CENTER FOR NUCLEAR WASTE REGULATORY ANALYSES

CORRECTIVE ACTION REQUEST

CAR No. _____92-1_____   Associated AR,SR,NCR NO. AR92-1 _____

PART 1: DESCRIPTION OF CONDITION ADVERSE TO QUALITY

TOP-018, Revision 1, "Configuration Management and Control of Scientific and Engineering Computer Codes," is not being fully implemented. See attached for specific deficiencies.

Initiated by: R. W. Folck   Date: 6/5/92

PART 2: PROPOSED ACTION   Responsible Element Manager: W. Patrick

a) Root Cause: *response due 7/5/92*

Inadequate training for implementation is the root cause. If during training and late implementation, deficiencies are discovered in the procedure, then the procedure will be revised.

b) Corrective Action to Preclude Recurrence:

(1) Develop a training plan and train all the staff to implementation of TOP-018.

(2) Develop a schedule for conforming to the procedure for the existing software

(3) Remedial action will be taken on the three identified deficiencies. Target Date for Completion: August 28, 1992

Response provided by: _[signature]_   Date: 6/29/92

PART 3: APPROVAL

Comments/Instructions:

Director of QA: _[signature]_   Date: 7/2/92

PART 4: VERIFICATION OF CORRECTIVE ACTION IMPLEMENTATION

SEE B. MABRITO memorandum To CAR File 92-1 describing Actions Taken by The CNWRA, dated 1/26/93.

Verified by: _[signature]_   Date: 1/26/93

CNWRA FORM QAP 14-0

CENTER FOR NUCLEAR WASTE REGULATORY ANALYSES

Attachment to CAR No. 92-1

- The CNWRA Information Processing Standard Summary Form currently in use is not the same form as specified in TOP-018. The active/inactive status blocks are omitted on the form in use.

- Copies of purchased computer codes ISM and IVM are not stored in the fire proof vault as required by TOP-018, paragraph 6.3.3(2).

- Software has been developed (e.g., Moriana, Twitch) without a Requirements Document first being developed as specified in TOP-018, paragraph 6.2(1).

CENTER FOR NUCLEAR WASTE REGULATORY ANALYSES

M E M O R A N D U M

To: Corrective Action Request (CAR) 92-1 File

From: Budhi Sagar

Subject: Extension of Due Date for Corrective Action

Date: August 27, 1992

B. Baca has reviewed TOP-018 and has determined that revision of the procedure is necessary in order to accomplish effective implementation. Due to this additional work necessary for corrective action, the due date is requested to be extended to October 31, 1992. During that period, scientific and engineering codes will continue to be controlled as with the current procedure. No adverse impact is anticipated by extending this due date.

Concurrence: _____   8/27/92
                   Director of Quality Assurance

M E M O R A N D U M

TO: Bruce Mabrito   September 29, 1992

FROM: R. G. Baca

SUBJECT: Status of TOP-018 Revision

The subject procedure for configuration management and control of scientific and engineering computer codes is presently being revised. Paul Fitzgerald, Division 05, and I are working jointly on this effort. We have completed a detailed review and critique of the TOP-018 procedure. In addition, we have reviewed similar procedures issued by Divisions 05 and 15, as well as related documentation from the DOE.

Paul and I have formulated an approach that combines software Quality Assurance (QA) and Configuration Management (CM). This approach is patterned after the one used at Idaho National Engineering Laboratories (INEL), and incorporates ideas from procedures being used here at the Institute. Some of the new additions to the procedure include:

- Definition of requirements for admission of a code to the structured software QA and CM system, i.e., specification of what constitutes a baseline code,

- Use of a single and external custodian for all codes in the system,

- Use of the software on the INEL Cray for FORTRAN interrogation and version/revision control, maintaining change history, etc., and

- CM documentation and code testing requirements.

The revised procedure will include various flow charts to facilitate training.

In addition, I have worked with Norm Eisenberg and Emily Robinson (NRC/IRM) to make use of the INEL's scientific computer applications group. Under the current arrangement, the INEL group would implement the new procedure for the codes used for Iterative PA effort, namely, the Total System Performance Assessment (TPA) code and auxiliary analysis codes. I have left the option open to include other CNWRA codes. The INEL support for the installation of the codes under a CM system would be at no cost to the Center (i.e., directly billed to NMSS). However, maintenance of the codes and CM system may require a direct subcontract with INEL.

