


SOFTWARE RELEASE NOTICE

1. SRN Number: <i>PA-SRN-298</i>		
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 <div style="display: flex; justify-content: space-between;"> <div> <input type="checkbox"/> Release of new software <input checked="" type="checkbox"/> Release of modified software: <div style="margin-left: 20px;"> <input checked="" type="checkbox"/> Enhancements made <input checked="" type="checkbox"/> Corrections made </div> </div> <div> <input type="checkbox"/> Change of access software <input type="checkbox"/> Software Retirement </div> </div>		
6. Validation Status <input checked="" type="checkbox"/> Validated <input type="checkbox"/> Limited Validation <input type="checkbox"/> 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: <i>Gordon Wittmeyer</i>		Date: <i>7/29/2003</i>
9. Remarks: An 8mm tape containing FORTRAN source code for the TPA Version 5.0o code.		

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: <input type="checkbox"/> Automated Data System <input checked="" type="checkbox"/> Computer Program <input type="checkbox"/> Subroutine/Module	09. Processing Mode: <input type="checkbox"/> Interactive <input checked="" type="checkbox"/> Batch <input type="checkbox"/> Combination	10. Application Area: a. General: <input type="checkbox"/> Scientific/Engineering <input type="checkbox"/> Auxiliary Analyses <input checked="" type="checkbox"/> Total System PA <input type="checkbox"/> Subsystem PA <input type="checkbox"/> 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, MECHFAL			
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: <input checked="" type="checkbox"/> Available <input type="checkbox"/> Limited <input type="checkbox"/> In-House ONLY		24. Documentation Availability: <input type="checkbox"/> Available <input type="checkbox"/> Preliminary <input checked="" type="checkbox"/> In-House ONLY	
25. Software Developer:  Date: 7-29-03			

CENTER FOR NUCLEAR WASTE REGULATORY ANALYSES
QA VERIFICATION REPORT
FOR

→ DEVELOPED OR ACQUIRED TO BE MODIFIED SOFTWARE ←

Software Title/Name:	<u>TPA</u>
Version:	<u>5.0</u>
Demonstration workstation:	<u>Scratchy 1</u>
Operating System:	<u>Solaris 5.9</u>
Developer:	<u>R. Sanetka / S. Mahanty</u>

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

SRD Version:	<u>5.0</u>
SRD Approval Date:	<u>12/7/01</u>

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?

This is a major revision, but SCR's were used to manage and test all of the changes.

Yes: ☐ No: ☐ N/A: ☒

Comments:

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

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

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?

Module(s) Reviewed:	<u>FORTRAN 77</u>	Yes: <input checked="" type="checkbox"/> No: <input type="checkbox"/> N/A: <input type="checkbox"/>
Comments:	<u>Executive, numrecip.f, uzflow.f</u>	

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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, numrecif.f, uzflow.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 S.P.O., many others since last release, S.P.O.*

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, numrecif.f, uzflow.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 Platform: 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 Platform: SUN Operating Systems: SOLARIS 5.9

Location of Acceptance Test Results: on system after Host Security 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: in v. 4.0 User Manual, 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: 7-29-03

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) & Scratchy 1

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: ☐

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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: 3/21/02

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:

Ron J. Smith
Software Developer/Date 7-30-03

Robert D. Smith 7/30/03
Software Custodian/Date

tpa50o/
tpa50o/CLEANUP
tpa50o/cleart
tpa50o/array.f
tpa50o/ashplumo.f
tpa50o/ashrmovo.f
tpa50o/condxyzt.f
tpa50o/coefkdeg.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/ful.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/sampler4.i
tpa50o/sampler.a.i
tpa50o/samplerb.i
tpa50o/samplerc.i
tpa50o/samplerd.i
tpa50o/sampler.e.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/samlern.i
tpa50o/samlero.i
tpa50o/samplerp.i
tpa50o/samplerq.i
tpa50o/samlerr.i
tpa50o/samplers.i
tpa50o/samlert.i
tpa50o/samleru.i
tpa50o/samlerv.i
tpa50o/samplerw.i
tpa50o/samplerx.i
tpa50o/samlery.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/addusersupplieddiscrete.h
tpa50o/addusersuppliedpwisecdf.h
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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/findpkmdose.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/ichckforduplicates.h
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tpa50o/igetunitnumber.h
tpa50o/imvquery.h
tpa50o/initr.h
tpa50o/iranu.h
tpa50o/isconstant.h
tpa50o/isoneoffset.h
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tpa50o/ispquerynostop.h
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tpa50o/kstr2tok_and_val.h
tpa50o/leachrate.h
tpa50o/lhsnew.h
tpa50o/ljs.h
tpa50o/ljs2.h
tpa50o/locadd_vector.h
tpa50o/maplist.h
tpa50o/maptimeofevent.h
tpa50o/mget_from_name.h
tpa50o/newlhssm.h
tpa50o/newmvdb.h
tpa50o/newrealization.h
tpa50o/newspdb.h
tpa50o/nextline.h
tpa50o/opnfil.h
tpa50o/peakfinder.h
tpa50o/prenefmks.h
tpa50o/printfun.h
tpa50o/printtimesvalue.h
tpa50o/printtitlesmv.h
tpa50o/printtitlesp.h
tpa50o/printvaluesmv.h
tpa50o/printvaluesp.h
tpa50o/putfailwp.h

tpa50o/putgwtt.h
tpa50o/ran1.h
tpa50o/ran1seis.h
tpa50o/raneseis.h
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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/addusersupplieddiscrete.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/findpkmdose.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/ichckforduplicates.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/printtitlesp.t
tpa50o/printvaluesmv.t
tpa50o/printvaluesp.t
tpa50o/putfailwp.t
tpa50o/putgwtt.t
tpa50o/querystop.t
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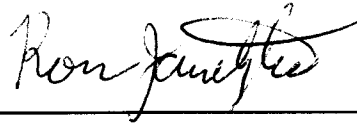
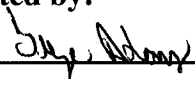

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SOFTWARE CHANGE REPORT (SCR)

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, nfenw.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 	
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	

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 writepaccdf, 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.

Three 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`.

MECHFFAIL.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 `wrikeepacdf` 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[]`.

RELEASESET.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 MECHFALL standalone module with hand calculated values.

System Level Tests:

1. Verify that the MECHFALL 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 MECHFALL, 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 MECHFALL, 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_FI_PreTemperaturePeak[mol/L]	{constant, 1.0E-5}
Indrift_FI_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.

