0F>> = $HOME/PA-SCR-451/test/pltest/pl-2/testA

<<Run Directory 5.0M>> = $HOME/PA-SCR-451/test/pltest/pl-2/testB

2.0 Path for Archived Results

$HOME/PA-SCR-451/test

3.0 Environment Variables

TPA_TEST = $HOME/PA-SCR-451/tpa50f

TPA_DATA = $HOME/PA-SCR-451/tpa50f

4.0 Special Input Files or Modifications to Input Files Required

4.1 The base case tpa.inp file is modified as follows:

Parameter	Value
OutputMode	1
SelectAppendFiles	0
NumberOfRealizations	1
StopAtSubarea	1

4.2 After the tpa code executes, ebsflo.dat is modified to contain zero flows over all time steps for both test cases.

5.0 Special Diagnostic Code Modifications Required:

None

6.0 Program Modes to be Used

6.1 Input files are modified in accordance with Section 4.0.

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 releaset code no longer generates release values when the flow values in ebsflo.dat are all zero,.

8.2 Assumptions: none

8.3 Constraints: none

8.4 Output Files: trelease.out

8.5 Procedure:

1. At the command prompt from the <<Run Directory TPA>>, type the following:, tpa.e.

2. After the tpa code executes, copy ebsflo.dat, ebspac.nuc, ebsrel.inp, and ebstrh.dat to the <<Run Directory 5.0F>> and <<Run Directory 5.0M>> directories. Modify the ebsflo.dat files in accordance with Section 4.0.

3. Copy releaset.e from version 5.0f to <<Run Directory 5.0F>> and copy releaset.e from version 5.0m to <<Run Directory 5.0M>>.

4. At the command prompt from the <<Run Directory 5.0F>>, type the following: "releaset.e."

5. At the command prompt from the <<Run Directory 5.0M>>, type the following: "releaset.e."

6. Within trelease.out in <<Run Directory 5.0F>>, verify radionuclides have nonzero release; whereas, the trelease.out file in the <<Run Directory 5.0M>> directory contains zero release over all time steps.

8.6 Pass/Fail Criteria: The code runs to completion and generates output information in accordance with Section 8.5, Step 6.

9.0 Test Results

9.1 Output and Supporting Files: All files are archived to a CD labeled, "Test Plan and Test Results for TPA SCR #451."

9.2 Criterion 1: Verify the code generates output information in accordance with Section 8.5, Step 6.

9.3 Overall Test Status:

This test successfully **PASSED** the criterion above for test PL-2.

The version 5.0F code (original code) contains nonzero releases; whereas, the version 5.0M code (scr upgraded code) contains zero releases over all time steps as required.

The version 5.0F code contains nonzero releases within file trelease.out. A portion of the file was extracted and is displayed below showing the nonzero releases for two radionuclides:

```
release with time [ci/subarea]
CM246
    2.3102000000000  0.  0
    4.6744000000000  0.  0
    7.0940000000000  0.  0
    9.5702000000000  0.  0
    12.104400000000  0.  0
    14.698000000000  0.  0
    17.352200000000  0.  0
    20.068600000000  0.  0
    22.848600000000    3.9604033234528D-10  0
    25.693700000000    1.6185206790719D-09  0
    28.605400000000    3.7051150618061D-09  0
    31.585200000000    6.6671351285098D-09  0
    34.634900000000    1.0508266724108D-08  0
    37.755900000000    1.5227332673812D-08  0
    40.949900000000    2.0821680586296D-08  0
    44.218800000000    2.7288934887831D-08  0
    47.564200000000    3.4626899502100D-08  0
    50.987900000000    4.2833539906651D-08  0
    54.491700000000    5.9296157839786D-08  0
    58.077600000000    9.0337159455967D-08  0
    61.747400000000    1.3856802473871D-07  0
    65.503200000000    2.0734051825555D-07  0
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
 NB94
    2.3102000000000  0.  0
```

```
 4.6744000000000  0.  0
 7.0940000000000  0.  0
 9.5702000000000  0.  0
 12.104400000000  0.  0
 14.698000000000  0.  0
 17.352200000000  0.  0
 20.068600000000  0.  0
 22.848600000000    4.4266915514280D-09  0
 25.693700000000    1.5575946470412D-08  0
 28.605400000000    2.7149568694617D-08  0
 31.585200000000    3.8849049072873D-08  0
 34.634900000000    5.0652225036289D-08  0
 37.755900000000    6.2544999214870D-08  0
 40.949900000000    7.4520614638749D-08  0
 44.218800000000    8.6577200661848D-08  0
 47.564200000000    9.8714417688311D-08  0
 50.987900000000    1.1093250451358D-07  0
 54.491700000000    1.3130276056957D-07  0
 58.077600000000    1.5914153518416D-07  0
 61.747400000000    1.8991196529815D-07  0
 65.503200000000    2.2273496407665D-07  0
 69.346900000000    2.5725483173376D-07  0
 73.280500000000    2.9321123358647D-07  0
 77.306300000000    3.3039078017108D-07  0
 81.426300000000    3.6863300512267D-07  0
 85.642800000000    4.0781367839124D-07  0
 89.957900000000    4.4782589889812D-07  0
```

The version 5.0M code contains zero releases over all time steps within file trelease.out. A portion of the file was extracted and is displayed below showing the zero releases for two radionuclides:

```
release with time [ci/subarea]
CM246
 2.3102000000000  0.  0
 4.6744000000000  0.  0
 7.0940000000000  0.  0
 9.5702000000000  0.  0
 12.104400000000  0.  0
 14.698000000000  0.  0
 17.352200000000  0.  0
 20.068600000000  0.  0
 22.848600000000  0.  0
 25.693700000000  0.  0
 28.605400000000  0.  0
 31.585200000000  0.  0
 34.634900000000  0.  0
 37.755900000000  0.  0
 40.949900000000  0.  0
```

```
    44.218800000000  0.  0
    47.564200000000  0.  0
    50.987900000000  0.  0
    54.491700000000  0.  0
    58.077600000000  0.  0
    61.747400000000  0.  0
    65.503200000000  0.  0
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
 NB94
    2.3102000000000  0.  0
    4.6744000000000  0.  0
    7.0940000000000  0.  0
    9.5702000000000  0.  0
    12.104400000000  0.  0
    14.698000000000  0.  0
    17.352200000000  0.  0
    20.068600000000  0.  0
    22.848600000000  0.  0
    25.693700000000  0.  0
    28.605400000000  0.  0
    31.585200000000  0.  0
    34.634900000000  0.  0
    37.755900000000  0.  0
    40.949900000000  0.  0
    44.218800000000  0.  0
    47.564200000000  0.  0
    50.987900000000  0.  0
    54.491700000000  0.  0
    58.077600000000  0.  0
    61.747400000000  0.  0
    65.503200000000  0.  0
    69.346900000000  0.  0
    73.280500000000  0.  0
    77.306300000000  0.  0
    81.426300000000  0.  0
    85.642800000000  0.  0
    89.957900000000  0.  0
```

System Level Tests

The system level tests are designed to verify that i) subroutine buildCharacterString performs error checking and ii) subroutine cleanupwd removes the required files.

SL-1 Subroutine Cleanupwd

1.0 Path for Run Directory

<<Run Directory>> = $HOME/PA-SCR-451/test/sltest/sl-1

2.0 Path for Archived Results

$HOME/PA-SCR-451/test

3.0 Environment Variables

TPA_TEST = $HOME/PA-SCR-451/tpa50m

TPA_DATA = $HOME/PA-SCR-451/tpa50m

4.0 Special Input Files or Modifications to Input Files Required

4.1 The base case tpa.inp file is modified as follows:

Parameter	Value
OutputMode	1
SelectAppendFiles	0
NumberOfRealizations	1

5.0 Special Diagnostic Code Modifications Required:

5.1 Include cleanupwd.t (actual test code) in the build. This test code checks for a series of files in the run directory and verifies that they are removed at the beginning of tpa execution.

6.0 Program Modes to be Used

6.1 Input files are modified in accordance with Section 4.0.

7.0 Utility Scripts Needed to Perform the Test

None

8.0 Test Description

8.1 Objective: This test is designed to verify that subroutine cleanupwd removes the required files.

8.2 Assumptions: none

8.3 Constraints: none

8.4 Output Files: OutputMode set to 1 to generate all output files

8.5 Procedure:

1. At the command prompt from the <<Run Directory>>, type the following: tpa.e.

2. Verify in the <<Run Directory>> that the following files are present: arpkds_c.res, cumrel_c.res, gsccdf.res, gsccdf_c.res, gwccdf.res, gwccdf_c.res, gwpkds_c.res, npkdst_c.res, pkrltm_c.res, relccdf.res, relgwgs.res, rlccdf_c.res, rlgwgs_c.res, totdos_c.res.

3. With the files present in the <<Run Directory>>, invoke the tpa code again by typing, "tpa.e > PA-SCR-451_SL1.out." Screen output will be captured in file, "PA-SCR-451_SL1.out."

4. From the screen output, verify that the unit test for cleanupwd successfully executes.

8.6 Pass/Fail Criteria: The code runs to completion and successfully executes the unit test for subroutine cleanupwd.

9.0 Test Results

9.1 Output and Supporting Files: All files are archived to a CD labeled, "Test Plan and Test Results for TPA SCR #451."

9.2 Criterion 1: Verify the unit test successfully executes for subroutine cleanupwd in accordance with Section 8.5, Step 4.

9.3 Overall Test Status:

This test successfully **PASSED** the criterion above for test SL-1.

A screen output showing the directory contents after the initial tpa execution follows:

```
spock% ls *.res
airpkdos.res  gsccdf.res    gwttuzsz.res  pkrltm_c.res  totdos_c.res
arpkds_c.res  gsccdf_c.res  infilper.res  relccdf.res   totdose.res
ashout.res    gwccdf.res    nearfld.res   relgwgs.res   wpsfail.res
cumrel.res    gwccdf_c.res  npkdoset.res  rlccdf_c.res
cumrel_c.res  gwpkdos.res   npkdst_c.res  rlgwgs_c.res
dsfail.res    gwpkds_c.res  pkreltim.res  samplpar.res
```

The screen output with the test code for cleanupwd is shown below. The test successfully executed.

```
VT:
VT: exec:cleanupwd:testcase 1
VT: cleanupwd - cleanup write directory
VT: This test case is designed to verify that files which should not be present
VT:    in the write directory are not present.
VT:
VT: Test criteria
VT: The files which should not be present are not present in the write
VT:    directory.
VT:
VT: Test results
VT: File: npkdoset.res         is not present.
VT: File: totdose.res          is not present.
VT: File: airpkdos.res         is not present.
VT: File: gwpkdos.res          is not present.
VT: File: nearfld.res          is not present.
VT: File: gwttuzsz.res         is not present.
VT: File: cumrel.res           is not present.
VT: File: pkreltim.res         is not present.
VT: File: wpsfail.res          is not present.
VT: File: dsfail.res           is not present.
VT: File: infilper.res         is not present.
VT: File: samplpar.res         is not present.
```

```
VT: File: ashout.res           is not present.
VT: File: ccdfgwgs.res         is not present.
VT: File: epa_ave.out          is not present.
VT: File: epapktim.out         is not present.
VT: File: arpkds_c.res         is not present.
VT: File: cumrel_c.res         is not present.
VT: File: gsccdf.res           is not present.
VT: File: gsccdf_c.res         is not present.
VT: File: gwccdf.res           is not present.
VT: File: gwccdf_c.res         is not present.
VT: File: gwpkds_c.res         is not present.
VT: File: npkdst_c.res         is not present.
VT: File: pkrltm_c.res         is not present.
VT: File: relccdf.res          is not present.
VT: File: relgwgs.res          is not present.
VT: File: rlccdf_c.res         is not present.
VT: File: rlgwgs_c.res         is not present.
VT: File: totdos_c.res         is not present.
VT:
VT: Test status: OK - exec:cleanupwd VALIDATION TEST PASSED: Test Case: 1
VT:
VT: exec:cleanupwd - end of testcase 1
```

SL-2 Subroutine buildCharacterString

1.0 Path for Run Directory

For Test Case A: <<Run Directory>> = $HOME/PA-SCR-451/test/sltest/sl-2/testA

For Test Case B: <<Run Directory>> = $HOME/PA-SCR-451/test/sltest/sl-2/testB

For Test Case C: <<Run Directory>> = $HOME/PA-SCR-451/test/sltest/sl-2/testC

For Test Case D: <<Run Directory>> = $HOME/PA-SCR-451/test/sltest/sl-2/testD

2.0 Path for Archived Results

<<Run Directory>>

3.0 Environment Variables

TPA_TEST = $HOME/PA-SCR-451/tpa50m

TPA_DATA = $HOME/PA-SCR-451/tpa50m

4.0 Special Input Files or Modifications to Input Files Required

4.1 The base case tpa.inp file is used.

5.0 Special Diagnostic Code Modifications Required:

5.1 Within seismo2.f, add the following code after line 302:

```
c     Special test code PA-SCR-451
      CHARACTER * 20 test_str

c     TestA
      CALL buildCharacterString(test_str, 30, 'testa', 1, 'testb')
c     TestB
      CALL buildCharacterString(test_str, 20, 'testalongstring', 1,
     &  'testblongstring')
c     TestC
      CALL buildCharacterString(test_str, 20, 'testa', 99999, 'testb')
c     TestD
      CALL buildCharacterString(test_str, 20, 'testa', -1, 'testb')
c     End of Special test code PA-SCR-451
```

The test code shown above tests each of the error checking features within the buildCharacterString subroutine. Note that only one test may be performed at a time. For example, when testA code is being used, testB, C, and D code above should be commented out.

6.0 Program Modes to be Used

None

7.0 Utility Scripts Needed to Perform the Test

None

8.0 Test Description

8.1 Objective: This test is designed to verify that subroutine buildCharacterString correctly error checks the input parameters.

8.2 Assumptions: none

8.3 Constraints: none

8.4 Output Files: screen output

8.5 Procedure:

1. Build the tpa code for Test Case A in accordance with Section 5.1.

2. Invoke the tpa code from the <<Run Directory>> and verify that the code stops at the buildCharacterString module.

3. Build the tpa code for Test Case B in accordance with Section 5.1.

4. Invoke the tpa code from the <<Run Directory>> and verify that the code stops at the buildCharacterString module.

5. Build the tpa code for Test Case C in accordance with Section 5.1.

6. Invoke the tpa code from the <<Run Directory>> and verify that the code stops at the buildCharacterString module.

7. Build the tpa code for Test Case D in accordance with Section 5.1.

8. Invoke the tpa code from the <<Run Directory>> and verify that the code stops at the buildCharacterString module.

8.6 Pass/Fail Criteria: The code runs to completion and successfully executes the unit test for subroutine cleanupwd.

9.0 Test Results

9.1 Output and Supporting Files: All files are archived to a CD labeled, "Test Plan and Test Results for TPA SCR #451."

9.2 Criterion 1: Verify the tpa code stops for each of the test cases in accordance with Section 8.5, Steps 2, 4, 6, and 8.

9.3 Overall Test Status:

This test successfully **PASSED** the criterion above for test SL-2.

For each of the test cases, the tpa code stops at the buildCharacterString module and generates an error message for each of the four types of errors that are generated.

The screen output from the series of test cases follows:

~~~~~~~~~~~~~~~~~~~~~~

From Test Case A:

```
------------------------------------------------------------------------
     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

  ***>>> Error in buildCharacterString <<<***
  The declared length of the output string is smaller
  than the requested length for output.
  len(characterString) =   20
  lengthString =   30
```
~~~~~~~~~~~~~~~~~~~~~~

~~~~~~~~~~~~~~~~

From Test Case B:

```
-------------------------------------------------------------------------
     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

  ***>>> Error in buildCharacterString <<<***
  The declared length of the output string is smaller
  than the combined declared length of the input.
  len(characterString) =   20
  len(textOne) =   15
  len(textTwo) =   15
```

~~~~~~~~~~~~~~~~~~

From Test Case 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

  ***>>> Error in buildCharacterString <<<***
  The input integer value is greater than 4 digits.
  iValue =   99999
```

~~~~~~~~~~~~~~~

From Test Case D:

```
-------------------------------------------------------------------------
     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

 ***>>> Error in buildCharacterString <<<***
 The input integer value is less than 0.
 iValue =    -1
```

SOFTWARE CHANGE REPORT (SCR)

SCR No. (*Software Developer Assigns*): PA-SCR-450	**Software Title and Version:** **TPA 5.0e**	**/Project No:** 20.06002.01.113

Affected Software Module(s), Description of Problem(s): invent.f, uzft.f, szft.f, reader.f, exec.f, ebsrel.f, tpa.inp, tpanames.dbs, reversibles.inp, and coefkdeqr.dat.

D. Picket has provided an update of the colloid UZ layer filter factors and the colloid release factors. The colloidal chains end in a short half-life isotope. This may not be a conservative approach.

Change Requested by:	**Change Authorized by** (*Software Developer*):
D. Pickett Date: 5-23-03	R. Janetzke Date: 5-23-03

Description of Change(s) or Problem Resolution (*If changes not implemented, please justify*): New values for colloid filter factors.
TSw = 0.65 CHnv = 0.50 CHnz = 0.57 PPw = 0.19 UCF = 0.25 BFw = 0.18
New values for colloid release factors: all are 0.1.
Allow duplicate solute nuclide names provided they appear only once in each of the solute and colloid sets. All sections of the code that assumed there were no duplicate names were changed to use the nuclide order in *tpa.inp* as specification for the order of nuclides in all data files. The file szft.rlt was also modified to list colloids separate from solute nuclides.

Implemented by:	**Date:**
R. Janetzke	6-03-03

Description of Acceptance Tests:
Refer to the CD labeled "Test Plan and Test Results for TPA SCR #450" for a full description of the acceptance tests and the documented results. The following is a brief explanation of the four system-level tests conducted for this SCR:
1. Verify the colloid release factors by identifying an isotope and hand-calculating the colloid release with the factor identified in tpa.inp. The factors should compare to within 1%.
2. Verify the colloid filter factors by conducting four separate test cases, each in a different subarea and with a different isotope, and hand-calculating the filter factor. The factors should compare to within 1%.
3. Verify invalid duplicate solute names in tpa.inp by conducting 4 separate test cases: a.) Duplicate an isotope from a colloid chain into a solute chain; b.) Duplicate an isotope from a solute chain to a colloid chain; c.) Remove a solute nuclide and create a duplicate in a colloid chain; d.) Remove a colloid nuclide and create a duplicate in a solute chain. All cases should abort and give diagnostic information.
4. Verify that the szft.rlt file lists colloids separate from solute nuclides by comparing the ordering and number of item to the ordering and number of nuclides (solute and colloidal) in tpa.inp.

All test cases **PASSED.**

Tested by:	**Date:**
A. Jank	July 24, 2003

Test Plan for TPA SCR # 450

Test Plan Name: Verify Modified Colloid Parameters

Tested By: Andrew Jank **Date:** July 24, 2003

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

Baseline Version: 5.0e **Test Version:** 5.0m

System Level Tests

The system level tests are designed to verify the new parameters for colloid filter and release factors exist in the tpa.inp file and are used properly in the TPA50 code. Additionally, more tests are provided to assess the changes to reflect the correct ordering of nuclide data in output files, as well as the separation of colloid data from solute nuclides in the szft.rlt file.

SL-1 Verification of new colloid release factors

1.0 Path for Run Directory

<<Run Directory>> = $HOME/PA-SCR-450/test/sltest/sl-1

2.0 Path for Archived Results

<<Run Directory>>

3.0 Environment Variables

TPA_TEST = $HOME/PA-SCR-460/tpa50m

TPA_DATA = $HOME/PA-SCR-460/tpa50m

4.0 Special Input Files or Modifications to Input Files Required

4.1 Set the values in TPA.INP in accordance with the following table:

Parameter	Value
NumberOfRealizations	1
StartAtSubarea	1
StopAtSubarea	1
OutputMode	1
PermanentLossColloidFilterFactor_CHnv[]	0.25

5.0 Special Diagnostic Code Modifications Required: The file nfenv.f was modified to print out the time step and the associated fracture fraction for each of the time steps. The data is written to a file called "fracturefraction.out".

6.0 Program Modes to be Used

6.1 Input files are modified in accordance with Section 4.0.

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 new values for the colloid filter factors are being used properly.

8.2 Assumptions: none

8.3 Constraints: none

8.4 Output Files: TPA.INP is modified to generate all output files

8.5 Procedure:

1. Modify the nfenv.f file to output the temporary variable fracturefraction, along with the integer time step.

2. Rebuild version tpa50m.

3. Copy the tpa.e and tpa.inp from the $TPA_TEST directory to the <<Run Directory>> and perform the modifications to the tpa.inp file as noted in 4.1.

4. At the command prompt from the <<Run Directory>>, type the following:, "tpa.e > PA-SCR-450_SL1.out." The screen output will be captured to file PA-SCR-450_SL1.out.

5. Use the parameters and output from files tpa.inp, uzft.out, and nefiiuz.out to verify that the new colloid values are correctly used for a given nuclide using the following process for a selected nuclide from each test case:

a. Select a given nuclide, in this test use Cm245 for the test case.

b. Copy the time-dependent activity for the given nuclide into a spreadsheet from uzft.rlt. Copy the the time-dependent activity for the colloid (Jc245) from the same file into the spreadsheet.

c. Under "Network Properties Array" in nefiiuz.out take the 2nd and subsequent values for Length(m) and cross reference those values to find the appropriate filter factor for the correct Subarea under inspection. (E.g. - Length=19, subarea=1, CHnvThickness_1Subarea[m]=19, so filter factor is for CHnv (0.5)).

d. Obtain the colloid release factor from tpa.inp for the given colloid from tpa.inp, and use the following equation to calculate the colloid activity. Obtain the fracturefraction from the fracturefraction.out file. Compare those values with those as calculated and displayed in uzft.rlt:

Activity(Jc245(time)) =
Activity(Cm245(time))xColloidReleaseFactor_Jc245x
(1-PermanentLossColloidFilterFactor_#1)x ... x
(1-PermanentLossColloidFilterFactor_#n) -
Activity(Cm245(time))*fracturefraction(time)

8.6 Pass/Fail Criteria: The code runs to completion and generates screen output and file output information corresponding to that expected in section 8.5.

9.0 Test Results

9.1 Output and Supporting Files: All files are archived to a CD labeled, "Test Plan and Test Results for TPA SCR #450."

9.2 Criterion 1: Verify that the colloid release factors for a given nuclide are properly used for each test case using the procedure in 8.5 and that the hand-calculated values are within 1% of the actual values to allow for round-off errors.

9.3 Overall Test Status:

Reference file PA-SCR-450_SL1.xls for the output data and associated calculations.

For the test case described, the maximum difference between the hand calculated and model-produced values for Jc245 was 0.01%. There were no fracturefractions to impact the results.

This test successfully **PASSED** the criterion above for test SL-1.

SL-2 Verification of new values for colloid filter factors

1.0 Path for Run Directory

For Test Case A: <<Run Directory>> = $HOME/PA-SCR-450/test/sltest/sl-2/testA

For Test Case B: <<Run Directory>> = $HOME/PA-SCR-450/test/sltest/sl-2/testB

For Test Case C: <<Run Directory>> = $HOME/PA-SCR-450/test/sltest/sl-2/testC

For Test Case D: <<Run Directory>> = $HOME/PA-SCR-450/test/sltest/sl-2/testD

2.0 Path for Archived Results

<<Run Directory>> for each test case

3.0 Environment Variables

For All Test Cases:

TPA_TEST = $HOME/PA-SCR-460/tpa50m

TPA_DATA = $HOME/PA-SCR-460/tpa50m

4.0 Special Input Files or Modifications to Input Files Required

4.1 Set the values in TPA.INP in accordance with the following table:

For Test Case A:

Parameter	Value
NumberOfRealizations	1
StartAtSubarea	1
StopAtSubarea	1
OutputMode	1

For Test Case B:

Parameter	Value
NumberOfRealizations	1
StartAtSubarea	2
StopAtSubarea	2
OutputMode	1

For Test Case C:

Parameter	Value
NumberOfRealizations	1
StartAtSubarea	6
StopAtSubarea	6
OutputMode	1

For Test Case D:

Parameter	Value
NumberOfRealizations	1
StartAtSubarea	7
StopAtSubarea	7
OutputMode	1

5.0 Special Diagnostic Code Modifications Required: None.

6.0 Program Modes to be Used

6.1 Input files are modified in accordance with Section 4.0.

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 colloid release factors have all been set to 0.1 and are used properly.

8.2 Assumptions: none

8.3 Constraints: none

8.4 Output Files: TPA.INP is modified to generate all output files

8.5 Procedure:

1. For Test Case A: Copy the tpa.e and tpa.inp from the $TPA_TEST directory to the <<Run Directory>> and perform the modifications to the tpa.inp file as noted in 4.1.

2. At the command prompt from the <<Run Directory>> for Test Case A, type the following:, "tpa.e > PA-SCR-450_SL2-A.out." The screen output will be captured to file PA-SCR-450_SL2-A.out.

3. For Test Case B: Copy the tpa.e and tpa.inp from the $TPA_TEST directory to the <<Run Directory>> and perform the modifications to the tpa.inp file as noted in 4.1.

4. At the command prompt from the <<Run Directory>> for Test Case B, type the following:, "tpa.e > PA-SCR-450_SL2-B.out." The screen output will be captured to file PA-SCR-450_SL2-B.out.

5. For Test Case C: Copy the tpa.e and tpa.inp from the $TPA_TEST directory to the <<Run Directory>> and perform the modifications to the tpa.inp file as noted in 4.1.

6. At the command prompt from the <<Run Directory>> for Test Case C, type the following:, "tpa.e > PA-SCR-450_SL2-C.out." The screen output will be captured to file PA-SCR-450_SL2-C.out.

7. For Test Case D: Copy the tpa.e and tpa.inp from the $TPA_TEST directory to the <<Run Directory>> and perform the modifications to the tpa.inp file as noted in 4.1.

8. At the command prompt from the <<Run Directory>> for Test Case D, type the following:, "tpa.e > PA-SCR-450_SL2-D.out." The screen output will be captured to file PA-SCR-450_SL2-D.out.

9. Use the parameters and output from files tpa.inp, uzft.out, and nefiiuz.out to verify that the new colloid values are correctly used for a given nuclide using the following process for a selected nuclide from each test case:

a. Select a given nuclide, in this test use Cm245 for Test Case A, Am241 for Test Case B, Th230 for Test Case C, and Cm246 for Test Case D.

b. Copy the time-dependent activity for the given nuclide and its colloid into a spreadsheet from ebsnef2.dat. Copy the the time-dependent activity for the colloid (Jc245, Ja241, Jt230, Jc246, respectively) from the same file into the spreadsheet.

c. For each time step, calculate the factor between colloid and the parent for each nuclide. Find the maximum and minimum of these values (but only for those time that release occurs) and compare those to the appropriate ColloidReleaseFactor from the tpa.inp.

8.6 Pass/Fail Criteria: The code runs to completion and generates screen output and file output information corresponding to that expected in section 8.5.

9.0 Test Results

9.1 Output and Supporting Files: All files are archived to a CD labeled, "Test Plan and Test Results for TPA SCR #450."

9.2 Criterion 1: Verify that the calculated colloid release factors for a given nuclide are within 1% of the tpa.inp factor for the respective nuclide, using the procedure in 8.5.

9.3 Overall Test Status:

Reference file PA-SCR-450_SL2.xls for the output data and associated calculations.

In all cases, the minimum and maximum colloid release factors were all calculated to be 0.1. This matches the values as specified for each of the colloids in the tpa.inp file.

This test successfully **PASSED** the criterion above for test SL-2.

SL-3 Verify invalid duplicate solute names

1.0 Path for Run Directory

Test Case A: <<Run Directory>> = $HOME/PA-SCR-450/test/sltest/sl-3/testA

Test Case B: <<Run Directory>> = $HOME/PA-SCR-450/test/sltest/sl-3/testB

Test Case C: <<Run Directory>> = $HOME/PA-SCR-450/test/sltest/sl-3/testC

Test Case D: <<Run Directory>> = $HOME/PA-SCR-450/test/sltest/sl-3/testD

2.0 Path for Archived Results

<<Run Directory>> for each test case

3.0 Environment Variables

TPA_TEST = $HOME/PA-SCR-460/tpa50m

TPA_DATA = $HOME/PA-SCR-460/tpa50m

4.0 Special Input Files or Modifications to Input Files Required

4.1 Set the values in TPA.INP in accordance with the following table:

Test Case A:

Parameter	Value
NumberOfRealizations	1
StartAtSubarea	1
StopAtSubarea	1
OutputMode	1
Aqueousnuclides	21 (from 20) 13
Aqueousnuclides, chain 1	3 (from 2) Pu240 (added) Cm246 U238

Test Case B:

Parameter	Value
NumberOfRealizations	1
StartAtSubarea	1
StopAtSubarea	1
OutputMode	1
Colloidalnuclides	12 (from 11)

Colloidalnuclides, colloidal chain 1	3 (from 2) Jc246 Jp239 (added) U238

Test Case C:

Parameter	Value
NumberOfRealizations	1
StartAtSubarea	1
StopAtSubarea	1
OutputMode	1
Aqueousnuclides	19 (from 20) 13
Aqueousnuclides, chain 1	1 (from 2) Cm246 (deleted U238)
Colloidalnuclides	12 (from 11)
Colloidalnuclides, colloidal chain 4	2 (from 1) Jp240 U238 (added)

Test Case D:

Parameter	Value
NumberOfRealizations	1
StartAtSubarea	1
StopAtSubarea	1
OutputMode	1
Aqueousnuclides	21 (from 20) 13
Aqueousnuclides, chain 4	2 (from 1) Pu240 Pb210 (added)
Colloidalnuclides	10 (from 11)

Colloidalnuclides, colloidal chain 5	2 (from 3) Jt230 Ra226 (deleted Pb210)

5.0 Special Diagnostic Code Modifications Required: None

6.0 Program Modes to be Used

6.1 Input files are modified in accordance with Section 4.0.

7.0 Utility Scripts Needed to Perform the Test

None

8.0 Test Description

8.1 Objective: This test is designed to verify that duplicates, in various combinations between aqueous and colloidal nuclides, are not allowed.

8.2 Assumptions: none

8.3 Constraints: none

8.4 Output Files: TPA.INP is modified to generate all output files

8.5 Procedure:

1. For Test Case A: Copy the tpa.e and tpa.inp from the $TPA_TEST directory to the <<Run Directory>> and perform the modifications to the tpa.inp file as noted in 4.1.

2. At the command prompt from the <<Run Directory>> for Test Case A, type the following:, "tpa.e > PA-SCR-450_SL3-A.out." The screen output will be captured to file PA-SCR-450_SL3-A.out.

3. For Test Case B: Copy the tpa.e and tpa.inp from the $TPA_TEST directory to the <<Run Directory>> and perform the modifications to the tpa.inp file as noted in 4.1.

4. At the command prompt from the <<Run Directory>> for Test Case B, type the following:, "tpa.e > PA-SCR-450_SL3-B.out." The screen output will be captured to file PA-SCR-450_SL3-B.out.

5. For Test Case C: Copy the tpa.e and tpa.inp from the $TPA_TEST directory to the <<Run Directory>> and perform the modifications to the tpa.inp file as noted in 4.1.

6. At the command prompt from the <<Run Directory>> for Test Case C, type the following:, "tpa.e > PA-SCR-450_SL3-C.out." The screen output will be captured to file PA-SCR-450_SL3-C.out.

7. For Test Case D: Copy the tpa.e and tpa.inp from the $TPA_TEST directory to the <<Run Directory>> and perform the modifications to the tpa.inp file as noted in 4.1.

8. At the command prompt from the <<Run Directory>> for Test Case D, type the following:, "tpa.e > PA-SCR-450_SL3-D.out." The screen output will be captured to file PA-SCR-450_SL3-D.out.

9. Each of the four test cases should fail and provide diagnostic information for the duplicate parameter.

8.6 Pass/Fail Criteria: The code should fail for each test case, since a duplicate is placed in each Test Case.

9.0 Test Results

9.1 Output and Supporting Files: All files are archived to a CD labeled, "Test Plan and Test Results for TPA SCR #450."

9.2 Criterion 1: Each test case should fail and provide diagnostic information about where the duplicate value can be found within the tpa.inp file.

9.3 Overall Test Status:

The following provides the screen output results from each test case:

Test Case A:

```
================================================================================
         exec: Welcome to TPA Version 5.0m
       Job started: Fri Jul 25 12:20:39 2003
================================================================================

 ***>>> Error in Reader <<<***
 list of aqueous nuclide names has duplicate
  1 name = Pu240
  2 name = Cm246
  3 name = U238
  4 name = Cm245
  5 name = Am241
  6 name = Np237
  7 name = Am243
  8 name = Pu239
  9 name = Pu240
  10 name = U234
  11 name = Th230
  12 name = Ra226
  13 name = Pb210
  14 name = Cs135
  15 name = I129
  16 name = Tc99
  17 name = Ni59
  18 name = C14
  19 name = Se79
  20 name = Nb94
  21 name = Cl36
```

```
 Look on line =   356
```

Test Case B:

```
================================================================================
         exec: Welcome to TPA Version 5.0m
       Job started: Fri Jul 25 12:21:03 2003
================================================================================

 ***>>> Error in Reader <<<***
 list of colloidal nuclide names has duplicate
  1 name = Jc246
  2 name = Jp239
  3 name = U238
  4 name = Jc245
  5 name = Ja241
  6 name = Np237
  7 name = Ja243
  8 name = Jp239
  9 name = Jp240
  10 name = Jt230
  11 name = Ra226
  12 name = Pb210
 Look on line =   385
```

Test Case C:

```
================================================================================
         exec: Welcome to TPA Version 5.0m
       Job started: Fri Jul 25 12:21:21 2003
================================================================================

  ***>>> Error in Reader <<<***
 Do not understand name of nuclide.
 If it is not a colloidal nuclide then it
 needs to be one of the solute nuclides
 already delcared in tpa.inp
 name = U238
 Look on line =   366

 Non-colloid nuclide names in a colloid chain
```

```
 need to be one of the following:
Cm246
Cm245
Am241
Np237
Am243
Pu239
Pu240
U234
Th230
Ra226
Pb210
Cs135
I129
Tc99
Ni59
C14
Se79
Nb94
Cl36
```

Test Case D:

```
================================================================================
         exec: Welcome to TPA Version 5.0m
       Job started: Fri Jul 25 12:21:53 2003
================================================================================

 ***>>> Error in Reader <<<***
 list of aqueous nuclide names has duplicate
  1 name = Cm246
  2 name = U238
  3 name = Cm245
  4 name = Am241
  5 name = Np237
  6 name = Am243
  7 name = Pu239
  8 name = Pu240
  9 name = Pb210
  10 name = U234
  11 name = Th230
  12 name = Ra226
```

```
 13 name = Pb210
 14 name = Cs135
 15 name = I129
 16 name = Tc99
 17 name = Ni59
 18 name = C14
 19 name = Se79
 20 name = Nb94
 21 name = Cl36
Look on line =   356
```

All four tests provide diagnostic information as to the error in the tpa.inp file and all the runs resulted in an abort.

This test successfully **PASSED** the criterion above for test SL-3.

SL-4 Verification that szft.rlt lists colloids separate from solute nuclides

1.0 Path for Run Directory

<<Run Directory>> = $HOME/PA-SCR-450/test/sltest/sl-4

2.0 Path for Archived Results

<<Run Directory>>

3.0 Environment Variables

TPA_TEST = $HOME/PA-SCR-460/tpa50m

TPA_DATA = $HOME/PA-SCR-460/tpa50m

4.0 Special Input Files or Modifications to Input Files Required

4.1 Set the values in TPA.INP in accordance with the following table:

Parameter	Value
NumberOfRealizations	1
StartAtSubarea	1
StopAtSubarea	1
OutputMode	1

5.0 Special Diagnostic Code Modifications Required: None.

6.0 Program Modes to be Used

6.1 Input files are modified in accordance with Section 4.0.

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 szft.rlt file lists colloids separate from solute nuclides.

8.2 Assumptions: none

8.3 Constraints: none

8.4 Output Files: TPA.INP is modified to generate all output files

8.5 Procedure:

1. Copy the tpa.e and tpa.inp from the $TPA_TEST directory to the <<Run Directory>> and perform the modifications to the tpa.inp file as noted in 4.1.

2. At the command prompt from the <<Run Directory>>, type the following:, "tpa.e > PA-SCR-450_SL4.out." The screen output will be captured to file PA-SCR-450_SL4.out

3. Compare the ordering of all nuclides between the szft.rlt output file and the tpa.inp file.

8.6 Pass/Fail Criteria: The code runs to completion and generates screen output and file output information corresponding to that expected in section 8.5.

9.0 Test Results

9.1 Output and Supporting Files: All files are archived to a CD labeled, "Test Plan and Test Results for TPA SCR #450."

9.2 Criterion 1: Verify that the number and ordering of nuclides in tpa.inp corresponds with those presented in tpa.inp.

9.3 Overall Test Status:

The following presents the order and number of nuclides as presented in tpa.inp and szft.rlt:

Tpa.inp	Szft.rlt
Solute Nuclides	**Solute Nuclides**
Cm246	Cm246
U238	U238
Cm245	Cm245
Am241	Am241
Np237	Np237
Am243	Am243
Pu239	Pu239
Pu240	Pu240
U234	U234
Th230	Th230
Ra226	Ra226
Pb210	Pb210
Cs135	Cs135
I129	I129
Tc99	Tc99
Ni59	Ni59
C14	C14
Se79	Se79
Nb94	Nb94
C136	C136
Colloidal Nuclides	**Colloidal Nuclides**
Jc246	Jc246
U238	U238
Jc245	Jc245

Ja241	Ja241
Np237	Np237
Ja243	Ja243
Jp239	Jp239
Jp240	Jp240
Jt230	Jt230
Ra226	Ra226
Pb210	Pb210

The ordering, number and presentation of nuclides between the two files corresponds. All of the colloidal nuclides are listed after the solute nuclides.

This test successfully **PASSED** the criterion above for test SL-4.

SOFTWARE CHANGE REPORT (SCR)

SCR No. (*Software Developer Assigns*): PA-SCR-452	**Software Title and Version:** **TPA 5.0g**	**/Project No:** 20.06002.01.113

Affected Software Module(s), Description of Problem(s): *tpa.inp,*
Update saturated zone parameter distributions in the TPA input file with new values from J. Winterle.

Change Requested by:	**Change Authorized by** (*Software Developer*):
J. Winterle Date: 6-16-03	R. Janetzke Date: 6-16-03

Description of Change(s) or Problem Resolution (*If changes not implemented, please justify*):
change *tpa.inp* parameters to the new values listed below. See Attachments 1 and 2 for a complete description of changes.

loguniform
DiffusionRate_STFF
1.0E-4, 1.0E-2

uniform
DistanceToTuffAlluviumInterface[km]
12., 17.

constant
SZFluxMultiplierAtGlacialMaximum[]
1.0

uniform
StreamTubeWidthMultiplier[]
0.8, 1.2

Implemented by:	**Date:**
R. Janetzke	6-21-03

Description of Acceptance Tests:

Perform a code review of the *tpa.inp* file to verify modifications were implemented. Run the tpa code to verify successful execution.

The software successfully passed the process level test in accordance with the Test Plan for TPA SCR #452. The test plan and test results are included on a CD labeled, "Test Plan and Test Results for TPA SCR #452."

Tested by:	**Date:**
Brandi L. Winfrey	July 16, 2003

ATTACHMENT 1

Item #DC1

Proposed change: Adjust the value of the matrix diffusion parameter, DiffusionRate_STFF.

Basis: TPA Version 4.1 base case uses a constant value of 0.001 m2/yr for this parameter, based on laboratory estimates for diffusion of TCO_4^- ion in saturated Tuff (Triay et al., 1997). This value is thought to be conservative because the TCO_4^- is a large molecule and its negative charge makes it susceptible to anion exclusion processes because of negative surface charges on the porous materials. Estimated diffusion coefficients for smaller or uncharged molecules such as tritium are generally more than an order of magnitude greater than those estimated for TCO_4^-. Because this single diffusion coefficient is used to represent all radionuclide species in the SZFT module, there is an uncertainty that an appropriate value could be as much as an order of magnitude greater. Another uncertainty is the distribution of mineral coatings of fractures in the saturated zone that could act to limit matrix diffusion rates; thus, an appropriate value for the diffusion rate parameter could be significantly lower. To address these uncertainties, we propose that the DiffusionRate_STFF parameter for the TPA Version 5.0 base case should be sampled from a loguniform distribution that spans a range of one order of magnitude above and below the previously used constant value. The input lines for *tpa.inp* would then be as follows:

loguniform
DiffusionRate_STFF
1.0E-4, 1.0E-2

Reference

Triay, I.R., A. Meijer, J.L. Conca, K.S. Kung, R.S. Rundberg, B.A. Strietelmeier, and C.D. Tait. *Summary and Synthesis Report on Radionuclide Retardation for the Yucca Mountain Site Characterization Project.* LA-13262-MS. Los Alamos, NM: Los Alamos National Laboratory. 1997.

ATTACHMENT 2

Proposed change: Update saturated zone parameter distributions

==========
uniform
DistanceToTuffAlluviumInterface[km]
12., 18.

Basis: The mid-range value of 15 km is consistent with the modeling results obtained by Winterle (2003), which were based on an underlying hydrogeologic framework model by Sims et al. (1999). Lower bound value of 12 is based on location of Nye County well NC-EWDP-10S, which penetrates saturated alluvium at a distance of 12 km from the boundary of the EDA-II repository design. Upper bound of 18 km is based on a possible conceptual model in which a confining tuff-alluvium interface keeps flow paths within volcanic units beyond the 18-km compliance boundary.

Note: DistanceToTuffAlluviumInterface was limited to 17 to accommodate the NEFTRAN algorithm

==========
constant
SZFluxMultiplierAtGlacialMaximum[]
1.0

Basis: Modeling by Winterle (2003) suggests that groundwater fluxes and travel times in the saturated zone would not change significantly in the event of a regional water table rise and increased recharge. Additionally, the base case strmtube.dat file for TPA 5.0 is already based on a potential wetter future climate scenario.

==========
uniform
StreamTubeWidthMultiplier[]
0.8, 1.2

Basis: Evaluation of several alternative conceptual models (Winterle et al., 2002; Winterle, 2003) suggests that the widths of flow paths originating beneath the repository vary significantly only slightly between differing alternative model scenarios. Twenty percent above and below the mean value of 1.0 should bound this uncertainty.

SOFTWARE CHANGE REPORT (SCR)

SCR No. (*Software Developer Assigns*): PA-SCR-454	**Software Title and Version:** **TPA 5.0n**	**Project No:** 20.06002.01.113

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

The UZ fracture flow and transport model abstraction is excessively conservative by initiating fracture flow for all layers whenever the infiltration is greater that the minimum matrix permeability (or conductivity) for all units.

Change Requested by:	**Change Authorized by** (*Software Developer*):
G. Wittmeyer Date: 6-20-03	R. Janetzke Date: 6-20-03

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

The fracture fraction determination section in uzft.f was moved to below the section for **avgwtt** since the **avgwtt** is used in the new method. This new method uses the layer with the highest matrix permeability (or conductivity) to determine the flow network specified in the UZ NEFTRAN input file, *nefii.inp*.

Implemented by:	**Date:**
R. Janetzke	6-21-03

Description of Acceptance Tests: See Attachment 1 for the full test description and expected results. See "Test Plan for TPA SCR #454" for the actual test procedures and results. See the CD labeled "Test Plan and Test Results for TPA SCR #454" for test data and test runs.

One system level test was designed to verify the calculations for colloidal activity with various infiltration rates. Based on the infiltration rates of 16, 4, 2, 1, and 0.1 mm/yr, different matrix layers should affect the fracture flow. The colloidal activity from the unsaturated zone, as produced for each of the five test runs can be hand-calculated to determine correctness.

All test cases PASSED.

Tested by:	**Date:**
A. Jank	7-28-03

Attachment 1

Introduction:

The following description of the acceptance test for SCR-454 is largely based on the SVTR for test C9-3 (computational correctness of the model abstraction for colloid transport in UZ.) The primary differences are (i) a mean value *tpa.inp* file is used and (ii) the permeabilities for the matrix and fracture continua in the UZ are set to constant values that will trigger the onset of fracture flow and transport depending on the constant infiltration rate that is specified in the *tpa.inp* file. For the case where the aqueous (dissolved) and colloidal species of the same radionuclide are unaffected by retardation during transport through the UZ, the difference between the activity rate (Ci/yr) of the aqueous and the colloidal species released from the UZ at a specific time should be solely affected by the colloid release factor and the permanent loss colloid filter factors for those units with active matrix flow.

Environment Variables:

> setenv TPA_TEST <as required for each Test Case>
> setenv TPA_DATA <as required for each Test Case>

after modifying *tpa.inp* and *uzft.f* (as specified below), and recompiling:

> tpa.e > tpa.out

The file *uzft.f* should be modified to print out values needed to verify the test results. Print statements in the subroutine *prenefmks* for displaying the values of the layer, flfc, and toteffcomplfc as identified in the following text:

```
cc Find total effective permanent loss colloid filter factor as
cc a product of all matrix layers.
           toteffcompflfc = 1.0
           do ilayer = 1, NLYERU
              if (lmedia(ilayer). eq. 1) then
                toteffcompflfc = toteffcompflfc * (1.0d0 - flfc(ilayer))
       print *, 'layer = ', ilayer
       print *, 'flfc  = ', flfc(ilayer)
       print *, 'toteffcomplfc = ', toteffcompflfc
              end if
           end do
```

The TPA Version 5.0m code should be executed in single-realization mode with the changes listed below to the mean-values *tpa.inp* file to facilitate identification of the processes affecting transport of aqueous and colloidal radionuclides through the unsaturated zone below the repository. These changes to the *tpa.inp* file include:

- Use a single subarea (set `StartAtSubarea` to 1 and `StopAtSubarea` to 1)
- Set MaximumTime to 1.0e5

- Conduct a set of five single, mean-value runs in which the infiltration rate is set to a constant value that will force matrix flow in one or more of the UZ units in Subarea 1 (set `ArealAverageMeanAnnualInfiltrationAtStart` to a constant [run *tpa.e* five times using 16, 4, 2, 1, and 0.1 mm/yr (See Tables 1 and 2)]; set `MeanAnnualPrecipitationMultiplierAtGlacialMaximum` to 1; set `MeanAnnualTemperatureIncreaseAtGlacialMaximum` to 0.]
- Force all WP to be initial failures at time zero to force a large, early pulse-like release of radionuclides if water enters the WP and exits using the flowthrough model (set `InitialFailureTime` to 0.; `DefectiveFractionOfWPs/cell` to 1.0; `WaterContactMode_Initial` to 1)
- Remove the effect of the drip shield to allow water to enter the WP and thus ensure a large early release of radionuclides (set `DripShieldTimeMark` to 0.)
- Track only the two chains associated with the aqueous(dissolved) and colloidal species of curium-245 and americium-241, as well as the final daughter product neptunium-237 (an aqueous species only) (comment out all chains except the two 245->241->237 chains in *tpa.inp,* change number of species to 3 and number of chains to 1 for aqueous and colloidal chains)
- Remove effect of invert so pulse release enters UZ (set `InvertBypass` to 1.)
- Produce full set of *.rlt* and *.out* files (set `SelectAppendFiles` to 0 and OutputMode to 1)
- Ensure that retardation of the dissolved radionuclides of interest (Cm-245, Am-241, Np-237) is "turned off" in the UZ (`MatrixKD_`<unit>`_`<nuclide> is set to a constant of 0 and FractureRD_<layer>_<nuclide> to 1.) In the data subdirectory, edit *coefkdeq.dat* and replace the number '5' with '0' where number of radioelements is specified.
- Set UZFractureForceFactor to 1.0 and SZFractureForceFactor to 0.0.