We expect the revised procedure to be completed and distributed for review by October 12, 1992.

cc: W. Patrick
      CNWRA Directors
      CNWRA Element Managers
      PA Staff

CENTER FOR NUCLEAR WASTE REGULATORY ANALYSES

M E M O R A N D U M

November 6, 1992

TO: Corrective Action Request (CAR) 92-1 File

FROM: Budhi Sagar

SUBJECT: Extension of Due Date for Corrective Action

A Draft Revision 2 Change 0 to Technical Operating Procedure - 018 (Configuration Management and Control of Scientific and Engineering Computer Codes) was written by Robert Baca and presented for review and comment October 30, 1992. The issue of having an "outside organization," in essence, control the software codes for the Center is an element in the revised procedure and will need to be agreed to by Center management. Based upon this new ingredient in the procedure, additional meetings and approvals will be needed to finalize TOP-018, and the due date is requested to be extended to December 22, 1992. During that period, scientific and engineering codes will continue to be controlled as described in the current TOP. No adverse impact is anticipated by extending the CAR completion due date.

Concurrence: _____ 11/6/92
             Director of Quality Assurance

MEMORANDUM   December 22, 1992

To: Bruce Mabrito, Director
               Quality Assurance

From: Robert G. Baca, Manager
               Performance Assessment & Hydrologic Transport

Subject: Request for Extension on TOP-018 Correction Action Report (CAR)

I recently prepared a set of viewgraphs for use in conducting training sessions on the revised configuration management procedure, TOP-018. Because of the complexity and detailed nature of the procedure, I plan to conduct the training in two separate steps. As a first step, a training session will be given to the PA Element staff to determine the adequacy and completeness of the presentation materials. Based on the questions and comments raised in this initial "trial" session, the training material will be modified and improved. The second step will involve training of the remainder of the Center staff. This training is expected to be performed in small groups, possibly on an Element by Element basis.

Because of this two-step approach, the final dispositioning of the CAR will require additional time. Other associated causes for this delay are: (1) recent commitments to participate in the NRC/DOE Technical Exchange and ACNW meetings (Intermediate Milestone), (2) commitments to finalize the review of DOE's TSPA for the Yucca Mountain Site (Intermediate Milestone) and (3) the unavailability of Center staff during the Christmas and New Year holidays. Consequently, I am requesting a delay until January 22, 1993.

cc: W. C. Patrick
       B. Sagar

Accepted: _____ 12/23/92

CENTER FOR NUCLEAR WASTE REGULATORY ANALYSES

M E M O R A N D U M

To: CNWRA Directors, Element Managers,Wesley Patrick

From: R. Brient

Subject: Implementation of TOP-018; Code Baselining

Date: January 21, 1993

As discussed in the Management Meeting of January 18, 1993, implementation of TOP-018 can best be accomplished by developing a schedule for baselining active scientific and engineering computer codes. The first phase of developing such a schedule is to compile a list of all active and inactive codes that are subject to TOP-018 controls. The attached CNWRA Scientific/Engineering Code Configuration Status should be used as a basis for developing a current list.

The second phase of developing a schedule should be for Element Managers to identify target dates for baselining for each of the active codes and code versions within their responsibility. Target dates should be determined based on the status of the code/version (in development, in use, etc.) and the importance of the code to current tasks. The Configuration Control Board should meet to review the baselining target dates, and revise them as appropriate.

Please review the Scientific/Engineering Code Configuration Status, especially for those codes that your element has responsibility and those that your element may work with. Add (or delete) codes/versions to complete the list, indicate each code/version (of your element) as active or inactive. In addition, identify target dates for baselining each active code/version. _Please provide this information to me by February 5, 1993._ The list will be revised, and will be available for a CCB meeting to be held during the week of February 15, 1993.