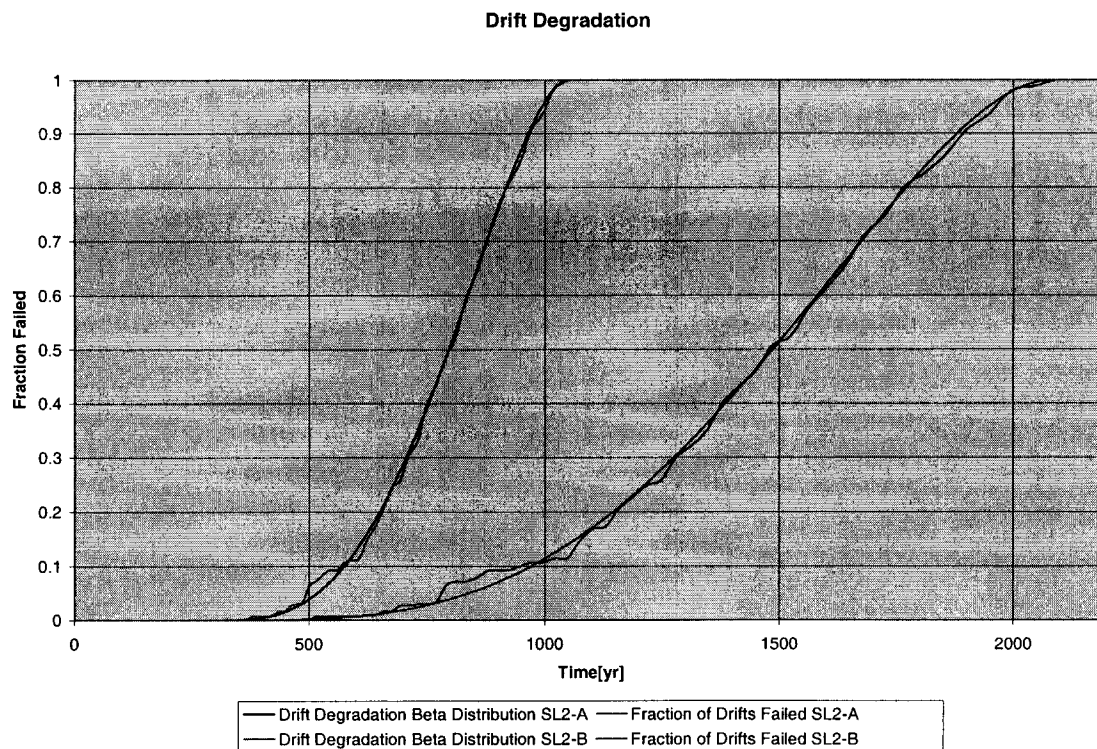
9.3 Criterion 2: Verify that the drift failure fraction distribution approximates the shifted drift degradation beta distributions for Test Cases A and B.

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_FI_PreTemperaturePeak[mol/L]	{constant, 0.52}
Indrift_FI_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 WeldAdvectionFraction[] 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 WeldAdvectionFraction[] 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, criticalrelativehumidityaqueous 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, criticalrelativehumidityaqueous 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, criticalrelativehumidityaqueous 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: O. Povetko Date: 4-3-03	Change Authorized by (Software Developer): R. Janetzke Date: 5-16-03 <i>R. Janetzke</i>	
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: R. Janetzke <i>R. Janetzke</i>	Date: 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: <i>G. Adams</i> G. Adams and B. Winfrey <i>B. Winfrey</i>	Date: 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: nefiuz.cum, nefiisz.cum, nefiuz.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 nefiuz.out to nefiisz.out. Compare file nefiuz.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 nefiuz.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 nefiuz.cum, nefiuz.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 nefiuz.cum and nefiisz.cum files.

The file, nefiisz.cum is similar in format and organization to nefiuz.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

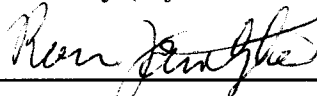
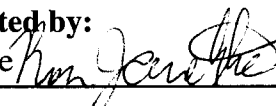

Values from nefiisz.cum:

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: J. Winterle Date: 5-8-03	Change Authorized by (Software Developer): 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: R. Janetzke 	Date: 5-29-03	
Description of Acceptance Tests: Perform a code review of file <i>strmtube.dat</i> to verify modifications were implemented. Review output file <i>gwttuzsz.res</i> 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: B. Winfrey 	Date: 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
<p>Affected Software Module(s), Description of Problem(s): <i>releaset.f, seismo2.f, tpa.inp, repdes.dat, exec.f, and drythick.dat, dcagw.f.</i></p> <p>The file <i>trelease.out</i> contains non-zero release values when the flow values in <i>ebsflo.dat</i> are all 0.0. Invalid input integers are not error checked in the BuildCharacterString subroutine.</p> <p>The availability of the pluvial dilution model switch in <i>tpa.inp</i> is inconsistent with the <i>dcagw.f</i> code.</p> <p>The cleanupwd subroutine in <i>exec.f</i> does not remove all of the *.res files.</p>		
Change Requested by: G. Wittmeyer/P. LaPlante Date: 6-6-03	Change Authorized by (Software Developer): R. Janetzke Date: 6-6-03 <i>R. Janetzke</i>	
<p>Description of Change(s) or Problem Resolution (If changes not implemented, please justify):</p> <p>See attachment 1.</p>		
Implemented by: R. Janetzke <i>R. Janetzke</i>	Date: 6-13-03	
<p>Description of Acceptance Tests:</p> <p>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 <i>dcagw.f</i> code file and the data files (<i>tpa.inp</i>, <i>repdes.dat</i>, and <i>drythick.dat</i>) modified under this scr contain the correct information and ii) the <i>releaset</i> code no longer generates release values when the flow values in <i>ebsflo.dat</i> are all zero. The system level tests are designed to verify that i) subroutine <i>buildCharacterString</i> performs error checking and ii) subroutine <i>cleanupwd</i> removes the required files.</p> <p>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."</p>		
Tested by: G. Adams <i>G. Adams</i>	Date: 7-21-03	

Attachment 1

Description of Change(s) or Problem Resolution

reaset.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

2.31020000000000	0.	0
4.67440000000000	0.	0
7.09400000000000	0.	0
9.57020000000000	0.	0
12.10440000000000	0.	0
14.69800000000000	0.	0
17.35220000000000	0.	0
20.06860000000000	0.	0
22.84860000000000	3.9604033234528D-10	0
25.69370000000000	1.6185206790719D-09	0
28.60540000000000	3.7051150618061D-09	0
31.58520000000000	6.6671351285098D-09	0
34.63490000000000	1.0508266724108D-08	0
37.75590000000000	1.5227332673812D-08	0
40.94990000000000	2.0821680586296D-08	0
44.21880000000000	2.7288934887831D-08	0
47.56420000000000	3.4626899502100D-08	0
50.98790000000000	4.2833539906651D-08	0
54.49170000000000	5.9296157839786D-08	0
58.07760000000000	9.0337159455967D-08	0
61.74740000000000	1.3856802473871D-07	0
65.50320000000000	2.0734051825555D-07	0

~~~~~

NB94

|                  |    |   |
|------------------|----|---|
| 2.31020000000000 | 0. | 0 |
|------------------|----|---|

|                  |                     |   |
|------------------|---------------------|---|
| 4.6744000000000  | 0.                  | 0 |
| 7.0940000000000  | 0.                  | 0 |
| 9.5702000000000  | 0.                  | 0 |
| 12.1044000000000 | 0.                  | 0 |
| 14.6980000000000 | 0.                  | 0 |
| 17.3522000000000 | 0.                  | 0 |
| 20.0686000000000 | 0.                  | 0 |
| 22.8486000000000 | 4.4266915514280D-09 | 0 |
| 25.6937000000000 | 1.5575946470412D-08 | 0 |
| 28.6054000000000 | 2.7149568694617D-08 | 0 |
| 31.5852000000000 | 3.8849049072873D-08 | 0 |
| 34.6349000000000 | 5.0652225036289D-08 | 0 |
| 37.7559000000000 | 6.2544999214870D-08 | 0 |
| 40.9499000000000 | 7.4520614638749D-08 | 0 |
| 44.2188000000000 | 8.6577200661848D-08 | 0 |
| 47.5642000000000 | 9.8714417688311D-08 | 0 |
| 50.9879000000000 | 1.1093250451358D-07 | 0 |
| 54.4917000000000 | 1.3130276056957D-07 | 0 |
| 58.0776000000000 | 1.5914153518416D-07 | 0 |
| 61.7474000000000 | 1.8991196529815D-07 | 0 |
| 65.5032000000000 | 2.2273496407665D-07 | 0 |
| 69.3469000000000 | 2.5725483173376D-07 | 0 |
| 73.2805000000000 | 2.9321123358647D-07 | 0 |
| 77.3063000000000 | 3.3039078017108D-07 | 0 |
| 81.4263000000000 | 3.6863300512267D-07 | 0 |
| 85.6428000000000 | 4.0781367839124D-07 | 0 |
| 89.9579000000000 | 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 |
| 12.1044000000000 | 0. | 0 |
| 14.6980000000000 | 0. | 0 |
| 17.3522000000000 | 0. | 0 |
| 20.0686000000000 | 0. | 0 |
| 22.8486000000000 | 0. | 0 |
| 25.6937000000000 | 0. | 0 |
| 28.6054000000000 | 0. | 0 |
| 31.5852000000000 | 0. | 0 |
| 34.6349000000000 | 0. | 0 |
| 37.7559000000000 | 0. | 0 |
| 40.9499000000000 | 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

2.310200000000	0.	0
4.674400000000	0.	0
7.094000000000	0.	0
9.570200000000	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, gscddf.res, gscddf_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    gwttuusz.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: gwttuusz.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:

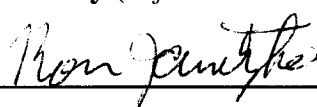
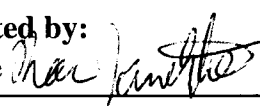