Test Procedure:

Filtration of colloidal species by active matrix flow in the unsaturated zone below the repository. Specify constant values for the variables `PermanentLossColloidFilterFactor_#`, where # designates each of the hydrostratigraphic units in the unsaturated zone (TSw, CHnv, CHnz, PPw, UCF, BFw, UFz) in *tpa.inp*. Execute the TPA Version 5.0m code. Examine *tpa.out* to determine which hydrostratigraphic units contributed to the colloid filtering process. The filtering factor for each matrix layer will be listed as well as the product of all filtering factors for the matrix layers for the selected subarea. Examine the file *uzft.rlt* and record the peak values for the release of aqueous and colloidal curium-245 and americium-241 to the water table, as well as the time at which the peak values occur (aqueous and colloidal species peak values should occur at close to the same time). In addition, record release values and their times of occurrence at several (two to four) times after the peak release. For both curium-245 and americium-241 the relationship between the activity (Ci/yr) of the colloidal species and the aqueous species is given by:

```
Activity(Jc245(time)) = Activity(Cm245(time)) × ColloidReleaseFactor_Jc245 ×
```

```
(1 - PermanentLossColloidFilterFactor_#1)×…×
(1 - PermanentLossColloidFilterFactor_#n)
```

where `#1` is the designator for the topmost hydrostratigraphic unit in which matrix transport occurs, `#n` is the designator for the bottommost hydrostratigraphic unit in which matrix transport occurs, and the ellipsis implies inclusion of similar terms for intermediate units.

Test Criterion or Expected Results:

The test criterion is the difference between the right-hand side(RHS) and left-hand side (LHS) of equation 1 is less than one percent. Any differences between the RHS and LHS may be attributetd to interpolating from the NEFTRAN computational times to the TPA times. Table 1 below shows an example set of runs that may be used to test the activation of the colloid filter effect in those units for which matric flow is active. For the case where the infiltration rate is 16 mm/yr, no matrix flow is active so the difference between the activity of aqueous curium-245 (column 3) and colloidal curium-245 (column 4) is due to the ColloidReleaseFactor_Jc245, which is 0.1. For the case where the infiltration rate is 2 mm/yr, matrix flow is active in the CHnv and PPw units, so the difference between the activity of aqueous curium-245 (column 3) and colloidal curium-245 (column 4) is due to the product of the ColloidReleaseFactor_Jc245 (equal to 0.1), (1-PermanentLossColloidFilterFactor_CHnv) (equal to 0.5), and (1-PermanentLossColloidFilterFactor_PPw) (equal to 0.81).

Table 1. Example of Test Calculations

Infiltration Rate (mm/yr)	**Time of UZ Peak Release**	**Cm245 (Ci/yr)**	**Jc245 (Ci/yr)**	**Matrix Units Active**
16	1022	6.9719×10^{-4}	6.9719×10^{-5}	None
4	2796	4.8919×10^{-4}	2.4460×10^{-5}	CHnv
2	9107	2.3124×10^{-4}	9.3651×10^{-6}	CHnv, PPw
1	31,600	2.8755×10^{-5}	5.0093×10^{-7}	CHnv, PPw, CHnz

Table 2. Example of Matrix Hydraulic Properties

Unit	k (m^2)	K (mm/yr)	Thickness (SA1) (m)	Matrix I=16 mm/yr	Matrix I=4 mm/yr	Matrix I=2 mm/yr	Matrix I=1 mm/yr	Matrix I=0.1 mm/yr	Filter Factor
TSw-matrix	2.00E-19	0.06148	100	no	no	no	no	no	0.65
CHv-matrix	5.00E-17	15.37000	19	no	yes	yes	yes	yes	0.5
CHz-matrix	5.00E-18	1.53700	72	no	no	no	yes	yes	0.57
PPw-matrix	1.00E-17	3.07400	50	no	no	yes	yes	yes	0.19
UCF-matrix	3.00E-18	0.92220	57	no	no	no	no	yes	0.25
BFn-matrix	2.00E-19	0.06148	22	no	no	no	no	no	0.18

where: I = infiltration, no = no matrix flow, yes = matrix flow

Test Plan for TPA SCR # 454

Test Plan Name: Correction of fracture flow algorithm

Tested By: Andrew Jank

Date: July 28, 2003

Host Machine: SUN Ultra-4 Server: spock

Host OS: Solaris 5.8

Baseline Version: TPA5.0e

Test Version: TPA5.0n

System Level Tests

The system level tests are designed to verify the new values for fracture flow and the transport model abstraction for the unsaturated zone.

SL-1 Verify Colloidal Infiltration

1.0 Path for Run Directory

Test Case A:

<<Run Directory>> = $HOME/PA-SCR-454/test/sltest/sl-1/testA

Test Case B:

<<Run Directory>> = $HOME/PA-SCR-454/test/sltest/sl-1/testB

Test Case C:

<<Run Directory>> = $HOME/PA-SCR-454/test/sltest/sl-1/testC

Test Case D:

<<Run Directory>> = $HOME/PA-SCR-454/test/sltest/sl-1/testD

Test Case E:

<<Run Directory>> = $HOME/PA-SCR-454/test/sltest/sl-1/testE

2.0 Path for Archived Results

The appropriate <<Run Directory>> for each test case.

3.0 Environment Variables

For all test cases:

TPA_TEST = $HOME/PA-SCR-454/tpa50n

TPA_DATA = $HOME/PA-SCR-454/tpa50n

4.0 Special Input Files or Modifications to Input Files Required

4.1 For all test cases, modify the TPA.INP file in accordance with the following table:

Parameter	Value
NumberOfRealizations	1
StartAtSubarea	1

StopAtSubarea	1
MaximumTime[yr]	1.0e5
MeanAnnualPrecipitationMultiplierAtGlacialMaximum	{constant, 1}
MeanAnnualTemperatureIncreaseAtGlacialMaximum[degC]	{constant, 0}
InitialFailureTime[yr]	0
DefectiveFractionOfWPs/cell	{constant,1.0}
WaterContactMode_Initial(0=BathTub,1=FlowThrough)	1
DripShieldTimeMark[yr]	0.0
aqueousnuclides	3 1
Comment out all solute nuclides except for chain 2	3 Cm245 Am241 Np237
colloidalnuclides	3 1
Comment out all colloidal nuclides except for chain 2	3 Jc245 Ja241 Np237
InvertBypass(0=ebsfilt,1=bypass-ebsfilt)	1
SelectAppendFiles	0
OutputMode	1
UZFractureForceFactorForKdToRd	1.0
SZFractureForceFactorForKdToRd	0.0
MatrixKD_<unit><nuclide>[m3/kg] Where: unit = Tsw_, CHnv, CHnz, PPw_, UCF_, BFW_, UFZ_ nuclide = Cm, Am, Np	{constant, 0.0}
FractureRD_<layer><nuclide> Where: layer = Tsw_, CHnv, CHnz, PPw_, UCF_, BFW_, UFZ_ nuclide = Cm, Am, Np	{constant, 1.0}
AlluviumMatrixRD_SAV_Am	{lognormal,7.5e4,6.8e10}
AlluviumMatrixRD_SAV_Np	{lognormal,1.0,3.9e3}
ImmobileRD_STFF_Am	{constant,1.8e4}
ImmobileRD_STFF_Np	{constant,19.0}
MatrixPermeability_Tsw_[m2]	{constant, 2.0e-19}
MatrixPermeability_Chnv[m2]	{constant, 5.0e-17}

MatrixPermeability_CHnz[m2]	{constant, 5.0e-18}
MatrixPermeability_PPw_[m2]	{constant, 1.0e-17}
MatrixPermeability_UCF_[m2]	{constant, 3.0e-18}
MatrixPermeability_BFw_[m2]	{constant, 2.0e-19}

4.2 For all test cases, modify the coefkdeq.dat file from the data directory in accordance with the following table:

Parameter	Value
Number of radioelements	0 (from 5)

4.3 For Test Case A, also modify the TPA.INP file in accordance with the following table:

Parameter	Value
ArealAverageMeanAnnualInfiltrationAtStart[mm/yr]	{constant, 16.0}

4.4 For Test Case B, also modify the TPA.INP file in accordance with the following table:

Parameter	Value
ArealAverageMeanAnnualInfiltrationAtStart[mm/yr]	{constant, 4.0}

4.5 For Test Case C, also modify the TPA.INP file in accordance with the following table:

Parameter	Value
ArealAverageMeanAnnualInfiltrationAtStart[mm/yr]	{constant, 2.0}

4.6 For Test Case D, also modify the TPA.INP file in accordance with the following table:

Parameter	Value
ArealAverageMeanAnnualInfiltrationAtStart[mm/yr]	{constant, 1.0}

4.7 For Test Case E, also modify the TPA.INP file in accordance with the following table:

Parameter	Value
ArealAverageMeanAnnualInfiltrationAtStart[mm/yr]	{constant, 0.1}

5.0 Special Diagnostic Code Modifications Required: The file uzft.f should be modified to output the variables layer, flfc, and toteffcompflfc from subroutine prenefmksa.

6.0 Program Modes to be Used:

6.1 Input files are modified in accordance with Section 4.

7.0 Utility Scripts Needed to Perform the Test

None

8.0 Test Description

8.1 Objective: This test is designed to verify the processes affecting transport of aqueous and colloidal radionuclides through the unsaturated zone below the repository.

8.2 Assumptions: none

8.3 Constraints: none

8.4 Output Files: OutputMode is set to 1 to generate all output files.

8.5 Procedure:

1. Perform the diagnostic code modifications in uzft.f as prescribed in section 5.0 and rebuild version TPA50n.

2. Perform the modification to coefkdeq.dat prescribed in section 4.2 in the $TPA_DATA/data directory.

3. For Test Case A:

a.) Copy the tpa.e and tpa.inp into the <<Run Directory>> for Test Case A.

b.) Modify the tpa.inp file in accordance to section 4.

c.) At the command prompt from the <<Run Directory>> directory, type the following, "tpa.e > PA-SCR-454_SL1-A.out." The screen output will be captured to file PA-SCR-454_SL1-A.out.

4. For Test Case B:

a.) Copy the tpa.e and tpa.inp into the <<Run Directory>> for Test Case B.

b.) Modify the tpa.inp file in accordance to section 4.

c.) At the command prompt from the <<Run Directory>> directory, type the following, "tpa.e > PA-SCR-454_SL1-B.out." The screen output will be captured to file PA-SCR-454_SL1-B.out.

5. For Test Case C:

a.) Copy the tpa.e and tpa.inp into the <<Run Directory>> for Test Case C.

b.) Modify the tpa.inp file in accordance to section 4.

c.) At the command prompt from the <<Run Directory>> directory, type the following, "tpa.e > PA-SCR-454_SL1-C.out." The screen output will be captured to file PA-SCR-454_SL1-C.out.

6. For Test Case D:

a.) Copy the tpa.e and tpa.inp into the <<Run Directory>> for Test Case D.

b.) Modify the tpa.inp file in accordance to section 4.

c.) At the command prompt from the <<Run Directory>> directory, type the following, "tpa.e > PA-SCR-454_SL1-D.out." The screen output will be captured to file PA-SCR-454_SL1-D.out.

7. For Test Case E:

a.) Copy the tpa.e and tpa.inp into the <<Run Directory>> for Test Case E.

b.) Modify the tpa.inp file in accordance to section 4.

c.) At the command prompt from the <<Run Directory>> directory, type the following, "tpa.e > PA-SCR-454_SL1-E.out." The screen output will be captured to file PA-SCR-454_SL1-E.out.

8. Calculate the colloid activity using the equation below. The output values should be within 1%, to allow for errors involved in interpolating from the NEFTRAN computational times to the TPA times.

```
Activity(Jc245(time)) =
Activity(Cm245(time)) × colloidReleaseFactor_Jc245 ×
(1 - PermanentLossColloidFilterFactor_#1)×...×
(1 - PermanentLossColloidFilterFactor_#n)
```

8.6 Pass/Fail Criteria: The code runs to completion and generates the required output information in accordance with Section 8.5, Step 8.

9.0 Test Results

9.1 Output and Supporting Files: Files will be archived on a CD labeled, "Test Plan and Test Results for TPA SCR #454."

9.2 Criterion 1: Verify the tpa code executes to completion without aborting.

9.3 Criterion 2: Verify the output information in accordance with Section 8.5, Step 8.

9.4 Overall Test Status:

Please reference the spreadsheet titled "PA-SCR-454_SL1.xls" for a full demonstration of test calculations for Jc245 and Ja241 throughout all TPA time steps and for each infiltration rate. All test runs ran to completion and produced the desired output.

The test spreadsheet calculations for Jc245 and Ja241 came within 0.01% of the value for all time steps and each infiltration rate. For the infiltration rate of 0.1 mm/yr, no release occurred from the unsaturated zone, however, the diagnostic code revealed that four layers were affected by the flow. The other tests (A, B, C, and D) each had 0,1,2,and 3 layers affected, respectively, and their filtering impact was accurately taken into account by the new algorithm for calculating colloidal release from the unsaturated zone.

The software successfully **PASSED** the criterion above for test SL-1.

SOFTWARE CHANGE REPORT (SCR)

SCR No. (*Software Developer Assigns*): PA-SCR-455	**Software Title and Version:** **TPA 5.0h**	**/Project No:** 20.06002.01.113

Affected Software Module(s), Description of Problem(s): *SIZES.INC*

Part 1: Nefmks does not accept chains with 7 members. The Cm246 chain can be fully declared with 7 members.

Change Requested by:	**Change Authorized by** (*Software Developer*):
C. Scherer Date: 6-23-03	R. Janetzke Date: 6-23-03

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

The MXMEM parameter was changed from 6 to 7 in the *SIZES.INC* file in the codes directory.

Implemented by:	**Date:**
R. Janetzke,	6-24-03

Description of Acceptance Tests:
Perform a code inspection of the *SIZES.INC* file to verify that the value of the parameter MXMEM was changed from 6 to 7.

Insert chains with 7 members into tpa.inp and run tpa to verify that it successfully executes. For complete details, see the Test Plan for SCR455.

The software successfully passed the process level test in accordance with the Test Plan for TPA SCR #455. The test plan and test results are included on a CD labeled, "Test Plan and Test Results for TPA SCR #455."

Tested by:	**Date:**
B. Winfrey	July 24, 2003

SOFTWARE CHANGE REPORT (SCR)

SCR No. (*Software Developer Assigns*): PA-SCR-456	**Software Title and Version:** TPA 5.0h	**/Project No:** 20-06002-01.113

Affected Software Module(s), Description of Problem(s): *reader.f*

Automated validation tests are inconvenienced by numerous STOP statements in the error checking section of *reader.f*.

Change Requested by:	**Change Authorized by** (*Software Developer*):
R. Rice Date: 6-25-03	R. Janetzke Date: 6-25-03

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

Add subroutine querystop() to skip over STOP statements for validation tests.

Implemented by:	**Date:**
R. Rice	6-25-03

Description of Acceptance Tests:

Verify that subroutine querystop() has been added to the file *reader.f* and that the function performs its intended function.

An error is inserted into tpa.inp to cause a reader.f error. This will invoke the new subroutine querystop. With a null querystop.t file, tpa should halt execution. With the non-null *querystop.t* file specified in Attachment 1, tpa should not halt execution when the subroutine querystop is called. See Test Plan for a complete description of tests.

The software successfully passed the process level test in accordance with the Test Plan for TPA SCR #456. The test plan and test results are included on a CD labeled, "Test Plan and Test Results for TPA SCR #456."

Tested by:	**Date:**
Brandi L. Winfrey	July 22, 2003

ATTACHMENT 1

non-null *querystop.t* file contents:

```
c
c     NAME:  include file 'querystop.t'
c
c     HISTORY:  by R. Rice 05/31/03
c
c     PURPOSE:  The 'stop' test checking error traps in
'reader.f'
c

cccccc
c
c     GLOSSARY
c
c     iset = integer, set equal to 1 for testing (i.e., no
stopping)
c
cccccc

c     implicit none

c     integer iset

      iset = 1
```

SOFTWARE CHANGE REPORT (SCR)

SCR No. 457	**Software Title and Version:** TPA 5.0h	**Project No:** 20.06002.01.012

Affected Software Module(s), Description of Problem(s): dsfailt.f, dsfail.f, dsfailt.def, tpa.inp

It was requested by NRC to add the capability of computing the failure time of the drip shield without the use of an enhancing factor on the corrosion rate computed as a function of the fluoride concentration.

Change Requested by: Tim McCartin/David Esh Date: 6/26/2003	**Change Authorized by** (*Software Developer*): Ron Janetzke Date: 6/26/03

Description of Change(s) or Problem Resolution (*If changes not implemented, please justify*):
A new input parameter was added to the file tpa.inp
UseFluorideEnhancingFactor(0=no,1=yes)

When UseFluorideEnhancingFactor=0, the enhancing factor is not applied to the drip shield corrosion rate. On the other hand, when UseFluorideEnhancingFactor=1, the enhancing factor is used.

Which test files require modification to accommodate this change?
none

Implemented by: Osvaldo Pensado	**Date:** 6/26/2003

Description of Acceptance Tests:

The Test Plan for TPA SCR#457 consists of one process level test and one system level test. The process level test is designed to verify that the DSFAILT module produces the same drip shield thickness versus time in the new code version as was generated prior to the code change when Fluoride Enhancing Factor was always used. The system level test is designed to verify that without fluoride enhancement, the DSFAIL/DSFAILT module will correctly generate a linearly decreasing drip shield thickness versus time that corresponds to the drip shield corrosion rate.

The software successfully passed the process level and system level test in accordance with the Test Plan for TPA SCR #457. The test plan and test results are included on a CD labeled, "Test Plan and Test Results for TPA SCR #457."

Tested by: George Adams	**Date:** 7/28/2003

Test Plan for TPA SCR # 457

Test Plan Name: Drip Shield Failure Fluoride Enhancement Factor

Tested By: George Adams

Date: July 25, 2003

Host Machine: SUN Ultra-4 Server: spock

Host OS: Solaris 5.8

Baseline Version: 5.0h

Test Version: 5.0m

Process Level Tests

The process level test is designed to verify that the DSFAILT module will generate the same drip shield thickness versus time in the new code version (tpa5.0m) as was generated previously (tpa5.0h) when Fluoride Enhancing Factor was always used.

PL-1 Compare with Previous Results

1.0 Path for Run Directory

For TPA code: <<Run Directory>> = $HOME/PA-SCR-457/test/pltest/pl-1

For Test Case A (tpa5.0h) standalone:

<<Run Directory>> = $HOME/PA-SCR-457/test/pltest/pl-1/testA

For Test Case B (tpa5.0m) standalone:

<<Run Directory>> = $HOME/PA-SCR-457/test/pltest/pl-1/testB

2.0 Path for Archived Results

<<Run Directory>>

3.0 Environment Variables

TPA_TEST = $HOME/PA-SCR-457/tpa50h

TPA_DATA = $HOME/PA-SCR-457/tpa50h

4.0 Special Input Files or Modifications to Input Files Required

4.1 Generate the mean case tpa.inp file (tpameans.out) with the following parameters:

Parameter	Value
OutputMode	1
StopAtSubarea	1
MaximumTime[yr]	1.0e5

5.0 Special Diagnostic Code Modifications Required: None

6.0 Program Modes to be Used

6.1 Input files are modified in accordance with Section 4.0.

7.0 Utility Scripts Needed to Perform the Test

None

8.0 Test Description

8.1 Objective: This test is designed to verify that DSFAILT will generate the same drip shield thickness versus time in the new code version (tpa5.0m) as was generated previously (tpa5.0h) when Fluoride Enhancing Factor was always used.

8.2 Assumptions: none

8.3 Constraints: none

8.4 Output Files: dsfailt.dat

8.5 Procedure:

1. From the <<Run Directory>>, invoke the tpa code with the mean data set tpa.inp file at the command prompt.

2. Copy dsfailt.inp and fluoride.dat to the standalone directory for Test Case A.

3. Copy fluoride.dat to the standalone directory for Test Case B. Copy the dsfailt.def file to the standalone directory for Test Case B. Modify the file to contain the same parameter values as the dsfailt.inp file in Test Case A. In addition, set the FluorideEnh value to 1

4. For Test Case A, at the command prompt from the <<Run Directory>>, type the following:, "dsfailt.e."

5. For Test Case B, at the command prompt from the <<Run Directory>>, type the following:, "dsfailt.e."

6. Compare the dsfailt.dat files for the two test cases and verify they contain the same information.

8.6 Pass/Fail Criteria: The code generates file output information in accordance with Section 8.5, Step 6.

9.0 Test Results

9.1 Output and Supporting Files: All files are archived to a CD labeled, "Test Plan and Test Results for TPA SCR #457."

9.2 Criterion 1: Verify the dsfailt.dat files contain the same information in accordance with Section 8.5, Step 6.

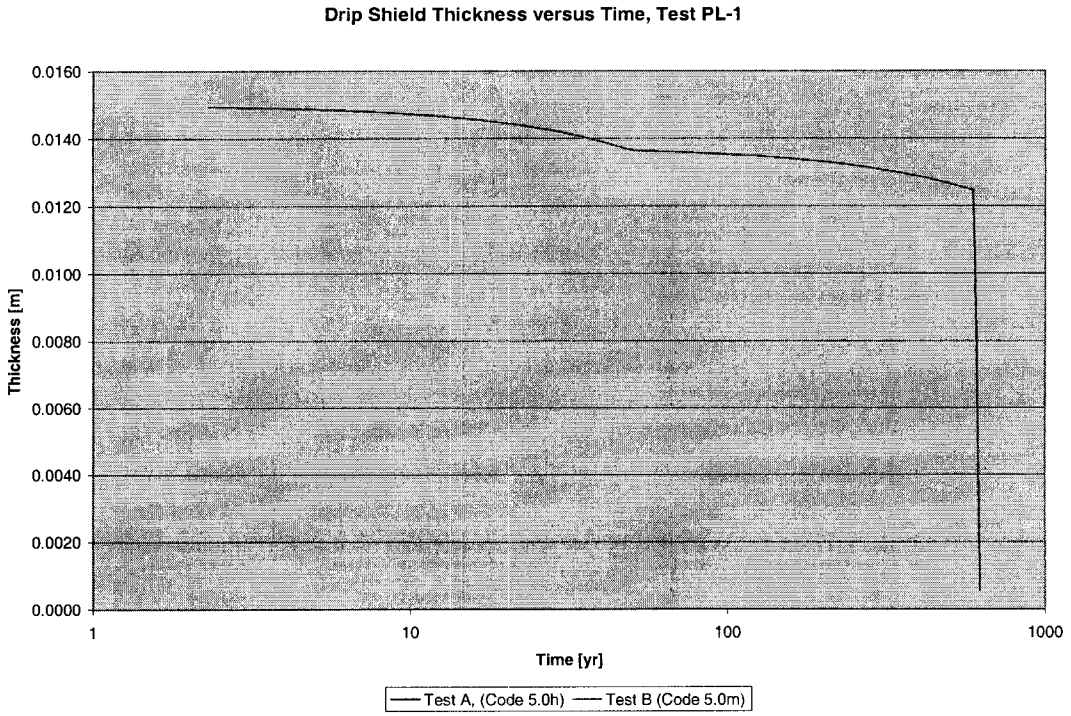
9.3 Overall Test Status:

This test successfully **PASSED** the criterion above for test PL-1.

A screen capture of the difference between the Test Case A and Test Case B dsfailt.dat files shows no difference in these two files:

```
spock% ls
dsfailt-A.dat  dsfailt-B.dat
spock% diff dsfailt-A.dat dsfailt-B.dat
spock%
```

The drip shield thickness versus time plotted below for Test Case A and Test Case B fall on top of each other as shown below:



System Level Tests

The system level test is designed to verify that the DSFAIL/DSFAILT module will correctly generate drip shield thickness versus time without the Fluoride Enhancing Factor.

SL-1 Verify Drip Shield Thickness Without Fluoride Enhancing Factor

1.0 Path for Run Directory

<<Run Directory>> = $HOME/PA-SCR-457/test/sltest/sl-1

2.0 Path for Archived Results

<<Run Directory>>

3.0 Environment Variables

TPA_TEST = $HOME/PA-SCR-457/tpa50m

TPA_DATA = $HOME/PA-SCR-457/tpa50m

4.0 Special Input Files or Modifications to Input Files Required

4.1 Generate the mean case tpa.inp file (tpameans.out) with the following parameters:

Parameter	Value
OutputMode	1
StopAtSubarea	1
MaximumTime[yr]	1.0e5
UseFluorideEnhancingFactor(0=no,1=yes)	0

5.0 Special Diagnostic Code Modifications Required: None

6.0 Program Modes to be Used

6.1 Input files are modified in accordance with Section 4.0.

7.0 Utility Scripts Needed to Perform the Test

None

8.0 Test Description

8.1 Objective: This test is designed to verify that DSFAIL/DSFAILT will generate a drip shield thickness versus time that decreases linearly with time corresponding to the drip shield corrosion rate.

8.2 Assumptions: none

8.3 Constraints: none

8.4 Output Files: dsfail.rlt

8.5 Procedure:

1. At the command prompt from the <<Run Directory>>, type the following:, "tpa.e > PA-SCR-457_SL1.out." The screen output will be captured to file PA-SCR-457_SL1.out.

2. Using dsfail.rlt, verify the drip shield thickness decreases linearly with time at a rate corresponding to the drip shield corrosion rate.

8.6 Pass/Fail Criteria: The code generates file output information in accordance with Section 8.5, Step 2.

9.0 Test Results

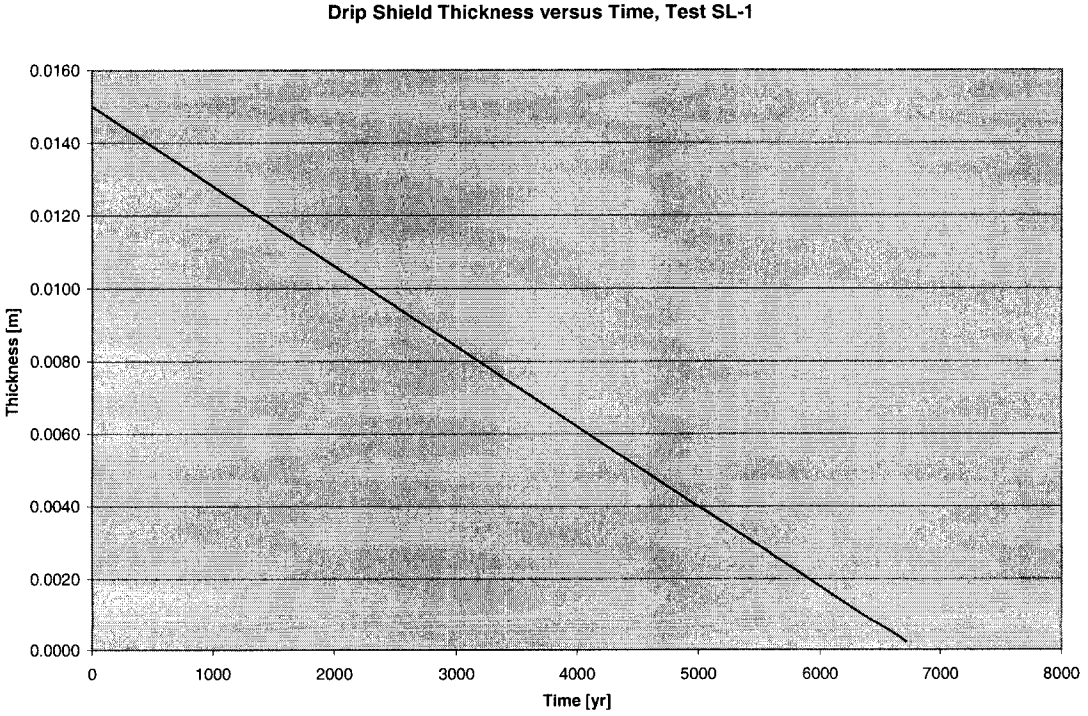
9.1 Output and Supporting Files: All files are archived to a CD labeled, "Test Plan and Test Results for TPA SCR #457."

9.2 Criterion 1: Verify the drip shield thickness decreases linearly with time in accordance with Section 8.5, Step 2.

9.3 Overall Test Status:

This test successfully **PASSED** the criterion above for test SL-1.

The drip shield thickness versus time was extracted from dsfail.rlt and plotted in scr457.xls. This spreadsheet also shows that the drip shield thickness versus time calculated from a corrosion rate of 2.2e-6 m/yr agreed with the drip shield thickness versus time generated to dsfail.rlt and plotted below.



The generated drip shield thickness versus time and the calculated drip shield thickness verus time from scr457.xls is tabulated below:

Time [yr]	Thickness [m]	Calculated Thickness [m]	Difference
0.00E+00	1.500000E-02	1.500000E-02	0.000000E+00
2.31E+00	1.499500E-02	1.499492E-02	8.244000E-08
4.67E+00	1.499000E-02	1.498972E-02	2.836800E-07
7.09E+00	1.498400E-02	1.498439E-02	-3.932000E-07
9.57E+00	1.497900E-02	1.497895E-02	5.444000E-08
1.21E+01	1.497300E-02	1.497337E-02	-3.712000E-07
1.47E+01	1.496800E-02	1.496766E-02	3.356000E-07

Time [yr]	Thickness [m]	Calculated Thickness [m]	Difference
1.74E+01	1.496200E-02	1.496183E-02	1.744000E-07
2.01E+01	1.495600E-02	1.495585E-02	1.518000E-07
2.28E+01	1.495000E-02	1.494973E-02	2.678000E-07
2.57E+01	1.494300E-02	1.494347E-02	-4.732000E-07
2.86E+01	1.493700E-02	1.493707E-02	-6.900000E-08
3.16E+01	1.493100E-02	1.493051E-02	4.870000E-07
3.46E+01	1.492400E-02	1.492380E-02	1.970000E-07
3.78E+01	1.491700E-02	1.491694E-02	6.320000E-08
4.10E+01	1.491000E-02	1.490991E-02	9.000000E-08
4.42E+01	1.490300E-02	1.490272E-02	2.818000E-07
4.76E+01	1.489500E-02	1.489536E-02	-3.592000E-07
5.10E+01	1.488800E-02	1.488783E-02	1.736000E-07
5.45E+01	1.488000E-02	1.488012E-02	-1.176000E-07
5.81E+01	1.487200E-02	1.487223E-02	-2.284000E-07
6.17E+01	1.486400E-02	1.486416E-02	-1.566000E-07
6.55E+01	1.485600E-02	1.485589E-02	1.066000E-07
6.93E+01	1.484700E-02	1.484744E-02	-4.366000E-07
7.33E+01	1.483900E-02	1.483878E-02	2.182000E-07
7.73E+01	1.483000E-02	1.482993E-02	7.320000E-08
8.14E+01	1.482100E-02	1.482086E-02	1.372000E-07
8.56E+01	1.481200E-02	1.481159E-02	4.146000E-07
9.00E+01	1.480200E-02	1.480209E-02	-9.240000E-08
9.44E+01	1.479200E-02	1.479238E-02	-3.772000E-07
9.89E+01	1.478200E-02	1.478243E-02	-4.332000E-07
1.04E+02	1.477200E-02	1.477226E-02	-2.560000E-07
1.08E+02	1.476200E-02	1.476185E-02	1.500000E-07
1.13E+02	1.475100E-02	1.475118E-02	-1.800000E-07
1.18E+02	1.474000E-02	1.474027E-02	-2.680000E-07
1.23E+02	1.472900E-02	1.472911E-02	-1.140000E-07
1.28E+02	1.471800E-02	1.471770E-02	3.040000E-07
1.34E+02	1.470600E-02	1.470599E-02	8.000000E-09
1.39E+02	1.469400E-02	1.469402E-02	-2.400000E-08
1.45E+02	1.468200E-02	1.468179E-02	2.080000E-07
1.50E+02	1.466900E-02	1.466925E-02	-2.520000E-07
1.56E+02	1.465600E-02	1.465643E-02	-4.260000E-07
1.62E+02	1.464300E-02	1.464331E-02	-3.140000E-07
1.68E+02	1.463000E-02	1.462987E-02	1.280000E-07
1.74E+02	1.461600E-02	1.461612E-02	-1.220000E-07
1.81E+02	1.460200E-02	1.460206E-02	-6.400000E-08
1.87E+02	1.458800E-02	1.458765E-02	3.460000E-07
1.94E+02	1.457300E-02	1.457291E-02	8.600000E-08
2.01E+02	1.455800E-02	1.455784E-02	1.560000E-07
2.08E+02	1.454200E-02	1.454240E-02	-4.000000E-07
2.15E+02	1.452700E-02	1.452660E-02	3.960000E-07
2.23E+02	1.451000E-02	1.451046E-02	-4.560000E-07
2.30E+02	1.449400E-02	1.449391E-02	8.800000E-08
2.38E+02	1.447700E-02	1.447697E-02	2.800000E-08
2.46E+02	1.446000E-02	1.445964E-02	3.640000E-07
2.54E+02	1.444200E-02	1.444190E-02	9.600000E-08
2.62E+02	1.442400E-02	1.442375E-02	2.460000E-07

Time [yr]	Thickness [m]	Calculated Thickness [m]	Difference
2.70E+02	1.440500E-02	1.440519E-02	-1.860000E-07
2.79E+02	1.438600E-02	1.438618E-02	-1.780000E-07
2.88E+02	1.436700E-02	1.436673E-02	2.700000E-07
2.97E+02	1.434700E-02	1.434682E-02	1.800000E-07
3.06E+02	1.432600E-02	1.432645E-02	-4.480000E-07
3.16E+02	1.430600E-02	1.430559E-02	4.080000E-07
3.25E+02	1.428400E-02	1.428425E-02	-2.520000E-07
3.35E+02	1.426200E-02	1.426243E-02	-4.280000E-07
3.45E+02	1.424000E-02	1.424008E-02	-7.600000E-08
3.56E+02	1.421700E-02	1.421720E-02	-1.960000E-07
3.66E+02	1.419400E-02	1.419379E-02	2.120000E-07
3.77E+02	1.417000E-02	1.416983E-02	1.700000E-07
3.88E+02	1.414500E-02	1.414532E-02	-3.220000E-07
4.00E+02	1.412000E-02	1.412022E-02	-2.200000E-07
4.12E+02	1.409500E-02	1.409455E-02	4.540000E-07
4.24E+02	1.406800E-02	1.406826E-02	-2.560000E-07
4.36E+02	1.404100E-02	1.404137E-02	-3.720000E-07
4.48E+02	1.401400E-02	1.401385E-02	1.500000E-07
4.61E+02	1.398600E-02	1.398567E-02	3.320000E-07
4.74E+02	1.395700E-02	1.395685E-02	1.520000E-07
4.88E+02	1.392700E-02	1.392735E-02	-3.460000E-07
5.01E+02	1.389700E-02	1.389714E-02	-1.400000E-07
5.15E+02	1.386600E-02	1.386623E-02	-2.300000E-07
5.30E+02	1.383500E-02	1.383462E-02	3.840000E-07
5.44E+02	1.380200E-02	1.380225E-02	-2.540000E-07
5.59E+02	1.376900E-02	1.376912E-02	-1.220000E-07
5.75E+02	1.373500E-02	1.373522E-02	-2.200000E-07
5.91E+02	1.370100E-02	1.370053E-02	4.740000E-07
6.07E+02	1.366500E-02	1.366504E-02	-4.000000E-08
6.23E+02	1.362900E-02	1.362870E-02	3.040000E-07
6.40E+02	1.359200E-02	1.359152E-02	4.840000E-07
6.58E+02	1.355300E-02	1.355346E-02	-4.560000E-07
6.75E+02	1.351500E-02	1.351449E-02	5.060000E-07
6.93E+02	1.347500E-02	1.347465E-02	3.480000E-07
7.12E+02	1.343400E-02	1.343384E-02	1.580000E-07
7.31E+02	1.339200E-02	1.339211E-02	-1.080000E-07
7.50E+02	1.334900E-02	1.334938E-02	-3.840000E-07
7.70E+02	1.330600E-02	1.330565E-02	3.520000E-07
7.91E+02	1.326100E-02	1.326090E-02	1.000000E-07
8.11E+02	1.321500E-02	1.321510E-02	-9.600000E-08
8.33E+02	1.316800E-02	1.316824E-02	-2.360000E-07
8.54E+02	1.312000E-02	1.312028E-02	-2.760000E-07
8.77E+02	1.307100E-02	1.307117E-02	-1.720000E-07
9.00E+02	1.302100E-02	1.302095E-02	5.400000E-08
9.23E+02	1.297000E-02	1.296953E-02	4.680000E-07
9.47E+02	1.291700E-02	1.291691E-02	9.200000E-08
9.71E+02	1.286300E-02	1.286305E-02	-5.200000E-08
9.96E+02	1.280800E-02	1.280794E-02	5.800000E-08
1.02E+03	1.275200E-02	1.275160E-02	4.000000E-07
1.05E+03	1.269400E-02	1.269374E-02	2.600000E-07

Time [yr]	Thickness [m]	Calculated Thickness [m]	Difference
1.08E+03	1.263500E-02	1.263478E-02	2.200000E-07
1.10E+03	1.257400E-02	1.257428E-02	-2.800000E-07
1.13E+03	1.251200E-02	1.251246E-02	-4.600000E-07
1.16E+03	1.244900E-02	1.244910E-02	-1.000000E-07
1.19E+03	1.238400E-02	1.238420E-02	-2.000000E-07
1.22E+03	1.231800E-02	1.231798E-02	2.000000E-08
1.25E+03	1.225000E-02	1.225000E-02	0.000000E+00
1.28E+03	1.218100E-02	1.218070E-02	3.000000E-07
1.31E+03	1.211000E-02	1.210964E-02	3.600000E-07
1.35E+03	1.203700E-02	1.203682E-02	1.800000E-07
1.38E+03	1.196200E-02	1.196224E-02	-2.400000E-07
1.42E+03	1.188600E-02	1.188612E-02	-1.200000E-07
1.45E+03	1.180800E-02	1.180824E-02	-2.400000E-07
1.49E+03	1.172800E-02	1.172838E-02	-3.800000E-07
1.52E+03	1.164700E-02	1.164676E-02	2.400000E-07
1.56E+03	1.156300E-02	1.156316E-02	-1.600000E-07
1.60E+03	1.147800E-02	1.147758E-02	4.200000E-07
1.64E+03	1.139000E-02	1.139002E-02	-2.000000E-08
1.68E+03	1.130000E-02	1.130048E-02	-4.800000E-07
1.72E+03	1.120900E-02	1.120874E-02	2.600000E-07
1.77E+03	1.111500E-02	1.111480E-02	2.000000E-07
1.81E+03	1.101900E-02	1.101888E-02	1.200000E-07
1.85E+03	1.092100E-02	1.092054E-02	4.600000E-07
1.90E+03	1.082000E-02	1.082000E-02	0.000000E+00
1.95E+03	1.071700E-02	1.071704E-02	-4.000000E-08
1.99E+03	1.061200E-02	1.061166E-02	3.400000E-07
2.04E+03	1.050400E-02	1.050386E-02	1.400000E-07
2.09E+03	1.039300E-02	1.039342E-02	-4.200000E-07
2.15E+03	1.028100E-02	1.028056E-02	4.400000E-07
2.20E+03	1.016500E-02	1.016506E-02	-6.000000E-08
2.25E+03	1.004700E-02	1.004670E-02	3.000000E-07
2.31E+03	9.925700E-03	9.925700E-03	0.000000E+00
2.36E+03	9.801800E-03	9.801840E-03	-4.000000E-08
2.42E+03	9.675000E-03	9.675120E-03	-1.200000E-07
2.48E+03	9.545300E-03	9.545320E-03	-2.000000E-08
2.54E+03	9.412500E-03	9.412440E-03	6.000000E-08
2.60E+03	9.276600E-03	9.276700E-03	-1.000000E-07
2.66E+03	9.137500E-03	9.137440E-03	6.000000E-08
2.73E+03	8.995200E-03	8.995100E-03	1.000000E-07
2.80E+03	8.849500E-03	8.849460E-03	4.000000E-08
2.86E+03	8.700400E-03	8.700520E-03	-1.200000E-07
2.93E+03	8.547900E-03	8.547840E-03	6.000000E-08
3.00E+03	8.391700E-03	8.391640E-03	6.000000E-08
3.08E+03	8.232000E-03	8.231920E-03	8.000000E-08
3.15E+03	8.068400E-03	8.068460E-03	-6.000000E-08
3.23E+03	7.901100E-03	7.901040E-03	6.000000E-08
3.30E+03	7.729800E-03	7.729880E-03	-8.000000E-08
3.38E+03	7.554500E-03	7.554540E-03	-4.000000E-08
3.47E+03	7.375100E-03	7.375020E-03	8.000000E-08
3.55E+03	7.191500E-03	7.191540E-03	-4.000000E-08

Time [yr]	Thickness [m]	Calculated Thickness [m]	Difference
3.63E+03	7.003600E-03	7.003660E-03	-6.000000E-08
3.72E+03	6.811300E-03	6.811380E-03	-8.000000E-08
3.81E+03	6.614500E-03	6.614480E-03	2.000000E-08
3.90E+03	6.413100E-03	6.413180E-03	-8.000000E-08
4.00E+03	6.207000E-03	6.207040E-03	-4.000000E-08
4.09E+03	5.996100E-03	5.996060E-03	4.000000E-08
4.19E+03	5.780200E-03	5.780240E-03	-4.000000E-08
4.29E+03	5.559300E-03	5.559360E-03	-6.000000E-08
4.39E+03	5.333200E-03	5.333200E-03	0.000000E+00
4.50E+03	5.101800E-03	5.101760E-03	4.000000E-08
4.61E+03	4.865000E-03	4.865040E-03	-4.000000E-08
4.72E+03	4.622600E-03	4.622600E-03	0.000000E+00
4.83E+03	4.374600E-03	4.374660E-03	-6.000000E-08
4.95E+03	4.120800E-03	4.120780E-03	2.000000E-08
5.06E+03	3.861000E-03	3.860960E-03	4.000000E-08
5.18E+03	3.595100E-03	3.595200E-03	-1.000000E-07
5.31E+03	3.323000E-03	3.323060E-03	-6.000000E-08
5.43E+03	3.044600E-03	3.044540E-03	6.000000E-08
5.56E+03	2.759600E-03	2.759640E-03	-4.000000E-08
5.70E+03	2.467900E-03	2.467920E-03	-2.000000E-08
5.83E+03	2.169500E-03	2.169380E-03	1.200000E-07
5.97E+03	1.864000E-03	1.864020E-03	-2.000000E-08
6.11E+03	1.551400E-03	1.551400E-03	2.168404E-18
6.26E+03	1.231500E-03	1.231520E-03	-2.000000E-08
6.41E+03	9.040300E-04	9.039400E-04	9.000000E-08
6.56E+03	5.689400E-04	5.688800E-04	6.000000E-08
6.72E+03	2.260100E-04	2.261200E-04	-1.100000E-07
6.88E+03	0.000000E+00	0.000000E+00	0.000000E+00
7.04E+03	0.000000E+00	0.000000E+00	0.000000E+00
7.21E+03	0.000000E+00	0.000000E+00	0.000000E+00
7.38E+03	0.000000E+00	0.000000E+00	0.000000E+00
7.55E+03	0.000000E+00	0.000000E+00	0.000000E+00
7.73E+03	0.000000E+00	0.000000E+00	0.000000E+00
7.91E+03	0.000000E+00	0.000000E+00	0.000000E+00
8.10E+03	0.000000E+00	0.000000E+00	0.000000E+00
8.29E+03	0.000000E+00	0.000000E+00	0.000000E+00
8.49E+03	0.000000E+00	0.000000E+00	0.000000E+00
8.69E+03	0.000000E+00	0.000000E+00	0.000000E+00
8.90E+03	0.000000E+00	0.000000E+00	0.000000E+00
9.11E+03	0.000000E+00	0.000000E+00	0.000000E+00
9.32E+03	0.000000E+00	0.000000E+00	0.000000E+00
9.54E+03	0.000000E+00	0.000000E+00	0.000000E+00
9.77E+03	0.000000E+00	0.000000E+00	0.000000E+00
1.00E+04	0.000000E+00	0.000000E+00	0.000000E+00
1.09E+04	0.000000E+00	0.000000E+00	0.000000E+00
1.18E+04	0.000000E+00	0.000000E+00	0.000000E+00
1.27E+04	0.000000E+00	0.000000E+00	0.000000E+00
1.36E+04	0.000000E+00	0.000000E+00	0.000000E+00
1.45E+04	0.000000E+00	0.000000E+00	0.000000E+00
1.54E+04	0.000000E+00	0.000000E+00	0.000000E+00

Time [yr]	Thickness [m]	Calculated Thickness [m]	Difference
1.63E+04	0.000000E+00	0.000000E+00	0.000000E+00
1.72E+04	0.000000E+00	0.000000E+00	0.000000E+00
1.81E+04	0.000000E+00	0.000000E+00	0.000000E+00
1.90E+04	0.000000E+00	0.000000E+00	0.000000E+00
1.99E+04	0.000000E+00	0.000000E+00	0.000000E+00
2.08E+04	0.000000E+00	0.000000E+00	0.000000E+00
2.17E+04	0.000000E+00	0.000000E+00	0.000000E+00
2.26E+04	0.000000E+00	0.000000E+00	0.000000E+00
2.35E+04	0.000000E+00	0.000000E+00	0.000000E+00
2.44E+04	0.000000E+00	0.000000E+00	0.000000E+00
2.53E+04	0.000000E+00	0.000000E+00	0.000000E+00
2.62E+04	0.000000E+00	0.000000E+00	0.000000E+00
2.71E+04	0.000000E+00	0.000000E+00	0.000000E+00
2.80E+04	0.000000E+00	0.000000E+00	0.000000E+00
2.89E+04	0.000000E+00	0.000000E+00	0.000000E+00
2.98E+04	0.000000E+00	0.000000E+00	0.000000E+00
3.07E+04	0.000000E+00	0.000000E+00	0.000000E+00
3.16E+04	0.000000E+00	0.000000E+00	0.000000E+00
3.25E+04	0.000000E+00	0.000000E+00	0.000000E+00
3.34E+04	0.000000E+00	0.000000E+00	0.000000E+00
3.43E+04	0.000000E+00	0.000000E+00	0.000000E+00
3.52E+04	0.000000E+00	0.000000E+00	0.000000E+00
3.61E+04	0.000000E+00	0.000000E+00	0.000000E+00
3.70E+04	0.000000E+00	0.000000E+00	0.000000E+00
3.79E+04	0.000000E+00	0.000000E+00	0.000000E+00
3.88E+04	0.000000E+00	0.000000E+00	0.000000E+00
3.97E+04	0.000000E+00	0.000000E+00	0.000000E+00
4.06E+04	0.000000E+00	0.000000E+00	0.000000E+00
4.15E+04	0.000000E+00	0.000000E+00	0.000000E+00
4.24E+04	0.000000E+00	0.000000E+00	0.000000E+00
4.33E+04	0.000000E+00	0.000000E+00	0.000000E+00
4.42E+04	0.000000E+00	0.000000E+00	0.000000E+00
4.51E+04	0.000000E+00	0.000000E+00	0.000000E+00
4.60E+04	0.000000E+00	0.000000E+00	0.000000E+00
4.69E+04	0.000000E+00	0.000000E+00	0.000000E+00
4.78E+04	0.000000E+00	0.000000E+00	0.000000E+00
4.87E+04	0.000000E+00	0.000000E+00	0.000000E+00
4.96E+04	0.000000E+00	0.000000E+00	0.000000E+00
5.05E+04	0.000000E+00	0.000000E+00	0.000000E+00
5.14E+04	0.000000E+00	0.000000E+00	0.000000E+00
5.23E+04	0.000000E+00	0.000000E+00	0.000000E+00
5.32E+04	0.000000E+00	0.000000E+00	0.000000E+00
5.41E+04	0.000000E+00	0.000000E+00	0.000000E+00
5.50E+04	0.000000E+00	0.000000E+00	0.000000E+00
5.59E+04	0.000000E+00	0.000000E+00	0.000000E+00
5.68E+04	0.000000E+00	0.000000E+00	0.000000E+00
5.77E+04	0.000000E+00	0.000000E+00	0.000000E+00
5.86E+04	0.000000E+00	0.000000E+00	0.000000E+00
5.95E+04	0.000000E+00	0.000000E+00	0.000000E+00
6.04E+04	0.000000E+00	0.000000E+00	0.000000E+00

Time [yr]	Thickness [m]	Calculated Thickness [m]	Difference
6.13E+04	0.000000E+00	0.000000E+00	0.000000E+00
6.22E+04	0.000000E+00	0.000000E+00	0.000000E+00
6.31E+04	0.000000E+00	0.000000E+00	0.000000E+00
6.40E+04	0.000000E+00	0.000000E+00	0.000000E+00
6.49E+04	0.000000E+00	0.000000E+00	0.000000E+00
6.58E+04	0.000000E+00	0.000000E+00	0.000000E+00
6.67E+04	0.000000E+00	0.000000E+00	0.000000E+00
6.76E+04	0.000000E+00	0.000000E+00	0.000000E+00
6.85E+04	0.000000E+00	0.000000E+00	0.000000E+00
6.94E+04	0.000000E+00	0.000000E+00	0.000000E+00
7.03E+04	0.000000E+00	0.000000E+00	0.000000E+00
7.12E+04	0.000000E+00	0.000000E+00	0.000000E+00
7.21E+04	0.000000E+00	0.000000E+00	0.000000E+00
7.30E+04	0.000000E+00	0.000000E+00	0.000000E+00
7.39E+04	0.000000E+00	0.000000E+00	0.000000E+00
7.48E+04	0.000000E+00	0.000000E+00	0.000000E+00
7.57E+04	0.000000E+00	0.000000E+00	0.000000E+00
7.66E+04	0.000000E+00	0.000000E+00	0.000000E+00
7.75E+04	0.000000E+00	0.000000E+00	0.000000E+00
7.84E+04	0.000000E+00	0.000000E+00	0.000000E+00
7.93E+04	0.000000E+00	0.000000E+00	0.000000E+00
8.02E+04	0.000000E+00	0.000000E+00	0.000000E+00
8.11E+04	0.000000E+00	0.000000E+00	0.000000E+00
8.20E+04	0.000000E+00	0.000000E+00	0.000000E+00
8.29E+04	0.000000E+00	0.000000E+00	0.000000E+00
8.38E+04	0.000000E+00	0.000000E+00	0.000000E+00
8.47E+04	0.000000E+00	0.000000E+00	0.000000E+00
8.56E+04	0.000000E+00	0.000000E+00	0.000000E+00
8.65E+04	0.000000E+00	0.000000E+00	0.000000E+00
8.74E+04	0.000000E+00	0.000000E+00	0.000000E+00
8.83E+04	0.000000E+00	0.000000E+00	0.000000E+00
8.92E+04	0.000000E+00	0.000000E+00	0.000000E+00
9.01E+04	0.000000E+00	0.000000E+00	0.000000E+00
9.10E+04	0.000000E+00	0.000000E+00	0.000000E+00
9.19E+04	0.000000E+00	0.000000E+00	0.000000E+00
9.28E+04	0.000000E+00	0.000000E+00	0.000000E+00
9.37E+04	0.000000E+00	0.000000E+00	0.000000E+00
9.46E+04	0.000000E+00	0.000000E+00	0.000000E+00
9.55E+04	0.000000E+00	0.000000E+00	0.000000E+00
9.64E+04	0.000000E+00	0.000000E+00	0.000000E+00
9.73E+04	0.000000E+00	0.000000E+00	0.000000E+00
9.82E+04	0.000000E+00	0.000000E+00	0.000000E+00
9.91E+04	0.000000E+00	0.000000E+00	0.000000E+00
1.00E+05	0.000000E+00	0.000000E+00	0.000000E+00

SOFTWARE CHANGE REPORT (SCR)

SCR No. (*Software Developer Assigns*): PA-SCR-458	**Software Title and Version:** TPA 5.0i	**/Project No:** 20-1402-762

Affected Software Module(s), Description of Problem(s): iareader.f, ia1.i

Error checking will be added to *iareader.f* to test for the following conditions:

- Value added to a Barrier
- Value added to a Component
- Value added to a Subsystem
- A Parameter has more than one value
- A Parameter has no value
- A Barrier is placed before a Subsystem
- A Component is placed before a Subsystem
- Two Subsystems without a Barrier separating them
- Two Barriers without a Component separating them
- Two Components without a Parameter separating them
- Duplicate Subsystem names
- Duplicate Barrier names
- Duplicate Component names

Change Requested by: **B. Winfrey** **Date: 6-30-03**	**Change Authorized by (*Software Developer*):** **R. Janetzke** **Date: 1-14-02**

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

See Attachment 1

Implemented by: B. Winfrey	**Date: 6-30-03**

Description of Acceptance Tests:

See Attachment 2.