RDB/

cc: Mark Muller, Div. 15
attachment

Code Name: EQ3/6   Murphy

1. Software Summary, date
      EQ3/6-90, 1/17/92
      EQ3/6-92, 6/1/92

2. Copy of Code, date
      EQ3/6-90, 1/3/91 (2) Diskettes
      EQ3/6-92, 5/29/92 (4) Diskettes

3. Documentation:
      EQ3NR User's Guide, LLNL Report UCRL-53414, 4/18/83
      Memo-Controlled Use of EQ3/6, 5/29/92
      Software Problem/Change Report 3704-SPCr-001, 6/3/92

Code Name: SUPCRT   Murphy

1. Software Summary, date
      SUPCRT92, 2/10/92

2. Copy of Code, date
      SUPCRT92 (2) Diskettes

3. Documentation:
      Publications in process.

Code Name: SEISM1   Hofmann

1. Software Summary, date
      SEISM1, 2/4/92

2. Copy of Code, date
      SEISM1 (5) Diskettes, Sun and Cray versions, Input Data on 150 MB cartridge tape

3. Documentation:
      SHC Software and Database - Draft NUREG/CR 3/91 (LLNL), Test Case: Shearon
Harris Output File (diskette)

Code Name: UDEC   Chowdhury

1. Software Summary, date
      UDEC V. ICG 1.7, 2/11/92

2. Copy of Code, date
      UDEC V. ICG 1.7

3. Documentation:
  UDEC User's Guide 4/91

Code Name: VNETPC   Chowdhury

1. Software Summary, date
  VNETPC V. 3.1, 2/11/92

2. Copy of Code, date
  VNETPC V. 3.1

3. Documentation:
  VNET Program Description/User's Guide, 2/91

Code Name: Spectrum-331   Chowdhury

1. Software Summary, date
  SPECTROM-331, 2/11/92

2. Copy of Code, date
  SPECTROM-331

3. Documentation:
  SPECTROM-331 Program Description, 11/87

Code Name: TOPAZ2D   Chowdhury

1. Software Summary, date
  TOPAZ2D, 2/11/92

2. Copy of Code, date
  TOPAZ2D

3. Documentation:
  TOPAZ2D LLNL Report UCID-20824, 7/86

Code Name: ORION   Chowdhury

1. Software Summary, date
  ORION, 2/11/92

2. Copy of Code, date
  ORION

3. Documentation:
  ORION LLNL Report UCID-19310, Rev. 2, 8/85

Code Name: MAZE

1. Software Summary, date
   MAZE, 2/11/92

2. Copy of Code, date
   MAZE

3. Documentation:
   MAZE LLNL Report UCID-19029, Rev.2, 6/83

Code Name: DYNA2D   Chowdhury

1. Software Summary, date
   DYNA2D Rev.3, 2/11/92

2. Copy of Code, date
   DYNA2D, Rev. 3

3. Documentation:
   DYNA2D LLNL Report UCID-18756, Rev. 3, 3/88

Code Name: DYNA3D   Chowdhury

1. Software Summary, date
   DYNA3D, 2/11/92

2. Copy of Code, date
   DYNA3D

3. Documentation:
   DYNA3D, LLNL REPORT UCRL-MA-107254, 5/91 (User's Manual)

Code Name: NIKE2D   Chowdhury

1. Software Summary, date
   NIKE2D, 2/11/92

2. Copy of Code, date
   NIKE2D

3. Documentation:
   NIKE2D LLNL Report UCRL-MA-105413, 4/91 (User's Manual)

Code Name: NIKE3D

<div align="right">Chowdhury</div>

1. Software Summary, date
   NIKE3D, 2/11/92

2. Copy of Code, date
   NIKE3D

3. Documentation:
   NIKE3D LLNL Report UCRL-MA-105268, 1/91

Code Name: SANGRE-P

<div align="right">Chowdhury</div>

1. Software Summary, date
   SANGRE-P, 2/11/92

2. Copy of Code, date
   SANGRE-P

3. Documentation:
   SANGRE-P LANL REPORT, 8/83

Code Name: CLIMSIM

<div align="right">Chowdhury</div>

1. Software Summary, date
   CLIMSIM V. 2.0, 2/11/92

2. Copy of Code, date
   CLIMSIM V. 2.0

3. Documentation:
   CLIMSIM User's Manual, 8/90

Code Name: Bigflow

<div align="right">Ababou</div>

Under development.

Code Name: XIMUL

<div align="right">Ababou</div>

Under development.