```
-----
      subarea   1 of 10           realization   1 of 1
-----

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
<p>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.</p> <p>D. Pickett 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.</p>		
Change Requested by: D. Pickett Date: 5-23-03	Change Authorized by (Software Developer): R. Janetzke Date: 5-23-03 	
<p>Description of Change(s) or Problem Resolution (<i>If changes not implemented, please justify</i>): 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 <i>tpa.inp</i> as specification for the order of nuclides in all data files. The file <i>szft.rlt</i> was also modified to list colloids separate from solute nuclides.</p>		
Implemented by: R. Janetzke 	Date: 6-03-03	
<p>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:</p> <ol style="list-style-type: none"> 1. Verify the colloid release factors by identifying an isotope and hand-calculating the colloid release with the factor identified in <i>tpa.inp</i>. 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 <i>tpa.inp</i> 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 <i>szft.rlt</i> 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 <i>tpa.inp</i>. <p>All test cases PASSED.</p>		
Tested by: A. Jank 	Date: 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 nefiuz.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 nefiuz.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:

$$\begin{aligned} \text{Activity}(\text{Jc245}(\text{time})) = & \\ \text{Activity}(\text{Cm245}(\text{time})) \times & \text{ColloidReleaseFactor_Jc245} \times \\ (1 - \text{PermanentLossColloidFilterFactor_}\#1) \times \dots \times & \\ (1 - \text{PermanentLossColloidFilterFactor_}\#n) - & \\ \text{Activity}(\text{Cm245}(\text{time})) \times \text{fracturefraction}(\text{time}) & \end{aligned}$$

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 nefiuz.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 declared 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

C136

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): <i>tpa.inp</i> , Update saturated zone parameter distributions in the TPA input file with new values from J. Winterle.		
Change Requested by: J. Winterle Date: 6-16-03	Change Authorized by (Software Developer): R. Janetzke Date: 6-16-03 <i>Ron Janetzke</i>	
Description of Change(s) or Problem Resolution (If changes not implemented, please justify): change <i>tpa.inp</i> 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: R. Janetzke <i>Ron Janetzke</i>	Date: 6-21-03	
Description of Acceptance Tests: Perform a code review of the <i>tpa.inp</i> 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: Brandi L. Winfrey <i>Brandi L. Winfrey</i>	Date: 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 TCO₄⁻ ion in saturated Tuff (Triay et al., 1997). This value is thought to be conservative because the TCO₄⁻ 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 TCO₄⁻. 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

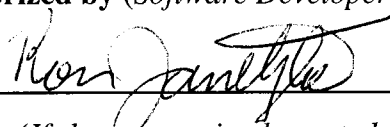


Basis: Modeling by Winterle (2003) suggests that groundwater fluxes and travel times in the saturated zone would not change significantly in the event of a regional water table rise and increased recharge. Additionally, the base case strmtube.dat file for TPA 5.0 is already based on a potential wetter 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): <i>uzft.f</i> The UZ fracture flow and transport model abstraction is excessively conservative by initiating fracture flow for all layers whenever the infiltration is greater than the minimum matrix permeability (or conductivity) for all units.		
Change Requested by: G. Wittmeyer Date: 6-20-03	Change Authorized by (Software Developer): 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 <i>uzft.f</i> 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, <i>nefti.inp</i> .		
Implemented by: R. Janetzke 	Date: 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: A. Jank 	Date: 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 *prenefnks* 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.
    toteffcomplfc = 1.0
    do ilayer = 1, NLYERU
        if (lmedia(ilayer).eq. 1) then
            toteffcomplfc = toteffcomplfc * (1.0d0 - flfc(ilayer))
        print *, 'layer = ', ilayer
        print *, 'flfc = ', flfc(ilayer)
        print *, 'toteffcomplfc = ', toteffcomplfc
    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:

$$\text{Activity}(\text{Jc245}(\text{time})) = \text{Activity}(\text{Cm245}(\text{time})) \times \text{ColloidReleaseFactor_Jc245} \times$$

(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 attributed 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 matrix 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=ebfilt,1=bypass-ebfilt)	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.

$$\text{Activity}(\text{Jc245}(\text{time})) = \text{Activity}(\text{Cm245}(\text{time})) \times \text{colloidReleaseFactor_Jc245} \times (1 - \text{PermanentLossColloidFilterFactor_}\#1) \times \dots \times (1 - \text{PermanentLossColloidFilterFactor_}\#n)$$

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.

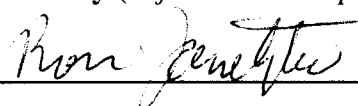
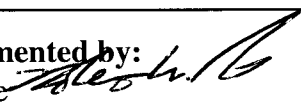
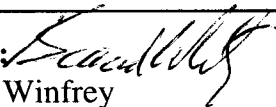
The test spreadsheet calculations for Jc245 and Ja241 came within 0.01% of the value for all time steps and each infiltration rate. For the infiltration rate of 0.1 mm/yr, no release occurred from the unsaturated zone, however, the diagnostic code revealed that four layers were affected by the flow. 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): <i>SIZES.INC</i> Part 1: Nefmks does not accept chains with 7 members. The Cm246 chain can be fully declared with 7 members.		
Change Requested by: C. Scherer Date: 6-23-03	Change Authorized by (Software Developer): R. Janetzke Date: 6-23-03 <i>Ron Janetzke</i>	
Description of Change(s) or Problem Resolution (If changes not implemented, please justify): The MXMEM parameter was changed from 6 to 7 in the <i>SIZES.INC</i> file in the codes directory.		
Implemented by: R. Janetzke, <i>Ron Janetzke</i>	Date: 6-24-03	
Description of Acceptance Tests: Perform a code inspection of the <i>SIZES.INC</i> 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: B. Winfrey <i>B. Winfrey</i>	Date: 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): <i>reader.f</i> Automated validation tests are inconvenienced by numerous STOP statements in the error checking section of <i>reader.f</i> .		
Change Requested by: R. Rice Date: 6-25-03	Change Authorized by (Software Developer): 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: R. Rice 	Date: 6-25-03	
Description of Acceptance Tests: Verify that subroutine querystop() has been added to the file <i>reader.f</i> 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 <i>querystop.t</i> 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:  Brandi L. Winfrey	Date: 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

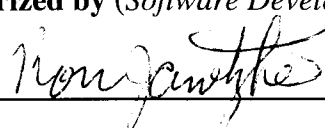
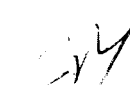
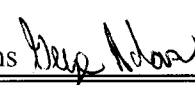
cccccc
c
c      GLOSSARY
c
c      iset = integer, set equal to 1 for testing (i.e., no
stopping)
c
cccccc

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): dsfai1t.f, dsfail.f, dsfai1t.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.