Tested by: **G. Adams**	**Date: July 30, 2003**

ATTACHMENT 1: Description of Change(s) or Problem Resolution

ia1.i: Removed parameter lerror

iareader.f:
Add a call to checkforduplicate for subroutines iafile, iabarrier, and iacomponent. Modify the subroutine checkforduplicate to include input parameters for an array of names, an index for that array, and a maxsize to dimension the array. This allows each of the previously mentioned subroutines to send an array to be checked.

Added a common variable "oldclineid" to the subroutines iafile, iabarrier, iacomponent, and iaparameter to save the previous input line for comparison with the current line "clineid". This allows each subroutine to detect consecutive Subsystems, Barriers, and Components and report the error.

Removed references to "lerror."

Changes made to *iareader.f*:

```
c=======================================================================
      subroutine iabarrier(iaunit)
c=======================================================================
c
c This routine reads the importance analysis data base information for
c the current SUBSYSTEM level.
c
c iaunit = integer, logical unit for the 'ia.dat' file.
c
      implicit double precision (a-h,o-z)
      include 'ia1.i'

c blw 6/30/03 - added temporary storage of old clineid for comparison
      character*15 oldclineid
      common /iaread1/ oldclineid

      character*15 clineid
      character*60 cparamvalue
cc
  100 continue
cc
cc
cc
cc    Read next significant line of the input file.
cc
      call nextline (iaunit, clineid, cparamvalue, dparamvalue)
      if (lend) return
cc
cc    Test for keyword.
cc
      if (clineid .eq. 'BARRIER') then
c blw 6/30/03 added call to check for duplicate barrier names
         call checkforduplicate( cbarrier, numbarrs, maxbarrs,
     &                           cparamvalue, lduplicate)
         if (lduplicate) then
         print *, ''
         print *, ' ***>>> Error in file ia.dat <<<*** '
            print *, 'Barrier '//cparamvalue// ' already defined.'
            stop
```

```
         end if

cc       Save data and advance to next level of membership hierarchy.
         numbarrs = numbarrs + 1
         cbarrier(numbarrs) = cparamvalue
c blw 6/30/03 - save the current clineid for comparison with the next
c                line in iacomponent
         oldclineid = clineid
         call iacomponent(iaunit)
         backspace(iaunit)
cc rlr 12-3-02 SCR417 Added decrement of ilinenum to keep track with
cc backspace command above.
         ilinenum = ilinenum - 1
         go to 100
      else
         if (clineid .eq. 'SUBSYSTEM') then
            if(oldclineid .eq. 'SUBSYSTEM')then
               print *, ''
               print *, ' ***>>> Error in file ia.dat <<<*** '
               print *, 'Expecting barrier line and found ' //
     &                    clineid // ' line at line number', ilinenum
               stop
            else
               return
            end if
         else
         print *, ''
         print *, ' ***>>> Error in file ia.dat <<<*** '
            print *, 'Expecting barrier line and found ' // clineid //
     &                 ' line at line number', ilinenum
            stop
         end if
      end if
      return
      end


c=======================================================================
      subroutine iacomponent(iaunit)
c=======================================================================
c
c This routine reads the importance analysis data base information for
c the current BARRIER level.
c
c iaunit = integer, logical unit for the 'ia.dat' file.
c
      implicit double precision (a-h,o-z)
      include 'ia1.i'

      character*15 clineid
c blw 6/30/03 - added temporary storage of old clineid for comparison
      character*15 oldclineid
      common /iaread1/ oldclineid

      character*60 cparamvalue
  100 continue


cc
cc    Read next significant line of the input file.
cc
      call nextline (iaunit, clineid, cparamvalue, dparamvalue)
      if (lend) return
cc
cc    Test for keyword.
cc
      if (clineid .eq. 'Component' .or.
```

```
     &    clineid .eq. 'COMPONENT') then
  200    continue
c blw 6/30/03 added call to check for duplicate component names
         call checkforduplicate( ccomponent, numcomps, maxcomps,
     &                           cparamvalue, lduplicate)
         if (lduplicate) then
         print *, ''
         print *, ' ***>>> Error in file ia.dat <<<*** '
            print *, 'Component '//cparamvalue// ' already defined.'
            stop
         end if

cc       Save data and advance to next level of membership hierarchy.
         numcomps= numcomps + 1
         ccomponent(numcomps) = cparamvalue
c blw 6/30/03 - save the current clineid for comparison with the next
c                line in iacomponent
         oldclineid = clineid
         call iaparameter(iaunit)
c         call nextline (iaunit, clineid, cparamvalue)
c         if (lend) return
c         if (clineid .eq. 'COMPONENT') go to 200
         backspace(iaunit)
cc rlr 12-3-02 SCR417 Added decrement of ilinenum to keep track with
cc backspace command above.
         ilinenum = ilinenum - 1
         go to 100
      else
c blw 6/30/03 - do not allow two consecutive BARRIERs without a
c                component seperating the two
c        if (clineid .eq. 'SUBSYSTEM' .or.
c    &       clineid .eq. 'BARRIER') then
c           return
         if (clineid .eq. 'SUBSYSTEM') then
            return
         end if
         if (clineid .eq. 'BARRIER') then
            if(oldclineid .eq. 'BARRIER')then
               print *, ''
               print *, ' ***>>> Error in file ia.dat <<<*** '
               print *, 'Expecting component line and found ' //
     &                   clineid // ' line at line number', ilinenum
               stop
            else
               return
            end if
c blw - end change
         else
         print *, ''
         print *, ' ***>>> Error in file ia.dat <<<*** '
            print *, 'Expecting component line and found ' // clineid //
     &               ' line at line number', ilinenum
            stop
         end if
      end if
      return
      end

c=======================================================================
      subroutine iaparameter(iaunit)
c=======================================================================
c
c This routine reads the importance analysis data base information for
c the current COMPONENT level.
c
c iaunit = integer, logical unit for the 'ia.dat' file.
c
```

```
      implicit double precision (a-h,o-z)
      include 'ia1.i'

c blw 6/30/03 - added temporary storage of old clineid for comparison
      character*15 oldclineid
      common /iaread1/ oldclineid

      character*15 clineid
      character*60 cparamvalue
      logical lduplicate
  100 continue
cc
cc    Read next significant line of the input file.
cc
      call nextline (iaunit, clineid, cparamvalue, dparamvalue)
      if (lend) return
cc
cc    Test for keyword.
cc
      if (clineid .eq. 'parameter' .or.
     &    clineid .eq. 'PARAMETER') then
  200    continue
c blw 6/30/03 added parameters to subroutine checkforduplicates
c             now, pass in the array, its index, and maxsize
         call checkforduplicate( cparametername, numparams, maxparams,
     &                           cparamvalue, lduplicate)
c        call checkforduplicate( cparamvalue, lduplicate)
         if (lduplicate) then
         print *, ''
         print *, ' ***>>> Error in file ia.dat <<<*** '
            print *, 'Parameter '//cparamvalue// ' already defined.'
            stop
         end if
cc       Save data and advance to next level of membership hierarchy.
         numparams= numparams + 1
         cparametername(numparams) = cparamvalue
c blw 6/30/03 - save the current clineid for comparison with the next
c               line in iacomponent
         oldclineid = clineid
         call iavalue(iaunit)
         go to 100
      else
         if (clineid .eq. 'SUBSYSTEM' .or.
c blw 6/30/03 -
c    &       clineid .eq. 'BARRIER' .or.
c    &       clineid .eq. 'COMPONENT') then
c           return
     &       clineid .eq. 'BARRIER') then
            return
         end if
         if (clineid .eq. 'COMPONENT') then
            if(oldclineid .eq. 'COMPONENT')then
               print *, ''
               print *, ' ***>>> Error in file ia.dat <<<*** '
               print *, 'Expecting parameter line and found ' //
     &                  clineid // ' line at line number', ilinenum
               stop
            else
               return
            end if
c blw - end change

         else
         print *, ''
         print *, ' ***>>> Error in file ia.dat <<<*** '
            print *, 'Expecting PARAMETER line and found ' // clineid //
     &               ' line at line number', ilinenum
```

```
            stop
         end if
      end if
      end


c blw 6/30/03 new parameter list:  now pass in the array name, it's
c             index, and maxsize.  This allows the subroutine to be
c             used to check for duplicate subsystem, barrier, component,
c             and parameter.
c=====================================================================
c     subroutine checkforduplicate(cparamvalue, lduplicate)
c=====================================================================
c=====================================================================
      subroutine checkforduplicate( cnamearray, index, maxsize,
     &                              cparamvalue, lduplicate)
c=====================================================================
c
c This routine checks for duplicate parameter name entries in the ia.dat
c file.
c
c cnamearray = input, character*60 array, name of input array.
c cparamvalue = input, character*60, parameter name.
c index = input, integer, index for input array.
c lduplicate  = output, logical, duplicate flag [.false. = unique entry,
c                                .true. = duplicate entry]
c maxsize = input, integer, maximum size of input array.
c
      implicit double precision (a-h,o-z)
c blw 6/30/03 commented out, values now passed in as parameters
c     include 'ia1.i'

cc
c blw 6/30/03 - added input parameters
      integer index
      integer maxsize
      character*60 cnamearray(maxsize)

      character*60 cparamvalue
      logical lduplicate
cc
      lduplicate = .false.
cc
cc    Loop over previously stored names.
cc
c blw 6/30/03 - changed array and index to those passed in
c     do i=1,numparams
c        if (cparamvalue .eq. cparametername(numparams) ) then
      do i=1,index
         if (cparamvalue .eq. cnamearray(i) ) then
            lduplicate = .true.
            return
         end if
      end do
      return
      end
```

ATTACHMENT 2: Description of Acceptance Tests

The Test Plan for TPA SCR #458 consists of 14 process level tests. Thirteen of these tests are designed to verify that an incorrectly formatted ia.dat file will cause TPA execution to stop and an appropriately formatted error message will be generated to the screen. One test verifies that multiple sequential comment lines are acceptable in ia.dat.

The software successfully passed the process level tests in accordance with the Test Plan for TPA SCR #458. The test plan and test results are included on a CD labeled, "Test Plan and Test Results for PA-SCR-458."

Test Plan for TPA SCR # 458

Test Plan Name: Error Checking for Improperly Formatted IA.DAT

Tested By: George Adams **Date:** July 30, 2003

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

Baseline Version: 5.0i **Test Versions:** 5.0o

Process Level Tests

These process level tests are designed to verify that an incorrectly formatted *ia.dat* file will cause TPA execution to stop and an appropriately formatted error message will be generated to the screen.

PL-1

1.0 Path for Run Directory

<<Run Directory>> = $HOME/PA-SCR-458/test/pltest/pl-1

2.0 Path for Archived Results

$HOME/PA-SCR-458/testresults

All files will be archived on a CD labeled, "Test Plan and Test Results for PA-SCR-458".

3.0 Environment Variables

TPA_TEST = $HOME/PA-SCR-458/tpa50o

TPA_DATA = $HOME/PA-SCR-458/tpa50o

4.0 Special Input Files or Modifications to Input Files Required

4.1 Set the values in *tpa.inp* in accordance with the following table:

Parameter	Value
StopAtSubarea	1
ALL Importance Analysis Flags	1

4.2 Make the following modifications to the file *ia.dat* : Add a value to a Barrier.

```
BARRIER    = 'BarrierBiosphereStudy'
```

```
value      = 1.0
```

5.0 Special Diagnostic Code Modifications Required: None

6.0 Program Modes to be Used

6.1 Input files are modified in accordance with Sections 4.0.

7.0 Utility Scripts Needed to Perform the Test: None

8.0 Test Description

8.1 Objective: This test is designed to verify that an improperly formatted *ia.dat* file that has a value assigned to a Barrier will stop tpa execution and produce an error message.

8.2 Assumptions: None

8.3 Constraints: None

8.4 Output Files: *PA-SCR-458_PL1.out*

8.5 Procedure:

1. Copy the files *tpa.e* and *tpa.inp* from their source directory to their <<run directory>>.
2. Change to the <<run directory>> and run tpa with the command "tpa.e > PA-SCR-458_PL1.out".

2.1 Copy *PA-SCR-458_PL1.out* to the archive directory.

2.2 Copy *ia.dat* to *ia_PL1.dat* and place *ia_PL1.dat* in the archive directory.

2.3 Open the file *PA-SCR-458_PL1.out* and verify that tpa did not successfully execute and the following error message is located at the end of the file:

```
  ***>>> Error in file ia.dat <<<***
 Expecting component line and found VALUE          line
at line number  7
```

8.6 Pass/Fail Criteria: Execution of the tpa code generates the output as specified in Section 8.5 step 2.3.

9.0 Test Results

9.1 Output and Supporting Files: All files will be archived on a CD labeled, "Test Plan and Test Results for PA-SCR-458".

9.2 Criterion 1: Verify the tpa code stops upon detection of the improperly formatted *ia.dat* file.

9.3 Criterion 2: Verify the error message is generated in accordance with Section 8.5, Step 2.3.

9.4 Overall Test Status:

This test successfully **PASSED** the criterion above for test PL-1.

The tpa code stopped execution with the following error message generated:

```
***>>> Error in file ia.dat <<<***
     Expecting component line and found VALUE           line at
      line number  7
```

PL-2

All setup procedures for this test have been completed in PL-1 steps 1 through 8.4 with the exception being step 4.2; therefore, beginning with step 4.2 and skipping to step 8.4, the following procedure is used (Note: for this test, the <<Run Directory>> is $HOME/PA-SCR-458/pltest/pl-2):

4.2 Make the following modifications to the *ia.dat* file : Add a value to a Component.

```
Component = 'ComponentPrecipitationStudy'
value     = 1.0
```

8.4 Output Files: *PA-SCR-458_PL2.out*

8.5 Procedure:

1. Copy the files *tpa.e* and *tpa.inp* from their source directory to their <<run directory>>.
2. Change to the <<run directory>> and run tpa with the command "tpa.e > PA-SCR-458_PL2.out".

   2.1 Copy *PA-SCR-458_PL2.out* to the archive directory.

   2.2 Copy *ia.dat* to *ia_PL2.dat* and place *ia_PL2.dat* in the archive directory.

   2.3 Open the file *PA-SCR-458_PL2.out* and verify that tpa did not successfully execute and the following error message is located at the end of the file:

```
  ***>>> Error in file ia.dat <<<***
 Expecting PARAMETER line and found VALUE          line
at line number  9
```

8.6 Pass/Fail Criteria: Execution of the tpa code generates the output as specified in Section 8.5 Step 2.3.

9.0 Test Results

9.1 Output and Supporting Files: All files will be archived on a CD labeled, "Test Plan and Test Results for PA-SCR-458".

9.2 Criterion 1: Verify the tpa code stops upon detection of the improperly formatted *ia.dat* file.

9.3 Criterion 2: Verify the error message is generated in accordance with Section 8.5, Step 2.3.

9.4 Overall Test Status:

This test successfully **PASSED** the criterion above for test PL-2.

The tpa code stopped execution with the following error message generated:

```
***>>> Error in file ia.dat <<<***
     Expecting PARAMETER line and found VALUE            line at
    line number  9
```

PL-3

All setup procedures for this test have been completed in PL-1 steps 1 through 8.4 with the exception being step 4.2; therefore, beginning with step 4.2 and skipping to step 8.4, the following procedure is used (Note: for this test, the <<Run Directory>> is $HOME/PA-SCR-458/pltest/pl-3):

4.2 Make the following modifications to the file *ia.dat* : Add a value to a Subsystem.

```
SUBSYSTEM = 'SubsystemNaturalStudy'
value     = 1.0
```

8.4 Output Files: *PA-SCR-458_PL3.out*

8.5 Procedure:

1. Copy the files *tpa.e* and *tpa.inp* from their source directory to their <<run directory>>.
2. Change to the <<run directory>> and run tpa with the command "tpa.e > PA-SCR-458_PL3.out".

2.1 Copy *PA-SCR-458_PL3.out* to the archive directory.

2.2 Copy *ia.dat* to *ia_PL3.dat* and place *ia_PL3.dat* in the archive directory.

2.3 Open the file *PA-SCR-458_PL3.out* and verify that tpa did not successfully execute and the following error message is located at the end of the file:

```
  ***>>> Error in file ia.dat <<<***
 Expecting barrier line and found VALUE           line at
line number  5
```

8.6 Pass/Fail Criteria: Execution of the tpa code generates the output as specified in Section 8.5 Step 2.3.

9.0 Test Results

9.1 Output and Supporting Files: All files will be archived on a CD labeled, "Test Plan and Test Results for PA-SCR-458".

9.2 Criterion 1: Verify the tpa code stops upon detection of the improperly formatted *ia.dat* file.

9.3 Criterion 2: Verify the error message is generated in accordance with Section 8.5, Step 2.3.

9.4 Overall Test Status:

This test successfully **PASSED** the criterion above for test PL-3.

The tpa code stopped execution with the following error message generated:

```
***>>> Error in file ia.dat <<<***
     Expecting barrier line and found VALUE           line at
    line number  5
```

PL-4

All setup procedures for this test have been completed in PL-1 steps 1 through 8.4 with the exception being step 4.2; therefore, beginning with step 4.2 and skipping to step 8.4, the following procedure is used (Note: for this test, the <<Run Directory>> is $HOME/PA-SCR-458/pltest/pl-4):

4.2 Make the following modifications to the file *ia.dat* : A parameter has two values instead of the allowable one.

```
parameter = 'WastePackageFlowMultiplicationFactor'
value     = 1.0
```

```
value      = 1.0
```

8.4 Output Files: *PA-SCR-458_PL4.out*

8.5 Procedure:

1. Copy the files *tpa.e* and *tpa.inp* from their source directory to their <<run directory>>.
2. Change to the <<run directory>> and run tpa with the command "tpa.e > PA-SCR-458_PL4.out".
   2.1 Copy *PA-SCR-458_PL4.out* to the archive directory.
   2.2 Copy *ia.dat* to *ia_PL4.dat* and place *ia_PL4.dat* in the archive directory.
   2.3 Open the file *PA-SCR-458_PL4.out* and verify that tpa did not successfully execute and the following error message is located at the end of the file:

```
   ***>>> Error in file ia.dat <<<***
 Expecting PARAMETER line and found VALUE            line
at line number  12
```

8.6 Pass/Fail Criteria: Execution of the tpa code generates the output as specified in Section 8.5 Step 2.3.

9.0 Test Results

9.1 Output and Supporting Files: All files will be archived on a CD labeled, "Test Plan and Test Results for PA-SCR-458".

9.2 Criterion 1: Verify the tpa code stops upon detection of the improperly formatted *ia.dat* file.

9.3 Criterion 2: Verify the error message is generated in accordance with Section 8.5, Step 2.3.

9.4 Overall Test Status:

This test successfully **PASSED** the criterion above for test PL-4.

The tpa code stopped execution with the following error message generated:

```
***>>> Error in file ia.dat <<<***
     Expecting PARAMETER line and found VALUE            line at
    line number  12
```

PL-5

All setup procedures for this test have been completed in PL-1 steps 1 through 8.4 with the exception being step 4.2; therefore, beginning with step 4.2 and skipping to step 8.4, the

following procedure is used (Note: for this test, the <<Run Directory>> is $HOME/PA-SCR-458/pltest/pl-5):

4.2 Make the following modifications to the file *ia.dat* : A parameter has no value instead of the required one.

```
  parameter = 'WastePackageFlowMultiplicationFactor'
**
  parameter = 'SubAreaWetFraction'
  value     = 1.0
```

8.4 Output Files: *PA-SCR-458_PL5.out*

8.5 Procedure:

1. Copy the files *tpa.e* and *tpa.inp* from their source directory to their <<run directory>>.
2. Change to the <<run directory>> and run tpa with the command "tpa.e > PA-SCR-458_PL5.out".

   2.1 Copy *PA-SCR-458_PL5.out* to the archive directory.

   2.2 Copy *ia.dat* to *ia_PL5.dat* and place *ia_PL5.dat* in the archive directory.

   2.3 Open the file *PA-SCR-458_PL5.out* and verify that tpa did not successfully execute and the following error message is located at the end of the file:

```
  ***>>> Error in file ia.dat <<<***
 Expecting value line and found PARAMETER       line at
line number  12
```

8.6 Pass/Fail Criteria: Execution of the tpa code generates the output as specified in Section 8.5 Step 2.3.

9.0 Test Results

9.1 Output and Supporting Files: All files will be archived on a CD labeled, "Test Plan and Test Results for PA-SCR-458".

9.2 Criterion 1: Verify the tpa code stops upon detection of the improperly formatted *ia.dat* file.

9.3 Criterion 2: Verify the error message is generated in accordance with Section 8.5, Step 2.3.

9.4 Overall Test Status:

This test successfully **PASSED** the criterion above for test PL-5.

The tpa code stopped execution with the following error message generated:

```
***>>> Error in file ia.dat <<<***
     Expecting value line and found PARAMETER        line at line
    number  12
```

PL-6

All setup procedures for this test have been completed in PL-1 steps 1 through 8.4 with the exception being step 4.2; therefore, beginning with step 4.2 and skipping to step 8.4, the following procedure is used (Note: for this test, the <<Run Directory>> is $HOME/PA-SCR-458/pltest/pl-6):

4.2 Make the following modifications to the file *ia.dat* : Place a Barrier before a Subsystem.

```
  BARRIER    = 'BarrierBiosphereStudy'
**
  SUBSYSTEM = 'SubsystemNaturalStudy'
**
```

8.4 Output Files: *PA-SCR-458_PL6.out*

8.5 Procedure:

1. Copy the files *tpa.e* and *tpa.inp* from their source directory to their <<run directory>>.
2. Change to the <<run directory>> and run tpa with the command "tpa.e > PA-SCR-458_PL6.out".

2.1 Copy *PA-SCR-458_PL6.out* to the archive directory.

2.2 Copy *ia.dat* to *ia_PL6.dat* and place *ia_PL6.dat* in the archive directory.

2.3 Open the file *PA-SCR-458_PL6.out* and verify that tpa did not successfully execute and the following error message is located at the end of the file:

```
  ***>>> Error in file ia.dat <<<***
  Expecting SUBSYSTEM line and found BARRIER          line
at line number  4
```

8.6 Pass/Fail Criteria: Execution of the tpa code generates the output as specified in Section 8.5, Step 2.3.

9.0 Test Results

9.1 Output and Supporting Files: All files will be archived on a CD labeled, "Test Plan and Test Results for PA-SCR-458".

9.2 Criterion 1: Verify the tpa code stops upon detection of the improperly formatted *ia.dat* file.

9.3 Criterion 2: Verify the error message is generated in accordance with Section 8.5, Step 2.3.

9.4 Overall Test Status:

This test successfully **PASSED** the criterion above for test PL-6.

The tpa code stopped execution with the following error message generated:

```
***>>> Error in file ia.dat <<<***
      Expecting SUBSYSTEM line and found BARRIER          line at
    line number  4
```

PL-7

All setup procedures for this test have been completed in PL-1 steps 1 through 8.4 with the exception being step 4.2; therefore, beginning with step 4.2 and skipping to step 8.4, the following procedure is used (Note: for this test, the <<Run Directory>> is $HOME/PA-SCR-458/pltest/pl-7):

4.2 Make the following modifications to the file *ia.dat:* Place a Component before a Subsystem.

```
  Component = 'ComponentPrecipitationStudy'
**
  SUBSYSTEM = 'SubsystemNaturalStudy'
```

8.4 Output Files: *PA-SCR-458_PL7.out*

8.5 Procedure:

1. Copy the files *tpa.e* and *tpa.inp* from their source directory to their <<run directory>>.
2. Change to the <<run directory>> and run tpa with the command "tpa.e > PA-SCR-458_PL7.out".

   2.1 Copy *PA-SCR-458_PL7.out* to the archive directory.

   2.2 Copy *ia.dat* to *ia_PL7.dat* and place *ia_PL7.dat* in the archive directory.

   2.3 Open the file *PA-SCR-458_PL7.out* and verify that tpa did not successfully execute and the following error message is located at the end of the file:

```
  ***>>> Error in file ia.dat <<<***
  Expecting SUBSYSTEM line and found COMPONENT        line
at line number  4
```

8.6 Pass/Fail Criteria: Execution of the tpa code generates the output as specified in Section 8.5, Step 2.3.

9.0 Test Results

9.1 Output and Supporting Files: All files will be archived on a CD labeled, "Test Plan and Test Results for PA-SCR-458".

9.2 Criterion 1: Verify the tpa code halts upon detection of the improperly formatted *ia.dat* file.

9.3 Criterion 2: Verify the error message is generated in accordance with Section 8.5, Step 2.3.

9.4 Overall Test Status:

This test successfully **PASSED** the criterion above for test PL-7.

The tpa code stopped execution with the following error message generated:

```
***>>> Error in file ia.dat <<<***
      Expecting SUBSYSTEM line and found COMPONENT        line at
    line number  4
```

PL-8

All setup procedures for this test have been completed in PL-1 steps 1 through 8.4 with the exception being step 4.2; therefore, beginning with step 4.2 and skipping to step 8.4, the following procedure is used (Note: for this test, the <<Run Directory>> is $HOME/PA-SCR-458/pltest/pl-8):

4.2 Make the following modifications to the file *ia.dat* : Have two Subsystems without a Barrier separating them.

```
  SUBSYSTEM = 'SubsystemNaturalStudy'
**
  SUBSYSTEM = 'SubsystemEngineeredStudy'
**
```

8.4 Output Files: *PA-SCR-458_PL8.out*

8.5 Procedure:

1. Copy the files *tpa.e* and *tpa.inp* from their source directory to their <<run directory>>.

2. Change to the <<run directory>> and run tpa with the command "tpa.e > PA-SCR-458_PL8.out".

2.1 Copy *PA-SCR-458_PL8.out* to the archive directory.

2.2 Copy *ia.dat* to *ia_PL8.dat* and place *ia_PL8.dat* in the archive directory.

2.3 Open the file *PA-SCR-458_PL8.out* and verify that tpa did not successfully execute and the following error message is located at the end of the file:

```
  ***>>> Error in file ia.dat <<<***
 Expecting barrier line and found SUBSYSTEM       line at
line number  6
```

8.6 Pass/Fail Criteria: Execution of the tpa code generates the output as specified in Section 8.5, Step 2.3.

9.0 Test Results

9.1 Output and Supporting Files: All files will be archived on a CD labeled, "Test Plan and Test Results for PA-SCR-458".

9.2 Criterion 1: Verify the tpa code halts upon detection of the improperly formatted *ia.dat* file.

9.3 Criterion 2: Verify the error message is generated in accordance with Section 8.5, Step 2.3.

9.4 Overall Test Status:

This test successfully **PASSED** the criterion above for test PL-8.

The tpa code stopped execution with the following error message generated:

```
***>>> Error in file ia.dat <<<***
     Expecting barrier line and found SUBSYSTEM       line at
    line number  6
```

PL-9

All setup procedures for this test have been completed in PL-1 steps 1 through 8.4 with the exception being step 4.2; therefore, beginning with step 4.2 and skipping to step 8.4, the following procedure is used (Note: for this test, the <<Run Directory>> is $HOME/PA-SCR-458/pltest/pl-9):

4.2 Make the following modifications to the file *ia.dat*: Have two Barriers without a Component separating them.

```
  BARRIER    = 'BarrierBiosphereStudy'
**
  BARRIER    = 'BarrierUpperUnsaturatedZoneStudy'
**
```

8.4 Output Files: *PA-SCR-458_PL9.out*

8.5 Procedure:

1. Copy the files *tpa.e* and *tpa.inp* from their source directory to their <<run directory>>.
2. Change to the <<run directory>> and run tpa with the command "tpa.e > PA-SCR-458_PL9.out".
   2.1 Copy *PA-SCR-458_PL9.out* to the archive directory.
   2.2 Copy *ia.dat* to *ia_PL9.dat* and place *ia_PL9.dat* in the archive directory.
   2.3 Open the file *PA-SCR-458_PL9.out* and verify that tpa did not successfully execute and the following error message is located at the end of the file:

```
 ***>>> Error in file ia.dat <<<***
 Expecting component line and found BARRIER          line
at line number  8
```

8.6 Pass/Fail Criteria: Execution of the tpa code generates the output as specified in Section 8.5, Step 2.3.

9.0 Test Results

9.1 Output and Supporting Files: All files will be archived on a CD labeled, "Test Plan and Test Results for PA-SCR-458".

9.2 Criterion 1: Verify the tpa code halts upon detection of the improperly formatted *ia.dat* file.

9.3 Criterion 2: Verify the error message is generated in accordance with Section 8.5, Step 2.3.

9.4 Overall Test Status:

This test successfully **PASSED** the criterion above for test PL-9.

The tpa code stopped execution with the following error message generated:

```
***>>> Error in file ia.dat <<<***
     Expecting component line and found BARRIER          line at
    line number  8
```

PL-10

All setup procedures for this test have been completed in PL-1 steps 1 through 8.4 with the exception being step 4.2; therefore, beginning with step 4.2 and skipping to step 8.4, the following procedure is used (Note: for this test, the <<Run Directory>> is $HOME/PA-SCR-458/pltest/pl-10):

4.2 Make the following modifications to the file *ia.dat* : Have two Components without a Parameter separating them.

```
  Component = 'ComponentPrecipitationStudy'
**
  Component = 'ComponentTivaCanyonStudy'
**
```

8.4 Output Files: *PA-SCR-458_PL10.out*

8.5 Procedure:

1. Copy the files *tpa.e* and *tpa.inp* from their source directory to their <<run directory>>.
2. Change to the <<run directory>> and run tpa with the command "tpa.e > PA-SCR-458_PL10.out".
   2.1 Copy *PA-SCR-458_PL10.out* to the archive directory.
   2.2 Copy *ia.dat* to *ia_PL10.dat* and place *ia_PL10.dat* in the archive directory.
   2.3 Open the file *PA-SCR-458_PL10.out* and verify that tpa did not successfully execute and the following error message is located at the end of the file:

```
 ***>>> Error in file ia.dat <<<***
 Expecting parameter line and found COMPONENT        line
at line number  10
```

8.6 Pass/Fail Criteria: Execution of the tpa code generates the output as specified in Section 8.5, Step 2.3.

9.0 Test Results

9.1 Output and Supporting Files: All files will be archived on a CD labeled, "Test Plan and Test Results for PA-SCR-458".

9.2 Criterion 1: Verify the tpa code stops upon detection of the improperly formatted *ia.dat* file.

9.3 Criterion 2: Verify the error message is generated in accordance with Section 8.5, Step 2.3.

9.4 Overall Test Status:

This test successfully **PASSED** the criterion above for test PL-10.

The tpa code stopped execution with the following error message generated:

```
***>>> Error in file ia.dat <<<***
     Expecting parameter line and found COMPONENT        line at
    line number  10
```

PL-11

All setup procedures for this test have been completed in PL-1 steps 1 through 8.4 with the exception being step 4.2; therefore, beginning with step 4.2 and skipping to step 8.4, the following procedure is used (Note: for this test, the <<Run Directory>> is $HOME/PA-SCR-458/pltest/pl-11):

4.2 Make the following modifications to the file *ia.dat* : Allow for more than one comment line.

```
**
**
**
**
**
**
```

8.4 Output Files: *PA-SCR-458_PL11.out*

8.5 Procedure:

1. Copy the files *tpa.e* and *tpa.inp* from their source directory to their <<run directory>>.
2. Change to the <<run directory>> and run tpa with the command "tpa.e > PA-SCR-458_PL11.out".
   - 2.1 Copy *PA-SCR-458_PL11.out* to the archive directory.
   - 2.2 Copy *ia.dat* to *ia_PL11.dat* and place *ia_PL11.dat* in the archive directory.
   - 2.3 Open the file *PA-SCR-458_PL11.out* and verify that tpa did successfully execute to completion.

8.6 Pass/Fail Criteria: Execution of the tpa code generates the output as specified in Section 8.5, Step 2.3.

9.0 Test Results

9.1 Output and Supporting Files: All files will be archived on a CD labeled, "Test Plan and Test Results for PA-SCR-458".

9.2 Criterion 1: Verify the tpa code successfully executes to completion.

9.4 Overall Test Status:

This test successfully **PASSED** the criterion above for test PL-11.

The tpa code executed and generated the following message:

```
exec:  Run Successfully Completed
```

PL-12

All setup procedures for this test have been completed in PL-1 steps 1 through 8.4 with the exception being step 4.2; therefore, beginning with step 4.2 and skipping to step 8.4, the following procedure is used (Note: for this test, the <<Run Directory>> is $HOME/PA-SCR-458/pltest/pl-12):

4.2 Make the following modifications to the file *ia.dat:* Duplicate Barrier names.

```
  BARRIER    = 'BarrierBiosphereStudy'
**
  BARRIER    = 'BarrierBiosphereStudy'
```

8.4 Output Files: *PA-SCR-458_PL12.out*

8.5 Procedure:

1. Copy the files *tpa.e* and *tpa.inp* from their source directory to their <<run directory>>.
2. Change to the <<run directory>> and run tpa with the command "tpa.e > PA-SCR-458_PL12.out".
   2.1 Copy *PA-SCR-458_PL12.out* to the archive directory.
   2.2 Copy *ia.dat* to *ia_PL12.dat* and place *ia_PL12.dat* in the archive directory.
   2.3 Open the file *PA-SCR-458_PL12.out* and verify that tpa did not successfully execute and the following error message is located at the end of the file:

```
 ***>>> Error in file ia.dat <<<***
Barrier BarrierBiosphereStudy            already defined.
```

8.6 Pass/Fail Criteria: Execution of the tpa code generates the output as specified in Section 8.5, Step 2.3.

9.0 Test Results

9.1 Output and Supporting Files: All files will be archived on a CD labeled, "Test Plan and Test Results for PA-SCR-458".

9.2 Criterion 1: Verify the tpa code stops upon detection of the improperly formatted *ia.dat* file.

9.3 Criterion 2: Verify the error message is generated in accordance with Section 8.5, Step 2.3.

9.4 Overall Test Status:

This test successfully **PASSED** the criterion above for test PL-12.

The tpa code stopped execution with the following error message generated:

```
***>>> Error in file ia.dat <<<***
     Barrier BarrierBiosphereStudy
    already defined.
```

PL-13

All setup procedures for this test have been completed in PL-1 steps 1 through 8.4 with the exception being step 4.2; therefore, beginning with step 4.2 and skipping to step 8.4, the following procedure is used (Note: for this test, the <<Run Directory>> is $HOME/PA-SCR-458/pltest/pl-13):

4.2 Make the following modifications to the file *ia.dat* : Duplicate Subsystem names.

```
  SUBSYSTEM = 'SubsystemNaturalStudy'
**
  SUBSYSTEM = 'SubsystemNaturalStudy'
```

8.4 Output Files: *PA-SCR-458_PL13.out*

8.5 Procedure:

1. Copy the files *tpa.e* and *tpa.inp* from their source directory to their <<run directory>>.
2. Change to the <<run directory>> and run tpa with the command "tpa.e > PA-SCR-458_PL13.out".

   2.1 Copy *PA-SCR-458_PL13.out* to the archive directory.

2.2 Copy *ia.dat* to *ia_PL13.dat* and place *ia_PL13.dat* in the archive directory.

2.3 Open the file *PA-SCR-458_PL13.out* and verify that tpa did not successfully execute and the following error message is located at the end of the file:

```
***>>> Error in file ia.dat <<<***
Subsystem SubsystemNaturalStudy          already defined.
```

8.6 Pass/Fail Criteria: Execution of the tpa code generates the output as specified in Section 8.5, Step 2.3.

9.0 Test Results

9.1 Output and Supporting Files: All files will be archived on a CD labeled, "Test Plan and Test Results for PA-SCR-458".

9.2 Criterion 1: Verify the tpa code stops upon detection of the improperly formatted *ia.dat* file.

9.3 Criterion 2: Verify the error message is generated in accordance with Section 8.5, Step 2.3.

9.4 Overall Test Status:

This test successfully **PASSED** the criterion above for test PL-13.

The tpa code stopped execution with the following error message generated:

```
***>>> Error in file ia.dat <<<***
     Subsystem SubsystemNaturalStudy
    already defined.
```

PL-14

All setup procedures for this test have been completed in PL-1 steps 1 through 8.4 with the exception being step 4.2; therefore, beginning with step 4.2 and skipping to step 8.4, the following procedure is used (Note: for this test, the <<Run Directory>> is $HOME/PA-SCR-458/pltest/pl-14):

4.2 Make the following modifications to the file *ia.dat:* Duplicate Component names.

```
  Component = 'ComponentPrecipitationStudy'
**
  Component = 'ComponentPrecipitationStudy'
```

8.4 Output Files: *PA-SCR-458_PL14.out*

8.5 Procedure:

1. Copy the files *tpa.e* and *tpa.inp* from their source directory to their <<run directory>>.
2. Change to the <<run directory>> and run tpa with the command "tpa.e > PA-SCR-458_PL14.out".
   2.1 Copy *PA-SCR-458_PL14.out* to the archive directory.
   2.2 Copy *ia.dat* to *ia_PL14.dat* and place *ia_PL14.dat* in the archive directory.
   2.3 Open the file *PA-SCR-458_PL14.out* and verify that tpa did not successfully execute and the following error message is located at the end of the file:

```
***>>> Error in file ia.dat <<<***
Component ComponentPrecipitationStudy                already defined.
```

8.6 Pass/Fail Criteria: Execution of the tpa code generates the output as specified in Section 8.5 Step 2.3.

9.0 Test Results

9.1 Output and Supporting Files: All files will be archived on a CD labeled, "Test Plan and Test Results for PA-SCR-458".

9.2 Criterion 1: Verify the tpa code halts upon detection of the improperly formatted *ia.dat* file.

9.3 Criterion 2: Verify the error message is generated in accordance with Section 8.5, Step 2.3.

9.4 Overall Test Status:

This test successfully **PASSED** the criterion above for test PL-14.

The tpa code stopped execution with the following error message generated:

```
***>>> Error in file ia.dat <<<***
 Component ComponentPrecipitationStudy
already defined.
```

SOFTWARE CHANGE REPORT (SCR)

SCR No. 459	**Software Title and Version:** TPA 5.0i	**Project No:** 20.06002.01.012

Affected Software Module(s), Description of Problem(s): *ebsfilt.f*

The **dti** variable in the **ebsfilt** module can be negative when both **tlow** and **thigh** are negative.

Change Requested by:	**Change Authorized by** (*Software Developer*):
G. Wittmeyer	Ron Janetzke
Date: 7-1-03	Date: 7-1-03

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

A lower bound for **thigh** was established by limiting its lowest value to **tlow**.

Which test files require modification to accommodate this change?

None.

Implemented by:	**Date:**
R. Janetzke	7-1-03

Description of Acceptance Tests:

The test plan for TPA SCR #459 consists of one process level test designed to verify that the EBSFILT module correctly bounds variable thigh and that variable dti is no longer negative.

The software successfully passed the process level test in accordance with the Test Plan for TPA SCR #459. The test plan and test results are included on a CD labeled, "Test Plan and Test Results for TPA SCR #459."

Tested by:	**Date:**
G. Adams	7-11-03

Test Plan for TPA SCR # 459

Test Plan Name: Verify Variable thigh is Bounded

Tested By: George Adams

Date: July 11, 2003

Host Machine: SUN Ultra-4 Server: spock

Host OS: Solaris 5.8

Baseline Version: 5.0i

Test Version: 5.0j

Process Level Tests

The process level test is designed to verify that the EBSFILT module correctly bounds variable thigh and that variable dti is no longer negative.

SL-1 Generate Output Files

1.0 Path for Run Directory

<<Run Directory TPA>> = $HOME/PA-SCR-459/test/pltest/pl-1

<<Run Directory Standalone>> = $HOME/PA-SCR-459/test/pltest/pl-1/standalone

2.0 Path for Archived Results

<<Run Directory Standalone>>

3.0 Environment Variables

TPA_TEST = $HOME/PA-SCR-459/tpacode

TPA_DATA = $HOME/PA-SCR-459/tpacode

4.0 Special Input Files or Modifications to Input Files Required

4.1 The base case tpa.inp file is used.

4.2 After the tpa code executes, ebsfilt.inp is modified such that the ksat term is reduced to 1.2e-2 as follows:

```
1.11875882097E-02  3.0000E-01  1.2E-02  7.5000E-01  4.4000E-05
```

This change to ebsfilt.inp is done to ensure the ebsfilt code executes the loop where the correction to the code was made.

5.0 Special Diagnostic Code Modifications Required:

5.1 The ebsfilt.f module is modified to print tlow, thigh, and dti values to the screen. The variables tlow and thigh are generated before and after the code modification section. Within ebsfilt.f add the following lines:

After line 326:

```
      print *, 'time: ', t, ' tlow(before correction): ', tlow,
     &     ' thigh(before correction): ', thigh
```

After line 353:

```
      print *, 'time: ', t, ' tlow(after correction): ', tlow,
     &     ' thigh(after correction): ', thigh, ' dti: ', dti
```

6.0 Program Modes to be Used

6.1 Input files are modified in accordance with Section 4.0.

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 EBSFILT module correctly bounds variable thigh and that variable dti is no longer negative.

8.2 Assumptions: none

8.3 Constraints: none

8.4 Output Files: ebsfilt.out

8.5 Procedure:

1. After building the tpa code with the ebsfilt modifications identified in Section 5.1, at the command prompt from the <<Run Directory TPA>>, type the following:, tpa.e.

2. After the tpa code executes, copy ebsfilt.inp, ebsnef.dat, ebsnef2.dat, and ebsfilt.e to the <<Run Directory Standalone>> directory. Modify the ebsfilt.inp file in accordance with Section 4.0.

3. At the command prompt from the <<Run Directory Standalone>>, type the following:, "ebsfilt.e > ebsfilt.out." The screen output will be captured to file ebsfilt.out.

4. Within ebsfilt.out, verify that variable thigh is bounded and that dti is not negative.

8.6 Pass/Fail Criteria: The code runs to completion and generates output information in accordance with Section 8.5, Step 4.

9.0 Test Results

9.1 Output and Supporting Files: All files are archived to a CD labeled, "Test Plan and Test Results for TPA SCR #459."

9.2 Criterion 1: Verify the code generates output information in accordance with Section 8.5, Step 4.

9.3 Overall Test Status:

This test successfully **PASSED** the criterion above for test PL-1.

Sample output information extracted from ebsfilt.out:

```
 ebsfilt.inp - filtering parameters for ebsfilt
nnuc,flux,por,ksat,x,diff  20    1.1187588209700D-02   0.30000000000000
    1.2000000000000D-02   0.75000000000000    4.4000000000000D-05
 Colloids
time:     4.6744000000000 tlow(before correction):    -166039.87646984
 thigh(before correction):    -79086.329538083
time:     4.6744000000000 tlow(after correction):   0.
 thigh(after correction):   0. dti:   0.
time:     7.0940000000000 tlow(before correction):    -166037.45686984
```

As shown above, dti is non-negative for thigh(before correction) values that are negative because variable thigh was bounded to a minimum value of zero (thigh(after correction) was zero).

```
  thigh(before correction):      137.76716207224
time:      230.04000000000 tlow(after correction):      36.321357318521
 thigh(after correction):      137.76716207224 dti:      1.0144580475372
time:      237.74000000000 tlow(before correction):      44.021357318521
 thigh(before correction):      145.46716207224
time:      237.74000000000 tlow(after correction):      44.021357318521
 thigh(after correction):      145.46716207224 dti:      1.0144580475372
time:      245.62000000000 tlow(before correction):      51.901357318521
 thigh(before correction):      153.34716207224
time:      245.62000000000 tlow(after correction):      51.901357318521
 thigh(after correction):      153.34716207224 dti:      1.0144580475372
```

As shown above, in this additional section of ebsfilt.out, the correction to bound thigh does not affect the value for thigh for positive values. Parameter dti is non-negative.

SOFTWARE CHANGE REPORT (SCR)

1. SCR No. (*Software Developer Assigns*): 460	2. Software Title and Version: TPA5.0i	3. Project No: 20-0602-01-113

4. Affected Software Module(s), Description of Problem(s): A problem was discovered with the ASHRMOVO module during software validation testing for test C16-2. The temporal values for *resuspendablefraction* **were cyclic, when a smooth function was anticipated. Investigation found that this was the result of (i) a misdeclared parameter name in ASHRMOVO, (ii) an incorrect formula for** *amassash(t)* **that used a dilution factor for ash removal processes from the RMEI location, and (iii)** values for *amassash* and *amassashredt* should not be permitted to have values less than zero.