Code Name: VTOUGH

1. Software Summary, date
   1/10/92

2. Copy of Code, date
   VTOUGH Version 3.0, 3/11/92

3. Documentation:
   Draft LLNL Report 11/18/89 (J.J. Nitao)

Code Name: EBSPAC   Nair

Under development.

Code Name: SOTEC   Nair

Under development. Software Summary 4/20/92

Code Name: TWITCH   Nair

Under development. Software Summary 4/20/92

Code Name: MARIANA   Nair

Under development. Software Summary 4/20/92

Code Name: FACET   (Inactive)   Nair

1. Software Summary, date
   FACET, 4/20/92

2. Copy of Code, date
   Stored in CCFVAX, 8/85

3. Documentation:

Code Name: TOPAZ 3D (Inactive)   Nair

1. Software Summary, date
    TOPAZ 3D, 4/20/92 (TAURUS, FACET, and INGRID are ancillary codes for TOPAZ3D.

2. Copy of Code, date
    None

3. Documentation:
    (References)
    Fuller, G.H., "Thermal Model Comparisons and Recommendation," System Support Inc., Report to CNWRA, 9/26/1989.

    Pennick, H.G., "Evaluation of a Thermal Analysis Model for the Engineered Barrier System Performance Assessment Code," 6/28/1990.

    Shapiro, A.B., "TOPAZ3D - A three-dimensional finite element heat transfer code," Report UCID-20484, Lawrence Livermore Laboratory, 8/85.

Code Name: INGRID (Inactive)   Nair

1. Software Summary, date
    INGRID, 4/20/92

2. Copy of Code, date
    Stored in the CCFVAX.

3. Documentation:
    (References)

    Stillman, D.W., and Hallquist, J.O., "INGRID: A three-dimensional mesh generator for modeling nonlinear systems," Report UCID-20506, 7/89.

    Wayne, B.M., "INGRID: Entering Mathematical Specifications," Report UCID-21798, 7/89.

    Rainsberger, R., "INGRID - Features and Updates," Report UCID-21620, 1/88.

    Rainsberger, R., "INGRID - by Example A Pictorial Tutorial," Report UCID-21566, 11/88.