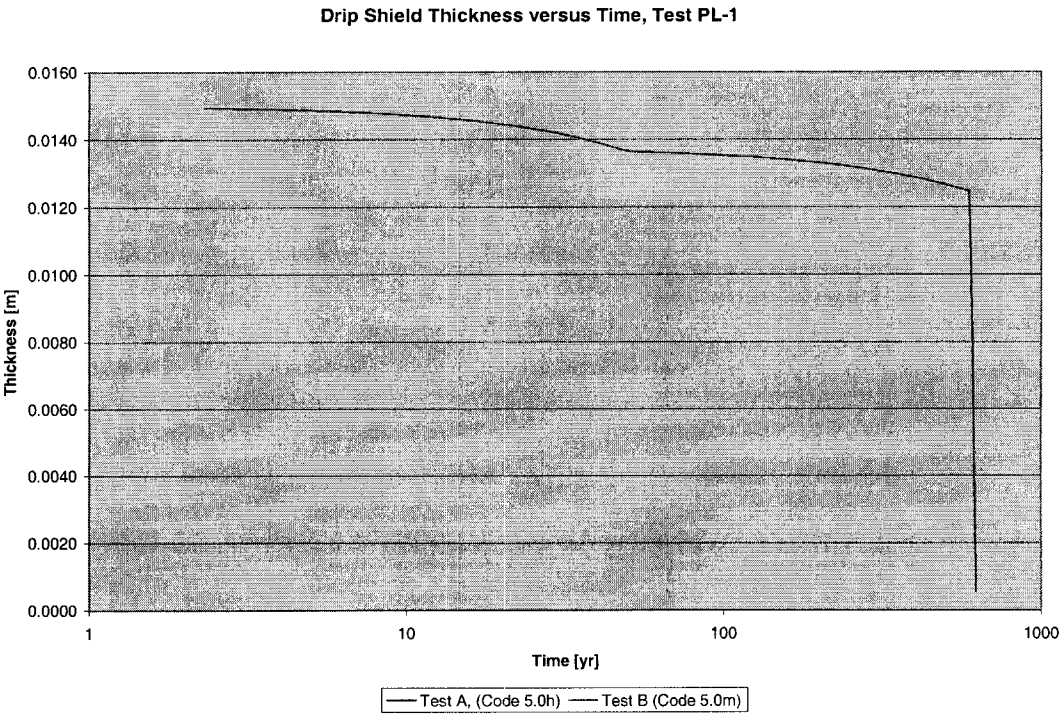
9.3 Overall Test Status:

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

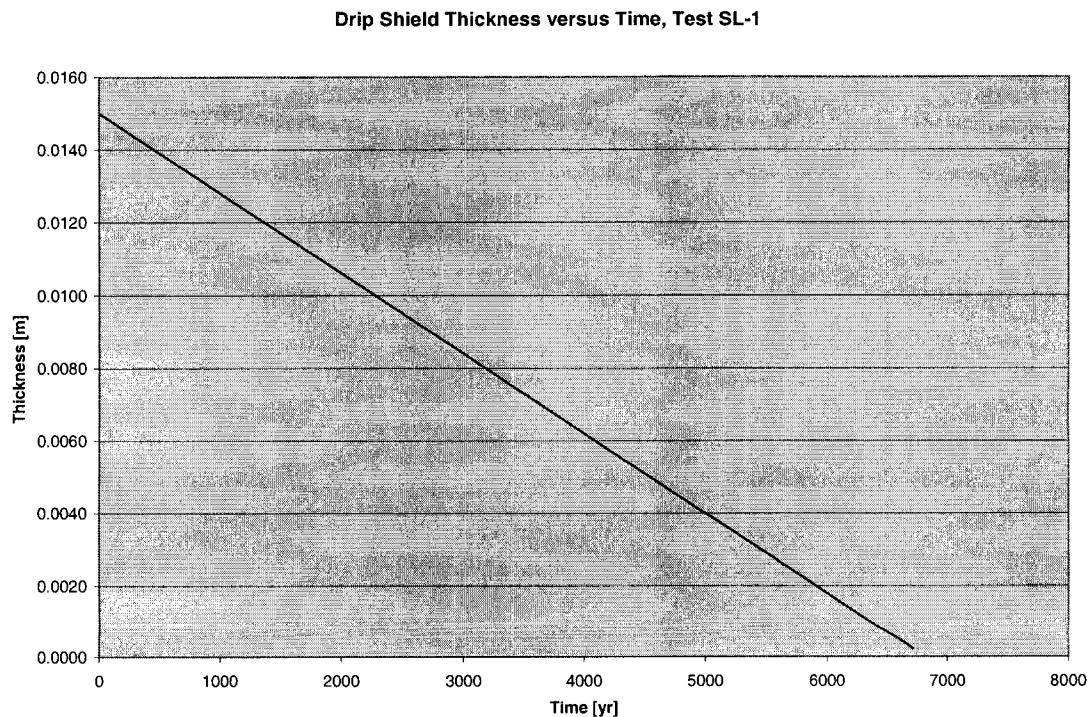
9.1 Output and Supporting Files: All files are archived to a CD labeled, "Test Plan and Test Results for TPA SCR #457."

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 $2.2\text{e-}6$ 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 versus 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