5. Change Requested by: Michael A. Smith Date: 1 July 2003	6. Change Authorized by (*Software Developer*): Date: 7-1-03

7. Description of Change(s) or Problem Resolution (*If changes not implemented, please justify*):
(i) Change spelling of *longrangedePrate* to *longrangedeprate* (2 occurrences) and change declaration of *longrangedeprate* from integer to double precision.

(ii) Modify equation for *term5* to remove dilution factors for removal of ash from the RMEI location by fluvial and aeolian erosion. The dilution factors are only needed for erosion processes carrying material into the critical group area.

Old:
```
    term5 = (-erosratediswind*dilwinddis-erosratedisfl*dilfldis)
   &          *(time(itoe+i)-time(itoe)) + amassash(itoe)
```

New:
```
    term5 = (-erosratediswind-erosratedisfl)
   &         *(time(itoe+i)-time(itoe))+amassash(itoe)
```

(iii) Add if-then routines to reassign values for *amassash* and *amassashredt* to zero if the calculated value is less than or equal to zero.

(iv) Move the following commands to just precede calculation for dladd(itoe+i,m) to improve computational efficiency. Currently, the nonradionuclide-specific calculations for *bterm1*, *bterm2*, *bterm3*, *bterm4*, *bterm5*, and *amassasht* are unnecessarily repeated in the radionuclide-specific do loop.

```
      do m=1,43
        decision=sol(m)*(precip*(1.d0-fpe)*fpsat+
     &             dirr*(1.d0-fie)*fisat)
```

8. Implemented by: M. Smith	Date: 7/28/2003

9. Description of Acceptance Tests:
1. Verify that the modifications to the ASHRMOVO module produces the desired results in the amassash, amassassredt and term5 variables.
2. Verify that the modifications to the ASHRMOVO module produces the desired results in the resuspendablefraction variable in the DCAGS module.
For full test description and results, reference the CD labeled, "Test Plan and Test Results for TPA SCR #460"
All acceptance tests **PASSED.**

10. Tested by: A. Jank	Date: July 22, 2003

Test Plan for TPA SCR # 460

Test Plan Name: ASHRMOVO/DCAGS

Tested By: Andrew Jank

Date: July 17, 2003

Host Machine: SUN Ultra-4 Server: spock

Host OS: Solaris 5.8

Baseline Version: 5.0i (modified)

Test Version: 5.0j (modified)

System Level Tests

The system level tests are designed to verify the new calculations for the temporary variable term5 and the result values for amassah(t), amassashred(t), and resuspendablefraction. The file ashrmovo.f was modified to create an output file for the first three variables, while dcags.f was modified to create an output file for the remaining variable resuspendablefraction. The modified versions were used for both System Level tests.

SL-1 Verification of ASHRMOVO variable values

1.0 Path for Run Directory

For Test Case A: <<Run Directory>> = $HOME/PA-SCR-460/test/sltest/sl-1/testA

For Test Case B: <<Run Directory>> = $HOME/PA-SCR-460/test/sltest/sl-1/testB

2.0 Path for Archived Results

<<Run Directory>> for each test case

3.0 Environment Variables

For Test Case A:

TPA_TEST = $HOME/PA-SCR-460/tpa50i

TPA_DATA = $HOME/PA-SCR-460/tpa50i

For Test Case B:

TPA_TEST = $HOME/PA-SCR-460/tpa50j

TPA_DATA = $HOME/PA-SCR-460/tpa50j

4.0 Special Input Files or Modifications to Input Files Required

4.1 Set the values in TPA.INP in accordance with the following table:

For Test Case A:

Parameter	Value
NumberOfRealizations	1
StartAtSubarea	2
StopAtSubarea	2
VolcanismDisruptiveScenarioFlag(yes=1,no=0)	1
SubareaOfVolcanicEvent	2

ChlorideMultFactor	{uniform, 1.0, 3.6}

For Test Case B:

Parameter	Value
NumberOfRealizations	1
StartAtSubarea	2
StopAtSubarea	2
VolcanismDisruptiveScenarioFlag(yes=1,no=0)	1
SubareaOfVolcanicEvent	2
ChlorideMultFactor	{uniform, 1.0,3.6}

5.0 Special Diagnostic Code Modifications Required: File output statements were introduced into ashrmovo.f to produce ashtmpvals_50i.out and ashtmpvals_50j.out for the two test cases, respectively.

6.0 Program Modes to be Used

6.1 Input files are modified in accordance with Section 4.0. For Test Case B, the reversion of the ChlorideMultFactor from a constant back to a distribution for version TPA 50j is designed to produce the same sampled parameters for output value comparison.

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 modifications to the ASHRMOVO module produces the desired results.

8.2 Assumptions: none

8.3 Constraints: none

8.4 Output Files: TPA.INP is modified to generate all output files

8.5 Procedure:

1. Modify the ashrmovo.f file to output the values for time, term5, amassash, and amassashredt. Reference the modified files section for the associated changes.

2. Rebuild versions tpa50i and tpa50j.

3. For Test Case A: Copy the tpa.e and tpa.inp from the Test Case A $TPA_TEST directory to the <<Run Directory>> and perform the modifications to the tpa.inp file as noted in 4.1.

4. At the command prompt from the <<Run Directory>> for Test Case A, type the following:, "tpa.e > PA-SCR-460_SL1-A.out." The screen output will be captured to file PA-SCR-460_SL1-A.out.

5. For Test Case B: Copy the tpa.e and tpa.inp from the Test Case B $TPA_TEST directory to the <<Run Directory>> and perform the modifications to the tpa.inp file as noted in 4.1.

6. At the command prompt from the <<Run Directory>> for Test Case B, type the following:, "tpa.e > PA-SCR-460_SL1-B.out." The screen output will be captured to file PA-SCR-460_SL1-B.out.

7. Copy the values from the output files ashtmpvals_50i.out and ashtmpvals_50j.out for each of the respective test cases into a spreadsheet. Plot the values for both sets of term5, amassash, and amassashredt on separate plots and compare them. Produce additional plots for term5 and

amassash individually for TestCase B, to show the new curves in a more pronounced manner. The new curves for all three parameters should be smooth and reflect the modification to the term5 calculation.

8. Inspect the spreadsheet values for amassash and amassashredt for negative values for Test Case B.

9. Perform a code inspection to ensure that the change in loop control for the bterm[1..5] variables does not impact the output results by affecting intermediary variables.

8.6 Pass/Fail Criteria: The code runs to completion and generates screen output and file output information corresponding to that expected in section 8.5.

9.0 Test Results

9.1 Output and Supporting Files: All files are archived to a CD labeled, "Test Plan and Test Results for TPA SCR #460."

9.2 Criterion 1: Verify that the curves for term5, amassash, amassashredt are now smooth.

9.3 Criterion 2: Verify that negative values are no longer produced for amassash and amassashredt.

9.4 Criterion 3: Perform a code inspection/comparison to ensure that the change for computational efficiency of the bterm[1..5] variables has no impact on their calculation.

9.4 Overall Test Status:

Reference file PA-SCR-460_SL1.xls for the output data and associated plots.

By inspection of the plot for term5 comparison, the plot for version TPA50i is jagged and accelerates, overall, in value. The individual plot for term5 for version TPA50j is a smooth curve that decreases in value over time, representing this factor's contribution to the mass of ash over time.

By inspection of the plot for amassash comparison, the plot for version TPA50i is also jagged and accelerates, overall, in value. The individual plot for amassash for version TPA50j is a relatively smooth/predictable curve that increases in value after the volcanic event and then degrades to zero over time. When comparing the spreadsheet values for each of the versions, the TPA50i version contains negative values, while the TPA50j version does not.

By inspection of the plot for amassashredt, the two curves are identical until the TPA50i degrades below zero, while the TPA50j version intersects with zero and maintains that value through the end of simulation. This is also apparent by inspection of the data.

By comparing the ashrmovo.f files for each version, the modification to move the "do" loop in order to improve computational efficiency will not have an impact on the results, since there are no intermediate/loop dependent variables involved in the calculation of the bterm[1..5] and amassasht variables.

This test successfully **PASSED** the criterion above for test SL-1.

SL-2 Verification of DCAGS values for resuspendablefraction

1.0 Path for Run Directory

For Test Case A: <<Run Directory>> = $HOME/PA-SCR-460/test/sltest/sl-2/testA

For Test Case B: <<Run Directory>> = $HOME/PA-SCR-460/test/sltest/sl-2/testB

2.0 Path for Archived Results

<<Run Directory>> for each test case

3.0 Environment Variables

For Test Case A:

TPA_TEST = $HOME/PA-SCR-460/tpa50i

TPA_DATA = $HOME/PA-SCR-460/tpa50i

For Test Case B:

TPA_TEST = $HOME/PA-SCR-460/tpa50j

TPA_DATA = $HOME/PA-SCR-460/tpa50j

4.0 Special Input Files or Modifications to Input Files Required

4.1 Set the values in TPA.INP in accordance with the following table:

For Test Case A:

Parameter	Value
NumberOfRealizations	1
StartAtSubarea	2
StopAtSubarea	2
VolcanismDisruptiveScenarioFlag(yes=1,no=0)	1
SubareaOfVolcanicEvent	2
ChlorideMultFactor	{uniform, 1.0, 3.6}

For Test Case B:

Parameter	Value
NumberOfRealizations	1
StartAtSubarea	2
StopAtSubarea	2
VolcanismDisruptiveScenarioFlag(yes=1,no=0)	1
SubareaOfVolcanicEvent	2
ChlorideMultFactor	{uniform, 1.0,3.6}

5.0 Special Diagnostic Code Modifications Required: File output statements were introduced into

dcags.f to produce resfrac_50i.out and resfrac_50j.out for the two test cases, respectively.

6.0 Program Modes to be Used

6.1 Input files are modified in accordance with Section 4.0. For Test Case B, the reversion of the ChlorideMultFactor from a constant back to a distribution for TPA 50j is designed to produce the same sampled parameters for output value comparison.

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 modifications to the ASHRMOVO produce the desired results in the DCAGS module.

8.2 Assumptions: none

8.3 Constraints: none

8.4 Output Files: The dcags.f file was modified to produce the output files resfrac_50i.out and resfrac_50j.out for the two test cases, respectively.

8.5 Procedure:

1. Modify the dcags.f file to output the values for time and resuspendablefraction. Reference the modified files section for the associated changes.

2. Rebuild versions tpa50i and tpa50j.

3. For Test Case A: Copy the tpa.e and tpa.inp from the Test Case A $TPA_TEST directory to the <<Run Directory>> and perform the modifications to the tpa.inp file as noted in 4.1.

4. At the command prompt from the <<Run Directory>> for Test Case A, type the following:, "tpa.e > PA-SCR-460_SL2-A.out." The screen output will be captured to file PA-SCR-460_SL2-A.out.

5. For Test Case B: Copy the tpa.e and tpa.inp from the Test Case B $TPA_TEST directory to the <<Run Directory>> and perform the modifications to the tpa.inp file as noted in 4.1.

6. At the command prompt from the <<Run Directory>> for Test Case B, type the following:, "tpa.e > PA-SCR-460_SL2-B.out." The screen output will be captured to file PA-SCR-460_SL2-B.out.

7. Copy the values from the output files resfrac_50i.out and resfrac_50j.out for each of the respective test cases. Plot the values for both sets of resuspendablefraction data and compare the curves. The new curve for the parameter should be smooth, reflecting the modification to the ASHRMOVO module.

8. Inspect the spreadsheet values for resuspendablefraction to ensure that no negative values are produced.

8.6 Pass/Fail Criteria: The code runs to completion and generates screen output and file output information corresponding to that expected in section 8.5.

9.0 Test Results

9.1 Output and Supporting Files: All files are archived to a CD labeled, "Test Plan and Test Results for TPA SCR #460."

9.2 Criterion 1: Verify that the curve for resuspendablefraction is now reasonable.

9.3 Criterion 2: Verify that negative values are no longer produced for resuspendablefraction.

9.4 Overall Test Status:

Reference file PA-SCR-460_SL2.xls for the output data and associated plots.

By inspection of the plot for resuspendablefraction, the plot for version TPA50i is jagged and contains

numerous negative values. However, the plot for version TPA50j begins at 1.0 and switches to 0.0 at the point when the curve for TPA50i begins to produce negative values. The TPA50j data source values do not contain any negative values.

This test successfully **PASSED** the criterion above for test SL-2.

SOFTWARE CHANGE REPORT (SCR)

1. SCR No. (*Software Developer Assigns*): 461	2. Software Title and Version: TPA5.0j	3. Project No: 20-06002-01-113

4. Affected Software Module(s), Description of Problem(s):
volcano.f

The volcano module does not produce a constant number of WP failed in-drift, for the non-extrusive case, when the parameter in *tpa.inp* requests a constant number to be failed.

5. Change Requested by: B. Winfrey Date:7-3-03	6. Change Authorized by (*Software Developer*): R. Janetzke Date: 7-3-03

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

```
The following code was add in the model 2 section of volcano.f:
< cc rwj 7-5-03;  SCR461
< c       wpentrained  = valuesp( iwpentrained )
<         if( pext .le. fext ) then
<             lExtrusive = .TRUE.
<         else
<             lExtrusive = .FALSE.
<         end if
<
<         if ( lExtrusive ) then
<           wpentrained  = valuesp( iwpentrained )
<         else
<           wpentrained  = 0.0d0
<         end if
< cc end of change for SCR461
```

8. Implemented by: R. Janetzke	Date: 7-5-03

9. Description of Acceptance Tests:

Set the volcano model to distribution and the parameter NumberOfWPsEntrainedByEjecta[] in *tpa.inp* to a constant value. Run tpa for at least three realizations so that there are a few results to compare. The amount of waste packages failed due to igneous activity in the file *wpsfail.res* should equal the constant value assigned to the parameter NumberOfWPsEntrainedByEjecta[] in *tpa.inp,* plus or minus one waste package, for each realization run.

For complete details see the Test Plan for SCR 461.

The software successfully passed the process level test in accordance with the Test Plan for TPA SCR #461. The test plan and test results are included on a CD labeled, "Test Plan and Test Results for TPA SCR #461."

10. Tested by: B. Winfrey	Date: 7-23-2003

SOFTWARE CHANGE REPORT (SCR)

SCR No. 462	Software Title and Version: TPA5.0j	Project No: 20.06002.01.012

Affected Software Module(s), Description of Problem(s):
New parameter values were received from R. Pabalan:

```
Use the following ranges of values for pH:

CNSF package: 3.6 to 8.1, normal distribution
Codisposal package: 4.8 to 10.0, normal distribution

The above ranges were taken from Table 3 of the DOE Analysis Model Report:
Summary of In-Package Chemistry for Waste Forms (ANL-EBS-MD-000050 REV 00).
A normal distribution was assumed, in the absence of technical basis for
other distribution types.
```

Change Requested by: R. Pabalan Date:7-8-03	**Change Authorized by** (*Software Developer*): R. Janetzke Date: 7-8-03

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

The CNSF distribution was applied to the ReferencepH parameter, and the `Codisposal` distribution was applied to the pHForGlassModel[] parameter in *tpa.inp*.

Which test files require modification to accommodate this change?
None

Implemented by: R. Janetzke	**Date:** 7-9-03

Description of Acceptance Tests:

Perform a visual inspection of file *tpa.inp* to ensure that modifications were accomplished.

Tested by: Brandi L. Winfrey	**Date:** 7-24-2003

SOFTWARE CHANGE REPORT (SCR)

SCR No. (*Software Developer Assigns*): PA-SCR-464	**Software Title and Version:** TPA 5.0l	**/Project No:** 20-06002-01.113

Affected Software Module(s), Description of Problem(s): *mechfail.f, itym.dat*

itym.dat: typographical error, added clarifying comments

mechfail.f: drift height could exceed the maximum drift failure height during seismic activity

Change Requested by:	**Change Authorized by** (*Software Developer*):
G. Adams Date: 7-14-03	R. Janetzke Date: 7-14-03

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

itym.dat: Corrected a typographical error (line 24 Modified Atothoff96 to Stothoff96), added comments at lines 306 and 762

mechfail.f: Limited the addition to drift height due to seismic activity to not exceed the maximum drift failure height. Added a constant (ID_DEBUG_ROCK) so that the user can select the type of rock for debug analysis.

Implemented by:	**Date:**
G. Adams	7-15-03

Description of Acceptance Tests:

See attachment.

Tested by:	**Date:**
R. Janetzke	7-24-03

Test Plan for TPA SCR # 464

Test Plan Name: Verify Drift Failure Height is Bounded for Seismicity

Tested By: Ron Janetzke

Date: July 24, 2003

Host Machine: SUNW Sun-Blade-100: scratchy1

Host OS: Solaris 5.9

Baseline Version: 5.0l

Test Version: 5.0m

Baselline Demonstration of Drift Failure Height using Rock Type 1

This section will demonstrate the problem as it existed in the baseline version of the code. The output from the baseline version always applies to rock type 1, so it is the only rock type that can be demonstrated.

1.0 Path for Run Directory
<<Run Directory TPA>> = /export/home/janetzke/tpa/test/tparun
<<Run Directory Standalone>> = /export/home/janetzke/tpa/test/scr464/pl1i

2.0 Path for Archived Results
CD labeled "Test Results for SCR 464": /scr464/pl1i

3.0 Environment Variables
TPA_TEST = /export/home/janetzke/tpa/test
TPA_DATA = /export/home/janetzke/tpa/test

4.0 Special Input Files or Modifications to Input Files Required
4.1 The base case *tpa.inp* file is used.
4.2 After the TPA code executes, modify the *mechfail.inp* file to designate a time of seismic event at 71 years and a type of seismic event of 5.0.

5.0 Special Diagnostic Code Modifications Required:
5.1 The baseline MECHFAIL module is built with debugging available only for rock type 1. This is normally set to false.. Set DEBUG_FLAG to TRUE and recompile. (NOTE: include files *mechadj.i*, *../maxntime.i*, and *../seisadj.i* are required as well as object file *../zportunx.o*)

6.0 Program Modes to be Used
6.1 Files are modified in accordance with Section 4.0.

7.0 Utility Scripts Needed to Perform the Test
None

8.0 Test Description
8.1 Objective: This run is designed to demonstrate that the problem in MECHFAIL module where it incorrectly bounds drift height for seismic events.

8.2 Assumptions: none
8.3 Constraints: none
8.4 Output Files: *mechfail.dat, mechfail.out*

8.5 Procedure:

1. After building the TPA code with the debug options set in MECHFAIL in accordance with Section 5.1, at the command prompt from the <<Run Directory TPA>>, type the following:

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

2. After the TPA code executes, copy *mechfail.e*, *mechfail.inp*, *seisbs1.dis*, and *seisbs2.dis* to the <<Run Directory Standalone>> directory. Modify the *mechfail.inp* file in accordance with Section 4.2.

3. At the command prompt from the <<Run Directory Standalone>>, type the following:,

```
>mechfail.e > mechfail.out
```

The screen output will be captured to file *mechfail.out*.

4. Within *mechfail.out*, notice that at the time of the seismic event (71 years) which appears immediately following the "Volume of dislodged rock:" line, the drift height of 3.6053e+01, exceeds 9.050059 the maximum drift failure height for grid 1, found after the "Drift VOID AREA:" line.

8.6 Demonstration of Problem:
The drift height value from *mechfail.e* should not exceed the maximum drift failure height for the grid, but does so in this demonstration as shown in Section 8.5

Process Level Tests

The process level tests are designed to verify that the MECHFAIL module correctly bounds the drift failure height for rock types 1 and 2 during seismic activity.

PL-1 Drift Failure Height Rock Type 1

1.0 Path for Run Directory

<<Run Directory TPA>> = /export/home/janetzke/tpa/test/tparun

<<Run Directory Standalone>> = /export/home/janetzke/tpa/test/scr464/pl1m

2.0 Path for Archived Results

CD labeled "Test Results for SCR 464": ../tparun and ../scr464/pl1m

3.0 Environment Variables

TPA_TEST = /export/home/janetzke/tpa/test

TPA_DATA = /export/home/janetzke/tpa/test

4.0 Special Input Files or Modifications to Input Files Required

4.1 The base case *tpa.inp* file is used.

4.2 After the TPA code executes. Modify the *mechfail.inp* file to designate a time of seismic event at 71 years and a type of seismic event of 5.0.

5.0 Special Diagnostic Code Modifications Required:

5.1 The MECHFAIL module is built with debugging available for rock types 1 & 2. This is normally set to false.. Set DEBUG_FLAG to TRUE, ID_DEBUG_ROCK to 1 and recompile. (NOTE: INCLUDE files *mechadj.i*, *../maxntime.i*, and *../seisadj.i* are required as well as object file *../zportunx.o*)

6.0 Program Modes to be Used

6.1 Files are modified in accordance with Section 4.0.

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 MECHFAIL module correctly bounds drift height for rock type 1 with magnitude 5 seismic events.

8.2 Assumptions: none

8.3 Constraints: none

8.4 Output Files: *mechfail.dat*, *mechfail.out*

8.5 Procedure:

1. After building the TPA code with the debug options set in MECHFAIL in accordance with Section 5.1, at the command prompt from the <<Run Directory TPA>>, type the following:,

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

2. After the TPA code executes, copy *mechfail.e, mechfail.inp, seisbs1.dis*, and *seisbs2.dis* to the <<Run Directory Standalone>> directory. Modify the *mechfail.inp* file in accordance with Section 4.2.

3. At the command prompt from the <<Run Directory Standalone>>, type the following:,

```
>mechfail.e > mechfail.out
```

The screen output will be captured to file *mechfail.out.*

8.6 Pass/Fail Criteria:

Within *mechfail.out*, at the time of the seismic event (71 years) which appears immediately following the "Volume of dislodged rock:" line, the drift height should not exceed (allowing for display format rounding) the maximum drift failure height for grid 1, found after the "Drift VOID AREA:" line.

9.0 Test Results

9.1 Output and Supporting Files: All files are archived to a CD labeled "Test Results for SCR 464"

9.2 Criterion 1: The drift height of 9.0501e+00, does not exceed (allowing for display format rounding) 9.050059 the maximum drift failure height for grid 1.

9.3 Test Status:

PASS

PL-2 Drift Failure Height Rock Type 2

1.0 Path for Run Directory

<<Run Directory TPA>> = /export/home/janetzke/tpa/test/scr464/pl2m

<<Run Directory Standalone>> = /export/home/janetzke/tpa/test/scr464/pl2m

2.0 Path for Archived Results

CD labeled "Test Results for SCR 464": ../scr464/pl2m

3.0 Environment Variables

TPA_TEST = /export/home/janetzke/tpa/test

TPA_DATA = /export/home/janetzke/tpa/test

4.0 Special Input Files or Modifications to Input Files Required

4.1 The base case *tpa.inp* file is used.

4.2 After the TPA code executes. Modify the *mechfail.inp* file to designate a time of seismic event at 71 years and a type of seismic event of 5.0.

5.0 Special Diagnostic Code Modifications Required:

5.1 The MECHFAIL module is built with debugging available for rock types 1 & 2. This is normally set to false.. Set DEBUG_FLAG to TRUE, ID_DEBUG_ROCK to 2 and recompile. (NOTE: INCLUDE files *mechadj.i*, *../maxntime.i*, and *../seisadj.i* are required as well as object file *../zportunx.o*)

6.0 Program Modes to be Used

6.1 Files are modified in accordance with Section 4.0.

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 MECHFAIL module correctly bounds drift height for rock type 2 with magnitude 5 seismic events.

8.2 Assumptions: none

8.3 Constraints: none

8.4 Output Files: *mechfail.dat*, *mechfail.out*

8.5 Procedure:

1. After building the TPA code with the debug options set in MECHFAIL in accordance with Section 5.1, at the command prompt from the <<Run Directory TPA>>, type the following:,

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

2. After the TPA code executes, files *mechfail.e, mechfail.inp, seisbs1.dis*, and *seisbs2.dis* will be e in the <<Run Directory Standalone>> directory. Modify the *mechfail.inp* file in accordance with Section 4.2.

3. At the command prompt from the <<Run Directory Standalone>>, type the following:,

```
>rm mechfail.out
>mechfail.e > mechfail.out
```

The screen output will be captured to file *mechfail.out*.

8.6 Pass/Fail Criteria:

Within *mechfail.out*, at the time of the seismic event (71 years) which appears immediately following the "Dynamic Bhead Plastic Strain" line, the drift height should not exceed (allowing for display format rounding) the maximum drift failure height for grid 2, found after the "Impact Mitigation Height::" line for grid 1.

9.0 Test Results

9.1 Output and Supporting Files: All files are archived to a CD labeled "Test Results for SCR 464"

9.2 Criterion 1: The drift height of 1.0844e+01, does not exceed (allowing for display format rounding) 10.84423054 the maximum drift failure height for grid 2.

9.3 Test Status:

PASS

SOFTWARE CHANGE REPORT (SCR)

SCR No. 465	**Software Title and Version:** TPA 5.0m	**Project No:** 20.06002.01.012

Affected Software Module(s), Description of Problem(s): *releaset.f*

There are 3 problems that have been identified: (1) the *releaset.f* code generates release rates which can have a mass balance error for all models, especially noticeable for the high dissolution rate models (e.g., Models 1 and 5); (2) Model 4 release rates are not correctly computed (i.e., release rates are orders of magnitude too small); and (3) Model 4 does not account for the subarea wet fraction.

Change Requested by:	**Change Authorized by** (*Software Developer*):
S. Mohanty Date: 7-25-03	R. Janetzke Date: 7-25-03

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

The 3 problems identified above are resolved by making the following *releaset.f* source code modifications.

(1) Use the initial (i.e., t = 0 yr) waste mass from the *releaset.f* input file *ebsrel.inp* (i.e., the"amassc" variable) instead of the waste mass present at the beginning of an integration time step (i.e., the "y(3)" variable).

(2) By-pass a calculation for the dissolution rate (the "uo2rate" variable) using the modified surface area (the "saream" variable) when Model 4 is selected. This calculation was zeroing out the Model 4 dissolution rate because "saream" equals zero when Model 4 is selected. Note that the Model 4 dissolution rate is calculated directly (and previous to this portion of the source code) compared to the other dissolution rate models which rely on this calculation using "saream" to determine the dissolution rate.

(3) Include the subarea wet fraction (the "xfrac" variable) as a multiplier in the calculation of the dissolution rate (the "uo2rate" variable) for Model 4.

Which test files require modification to accommodate this change?
None.

Implemented by:	**Date:**
S. Mohanty	7-25-03

Description of Acceptance Tests:
For this SCR, the Test Plan is provided in Attachment 1 and the Test Results are included in Attachment 2. The attached CD contains all electronic files associated with this SCR.

Tested by:	**Date:**
R. Rice	7-26-03

Attachment 1

Test Plan for TPA SCR # 465

Test Plan Name: Verify Mass Balance and Model 4 Corrections in RELEASET

Tested By: R. Rice

Date: July 28, 2003

Host Machine: SUN Ultra-4 Server: Spock

Host OS: Solaris 5.8

Baseline Version: 5.0m

Test Version: 5.0n

Introduction

There are 3 problems in RELEASET that have been identified, including RELEASET results can have a mass balance error, Model 4 release rates appear to not be correctly computed, and Model 4 does not account for the wet fraction.

These problems were resolved by modifying the *releaset.f* source code. For the mass balance correction, the initial waste mass was used instead of the waste mass present at the beginning of an integration time step. For incorrect Model 4 results, a dissolution rate calculation, which incorrectly included Model 4 and used the modified surface area, was by-passed and thus prevented incorrectly zeroing out the Model 4 dissolution rate. Also, for the omission of the wet fraction ("xfrac") in Model 4, the wet fraction was added as a multiplier in the calculation of the dissolution rate.

During testing, the TPA code will be executed using Version 5.0m, which does not have the RELEASET changes. Subsequently, the current TPA code, Version 5.0n, with RELEASET modifications will be executed to demonstrate that the RELEASET problems were successfully resolved.

For this testing only, the RELEASET code in Versions 5.0m and 5.0n will be modified to screenprint values for the dissolution rate and WP flow rates. This modification was needed because these values are intermediate and not written to an output file.

Test Purpose

This test is designed to verify that source code modifications to RELEASET have been successfully implemented to ensure RELEASET correctly computes waste dissolution rates for Models 1, 2, 3, 4, and 5. For this test, the radionuclide release rates in the RELEASET output file should be consistent with waste dissolution rates. Specifically, for each waste dissolution model testing will determine whether (1) the released mass is consistent with the initial mass present in a WP (mass balance) and (2) the RELEASET waste dissolution rate (kg of waste/yr) is consistent with a waste dissolution rate back-calculated from a conservative, soluble, non-retarded radionuclide release rate (Ci of that radionuclide released/yr).

Consistent with testing conducted for SVTR Test ID C7-2, Tc-99 was the radionuclide chosen because of its long half-life, high solubility, and lack of retardation, and a time of 1766 yr was selected for this analysis.

Test Conditions and Procedure

1.0 Path for Run Directory

For the TPA runs on Spock:

<<Baseline Version Run Directory TPA>> = /sscr1/rrice/tpa50m

<<Test Version Run Directory TPA>> = /sscr1/rrice/tpa50n

2.0 Path for Results

For the TPA runs on Spock:

Baseline results (i.e., using default files)

<<Baseline Version Results Directory TPA>> = /sscr1/rrice/tpa50m/basecase

<<Test Version Results Directory TPA>> = /sscr1/rrice/tpa50n/basecase

Mean value results (i.e., same as baseline except using values from the *tpameans.out* file)

<<Baseline Version Results Directory TPA>> = /sscr1/rrice/tpa50m/tpa_mean_value

<<Test Version Results Directory TPA>> = /sscr1/rrice/tpa50n/tpa_mean_value

Dissolution rate model results (i.e., same as mean value except using IModels 1 - 5)

<<Baseline Version Results Directory TPA>> = /sscr1/rrice/tpa50m/IModel*

<<Test Version Results Directory TPA>> = /sscr1/rrice/tpa50n/IModel*

(there are 5 subdirectories with * = 1 to 5, representing the dissolution rate model)

RELEASET standalone dissolution rate results for determining mass balance and Model 4 results (use RELEASET input files from the dissolution rate model results that are up one directory)

<<Baseline Version Results Directory TPA>> = /sscr1/rrice/tpa50m/IModel*/releaset

<<Test Version Results Directory TPA>> = /sscr1/rrice/tpa50n/IModel*/releaset

(there are 5 subdirectories with * = 1 to 5, representing the dissolution rate model)

RELEASET standalone results for testing the IModel 4 "xfrac" addition (use RELEASET input files from the dissolution rate model results that are up one directory)

<<Baseline Version Results Directory TPA>>=/sscr1/rrice/tpa50m/IModel4/releaset/sa_wet_bathtub;
/sscr1/rrice/tpa50m/IModel4/releaset/sa_wet_bathtub/xfrac;
/sscr1/rrice/tpa50m/IModel4/releaset/sa_wet_flow_thru;
and /sscr1/rrice/tpa50m/IModel4/releaset/sa_wet_flow_thru/xfrac

<<Test Version Results Directory TPA>> = /sscr1/rrice/tpa50n/IModel4/releaset/sa_wet_bathtub;
/sscr1/rrice/tpa50n/IModel4/releaset/sa_wet_bathtub/xfrac;
/sscr1/rrice/tpa50n/IModel4/releaset/sa_wet_flow_thru;

and /sscr1/rrice/tpa50n/IModel4/releaset/sa_wet_flow_thru/xfrac.

In the sa_wet_flow_thru and sa_wet_bathtub subdirectories, both the flow-thru and bathtub models with and without "xfrac" are tested for TPA Code Versions 5.0m and 5.0n. Note that Version 5.0m has "xfrac" added whereas Version 5.0 has "xfrac" deleted in the source code to compute the Model 4 "uo2rate".

3.0 Environment Variables

For the TPA runs on Spock:

<<Baseline Version>> TPA_TEST = /sscr1/rrice/tpa50m

<<Baseline Version>> TPA_DATA = /sscr1/rrice/tpa50m

<<Test Version>> TPA_TEST = /sscr1/rrice/tpa50n

<<Test Version>> TPA_DATA = /sscr1/rrice/tpa50n

4.0 Path for Archived Results

On the attached CD:

<<Baseline Version Results Directory TPA>> = /tpa50m/

<<Test Version Results Directory TPA>> = /tpa50n/

(note that these paths are the same as the paths listed in the "Path for Results" section above except "/sccr1/rrice" is not present in the CD directory structure)

5.0 Special Input Files or Modifications to Input Files Required

The mean value files for TPA Code Versions 5.0m and 5.0n determined from the basecase *tpa.inp* file were used with the following modifications. The differences between the files compared below are from the basecase *tpameans.out* file (which was generated using the basecase *tpa.inp* file) and a tpa.inp file that consists of this tpameans.out file modified for testing.

(note that (1) the Tc-99 gap fraction was set to 0.0; (2) 1 subarea was specified; (3) the maximum simulation time was increased to 1.0e5 yr; and (4) the flow-through model was specified)

```
Comparing files tpa.inp and ..\BASECASE\TPAMEANS.OUT
***** tpa.inp
** Number and Location Of SubAreas[m] Based On Fig3.4-1 in TSPA95
subarea
1
****ZONE T="ONE RECTANGULAR ZONE SUBAREA", F=POINT
        547500.0        4076000.0
        547500.0        4079467.56
        548500.0        4079467.56
        548500.0        4076000.0
        547500.0        4076000.0
**subarea
***** ..\BASECASE\TPAMEANS.OUT
```

```
** Number and Location Of SubAreas[m] Based On Fig3.4-1 in TSPA95
**subarea
**1
****ZONE T="ONE RECTANGULAR ZONE SUBAREA", F=POINT
**        547500.0        4076000.0
**        547500.0        4079467.56
**        548500.0        4079467.56
**        548500.0        4076000.0
**        547500.0        4076000.0
**subarea
*****

***** tpa.inp
**
**
***** ..\BASECASE\TPAMEANS.OUT
**
subarea
10
edaii 1-cw
547514.88,4079310.61
548069.2,4079136.5
547847.3,4077816.2
547370.95,4077922.04
547514.88,4079310.61
edaii 2-cw
548069.2,4079136.5
548569.32,4078981.
548504.06,4077664.24
547847.3,4077816.2
548069.2,4079136.5
edaii 3-cw
547370.95,4077922.04
547847.3,4077816.2
548322.7,4077192.2
547474.7,4077281.6
547370.95,4077922.04
edaii 4-cw
547847.3,4077816.2
548504.06,4077664.24
548479.71,4077173.06
548322.7,4077192.2
547847.3,4077816.2
edaii 5-cw
547474.7,4077281.6
547887.3,4077238.1
```

```
547897.79,4076045.46
547655.97,4076123.07
547474.7,4077281.6
edaii 6-cw
547887.3,4077238.1
548322.7,4077192.2
548155.7,4075962.63
547897.79,4076045.46
547887.3,4077238.1
edaii 7-cw
548322.7,4077192.2
548479.71,4077173.06
548455,4076674.51
548155.7,4075962.63
548322.7,4077192.2
edaii 8-cw
547645.27,4079656.06
548588.98,4079377.55
548569.32,4078981
547514.88,4079310.61
547645.27,4079656.06
edaii 9-cw
547732.82,4080960.00
548251.91,4080817.50
548116.89,4079516.81
547645.27,4079656.06
547732.82,4080960.00
edaii 10-cw
548251.91,4080817.50
548664.55,4080675.00
548588.98,4079377.55
548116.89,4079516.81
548251.91,4080817.50
**
*****

***** tpa.inp
MaximumTime[yr]
1.0e5
**
***** ..\BASECASE\TPAMEANS.OUT
MaximumTime[yr]
1.0e4
**
*****
```

```
***** tpa.inp
WaterContactMode_Initial(0=BathTub,1=FlowThrough)
1
**
***** ..\BASECASE\TPAMEANS.OUT
WaterContactMode_Initial(0=BathTub,1=FlowThrough)
0
**
*****

***** tpa.inp
GapFractionForTC99
0.0
**
***** ..\BASECASE\TPAMEANS.OUT
GapFractionForTC99
0.01
**
*****
```

6.0 Special Diagnostic Code Modifications Required:

The RELEASET standalone code was built by modifying the RELEASET source code (i.e., *releaset.f.original* modified to *releaset.f.modified*). Specifically, the following debug feature was added to screenprint flow rates into and out of the WP and waste dissolution-related values including the waste dissolution rate, "uo2rate".

```
Comparing files releaset.f.modified and RELEASET.F.ORIGINAL
***** releaset.f.modified
cc rwr debug begin 7/26/03
         if (it .eq. 301) then
           do i = 1,301
       print *,'debug:imodel,i,tflo(i),flowrate_in(i),flowrate_out(i)=',
     &         imodel,i,tflo(i),flowrate_in(i),flowrate_out(i)
           enddo
         endif
cc rwr debug end 7/26/03

        if(.not.fullw) then
***** RELEASET.F.ORIGINAL

        if(.not.fullw) then
*****

***** releaset.f.modified
```

```
            end if

cc rwr debug begin 7/26/03
            print *,'debug:imodel,it,y(3),uo2rate,sareat,saream,srate=',
     &              imodel,it,y(3),uo2rate,sareat,saream,srate
cc rwr debug end 7/26/03

c
***** RELEASET.F.ORIGINAL
            end if
c
*****
```

7.0 Program Modes to be Used

Files are modified in accordance with Sections 5.0 and 6.0.

8.0 Utility Scripts Needed to Perform the Test

None

9.0 Test Description

9.1 *Objective*: This test is designed to verify the correct implementation of RELEASET source code modifications intended to ensure (1) the RELEASET results do not have an unacceptable mass balance error, (2) Model 4 release rates are correctly computed, and (3) Model 4 accounts for the wet fraction. That is, from the TPA Code Version 5.0n, simulation results should show acceptable mass balance for all dissolution rate models and corrected Model 4 output that includes the wet fraction. Additionally, from the TPA Code Version 5.0m, simulation results should show unacceptable mass balance errors and incorrect Model 4 output.

9.2 *Assumptions*: none

9.3 *Constraints*: none

9.4 *Output Files*: *ebsnef.dat*, *releaset.out* (i.e., the screenprint which is labeled *releaset.screen* in the archived results on the CD)

9.5 *Procedure*:

1. After building the TPA Code Versions 5.0m and 5.0n with the debug options set in RELEASET, in accordance with Section 6.0, and using the *tpa.inp* file, in accordance with Section 5.0, at the command prompt from <<Baseline Version Run Directory TPA>>/basecase and <<Test Version Run Directory TPA>>/basecase, type the following:,../tpa.e. > tpa.out
2. After the TPA code executes, copy the *tpameans.out* file to *tpa.inp* in the tpa_means_out subdirectories and at the command prompt from <<Baseline Version Run Directory TPA>>/tpa_means_out and <<Test Version Run Directory TPA>>/tpa_means_out, type the following:,../tpa.e. > tpa.out

3. After the TPA code executes, modify the tpa.inp file according to Section 5.0, copy the *tpa.inp* file to <<Baseline Version Run Directory TPA>>/IModel* and <<Test Version Run Directory TPA>>/IModel* (where *= 1 to 5), and at the command prompt from <<Baseline Version Run Directory TPA>>/IModel* and <<Test Version Run Directory TPA>>/IModel*, type the following:,../tpa.e. > tpa.out

4. After the TPA code executes, copy the RELEASET input files *ebsflo.dat*, *ebstrh.dat*, *ebspac.nuc*, and *ebsrel.inp* and the RELEASET executable to <<Baseline Version Run Directory TPA>>/IModel*/releaset and <<Test Version Run Directory TPA>>/IModel*/releaset (where *= 1 to 5) and at the command prompt type the following:,../releaset.e. > releaset.screen

5. After the RELEASET code executes examine the files *ebsnef.dat* and *releaset.screen* for the TPA Code Versions 5.0m and 5.0n.

6. Verify that, for each of the TPA Code Versions 5.0m and 5.0n dissolution rate models, the overall mass balance is corrected using the Tc-99 release rates from *ebsnef.dat* in an EXCEL spreadsheet by computing the total mass of Tc-99 released and compare this with the initial mass (i.e., 114.4 Ci of Tc for spent fuel and 4.547 Ci of Tc for glass).

7. Verify that, for each of the TPA Code Versions 5.0m and 5.0n dissolution rate models, the dissolution rate mass balance is corrected (i.e., Version 5.0n results are corrected vis-a-vis Version 5.0m results) by comparing the "uo2rate" from *releaset.screen* and the Tc-99 release rate at 1766 yr in *ebsnef.dat* converted from Ci of Tc/yr to kg of waste/yr (using the factors 7890 kg of waste/114.4 Ci of Tc/17.5 flowing WPs for spent fuel in Models 1 - 4 and 1630 kg of waste/4.547 Ci of Tc/17.5 flowing WPs for glass in Model 5).

8. In subdirectories identified in Section 3.0 for testing the TPA Code Versions 5.0m and 5.0n RELEASET standalone results for the IModel 4 "xfrac" addition, copy all RELEASET related files from the .../Imodel4/RELEASET subdirectory, modify the ebsrel.inp file according to whether the "bathtub" or "flow-thru" model is being tested and by adjusting the initial failures wet fraction from 0.5 to 1.0, and at the command prompt type the following:,../releaset.e. > *releaset.screen*.

9. Repeat 8. except recompile the RELEASET code, modified either with (Version 5.0m) or without (Version 5.0n) the IModel 4 correction for "xfrac", and run RELEASET in standalone mode in the "xfrac" subdirectories.

9. Verify that the TPA Code Version 5.0n RELEASET results in *ebsnef.dat* are results doubled when the wet fraction is changed from 0.5 to 1.0 and that the "xfrac" directory results (i.e., when the "xfrac" adjustment is not made) is not changed by the specified initial failure wet fraction.

10. Verify that the TPA Code Version 5.0m RELEASET results in *ebsnef.dat* and the "xfrac" directory results(with "xfrac" added) are not changed when the wet fraction is changed from 0.5 to 1.0 (i..e, IModel 4 calculations are incorrect and zero-ed out, so the results should be independent of IModel 4 parameters like "xfrac").

9.6 Pass/Fail Criteria:

The TPA Code Versions 5.0m and 5.0n and the associated RELEASET standalone code runs to completion and generates output information in accordance with Section 9.5, Steps 6, 7, 9, and 10. These criteria demonstrate that previously the TPA code was incorrectly computing release rates in TPA Code Version 5.0m, but the corrections have been accomplished in the TPA Code Version 5.0n according to the Test Purpose section of this Test Plan.

Attachment 2

Test Results for TPA SCR # 465

Test Results Name: Verify Mass Balance and Model 4 Corrections in RELEASET

Tested By: R. Rice

Date: July 28, 2003

Host Machine: SUN Ultra-4 Server: Spock

Host OS: Solaris 5.8

Baseline Version: 5.0m

Test Version: 5.0n

Test Plan

For this SCR, the Test Plan is included with SCR #465.

Test Results

Output and Supporting Files:

All files are archived to a CD labeled, "Test Plan and Test Results for TPA SCR #465."

Test Criteria:

The test criteria, as presented in the Test Plan for SCR #465, and the results are provided.

Test Criterion 1. Verify that, for each of the TPA Code Versions 5.0m and 5.0n dissolution rate models, the overall mass balance is corrected using the Tc-99 release rates from *ebsnef.dat* in an EXCEL spreadsheet by computing the total mass of Tc-99 released and compare this with the initial mass (i.e., 114.4 Ci of Tc for spent fuel and 4.547 Ci of Tc for glass).

Table 1 provides the overall mass balance results for Ci of Tc-99 released. IModels 1 and 5 exhibit high dissolution rates and thus can show mass balance errors (i.e., release more mass than the initial mass). IModels 2, 3, and 4 exhibit small releases relative to the initial mass and consequently will not indicate an obvious overall mass balance error. Therefore, release rates from IModels 1 and 5 are the focus for this test.

In TPA Code Version 5.0m, the results for IModels 1 and 5 (2^{nd} column) show releases that are greater than the available mass (4^{th} column). In TPA Code Version 5.0n, the results for IModels 1 and 5 (3^{rd} column) are equal to or less than the available mass (4^{th} column). These results indicate the overall mass balance errors in TPA Code Version 5.0m are not present in TPA Code Version 5.0n.

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

Test Criterion 2. Verify that, for each of the TPA Code Versions 5.0m and 5.0n dissolution rate models, the dissolution rate mass balance is corrected (i.e., Version 5.0n results are corrected vis-a-vis Version 5.0m results) by comparing the "uo2rate" from *releaset.screen* and the Tc-99 release rate at 1766 yr in *ebsnef.dat* converted from Ci of Tc/yr to kg of waste/yr (using the factors 7890 kg of waste/114.4 Ci of Tc/17.5 flowing WPs for spent fuel in Models 1 - 4 and 1630 kg of waste/4.547 Ci of Tc/17.5 flowing WPs for glass in Model 5).

Table 2 supplies results from the TPA Code Version 5.0m and Table 3 provides results from the TPA Code Version 5.0n. In each of these tables, Column 2 lists the "uo2rate" at 1766 yr from *releaset.screen* and column 3 exhibits the Tc-99 release rate at 1766 yr in *ebsnef.dat*. The values in column 3 (Ci of Tc/yr) are converted to kg waste/yr by multiplying by the factors {7890 kg of waste/114.4 Ci of Tc/17.5 flowing WPs} for spent fuel in Models 1 - 4 and {1630 kg of waste/4.547 Ci of Tc/17.5 flowing WPs} for glass in Model 5. These results represent an "equivalent" (and what should be an approximately equal) waste dissolution rate compared to column 2. Column 5 of these tables presents the % error in the dissolution rate between the "uo2rate" from *releaset.screen* (column 2) and the "equivalent" dissolution rate computed from the Tc-99 release rate in *ebsnef.dat* (column 4).

The % errors for TPA Code Version 5.0m results in Table 2 are all relatively large and greater than 10% (the acceptable error limit in SVTR testing) except for IModel 3. Waste dissolution rates from IModel 3 are the smallest and, for a number of reasons including mass balance and possible numerical solution considerations, show the lowest error (i.e., 1%).

However, as the waste release rate increases in column 2 of Table 2, the % error in column 5 also increases. At the extreme is the Imodel 4 waste dissolution rate of 0. These results indicate a problem that is addressed through modifications implemented in TPA Code Version 5.0n. Results from TPA Code Version 5.0n are shown in Table3.

Table 3 is organized the same as described previously for Table 2 except these results are for the TPA Code Version 5.0n. The % errors in column 5 are all less than 10% and reflect good agreement (and an acceptable error that is less than 10%) between the "uo2rate" from *releaset.screen* (column 2) and equivalent dissolution rate computed from the Tc-99 release rate in *ebsnef.dat* (column 4). Therefore, the dissolution rate mass balance error in the RELEASET computations to determine release rates (in Ci of a radionuclide/yr) from waste dissolution (in kg waste/yr) has been corrected in the TPA Code Version 5.0n.

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

Test Criteria 3. (a) Verify that the TPA Code Version 5.0n RELEASET results in *ebsnef.dat* are results doubled when the wet fraction is changed from 0.5 to 1.0 and that the "xfrac" directory results (i.e., when the "xfrac" adjustment is not made) is not changed by the specified initial failure wet fraction.

Test Criteria 3. (b) Verify that the TPA Code Version 5.0m RELEASET results in *ebsnef.dat* and the "xfrac" directory results (with "xfrac" added) are not changed when the wet fraction is changed from 0.5 to 1.0 (i..e, IModel 4 calculations are incorrect and zero-ed out, so the results should be independent of IModel 4 parameters like "xfrac").

The results for this test are provided in the subdirectories described in the Test Plan. These directories are presented below.

```
RELEASET standalone results for testing the IModel 4 "xfrac" addition (use RELEASET input files from
the dissolution rate model results that are up one directory)
<<Baseline Version Results Directory TPA>> = /sscr1/rrice/tpa50n/IModel*/releaset/sa_wet_bathtub;
/sscr1/rrice/tpa50n/IModel*/releaset/sa_wet_bathtub/xfrac;
/sscr1/rrice/tpa50n/IModel*/releaset/sa_wet_flow_thru;
and /sscr1/rrice/tpa50n/IModel*/releaset/sa_wet_flow_thru/xfrac
<<Test Version Results Directory TPA>> = /sscr1/rrice/tpa50m/IModel*/releaset/sa_wet_bathtub;
/sscr1/rrice/tpa50m/IModel*/releaset/sa_wet_bathtub/xfrac;
/sscr1/rrice/tpa50m/IModel*/releaset/sa_wet_flow_thru;
and /sscr1/rrice/tpa50m/IModel*/releaset/sa_wet_flow_thru/xfrac.

In the sa_wet_flow_thru and sa_wet_bathtub subdirectories, both the flow-thru and bathtub models
with and without "xfrac" are tested for TPA Code Versions 5.0m and 5.0n.  Note that Version 5.0m has
"xfrac" added whereas Version 5.0 has "xfrac" deleted in the source code to compute the Model 4
"uo2rate".
```

A comparison of RELEASET results in the *ebsnef.dat* was conducted in this testing using the UNIX "diff" feature and by visually inspecting the results in this file. The *ebsrel.inp* file was modified by adjusting the initial failure wet fraction from 0.5 to 1.0.