Code Name: DACRIN

Baca

`1. Software Summary
DACRIN - 3/7/91

2. Copy of Code, date
DACRIN/PABLM Transfer Package 11/15/89

3. Documentation
Program Description (Battelle Report)

Code Name: PABLM

Baca

1. Software Summary
PABLM - 3/07/91

2. Copy of Code, date
DACRIN/PABLM Transfer
Package 11/15/89
(See DACRIN package)

3. Documentation
Program Description (Battelle Report)

Code Name: TOSPAC

Baca

1. Software Summary
TOSPAC - 3/7/91

2. Copy of Code, date
TOSPAC 7" reel (12/12/89)

3. Documentation
Program Documentation (SAND85-0004 Report)

Code Name: TRUMP

Baca

1. Software Summary
TRUMP - 3/7/91

2. Copy of Code, date
TRUMP 7" Reel

3. Documentation
Program Description
Sample Problems, Trump Sample Problem Output (microfiche)

Code Name: PORFLOW

1. Software Summary
   none

2. Copy of Code, date
   PORFLOW, 2/92

3. Documentation
   none

Code Name: preFOR: A Pre-processor for Fortran Files

1. Software Summary
   None

2. Copy of Code, date
   preFOR V2.0

3. Documentation
   CNWRA Report 91-003 preFOR: A Pre-processor for Fortran Files
   Program Description

Code Name: RDFREE-A Fortran Utility

1. Software Summary
   1/8/92

2. Copy of Code, date
   RDFREE-2.0 (1 disk)

3. Documentation
   RDFREE-A Fortran Utility User's Guide(1 disk)
   Program Description

Code Name: NEFTRAN II (MKS)-2/12/91

1. Software Summary
   1/8/92

2. Copy of Code, date
   NEFTRAN (MKS) 2/12/91

3. Documentation
   Program Description
   Source Code

Code Name: NEFTRAN2   Baca

1. Software Summary
   3/10/92

2. Copy of Code, date
   NEFTRAN2 - Flowmod.SRC 2/18/92

3. Documentation
   Source Code

Code Name: C14-Gas Flow Module   Baca

1. Software Summary
   3/10/92

2. Copy of Code, date
   Gas Glow Module 2/19/92

3. Documentation
   Draft Gas Flow Module Description 2/16/92 (NRC)

Code Name: C14HA-Gas Flow Module   Baca

1. Software Summary
   5/27/92

2. Copy of Code, date
   C14HA (from Rex Wescott) 5/27/92

3. Documentation
   None

Code Name: TRUST   Baca

1. Software Summary
   None

2. Copy of Code, date
   TRUST, 10" reel

3. Documentation
   Program Description LBL 28927, Draft 4/15/90

Code Name: TPA-Total Performance Assessment Computer Code   Baca

1. Software Summary
     1/8/92

2. Copy of Code, date
     Code development in progress.

3. Documentation
     CNWRA 91-009, Total System Performance Code

Code Name: DITTY   Baca

1. Software Summary
     DITTY - 3/11/92

2. Copy of Code, date
     DITTY - 2/28/92

3. Documentation
     none

Code Name: FLOW MOD   Baca

1. Software Summary
     FLOW MOD - 4/06/92

2. Copy of Code, date
     FLOW MOD - 3/18/92

3. Documentation
     Description of NEFTRAN2 modifications, 3/18/92.

Code Name: FLOW MOD 7/92   Janetzke

1. Software Summary
     FLOW MOD - 07/13/92

2. Copy of Code, date
     FLOW MOD - 07/10/92

3. Documentation
     Test Problems

Code Name: FLOW MOD   Janetzke

1. Software Summary
     FLOW MOD - 09/25/92

2. Copy of Code, date
     FLOW MOD - 09/17/92

3. Documentation
    None.

Code Name: GWTSUB.FOR   Janetzke

1. Software Summary
    GWTSUB.FOR - 09/01/92

2. Copy of Code, date
    GWTSUB.FOR - 09/01/92

3. Documentation
    None.

Code Name: Readlhs   Janetzke

1. Software Summary
    Readlhs - 08/11/92

2. Copy of Code, date
    Readlhs - 08/10/92

3. Documentation
    Postcript Job 203 SAMLHS.PS

Code Name: TWITCH   Walton

1. Software Summary
    TWITCH - 08/10/92

2. Copy of Code, date
    TWITCH - 08/10/92

3. Documentation
    None.

Code Name: PORFLOW 1.11   Ahola

1. Software Summary
    PORFLOW 1.11 - 02/24/92

2. Copy of Code, date
    PORFLOW 1.11 - 02/24/92

3. Documentation
    None.

Code Name: BIGFLOW (provisional)   Ababou

1. Software Summary
    BIGFLOW (provisional)

2. Copy of Code, date
    BIGFLOW (provisional)

3. Documentation
    None.

Code Name: MINTEQA2/PRODEFA2   Turner

1. Software Summary
    MINTEQA2/PRODEFA2 V.3.00

2. Copy of Code, date
    MINTEQA2/PRODEFA2 Version 3.00 (1 disk)

3. Documentation
    User's Manual 8/90

Code Name: FITEQL

1. Software Summary
   FITEQL V.2 - 4/1/92

2. Copy of Code, date
   FITEQL Version 2 (1 disk)

3. Documentation
   Program Description 10/82

SEPDB VMS

Russell

1. Software Summary
   N/A - This a data base.

2. Copy of Code, date
   7-INCH REEL - SEPDB.BCK
   10-IN CH REEL - VMS Backup

3. Documentation
   N/A

Code Name: AREST

Sagar

1. Software Summary, date
   AREST - 10/21/91

2. Copy of Code, date (Name)
   AREST_QA1.bck 8/26/91 7" disk

3. Documentation:
   Model Inputs/Daily Req.
   AREST Code Output

Code Name: DCM3D

Sagar

1. Software Summary
   DCM3D - 1/17/91

2. Copy of Code, date
   None

3. Documentation
   Source Code

Code Name: MULTFRAC

Gureghian

1. Software Summary
    MULTFRAC, 1/7/92

2. Copy of Code, date
    None

3. Documentation
    CNWRA Report 91-010

Code Name: RADTRAN

La Plante

1. Software Summary
    None

2. Copy of Code, date
    None

3. Documentation
    None

Center for Nuclear Waste Regulatory Analyses

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November 25, 1992
Contract No. NRC-02-88-005
Account No. 20-5702-065

U. S. Nuclear Regulatory Commission
ATTN: Mr. Robert B. Neel
Mail Stop 4-H-3
Washington, D.C. 20555

Subject: Revision of controlled document TOP-018, Revision 2, Change 0: Procedure on Configuration Management of Engineering and Scientific Computer Codes

Dear Mr. Neel:

The subject technical operating procedure (TOP) was originally submitted as Intermediate Milestone, in FY91. The original procedure was completely rewritten in response to an internal CNWRA QA audit finding. As outlined in the FY93 OPS plan, the new procedure will be applied to the Iterative Performance Assessment system and auxiliary analyses codes.