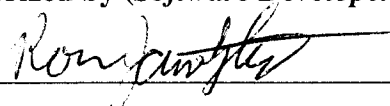

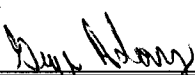
Time [yr]	Thickness [m]	Calculated Thickness [m]	Difference
1.08E+03	1.263500E-02	1.263478E-02	2.200000E-07
1.10E+03	1.257400E-02	1.257428E-02	-2.800000E-07
1.13E+03	1.251200E-02	1.251246E-02	-4.600000E-07
1.16E+03	1.244900E-02	1.244910E-02	-1.000000E-07
1.19E+03	1.238400E-02	1.238420E-02	-2.000000E-07
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, ial.i Error checking will be added to <i>iareader.f</i> to test for the following conditions: <ul style="list-style-type: none"> • 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  Description of Acceptance Tests: See Attachment 2.	Date: 6-30-03	
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 iafire, 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 iafire, 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 'ial.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
cc      call nextline (iaunit, clineid, cparamvalue, dparamvalue)
cc      if (lend) return
cc
cc      Test for keyword.
cc
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
c      if (clineid .eq. 'SUBSYSTEM') then
c      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 'ial.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
cc      call nextline (iaunit, clineid, cparamvalue, dparamvalue)
cc      if (lend) return
cc
cc      Test for keyword.
cc
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
c      call checkforduplicate( cparametername, numparams, maxparams,
        &      cparamvalue, lduplicate)
c      call checkforduplicate( cparamvalue, lduplicate)
c      if (lduplicate) then
c      print *, ''
c      print *, ' ***>>> Error in file ia.dat <<<*** '
c      print *, 'Parameter '//cparamvalue// ' already defined.'
c      stop
c      end if
cc      Save data and advance to next level of membership hierarchy.
cc      numparams= numparams + 1
cc      cparametername(numparams) = cparamvalue
c blw 6/30/03 - save the current clineid for comparison with the next
c      line in iacomponent
c      oldclineid = clineid
c      call iavalue(iaunit)
c      go to 100
c      else
c      if (clineid .eq. 'SUBSYSTEM' .or.
c blw 6/30/03 -
c      &      clineid .eq. 'BARRIER' .or.
c      &      clineid .eq. 'COMPONENT') then
c      return
c      &      clineid .eq. 'BARRIER') then
c      return
c      end if
c      if (clineid .eq. 'COMPONENT') then
c      if (oldclineid .eq. 'COMPONENT') then
c      print *, ''
c      print *, ' ***>>> Error in file ia.dat <<<*** '
c      print *, 'Expecting parameter line and found ' //
        &      clineid // ' line at line number', ilinenum
c      stop
c      else
c      return
c      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=====
c      subroutine checkforduplicate( cnamearray, index, maxsize,
c      &                           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
c      implicit double precision (a-h,o-z)
c blw 6/30/03 commented out, values now passed in as parameters
c      include 'ial.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
c              do i=1,index
c                  if (cparamvalue .eq. cnamearray(i) ) then
c                      lduplicate = .true.
c                      return
c                  end if
c              end do
c          return
c      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
<p>Affected Software Module(s), Description of Problem(s): <i>ebsfilt.f</i></p> <p>The dti variable in the ebsfilt module can be negative when both tlow and thigh are negative.</p>		
Change Requested by: G. Wittmeyer Date: 7-1-03	Change Authorized by (Software Developer): Ron Janetzke Date: 7-1-03 <i>Ron Janetzke</i>	
<p>Description of Change(s) or Problem Resolution <i>(If changes not implemented, please justify):</i></p> <p>A lower bound for thigh was established by limiting its lowest value to tlow.</p>		
<p>Which test files require modification to accommodate this change?</p> <p>None.</p>		
Implemented by: R. Janetzke <i>Ron Janetzke</i>	Date: 7-1-03	
<p>Description of Acceptance Tests:</p> <p>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.</p> <p>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."</p>		
Tested by: G. Adams <i>G. Adams</i>	Date: 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 ksats 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 0.300000000000000
1.20000000000000D-02 0.750000000000000 4.40000000000000D-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:      230.040000000000 tlow(after correction):    36.321357318521
    thigh(after correction):    137.76716207224 dti:    1.0144580475372
time:      237.740000000000 tlow(before correction):    44.021357318521
    thigh(before correction):    145.46716207224
time:      237.740000000000 tlow(after correction):    44.021357318521
    thigh(after correction):    145.46716207224 dti:    1.0144580475372
time:      245.620000000000 tlow(before correction):    51.901357318521
    thigh(before correction):    153.34716207224
time:      245.620000000000 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: 20-06002-01-113
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 <i>resuspendablefraction</i> 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 <i>amassash(t)</i> that used a dilution factor for ash removal processes from the RMEI location, and (iii) values for <i>amassash</i> and <i>amassashredt</i> 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 <i>Non-jan 1/03</i>	
7. Description of Change(s) or Problem Resolution (If changes not implemented, please justify): (i) Change spelling of <i>longrangedePrate</i> to <i>longrangedeprate</i> (2 occurrences) and change declaration of <i>longrangedeprate</i> from integer to double precision. (ii) Modify equation for <i>term5</i> 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: $\text{term5} = (-\text{erosratediswind} * \text{dilwinddis} - \text{erosratedisfl} * \text{dilflldis})$ $\& \quad * (\text{time}(\text{itoe} + i) - \text{time}(\text{itoe})) + \text{amassash}(\text{itoe})$ New: $\text{term5} = (-\text{erosratediswind} - \text{erosratedisfl})$ $\& \quad * (\text{time}(\text{itoe} + i) - \text{time}(\text{itoe})) + \text{amassash}(\text{itoe})$ (iii) Add if-then routines to reassign values for <i>amassash</i> and <i>amassashredt</i> to zero if the calculated value is less than or equal to zero. (iv) Move the following commands to just precede calculation for <i>dladd(itoe+i,m)</i> to improve computational efficiency. Currently, the nonradionuclide-specific calculations for <i>bterm1</i> , <i>bterm2</i> , <i>bterm3</i> , <i>bterm4</i> , <i>bterm5</i> , and <i>amassasht</i> are unnecessarily repeated in the radionuclide-specific do loop. $\text{do m}=1,43$ $\text{decision}=\text{sol}(\text{m}) * (\text{precip} * (1.\text{d0} - \text{fpe}) * \text{fpsat} +$ $\& \quad \text{dirr} * (1.\text{d0} - \text{fie}) * \text{fisat})$		
8. Implemented by: <i>Michael A. Smith</i> M. Smith	Date: <i>7/28/2003</i>	
9. Description of Acceptance Tests: 1. Verify that the modifications to the ASHRMOVO module produces the desired results in the <i>amassash</i> , <i>amassassredt</i> and <i>term5</i> variables. 2. Verify that the modifications to the ASHRMOVO module produces the desired results in the <i>resuspendablefraction</i> 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: <i>Andrew C. Jahn</i> 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:

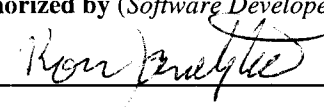
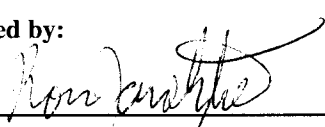

Reference file PA-SCR-460_SL2.xls for the output data and associated plots.

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): <i>volcano.f</i> The volcano module does not produce a constant number of WP failed in-drift, for the non-extrusive case, when the parameter in <i>tpa.inp</i> 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: <pre> < cc rwj 7-5-03; SCR461 < c wpentrained = valuesp(iwentrained) < if(pext .le. fext) then < lExtrusive = .TRUE. < else < lExtrusive = .FALSE. < end if < < if (lExtrusive) then < wpentrained = valuesp(iwentrained) < else < wpentrained = 0.0d0 < end if < cc end of change for SCR461 </pre>		
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 <i>tpa.inp</i> 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 <i>wpsfail.res</i> should equal the constant value assigned to the parameter NumberOfWPsEntrainedByEjecta[] in <i>tpa.inp</i> , 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 <i>Ron Janetzke</i> Date: 7-8-03	
Description of Change(s) or Problem Resolution <i>(If changes not implemented, please justify):</i> The CNSF distribution was applied to the ReferencepH parameter, and the Codisposal distribution was applied to the pHForGlassModel[] parameter in <i>tpa.inp</i> .		
Which test files require modification to accommodate this change? None		
Implemented by: R. Janetzke <i>Ron Janetzke</i>	Date: 7-9-03	
Description of Acceptance Tests: Perform a visual inspection of file <i>tpa.inp</i> to ensure that modifications were accomplished.		
Tested by: <i>Brandi L. Winfrey</i> Brandi L. Winfrey		
Date: 7-24-2003		

SOFTWARE CHANGE REPORT (SCR)

SCR No. (Software Developer Assigns): PA-SCR-464	Software Title and Version: TPA 5.01	/Project No: 20-06002-01.113
Affected Software Module(s), Description of Problem(s): <i>mechfail.f, itym.dat</i> <i>itym.dat:</i> typographical error, added clarifying comments <i>mechfail.f:</i> drift height could exceed the maximum drift failure height during seismic activity		
Change Requested by: G. Adams Date: 7-14-03	Change Authorized by (Software Developer): R. Janetzke Date: 7-14-03 <i>Ron Janetzke</i>	
Description of Change(s) or Problem Resolution (If changes not implemented, please justify): <i>itym.dat:</i> Corrected a typographical error (line 24 Modified Atothoff96 to Stothoff96), added comments at lines 306 and 762 <i>mechfail.f:</i> 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: G. Adams <i>G. Adams</i>	Date: 7-15-03	
Description of Acceptance Tests: See attachment.		
Tested by: R. Janetzke <i>Ron Janetzke</i>	Date: 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