The results from this test are consistent with expected results. That is, when "xfrac" was present in the RELEASET source code in TPA Code Version 5.0n and the initial failure wet fraction was adjusted from 0.5 to 1.0, the release rates in *ebsnef.dat* doubled. For the TPA Code Version 5.0m, the IModel 4 release calculations were incorrect and there was no difference in ebsnef.dat values either with or without the "xfrac" modification to the RELEASET source code. This result also confirms that the IModel 4 calculations were incorrect.

All of these results are expected and indicate IModel 4 does include the initial failure wet fraction in its computations.

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

Overall Test Status

The test is successfully **PASSED.**

Table 1. Mass Balance Results for Tc-99 Computed Using TPA Versions 5.0m and 5.0n and Dissolution Models 1 - 5

Dissolution Rate Model	Tc-99 Mass Released Using TPA Code Version 5.0m (no RELEASET changes) (kg)	Tc-99 Mass Released Using TPA Code Version 5.0n (with RELEASET changes) (kg)	Available Tc-99 Mass (kg)
1	2454*	115.0	114.4
2	1.5	1.49	114.4
3	0.03	0.03	114.4
4	3.20E-16**	9.22E-03	114.4
5	7.6*	3.71	4.547

* = mass balance error in TPA Code Version 5.0m when compared to the available mass shown in the last column; this error is fixed in TPA Code Version 5.0n as shown in the 3rd column

** = dissolution rate model results are increased about 13 orders of magnitude and indicate RELEASET has been modified to fix this release calculation

Table 2.	TPA Code Version 5.0m (no RELEASET changes)			
Dissolution Rate Model	RELEASET Waste Dissolution Rate at 1,766 yr (kg/yr/WP)	Release Rate from the RELEASET Output File *ebsnef.dat* for Tc-99 at 1,776 yr (Ci of Tc-99/yr for all 35 failed WPs)	Equivalent RELEASET Waste Dissolution Rate Computed Using the Tc-99 Release Rate in the Previous Column (kg/yr/WP)	% Error Between Column 2 and Column 4 Waste Dissolution Rates
1	4.831E+00	2.773E+00	1.093E+01	126%
2	3.750E-03	7.704E-04	3.036E-03	-19%
3	1.53E-05	3.85E-06	1.516E-05	-1%
4	0.00E+00	9.81E-21	3.866E-20	#DIV/0!
5	0.330022	3.92E-02	8.029E-01	143%

Table 3.	TPA Code Version 5.0n (with RELEASET changes)			
Dissolution Rate Model	RELEASET Waste Dissolution Rate at 1,766 yr (kg/yr/WP)	Release Rate from the RELEASET Output File *ebsnef.dat* for Tc-99 at 1,776 yr (Ci of Tc-99/yr for all 35 failed WPs)	Equivalent RELEASET Waste Dissolution Rate Computed Using the Tc-99 Release Rate in the Previous Column (kg/yr/WP)	% Error Between Column 2 and Column 4 Waste Dissolution Rates
1	4.831E+00	1.293E+00	5.096E+00	5%
2	3.070E-03	7.701E-04	3.035E-03	-1%
3	1.53E-05	3.85E-06	1.516E-05	-1%
4	1.00E-07	2.49E-08	9.832E-08	-2%
5	3.30E-01	1.74E-02	3.560E-01	8%

SOFTWARE CHANGE REPORT (SCR)

SCR No. 466	**Software Title and Version:** TPA 5.0k	**Project No:** 20.06002.01.012

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

UZ layers with 0 thickness participate in the colloid filter calculation when they should be omitted.

Change Requested by: R. Rice Date: 7-15-03	**Change Authorized by** (*Software Developer*): R. Janetzke Date: 7-15-03

Description of Change(s) or Problem Resolution (*If changes not implemented, please justify*):
The following test was implemented at line 2039 in uzft.f.

```
            if (lmedia(ilayer). eq. 1 .and.
     &          leglen(np,ilayer) .gt. 0.0d0) then
              toteffcompflfc = toteffcompflfc * (1.0d0 - flfc(ilayer))
            end if
```

Which test files require modification to accommodate this change?
None

Implemented by: R. Janetzke	**Date:** 7-18-03

Description of Acceptance Tests:

Test performed under TPA SVTR C9-3.

Tested by:	**Date:**

SOFTWARE CHANGE REPORT (SCR)

SCR No. 467	Software Title and Version: TPA 5.0l	Project No: 20.06002.01.012

Affected Software Module(s), Description of Problem(s): tpa.inp
The following is a request from O. Pensado.

There are some parameters not quite correct in the current version of *tpa.inp*. These should be the updated values:

ErpInterceptWeld[mVSHE]	1041.2
TemperatureCoefficientOfErpInterceptWeld[mVSHE/C]	-10.0
ErpSlopeWeld[mVSHE]	-584.2
TemperatureCoefficientOfErpSlopeWeld[mVSHE/C]	3.7
OuterOverpackErpIntercept	1541.2
TempCoefOfOuterPackErpIntercept	-13.1
OuterOverpackErpSlope	-362.7
TempCoefOfOuterPackErpSlope	2.3

Change Requested by:	**Change Authorized by** (*Software Developer*):
O. Pensado Date: 7-15-03	R. Janetzke Date: 7-15-03

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

TPA input file *tpa.inp* was changed as specified above.

Which test files require modification to accommodate this change?
None

Implemented by:	**Date:**
R. Janetzke	7-18-03

Description of Acceptance Tests:

Perform a visual inspection of file *tpa.inp* to ensure that modifications were accomplished.

The software successfully passed the process level test in accordance with the Test Plan for TPA SCR #467. The test plan and test results are included on a CD labeled, "Test Plan and Test Results for TPA SCR #467."

Tested by:	**Date:**
Brandi L. Winfrey	July 24, 2003

SOFTWARE CHANGE REPORT (SCR)

SCR No. 468	Software Title and Version: TPA 5.01	Project No: 20.06002.01.012

Affected Software Module(s), Description of Problem(s): repdes.dat

The emplacement block start and stop points are not aligned with the repository outline coordinates.

Change Requested by:	Change Authorized by (*Software Developer*):
G. Adams Date: 7-16-03	R. Janetzke Date: 7-16-03

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

Change the first x values from 547504.18 to 547514.88 for both blocks.
Change the first y values form 4079310.6 to 4079310.61 for both blocks.
Change the last y value of the first block from 4075962.6 to 4075962.63.

Which test files require modification to accommodate this change?
None.

Implemented by:	Date:
R. Janetzke	7-16-03

Description of Acceptance Tests:

Perform a code inspection of the file repdes.dat to verify that the x,y values for the emplacement blocks have been modified to the new values.

Plot the x,y coordinates for the emplacement blocks with TecPlot and verify that the emplacement block start and stop points are aligned with the repository outline coordinates. See Test Plan for complete details.

The software successfully passed the process level test in accordance with the Test Plan for TPA SCR #468. The test plan and test results are included on a CD labeled, "Test Plan and Test Results for TPA SCR #468."

Tested by:	Date:
Brandi L. Winfrey	7-25-03

Test Plan for TPA SCR # 468

Test Plan Name: SCR 468 Test Plan

Tested By: Brandi L. Winfrey

Date: July 25, 2003

Host Machine: SUN Ultra-4 Server: spock

Host OS: Solaris 5.8

Baseline Version: 5.0l

Test Version: 5.0m

Process Level Tests

The process level tests are designed to verify that the data file modified under this SCR contains the correct information

PL-1 Data Files Contain the Correct Information

1.0 Path for Data File Inspection Directory

<<REPDES.DAT Directory>> = $HOME/PA-SCR-468/code50m/data

<<TPA>INP Directory>> = $HOME/PA-SCR-468/code50m

2.0 Path for Archived Results

$HOME/PA-SCR-468

3.0 Environment Variables

None

4.0 Special Input Files or Modifications to Input Files Required

None

5.0 Special Diagnostic Code Modifications Required

None

6.0 Program Modes to be Used

None

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 following files contain the updated information in accordance with this SCR: *repdes.dat*

8.2 Assumptions: none

8.3 Constraints: none

8.4 Inspected File: *repdes.dat*

8.5 Procedure:

1. Copy the files *tpa.inp* and *repdes.dat* to the archive directory.
2. Open the file repdes.dat

verify that the x,y coordinates have been modified in accordance with the following table:

(X,Y) points to change	Old value	New value
the first x values for both blocks	547504.18	547514.88
the first y values for both blocks	4079310.6	4079310.61
the last y value of the first block	4075962.6	4075962.63

3. Create two data files formatted for TecPlot to visualize the modifications.

The first data file will be named *tec_repdes.dat* and will contain the data points for the repository and emplacement blocks from *repdes.dat*, reformatted for TecPlot as follows:

```
TITLE = "REPDES.DAT repository design and emplacement data"
VARIABLES = "X1", "Y1"
ZONE T=RepOutlineVertices, I=15, F=POINT
547732.82,4080960.00
548664.55,4080675.00
548588.98,4079377.55
548569.32,4078981.
548504.06,4077664.24
548479.71,4077173.06
548455.  ,4076674.51
548155.7 ,4075962.63
547897.79,4076045.46
547655.97,4076123.07
547474.7 ,4077281.6
547370.95,4077922.04
547514.88,4079310.61
547645.27,4079656.06
547732.82,4080960.00

VARIABLES = "X1", "Y1"
ZONE T=emplacementBlock1, I=2, F=POINT
547514.88,   4079310.61, 548155.70,   4075962.63

VARIABLES = "X1", "Y1"
ZONE T=emplacementBlock2, I=2, F=POINT
547514.88,   4079310.61, 547732.82,   4081208.1
```

The second data file will be named *tec_tpa_subareas.dat* and will contain data points for the subareas found in *tpa.inp* reformatted for TecPlot as follows:

```
TITLE = "TPA.INP repository design and Subarea data"
VARIABLES = "X1", "Y1"
ZONE T=Subarea1, I=5, F=POINT
```

```
547514.88,4079310.61
548069.2,4079136.5
547847.3,4077816.2
547370.95,4077922.04
547514.88,4079310.61
VARIABLES = "X1", "Y1"
ZONE T=Subarea2, I=5, F=POINT
548069.2,4079136.5
548569.32,4078981.
548504.06,4077664.24
547847.3,4077816.2
548069.2,4079136.5
VARIABLES = "X1", "Y1"
ZONE T=Subarea3, I=5, F=POINT
547370.95,4077922.04
547847.3,4077816.2
548322.7,4077192.2
547474.7,4077281.6
547370.95,4077922.04
VARIABLES = "X1", "Y1"
ZONE T=Subarea4, I=5, F=POINT
547847.3,4077816.2
548504.06,4077664.24
548479.71,4077173.06
548322.7,4077192.2
547847.3,4077816.2
VARIABLES = "X1", "Y1"
ZONE T=Subarea5, I=5, F=POINT
547474.7,4077281.6
547887.3,4077238.1
547897.79,4076045.46
547655.97,4076123.07
547474.7,4077281.6
VARIABLES = "X1", "Y1"
ZONE T=Subarea6, I=5, F=POINT
547887.3,4077238.1
548322.7,4077192.2
548155.7,4075962.63
547897.79,4076045.46
547887.3,4077238.1
VARIABLES = "X1", "Y1"
ZONE T=Subarea7, I=5, F=POINT
548322.7,4077192.2
548479.71,4077173.06
548455,4076674.51
```

```
548155.7,4075962.63
548322.7,4077192.2
VARIABLES = "X1", "Y1"
ZONE T=Subarea8, I=5, F=POINT
547645.27,4079656.06
548588.98,4079377.55
548569.32,4078981
547514.88,4079310.61
547645.27,4079656.06
VARIABLES = "X1", "Y1"
ZONE T=Subarea9, I=5, F=POINT
547732.82,4080960.00
548251.91,4080817.50
548116.89,4079516.81
547645.27,4079656.06
547732.82,4080960.00
VARIABLES = "X1", "Y1"
ZONE T=Subarea10, I=5, F=POINT
548251.91,4080817.50
548664.55,4080675.00
548588.98,4079377.55
548116.89,4079516.81
548251.91,4080817.50
```

4. Using TecPlot, create a layout of the two data files *tec_repdes.dat* and *tec_tpa_subareas.dat*. Save that layout as *PA-SCR-468_PL-1.lay*.
    - Verify that Emplacement Block 1 starts at subarea1 and extends to the southernmost point of the repository
    - Verify that Emplacement Block 2 starts at subarea1 and extends to the northernmost point of the repository.

8.6 Pass/Fail Criteria: The updated files identified in Section 8.4 contain the required information in accordance with Section 8.5 step 2, and the extent of both Emplacement Blocks are consistent with the description in section 8.5 step 4.

9.0 Test Results

9.1 Output and Supporting Files: All files are archived to a CD labeled, "Test Plan and Test Results for TPA SCR #468."

9.2 Criterion 1: Verify the *repdes.dat* file contains the required information in accordance with Section 8.5 step 2.

9.3 Criterion 2: Verify that the emplacement block start and stop points are aligned with the repository outline coordinates as specified in Section 8.5 step 4.

9.3 Overall Test Status:

This test successfully **PASSED** the criterion above for test PL-1.

SOFTWARE CHANGE REPORT (SCR)

SCR No. 469	Software Title and Version: TPA 5.0l	Project No: 20.06002.01.012

Affected Software Module(s), Description of Problem(s): ebsrel.f
EBSREL appears to be double counting the number of WP for scenario failures when glass waste form is selected. This is due to the glass run of RELEASET using the same number of scenario failures as the spent fuel waste form run. Since the release from the spent fuel run is added to the release of the glass waste run they are double counted.

Change Requested by:	**Change Authorized by** (*Software Developer*):
R. Rice Date: 7-18-03	R. Janetzke Date: 7-18-03

Description of Change(s) or Problem Resolution (*If changes not implemented, please justify*):
The writing of the scenario failure times and number of failures in file *ebsrel.inp* was made conditional upon being the first run of RELEASET for a subarea. For the second run of RELEASET which, if it occurs is always glass waste form, the scenario failures and times are zero, leaving just the corrosion failures for glass consideration.

Which test files require modification to accommodate this change?
None.

Implemented by:	**Date:**
R. Janetzke	7-19-03

Description of Acceptance Tests:
For this SCR, the Test Plan is provided in Attachment 1 and the Test Results are included in Attachment 2. The attached CD contains all electronic files associated with this SCR.

Tested by:	**Date:** 7/25/03
R. Rice	7-25-03

CNWRA Form TOP-5 (01/99)

Attachment 1

Test Plan for TPA SCR # 469

Test Plan Name: Verify the Assignment of WP Failures for Spent Fuel and Glass

Tested By: R. Rice

Date: July 25, 2003

Host Machine: SUN Ultra-4 Server: Spock

Host OS: Solaris 5.8

Baseline Version: 5.0k

Test Version: 5.0m

Introduction

The TPA code was executed using Version 5.0k, which does not have the change described previously, to demonstrate WP double counting. Subsequently, the current TPA code, Version 5.0m, was executed to demonstrate that the problem of WP double counting was successfully resolved.

To verify the elimination of WP double counting, modified *tpa.inp* and EBSREL files forced all WP scenario failure types (i.e., initial, seismic, faulting, and igneous).

For this testing only, the EBSREL module in Versions 5.0k and 5.0m was modified to copy the *ebsrel.inp* file following execution of RELEASET for spent fuel from the *ebsrel.inp* file to the *ebsrelsf.inp* file and following execution of RELEASET for glass from the *ebsrel.inp* file to the *ebsrelglass.inp* file. This modification was needed because the *ebsrel.inp* file was overwritten during TPA code execution. The Version 5.0k *ebsrelsf.inp* and *ebsrelglass.inp* files showed WP double counting. The Version 5.0m *ebsrelsf.inp* and *ebsrelglass.inp* files showed (1) non-zero scenario WP failures for spent fuel and (2) zeroed-out scenario WP failures for glass.

Additionally, Versions 5.0k and 5.0m *wpsfail.res* files were compared to demonstrate the number of failed WP was not changed as a result of this modification.

Test Purpose

This test is designed to verify that the EBSREL module correctly assigns WP scenario failures to the RELEASET input file *ebsrel.inp* for the spent fuel RELEASET execution and that WP scenario failures are zeroed-out for the glass RELEASET execution. Additionally, the number of WP failures in wpsfail.res should not be affected as a result of this modification.

Test Conditions and Procedure

1.0 Path for Run Directory

For the TPA runs on Spock:

<<Baseline Version Run Directory TPA>> = /sscr1/rrice/tpa50k

<<Test Version Run Directory TPA>> = /sscr1/rrice/tpa50m

2.0 Path for Results

For the TPA runs on Spock:

<<Baseline Version Results Directory TPA>> = /sscr1/rrice/tpa50k/run2

<<Test Version Results Directory TPA>> = /sscr1/rrice/tpa50m/run2

3.0 Environment Variables

For the TPA runs on Spock:

<<Baseline Version>> TPA_TEST = /sscr1/rrice/tpa50k

<<Baseline Version>> TPA_DATA = /sscr1/rrice/tpa50k

<<Test Version>> TPA_TEST = /sscr1/rrice/tpa50m

<<Test Version>> TPA_DATA = /sscr1/rrice/tpa50m

4.0 Path for Archived Results

On the attached CD:

<<Baseline Version Results Directory TPA>> = /tpa50k/run2

<<Test Version Results Directory TPA>> = /tpa50m/run2

5.0 Special Input Files or Modifications to Input Files Required

The basecase *tpa.inp* file was used with the following modifications. These files are *tpa.inp.orig* and *tpa.inp* (the modified file).

Note that the (1) disruptive flags were activated; (2) 1 subarea was specified; (3) the maximum simulation time was increased to 1.0e5 yr; (4) the fraction of glass was set at 0.24; and (5) and threshold for faulting was decreased by two orders of magnitude to force faulting WP failures.

```
Comparing files tpa.orig.inp and TPA.INP
***** tpa.orig.inp
VolcanismDisruptiveScenarioFlag(yes=1,no=0)
0
**
***** TPA.INP
VolcanismDisruptiveScenarioFlag(yes=1,no=0)
1
**
*****

***** tpa.orig.inp
FaultingDisruptiveScenarioFlag(yes=1,no=0)
0
```

```
**
***** TPA.INP
FaultingDisruptiveScenarioFlag(yes=1,no=0)
1
**
*****

***** tpa.orig.inp
** Number and Location Of SubAreas[m] Based On Fig3.4-1 in TSPA95
**subarea
**1
****ZONE T="ONE RECTANGULAR ZONE SUBAREA", F=POINT
**        547500.0       4076000.0
**        547500.0       4079467.56
**        548500.0       4079467.56
**        548500.0       4076000.0
**        547500.0       4076000.0
**subarea
***** TPA.INP
** Number and Location Of SubAreas[m] Based On Fig3.4-1 in TSPA95
subarea
1
****ZONE T="ONE RECTANGULAR ZONE SUBAREA", F=POINT
        547500.0       4076000.0
        547500.0       4079467.56
        548500.0       4079467.56
        548500.0       4076000.0
        547500.0       4076000.0
**subarea
*****

***** tpa.orig.inp
**
subarea
10
edaii 1-cw
547514.88,4079310.61
548069.2,4079136.5
547847.3,4077816.2
547370.95,4077922.04
547514.88,4079310.61
edaii 2-cw
548069.2,4079136.5
548569.32,4078981.
548504.06,4077664.24
547847.3,4077816.2
548069.2,4079136.5
edaii 3-cw
547370.95,4077922.04
547847.3,4077816.2
548322.7,4077192.2
547474.7,4077281.6
547370.95,4077922.04
```

```
edaii 4-cw
547847.3,4077816.2
548504.06,4077664.24
548479.71,4077173.06
548322.7,4077192.2
547847.3,4077816.2
edaii 5-cw
547474.7,4077281.6
547887.3,4077238.1
547897.79,4076045.46
547655.97,4076123.07
547474.7,4077281.6
edaii 6-cw
547887.3,4077238.1
548322.7,4077192.2
548155.7,4075962.63
547897.79,4076045.46
547887.3,4077238.1
edaii 7-cw
548322.7,4077192.2
548479.71,4077173.06
548455,4076674.51
548155.7,4075962.63
548322.7,4077192.2
edaii 8-cw
547645.27,4079656.06
548588.98,4079377.55
548569.32,4078981
547514.88,4079310.61
547645.27,4079656.06
edaii 9-cw
547732.82,4080960.00
548251.91,4080817.50
548116.89,4079516.81
547645.27,4079656.06
547732.82,4080960.00
edaii 10-cw
548251.91,4080817.50
548664.55,4080675.00
548588.98,4079377.55
548116.89,4079516.81
548251.91,4080817.50
**
***** TPA.INP
**
**
*****

***** tpa.orig.inp
MaximumTime[yr]
1.0e4
**
***** TPA.INP
```

```
MaximumTime[yr]
1.0e5
**
*****

***** tpa.orig.inp
FractionOfRepositoryWasteInGlassForm[]
0.0
**
***** TPA.INP
FractionOfRepositoryWasteInGlassForm[]
0.24
**
*****

***** tpa.orig.inp
4
0.1
0.2
0.3
0.4
**
***** TPA.INP
4
0.001
0.002
0.003
0.004
**
*****
```

6.0 Special Diagnostic Code Modifications Required:

The EBSREL module was built with the following debug feature added.

```
Comparing files ebsrel.f.original and EBSREL.F.MODIFIED
***** ebsrel.f.original

cc 4/20/01 mam modified write from float to int because
***** EBSREL.F.MODIFIED

cc rwr SCR469 Test
cc rwr set the WPs failed by SEISMO here for this test (currently can't force a SEISMO
failure)
      releasewpfailedtime(1,4) = 123.0d0
      releasewpfailedtime(1,5) = 234.0d0
      releasewpfailedtime(1,6) = 345.0d0
      releasewpfailedtime(1,7) = 456.0d0

cc 4/20/01 mam modified write from float to int because
*****

***** EBSREL.F.MODIFIED
```

```
cc rwr SCR469 Test
cc rwr copy the RELEASET input file so that it is
cc rwr not overwritten; this allows for checking
cc rwr whether the WP failures are zeroed-out for glass
      call clearchar(80,command)
      if (iwasteform .eq. 1) then
         command = 'cp ebsrel.inp ebsrelsf.inp'
      else
         command = 'cp ebsrel.inp ebsrelglass.inp'
      end if
*****
```

7.0 Program Modes to be Used

Files are modified in accordance with Sections 5.0 and 6.0.

8.0 Utility Scripts Needed to Perform the Test

None

9.0 Test Description

9.1 *Objective*: This test is designed to verify the assignment of WP failures for spent fuel and glass are correctly made in the RELEASET input file *ebsrel.inp*. That is, in the TPA Code Version 5.0m, all scenario WP failures are included in the spent fuel *ebsrel.inp* file and those scenario WP failures are zero-ed out in the glass *ebsrel.inp* file. These value will not be zero-ed out in the TPA Code Version 5.0k

9.2 *Assumptions*: none

9.3 *Constraints*: none

9.4 *Output Files*: *ebsrelsf.inp*, *ebsrelglass.inp*, *wpsfail.res*

9.5 *Procedure*:

1. After building the TPA Code Versions 5.0k and 5.0m with the debug options set in EBSREL, in accordance with Section 6.0, and using the *tpa.inp* file, , in accordance with Section 5.0, at the command prompt from <<Baseline Version Run Directory TPA>> and <<Test Version Run Directory TPA>>, type the following:,../tpa.e. > tpa.out

2. After the tpa code executes, examine the files *ebsrelsf.inp* and *ebsrelglass.inp* for the TPA Code Versions 5.0k and 5.0m.5.

3.Verify that, for the TPA Code Version 5.0m, all scenario WP failures are included in the spent fuel *ebsrel.inp* file and those scenario WP failures are zero-ed out in the glass *ebsrel.inp* file. For the TPA Code Version 5.0k, the scenario WP failures are not zero-ed out.

4. Examine the *wpsfail.res* file for TPA Code Versions 5.0k and 5.0m.

5. Verify that the results for the WP failure type and the time of the WP failures in the *wpsfail.res* files for TPA Code Versions 5.0k and 5.0m are not different.

9.6 Pass/Fail Criteria:

The TPA Code Versions 5.0k and 5.0m runs to completion and generates output information in accordance with Section 9.5, Steps 3 and 5. These criteria demonstrate that previously the TPA code was double counting WP scenario failures in TPA Code Version 5.0k, but is not double counting WP scenario failures in the TPA Code Version 5.0m.

Attachment 2

Test Results for TPA SCR # 469

Test Results Name: Verify the Assignment of WP Failures for Spent Fuel and Glass

Tested By: R. Rice

Date: July 25, 2003

Host Machine: SUN Ultra-4 Server: Spock

Host OS: Solaris 5.8

Baseline Version: 5.0k

Test Version: 5.0m

Test Plan

For the SCR # 469, see the Test Plan attached to the SCR.

Test Results

Output and Supporting Files:

All files are archived to a CD labeled, "Test Plan and Test Results for TPA SCR #469."

Test Criteria:

The 2 test criteria, as presented in the Test Plan for SCR #469, and the results are provided.

Test Criterion 1. Verify that, for the TPA Code Version 5.0m, all scenario WP failures are included in the spent fuel *ebsrel.inp* file and those scenario WP failures are zero-ed out in the glass *ebsrel.inp* file. For the TPA Code Version 5.0k, the scenario WP failures are not zero-ed out.

From the TPA Code Version 5.0k, the *ebsrelsf.inp* and *ebsrelglass.inp* files are listed. The bold text highlights the scenario WP failures.

TPA Code Version 5.0k *ebsrelsf.inp*:

```
\Input data file for release for glass, diffusion and clad: releaset5d.f 7/26/02 rbc
|
\Cell information
```

```
  5.21200E+03    4.17697E-01    ! xcon: # of WP; sawetfrac: wetted subarea
0.00000E+00        15        ! defect,idefect:  initially defective time [yr] & WPs affected
7.55132E+03        35        ! sftimef,isconf:  faulting fail time [yr] & WPs affected
5.30772E+03        17        ! sftimev,isconv:  volcano fail time [yr] & WPs affected
9.96390E+02       123        ! seismt1,seismp1: first  seismic failure time [yr] & WP affected
3.46586E+03       234        ! seismt2,seismp2: second seismic failure time [yr] & WP affected
7.37632E+03       345        ! seismt3,seismp3: third  seismic failure time [yr] & WP affected
5.50000E+04       456        ! seismt4,seismp4: fourth seismic failure time [yr] & WP affected
|
\WP information
  1.57900E+00,    5.27500E+00   ! dintl: wp ID, xintl: internal length [m]
  4.83000E+00                   ! xvol: wp internal vol[m3]
|
\Thermal data
'ebstrh.dat'                    ! temfil: temp. file (output from ebspac_fail.f)
  9.99000E+02                   ! ctemp: BP of water at atm. condition [C]
|
\Flow parameters
'ebsflo.dat'                    ! hydfil: flow parameters file
|
\SF  materials
\
  0.78900E+04                   ! amassc: SF mass per WP [kg]
  1.06000E+04                   ! fueden
\
```

```
\Fuel leaching model paramters and water contact mode (bathtub=0, flowthru=1)
 5.39016E-01   0       ! wetfrac(1),iwatcont(1): init def ht fract of wet SF and water contact
 4.43426E-01   1       ! wetfrac(2),iwatcont(2): fau fail ht fract of wet SF and water contact
 7.44695E-01   1       ! wetfrac(3),iwatcont(3): vol fail ht fract of wet SF and water contact
 3.73904E-02   0       ! wetfrac(4),iwatcont(4): seim1 fail ht fract of wet SF and water contact
 9.04091E-01   0       ! wetfrac(5),iwatcont(5): seim2 fail ht fract of wet SF and water contact
 4.50167E-01   0       ! wetfrac(6),iwatcont(6): seim3 fail ht fract of wet SF and water contact
 6.66500E-01   0       ! wetfrac(7),iwatcont(7): seim4 fail ht fract of wet SF and water contact
 9.33378E-01   0       ! wetfrac(8),iwatcont(8): cor fail ht fract of wet SF and water contact
 2                             ! imodel: leaching model
 6.210E+00  2.100E-01  3.710E+00 ! phvalue,oxgnovpr [atm]; cco3 [mol/L]: used if imodel=1
   2.500E-06                    ! usrlrate:[kg/yr/m2]: used if imodel=3
   5.135E+04                    ! preexpo: preexponential term for imodel=2
|
\ Radionuclide inventory
'ebspac.nuc'                   ! elefil: nuclide names, t1/2,invent ,correction for Diff
|
\C-14 generation
   1.11055E-03          ! r0z: initial radius of SF particle [m]
   1.25000E-05          ! radu: radius of the SF grain [m]
   8.73961E-07          ! radsg: subgrain fragment radius after trans. frac. [m]
   1.00000E+00          ! claddingcorfact: cladding correction factor
   4.24899E+01          ! cladve, velocity enhancement factor (1 to 240)
   2.00000E+00       ! ltube0, half length of fuel rod, meters
   5.00000E-03          ! rrod, radius of fuel in rod, meters
```

```
   6.10000E-04          ! thclad: thickness of cladding [m]

   7.20000E-04          ! cfuel: C-14 [ci] /kg SF

   4.89000E-04          ! czmetal: C-14 [ci] /kg SF in Zyr. clad & other metals

   2.48000E-05          ! czoxide: C-14/kg SF in initial Zry oxide & crud

   6.20000E-06          ! cgap: C-14/kg SF in grain and gap

|

\glass model

   5.63000E-02          ! simglass m^2/kg

   8.40195E+00          ! phglass

   6.90000E+00          ! logkeffhi

   4.00000E-01          ! etahi

   8.00000E+01          ! eahi kj/mol deg K

   9.00000E+00          ! logkefflow

  -6.00000E-01          ! etalow

   5.30000E+01          ! ealow kj/mol deg K

|

\diffusion model

   1.00000E-01          ! cr_length, length of crack, meters

   2.00000E-05          ! cr-area_a, area of crack at t=0, m^2

   1.00000E-08          ! cr_area_b, slope of crack growth, m^2/yr

   2.00000E-01          ! l_internal,length of interior film pathway, meters

   2.00000E-05          ! a_internal, cross section of interior film, m^2

   2.30000E-09          ! d_water, diffusivity of water at 20C, m^2/sec

   1.00000E-01          ! ftilt, fraction of WPs in diffusion orientation

|
```

```
\NUMERICAL
\
\Grids
10, 10                          ! imax,jmax: # of grid nodes in i,j directions
\X-COOR of grid nodes
.1, .5, 1.0, 2.0, 4.0, 5.0, 6.0, 7.0, 8.0, 9.0
\Y-COOR of grid nodes
.1, .5, 1.0, 2.0, 4.0, 5.0, 6.0, 7.0, 8.0, 9.0
\ Note: zones apply to the above grid, zones are the same for all cell
\ZONES
4                               ! nzones: no. of zones for material types
1    1  1    1  1               ! iz,ib,jb,ie,je: for zone 1
2    2  1    2  1              ! iz,ib,jb,ie,je: for zone 2
3    3  1    3  1               ! iz,ib,jb,ie,je: for zone 3
4    4  1    10 1               ! iz,ib,jb,ie,je: for zone 4
|
\Rock parameters
0.14, 0.14, 0.14, 0.14          ! rpor(1..nzones): rock porosity
|
\ Radionuclide transport
5.6e-5, 5.6e-5, 5.6e-5, 5.6e-5   ! rdiff(1..nzones):diffusion coef. [m2/yr]
   5.50000E+00                  ! driftdia [m]
|
\ Solution algorithm control parameters (Runge-Kutta)
25., 0.0, 10.                   ! dtinit [yr], dtmin [yr], dtmax [yr]
```

```
1.0e-2, 1.0e-10                ! eps, tiny

|

\output parameters

200                            ! nbt: number of time intervals for output

|

\END
```

TPA Code Version 5.0k *ebsrelglass.inp*:

```
\Input data file for release for glass, diffusion and clad: releaset5d.f 7/26/02 rbc

|

\Cell information

    7.96700E+03     4.17697E-01     ! xcon: # of WP; sawetfrac: wetted subarea

 0.00000E+00            15           ! defect,idefect:  initially defective time [yr]
& WPs affected
 7.55132E+03            35           ! sftimef,isconf:  faulting fail time [yr] & WPs
affected
 5.30772E+03            17           ! sftimev,isconv:  volcano fail time [yr] & WPs
affected
 9.96390E+02           123           ! seismt1,seismp1: first  seismic failure time [yr]
& WP affected
 3.46586E+03           234           ! seismt2,seismp2: second seismic failure time [yr]
& WP affected
 7.37632E+03           345           ! seismt3,seismp3: third  seismic failure time [yr]
& WP affected
 5.50000E+04           456           ! seismt4,seismp4: fourth seismic failure time [yr]
& WP affected
|

\WP information

    1.57900E+00,     5.27500E+00    ! dintl: wp ID, xintl: internal length [m]

    4.83000E+00                     ! xvol: wp internal vol[m3]

|

\Thermal data
```

```
'ebstrh.dat'                              ! temfil: temp. file (output from ebspac_fail.f)

    9.99000E+02                           ! ctemp: BP of water at atm. condition [C]

|

\Flow parameters

'ebsflo.dat'                              ! hydfil: flow parameters file

|

\SF  materials

\

    0.16300E+04                           ! amassc: SF mass per WP [kg]

    1.06000E+04                           ! fueden

\

\Fuel leaching model paramters and water contact mode (bathtub=0,  flowthru=1)

 5.39016E-01    0            ! wetfrac(1),iwatcont(1): init def ht fract of wet SF and
water contact
 4.43426E-01    1            ! wetfrac(2),iwatcont(2): fau fail ht fract of wet SF and
water contact
 7.44695E-01    1            ! wetfrac(3),iwatcont(3): vol fail ht fract of wet SF and
water contact
 3.73904E-02    0            ! wetfrac(4),iwatcont(4): seim1 fail ht fract of wet SF and
water contact
 9.04091E-01    0            ! wetfrac(5),iwatcont(5): seim2 fail ht fract of wet SF and
water contact
 4.50167E-01    0            ! wetfrac(6),iwatcont(6): seim3 fail ht fract of wet SF and
water contact
 6.66500E-01    0            ! wetfrac(7),iwatcont(7): seim4 fail ht fract of wet SF and
water contact
 9.33378E-01    0            ! wetfrac(8),iwatcont(8): cor fail ht fract of wet SF and
water contact
 5                                    ! imodel: leaching model

 6.210E+00   2.100E-01   3.710E+00  ! phvalue,oxgnovpr [atm]; cco3 [mol/L]: used if
imodel=1
    2.500E-06                         ! usrlrate:[kg/yr/m2]: used if imodel=3

    5.135E+04                         ! preexpo: preexponential term for imodel=2

|
```

```
\ Radionuclide inventory

'ebspac.nuc'                              ! elefil: nuclide names, t1/2,invent ,correction
for Diff
|

\C-14 generation

    1.11055E-03            ! r0z: initial radius of SF particle [m]

    1.25000E-05            ! radu: radius of the SF grain [m]

     8.73961E-07             ! radsg: subgrain fragment radius after trans. frac. [m]

    1.00000E+00             ! claddingcorfact: cladding correction factor

    4.24899E+01             ! cladve, velocity enhancement factor (1 to 240)

    2.00000E+00          ! ltube0, half length of fuel rod, meters

    5.00000E-03             ! rrod, radius of fuel in rod, meters

    6.10000E-04            ! thclad: thickness of cladding [m]

    7.20000E-04           ! cfuel: C-14 [ci] /kg SF

     4.89000E-04            ! czmetal: C-14 [ci] /kg SF in Zyr. clad & other metals

    2.48000E-05             ! czoxide: C-14/kg SF in initial Zry oxide & crud

    6.20000E-06            ! cgap: C-14/kg SF in grain and gap

|

\glass model

    5.63000E-02            ! simglass m^2/kg

   8.40195E+00           ! phglass

    6.90000E+00           ! logkeffhi

    4.00000E-01            ! etahi

    8.00000E+01            ! eahi kj/mol deg K

    9.00000E+00           ! logkefflow

  -6.00000E-01           ! etalow
```

```
   5.30000E+01            ! ealow kj/mol deg K
|
\diffusion model
   1.00000E-01            ! cr_length, length of crack, meters
   2.00000E-05            ! cr-area_a, area of crack at t=0, m^2
   1.00000E-08            ! cr_area_b, slope of crack growth, m^2/yr
   2.00000E-01            ! l_internal,length of interior film pathway, meters
   2.00000E-05            ! a_internal, cross section of interior film, m^2
   2.30000E-09            ! d_water, diffusivity of water at 20C, m^2/sec
   1.00000E-01            ! ftilt, fraction of WPs in diffusion orientation
|
\NUMERICAL
\
\Grids
10, 10                                ! imax,jmax: # of grid nodes in i,j directions
\X-COOR of grid nodes
.1, .5, 1.0, 2.0, 4.0, 5.0, 6.0, 7.0, 8.0, 9.0
\Y-COOR of grid nodes
.1, .5, 1.0, 2.0, 4.0, 5.0, 6.0, 7.0, 8.0, 9.0
\ Note: zones apply to the above grid, zones are the same for all cell
\ZONES
4                                     ! nzones: no. of zones for material types
1    1  1    1  1                     ! iz,ib,jb,ie,je: for zone 1
2    2  1    2  1                     ! iz,ib,jb,ie,je: for zone 2
3    3  1    3  1                     ! iz,ib,jb,ie,je: for zone 3
```

```
4     4  1     10 1                    ! iz,ib,jb,ie,je: for zone 4
|
\Rock parameters
0.14, 0.14, 0.14, 0.14                 ! rpor(1..nzones): rock porosity
|
\ Radionuclide transport
5.6e-5, 5.6e-5, 5.6e-5, 5.6e-5         ! rdiff(1..nzones):diffusion coef. [m2/yr]
   5.50000E+00                         ! driftdia [m]
|
\ Solution algorithm control parameters (Runge-Kutta)
25., 0.0, 10.                          ! dtinit [yr], dtmin [yr], dtmax [yr]
1.0e-2, 1.0e-10                        ! eps, tiny
|
\output parameters
200                                    ! nbt: number of time intervals for output
|
\END
```

From the TPA Code Version 5.0m, the *ebsrelsf.inp* and *ebsrelglass.inp* files are listed.

TPA Code Version 5.0m *ebsrelsf.inp*:

```
\Input data file for release for glass, diffusion and clad: releaset5d.f 7/26/02 rbc
|
\Cell information
   5.20800E+03     4.17697E-01     ! xcon: # of WP; sawetfrac: wetted subarea    ebsrel:
xcon
 0.00000E+00            15          ! defect,idefect:  initially defective time [yr]
& WPs affected   e
```

```
 7.55132E+03              35            ! sftimef,isconf:  faulting fail time [yr] & WPs
affected  ebsrel:
 5.30772E+03              17            ! sftimev,isconv:  volcano fail time [yr] & WPs
affected  ebsrel:
 9.96390E+02             123           ! seismt1,seismp1: first  seismic failure time [yr]
& WP affected
 3.46586E+03             234           ! seismt2,seismp2: second seismic failure time [yr]
& WP affected
 7.37632E+03             345           ! seismt3,seismp3: third  seismic failure time [yr]
& WP affected
 5.50000E+04             456           ! seismt4,seismp4: fourth seismic failure time [yr]
& WP affected
|

\WP information

    1.57900E+00,     5.27500E+00    ! dintl: wp ID, xintl: internal length [m]

    4.83000E+00                     ! xvol: wp internal vol[m3]

|

\Thermal data

'ebstrh.dat'                         ! temfil: temp. file (output from ebspac_fail.f)

    9.99000E+02                      ! ctemp: BP of water at atm. condition [C]

|

\Flow parameters

'ebsflo.dat'                        ! hydfil: flow parameters file

|

\SF  materials

\

    0.78900E+04                    ! amassc: SF mass per WP [kg]

    1.06000E+04                     ! fueden: SF density [kg/m3]

\

\Fuel leaching model paramters and water contact mode (bathtub=0, flowthru=1)

 5.39016E-01    0          ! wetfrac(1),iwatcont(1): init def ht fract of wet SF and
water contact ebsr
```

```
 4.43426E-01     1           ! wetfrac(2),iwatcont(2): fau fail ht fract of wet SF and
water contact   eb
 7.44695E-01     1           ! wetfrac(3),iwatcont(3): vol fail ht fract of wet SF and
water contact   eb
 3.73904E-02     0           ! wetfracs(1,sa),iwatcont(4): seim1 fail ht fract of wet SF
and water contac
 9.04091E-01     0           ! wetfrac(5),iwatcont(5): seim2 fail ht fract of wet SF and
water contact
 4.50167E-01     0           ! wetfrac(6),iwatcont(6): seim3 fail ht fract of wet SF and
water contact
 6.66500E-01     0           ! wetfrac(7),iwatcont(7): seim4 fail ht fract of wet SF and
water contact
 9.33378E-01     0           ! wetfrac(8),iwatcont(8): cor fail ht fract of wet SF and
water contact   eb
 2                                   ! imodel: leaching model

 6.210E+00    2.100E-01    3.710E+00  ! phvalue,oxgnovpr [atm]; cco3 [mol/L]: used if
imodel=1
    2.500E-06                        ! usrlrate:[kg/yr/m2]: used if imodel=3

    5.135E+04                        ! preexpo: preexponential term for imodel=2

|

\ Radionuclide inventory

'ebspac.nuc'                         ! elefil: nuclide names, t1/2,invent ,correction
for Diff
|

\C-14 generation

    1.11055E-03           ! r0z: initial radius of SF particle [m]

    1.25000E-05           ! radu: radius of the SF grain [m]

    8.73961E-07           ! radsg: subgrain fragment radius after trans. frac. [m]

    1.00000E+00           ! claddingcorfact: cladding correction factor

    4.24899E+01           ! cladve, velocity enhancement factor (1 to 240)

    2.00000E+00          ! ltube0, half length of fuel rod, meters   ebsrel: eltube0

    5.00000E-03           ! rrod, radius of fuel in rod, meters

    6.10000E-04           ! thclad: thickness of cladding [m]

    7.20000E-04          ! cfuel: C-14 [ci] /kg SF
```

```
    4.89000E-04             ! czmetal: C-14 [ci] /kg SF in Zyr. clad & other metals

    2.48000E-05             ! czoxide: C-14/kg SF in initial Zry oxide & crud

    6.20000E-06             ! cgap: C-14/kg SF in grain and gap

|

\glass model

    5.63000E-02           ! simglass m^2/kg

    8.40195E+00           ! phglass

    6.90000E+00           ! logkeffhi

    4.00000E-01           ! etahi

    8.00000E+01           ! eahi kj/mol deg K

    9.00000E+00           ! logkefflow

   -6.00000E-01          ! etalow

    5.30000E+01           ! ealow kj/mol deg K

|

\diffusion model

    1.00000E-01           ! cr_length, length of crack, meters

    2.00000E-05           ! cr-area_a, area of crack at t=0, m^2

    1.00000E-08           ! cr_area_b, slope of crack growth, m^2/yr

    2.00000E-01           ! l_internal,length of interior film pathway, meters  ebsrel:
el_internal
    2.00000E-05           ! a_internal, cross section of interior film, m^2

    2.30000E-09           ! d_water, diffusivity of water at 20C, m^2/sec

    1.00000E-01           ! ftilt, fraction of WPs in diffusion orientation

|

\NUMERICAL

\
```

```
\Grids
10, 10                                  ! imax,jmax: # of grid nodes in i,j directions
\X-COOR of grid nodes
.1, .5, 1.0, 2.0, 4.0, 5.0, 6.0, 7.0, 8.0, 9.0
\Y-COOR of grid nodes
.1, .5, 1.0, 2.0, 4.0, 5.0, 6.0, 7.0, 8.0, 9.0
\ Note: zones apply to the above grid, zones are the same for all cell
\ZONES
4                                       ! nzones: no. of zones for material types
1     1  1     1  1                     ! iz,ib,jb,ie,je: for zone 1
2     2  1     2  1                     ! iz,ib,jb,ie,je: for zone 2
3     3  1     3  1                     ! iz,ib,jb,ie,je: for zone 3
4     4  1     10 1                     ! iz,ib,jb,ie,je: for zone 4
|
\Rock parameters
0.14, 0.14, 0.14, 0.14                  ! rpor(1..nzones): rock porosity
|
\ Radionuclide transport
5.6e-5, 5.6e-5, 5.6e-5, 5.6e-5          ! rdiff(1..nzones):diffusion coef. [m2/yr]
   5.50000E+00                          ! driftdia [m]
|
\ Solution algorithm control parameters (Runge-Kutta)
25., 0.0, 10.                           ! dtinit [yr], dtmin [yr], dtmax [yr]
1.0e-2, 1.0e-10                         ! eps, tiny
|
```

```
\output parameters

200                                    ! nbt: number of time intervals for output

|

\END
```

TPA Code Version 5.0m *ebsrelglass.inp*:

```
\Input data file for release for glass, diffusion and clad: releaset5d.f 7/26/02 rbc

|

\Cell information

   7.96100E+03     4.17697E-01     ! xcon: # of WP; sawetfrac: wetted subarea    ebsrel:
xcon
 0.00000E+00              0          ! defect,idefect:  initially defective time [yr]
& WPs affected   e
 0.00000E+00              0          ! sftimef,isconf:  faulting fail time [yr] & WPs
affected   ebsrel:
 0.00000E+00              0          ! sftimev,isconv:  volcano fail time [yr] & WPs
affected   ebsrel:
 0.00000E+00             0          ! seismt1,seismp1: first  seismic failure time [yr]
& WP affected
 0.00000E+00             0          ! seismt2,seismp2: second seismic failure time [yr]
& WP affected
 0.00000E+00             0          ! seismt3,seismp3: third  seismic failure time [yr]
& WP affected
 0.00000E+00             0          ! seismt4,seismp4: fourth seismic failure time [yr]
& WP affected
|

\WP information

   1.57900E+00,     5.27500E+00    ! dintl: wp ID, xintl: internal length [m]

   4.83000E+00                    ! xvol: wp internal vol[m3]

|

\Thermal data

'ebstrh.dat'                         ! temfil: temp. file (output from ebspac_fail.f)

   9.99000E+02                      ! ctemp: BP of water at atm. condition [C]

|
```

```
\Flow parameters

'ebsflo.dat'                          ! hydfil: flow parameters file

|

\SF  materials

\

   0.16300E+04                        ! amassc: SF mass per WP [kg]

   1.06000E+04                        ! fueden: SF density [kg/m3]

\

\Fuel leaching model paramters and water contact mode (bathtub=0, flowthru=1)

 5.39016E-01    0          ! wetfrac(1),iwatcont(1): init def ht fract of wet SF and
water contact ebsr
 4.43426E-01    1          ! wetfrac(2),iwatcont(2): fau fail ht fract of wet SF and
water contact   eb
 7.44695E-01    1          ! wetfrac(3),iwatcont(3): vol fail ht fract of wet SF and
water contact   eb
 3.73904E-02    0          ! wetfracs(1,sa),iwatcont(4): seim1 fail ht fract of wet SF
and water contac
 9.04091E-01    0          ! wetfrac(5),iwatcont(5): seim2 fail ht fract of wet SF and
water contact
 4.50167E-01    0          ! wetfrac(6),iwatcont(6): seim3 fail ht fract of wet SF and
water contact
 6.66500E-01    0          ! wetfrac(7),iwatcont(7): seim4 fail ht fract of wet SF and
water contact
 9.33378E-01    0          ! wetfrac(8),iwatcont(8): cor fail ht fract of wet SF and
water contact   eb
 5                                 ! imodel: leaching model

 6.210E+00   2.100E-01   3.710E+00  ! phvalue,oxgnovpr [atm]; cco3 [mol/L]: used if
imodel=1
   2.500E-06                        ! usrlrate:[kg/yr/m2]: used if imodel=3

   5.135E+04                        ! preexpo: preexponential term for imodel=2

|

\ Radionuclide inventory

'ebspac.nuc'                        ! elefil: nuclide names, t1/2,invent ,correction
for Diff
|
```

```
\C-14 generation
    1.11055E-03            ! r0z: initial radius of SF particle [m]
    1.25000E-05            ! radu: radius of the SF grain [m]
    8.73961E-07            ! radsg: subgrain fragment radius after trans. frac. [m]
    1.00000E+00            ! claddingcorfact: cladding correction factor
    4.24899E+01            ! cladve, velocity enhancement factor (1 to 240)
    2.00000E+00          ! ltube0, half length of fuel rod, meters   ebsrel: eltube0
    5.00000E-03            ! rrod, radius of fuel in rod, meters
    6.10000E-04            ! thclad: thickness of cladding [m]
    7.20000E-04            ! cfuel: C-14 [ci] /kg SF
    4.89000E-04            ! czmetal: C-14 [ci] /kg SF in Zyr. clad & other metals
    2.48000E-05            ! czoxide: C-14/kg SF in initial Zry oxide & crud
    6.20000E-06            ! cgap: C-14/kg SF in grain and gap
|
\glass model
    5.63000E-02          ! simglass m^2/kg
    8.40195E+00          ! phglass
    6.90000E+00          ! logkeffhi
    4.00000E-01          ! etahi
    8.00000E+01          ! eahi kj/mol deg K
    9.00000E+00          ! logkefflow
   -6.00000E-01          ! etalow
    5.30000E+01          ! ealow kj/mol deg K
|
\diffusion model
```

```
    1.00000E-01            ! cr_length, length of crack, meters

    2.00000E-05            ! cr-area_a, area of crack at t=0, m^2

    1.00000E-08            ! cr_area_b, slope of crack growth, m^2/yr

    2.00000E-01            ! l_internal,length of interior film pathway, meters   ebsrel:
el_internal
    2.00000E-05            ! a_internal, cross section of interior film, m^2

    2.30000E-09            ! d_water, diffusivity of water at 20C, m^2/sec

    1.00000E-01            ! ftilt, fraction of WPs in diffusion orientation

|

\NUMERICAL

\

\Grids

10, 10                                 ! imax,jmax: # of grid nodes in i,j directions

\X-COOR of grid nodes

.1, .5, 1.0, 2.0, 4.0, 5.0, 6.0, 7.0, 8.0, 9.0

\Y-COOR of grid nodes

.1, .5, 1.0, 2.0, 4.0, 5.0, 6.0, 7.0, 8.0, 9.0

\ Note: zones apply to the above grid, zones are the same for all cell

\ZONES

4                                      ! nzones: no. of zones for material types

1    1  1    1  1                     ! iz,ib,jb,ie,je: for zone 1

2    2  1    2  1                     ! iz,ib,jb,ie,je: for zone 2

3    3  1    3  1                     ! iz,ib,jb,ie,je: for zone 3

4    4  1    10 1                     ! iz,ib,jb,ie,je: for zone 4

|

\Rock parameters
```

```
0.14, 0.14, 0.14, 0.14              ! rpor(1..nzones): rock porosity
|
\ Radionuclide transport
5.6e-5, 5.6e-5, 5.6e-5, 5.6e-5      ! rdiff(1..nzones):diffusion coef. [m2/yr]
   5.50000E+00                      ! driftdia [m]
|
\ Solution algorithm control parameters (Runge-Kutta)
25., 0.0, 10.                        ! dtinit [yr], dtmin [yr], dtmax [yr]
1.0e-2, 1.0e-10                     ! eps, tiny
|
\output parameters
200                                   ! nbt: number of time intervals for output
|
\END
```

This test successfully **PASSED** the criterion above (see the **bold** text above in the 4 RELEASET input files).