The new procedure is being submitted to you for information purposes only and does not require approval. We are also sending a copy of the procedure to the INEL Super Computer staff that will be implementing the procedure on the INEL Cray.

If you have any questions, please call me on (210) 522-3805.

Very truly yours

Robert G. Baca, Manager
Performance Assessment & Hydrologic Transport

RGB/mag
f:Neel.ltr
cc: Distribution List

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CENTER FOR NUCLEAR WASTE REGULATORY ANALYSES

24

January 26, 1993

TO: Corrective Action Request 92-1 File

FROM: Bruce Mabrito, Director of Quality Assurance

SUBJECT: Verification of Corrective Action Implementation

REFERENCE: Technical Operating Procedure (TOP)-018 and CAR 92-1 File

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Corrective Action Request (CAR) 92-1 described the following condition adverse to quality: "TOP-018, Revision 1, 'Configuration Management and Control of Scientific and Engineering Computer Codes,' is not being fully implemented." The attachment to the CAR provided these specific deficiencies: The CNWRA Information Processing Standard Summary Form currently in use was not the same form as specified in TOP-018; the active/inactive status blocks were omitted on the form in use. Copies of purchased computer codes ISM and IVM were not stored in the fireproof vault as required by TOP-018, paragraph 6.3.3(2). Software "Mariana" and "Twitch" were developed without a Requirements Document first being presented as specified in TOP-018, paragraph 6.2(1).

The root cause of the CAR was identified as inadequate training for implementation of the procedure. During development of a training plan for TOP-018, Revision 1, it was determined that the procedure could be substantially improved and B. Sagar assigned R. Baca to review and revise the TOP (see Center memorandum of 8/27/92 from B. Sagar to CAR 92-1 file).

TOP-018 was completely rewritten and Revision 2, Change 0, was issued 11/23/92. Training to the new TOP commenced and the third training class for the "Configuration Management of Scientific and Engineering Computer Codes" procedure was accomplished January 21, 1993. Except for a few CNWRA and SwRI staff who were on travel during the three training sessions and are affected by this procedure, this completed the training required. (A follow-up TOP-018 training session for those personnel who missed the earlier training is currently being scheduled).

Implementation of the revised TOP-018 has been outlined in a January 21, 1993 memorandum from R. Brient to the CNWRA President, Directors, and Element Managers with the subject, "Implementation of TOP-018; Code Baselining." Deadlines are established for providing baseline information on each active or inactive scientific and engineering code. Also, there is a commitment to schedule a Configuration Control Board (CCB) meeting at the CNWRA during the week of February 15, 1993. Actions need to be taken at that time by the CCB to coordinate the activities of the Code Custodian, Code Developers, and Code Users in relation to TOP-018 (the full CCB responsibilities are detailed in section 5.1 of the TOP).

An independent CNWRA QA surveillance will be conducted in the month of March, 1993 to report to CNWRA Management on the extent of implementation of TOP-018.

Remedial Action in response to the specific deficiencies identified by the Internal Audit (and referenced above) are the following: 1) the Standard Summary Form has been corrected in TOP-018, Revision 2; 2) Copies of purchased codes not stored in the fireproof vault is not now a requirement under the TOP-018, Revision 2; 3) the Software Requirements Documents for "Mariana" and "Twitch" are now on file.

Based upon the actions taken to date, the objective evidence available, and the phased implementation planned, I am completing the Verification of Corrective Action Implementation section of the CAR 92-1 form.

cc: Center President
       Center Directors/EMs
       R. Brient
       J. Latz
       A. Whiting/SwRI QA
       T. Trbovich/SwRI QA
       M. Muller/Div. 15