Baseline 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 MECHFALL 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 *../zportunix.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 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

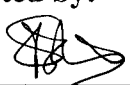


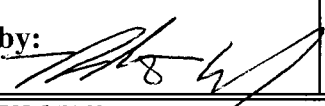
9.1 Output and Supporting Files: All files are archived to a CD labeled "Test Results for SCR 464"

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): <i>releaset.f</i> <p>There are 3 problems that have been identified: (1) the <i>releaset.f</i> 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.</p>		
Change Requested by: S. Mohanty  Date: 7-25-03	Change Authorized by (Software Developer): R. Janetzke  Date: 7-25-03	
Description of Change(s) or Problem Resolution <i>(If changes not implemented, please justify):</i> <p>The 3 problems identified above are resolved by making the following <i>releaset.f</i> source code modifications.</p> <p>(1) Use the initial (i.e., $t = 0$ yr) waste mass from the <i>releaset.f</i> input file <i>ebsrel.inp</i> (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).</p> <p>(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.</p> <p>(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.</p>		
Which test files require modification to accommodate this change? None.		
Implemented by:  S. Mohanty	Date: 7-25-03	
Description of Acceptance Tests: <p>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.</p>		
Tested by:  R. Rice	Date: <i>7/26/03</i> 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*/reaset

<<Test Version Results Directory TPA>> = /sscr1/rrice/tpa50n/IModel*/reaset

(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/reaset/sa_wet_bathtub;

/sscr1/rrice/tpa50m/IModel4/reaset/sa_wet_bathtub/xfrac;

/sscr1/rrice/tpa50m/IModel4/reaset/sa_wet_flow_thru;

and /sscr1/rrice/tpa50m/IModel4/reaset/sa_wet_flow_thru/xfrac

<<Test Version Results Directory TPA>> = /sscr1/rrice/tpa50n/IModel4/reaset/sa_wet_bathtub;

/sscr1/rrice/tpa50n/IModel4/reaset/sa_wet_bathtub/xfrac;

/sscr1/rrice/tpa50n/IModel4/reaset/sa_wet_flow_thru;

and /sscr1/rrice/tpa50n/Model4/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 "/sscr1/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 (2nd column) show releases that are greater than the available mass (4th column). In TPA Code Version 5.0n, the results for IModels 1 and 5 (3rd column) are equal to or less than the available mass (4th 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 Table 3.