That is, the non-zero scenario WP failures from the TPA Code Version 5.0k in the *ebsrelglass.inp* file were zero-ed out in the TPA Code Version 5.0m in *ebsrelglass.inp* file. Note that the same number of scenario WP failures are present in the ebsrelsf.inp files for the TPA Code Versions 5.0k and 5.0m.

Test Criterion 2. Verify that the results for the WP failure type and the time of the WP failures in the *wpsfail.res* files for TPA Code Versions 5.0k and 5.0m are not different.

From the TPA Code Version 5.0k, the *wpsfail.res* file is listed.

```
Input file tpa.inp as supplied with TPA Version 5.0k Code.
Base case.
TPA 5.0k, Job started: Thu Jul 24 19:48:28 2003
Number of Failed WPs by Type of Disruptive Event

Including Time of Event - Values for Each Vector
```

```
     vector              time            #corrode          #seismic           #fault
  #igact
     unitless             yr              unitless          unitless          unitless
 unitless
           1          5.3077E+03        0.0000E+00        0.0000E+00        0.0000E+00
1.7000E+01
           1          7.5513E+03        0.0000E+00        0.0000E+00        3.5000E+01
0.0000E+00
           1          6.6700E+04        6.7910E+03        0.0000E+00        0.0000E+00
0.0000E+00
```

From the TPA Code Version 5.0m, the *wpsfail.res* file is listed.

```
Input file tpa.inp as supplied with TPA Version 5.0m Code.
Base case.
TPA 5.0m, Job started: Thu Jul 24 19:41:18 2003
Number of Failed WPs by Type of Disruptive Event

Including Time of Event - Values for Each Vector


     vector              time            #corrode          #seismic           #fault
  #igact
     unitless             yr              unitless          unitless          unitless
 unitless
           1          5.3077E+03        0.0000E+00        0.0000E+00        0.0000E+00
1.7000E+01
           1          7.5513E+03        0.0000E+00        0.0000E+00        3.5000E+01
0.0000E+00
           1          6.6700E+04        6.7860E+03        0.0000E+00        0.0000E+00
0.0000E+00
```

(note: the number of corrosion failures is slightly different in these two files because of changes in the repository outline set in *repdes.dat* in TPA Code Versions 5.0k and 5.0m).

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

(Note that the SEISMO failures are not in the wpsfail.res file because those failures are hardcoded in EBSREL. There are currently no SEISMO failures in the TPA code)

Overall Test Status

The test is successfully **PASSED.**

SOFTWARE CHANGE REPORT (SCR)

SCR No. 471	**Software Title and Version:** TPA 5.0m	**Project No:** 20.06002.01.012

Affected Software Module(s), Description of Problem(s): szft.f, uzft.f
SVTR C10-1 revealed that the dispersion length for the SZ is incorrect . It appears that the dispersion for the SAV is also used for the STFF.
The equation for calculating the Rd in subroutine calc_rd, assumes moisture content in the SZ is 1. This is in error, the moisture content for the SZ should be equal to the porosity.

Change Requested by:	**Change Authorized by** (*Software Developer*):
T. McCartin Date: 7-25-03	R. Janetzke Date: 7-25-03

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

See attachment 1.

Which test files require modification to accommodate this change?
None.

Implemented by:	**Date:**
R. Janetzke	7-25-03

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	**Date:** 7-29-03

Attachment 1

Line 4495 was changed to:

```
rds(i)= 1.D0 + density*(1.D0-porosity)*kd_kas(i) / porosity
```

The call to **setvelfile** was changed to:

```
 call setvelfile(mxntime, tim, ntim, numsalayers, maxlyr,
&                vell, avgwtt, tavgwtt, etime, salength,
&                sawidth, flowrate, por, nefvel, neflen,
&                widthmult, samixlength, widthmix, pormix,
&                vtim, tvel, mixvel, numlegs, numsteps,
&                   residetim,    diffusrate,    disper,
&                nefresidetim, nefdiffusrate, tpadisper)
```

The dispersion loops were replaced with a single loop:

```
  do inc = 1, numlegs
    nefdiffus(inc) = 0
    if (neflen(inc)/nefvel(inc) .gt. nefresidetim(inc) .and.
&           nefdiffusrate(inc) .gt. 0.0d0) then
        nefdiffus(inc) = 1
        matdiffusion = 1
    end if
    nefdisper(inc) = tpadisper(inc) * neflen(inc)
  end do
```

Lines 3511,3514 were added in **setvelfile**

```
              tpadisper(inc)     = disper(layer2)
              nefresidetim(inc)  = residetim(layer2)
              nefdiffusrate(inc) = diffusrate(layer2)
```

Lines 3518,3529 were added in **setvelfile**:

```
            else
                if (inc .gt. 0) then
                   neflen(inc) = salength(layer2) + neflen(inc)
                end if
```

07/30/3

Test Plan/Report for TPA SCR #471

Test Plan Name: Correct STFF Dispersion and Calculation For Rd In SZ

Tested By: Carol S. Scherer **Date:** July 29, 2003

Host Machine: SUN Ultra-4 server: Spock **Host OS:** Sun Solaris 5.8

Baseline Version: TPA 5.0m (4.2 solapps compiler)

Test Version: TPA 5.0n (4.2 solapps compiler)

Code Modifications:

The following code modifications were made to **TPA** for SCR #471:

1. Modified szft.f: Formula for calcuation of matrix Rd in the SZ was changed from:

   rds(i) = 1.D0 * density * (1.D0 - porosity) * kd_kas(i)

   to:

   rds(i) = 1.D0 * density * (1.D0 - porosity) * kd_kas(i) / porosity

2. Modified szft.f: The subroutine setvelfile was modified to use dispersion for the STFF for the STFF leg instead of using dispersion for the SAV.

Testing Setup:

Directories/paths used for testing:

$HOME = /net/spock/home/cscherer

Path for base run directory: ***$HOME/tpatest/scr471/tpa50m***

Path for test run directory: ***$HOME/tpatest/scr471***

Environment variables:

for base runs:

TPA_TEST = $HOME*/tpatest/scr471/tpa50m*

TPA_DATA = $HOME*/tpatest/scr471/tpa50m*

for test runs:

TPA_TEST = $HOME/*tpatest/scr471*
TPA_DATA = $HOME/*tpatest/scr471*

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 # 471 - Test Directories*" (attached).

Test preparation instructions:

1. In the directory **$HOME**, create the following subdirectory: ***scr471***.

2. In the directory ***scr471***, create the following subdirectory: ***tpa50m***

3. Copy **TPA** version 5.0n to ***scr471***. Compile *tpa.e* using *Makefile4.2*.

4. Copy **TPA** version 5.0m to ***scr471/tpa50m***. Compile *tpa.e* using *Makefile4.2*.

Functional Level Tests:

None.

System Level Tests:

This test is designed to demonstrate that the modified code affects overall **TPA** processing and output as planned with no unwanted side effects.

1. Name: Compare Modified Code To Previous Version Of The Code 1024.

   Paths for archives of results: ***$HOME/tpatest/scr471***
   $HOME/tpatest/scr471/tpa50m

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

   Special diagnostic code modifications required: none.

   Program modes to be used: use base case tpa.inp for version n and version m

   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** code generates different results than before and that the new results are correct

- assumptions: none.

- constraints: the file *tpa_471.out* does not exist in either the base run or testA run directories.

- output files to compare or examine: *tpa_471.out* and ***tpa50a/****tpa_471.out*

- step by step test procedure to be used:
  1. —> change directory to <<base run directory>>
  2. run *tpa.e* using command "***tpa.e > tpa_471.out***"
  3. —> change directory to <<test run directory>>
  4. run *tpa.e* using command "***tpa.e > tpa_471.out***"
  5. look at files *nefiisz.inp* and ***tpa50m/****nefiisz.inp*

- pass/fail criteria: the test passes if:

  1. In the **MIGRATION PATH PROPERTIES ARRAY in** nefiisz.inp (version n), the value for **DISPER (M)** for the STFF leg, is equal to **LENGTH (M)** of the STFF leg in the **NETWORK LEG PROPERTIES ARRAY** multiplied by the **DispersionFraction_STFF** from *tpa.inp*. In the version m file (tpa50m/nefiisz.inp), the dispersion value for STFF was the same as the dispersion value for SAV.

  2. Compare the **ELEMENT PROPERTIES ARRAY** in both versions of nefiisz.inp. The **MOBIL RD** and **IMMOBILE RD** values for elements 2 - 6 (U, Am, Np, Pu, and Th) should differ. For the version n mobile rds, the values for **MOBIL RD** for the 3rd leg have the following relationship, where por should be equal to the value listed for **MOBILE POROS.** in the **MIGRATION PATH PROPERTIES ARRAY** in *scr471/nefiisz.inp*. (Allow for rounding errors.)

$$por = (\text{mobile rd (m)} - 1) / (\text{mobile rd(n)} - 1)$$

For the version n immobile rds, the values for **IMMOBILE RD** for the 2nd leg have the following relationship, where por should be equal to the value of **ImmobilePorsosity_STFF** from *scr471/tpa.inp*. (Allow for rounding errors.)

$$por = (immobile\ rd\ (m) - 1) / (immobile\ rd(n) - 1)$$

3. Results are calculated in the spreadsheet scr471.xls.

Results of running test:

PASSED.

NOTES:

```
scr471:
total 18111
drwxr-xr-x   7 cscherer sunuser     14848 Jul 29 13:55 .
drwxr-xr-x  12 cscherer sunuser       512 Jul 30 13:50 ..
-rwxr-xr-x   1 cscherer sunuser      2001 Jun 10 17:49 CLEANUP
-rw-r--r--   1 cscherer sunuser       965 Jul 29 10:49 FILENAME.DAT
-rw-r--r--   1 cscherer sunuser       869 Jun 28 14:00 Makefile
-rw-rw-rw-   1 cscherer sunuser       961 Jul  1 12:49 Makefile4.2
-rw-r--r--   1 cscherer sunuser       132 Jul 29 10:48 NEFII.VEL
-rwxr-xr-x   1 cscherer sunuser       312 Jun 29 19:55 acopy.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 acopy.t
-rw-r--r--   1 cscherer sunuser      3034 Jun 29 19:55 addbetapdf.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 addbetapdf.t
-rw-r--r--   1 cscherer sunuser      3042 Jun 29 19:55 addconstantpdf.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 addconstantpdf.t
-rw-r--r--   1 cscherer sunuser      3033 Jun 29 19:55 addcorrel.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 addcorrel.t
-rw-r--r--   1 cscherer sunuser      3048 Jun 29 19:55 addexpomentialpdf.h
-rw-r--r--   1 cscherer sunuser      3048 Jun 29 19:55 addexponentialpdf.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 addexponentialpdf.t
-rw-r--r--   1 cscherer sunuser      3060 Jun 29 19:55 addfiniteexponentialpdf.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 addfiniteexponentialpdf.t
-rw-r--r--   1 cscherer sunuser      3121 Jun 29 19:55 addhazardcurve.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 addhazardcurve.t
-rw-r--r--   1 cscherer sunuser      3044 Jun 29 19:55 addiconstantpdf.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 addiconstantpdf.t
-rw-r--r--   1 cscherer sunuser      3042 Jun 29 19:55 addiuniformpdf.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 addiuniformpdf.t
-rw-r--r--   1 cscherer sunuser      2932 Jun 29 19:55 addlogbetapdf.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 addlogbetapdf.t
-rw-r--r--   1 cscherer sunuser      2936 Jun 29 19:55 addlognormalpdf.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 addlognormalpdf.t
-rw-r--r--   1 cscherer sunuser      2944 Jun 29 19:55 addlogtriangularpdf.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 addlogtriangularpdf.t
-rw-r--r--   1 cscherer sunuser      2938 Jun 29 19:55 addloguniformpdf.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 addloguniformpdf.t
-rw-r--r--   1 cscherer sunuser      3038 Jun 29 19:55 addnormalpdf.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 addnormalpdf.t
-rwxr-xr-x   1 cscherer sunuser       288 Jun 29 19:55 addto.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 addto.t
-rw-r--r--   1 cscherer sunuser      3046 Jun 29 19:55 addtriangularpdf.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 addtriangularpdf.t
-rw-r--r--   1 cscherer sunuser      3040 Jun 29 19:55 adduniformpdf.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 adduniformpdf.t
-rw-r--r--   1 cscherer sunuser      3158 Jun 29 19:55
adduserdiscreteempirical.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06
adduserdiscreteempirical.t
-rw-r--r--   1 cscherer sunuser      3181 Jun 29 19:55 addusersuppliedddiscrete.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 addusersuppliedddiscrete.t
-rw-r--r--   1 cscherer sunuser      3178 Jun 29 19:55 addusersuppliedpwisecdf.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 addusersuppliedpwisecdf.t
-rw-r--r--   1 cscherer sunuser       444 Jun 23 11:02 aftnefmks.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 aftnefmks.t
-rwxr-xr-x   1 cscherer sunuser       323 Jun 29 19:55 ainterl.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 ainterl.t1
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 ainterl.t2
```

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-rw-r--r--   1 cscherer sunuser      2742 Jul 29 10:49 airpkdos.res
-rwxr-xr-x   1 cscherer sunuser      3420 Jul 19 18:19 allchains.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 allchains.t
-rw-r--r--   1 cscherer sunuser      2742 Jul 29 10:49 arpkds_c.res
-rw-r--r--   1 cscherer sunuser     29502 Mar 24 16:19 array.f
-rw-r--r--   1 cscherer sunuser     51356 Jul 28 12:13 array.o
-rw-r--r--   1 cscherer sunuser       910 Jul 29 10:49 ashout.res
-rw-r--r--   1 cscherer sunuser      1021 Jun 28 13:41 ashplume.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 ashplume.t
-rw-r--r--   1 cscherer sunuser     28377 Jun 28 13:11 ashplumo.f
-rw-r--r--   1 cscherer sunuser       204 Jun 28 13:41 ashplumo.h
-rw-r--r--   1 cscherer sunuser     45560 Jul 28 12:13 ashplumo.o
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 ashplumo.t
-rw-r--r--   1 cscherer sunuser     47213 Jul  3 07:59 ashrmovo.f
-rw-r--r--   1 cscherer sunuser       386 Jun 30 09:29 ashrmovo.h
-rw-r--r--   1 cscherer sunuser     46864 Jul 28 12:13 ashrmovo.o
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 ashrmovo.t
-rw-r--r--   1 cscherer sunuser       326 Jun 28 13:41 buildInputFiles.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 buildInputFiles.t
-rw-r--r--   1 cscherer sunuser      1025 Jul 29 10:44 burnup.dat
-rw-r--r--   1 cscherer sunuser       237 Jun 21 21:05 calc_kd.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 calc_kd.t
-rw-r--r--   1 cscherer sunuser       163 Jun 21 21:05 calc_mai.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 calc_mai.t
-rw-r--r--   1 cscherer sunuser       362 Jun 21 21:05 calc_rd.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 calc_rd.t
-rw-r--r--   1 cscherer sunuser       243 Jun 21 21:05 calc_wp.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 calc_wp.t
drwxr-xr-x   2 cscherer sunuser       512 Jul 28 10:05 ccdf
-rw-r--r--   1 cscherer sunuser       221 Jun 21 21:05 ccdfindexed.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 ccdfindexed.t
-rwxrwxrwx   1 cscherer sunuser       126 Jul 29 10:40 ch_env
-rwxr-xr-x   1 cscherer sunuser      2962 Jul 19 18:19 chains.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 chains.t
-rwxr-xr-x   1 cscherer sunuser      2947 Jul 19 18:19 chainsolver.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 chainsolver.t
-rw-r--r--   1 cscherer sunuser       131 Jun 29 19:55 checkforduplicate.h
-rwxr-xr-x   1 cscherer sunuser       314 Jun 29 19:55 checkforduplicates.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 checkforduplicates.t
-rwxr-xr-x   1 cscherer sunuser       302 Jun 29 19:55 checkinorder.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 checkinorder.t
-rw-r--r--   1 cscherer sunuser      2867 Jun 29 19:55 checklhsout.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 checklhsout.t
-rw-r--r--   1 cscherer sunuser       131 Jun 21 21:05 checknr.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 checknr.t
-rw-r--r--   1 cscherer sunuser       133 Jun 21 21:05 checknsa.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 checknsa.t
-rw-r--r--   1 cscherer sunuser      2922 Jun 29 19:55 checkspname.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 checkspname.t
-rw-r--r--   1 cscherer sunuser      5047 Jul 29 10:48 chlrdmf.dat
-rw-r--r--   1 cscherer sunuser        66 Jun 21 21:05 cleanupwd.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 cleanupwd.t
-rwxr-xr-x   1 cscherer sunuser       259 Jun 29 19:55 clearchar.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 clearchar.t
-rwxr-xr-x   1 cscherer sunuser      5634 Jul 19 18:03 cleart
-rw-r--r--   1 cscherer sunuser        71 Jun 21 21:05 clidat_init.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 clidat_init.t
```

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-rw-r--r--   1 cscherer sunuser        71 Jun 21 21:05 climate_init.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 climate_init.t
-rw-r--r--   1 cscherer sunuser        66 Jun 21 21:05 climato.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 climato.t
-rw-r--r--   1 cscherer sunuser    850000 Jul 29 10:45 climato1.dat
-rw-r--r--   1 cscherer sunuser      2200 Jul 29 10:45 climato2.dat
drwxr-xr-x   4 cscherer sunuser      1024 Jul 28 12:21 codes
-rw-r--r--   1 cscherer sunuser      6219 Jul 29 10:45 coefkdeq.dat
-rw-r--r--   1 cscherer sunuser       735 Feb 18 18:46 coefkdeq.i
-rw-r--r--   1 cscherer sunuser       530 Jun 28 13:41 cond3dxyzt.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 cond3dxyzt.t
-rw-r--r--   1 cscherer sunuser     14198 Jul 12 15:29 condxyzt.f
-rw-r--r--   1 cscherer sunuser      3400 Jul 28 12:17 condxyzt.o
-rw-r--r--   1 cscherer sunuser       138 Jun 29 19:55 copylines.h
-rw-r--r--   1 cscherer sunuser     16306 Jul 29 10:48 corrode.out
-rw-r--r--   1 cscherer sunuser     78191 Jul 29 10:49 cp.tpa
-rw-r--r--   1 cscherer sunuser       747 Jun 21 21:05 cumfail.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 cumfail.t
-rw-r--r--   1 cscherer sunuser      3106 Jul 29 10:49 cumrel.res
-rw-r--r--   1 cscherer sunuser      3106 Jul 29 10:49 cumrel_c.res
-rw-r--r--   1 cscherer sunuser     46580 Jul 29 10:48 cumrelse.out
drwxr-xr-x   2 cscherer sunuser      1536 Jul 28 10:05 data
-rw-r--r--   1 cscherer sunuser    124149 Mar 24 16:19 dcags.f
-rw-r--r--   1 cscherer sunuser    255932 Jul 28 12:14 dcags.o
-rw-r--r--   1 cscherer sunuser    157905 Jul  3 08:33 dcagw.f
-rw-r--r--   1 cscherer sunuser       577 Jun 29 19:55 dcagw.h
-rw-r--r--   1 cscherer sunuser    334128 Jul 28 12:14 dcagw.o
-rwxr-xr-x   1 cscherer sunuser      2906 Jul 19 18:19 decay43mol.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 decay43mol.t
-rwxr-xr-x   1 cscherer sunuser      3040 Jul 19 18:19 decay43molglass.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 decay43molglass.t
-rwxr-xr-x   1 cscherer sunuser      2995 Jul 19 18:19 decayremove43mol.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 decayremove43mol.t
-rw-r--r--   1 cscherer sunuser      6693 Jul 29 10:48 deltaec.inp
-rw-r--r--   1 cscherer sunuser       193 Jun 21 21:05 demij_to_m.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 demij_to_m.t
-rw-r--r--   1 cscherer sunuser      2821 Jun 29 19:55 dget_from_name.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 dget_from_name.t1
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 dget_from_name.t2
-rw-r--r--   1 cscherer sunuser      9800 Jul 29 10:48 diagnose.out
-rw-r--r--   1 cscherer sunuser      2200 Jul 29 10:49 dilution.dat
drwxr-xr-x   2 cscherer sunuser       512 Jul 30 12:58 docs
-rw-r--r--   1 cscherer sunuser      3870 Jul 29 10:44 drifts.dat
-rw-r--r--   1 cscherer sunuser       190 Sep 20  2002 driftsa.i
-rw-r--r--   1 cscherer sunuser       519 Jul 29 10:45 drythick.dat
-rw-r--r--   1 cscherer sunuser     33643 Jul  3 08:33 dsfail.f
-rw-r--r--   1 cscherer sunuser       459 Jun 28 13:41 dsfail.h
-rw-r--r--   1 cscherer sunuser     30228 Jul 28 12:14 dsfail.o
-rw-r--r--   1 cscherer sunuser      2478 Jul 29 10:49 dsfail.res
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 dsfail.t
-rw-r--r--   1 cscherer sunuser      5674 Jul 29 10:48 dsfailt.dat
-rw-r--r--   1 cscherer sunuser       882 Jul 29 10:45 dsfailt.def
-rwxr-xr-x   1 cscherer sunuser     43884 Jul 29 10:45 dsfailt.e
-rw-r--r--   1 cscherer sunuser       671 Jul 29 10:48 dsfailt.inp
-rw-r--r--   1 cscherer sunuser         0 Jul 29 10:45 dsfailt.out
-rw-r--r--   1 cscherer sunuser     68389 Jul 29 10:48 ebscld.out
-rw-r--r--   1 cscherer sunuser      5999 Jul 29 10:45 ebsfail.def
```

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-rw-r--r--   1 cscherer sunuser     49414 Jul  3 08:13 ebsfail.f
-rw-r--r--   1 cscherer sunuser      5734 Jul 29 10:48 ebsfail.inp
-rw-r--r--   1 cscherer sunuser    117604 Jul 28 12:14 ebsfail.o
-rw-r--r--   1 cscherer sunuser       790 Jul 29 10:45 ebsfilt.def
-rwxr-xr-x   1 cscherer sunuser     46604 Jul 29 10:45 ebsfilt.e
-rw-r--r--   1 cscherer sunuser      2678 Jul 29 10:48 ebsfilt.inp
-rw-r--r--   1 cscherer sunuser       239 Jul 29 10:48 ebsfilt.out
-rw-r--r--   1 cscherer sunuser     14029 Jul 29 10:48 ebsflo.dat
-rw-r--r--   1 cscherer sunuser    192529 Jul 29 10:48 ebsnef.dat
-rw-r--r--   1 cscherer sunuser    124252 Jul 29 10:48 ebsnef.out
-rw-r--r--   1 cscherer sunuser    504873 Jul 29 10:48 ebsnef2.dat
-rw-r--r--   1 cscherer sunuser      1883 Jul 29 10:48 ebspac.nuc
-rw-r--r--   1 cscherer sunuser      6246 Jul 29 10:45 ebsrel.def
-rw-r--r--   1 cscherer sunuser     90665 Jul 26 09:24 ebsrel.f
-rw-r--r--   1 cscherer sunuser     11110 Jul 29 10:48 ebsrel.inp
-rw-r--r--   1 cscherer sunuser    222192 Jul 28 12:15 ebsrel.o
-rw-r--r--   1 cscherer sunuser       149 Sep 25  2002 ebsrel1.i
-rw-r--r--   1 cscherer sunuser    124203 Jul 29 10:48 ebssf.dat
-rw-r--r--   1 cscherer sunuser     17315 Jul 29 10:48 ebstrh.dat
-rw-r--r--   1 cscherer sunuser     12335 Jul 29 10:48 ebstrhc.inp
-rw-r--r--   1 cscherer sunuser      2647 Jul 29 10:48 echofail.dat
-rw-r--r--   1 cscherer sunuser    511529 Jul 29 10:48 echofilt.dat
-rwxr-xr-x   1 cscherer sunuser    190772 Jul 29 10:49 env.e
-rwxr-xr-x   1 cscherer sunuser    282452 Jul 29 10:49 envin.e
-rw-r--r--   1 cscherer sunuser     39350 Jul 29 10:49 epa_ave.out
-rw-r--r--   1 cscherer sunuser        91 Jun 21 21:05 epaccdf.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 epaccdf.t
-rw-r--r--   1 cscherer sunuser        93 Jun 21 21:05 epaccdf_c.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 epaccdf_c.t
-rw-r--r--   1 cscherer sunuser      1703 Jul 29 10:49 epapktim.out
-rw-r--r--   1 cscherer sunuser    419272 Jul 26 09:24 exec.f
-rw-r--r--   1 cscherer sunuser   1060532 Jul 28 12:17 exec.o
-rw-r--r--   1 cscherer sunuser      3475 Jun 21 20:50 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       134 Jun 21 20:51 execd.i
-rwxr-xr-x   1 cscherer sunuser    136424 Jul 29 10:45 failt.e
-rw-r--r--   1 cscherer sunuser     17384 Jul 29 10:48 failt.out
-rw-r--r--   1 cscherer sunuser     10996 Jun 28 13:11 faulto.f
-rw-r--r--   1 cscherer sunuser       199 Jun 28 13:41 faulto.h
-rw-r--r--   1 cscherer sunuser      8616 Jul 28 12:15 faulto.o
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 faulto.t
-rw-r--r--   1 cscherer sunuser      8226 Jun 30 13:38 fileunit.f
-rw-r--r--   1 cscherer sunuser      8580 Jul 28 12:17 fileunit.o
-rwxr-xr-x   1 cscherer sunuser      8947 Jun 28 13:30 fileutil.f
-rw-r--r--   1 cscherer sunuser     10772 Jul 28 12:17 fileutil.o
-rw-r--r--   1 cscherer sunuser       113 Jun 21 21:05 findpkmndose.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 findpkmndose.t
-rw-r--r--   1 cscherer sunuser      6281 Jul 29 10:48 fluoride.dat
-rw-r--r--   1 cscherer sunuser     46580 Jul 29 10:48 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       339 Jul 26 09:22 gauleg.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 gauleg.t
-rw-r--r--   1 cscherer sunuser      6513 Jul 29 10:49 gbioac1.dat
-rw-r--r--   1 cscherer sunuser      3383 Jul 29 10:49 gdefault.def
-rw-r--r--   1 cscherer sunuser      3387 Jul 29 10:49 gdefault.inp
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-rw-r--r--   1 cscherer sunuser       64 Jul 29 10:49 gdosinc2.dat
-rw-r--r--   1 cscherer sunuser      112 Jun 29 19:55 gentodcf.h
-rw-r--r--   1 cscherer sunuser        0 Jul 29 10:49 gentoo.out
-rw-r--r--   1 cscherer sunuser       86 Jun 29 19:55 gentpa.h
-rw-r--r--   1 cscherer sunuser    35173 Jul 29 10:49 genv.in
-rw-r--r--   1 cscherer sunuser    18393 Jul 29 10:49 genv.out
-rw-r--r--   1 cscherer sunuser      346 Jun 28 13:58 getThickness.h
-rw-r--r--   1 cscherer sunuser        0 Jul 19 18:06 getThickness.t1
-rw-r--r--   1 cscherer sunuser        0 Jul 19 18:06 getThickness.t2
-rw-r--r--   1 cscherer sunuser       70 Jun 21 21:05 get_climean.h
-rw-r--r--   1 cscherer sunuser        0 Jul 19 18:06 get_climean.t
-rw-r--r--   1 cscherer sunuser       95 Jun 21 21:05 get_clinoise_set.h
-rw-r--r--   1 cscherer sunuser        0 Jul 19 18:06 get_clinoise_set.t
-rw-r--r--   1 cscherer sunuser      132 Jun 21 21:05 get_data_file.h
-rw-r--r--   1 cscherer sunuser        0 Jul 19 18:06 get_data_file.t
-rw-r--r--   1 cscherer sunuser      244 Jun 23 11:02 getelements.h
-rw-r--r--   1 cscherer sunuser        0 Jul 19 18:06 getelements.t
-rw-r--r--   1 cscherer sunuser      181 Jun 23 11:02 getvertlayers.h
-rw-r--r--   1 cscherer sunuser        0 Jul 19 18:06 getvertlayers.t
-rw-r--r--   1 cscherer sunuser     7011 Jul 29 10:49 gftrans.def
-rw-r--r--   1 cscherer sunuser     7142 Jul 29 10:49 gftrans.inp
-rw-r--r--   1 cscherer sunuser    15214 Jul 29 10:49 ggamen.dat
-rw-r--r--   1 cscherer sunuser    13855 Jul 29 10:49 ggenii.def
-rw-r--r--   1 cscherer sunuser    13164 Jul 29 10:49 ggenii.inp
-rw-r--r--   1 cscherer sunuser    10074 Jul 29 10:49 ggenii.out
-rw-r--r--   1 cscherer sunuser     5351 Jul 29 10:49 ggrdf.dat
-rw-r--r--   1 cscherer sunuser     5673 Jul 29 10:49 gmedia.out
-rw-r--r--   1 cscherer sunuser     9897 Jul 29 10:49 gnewdf.dat
-rw-r--r--   1 cscherer sunuser    13200 Jul 29 10:49 grmdlib.dat
-rw-r--r--   1 cscherer sunuser      568 Jul 29 10:49 gsccdf.res
-rw-r--r--   1 cscherer sunuser      568 Jul 29 10:49 gsccdf_c.res
-rw-r--r--   1 cscherer sunuser     3561 Jul 29 10:49 gw_cb_ad.dat
-rw-r--r--   1 cscherer sunuser     1264 Jul 29 10:49 gw_cb_ci.dat
-rw-r--r--   1 cscherer sunuser     3557 Jul 29 10:49 gw_pb_ad.dat
-rw-r--r--   1 cscherer sunuser     1261 Jul 29 10:49 gw_pb_ci.dat
-rw-r--r--   1 cscherer sunuser      568 Jul 29 10:49 gwccdf.res
-rw-r--r--   1 cscherer sunuser      568 Jul 29 10:49 gwccdf_c.res
-rw-r--r--   1 cscherer sunuser        9 Jul 29 10:49 gwork.buf
-rw-r--r--   1 cscherer sunuser     1734 Jul 29 10:49 gwpkdos.res
-rw-r--r--   1 cscherer sunuser     1734 Jul 29 10:49 gwpkds_c.res
-rw-r--r--   1 cscherer sunuser     2166 Jul 29 10:49 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       96 Jun 29 19:55 iabarrier.h
-rw-r--r--   1 cscherer sunuser       98 Jun 29 19:55 iacomponent.h
-rw-r--r--   1 cscherer sunuser       99 Jun 28 14:03 iaddconsmv.h
-rw-r--r--   1 cscherer sunuser        0 Jul 19 18:06 iaddconsmv.t1
-rw-r--r--   1 cscherer sunuser        0 Jul 19 18:06 iaddconsmv.t2
-rw-r--r--   1 cscherer sunuser       93 Jun 29 19:55 iafile.h
-rw-r--r--   1 cscherer sunuser       98 Jun 29 19:55 iaparameter.h
-rw-r--r--   1 cscherer sunuser    26410 Jul 12 16:12 iareader.f
-rw-r--r--   1 cscherer sunuser    45644 Jul 28 12:15 iareader.o
-rw-r--r--   1 cscherer sunuser       71 Jun 29 19:55 iasetup.h
-rw-r--r--   1 cscherer sunuser       94 Jun 29 19:55 iavalue.h
-rwxr-xr-x   1 cscherer sunuser      308 Jun 29 19:55 icheckforduplicates.h
-rw-r--r--   1 cscherer sunuser        0 Jul 19 18:06 icheckforduplicates.t
-rw-r--r--   1 cscherer sunuser     2822 Jun 29 19:55 iget_from_name.h
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-rw-r--r--   1 cscherer sunuser        0 Jul 19 18:06 iget_from_name.t1
-rw-r--r--   1 cscherer sunuser        0 Jul 19 18:06 iget_from_name.t2
-rw-r--r--   1 cscherer sunuser       81 Jun 29 19:55 igetunitnumber.h
-rw-r--r--   1 cscherer sunuser        0 Jul 19 18:06 igetunitnumber.t1
-rw-r--r--   1 cscherer sunuser        0 Jul 19 18:06 igetunitnumber.t2
-rw-r--r--   1 cscherer sunuser       98 Jun 28 14:04 imvquery.h
-rw-r--r--   1 cscherer sunuser        0 Jul 19 18:06 imvquery.t1
-rw-r--r--   1 cscherer sunuser        0 Jul 19 18:06 imvquery.t2
-rw-r--r--   1 cscherer sunuser     2326 Jul 29 10:49 infilper.res
-rwxr-xr-x   1 cscherer sunuser      281 Jun 29 19:55 initr.h
-rw-r--r--   1 cscherer sunuser        0 Jul 19 18:06 initr.t
-rw-r--r--   1 cscherer sunuser     1102 Jul 29 10:48 inv1000.out
-rw-r--r--   1 cscherer sunuser    74240 Jul 19 17:36 invent.f
-rw-r--r--   1 cscherer sunuser    86896 Jul 28 12:15 invent.o
-rw-r--r--   1 cscherer sunuser       57 Jun 28 11:49 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  2002 inventl.i
-rw-r--r--   1 cscherer sunuser      315 Dec 11  2002 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      217 Jun 21 21:05 iranu.h
-rw-r--r--   1 cscherer sunuser        0 Jul 19 18:06 iranu.t1
-rw-r--r--   1 cscherer sunuser        0 Jul 19 18:06 iranu.t2
-rw-r--r--   1 cscherer sunuser     2887 Jun 29 19:55 isconstant.h
-rw-r--r--   1 cscherer sunuser        0 Jul 19 18:06 isconstant.t1
-rw-r--r--   1 cscherer sunuser        0 Jul 19 18:06 isconstant.t2
-rwxr-xr-x   1 cscherer sunuser      305 Jun 29 19:55 isoneofset.h
-rw-r--r--   1 cscherer sunuser        0 Jul 19 18:06 isoneofset.t
-rw-r--r--   1 cscherer sunuser     2948 Jun 29 19:55 ispquery.h
-rw-r--r--   1 cscherer sunuser        0 Jul 19 18:06 ispquery.t1
-rw-r--r--   1 cscherer sunuser        0 Jul 19 18:06 ispquery.t2
-rw-r--r--   1 cscherer sunuser     2960 Jun 29 19:55 ispquerynostop.h
-rw-r--r--   1 cscherer sunuser        0 Jul 19 18:06 ispquerynostop.t1
-rw-r--r--   1 cscherer sunuser        0 Jul 19 18:06 ispquerynostop.t2
-rw-r--r--   1 cscherer sunuser     3052 Jun 29 19:55 ivaluesp.h
-rw-r--r--   1 cscherer sunuser        0 Jul 19 18:06 ivaluesp.t1
-rw-r--r--   1 cscherer sunuser        0 Jul 19 18:06 ivaluesp.t2
-rw-r--r--   1 cscherer sunuser      207 Jun 21 21:05 kstr2tok_and_val.h
-rw-r--r--   1 cscherer sunuser        0 Jul 19 18:06 kstr2tok_and_val.t1
-rw-r--r--   1 cscherer sunuser        0 Jul 19 18:06 kstr2tok_and_val.t2
-rw-r--r--   1 cscherer sunuser      461 Jun 28 13:41 leachrate.h
-rw-r--r--   1 cscherer sunuser        0 Jul 19 18:06 leachrate.t
-rw-r--r--   1 cscherer sunuser        0 Jul 29 10:44 lhs.csv
-rw-r--r--   1 cscherer sunuser    48211 Jul 29 10:44 lhs.inp
-rw-r--r--   1 cscherer sunuser     5901 Jul 29 10:45 lhs.out
-rw-r--r--   1 cscherer sunuser    80765 Jul 29 10:45 lhse.out
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-rw-r--r--   1 cscherer sunuser      2830 Jun 29 19:55 lhsnew.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 lhsnew.t
-rw-r--r--   1 cscherer sunuser      5340 Jul 28 12:17 linintrp.o
-rw-r--r--   1 cscherer sunuser        89 Jun 23 11:02 ljs.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 ljs.t1
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 ljs.t2
-rw-r--r--   1 cscherer sunuser        90 Jun 21 21:05 ljs2.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 ljs2.t1
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 ljs2.t2
-rw-r--r--   1 cscherer sunuser       191 Jun 21 21:05 locadd_vector.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 locadd_vector.t1
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 locadd_vector.t2
-rwxr-xr-x   1 cscherer sunuser       402 Jun 29 19:55 maplist.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 maplist.t
-rwxr-xr-x   1 cscherer sunuser       437 Jun 29 19:55 maptimeofevent.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 maptimeofevent.t
-rw-r--r--   1 cscherer sunuser       101 Jun 21 20:51 max500yr.i
-rw-r--r--   1 cscherer sunuser        99 Sep 25  2002 maxchain.i
-rw-r--r--   1 cscherer sunuser       178 Jun 21 20:51 maxclchn.i
-rw-r--r--   1 cscherer sunuser       144 Sep 25  2002 maxclnuc.i
-rw-r--r--   1 cscherer sunuser       577 Jun 21 20:51 maxnnucl.i
-rw-r--r--   1 cscherer sunuser       326 Jun 21 20:51 maxnsuba.i
-rw-r--r--   1 cscherer sunuser       229 Jun 21 20:51 maxntime.i
-rw-r--r--   1 cscherer sunuser      1095 Jul 29 10:48 maxrel.dat
-rwxr-xr-x   1 cscherer sunuser    943775 Jul 29 10:45 maydtbl.dat
-rw-r--r--   1 cscherer sunuser     31780 Jul 29 10:48 mechfail.dat
-rw-r--r--   1 cscherer sunuser      9729 Jul 29 10:45 mechfail.def
-rwxr-xr-x   1 cscherer sunuser     80512 Jul 29 10:45 mechfail.e
-rw-r--r--   1 cscherer sunuser      9747 Jul 29 10:48 mechfail.inp
-rw-r--r--   1 cscherer sunuser         0 Jul 29 10:48 mechfail.out
-rw-r--r--   1 cscherer sunuser      2822 Jun 29 19:55 mget_from_name.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 mget_from_name.t1
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 mget_from_name.t2
-rw-r--r--   1 cscherer sunuser      1251 Jul 29 10:45 multifaf.dat
-rw-r--r--   1 cscherer sunuser      1252 Jul 29 10:45 multifbe.dat
-rw-r--r--   1 cscherer sunuser     16805 Jun 30 14:21 mv.f
-rw-r--r--   1 cscherer sunuser     19416 Jul 28 12:15 mv.o
-rw-r--r--   1 cscherer sunuser     61237 Jul 29 10:49 mv.tpa
-rw-r--r--   1 cscherer sunuser       131 Jun 28 13:11 mva.i
-rw-r--r--   1 cscherer sunuser        77 Jun 28 13:11 mvb.i
-rw-r--r--   1 cscherer sunuser        79 Jun 28 13:11 mvc.i
-rw-r--r--   1 cscherer sunuser       101 Aug 16  1997 mvd.i
-rw-r--r--   1 cscherer sunuser       100 Jun 28 13:11 mve.i
-rw-r--r--   1 cscherer sunuser        98 Jun 28 13:11 mvf.i
-rw-r--r--   1 cscherer sunuser      2326 Jul 29 10:49 nearfld.res
-rw-r--r--   1 cscherer sunuser    109903 Jul 29 10:49 nefii.dis
-rw-r--r--   1 cscherer sunuser     11652 Jul 29 10:48 nefii.inp
-rw-r--r--   1 cscherer sunuser    165301 Jul 29 10:49 nefii.out
-rw-r--r--   1 cscherer sunuser       687 Jul 29 10:49 nefii.rel
-rw-r--r--   1 cscherer sunuser    109903 Jul 29 10:49 nefiisz.dis
-rw-r--r--   1 cscherer sunuser     11652 Jul 29 10:49 nefiisz.inp
-rw-r--r--   1 cscherer sunuser    165353 Jul 29 10:49 nefiisz.out
-rw-r--r--   1 cscherer sunuser    203070 Jul 29 10:49 nefiisz.src
-rw-r--r--   1 cscherer sunuser       132 Jul 29 10:49 nefiisz.vel
-rw-r--r--   1 cscherer sunuser     10018 Jul 29 10:48 nefiiuz.dis
-rw-r--r--   1 cscherer sunuser     10432 Jul 29 10:48 nefiiuz.inp
-rw-r--r--   1 cscherer sunuser     55862 Jul 29 10:48 nefiiuz.out
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-rw-r--r--   1 cscherer sunuser    208998 Jul 29 10:48 nefiiuz.src
-rw-r--r--   1 cscherer sunuser       175 Jul 29 10:48 nefiiuz.vel
-rwxr-xr-x   1 cscherer sunuser    407700 Jul 29 10:45 nefmks.e
-rw-r--r--   1 cscherer sunuser        80 Jul 29 10:48 nefmks.log
-rwxr-xr-x   1 cscherer sunuser      3922 Jul 19 18:19 newinventdb.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 newinventdb.t
-rw-r--r--   1 cscherer sunuser      3174 Jun 30 13:38 newlhssm.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 newlhssm.t
-rw-r--r--   1 cscherer sunuser        65 Jun 28 13:41 newmvdb.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 newmvdb.t
-rw-r--r--   1 cscherer sunuser      4275 Jun 30 13:39 newrealization.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 newrealization.t
-rw-r--r--   1 cscherer sunuser      3265 Jun 28 14:15 newspdb.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 newspdb.t
-rw-r--r--   1 cscherer sunuser       193 Jun 29 19:55 nextline.h
-rw-r--r--   1 cscherer sunuser    118820 Jun 28 13:11 nfenv.f
-rw-r--r--   1 cscherer sunuser     95676 Jul 28 12:15 nfenv.o
-rw-r--r--   1 cscherer sunuser       326 Nov 17  2002 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      2502 Jul 29 10:49 npkdoset.res
-rw-r--r--   1 cscherer sunuser      2502 Jul 29 10:49 npkdst_c.res
-rw-r--r--   1 cscherer sunuser      7152 Jul 29 10:44 nuclides.dat
-rw-r--r--   1 cscherer sunuser      8746 Jul 26 09:24 numrecip.f
-rw-r--r--   1 cscherer sunuser      3588 Jul 28 12:17 numrecip.o
-rw-r--r--   1 cscherer sunuser       217 Jun 21 21:05 opnfil.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 opnfil.t
-rw-r--r--   1 cscherer sunuser      7111 Jul 29 10:49 organdf.dat
-rw-r--r--   1 cscherer sunuser       259 Aug 16  1997 path.i
-rw-r--r--   1 cscherer sunuser      6890 Jun 28 13:11 peakfind.f
-rw-r--r--   1 cscherer sunuser      6328 Jul 28 12:17 peakfind.o
-rw-r--r--   1 cscherer sunuser      3397 Jun 28 13:41 peakfinder.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 peakfinder.t
-rw-r--r--   1 cscherer sunuser       698 Jul 29 10:49 pkmndose.out
-rw-r--r--   1 cscherer sunuser      8240 Jul 29 10:49 pkreltim.res
-rw-r--r--   1 cscherer sunuser      8240 Jul 29 10:49 pkrltm_c.res
-rw-r--r--   1 cscherer sunuser       702 Jun 23 11:02 prenefmks.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 prenefmks.t
-rw-r--r--   1 cscherer sunuser        72 Jun 28 13:41 printfun.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 printfun.t
-rw-r--r--   1 cscherer sunuser      2926 Jun 29 19:55 printtimesvalue.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 printtimesvalue.t
-rw-r--r--   1 cscherer sunuser        93 Jun 28 13:41 printtitlesmv.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 printtitlesmv.t
-rw-r--r--   1 cscherer sunuser      3032 Jun 29 19:55 printtitlessp.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 printtitlessp.t
-rw-r--r--   1 cscherer sunuser       111 Jun 28 13:41 printvaluesmv.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 printvaluesmv.t
-rw-r--r--   1 cscherer sunuser      2923 Jun 29 19:55 printvaluessp.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 printvaluessp.t
-rw-r--r--   1 cscherer sunuser       262 Jun 21 21:05 putfailwp.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 putfailwp.t
-rw-r--r--   1 cscherer sunuser       137 Jun 21 21:05 putgwtt.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 putgwtt.t
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 querystop.t
-rw-r--r--   1 cscherer sunuser     61265 Jun 21 20:51 ran.f
-rw-r--r--   1 cscherer sunuser      7292 Jul 28 12:17 ran.o
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-rw-r--r--   1 cscherer sunuser       253 Jun 21 21:05 ran1.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 ran1.t1
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 ran1.t2
-rw-r--r--   1 cscherer sunuser       261 Jun 21 21:05 ran1seis.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 ran1seis.t1
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 ran1seis.t2
-rw-r--r--   1 cscherer sunuser       211 Jun 21 21:05 raneseis.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 raneseis.t1
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 raneseis.t2
-rw-r--r--   1 cscherer sunuser    153738 Jun 28 13:11 reader.f
-rw-r--r--   1 cscherer sunuser       234 Jun 21 20:51 reader.i
-rw-r--r--   1 cscherer sunuser    437096 Jul 28 12:17 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 Jul 29 10:48 rel_flow.out
-rw-r--r--   1 cscherer sunuser       568 Jul 29 10:49 relccdf.res
-rw-r--r--   1 cscherer sunuser      2883 Jul 29 10:48 relcum.out
-rwxr-xr-x   1 cscherer sunuser    122584 Jul 29 10:45 releaset.e
-rw-r--r--   1 cscherer sunuser       414 Jul 29 10:48 releaset.out
-rw-r--r--   1 cscherer sunuser       773 Jul 29 10:48 relfrac.out
-rw-r--r--   1 cscherer sunuser       718 Jul 29 10:49 relgwgs.res
-rw-r--r--   1 cscherer sunuser       562 Jul 29 10:44 repdes.dat
-rw-r--r--   1 cscherer sunuser     47557 Jul 29 10:49 rgwna.tpa
-rw-r--r--   1 cscherer sunuser     47557 Jul 29 10:49 rgwnapani.tpa
-rw-r--r--   1 cscherer sunuser     47557 Jul 29 10:49 rgwnapdw.tpa
-rw-r--r--   1 cscherer sunuser     47557 Jul 29 10:49 rgwnapext.tpa
-rw-r--r--   1 cscherer sunuser     47557 Jul 29 10:49 rgwnapinh.tpa
-rw-r--r--   1 cscherer sunuser     47557 Jul 29 10:49 rgwnapmlk.tpa
-rw-r--r--   1 cscherer sunuser     47557 Jul 29 10:49 rgwnappla.tpa
-rw-r--r--   1 cscherer sunuser     47557 Jul 29 10:49 rgwnr.tpa
-rw-r--r--   1 cscherer sunuser      5133 Jul 29 10:49 rgwsa.tpa
-rw-r--r--   1 cscherer sunuser     16133 Jul 29 10:49 rgwsap.tpa
-rw-r--r--   1 cscherer sunuser      5179 Jul 29 10:49 rgwsr.tpa
-rw-r--r--   1 cscherer sunuser       568 Jul 29 10:49 rlccdf_c.res
-rw-r--r--   1 cscherer sunuser       718 Jul 29 10:49 rlgwgs_c.res
-rw-r--r--   1 cscherer sunuser        97 Jun 21 21:05 runnefmks.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 runnefmks.t
-rw-r--r--   1 cscherer sunuser      3150 Jun 29 19:55 samplehazardcurve.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 samplehazardcurve.t
-rw-r--r--   1 cscherer sunuser    106658 Jun 28 13:11 sampler.f
-rw-r--r--   1 cscherer sunuser    165644 Jul 28 12:17 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
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-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      3962 Jul 29 10:44 samplpar.abb
-rw-r--r--   1 cscherer sunuser     30632 Jul 29 10:44 samplpar.hdr
-rw-r--r--   1 cscherer sunuser      6543 Jul 29 10:49 samplpar.res
-rwxr-xr-x   1 cscherer sunuser       279 Jun 29 19:55 scale.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 scale.t
-rwxr-xr-x   1 cscherer sunuser       312 Jun 29 19:55 scopy.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 scopy.t
-rw-r--r--   1 cscherer sunuser       322 Nov 17  2002 seisadj.i
-rwxr-xr-x   1 cscherer sunuser    130758 Jul 29 10:45 seisbs1.dis
-rwxr-xr-x   1 cscherer sunuser    130758 Jul 29 10:45 seisbs2.dis
-rw-r--r--   1 cscherer sunuser     82426 Jul  2 19:31 seismo2.f
-rw-r--r--   1 cscherer sunuser     60160 Jul 28 12:17 seismo2.o
-rw-r--r--   1 cscherer sunuser        71 Jun 21 21:05 set_iouzflow.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 set_iouzflow.t
-rwxr-xr-x   1 cscherer sunuser      3188 Jul 19 18:19 setage.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 setage.t
-rw-r--r--   1 cscherer sunuser       140 Jun 28 13:41 setconsmv.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 setconsmv.t
-rw-r--r--   1 cscherer sunuser       120 Jun 21 21:05 setfiles.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 setfiles.t
-rw-r--r--   1 cscherer sunuser       239 Jun 21 21:05 setran.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 setran.t
-rw-r--r--   1 cscherer sunuser       247 Jun 21 21:05 setranseis.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 setranseis.t
-rw-r--r--   1 cscherer sunuser       132 Jun 28 13:41 setupCommons.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 setupCommons.t
-rwxrwxrwx   1 cscherer sunuser        30 Sep 12  2002 show_env
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 sigfpe_abort.t1
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 sigfpe_abort.t2
-rwxr-xr-x   1 cscherer sunuser    943788 Jul 29 10:45 smaydtbl.dat
-rwxr-xr-x   1 cscherer sunuser    243044 Jul 29 10:44 snllhs.e
-rwxr-xr-x   1 cscherer sunuser       277 Jun 29 19:55 sortqr.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 sortqr.t
-rw-r--r--   1 cscherer sunuser    203070 Jul 29 10:48 sotnef.dat
-rw-r--r--   1 cscherer sunuser     31817 Jul 29 10:49 sp.tpa
-rw-r--r--   1 cscherer sunuser      1940 Jul 28 12:17 srchpos.o
-rw-r--r--   1 cscherer sunuser       144 Sep  3  1997 stop.i
-rw-r--r--   1 cscherer sunuser      2721 Jul 29 10:45 strmtube.dat
-rw-r--r--   1 cscherer sunuser     38340 Jun 23 11:02 subarea.f
```

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-rw-r--r--   1 cscherer sunuser     59648 Jul 28 12:17 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    124061 Jul 26 09:24 szft.f
-rw-r--r--   1 cscherer sunuser       264 Nov 17  2002 szft.i
-rw-r--r--   1 cscherer sunuser    199856 Jul 28 12:16 szft.o
-rw-r--r--   1 cscherer sunuser       106 Jun 29 19:55 tempgl.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 tempgl.t1
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 tempgl.t2
-rw-r--r--   1 cscherer sunuser     13118 Jul 29 10:49 totdos_c.res
-rw-r--r--   1 cscherer sunuser     13118 Jul 29 10:49 totdose.res
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 touch.t
-rwxr-xr-x   1 cscherer sunuser   2446812 Jul 28 12:17 tpa.e
-rw-r--r--   1 cscherer sunuser     96722 Jul 26 09:24 tpa.inp
-rw-r--r--   1 cscherer sunuser     22100 Jul 29 10:49 tpa.out
drwxr-xr-x   5 cscherer sunuser     14848 Jul 29 13:55 tpa50m
-rw-r--r--   1 cscherer sunuser     97725 Jul 29 10:44 tpameans.out
-rw-r--r--   1 cscherer sunuser    107985 Jul 29 10:44 tpanames.dbs
-rw-r--r--   1 cscherer sunuser       179 Jun 21 21:05 trapint.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 trapint.t
-rw-r--r--   1 cscherer sunuser    147007 Jul 29 10:48 trelease.out
-rw-r--r--   1 cscherer sunuser        97 Jun 29 19:55 trim.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 trim.t2
-rw-r--r--   1 cscherer sunuser        93 Jun 21 21:05 ucljs.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 ucljs.t1
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 ucljs.t2
-rw-r--r--   1 cscherer sunuser        95 Jun 29 19:55 ucljsg.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 ucljsg.t2
-rw-r--r--   1 cscherer sunuser      3068 Jun 29 19:55 updatelhs.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 updatelhs.t
-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      1466 Jun 21 20:51 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      3722 Jun 21 20:51 uz_parms.i
-rw-r--r--   1 cscherer sunuser     85497 Jul  3 07:38 uzflow.f
-rw-r--r--   1 cscherer sunuser     57732 Jul 28 12:17 uzflow.o
-rw-r--r--   1 cscherer sunuser    147674 Jul 26 09:24 uzft.f
-rw-r--r--   1 cscherer sunuser       793 Jun 23 11:02 uzft.h
-rw-r--r--   1 cscherer sunuser    201920 Jul 28 12:17 uzft.o
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 uzft.t
-rw-r--r--   1 cscherer sunuser       755 Nov 17  2002 uzszft.i
-rw-r--r--   1 cscherer sunuser       103 Jun 30 14:08 valueconsmv.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 valueconsmv.t1
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 valueconsmv.t2
-rw-r--r--   1 cscherer sunuser      3050 Jun 29 19:55 valuesp.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 valuesp.t1
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 valuesp.t2
-rw-r--r--   1 cscherer sunuser     17849 Jul 12 15:29 volcano.f
-rwxr-xr-x   1 cscherer sunuser       282 Jun 28 13:41 volcano.h
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-rw-r--r--   1 cscherer sunuser     17616 Jul 28 12:17 volcano.o
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 volcano.t
-rw-r--r--   1 cscherer sunuser     14132 Jul 29 10:48 weldfail.out
-rw-r--r--   1 cscherer sunuser      1191 Jul 29 10:49 wpfillstats.out
-rw-r--r--   1 cscherer sunuser      8805 Jul 29 10:45 wpflow.dat
-rw-r--r--   1 cscherer sunuser     17410 Jul 29 10:45 wpflow.def
-rw-r--r--   1 cscherer sunuser       814 Jul 29 10:49 wpsfail.res
-rw-r--r--   1 cscherer sunuser       275 Jun 21 21:05 writedata.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 writedata.t
-rw-r--r--   1 cscherer sunuser       353 Jun 21 21:05 writeepaccdf.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 writeepaccdf.t
-rw-r--r--   1 cscherer sunuser       316 Jun 21 21:05 writehead.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 writehead.t
-rw-r--r--   1 cscherer sunuser       268 Jun 21 21:05 writehead2.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 writehead2.t
-rw-r--r--   1 cscherer sunuser      3212 Jun 29 19:55 writesnllhsinp.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 writesnllhsinp.t
-rw-r--r--   1 cscherer sunuser       519 Jun 23 11:02 writesource.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 writesource.t
-rw-r--r--   1 cscherer sunuser       275 Jun 21 21:05 writevelocities.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 writevelocities.t
-rw-r--r--   1 cscherer sunuser       220 Jun 28 13:41 xgauleg.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 xgauleg.t
-rw-r--r--   1 cscherer sunuser       158 Jun 21 21:05 yutok_in_ustr.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 yutok_in_ustr.t1
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 yutok_in_ustr.t2
-rwxr-xr-x   1 cscherer sunuser       252 Jun 29 19:55 zero.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 zero.t
-rwxr-xr-x   1 cscherer sunuser       245 Jun 29 19:55 zeroi.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 zeroi.t
-rw-r--r--   1 cscherer sunuser        77 Jun 29 19:55 zportctime.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 zportctime.t1
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 zportctime.t2
-rw-r--r--   1 cscherer sunuser       112 Jun 29 19:55 zportderf.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 zportderf.t1
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 zportderf.t2
-rw-r--r--   1 cscherer sunuser        51 Jun 30 09:25 zportfdate.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 zportfdate.t
-rw-r--r--   1 cscherer sunuser        54 Jun 29 19:55 zportfdatefun.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 zportfdatefun.t1
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 zportfdatefun.t2
-rw-r--r--   1 cscherer sunuser       193 Jun 29 19:55 zportieee_flags.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 zportieee_flags.t1
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 zportieee_flags.t2
-rw-r--r--   1 cscherer sunuser       196 Jun 29 19:55 zportieee_handler.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 zportieee_handler.t1
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 zportieee_handler.t2
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 zportparseunixcmdtodos.t
-rw-r--r--   1 cscherer sunuser       148 Jun 28 13:41
zportparseunixfilenametodos.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06
zportparseunixfilenametodos.t
-rw-r--r--   1 cscherer sunuser       101 Jun 29 19:55 zportsh.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 zportsh.t1
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 zportsh.t2
-rw-r--r--   1 cscherer sunuser        78 Jun 29 19:55 zporttime.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 zporttime.t1
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-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 zporttime.t2
-rw-r--r--   1 cscherer sunuser     16969 Jun 30 09:25 zportunx.f
-rw-r--r--   1 cscherer sunuser      1632 Jul 28 12:17 zportunx.o

scr471/ccdf:
total 42
drwxr-xr-x   2 cscherer sunuser       512 Jul 28 10:05 .
drwxr-xr-x   7 cscherer sunuser     14848 Jul 29 13:55 ..
-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

scr471/codes:
total 3030
drwxr-xr-x   4 cscherer sunuser      1024 Jul 28 12:21 .
drwxr-xr-x   7 cscherer sunuser     14848 Jul 29 13:55 ..
-rw-r--r--   1 cscherer sunuser      1299 Feb 21 21:10 Makefile
-rw-r--r--   1 cscherer sunuser      1673 Jun 23 11:03 Makefile4.2
-rw-r--r--   1 cscherer sunuser       499 Jun  2  1997 README
-rw-r--r--   1 cscherer sunuser      2440 Jun 28 13:16 SIZES.INC
-rw-r--r--   1 cscherer sunuser       164 Feb 17  1998 SIZES2.INC
-rwxr-xr-x   1 cscherer sunuser    164628 Jul 28 12:19 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     22376 Jul 28 12:19 corrosn.o
-rwxr-xr-x   1 cscherer sunuser     43884 Jul 28 12:20 dsfailt.e
-rw-r--r--   1 cscherer sunuser     24477 Jul 19 17:28 dsfailt.f
-rwxr-xr-x   1 cscherer sunuser     46604 Jul 28 12:20 ebsfilt.e
-rw-r--r--   1 cscherer sunuser     18060 Jul  3 07:59 ebsfilt.f
-rwxr-xr-x   1 cscherer sunuser    190772 Jul 28 12:21 env.e
-rwxr-xr-x   1 cscherer sunuser    282452 Jul 28 12:21 envin.e
-rwxr-xr-x   1 cscherer sunuser    136424 Jul 28 12:19 failt.e
-rw-r--r--   1 cscherer sunuser    104294 Apr  2 14:09 failt.f
-rw-r--r--   1 cscherer sunuser       450 Nov 17  2002 failtadj.i
drwxr-xr-x   2 cscherer sunuser      3072 Jul 28 12:21 gentpa
-rwxr-xr-x   1 cscherer sunuser      4635 Mar 24 16:15 integrt.f
-rw-r--r--   1 cscherer sunuser      2068 Jul 28 12:19 integrt.o
drwxr-xr-x   3 cscherer sunuser       512 Jul 28 10:06 itym
-rw-r--r--   1 cscherer sunuser       868 Dec 17  2002 lhs1.i
-rw-r--r--   1 cscherer sunuser      1308 Mar 14  2002 lhs2.i
-rw-r--r--   1 cscherer sunuser       438 Mar 14  2002 lhs3.i
-rw-r--r--   1 cscherer sunuser       437 Mar 14  2002 lhs4.i
-rw-r--r--   1 cscherer sunuser       374 Mar 14  2002 lhs5.i
-rw-r--r--   1 cscherer sunuser       450 Mar 14  2002 lhs6.i
-rw-r--r--   1 cscherer sunuser       464 Mar 14  2002 lhs7.i
-rw-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      3264 Jul 28 12:19 linintrp.o
-rw-r--r--   1 cscherer sunuser       331 Nov 17  2002 mechadj.i
-rwxr-xr-x   1 cscherer sunuser     80512 Jul 28 12:18 mechfail.e
-rw-r--r--   1 cscherer sunuser    136063 Jul 19 17:21 mechfail.f
-rwxr-xr-x   1 cscherer sunuser    407700 Jul 28 12:18 nefmks.e
-rw-r--r--   1 cscherer sunuser    308005 Feb 26 10:50 nefmks.f
-rwxr-xr-x   1 cscherer sunuser    122584 Jul 28 12:19 releaset.e
-rw-r--r--   1 cscherer sunuser    183347 Jul 26 09:02 releaset.f
-rwxr-xr-x   1 cscherer sunuser    243044 Jul 28 12:20 snllhs.e
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-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      1292 Jul 28 12:19 srchpos.o
-rwxr-xr-x   1 cscherer sunuser     19959 Mar 24 16:15 weldfail.f
-rw-r--r--   1 cscherer sunuser      9340 Jul 28 12:19 weldfail.o

scr471/codes/gentpa:
total 1063
drwxr-xr-x   2 cscherer sunuser      3072 Jul 28 12:21 .
drwxr-xr-x   4 cscherer sunuser      1024 Jul 28 12:21 ..
-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  2002 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     24088 Jul 28 12:20 accmod.o
-rw-r--r--   1 cscherer sunuser     10094 Feb 11  2000 acute1.f
-rw-r--r--   1 cscherer sunuser     16188 Jul 28 12:21 acute1.o
-rw-r--r--   1 cscherer sunuser      9579 Feb 11  2000 acutea.f
-rw-r--r--   1 cscherer sunuser     11180 Jul 28 12:21 acutea.o
-rw-r--r--   1 cscherer sunuser      7118 Feb 11  2000 acutec.f
-rw-r--r--   1 cscherer sunuser      8480 Jul 28 12:21 acutec.o
-rw-r--r--   1 cscherer sunuser      8669 Feb 11  2000 aircal.f
-rw-r--r--   1 cscherer sunuser     11224 Jul 28 12:21 aircal.o
-rw-r--r--   1 cscherer sunuser      8383 Feb 11  2000 anmcal.f
-rw-r--r--   1 cscherer sunuser     12708 Jul 28 12:21 anmcal.o
-rw-r--r--   1 cscherer sunuser      2043 Feb 11  2000 aqucal.f
-rw-r--r--   1 cscherer sunuser      3976 Jul 28 12:21 aqucal.o
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-rw-r--r--   1 cscherer sunuser      1217 Feb 11  2000 biocal.f
-rw-r--r--   1 cscherer sunuser      1936 Jul 28 12:21 biocal.o
-rw-r--r--   1 cscherer sunuser      4174 Feb 11  2000 blockd.f
-rw-r--r--   1 cscherer sunuser      6656 Jul 28 12:20 blockd.o
-rw-r--r--   1 cscherer sunuser      1405 Feb 11  2000 bsort.f
-rw-r--r--   1 cscherer sunuser      1192 Jul 28 12:21 bsort.o
-rw-r--r--   1 cscherer sunuser     13008 Feb 11  2000 candh.f
-rw-r--r--   1 cscherer sunuser     10412 Jul 28 12:21 candh.o
-rw-r--r--   1 cscherer sunuser      6653 Feb 11  2000 chain.f
-rw-r--r--   1 cscherer sunuser      5360 Jul 28 12:21 chain.o
-rw-r--r--   1 cscherer sunuser     23921 Feb 11  2000 check.f
-rw-r--r--   1 cscherer sunuser     48592 Jul 28 12:21 check.o
-rw-r--r--   1 cscherer sunuser     10189 Feb 11  2000 cronmod.f
-rw-r--r--   1 cscherer sunuser     22444 Jul 28 12:20 cronmod.o
-rw-r--r--   1 cscherer sunuser      5153 Feb 11  2000 crpcal.f
-rw-r--r--   1 cscherer sunuser      8548 Jul 28 12:21 crpcal.o
-rw-r--r--   1 cscherer sunuser      3842 Feb 11  2000 dkharv.f
-rw-r--r--   1 cscherer sunuser      6112 Jul 28 12:21 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      2620 Jul 28 12:21 drfbiv.o
-rw-r--r--   1 cscherer sunuser      6728 Feb 11  2000 drfsec.f
-rw-r--r--   1 cscherer sunuser      5240 Jul 28 12:21 drfsec.o
-rw-r--r--   1 cscherer sunuser      1877 Feb 11  2000 drkcal.f
-rw-r--r--   1 cscherer sunuser      2268 Jul 28 12:21 drkcal.o
-rw-r--r--   1 cscherer sunuser      1325 Feb 11  2000 dumred.f
-rw-r--r--   1 cscherer sunuser      3592 Jul 28 12:21 dumred.o
-rw-r--r--   1 cscherer sunuser      3958 Feb 11  2000 edranm.f
-rw-r--r--   1 cscherer sunuser      7236 Jul 28 12:21 edranm.o
-rw-r--r--   1 cscherer sunuser      3567 Feb 11  2000 edrcrp.f
-rw-r--r--   1 cscherer sunuser      7644 Jul 28 12:21 edrcrp.o
-rw-r--r--   1 cscherer sunuser      2525 Feb 11  2000 edrnon.f
-rw-r--r--   1 cscherer sunuser      4688 Jul 28 12:21 edrnon.o
-rw-r--r--   1 cscherer sunuser      2853 Feb 11  2000 edrres.f
-rw-r--r--   1 cscherer sunuser      4128 Jul 28 12:21 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      8700 Jul 28 12:20 envlib.o
-rw-r--r--   1 cscherer sunuser      1912 Feb 11  2000 exposr.f
-rw-r--r--   1 cscherer sunuser      2228 Jul 28 12:21 exposr.o
-rw-r--r--   1 cscherer sunuser      6774 Feb 11  2000 extcal.f
-rw-r--r--   1 cscherer sunuser      7564 Jul 28 12:21 extcal.o
-rw-r--r--   1 cscherer sunuser      1489 Feb 11  2000 filerr.f
-rw-r--r--   1 cscherer sunuser      3852 Jul 28 12:20 filerr.o
-rw-r--r--   1 cscherer sunuser      1986 Feb 11  2000 fntdrf.f
-rw-r--r--   1 cscherer sunuser      1992 Jul 28 12:21 fntdrf.o
-rw-r--r--   1 cscherer sunuser      3003 Feb 11  2000 headng.f
-rw-r--r--   1 cscherer sunuser      5732 Jul 28 12:21 headng.o
-rw-r--r--   1 cscherer sunuser      2203 Feb 11  2000 idnuc.f
-rw-r--r--   1 cscherer sunuser      2992 Jul 28 12:21 idnuc.o
-rw-r--r--   1 cscherer sunuser      2842 Feb 11  2000 inhcal.f
-rw-r--r--   1 cscherer sunuser      5696 Jul 28 12:21 inhcal.o
-rw-r--r--   1 cscherer sunuser      2392 Feb 11  2000 initnv.f
-rw-r--r--   1 cscherer sunuser      2748 Jul 28 12:21 initnv.o
-rw-r--r--   1 cscherer sunuser      1841 Feb 11  2000 intpol.f
-rw-r--r--   1 cscherer sunuser      3716 Jul 28 12:21 intpol.o
```