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.

```
RELEASESET standalone results for testing the IModel 4 "xfrac" addition (use RELEASESET 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 RELEASESET 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 RELEASESET 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 RELEASESET 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	Release Rate from the RELEASET Output File <i>ebsnef.dat</i>	Equivalent RELEASET Waste Dissolution Rate Computed Using the Tc-99 Release Rate in the Previous Column	% Error Between Column 2 and Column 4 Waste Dissolution Rates
	at 1,766 yr	for Tc-99 at 1,776 yr		
	(kg/yr/WP)	(Ci of Tc-99/yr for all 35 failed WPs)	(kg/yr/WP)	
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	Release Rate from the RELEASET Output File <i>ebsnef.dat</i>	Equivalent RELEASET Waste Dissolution Rate Computed Using the Tc-99 Release Rate in the Previous Column	% Error Between Column 2 and Column 4 Waste Dissolution Rates
	at 1,766 yr	for Tc-99 at 1,776 yr		
	(kg/yr/WP)	(Ci of Tc-99/yr for all 35 failed WPs)	(kg/yr/WP)	
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%

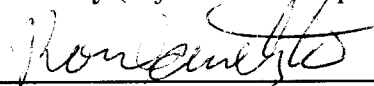
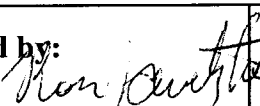
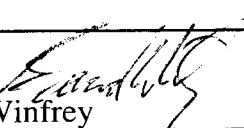
SOFTWARE CHANGE REPORT (SCR)

SCR No. 466	Software Title and Version: TPA 5.0k	Project No: 20.06002.01.012		
Affected Software Module(s), Description of Problem(s): <i>uzft.f</i> 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 <i>Ron Janetzke</i>			
Description of Change(s) or Problem Resolution <i>(If changes not implemented, please justify):</i> The following test was implemented at line 2039 in uzft.f. <pre style="margin-left: 40px;"> if (lmedia(ilayer).eq. 1 .and. & leglen(np,ilayer) .gt. 0.0d0) then toteffcompflfc = toteffcompflfc * (1.0d0 - flfc(ilayer)) end if </pre>				
Which test files require modification to accommodate this change? None				
<table style="width: 100%; border: none;"> <tr> <td style="width: 40%; border: none; vertical-align: top;"> Implemented by: R. Janetzke <i>Ron Janetzke</i> </td> <td style="width: 60%; border: none; vertical-align: top;"> Date: 7-18-03 </td> </tr> </table>			Implemented by: R. Janetzke <i>Ron Janetzke</i>	Date: 7-18-03
Implemented by: R. Janetzke <i>Ron Janetzke</i>	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 5.01	Project No: 20.06002.01.012																
<p>Affected Software Module(s), Description of Problem(s): tpa.inp</p> <p>The following is a request from O. Pensado.</p> <p>There are some parameters not quite correct in the current version of tpa.inp. These should be the updated values:</p> <table style="width: 100%; border: none;"> <tr> <td style="padding-left: 20px;">ErpInterceptWeld[mVSHE]</td> <td style="text-align: right;">1041.2</td> </tr> <tr> <td style="padding-left: 20px;">TemperatureCoefficientOfErpInterceptWeld[mVSHE/C]</td> <td style="text-align: right;">-10.0</td> </tr> <tr> <td style="padding-left: 20px;">ErpSlopeWeld[mVSHE]</td> <td style="text-align: right;">-584.2</td> </tr> <tr> <td style="padding-left: 20px;">TemperatureCoefficientOfErpSlopeWeld[mVSHE/C]</td> <td style="text-align: right;">3.7</td> </tr> <tr> <td style="padding-left: 20px;">OuterOverpackErpIntercept</td> <td style="text-align: right;">1541.2</td> </tr> <tr> <td style="padding-left: 20px;">TempCoefOfOuterPackErpIntercept</td> <td style="text-align: right;">-13.1</td> </tr> <tr> <td style="padding-left: 20px;">OuterOverpackErpSlope</td> <td style="text-align: right;">-362.7</td> </tr> <tr> <td style="padding-left: 20px;">TempCoefOfOuterPackErpSlope</td> <td style="text-align: right;">2.3</td> </tr> </table>			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
ErpInterceptWeld[mVSHE]	1041.2																	
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TempCoefOfOuterPackErpIntercept	-13.1																	
OuterOverpackErpSlope	-362.7																	
TempCoefOfOuterPackErpSlope	2.3																	
Change Requested by: O. Pensado Date: 7-15-03	Change Authorized by (Software Developer): R. Janetzk Date: 7-15-03																	
<p>Description of Change(s) or Problem Resolution <i>(If changes not implemented, please justify):</i></p> <p>TPA input file tpa.inp was changed as specified above.</p>																		
<p>Which test files require modification to accommodate this change?</p> <p>None</p>																		
<table style="width: 100%; border: none;"> <tr> <td style="width: 40%;">Implemented by:</td> <td style="width: 60%;">Date:</td> </tr> <tr> <td>R. Janetzk </td> <td>7-18-03</td> </tr> </table>			Implemented by:	Date:	R. Janetzk	7-18-03												
Implemented by:	Date:																	
R. Janetzk	7-18-03																	
<p>Description of Acceptance Tests:</p> <p>Perform a visual inspection of file tpa.inp to ensure that modifications were accomplished.</p> <p>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."</p>																		
<table style="width: 100%; border: none;"> <tr> <td style="width: 40%;">Tested by:</td> <td style="width: 60%;">Date:</td> </tr> <tr> <td>Brandi L. Winfrey </td> <td>July 24, 2003</td> </tr> </table>			Tested by:	Date:	Brandi L. Winfrey	July 24, 2003												
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: G. Adams Date: 7-16-03	Change Authorized by (Software Developer): R. Janetzke Date: 7-16-03 	
Description of Change(s) or Problem Resolution <i>(If changes not implemented, please justify):</i> Change the first x values from 547504.18 to 547514.88 for both blocks. Change the first y values from 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: R. Janetzke 		
Date: 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: Brandi L. Winfrey 	Date: 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=Subareal, 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_repdas.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 *repdas.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 5.01	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: R. Rice Date: 7-18-03	Change Authorized by (Software Developer): R. Janetzke Date: 7-18-03 <i>[Signature]</i>	
Description of Change(s) or Problem Resolution <i>(If changes not implemented, please justify):</i> The writing of the scenario failure times and number of failures in file <i>ebsrel.inp</i> 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: R. Janetzke <i>[Signature]</i>	Date: 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: R. Rice <i>[Signature]</i>	Date: 7/25/03 7-25-03	

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 *ebssrel.inp* file and those scenario WP failures are zero-ed out in the glass *ebssrel.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 *ebssrelsf.inp* and *ebssrelglass.inp* files are listed. The bold text highlights the scenario WP failures.

TPA Code Version 5.0k *ebssrelsf.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  ! dint1: wp ID, xint1: 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 ! rdif(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      ! dint1: wp ID, xint1: internal length [m]

      4.83000E+00              ! xvola: 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      ! rdif(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      ! wetfrac(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 ! dint1: wp ID, xint1: internal length [m]

4.83000E+00 ! xvola: wp internal vol[m3]

|

\Thermal data

'ebstrh.dat' ! temfil: temp. file (output from ebsspac_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  ! rdif(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 #igact	time	#corrode	#seismic	#fault
unitless unitless	yr	unitless	unitless	unitless
1 1.7000E+01	5.3077E+03	0.0000E+00	0.0000E+00	0.0000E+00
1 0.0000E+00	7.5513E+03	0.0000E+00	0.0000E+00	3.5000E+01
1 0.0000E+00	6.6700E+04	6.7910E+03	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 #igact	time	#corrode	#seismic	#fault
unitless unitless	yr	unitless	unitless	unitless
1 1.7000E+01	5.3077E+03	0.0000E+00	0.0000E+00	0.0000E+00
1 0.0000E+00	7.5513E+03	0.0000E+00	0.0000E+00	3.5000E+01
1 0.0000E+00	6.6700E+04	6.7860E+03	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).


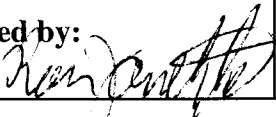
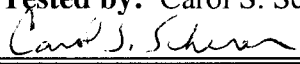
This test successfully **PASSED** the criterion above.

(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: T. McCartin Date: 7-25-03	Change Authorized by (Software Developer): 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: R. Janetzke 	Date: 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, tavwtt, 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 calculation of matrix Rd in the SZ was changed from:

$$\text{rds}(i) = 1.D0 * \text{density} * (1.D0 - \text{porosity}) * \text{kd_kas}(i)$$

to:

$$\text{rds}(i) = 1.D0 * \text{density} * (1.D0 - \text{porosity}) * \text{kd_kas}(i) / \text{porosity}$$

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**

07/30/3

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.)

$$\text{por} = (\text{mobile rd (m)} - 1) / (\text{mobile rd(n)} - 1)$$

07/30/3

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 **ImmobilePorosity_STFF** from *scr471/tpa.inp*. (Allow for rounding errors.)

$$\text{por} = (\text{immobile rd (m)} - 1) / (\text{immobile rd(n)} - 1)$$

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	addexponentialpdf.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	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	10:49	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	chlrdfm.dat
-rw-r--r--	1	cscherer	sunuser	66	Jun	21	21:05	cleanuppwd.h
-rw-r--r--	1	cscherer	sunuser	0	Jul	19	18:06	cleanuppwd.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	10:45	climatol.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
-rw-r--r--	1	cscherer	sunuser	2906	Jul	19	18:19	decay43mol.h
-rw-r--r--	1	cscherer	sunuser	0	Jul	19	18:06	decay43mol.t
-rw-r--r--	1	cscherer	sunuser	3040	Jul	19	18:19	decay43molglass.h
-rw-r--r--	1	cscherer	sunuser	0	Jul	19	18:06	decay43molglass.t
-rw-r--r--	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
-rw-r--r--	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

-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	fault.o.f
-rw-r--r--	1	cscherer	sunuser	199	Jun	28	13:41	fault.o.h
-rw-r--r--	1	cscherer	sunuser	8616	Jul	28	12:15	fault.o.o
-rw-r--r--	1	cscherer	sunuser	0	Jul	19	18:06	fault.o.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	findpkmnndose.h
-rw-r--r--	1	cscherer	sunuser	0	Jul	19	18:06	findpkmnndose.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	ful.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

-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	gwpkds.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	gwtuzsz.res
-rw-r--r--	1	cscherer	sunuser	1229	Jul	22	1999	ia.i
-rw-r--r--	1	cscherer	sunuser	956	Sep	26	2000	ial.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--r--	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	10:49	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

-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	nefi.dis
-rw-r--r--	1	cscherer	sunuser	11652	Jul 29 10:48	nefi.inp
-rw-r--r--	1	cscherer	sunuser	165301	Jul 29 10:49	nefi.out
-rw-r--r--	1	cscherer	sunuser	687	Jul 29 10:49	nefi.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	nefiuz.dis
-rw-r--r--	1	cscherer	sunuser	10432	Jul 29 10:48	nefiuz.inp
-rw-r--r--	1	cscherer	sunuser	55862	Jul 29 10:48	nefiuz.out

-rw-r--r--	1	cscherer	sunuser	208998	Jul	29	10:48	nefiuz.src
-rw-r--r--	1	cscherer	sunuser	175	Jul	29	10:48	nefiuz.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	npkdores.res
-rw-r--r--	1	cscherer	sunuser	2502	Jul	29	10:49	npkdsc.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	printtitlesp.h
-rw-r--r--	1	cscherer	sunuser	0	Jul	19	18:06	printtitlesp.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	printvaluesp.h
-rw-r--r--	1	cscherer	sunuser	0	Jul	19	18:06	printvaluesp.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

-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	ranlseis.h
-rw-r--r--	1	cscherer	sunuser	0	Jul	19	18:06	ranlseis.t1
-rw-r--r--	1	cscherer	sunuser	0	Jul	19	18:06	ranlseis.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	reaset.e
-rw-r--r--	1	cscherer	sunuser	414	Jul	29	10:48	reaset.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	sampler.a.i
-rw-r--r--	1	cscherer	sunuser	62	Aug	16	1997	sampler.b.i
-rw-r--r--	1	cscherer	sunuser	62	Aug	16	1997	sampler.c.i
-rw-r--r--	1	cscherer	sunuser	68	Aug	16	1997	sampler.d.i
-rw-r--r--	1	cscherer	sunuser	133	Aug	16	1997	sampler.e.i
-rw-r--r--	1	cscherer	sunuser	111	Aug	16	1997	sampler.f.i
-rw-r--r--	1	cscherer	sunuser	84	Aug	16	1997	sampler.g.i
-rw-r--r--	1	cscherer	sunuser	68	Aug	16	1997	sampler.h.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	samplerri.i
-rw-r--r--	1	cscherer	sunuser	336	Apr	3	1998	samplers.i
-rw-r--r--	1	cscherer	sunuser	70	Aug	16	1997	samlpert.i
-rw-r--r--	1	cscherer	sunuser	69	Aug	16	1997	sampleru.i
-rw-r--r--	1	cscherer	sunuser	62	Aug	16	1997	samlperv.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	samlpery.i
-rw-r--r--	1	cscherer	sunuser	60	Aug	16	1997	samplerz.i
-rw-r--r--	1	cscherer	sunuser	3962	Jul	29	10:44	samlpar.abb
-rw-r--r--	1	cscherer	sunuser	30632	Jul	29	10:44	samlpar.hdr
-rw-r--r--	1	cscherer	sunuser	6543	Jul	29	10:49	samlpar.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

-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

-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	zportieeee_flags.h
-rw-r--r--	1	cscherer	sunuser	0	Jul	19	18:06	zportieeee_flags.t1
-rw-r--r--	1	cscherer	sunuser	0	Jul	19	18:06	zportieeee_flags.t2
-rw-r--r--	1	cscherer	sunuser	196	Jun	29	19:55	zportieeee_handler.h
-rw-r--r--	1	cscherer	sunuser	0	Jul	19	18:06	zportieeee_handler.t1
-rw-r--r--	1	cscherer	sunuser	0	Jul	19	18:06	zportieeee_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	ORGPAP.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	acutel.f
-rw-r--r--	1	cscherer	sunuser	16188	Jul 28	12:21	acutel.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

-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	edrnnon.f
-rw-r--r--	1	cscherer	sunuser	4688	Jul 28	12:21	edrnnon.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

-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	rllibin.f
-rw-r--r--	1	cscherer	sunuser	10184	Jul 28	12:20	rllibin.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	..

```
-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 gbioacl.dat
-rw-r--r-- 1 cscherer sunuser 3383 Sep 4 2002 gdefaults.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	tefktd.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	addexponentialpdf.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	addconstantpdf.h
-rw-r--r--	1	cscherer	sunuser	0	Jul 19 18:06	addconstantpdf.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

-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	climatol.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

-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	dsfai.lt.dat
-rw-r--r--	1	cscherer	sunuser	882	Jul	29	10:40	dsfai.lt.def
-rwxr-xr-x	1	cscherer	sunuser	43912	Jul	29	10:40	dsfai.lt.e
-rw-r--r--	1	cscherer	sunuser	671	Jul	29	10:43	dsfai.lt.inp
-rw-r--r--	1	cscherer	sunuser	0	Jul	29	10:40	dsfai.lt.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	ebsrell.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

-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	fault.e
-rw-r--r--	1	cscherer	sunuser	17384	Jul	29	10:43	fault.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	findpkmdose.h
-rw-r--r--	1	cscherer	sunuser	0	Jul	19	18:06	findpkmdose.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	ful.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	gbioacl.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

-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	gwtuzsz.res
-rw-r--r--	1	cscherer	sunuser	1229	Jul	22	1999	ia.i
-rw-r--r--	1	cscherer	sunuser	956	Sep	26	2000	ial.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	invent.a.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	10:40	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

-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	nefiuiz.dis
-rw-r--r--	1	cscherer	sunuser	10432	Jul	29	10:43	nefiuiz.inp
-rw-r--r--	1	cscherer	sunuser	55862	Jul	29	10:43	nefiuiz.out
-rw-r--r--	1	cscherer	sunuser	208998	Jul	29	10:43	nefiuiz.src
-rw-r--r--	1	cscherer	sunuser	175	Jul	29	10:43	nefiuiz.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

-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	reaset.e
-rw-r--r--	1	cscherer	sunuser	414	Jul	29	10:43	reaset.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

-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	sampler.a.i
-rw-r--r--	1	cscherer	sunuser	62	Aug	16	1997	sampler.b.i
-rw-r--r--	1	cscherer	sunuser	62	Aug	16	1997	sampler.c.i
-rw-r--r--	1	cscherer	sunuser	68	Aug	16	1997	sampler.d.i
-rw-r--r--	1	cscherer	sunuser	133	Aug	16	1997	sampler.e.i
-rw-r--r--	1	cscherer	sunuser	111	Aug	16	1997	sampler.f.i
-rw-r--r--	1	cscherer	sunuser	84	Aug	16	1997	sampler.g.i
-rw-r--r--	1	cscherer	sunuser	68	Aug	16	1997	sampler.h.i
-rw-r--r--	1	cscherer	sunuser	83	Aug	16	1997	sampler.i.i
-rw-r--r--	1	cscherer	sunuser	61	Aug	16	1997	sampler.j.i
-rw-r--r--	1	cscherer	sunuser	208	Aug	16	1997	sampler.k.i
-rw-r--r--	1	cscherer	sunuser	104	Aug	16	1997	sampler.l.i
-rw-r--r--	1	cscherer	sunuser	63	Aug	16	1997	sampler.m.i
-rw-r--r--	1	cscherer	sunuser	79	Aug	16	1997	sampler.n.i
-rw-r--r--	1	cscherer	sunuser	63	Aug	16	1997	sampler.o.i
-rw-r--r--	1	cscherer	sunuser	260	Mar	14	2002	sampler.p.i
-rw-r--r--	1	cscherer	sunuser	103	Aug	16	1997	sampler.q.i
-rw-r--r--	1	cscherer	sunuser	176	Aug	16	1997	sampler.r.i
-rw-r--r--	1	cscherer	sunuser	336	Apr	3	1998	sampler.s.i
-rw-r--r--	1	cscherer	sunuser	70	Aug	16	1997	sampler.t.i
-rw-r--r--	1	cscherer	sunuser	69	Aug	16	1997	sampler.u.i
-rw-r--r--	1	cscherer	sunuser	62	Aug	16	1997	sampler.v.i
-rw-r--r--	1	cscherer	sunuser	60	Aug	16	1997	sampler.w.i
-rw-r--r--	1	cscherer	sunuser	406	Feb	22	16:36	sampler.x.i
-rw-r--r--	1	cscherer	sunuser	299	Apr	30	2001	sampler.y.i
-rw-r--r--	1	cscherer	sunuser	60	Aug	16	1997	sampler.z.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
-rwxr-xr-x	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	10:40	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_iouzfllow.h
-rw-r--r--	1	cscherer	sunuser	0	Jul	19	18:06	set_iouzfllow.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.db
-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

-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

-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

-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	reaset.e
-rw-r--r--	1	cscherer	sunuser	182376	Jun	28	13:16	reaset.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

-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	ORGPARG.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	acutel.f
-rw-r--r--	1	cscherer	sunuser	16196	Jul 29	10:37	acutel.o
-rw-r--r--	1	cscherer	sunuser	9579	Feb 11	2000	acutef.f
-rw-r--r--	1	cscherer	sunuser	11188	Jul 29	10:37	acutef.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

-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	edrnnon.f
-rw-r--r--	1	cscherer	sunuser	4696	Jul	29	10:37	edrnnon.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

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scr471/tpa50m/data:

total 7539

```

drwxr-xr-x 2 cscherer sunuser 1536 Jul 19 18:54 .

```

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	coefkdeg.dat
-rw-r--r--	1	cscherer	sunuser	6280	Jun 4	09:03	coefkdegr.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	gbioacl.dat
-rw-r--r--	1	cscherer	sunuser	3383	Sep 4	2002	gdefaults.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.db
-rw-r--r--	1	cscherer	sunuser	471041	Mar 22	2000	winddem.dat
-rw-r--r--	1	cscherer	sunuser	17410	Feb 2	2000	wpflow.def