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-rw-r--r--   1 cscherer sunuser      1348 Feb 11  2000 invmol.f
-rw-r--r--   1 cscherer sunuser      1152 Jul 28 12:21 invmol.o
-rw-r--r--   1 cscherer sunuser       677 Feb 11  2000 makda2.f
-rw-r--r--   1 cscherer sunuser      1040 Jul 28 12:20 makda2.o
-rw-r--r--   1 cscherer sunuser      5870 Feb 11  2000 opnfil.f
-rw-r--r--   1 cscherer sunuser     11740 Jul 28 12:20 opnfil.o
-rw-r--r--   1 cscherer sunuser      4217 Feb 11  2000 order.f
-rw-r--r--   1 cscherer sunuser      5724 Jul 28 12:20 order.o
-rw-r--r--   1 cscherer sunuser      2325 Feb 11  2000 packag.f
-rw-r--r--   1 cscherer sunuser      3472 Jul 28 12:21 packag.o
-rw-r--r--   1 cscherer sunuser      3366 Feb 11  2000 plmriz.f
-rw-r--r--   1 cscherer sunuser      2176 Jul 28 12:21 plmriz.o
-rw-r--r--   1 cscherer sunuser      1861 Feb 11  2000 prior.f
-rw-r--r--   1 cscherer sunuser      2228 Jul 28 12:21 prior.o
-rw-r--r--   1 cscherer sunuser      4080 Feb 11  2000 prob.f
-rw-r--r--   1 cscherer sunuser      2100 Jul 28 12:21 prob.o
-rw-r--r--   1 cscherer sunuser      2079 Feb 11  2000 profile.f
-rw-r--r--   1 cscherer sunuser      1604 Jul 28 12:21 profile.o
-rw-r--r--   1 cscherer sunuser     11351 Feb 11  2000 readin.f
-rw-r--r--   1 cscherer sunuser     47512 Jul 28 12:20 readin.o
-rw-r--r--   1 cscherer sunuser      6174 Feb 11  2000 redcas.f
-rw-r--r--   1 cscherer sunuser     24412 Jul 28 12:21 redcas.o
-rw-r--r--   1 cscherer sunuser      3867 Feb 11  2000 redcha.f
-rw-r--r--   1 cscherer sunuser      9240 Jul 28 12:21 redcha.o
-rw-r--r--   1 cscherer sunuser      8483 Feb 11  2000 redflt.f
-rw-r--r--   1 cscherer sunuser     35380 Jul 28 12:20 redflt.o
-rw-r--r--   1 cscherer sunuser      1694 Feb 11  2000 redist.f
-rw-r--r--   1 cscherer sunuser      1784 Jul 28 12:21 redist.o
-rw-r--r--   1 cscherer sunuser      8548 Feb 11  2000 ritenv.f
-rw-r--r--   1 cscherer sunuser     37144 Jul 28 12:21 ritenv.o
-rw-r--r--   1 cscherer sunuser      4371 Feb 11  2000 ritexp.f
-rw-r--r--   1 cscherer sunuser     10932 Jul 28 12:21 ritexp.o
-rw-r--r--   1 cscherer sunuser      2584 Feb 11  2000 ritmed.f
-rw-r--r--   1 cscherer sunuser      7292 Jul 28 12:21 ritmed.o
-rw-r--r--   1 cscherer sunuser     27222 Feb 11  2000 ritqa.f
-rw-r--r--   1 cscherer sunuser     93700 Jul 28 12:20 ritqa.o
-rw-r--r--   1 cscherer sunuser      4346 Feb 11  2000 rlibin.f
-rw-r--r--   1 cscherer sunuser     10184 Jul 28 12:20 rlibin.o
-rw-r--r--   1 cscherer sunuser      4399 Feb 11  2000 rwake.f
-rw-r--r--   1 cscherer sunuser      3384 Jul 28 12:21 rwake.o
-rw-r--r--   1 cscherer sunuser      2396 Feb 11  2000 sigma.f
-rw-r--r--   1 cscherer sunuser      1824 Jul 28 12:21 sigma.o
-rw-r--r--   1 cscherer sunuser      8387 Feb 11  2000 swcal.f
-rw-r--r--   1 cscherer sunuser      5860 Jul 28 12:21 swcal.o
-rw-r--r--   1 cscherer sunuser      1894 Feb 11  2000 trnspt.f
-rw-r--r--   1 cscherer sunuser      2040 Jul 28 12:21 trnspt.o
-rw-r--r--   1 cscherer sunuser      1771 Feb 11  2000 ustar.f
-rw-r--r--   1 cscherer sunuser      1492 Jul 28 12:21 ustar.o
-rw-r--r--   1 cscherer sunuser      9276 Feb 11  2000 xqcal.f
-rw-r--r--   1 cscherer sunuser     17120 Jul 28 12:21 xqcal.o
-rw-r--r--   1 cscherer sunuser      5277 Feb 11  2000 xqin.f
-rw-r--r--   1 cscherer sunuser     12464 Jul 28 12:21 xqin.o

scr471/codes/itym:
total 4
drwxr-xr-x   3 cscherer sunuser       512 Jul 28 10:06 .
drwxr-xr-x   4 cscherer sunuser      1024 Jul 28 12:21 ..
```

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-rw-r--r--   1 cscherer sunuser       596 Oct  1  2002 makefile
drwxr-xr-x   2 cscherer sunuser       512 Jul 28 10:06 src

scr471/codes/itym/src:
total 328
drwxr-xr-x   2 cscherer sunuser       512 Jul 28 10:06 .
drwxr-xr-x   3 cscherer sunuser       512 Jul 28 10:06 ..
-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     61114 Jul 19 18:00 estimator.f
-rw-r--r--   1 cscherer sunuser      5384 Dec 30  2002 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  2002 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

scr471/data:
total 7539
drwxr-xr-x   2 cscherer sunuser      1536 Jul 28 10:05 .
drwxr-xr-x   7 cscherer sunuser     14848 Jul 29 13:55 ..
-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      6280 Jun  4 09:03 coefkdeqr.dat
-rw-r--r--   1 cscherer sunuser      2200 Dec 19  2002 dilution.dat
-rw-r--r--   1 cscherer sunuser       519 Jun 14 18:45 drythick.dat
-rw-r--r--   1 cscherer sunuser       882 Jul  3 08:00 dsfailt.def
-rw-r--r--   1 cscherer sunuser      5999 Jun 28 13:28 ebsfail.def
-rw-r--r--   1 cscherer sunuser       790 May 28  1998 ebsfilt.def
-rw-r--r--   1 cscherer sunuser      6246 Jul 15 18:34 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
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-rw-r--r--   1 cscherer sunuser      8247 Feb 22 16:39 ia.dat
-rw-r--r--   1 cscherer sunuser     20698 Dec 30  2002 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  2002 maydtbl.dat
-rw-r--r--   1 cscherer sunuser      9729 Dec 17  2002 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       562 Jul 19 17:30 repdes.dat
-rw-r--r--   1 cscherer sunuser    247216 Jul 12 15:35 reversibles.inp
-rwxr-xr-x   1 cscherer sunuser    130758 Dec 17  2002 seisbs1.dis
-rwxr-xr-x   1 cscherer sunuser    130758 Dec 17  2002 seisbs2.dis
-rwxr-xr-x   1 cscherer sunuser    943788 Dec 30  2002 smaydtbl.dat
-rw-r--r--   1 cscherer sunuser    489858 Mar 22  2000 soildem.dat
-rw-r--r--   1 cscherer sunuser      2721 Jun 21 21:24 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     96722 Jul 26 09:24 tpa.inp
-rw-r--r--   1 cscherer sunuser    107985 Jun 28 13:28 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

scr471/docs:
total 111
drwxr-xr-x   2 cscherer sunuser       512 Jul 30 12:58 .
drwxr-xr-x   7 cscherer sunuser     14848 Jul 29 13:55 ..
-rwxr--r--   1 cscherer sunuser     18944 Jul 30 11:05 scr471.xls
-rwxr--r--   1 cscherer sunuser     16722 Apr  1 10:52 scr_445.wpd
-rwxr--r--   1 cscherer sunuser     17823 Jul 29 16:25 scr_471.wpd
-rwxr--r--   1 cscherer sunuser     41457 Jul 30 12:59 tp_scr471.wpd

scr471/tpa50m:
total 18059
drwxr-xr-x   5 cscherer sunuser     14848 Jul 29 13:55 .
drwxr-xr-x   7 cscherer sunuser     14848 Jul 29 13:55 ..
-rwxr-xr-x   1 cscherer sunuser      2001 Jun 10 17:49 CLEANUP
-rw-r--r--   1 cscherer sunuser       965 Jul 29 10:44 FILENAME.DAT
-rw-r--r--   1 cscherer sunuser       869 Jun 28 14:00 Makefile
-rw-rw-rw-   1 cscherer sunuser       961 Jul  1 12:49 Makefile4.2
-rw-r--r--   1 cscherer sunuser       132 Jul 29 10:43 NEFII.VEL
-rwxr-xr-x   1 cscherer sunuser       312 Jun 29 19:55 acopy.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 acopy.t
-rw-r--r--   1 cscherer sunuser      3034 Jun 29 19:55 addbetapdf.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 addbetapdf.t
-rw-r--r--   1 cscherer sunuser      3042 Jun 29 19:55 addconstantpdf.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 addconstantpdf.t
-rw-r--r--   1 cscherer sunuser      3033 Jun 29 19:55 addcorrel.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 addcorrel.t
-rw-r--r--   1 cscherer sunuser      3048 Jun 29 19:55 addexpomentialpdf.h
-rw-r--r--   1 cscherer sunuser      3048 Jun 29 19:55 addexponentialpdf.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 addexponentialpdf.t
-rw-r--r--   1 cscherer sunuser      3060 Jun 29 19:55 addfiniteexponentialpdf.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 addfiniteexponentialpdf.t
-rw-r--r--   1 cscherer sunuser      3121 Jun 29 19:55 addhazardcurve.h
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-rw-r--r--   1 cscherer sunuser        0 Jul 19 18:06 addhazardcurve.t
-rw-r--r--   1 cscherer sunuser     3044 Jun 29 19:55 addiconstantpdf.h
-rw-r--r--   1 cscherer sunuser        0 Jul 19 18:06 addiconstantpdf.t
-rw-r--r--   1 cscherer sunuser     3042 Jun 29 19:55 addiuniformpdf.h
-rw-r--r--   1 cscherer sunuser        0 Jul 19 18:06 addiuniformpdf.t
-rw-r--r--   1 cscherer sunuser     2932 Jun 29 19:55 addlogbetapdf.h
-rw-r--r--   1 cscherer sunuser        0 Jul 19 18:06 addlogbetapdf.t
-rw-r--r--   1 cscherer sunuser     2936 Jun 29 19:55 addlognormalpdf.h
-rw-r--r--   1 cscherer sunuser        0 Jul 19 18:06 addlognormalpdf.t
-rw-r--r--   1 cscherer sunuser     2944 Jun 29 19:55 addlogtriangularpdf.h
-rw-r--r--   1 cscherer sunuser        0 Jul 19 18:06 addlogtriangularpdf.t
-rw-r--r--   1 cscherer sunuser     2938 Jun 29 19:55 addloguniformpdf.h
-rw-r--r--   1 cscherer sunuser        0 Jul 19 18:06 addloguniformpdf.t
-rw-r--r--   1 cscherer sunuser     3038 Jun 29 19:55 addnormalpdf.h
-rw-r--r--   1 cscherer sunuser        0 Jul 19 18:06 addnormalpdf.t
-rwxr-xr-x   1 cscherer sunuser      288 Jun 29 19:55 addto.h
-rw-r--r--   1 cscherer sunuser        0 Jul 19 18:06 addto.t
-rw-r--r--   1 cscherer sunuser     3046 Jun 29 19:55 addtriangularpdf.h
-rw-r--r--   1 cscherer sunuser        0 Jul 19 18:06 addtriangularpdf.t
-rw-r--r--   1 cscherer sunuser     3040 Jun 29 19:55 adduniformpdf.h
-rw-r--r--   1 cscherer sunuser        0 Jul 19 18:06 adduniformpdf.t
-rw-r--r--   1 cscherer sunuser     3158 Jun 29 19:55
adduserdiscreteempirical.h
-rw-r--r--   1 cscherer sunuser        0 Jul 19 18:06
adduserdiscreteempirical.t
-rw-r--r--   1 cscherer sunuser     3181 Jun 29 19:55 addusersupplieddiscrete.h
-rw-r--r--   1 cscherer sunuser        0 Jul 19 18:06 addusersupplieddiscrete.t
-rw-r--r--   1 cscherer sunuser     3178 Jun 29 19:55 addusersuppliedpwisecdf.h
-rw-r--r--   1 cscherer sunuser        0 Jul 19 18:06 addusersuppliedpwisecdf.t
-rw-r--r--   1 cscherer sunuser      444 Jun 23 11:02 aftnefmks.h
-rw-r--r--   1 cscherer sunuser        0 Jul 19 18:06 aftnefmks.t
-rwxr-xr-x   1 cscherer sunuser      323 Jun 29 19:55 ainterl.h
-rw-r--r--   1 cscherer sunuser        0 Jul 19 18:06 ainterl.t1
-rw-r--r--   1 cscherer sunuser        0 Jul 19 18:06 ainterl.t2
-rw-r--r--   1 cscherer sunuser     2742 Jul 29 10:44 airpkdos.res
-rwxr-xr-x   1 cscherer sunuser     3420 Jul 19 18:19 allchains.h
-rw-r--r--   1 cscherer sunuser        0 Jul 19 18:06 allchains.t
-rw-r--r--   1 cscherer sunuser     2742 Jul 29 10:44 arpkds_c.res
-rw-r--r--   1 cscherer sunuser    29502 Mar 24 16:19 array.f
-rw-r--r--   1 cscherer sunuser    51364 Jul 29 10:29 array.o
-rw-r--r--   1 cscherer sunuser      910 Jul 29 10:44 ashout.res
-rw-r--r--   1 cscherer sunuser     1021 Jun 28 13:41 ashplume.h
-rw-r--r--   1 cscherer sunuser        0 Jul 19 18:06 ashplume.t
-rw-r--r--   1 cscherer sunuser    28377 Jun 28 13:11 ashplumo.f
-rw-r--r--   1 cscherer sunuser      204 Jun 28 13:41 ashplumo.h
-rw-r--r--   1 cscherer sunuser    45564 Jul 29 10:29 ashplumo.o
-rw-r--r--   1 cscherer sunuser        0 Jul 19 18:06 ashplumo.t
-rw-r--r--   1 cscherer sunuser    47213 Jul  3 07:59 ashrmovo.f
-rw-r--r--   1 cscherer sunuser      386 Jun 30 09:29 ashrmovo.h
-rw-r--r--   1 cscherer sunuser    46868 Jul 29 10:29 ashrmovo.o
-rw-r--r--   1 cscherer sunuser        0 Jul 19 18:06 ashrmovo.t
-rw-r--r--   1 cscherer sunuser      326 Jun 28 13:41 buildInputFiles.h
-rw-r--r--   1 cscherer sunuser        0 Jul 19 18:06 buildInputFiles.t
-rw-r--r--   1 cscherer sunuser     1025 Jul 29 10:40 burnup.dat
-rw-r--r--   1 cscherer sunuser      237 Jun 21 21:05 calc_kd.h
-rw-r--r--   1 cscherer sunuser        0 Jul 19 18:06 calc_kd.t
-rw-r--r--   1 cscherer sunuser      163 Jun 21 21:05 calc_mai.h
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-rw-r--r--   1 cscherer sunuser        0 Jul 19 18:06 calc_mai.t
-rw-r--r--   1 cscherer sunuser      362 Jun 21 21:05 calc_rd.h
-rw-r--r--   1 cscherer sunuser        0 Jul 19 18:06 calc_rd.t
-rw-r--r--   1 cscherer sunuser      243 Jun 21 21:05 calc_wp.h
-rw-r--r--   1 cscherer sunuser        0 Jul 19 18:06 calc_wp.t
drwxr-xr-x   2 cscherer sunuser      512 Jul 19 18:54 ccdf
-rw-r--r--   1 cscherer sunuser      221 Jun 21 21:05 ccdfindexed.h
-rw-r--r--   1 cscherer sunuser        0 Jul 19 18:06 ccdfindexed.t
-rwxrwxrwx   1 cscherer sunuser      140 Jul 29 10:39 ch_env
-rwxr-xr-x   1 cscherer sunuser     2962 Jul 19 18:19 chains.h
-rw-r--r--   1 cscherer sunuser        0 Jul 19 18:06 chains.t
-rwxr-xr-x   1 cscherer sunuser     2947 Jul 19 18:19 chainsolver.h
-rw-r--r--   1 cscherer sunuser        0 Jul 19 18:06 chainsolver.t
-rw-r--r--   1 cscherer sunuser      131 Jun 29 19:55 checkforduplicate.h
-rwxr-xr-x   1 cscherer sunuser      314 Jun 29 19:55 checkforduplicates.h
-rw-r--r--   1 cscherer sunuser        0 Jul 19 18:06 checkforduplicates.t
-rwxr-xr-x   1 cscherer sunuser      302 Jun 29 19:55 checkinorder.h
-rw-r--r--   1 cscherer sunuser        0 Jul 19 18:06 checkinorder.t
-rw-r--r--   1 cscherer sunuser     2867 Jun 29 19:55 checklhsout.h
-rw-r--r--   1 cscherer sunuser        0 Jul 19 18:06 checklhsout.t
-rw-r--r--   1 cscherer sunuser      131 Jun 21 21:05 checknr.h
-rw-r--r--   1 cscherer sunuser        0 Jul 19 18:06 checknr.t
-rw-r--r--   1 cscherer sunuser      133 Jun 21 21:05 checknsa.h
-rw-r--r--   1 cscherer sunuser        0 Jul 19 18:06 checknsa.t
-rw-r--r--   1 cscherer sunuser     2922 Jun 29 19:55 checkspname.h
-rw-r--r--   1 cscherer sunuser        0 Jul 19 18:06 checkspname.t
-rw-r--r--   1 cscherer sunuser     5047 Jul 29 10:43 chlrdmf.dat
-rw-r--r--   1 cscherer sunuser       66 Jun 21 21:05 cleanupwd.h
-rw-r--r--   1 cscherer sunuser        0 Jul 19 18:06 cleanupwd.t
-rwxr-xr-x   1 cscherer sunuser      259 Jun 29 19:55 clearchar.h
-rw-r--r--   1 cscherer sunuser        0 Jul 19 18:06 clearchar.t
-rwxr-xr-x   1 cscherer sunuser     5634 Jul 19 18:03 cleart
-rw-r--r--   1 cscherer sunuser       71 Jun 21 21:05 clidat_init.h
-rw-r--r--   1 cscherer sunuser        0 Jul 19 18:06 clidat_init.t
-rw-r--r--   1 cscherer sunuser       71 Jun 21 21:05 climate_init.h
-rw-r--r--   1 cscherer sunuser        0 Jul 19 18:06 climate_init.t
-rw-r--r--   1 cscherer sunuser       66 Jun 21 21:05 climato.h
-rw-r--r--   1 cscherer sunuser        0 Jul 19 18:06 climato.t
-rw-r--r--   1 cscherer sunuser   850000 Jul 29 10:40 climato1.dat
-rw-r--r--   1 cscherer sunuser     2200 Jul 29 10:40 climato2.dat
drwxr-xr-x   4 cscherer sunuser     1024 Jul 29 10:38 codes
-rw-r--r--   1 cscherer sunuser     6219 Jul 29 10:40 coefkdeq.dat
-rw-r--r--   1 cscherer sunuser      735 Feb 18 18:46 coefkdeq.i
-rw-r--r--   1 cscherer sunuser      530 Jun 28 13:41 cond3dxyzt.h
-rw-r--r--   1 cscherer sunuser        0 Jul 19 18:06 cond3dxyzt.t
-rw-r--r--   1 cscherer sunuser    14198 Jul 12 15:29 condxyzt.f
-rw-r--r--   1 cscherer sunuser     3404 Jul 29 10:34 condxyzt.o
-rw-r--r--   1 cscherer sunuser      138 Jun 29 19:55 copylines.h
-rw-r--r--   1 cscherer sunuser    16306 Jul 29 10:43 corrode.out
-rw-r--r--   1 cscherer sunuser    78191 Jul 29 10:44 cp.tpa
-rw-r--r--   1 cscherer sunuser      747 Jun 21 21:05 cumfail.h
-rw-r--r--   1 cscherer sunuser        0 Jul 19 18:06 cumfail.t
-rw-r--r--   1 cscherer sunuser     3106 Jul 29 10:44 cumrel.res
-rw-r--r--   1 cscherer sunuser     3106 Jul 29 10:44 cumrel_c.res
-rw-r--r--   1 cscherer sunuser    46580 Jul 29 10:43 cumrelse.out
drwxr-xr-x   2 cscherer sunuser     1536 Jul 19 18:54 data
-rw-r--r--   1 cscherer sunuser   124149 Mar 24 16:19 dcags.f
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-rw-r--r--   1 cscherer sunuser    255940 Jul 29 10:31 dcags.o
-rw-r--r--   1 cscherer sunuser    157905 Jul  3 08:33 dcagw.f
-rw-r--r--   1 cscherer sunuser       577 Jun 29 19:55 dcagw.h
-rw-r--r--   1 cscherer sunuser    334136 Jul 29 10:30 dcagw.o
-rwxr-xr-x   1 cscherer sunuser      2906 Jul 19 18:19 decay43mol.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 decay43mol.t
-rwxr-xr-x   1 cscherer sunuser      3040 Jul 19 18:19 decay43molglass.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 decay43molglass.t
-rwxr-xr-x   1 cscherer sunuser      2995 Jul 19 18:19 decayremove43mol.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 decayremove43mol.t
-rw-r--r--   1 cscherer sunuser      6693 Jul 29 10:43 deltaec.inp
-rw-r--r--   1 cscherer sunuser       193 Jun 21 21:05 demij_to_m.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 demij_to_m.t
-rw-r--r--   1 cscherer sunuser      2821 Jun 29 19:55 dget_from_name.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 dget_from_name.t1
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 dget_from_name.t2
-rw-r--r--   1 cscherer sunuser      9800 Jul 29 10:43 diagnose.out
-rw-r--r--   1 cscherer sunuser      2200 Jul 29 10:44 dilution.dat
-rw-r--r--   1 cscherer sunuser      3870 Jul 29 10:40 drifts.dat
-rw-r--r--   1 cscherer sunuser       190 Sep 20  2002 driftsa.i
-rw-r--r--   1 cscherer sunuser       519 Jul 29 10:40 drythick.dat
-rw-r--r--   1 cscherer sunuser     33643 Jul  3 08:33 dsfail.f
-rw-r--r--   1 cscherer sunuser       459 Jun 28 13:41 dsfail.h
-rw-r--r--   1 cscherer sunuser     30232 Jul 29 10:31 dsfail.o
-rw-r--r--   1 cscherer sunuser      2478 Jul 29 10:44 dsfail.res
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 dsfail.t
-rw-r--r--   1 cscherer sunuser      5674 Jul 29 10:43 dsfailt.dat
-rw-r--r--   1 cscherer sunuser       882 Jul 29 10:40 dsfailt.def
-rwxr-xr-x   1 cscherer sunuser     43912 Jul 29 10:40 dsfailt.e
-rw-r--r--   1 cscherer sunuser       671 Jul 29 10:43 dsfailt.inp
-rw-r--r--   1 cscherer sunuser         0 Jul 29 10:40 dsfailt.out
-rw-r--r--   1 cscherer sunuser     68389 Jul 29 10:43 ebscld.out
-rw-r--r--   1 cscherer sunuser      5999 Jul 29 10:40 ebsfail.def
-rw-r--r--   1 cscherer sunuser     49414 Jul  3 08:13 ebsfail.f
-rw-r--r--   1 cscherer sunuser      5734 Jul 29 10:43 ebsfail.inp
-rw-r--r--   1 cscherer sunuser    117612 Jul 29 10:31 ebsfail.o
-rw-r--r--   1 cscherer sunuser       790 Jul 29 10:40 ebsfilt.def
-rwxr-xr-x   1 cscherer sunuser     46612 Jul 29 10:40 ebsfilt.e
-rw-r--r--   1 cscherer sunuser      2678 Jul 29 10:43 ebsfilt.inp
-rw-r--r--   1 cscherer sunuser       239 Jul 29 10:43 ebsfilt.out
-rw-r--r--   1 cscherer sunuser     14029 Jul 29 10:43 ebsflo.dat
-rw-r--r--   1 cscherer sunuser    192529 Jul 29 10:43 ebsnef.dat
-rw-r--r--   1 cscherer sunuser    124252 Jul 29 10:43 ebsnef.out
-rw-r--r--   1 cscherer sunuser    504873 Jul 29 10:43 ebsnef2.dat
-rw-r--r--   1 cscherer sunuser      1883 Jul 29 10:43 ebspac.nuc
-rw-r--r--   1 cscherer sunuser      6246 Jul 29 10:40 ebsrel.def
-rw-r--r--   1 cscherer sunuser     90622 Jul 19 17:41 ebsrel.f
-rw-r--r--   1 cscherer sunuser     11110 Jul 29 10:43 ebsrel.inp
-rw-r--r--   1 cscherer sunuser    222196 Jul 29 10:31 ebsrel.o
-rw-r--r--   1 cscherer sunuser       149 Sep 25  2002 ebsrel1.i
-rw-r--r--   1 cscherer sunuser    124203 Jul 29 10:43 ebssf.dat
-rw-r--r--   1 cscherer sunuser     17315 Jul 29 10:43 ebstrh.dat
-rw-r--r--   1 cscherer sunuser     12335 Jul 29 10:43 ebstrhc.inp
-rw-r--r--   1 cscherer sunuser      2647 Jul 29 10:43 echofail.dat
-rw-r--r--   1 cscherer sunuser    511529 Jul 29 10:43 echofilt.dat
-rwxr-xr-x   1 cscherer sunuser    191036 Jul 29 10:44 env.e
-rwxr-xr-x   1 cscherer sunuser    282664 Jul 29 10:44 envin.e
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-rw-r--r--   1 cscherer sunuser     39350 Jul 29 10:44 epa_ave.out
-rw-r--r--   1 cscherer sunuser        91 Jun 21 21:05 epaccdf.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 epaccdf.t
-rw-r--r--   1 cscherer sunuser        93 Jun 21 21:05 epaccdf_c.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 epaccdf_c.t
-rw-r--r--   1 cscherer sunuser      1703 Jul 29 10:44 epapktim.out
-rw-r--r--   1 cscherer sunuser    419175 Jul 19 17:38 exec.f
-rw-r--r--   1 cscherer sunuser   1060536 Jul 29 10:34 exec.o
-rw-r--r--   1 cscherer sunuser      3475 Jun 21 20:50 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       134 Jun 21 20:51 execd.i
-rwxr-xr-x   1 cscherer sunuser    136472 Jul 29 10:40 failt.e
-rw-r--r--   1 cscherer sunuser     17384 Jul 29 10:43 failt.out
-rw-r--r--   1 cscherer sunuser     10996 Jun 28 13:11 faulto.f
-rw-r--r--   1 cscherer sunuser       199 Jun 28 13:41 faulto.h
-rw-r--r--   1 cscherer sunuser      8620 Jul 29 10:31 faulto.o
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 faulto.t
-rw-r--r--   1 cscherer sunuser      8226 Jun 30 13:38 fileunit.f
-rw-r--r--   1 cscherer sunuser      8584 Jul 29 10:34 fileunit.o
-rwxr-xr-x   1 cscherer sunuser      8947 Jun 28 13:30 fileutil.f
-rw-r--r--   1 cscherer sunuser     10776 Jul 29 10:34 fileutil.o
-rw-r--r--   1 cscherer sunuser       113 Jun 21 21:05 findpkmndose.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 findpkmndose.t
-rw-r--r--   1 cscherer sunuser      6281 Jul 29 10:43 fluoride.dat
-rw-r--r--   1 cscherer sunuser     46580 Jul 29 10:43 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         0 Jul 19 18:06 gauleg.t
-rw-r--r--   1 cscherer sunuser      6513 Jul 29 10:44 gbioac1.dat
-rw-r--r--   1 cscherer sunuser      3383 Jul 29 10:44 gdefault.def
-rw-r--r--   1 cscherer sunuser      3387 Jul 29 10:44 gdefault.inp
-rw-r--r--   1 cscherer sunuser        64 Jul 29 10:44 gdosinc2.dat
-rw-r--r--   1 cscherer sunuser       112 Jun 29 19:55 gentodcf.h
-rw-r--r--   1 cscherer sunuser         0 Jul 29 10:44 gentoo.out
-rw-r--r--   1 cscherer sunuser        86 Jun 29 19:55 gentpa.h
-rw-r--r--   1 cscherer sunuser     35173 Jul 29 10:44 genv.in
-rw-r--r--   1 cscherer sunuser     18393 Jul 29 10:44 genv.out
-rw-r--r--   1 cscherer sunuser       346 Jun 28 13:58 getThickness.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 getThickness.t1
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 getThickness.t2
-rw-r--r--   1 cscherer sunuser        70 Jun 21 21:05 get_climean.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 get_climean.t
-rw-r--r--   1 cscherer sunuser        95 Jun 21 21:05 get_clinoise_set.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 get_clinoise_set.t
-rw-r--r--   1 cscherer sunuser       132 Jun 21 21:05 get_data_file.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 get_data_file.t
-rw-r--r--   1 cscherer sunuser       244 Jun 23 11:02 getelements.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 getelements.t
-rw-r--r--   1 cscherer sunuser       181 Jun 23 11:02 getvertlayers.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 getvertlayers.t
-rw-r--r--   1 cscherer sunuser      7011 Jul 29 10:44 gftrans.def
-rw-r--r--   1 cscherer sunuser      7142 Jul 29 10:44 gftrans.inp
-rw-r--r--   1 cscherer sunuser     15214 Jul 29 10:44 ggamen.dat
-rw-r--r--   1 cscherer sunuser     13855 Jul 29 10:44 ggenii.def
-rw-r--r--   1 cscherer sunuser     13164 Jul 29 10:44 ggenii.inp
-rw-r--r--   1 cscherer sunuser     10074 Jul 29 10:44 ggenii.out
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-rw-r--r--   1 cscherer sunuser      5351 Jul 29 10:44 ggrdf.dat
-rw-r--r--   1 cscherer sunuser      5673 Jul 29 10:44 gmedia.out
-rw-r--r--   1 cscherer sunuser      9897 Jul 29 10:44 gnewdf.dat
-rw-r--r--   1 cscherer sunuser     13200 Jul 29 10:44 grmdlib.dat
-rw-r--r--   1 cscherer sunuser       568 Jul 29 10:44 gsccdf.res
-rw-r--r--   1 cscherer sunuser       568 Jul 29 10:44 gsccdf_c.res
-rw-r--r--   1 cscherer sunuser      3561 Jul 29 10:44 gw_cb_ad.dat
-rw-r--r--   1 cscherer sunuser      1264 Jul 29 10:44 gw_cb_ci.dat
-rw-r--r--   1 cscherer sunuser      3557 Jul 29 10:44 gw_pb_ad.dat
-rw-r--r--   1 cscherer sunuser      1261 Jul 29 10:44 gw_pb_ci.dat
-rw-r--r--   1 cscherer sunuser       568 Jul 29 10:44 gwccdf.res
-rw-r--r--   1 cscherer sunuser       568 Jul 29 10:44 gwccdf_c.res
-rw-r--r--   1 cscherer sunuser         9 Jul 29 10:44 gwork.buf
-rw-r--r--   1 cscherer sunuser      1734 Jul 29 10:44 gwpkdos.res
-rw-r--r--   1 cscherer sunuser      1734 Jul 29 10:44 gwpkds_c.res
-rw-r--r--   1 cscherer sunuser      2166 Jul 29 10:44 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        96 Jun 29 19:55 iabarrier.h
-rw-r--r--   1 cscherer sunuser        98 Jun 29 19:55 iacomponent.h
-rw-r--r--   1 cscherer sunuser        99 Jun 28 14:03 iaddconsmv.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 iaddconsmv.t1
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 iaddconsmv.t2
-rw-r--r--   1 cscherer sunuser        93 Jun 29 19:55 iafile.h
-rw-r--r--   1 cscherer sunuser        98 Jun 29 19:55 iaparameter.h
-rw-r--r--   1 cscherer sunuser     26410 Jul 12 16:12 iareader.f
-rw-r--r--   1 cscherer sunuser     45648 Jul 29 10:31 iareader.o
-rw-r--r--   1 cscherer sunuser        71 Jun 29 19:55 iasetup.h
-rw-r--r--   1 cscherer sunuser        94 Jun 29 19:55 iavalue.h
-rwxr-xr-x   1 cscherer sunuser       308 Jun 29 19:55 icheckforduplicates.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 icheckforduplicates.t
-rw-r--r--   1 cscherer sunuser      2822 Jun 29 19:55 iget_from_name.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 iget_from_name.t1
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 iget_from_name.t2
-rw-r--r--   1 cscherer sunuser        81 Jun 29 19:55 igetunitnumber.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 igetunitnumber.t1
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 igetunitnumber.t2
-rw-r--r--   1 cscherer sunuser        98 Jun 28 14:04 imvquery.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 imvquery.t1
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 imvquery.t2
-rw-r--r--   1 cscherer sunuser      2326 Jul 29 10:44 infilper.res
-rwxr-xr-x   1 cscherer sunuser       281 Jun 29 19:55 initr.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 initr.t
-rw-r--r--   1 cscherer sunuser      1102 Jul 29 10:43 inv1000.out
-rw-r--r--   1 cscherer sunuser     74240 Jul 19 17:36 invent.f
-rw-r--r--   1 cscherer sunuser     86900 Jul 29 10:32 invent.o
-rw-r--r--   1 cscherer sunuser        57 Jun 28 11:49 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  2002 inventl.i
-rw-r--r--   1 cscherer sunuser       315 Dec 11  2002 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       217 Jun 21 21:05 iranu.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 iranu.t1
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 iranu.t2
-rw-r--r--   1 cscherer sunuser      2887 Jun 29 19:55 isconstant.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 isconstant.t1
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 isconstant.t2
-rwxr-xr-x   1 cscherer sunuser       305 Jun 29 19:55 isoneofset.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 isoneofset.t
-rw-r--r--   1 cscherer sunuser      2948 Jun 29 19:55 ispquery.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 ispquery.t1
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 ispquery.t2
-rw-r--r--   1 cscherer sunuser      2960 Jun 29 19:55 ispquerynostop.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 ispquerynostop.t1
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 ispquerynostop.t2
-rw-r--r--   1 cscherer sunuser      3052 Jun 29 19:55 ivaluesp.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 ivaluesp.t1
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 ivaluesp.t2
-rw-r--r--   1 cscherer sunuser       207 Jun 21 21:05 kstr2tok_and_val.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 kstr2tok_and_val.t1
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 kstr2tok_and_val.t2
-rw-r--r--   1 cscherer sunuser       461 Jun 28 13:41 leachrate.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 leachrate.t
-rw-r--r--   1 cscherer sunuser         0 Jul 29 10:40 lhs.csv
-rw-r--r--   1 cscherer sunuser     48211 Jul 29 10:40 lhs.inp
-rw-r--r--   1 cscherer sunuser      5901 Jul 29 10:40 lhs.out
-rw-r--r--   1 cscherer sunuser     80765 Jul 29 10:40 lhse.out
-rw-r--r--   1 cscherer sunuser      2830 Jun 29 19:55 lhsnew.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 lhsnew.t
-rw-r--r--   1 cscherer sunuser      5344 Jul 29 10:34 linintrp.o
-rw-r--r--   1 cscherer sunuser        89 Jun 23 11:02 ljs.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 ljs.t1
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 ljs.t2
-rw-r--r--   1 cscherer sunuser        90 Jun 21 21:05 ljs2.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 ljs2.t1
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 ljs2.t2
-rw-r--r--   1 cscherer sunuser       191 Jun 21 21:05 locadd_vector.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 locadd_vector.t1
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 locadd_vector.t2
-rwxr-xr-x   1 cscherer sunuser       402 Jun 29 19:55 maplist.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 maplist.t
-rwxr-xr-x   1 cscherer sunuser       437 Jun 29 19:55 maptimeofevent.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 maptimeofevent.t
-rw-r--r--   1 cscherer sunuser       101 Jun 21 20:51 max500yr.i
-rw-r--r--   1 cscherer sunuser        99 Sep 25  2002 maxchain.i
-rw-r--r--   1 cscherer sunuser       178 Jun 21 20:51 maxclchn.i
-rw-r--r--   1 cscherer sunuser       144 Sep 25  2002 maxclnuc.i
-rw-r--r--   1 cscherer sunuser       577 Jun 21 20:51 maxnnucl.i
-rw-r--r--   1 cscherer sunuser       326 Jun 21 20:51 maxnsuba.i
-rw-r--r--   1 cscherer sunuser       229 Jun 21 20:51 maxntime.i
-rw-r--r--   1 cscherer sunuser      1095 Jul 29 10:43 maxrel.dat
-rwxr-xr-x   1 cscherer sunuser    943775 Jul 29 10:40 maydtbl.dat
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-rw-r--r--   1 cscherer sunuser     31780 Jul 29 10:43 mechfail.dat
-rw-r--r--   1 cscherer sunuser      9729 Jul 29 10:40 mechfail.def
-rwxr-xr-x   1 cscherer sunuser     80524 Jul 29 10:40 mechfail.e
-rw-r--r--   1 cscherer sunuser      9747 Jul 29 10:43 mechfail.inp
-rw-r--r--   1 cscherer sunuser         0 Jul 29 10:43 mechfail.out
-rw-r--r--   1 cscherer sunuser      2822 Jun 29 19:55 mget_from_name.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 mget_from_name.t1
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 mget_from_name.t2
-rw-r--r--   1 cscherer sunuser      1251 Jul 29 10:40 multifaf.dat
-rw-r--r--   1 cscherer sunuser      1252 Jul 29 10:40 multifbe.dat
-rw-r--r--   1 cscherer sunuser     16805 Jun 30 14:21 mv.f
-rw-r--r--   1 cscherer sunuser     19420 Jul 29 10:32 mv.o
-rw-r--r--   1 cscherer sunuser     61237 Jul 29 10:44 mv.tpa
-rw-r--r--   1 cscherer sunuser       131 Jun 28 13:11 mva.i
-rw-r--r--   1 cscherer sunuser        77 Jun 28 13:11 mvb.i
-rw-r--r--   1 cscherer sunuser        79 Jun 28 13:11 mvc.i
-rw-r--r--   1 cscherer sunuser       101 Aug 16  1997 mvd.i
-rw-r--r--   1 cscherer sunuser       100 Jun 28 13:11 mve.i
-rw-r--r--   1 cscherer sunuser        98 Jun 28 13:11 mvf.i
-rw-r--r--   1 cscherer sunuser      2326 Jul 29 10:44 nearfld.res
-rw-r--r--   1 cscherer sunuser    106205 Jul 29 10:44 nefii.dis
-rw-r--r--   1 cscherer sunuser     11652 Jul 29 10:43 nefii.inp
-rw-r--r--   1 cscherer sunuser    161605 Jul 29 10:44 nefii.out
-rw-r--r--   1 cscherer sunuser       687 Jul 29 10:44 nefii.rel
-rw-r--r--   1 cscherer sunuser    106205 Jul 29 10:44 nefiisz.dis
-rw-r--r--   1 cscherer sunuser     11652 Jul 29 10:44 nefiisz.inp
-rw-r--r--   1 cscherer sunuser    161657 Jul 29 10:44 nefiisz.out
-rw-r--r--   1 cscherer sunuser    203070 Jul 29 10:44 nefiisz.src
-rw-r--r--   1 cscherer sunuser       132 Jul 29 10:44 nefiisz.vel
-rw-r--r--   1 cscherer sunuser     10018 Jul 29 10:43 nefiiuz.dis
-rw-r--r--   1 cscherer sunuser     10432 Jul 29 10:43 nefiiuz.inp
-rw-r--r--   1 cscherer sunuser     55862 Jul 29 10:43 nefiiuz.out
-rw-r--r--   1 cscherer sunuser    208998 Jul 29 10:43 nefiiuz.src
-rw-r--r--   1 cscherer sunuser       175 Jul 29 10:43 nefiiuz.vel
-rwxr-xr-x   1 cscherer sunuser    407712 Jul 29 10:40 nefmks.e
-rw-r--r--   1 cscherer sunuser        80 Jul 29 10:43 nefmks.log
-rwxr-xr-x   1 cscherer sunuser      3922 Jul 19 18:19 newinventdb.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 newinventdb.t
-rw-r--r--   1 cscherer sunuser      3174 Jun 30 13:38 newlhssm.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 newlhssm.t
-rw-r--r--   1 cscherer sunuser        65 Jun 28 13:41 newmvdb.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 newmvdb.t
-rw-r--r--   1 cscherer sunuser      4275 Jun 30 13:39 newrealization.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 newrealization.t
-rw-r--r--   1 cscherer sunuser      3265 Jun 28 14:15 newspdb.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 newspdb.t
-rw-r--r--   1 cscherer sunuser       193 Jun 29 19:55 nextline.h
-rw-r--r--   1 cscherer sunuser    118820 Jun 28 13:11 nfenv.f
-rw-r--r--   1 cscherer sunuser     95684 Jul 29 10:32 nfenv.o
-rw-r--r--   1 cscherer sunuser       326 Nov 17  2002 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      2502 Jul 29 10:44 npkdoset.res
-rw-r--r--   1 cscherer sunuser      2502 Jul 29 10:44 npkdst_c.res
-rw-r--r--   1 cscherer sunuser      7152 Jul 29 10:40 nuclides.dat
-rw-r--r--   1 cscherer sunuser      6579 Mar 24 16:19 numrecip.f
-rw-r--r--   1 cscherer sunuser      4744 Jul 29 10:34 numrecip.o
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-rw-r--r--   1 cscherer sunuser       217 Jun 21 21:05 opnfil.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 opnfil.t
-rw-r--r--   1 cscherer sunuser      7111 Jul 29 10:44 organdf.dat
-rw-r--r--   1 cscherer sunuser       259 Aug 16  1997 path.i
-rw-r--r--   1 cscherer sunuser      6890 Jun 28 13:11 peakfind.f
-rw-r--r--   1 cscherer sunuser      6332 Jul 29 10:34 peakfind.o
-rw-r--r--   1 cscherer sunuser      3397 Jun 28 13:41 peakfinder.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 peakfinder.t
-rw-r--r--   1 cscherer sunuser       698 Jul 29 10:44 pkmndose.out
-rw-r--r--   1 cscherer sunuser      8240 Jul 29 10:44 pkreltim.res
-rw-r--r--   1 cscherer sunuser      8240 Jul 29 10:44 pkrltm_c.res
-rw-r--r--   1 cscherer sunuser       702 Jun 23 11:02 prenefmks.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 prenefmks.t
-rw-r--r--   1 cscherer sunuser        72 Jun 28 13:41 printfun.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 printfun.t
-rw-r--r--   1 cscherer sunuser      2926 Jun 29 19:55 printtimesvalue.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 printtimesvalue.t
-rw-r--r--   1 cscherer sunuser        93 Jun 28 13:41 printtitlesmv.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 printtitlesmv.t
-rw-r--r--   1 cscherer sunuser      3032 Jun 29 19:55 printtitlessp.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 printtitlessp.t
-rw-r--r--   1 cscherer sunuser       111 Jun 28 13:41 printvaluesmv.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 printvaluesmv.t
-rw-r--r--   1 cscherer sunuser      2923 Jun 29 19:55 printvaluessp.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 printvaluessp.t
-rw-r--r--   1 cscherer sunuser       262 Jun 21 21:05 putfailwp.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 putfailwp.t
-rw-r--r--   1 cscherer sunuser       137 Jun 21 21:05 putgwtt.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 putgwtt.t
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 querystop.t
-rw-r--r--   1 cscherer sunuser     61265 Jun 21 20:51 ran.f
-rw-r--r--   1 cscherer sunuser      7300 Jul 29 10:34 ran.o
-rw-r--r--   1 cscherer sunuser       253 Jun 21 21:05 ran1.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 ran1.t1
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 ran1.t2
-rw-r--r--   1 cscherer sunuser       261 Jun 21 21:05 ran1seis.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 ran1seis.t1
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 ran1seis.t2
-rw-r--r--   1 cscherer sunuser       211 Jun 21 21:05 raneseis.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 raneseis.t1
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 raneseis.t2
-rw-r--r--   1 cscherer sunuser    153738 Jun 28 13:11 reader.f
-rw-r--r--   1 cscherer sunuser       234 Jun 21 20:51 reader.i
-rw-r--r--   1 cscherer sunuser    437100 Jul 29 10:33 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 Jul 29 10:43 rel_flow.out
-rw-r--r--   1 cscherer sunuser       568 Jul 29 10:44 relccdf.res
-rw-r--r--   1 cscherer sunuser      2883 Jul 29 10:43 relcum.out
-rwxr-xr-x   1 cscherer sunuser    122432 Jul 29 10:40 releaset.e
-rw-r--r--   1 cscherer sunuser       414 Jul 29 10:43 releaset.out
-rw-r--r--   1 cscherer sunuser       773 Jul 29 10:43 relfrac.out
-rw-r--r--   1 cscherer sunuser       718 Jul 29 10:44 relgwgs.res
-rw-r--r--   1 cscherer sunuser       562 Jul 29 10:40 repdes.dat
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-rw-r--r--   1 cscherer sunuser     47557 Jul 29 10:44 rgwna.tpa
-rw-r--r--   1 cscherer sunuser     47557 Jul 29 10:44 rgwnapani.tpa
-rw-r--r--   1 cscherer sunuser     47557 Jul 29 10:44 rgwnapdw.tpa
-rw-r--r--   1 cscherer sunuser     47557 Jul 29 10:44 rgwnapext.tpa
-rw-r--r--   1 cscherer sunuser     47557 Jul 29 10:44 rgwnapinh.tpa
-rw-r--r--   1 cscherer sunuser     47557 Jul 29 10:44 rgwnapmlk.tpa
-rw-r--r--   1 cscherer sunuser     47557 Jul 29 10:44 rgwnappla.tpa
-rw-r--r--   1 cscherer sunuser     47557 Jul 29 10:44 rgwnr.tpa
-rw-r--r--   1 cscherer sunuser      5133 Jul 29 10:44 rgwsa.tpa
-rw-r--r--   1 cscherer sunuser     16133 Jul 29 10:44 rgwsap.tpa
-rw-r--r--   1 cscherer sunuser      5179 Jul 29 10:44 rgwsr.tpa
-rw-r--r--   1 cscherer sunuser       568 Jul 29 10:44 rlccdf_c.res
-rw-r--r--   1 cscherer sunuser       718 Jul 29 10:44 rlgwgs_c.res
-rw-r--r--   1 cscherer sunuser        97 Jun 21 21:05 runnefmks.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 runnefmks.t
-rw-r--r--   1 cscherer sunuser      3150 Jun 29 19:55 samplehazardcurve.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 samplehazardcurve.t
-rw-r--r--   1 cscherer sunuser    106658 Jun 28 13:11 sampler.f
-rw-r--r--   1 cscherer sunuser    165652 Jul 29 10:33 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      3962 Jul 29 10:40 samplpar.abb
-rw-r--r--   1 cscherer sunuser     30632 Jul 29 10:40 samplpar.hdr
-rw-r--r--   1 cscherer sunuser      6543 Jul 29 10:44 samplpar.res
-rwxr-xr-x   1 cscherer sunuser       279 Jun 29 19:55 scale.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 scale.t
-rwxr-xr-x   1 cscherer sunuser       312 Jun 29 19:55 scopy.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 scopy.t
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-rw-r--r--   1 cscherer sunuser       322 Nov 17  2002 seisadj.i
-rwxr-xr-x   1 cscherer sunuser    130758 Jul 29 10:40 seisbs1.dis
-rwxr-xr-x   1 cscherer sunuser    130758 Jul 29 10:40 seisbs2.dis
-rw-r--r--   1 cscherer sunuser     82426 Jul  2 19:31 seismo2.f
-rw-r--r--   1 cscherer sunuser     60168 Jul 29 10:33 seismo2.o
-rw-r--r--   1 cscherer sunuser        71 Jun 21 21:05 set_iouzflow.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 set_iouzflow.t
-rwxr-xr-x   1 cscherer sunuser      3188 Jul 19 18:19 setage.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 setage.t
-rw-r--r--   1 cscherer sunuser       140 Jun 28 13:41 setconsmv.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 setconsmv.t
-rw-r--r--   1 cscherer sunuser       120 Jun 21 21:05 setfiles.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 setfiles.t
-rw-r--r--   1 cscherer sunuser       239 Jun 21 21:05 setran.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 setran.t
-rw-r--r--   1 cscherer sunuser       247 Jun 21 21:05 setranseis.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 setranseis.t
-rw-r--r--   1 cscherer sunuser       132 Jun 28 13:41 setupCommons.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 setupCommons.t
-rwxrwxrwx   1 cscherer sunuser        30 Sep 12  2002 show_env
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 sigfpe_abort.t1
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 sigfpe_abort.t2
-rwxr-xr-x   1 cscherer sunuser    943788 Jul 29 10:40 smaydtbl.dat
-rwxr-xr-x   1 cscherer sunuser    243060 Jul 29 10:40 snllhs.e
-rwxr-xr-x   1 cscherer sunuser       277 Jun 29 19:55 sortqr.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 sortqr.t
-rw-r--r--   1 cscherer sunuser    203070 Jul 29 10:43 sotnef.dat
-rw-r--r--   1 cscherer sunuser     31817 Jul 29 10:44 sp.tpa
-rw-r--r--   1 cscherer sunuser      1944 Jul 29 10:34 srchpos.o
-rw-r--r--   1 cscherer sunuser       144 Sep  3  1997 stop.i
-rw-r--r--   1 cscherer sunuser      2721 Jul 29 10:40 strmtube.dat
-rw-r--r--   1 cscherer sunuser     38340 Jun 23 11:02 subarea.f
-rw-r--r--   1 cscherer sunuser     59656 Jul 29 10:33 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    120979 Jun  4 11:09 szft.f
-rw-r--r--   1 cscherer sunuser       264 Nov 17  2002 szft.i
-rw-r--r--   1 cscherer sunuser    199720 Jul 29 10:32 szft.o
-rw-r--r--   1 cscherer sunuser       106 Jun 29 19:55 tempgl.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 tempgl.t1
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 tempgl.t2
-rw-r--r--   1 cscherer sunuser     13118 Jul 29 10:44 totdos_c.res
-rw-r--r--   1 cscherer sunuser     13118 Jul 29 10:44 totdose.res
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 touch.t
-rwxr-xr-x   1 cscherer sunuser   2448144 Jul 29 10:34 tpa.e
-rw-r--r--   1 cscherer sunuser     96597 Jul 19 17:33 tpa.inp
-rw-r--r--   1 cscherer sunuser     22100 Jul 29 10:44 tpa.out
-rw-r--r--   1 cscherer sunuser     97602 Jul 29 10:40 tpameans.out
-rw-r--r--   1 cscherer sunuser    107985 Jul 29 10:40 tpanames.dbs
-rw-r--r--   1 cscherer sunuser       179 Jun 21 21:05 trapint.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 trapint.t
-rw-r--r--   1 cscherer sunuser    147007 Jul 29 10:43 trelease.out
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-rw-r--r--   1 cscherer sunuser        97 Jun 29 19:55 trim.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 trim.t2
-rw-r--r--   1 cscherer sunuser        93 Jun 21 21:05 ucljs.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 ucljs.t1
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 ucljs.t2
-rw-r--r--   1 cscherer sunuser        95 Jun 29 19:55 ucljsg.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 ucljsg.t2
-rw-r--r--   1 cscherer sunuser      3068 Jun 29 19:55 updatelhs.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 updatelhs.t
-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      1466 Jun 21 20:51 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      3722 Jun 21 20:51 uz_parms.i
-rw-r--r--   1 cscherer sunuser     85497 Jul  3 07:38 uzflow.f
-rw-r--r--   1 cscherer sunuser     57736 Jul 29 10:33 uzflow.o
-rw-r--r--   1 cscherer sunuser    147323 Jul 15 18:39 uzft.f
-rw-r--r--   1 cscherer sunuser       793 Jun 23 11:02 uzft.h
-rw-r--r--   1 cscherer sunuser    201980 Jul 29 10:34 uzft.o
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 uzft.t
-rw-r--r--   1 cscherer sunuser       755 Nov 17  2002 uzszft.i
-rw-r--r--   1 cscherer sunuser       103 Jun 30 14:08 valueconsmv.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 valueconsmv.t1
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 valueconsmv.t2
-rw-r--r--   1 cscherer sunuser      3050 Jun 29 19:55 valuesp.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 valuesp.t1
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 valuesp.t2
-rw-r--r--   1 cscherer sunuser     17849 Jul 12 15:29 volcano.f
-rwxr-xr-x   1 cscherer sunuser       282 Jun 28 13:41 volcano.h
-rw-r--r--   1 cscherer sunuser     17624 Jul 29 10:34 volcano.o
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 volcano.t
-rw-r--r--   1 cscherer sunuser     14132 Jul 29 10:43 weldfail.out
-rw-r--r--   1 cscherer sunuser      1191 Jul 29 10:44 wpfillstats.out
-rw-r--r--   1 cscherer sunuser      8805 Jul 29 10:40 wpflow.dat
-rw-r--r--   1 cscherer sunuser     17410 Jul 29 10:40 wpflow.def
-rw-r--r--   1 cscherer sunuser       814 Jul 29 10:44 wpsfail.res
-rw-r--r--   1 cscherer sunuser       275 Jun 21 21:05 writedata.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 writedata.t
-rw-r--r--   1 cscherer sunuser       353 Jun 21 21:05 writeepaccdf.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 writeepaccdf.t
-rw-r--r--   1 cscherer sunuser       316 Jun 21 21:05 writehead.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 writehead.t
-rw-r--r--   1 cscherer sunuser       268 Jun 21 21:05 writehead2.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 writehead2.t
-rw-r--r--   1 cscherer sunuser      3212 Jun 29 19:55 writesnllhsinp.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 writesnllhsinp.t
-rw-r--r--   1 cscherer sunuser       519 Jun 23 11:02 writesource.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 writesource.t
-rw-r--r--   1 cscherer sunuser       275 Jun 21 21:05 writevelocities.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 writevelocities.t
-rw-r--r--   1 cscherer sunuser       220 Jun 28 13:41 xgauleg.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 xgauleg.t
-rw-r--r--   1 cscherer sunuser       158 Jun 21 21:05 yutok_in_ustr.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 yutok_in_ustr.t1
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 yutok_in_ustr.t2
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-rwxr-xr-x   1 cscherer sunuser       252 Jun 29 19:55 zero.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 zero.t
-rwxr-xr-x   1 cscherer sunuser       245 Jun 29 19:55 zeroi.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 zeroi.t
-rw-r--r--   1 cscherer sunuser        77 Jun 29 19:55 zportctime.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 zportctime.t1
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 zportctime.t2
-rw-r--r--   1 cscherer sunuser       112 Jun 29 19:55 zportderf.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 zportderf.t1
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 zportderf.t2
-rw-r--r--   1 cscherer sunuser        51 Jun 30 09:25 zportfdate.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 zportfdate.t
-rw-r--r--   1 cscherer sunuser        54 Jun 29 19:55 zportfdatefun.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 zportfdatefun.t1
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 zportfdatefun.t2
-rw-r--r--   1 cscherer sunuser       193 Jun 29 19:55 zportieee_flags.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 zportieee_flags.t1
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 zportieee_flags.t2
-rw-r--r--   1 cscherer sunuser       196 Jun 29 19:55 zportieee_handler.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 zportieee_handler.t1
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 zportieee_handler.t2
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 zportparseunixcmdtodos.t
-rw-r--r--   1 cscherer sunuser       148 Jun 28 13:41
zportparseunixfilenametodos.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06
zportparseunixfilenametodos.t
-rw-r--r--   1 cscherer sunuser       101 Jun 29 19:55 zportsh.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 zportsh.t1
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 zportsh.t2
-rw-r--r--   1 cscherer sunuser        78 Jun 29 19:55 zporttime.h
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 zporttime.t1
-rw-r--r--   1 cscherer sunuser         0 Jul 19 18:06 zporttime.t2
-rw-r--r--   1 cscherer sunuser     16969 Jun 30 09:25 zportunx.f
-rw-r--r--   1 cscherer sunuser      1636 Jul 29 10:34 zportunx.o

scr471/tpa50m/ccdf:
total 42
drwxr-xr-x   2 cscherer sunuser       512 Jul 19 18:54 .
drwxr-xr-x   5 cscherer sunuser     14848 Jul 29 13:55 ..
-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

scr471/tpa50m/codes:
total 3030
drwxr-xr-x   4 cscherer sunuser      1024 Jul 29 10:38 .
drwxr-xr-x   5 cscherer sunuser     14848 Jul 29 13:55 ..
-rw-r--r--   1 cscherer sunuser      1299 Feb 21 21:10 Makefile
-rw-r--r--   1 cscherer sunuser      1673 Jun 23 11:03 Makefile4.2
-rw-r--r--   1 cscherer sunuser       499 Jun  2  1997 README
-rw-r--r--   1 cscherer sunuser      2440 Jun 28 13:16 SIZES.INC
-rw-r--r--   1 cscherer sunuser       164 Feb 17  1998 SIZES2.INC
-rwxr-xr-x   1 cscherer sunuser    164644 Jul 29 10:36 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     22380 Jul 29 10:35 corrosn.o
```

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-rwxr-xr-x   1 cscherer sunuser     43912 Jul 29 10:37 dsfailt.e
-rw-r--r--   1 cscherer sunuser     24477 Jul 19 17:28 dsfailt.f
-rwxr-xr-x   1 cscherer sunuser     46612 Jul 29 10:37 ebsfilt.e
-rw-r--r--   1 cscherer sunuser     18060 Jul  3 07:59 ebsfilt.f
-rwxr-xr-x   1 cscherer sunuser    191036 Jul 29 10:38 env.e
-rwxr-xr-x   1 cscherer sunuser    282664 Jul 29 10:37 envin.e
-rwxr-xr-x   1 cscherer sunuser    136472 Jul 29 10:35 failt.e
-rw-r--r--   1 cscherer sunuser    104294 Apr  2 14:09 failt.f
-rw-r--r--   1 cscherer sunuser       450 Nov 17  2002 failtadj.i
drwxr-xr-x   2 cscherer sunuser      3072 Jul 29 10:38 gentpa
-rwxr-xr-x   1 cscherer sunuser      4635 Mar 24 16:15 integrt.f
-rw-r--r--   1 cscherer sunuser      2072 Jul 29 10:35 integrt.o
drwxr-xr-x   3 cscherer sunuser       512 Jul 19 18:54 itym
-rw-r--r--   1 cscherer sunuser       868 Dec 17  2002 lhs1.i
-rw-r--r--   1 cscherer sunuser      1308 Mar 14  2002 lhs2.i
-rw-r--r--   1 cscherer sunuser       438 Mar 14  2002 lhs3.i
-rw-r--r--   1 cscherer sunuser       437 Mar 14  2002 lhs4.i
-rw-r--r--   1 cscherer sunuser       374 Mar 14  2002 lhs5.i
-rw-r--r--   1 cscherer sunuser       450 Mar 14  2002 lhs6.i
-rw-r--r--   1 cscherer sunuser       464 Mar 14  2002 lhs7.i
-rw-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      3272 Jul 29 10:35 linintrp.o
-rw-r--r--   1 cscherer sunuser       331 Nov 17  2002 mechadj.i
-rwxr-xr-x   1 cscherer sunuser     80524 Jul 29 10:34 mechfail.e
-rw-r--r--   1 cscherer sunuser    136063 Jul 19 17:21 mechfail.f
-rwxr-xr-x   1 cscherer sunuser    407712 Jul 29 10:35 nefmks.e
-rw-r--r--   1 cscherer sunuser    308005 Feb 26 10:50 nefmks.f
-rwxr-xr-x   1 cscherer sunuser    122432 Jul 29 10:36 releaset.e
-rw-r--r--   1 cscherer sunuser    182376 Jun 28 13:16 releaset.f
-rwxr-xr-x   1 cscherer sunuser    243060 Jul 29 10:36 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      1296 Jul 29 10:35 srchpos.o
-rwxr-xr-x   1 cscherer sunuser     19959 Mar 24 16:15 weldfail.f
-rw-r--r--   1 cscherer sunuser      9348 Jul 29 10:35 weldfail.o

scr471/tpa50m/codes/gentpa:
total 1063
drwxr-xr-x   2 cscherer sunuser      3072 Jul 29 10:38 .
drwxr-xr-x   4 cscherer sunuser      1024 Jul 29 10:38 ..
-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
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-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  2002 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     24096 Jul 29 10:37 accmod.o
-rw-r--r--   1 cscherer sunuser     10094 Feb 11  2000 acute1.f
-rw-r--r--   1 cscherer sunuser     16196 Jul 29 10:37 acute1.o
-rw-r--r--   1 cscherer sunuser      9579 Feb 11  2000 acutea.f
-rw-r--r--   1 cscherer sunuser     11188 Jul 29 10:37 acutea.o
-rw-r--r--   1 cscherer sunuser      7118 Feb 11  2000 acutec.f
-rw-r--r--   1 cscherer sunuser      8488 Jul 29 10:38 acutec.o
-rw-r--r--   1 cscherer sunuser      8669 Feb 11  2000 aircal.f
-rw-r--r--   1 cscherer sunuser     11232 Jul 29 10:38 aircal.o
-rw-r--r--   1 cscherer sunuser      8383 Feb 11  2000 anmcal.f
-rw-r--r--   1 cscherer sunuser     12716 Jul 29 10:37 anmcal.o
-rw-r--r--   1 cscherer sunuser      2043 Feb 11  2000 aqucal.f
-rw-r--r--   1 cscherer sunuser      3984 Jul 29 10:38 aqucal.o
-rw-r--r--   1 cscherer sunuser      1217 Feb 11  2000 biocal.f
-rw-r--r--   1 cscherer sunuser      1944 Jul 29 10:37 biocal.o
-rw-r--r--   1 cscherer sunuser      4174 Feb 11  2000 blockd.f
-rw-r--r--   1 cscherer sunuser      6664 Jul 29 10:37 blockd.o
-rw-r--r--   1 cscherer sunuser      1405 Feb 11  2000 bsort.f
-rw-r--r--   1 cscherer sunuser      1200 Jul 29 10:37 bsort.o
-rw-r--r--   1 cscherer sunuser     13008 Feb 11  2000 candh.f
-rw-r--r--   1 cscherer sunuser     10420 Jul 29 10:37 candh.o
-rw-r--r--   1 cscherer sunuser      6653 Feb 11  2000 chain.f
-rw-r--r--   1 cscherer sunuser      5368 Jul 29 10:38 chain.o
-rw-r--r--   1 cscherer sunuser     23921 Feb 11  2000 check.f
-rw-r--r--   1 cscherer sunuser     48600 Jul 29 10:37 check.o
-rw-r--r--   1 cscherer sunuser     10189 Feb 11  2000 cronmod.f
-rw-r--r--   1 cscherer sunuser     22452 Jul 29 10:37 cronmod.o
-rw-r--r--   1 cscherer sunuser      5153 Feb 11  2000 crpcal.f
-rw-r--r--   1 cscherer sunuser      8556 Jul 29 10:37 crpcal.o
-rw-r--r--   1 cscherer sunuser      3842 Feb 11  2000 dkharv.f
-rw-r--r--   1 cscherer sunuser      6120 Jul 29 10:38 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      2628 Jul 29 10:37 drfbiv.o
-rw-r--r--   1 cscherer sunuser      6728 Feb 11  2000 drfsec.f
-rw-r--r--   1 cscherer sunuser      5248 Jul 29 10:37 drfsec.o
-rw-r--r--   1 cscherer sunuser      1877 Feb 11  2000 drkcal.f
-rw-r--r--   1 cscherer sunuser      2276 Jul 29 10:38 drkcal.o
-rw-r--r--   1 cscherer sunuser      1325 Feb 11  2000 dumred.f
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-rw-r--r--   1 cscherer sunuser      3600 Jul 29 10:37 dumred.o
-rw-r--r--   1 cscherer sunuser      3958 Feb 11  2000 edranm.f
-rw-r--r--   1 cscherer sunuser      7244 Jul 29 10:37 edranm.o
-rw-r--r--   1 cscherer sunuser      3567 Feb 11  2000 edrcrp.f
-rw-r--r--   1 cscherer sunuser      7652 Jul 29 10:38 edrcrp.o
-rw-r--r--   1 cscherer sunuser      2525 Feb 11  2000 edrnon.f
-rw-r--r--   1 cscherer sunuser      4696 Jul 29 10:37 edrnon.o
-rw-r--r--   1 cscherer sunuser      2853 Feb 11  2000 edrres.f
-rw-r--r--   1 cscherer sunuser      4136 Jul 29 10:37 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      8708 Jul 29 10:37 envlib.o
-rw-r--r--   1 cscherer sunuser      1912 Feb 11  2000 exposr.f
-rw-r--r--   1 cscherer sunuser      2236 Jul 29 10:37 exposr.o
-rw-r--r--   1 cscherer sunuser      6774 Feb 11  2000 extcal.f
-rw-r--r--   1 cscherer sunuser      7572 Jul 29 10:38 extcal.o
-rw-r--r--   1 cscherer sunuser      1489 Feb 11  2000 filerr.f
-rw-r--r--   1 cscherer sunuser      3860 Jul 29 10:37 filerr.o
-rw-r--r--   1 cscherer sunuser      1986 Feb 11  2000 fntdrf.f
-rw-r--r--   1 cscherer sunuser      2000 Jul 29 10:37 fntdrf.o
-rw-r--r--   1 cscherer sunuser      3003 Feb 11  2000 headng.f
-rw-r--r--   1 cscherer sunuser      5740 Jul 29 10:37 headng.o
-rw-r--r--   1 cscherer sunuser      2203 Feb 11  2000 idnuc.f
-rw-r--r--   1 cscherer sunuser      3000 Jul 29 10:37 idnuc.o
-rw-r--r--   1 cscherer sunuser      2842 Feb 11  2000 inhcal.f
-rw-r--r--   1 cscherer sunuser      5704 Jul 29 10:38 inhcal.o
-rw-r--r--   1 cscherer sunuser      2392 Feb 11  2000 initnv.f
-rw-r--r--   1 cscherer sunuser      2756 Jul 29 10:37 initnv.o
-rw-r--r--   1 cscherer sunuser      1841 Feb 11  2000 intpol.f
-rw-r--r--   1 cscherer sunuser      3724 Jul 29 10:38 intpol.o
-rw-r--r--   1 cscherer sunuser      1348 Feb 11  2000 invmol.f
-rw-r--r--   1 cscherer sunuser      1160 Jul 29 10:37 invmol.o
-rw-r--r--   1 cscherer sunuser       677 Feb 11  2000 makda2.f
-rw-r--r--   1 cscherer sunuser      1048 Jul 29 10:37 makda2.o
-rw-r--r--   1 cscherer sunuser      5870 Feb 11  2000 opnfil.f
-rw-r--r--   1 cscherer sunuser     11748 Jul 29 10:37 opnfil.o
-rw-r--r--   1 cscherer sunuser      4217 Feb 11  2000 order.f
-rw-r--r--   1 cscherer sunuser      5732 Jul 29 10:37 order.o
-rw-r--r--   1 cscherer sunuser      2325 Feb 11  2000 packag.f
-rw-r--r--   1 cscherer sunuser      3480 Jul 29 10:38 packag.o
-rw-r--r--   1 cscherer sunuser      3366 Feb 11  2000 plmriz.f
-rw-r--r--   1 cscherer sunuser      2184 Jul 29 10:37 plmriz.o
-rw-r--r--   1 cscherer sunuser      1861 Feb 11  2000 prior.f
-rw-r--r--   1 cscherer sunuser      2236 Jul 29 10:37 prior.o
-rw-r--r--   1 cscherer sunuser      4080 Feb 11  2000 prob.f
-rw-r--r--   1 cscherer sunuser      2108 Jul 29 10:37 prob.o
-rw-r--r--   1 cscherer sunuser      2079 Feb 11  2000 profile.f
-rw-r--r--   1 cscherer sunuser      1612 Jul 29 10:37 profile.o
-rw-r--r--   1 cscherer sunuser     11351 Feb 11  2000 readin.f
-rw-r--r--   1 cscherer sunuser     47520 Jul 29 10:37 readin.o
-rw-r--r--   1 cscherer sunuser      6174 Feb 11  2000 redcas.f
-rw-r--r--   1 cscherer sunuser     24420 Jul 29 10:37 redcas.o
-rw-r--r--   1 cscherer sunuser      3867 Feb 11  2000 redcha.f
-rw-r--r--   1 cscherer sunuser      9248 Jul 29 10:37 redcha.o
-rw-r--r--   1 cscherer sunuser      8483 Feb 11  2000 redflt.f
-rw-r--r--   1 cscherer sunuser     35388 Jul 29 10:37 redflt.o
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-rw-r--r--   1 cscherer sunuser      1694 Feb 11  2000 redist.f
-rw-r--r--   1 cscherer sunuser      1792 Jul 29 10:37 redist.o
-rw-r--r--   1 cscherer sunuser      8548 Feb 11  2000 ritenv.f
-rw-r--r--   1 cscherer sunuser     37152 Jul 29 10:37 ritenv.o
-rw-r--r--   1 cscherer sunuser      4371 Feb 11  2000 ritexp.f
-rw-r--r--   1 cscherer sunuser     10940 Jul 29 10:37 ritexp.o
-rw-r--r--   1 cscherer sunuser      2584 Feb 11  2000 ritmed.f
-rw-r--r--   1 cscherer sunuser      7300 Jul 29 10:38 ritmed.o
-rw-r--r--   1 cscherer sunuser     27222 Feb 11  2000 ritqa.f
-rw-r--r--   1 cscherer sunuser     93708 Jul 29 10:37 ritqa.o
-rw-r--r--   1 cscherer sunuser      4346 Feb 11  2000 rlibin.f
-rw-r--r--   1 cscherer sunuser     10192 Jul 29 10:37 rlibin.o
-rw-r--r--   1 cscherer sunuser      4399 Feb 11  2000 rwake.f
-rw-r--r--   1 cscherer sunuser      3392 Jul 29 10:37 rwake.o
-rw-r--r--   1 cscherer sunuser      2396 Feb 11  2000 sigma.f
-rw-r--r--   1 cscherer sunuser      1832 Jul 29 10:37 sigma.o
-rw-r--r--   1 cscherer sunuser      8387 Feb 11  2000 swcal.f
-rw-r--r--   1 cscherer sunuser      5868 Jul 29 10:37 swcal.o
-rw-r--r--   1 cscherer sunuser      1894 Feb 11  2000 trnspt.f
-rw-r--r--   1 cscherer sunuser      2048 Jul 29 10:37 trnspt.o
-rw-r--r--   1 cscherer sunuser      1771 Feb 11  2000 ustar.f
-rw-r--r--   1 cscherer sunuser      1500 Jul 29 10:37 ustar.o
-rw-r--r--   1 cscherer sunuser      9276 Feb 11  2000 xqcal.f
-rw-r--r--   1 cscherer sunuser     17128 Jul 29 10:37 xqcal.o
-rw-r--r--   1 cscherer sunuser      5277 Feb 11  2000 xqin.f
-rw-r--r--   1 cscherer sunuser     12472 Jul 29 10:37 xqin.o

scr471/tpa50m/codes/itym:
total 4
drwxr-xr-x   3 cscherer sunuser       512 Jul 19 18:54 .
drwxr-xr-x   4 cscherer sunuser      1024 Jul 29 10:38 ..
-rw-r--r--   1 cscherer sunuser       596 Oct  1  2002 makefile
drwxr-xr-x   2 cscherer sunuser       512 Jul 19 18:54 src

scr471/tpa50m/codes/itym/src:
total 328
drwxr-xr-x   2 cscherer sunuser       512 Jul 19 18:54 .
drwxr-xr-x   3 cscherer sunuser       512 Jul 19 18:54 ..
-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     61114 Jul 19 18:00 estimator.f
-rw-r--r--   1 cscherer sunuser      5384 Dec 30  2002 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  2002 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

scr471/tpa50m/data:
total 7539
drwxr-xr-x   2 cscherer sunuser      1536 Jul 19 18:54 .
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drwxr-xr-x   5 cscherer sunuser     14848 Jul 29 13:55 ..
-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      6280 Jun  4 09:03 coefkdeqr.dat
-rw-r--r--   1 cscherer sunuser      2200 Dec 19  2002 dilution.dat
-rw-r--r--   1 cscherer sunuser       519 Jun 14 18:45 drythick.dat
-rw-r--r--   1 cscherer sunuser       882 Jul  3 08:00 dsfailt.def
-rw-r--r--   1 cscherer sunuser      5999 Jun 28 13:28 ebsfail.def
-rw-r--r--   1 cscherer sunuser       790 May 28  1998 ebsfilt.def
-rw-r--r--   1 cscherer sunuser      6246 Jul 15 18:34 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      8247 Feb 22 16:39 ia.dat
-rw-r--r--   1 cscherer sunuser     20698 Dec 30  2002 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  2002 maydtbl.dat
-rw-r--r--   1 cscherer sunuser      9729 Dec 17  2002 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       562 Jul 19 17:30 repdes.dat
-rw-r--r--   1 cscherer sunuser    247216 Jul 12 15:35 reversibles.inp
-rwxr-xr-x   1 cscherer sunuser    130758 Dec 17  2002 seisbs1.dis
-rwxr-xr-x   1 cscherer sunuser    130758 Dec 17  2002 seisbs2.dis
-rwxr-xr-x   1 cscherer sunuser    943788 Dec 30  2002 smaydtbl.dat
-rw-r--r--   1 cscherer sunuser    489858 Mar 22  2000 soildem.dat
-rw-r--r--   1 cscherer sunuser      2721 Jun 21 21:24 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     96597 Jul 19 17:33 tpa.inp
-rw-r--r--   1 cscherer sunuser    107985 Jun 28 13:28 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
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