

CENTER FOR NUCLEAR WASTE REGULATORY ANALYSES

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NONCONFORMANCE REPORT

Project No. 20-5702-723

NCR No. 94-05

PART 1: DESCRIPTION OF NONCONFORMANCE

Surveillance 43-21 identified the following document deficiencies with PORFlow code: *RS 2/9/94*

- 1. No objective evidence found in package to support software license. No license or transfer agreement found (TOP-018, para. 6.2.1).
- 2. No objective evidence was observed to indicate if any official copies of this package have been released to CNWRA (TOP-018, Appendix C and 8.1.3).
- 3. No objective evidence was observed to indicate that any of the evaluation tools (FORWARN, CRAFT, PCMETRICS) data have been reviewed by technical staff or acted upon by technical staff (TOP-018, para. 6.3.1).

Initiated by: *Sam Malambo*

Date: *2/7/94*

PART 2: PROPOSED DISPOSITION AND CORRECTIVE ACTION

Responsible: *R. Baca*  
Response due: *2/18/94*

Disposition:

*The CM paperwork has been brought into compliance.*

*RS 2/9/94*

Basis of Disposition:

*N/A*

Action to correct nonconformance:

- 1) See Attached
- 2) See Attached software release notes
- 3) Evaluation of PORFlow has been reviewed and signed by Principal Investigator

Target date for completion: *2/14/94*

Proposed by: *Mitchel Abola*

Date: *2/9/94*

PART 3: APPROVAL

Element Manager: *R. Baca*

Date: *2/15/94*

Director of QA: *Sam Malambo*

Date: *2/15/94*

Comments/Instructions:

PART 4: CLOSE OUT

Comments: *Document to address the 3 discrepant items is attached to this NCR*

Verified by: *Labant*

Date: *2/2/94*

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# CENTER FOR NUCLEAR WASTE REGULATORY ANALYSES QUALITY ASSURANCE SURVEILLANCE REPORT

PROJECT NO.: 20-5702-723

REPORT NO.: 93-21

PAGE 1 OF 1

REFERENCE DOCUMENTS: TOP-18, Rev 3, Chg 2.

STARTING DATE: 12-6-93

ENDING DATE: 12-10-93

QA REPRESENTATIVE: R. Mielke

PERSONS CONDUCTING TEST/EXAM/ACTIVITY: R. Mielke

SATISFACTORY FINDINGS: CNWRA File #Q19931105001 was reviewed to determine the level of conformance to TOP-18. Objective evidence exists to support the requirements for user and technical documentation. Objective evidence was found to show that the Software Summary Form is in use for this package. The software is in an approved language. The backup files for the package are stored in an acceptable format and media. Objective evidence was observed to indicate procedure-required software tool application did take place.

UNSATISFACTORY FINDINGS: 1. No objective evidence found in package to support software license. No license or transfer agreement found (TOP-018, para. 6.2.1).  
2. No objective evidence was observed to indicate if any official copies of this package have been released to CNWRA (TOP-018, Appendix C and 8.1.3).  
3. No objective evidence was observed to indicate that any of the evaluation tools (FORWARN, CRAFT, PCMETRICS) data have been reviewed by technical staff or acted upon by technical staff (TOP-018, para. 6.3.1).

NONCONFORMANCE REPORT NO.: 94-05

ATTACHMENTS: None

RECOMMENDATIONS/ACTIONS: TOP-18 does not require CNWRA to address any issue raised by the software tool analysis. This is a shortcoming of the procedure. TOP-18 should provide limits for McCabe and Halstead numbers and should state minimum level of testing coverage. Analysis showed that there were two issues concerning this code. 1. Use of undeclared variables. 2. Use of an assumed size internal array. Both of these can cause the program to execute in unforeseen ways and should be corrected.

APPROVED:

  
CENTER DIRECTOR OF QUALITY ASSURANCE

DATE:

2/7/94

DISTRIBUTION:

ORIGINAL - CENTER QA DIRECTOR - Bruce Mabrito  
ORIGINATOR - RWM/TCT  
Principle Engineer/Scientist - M. Ahola  
Element Manager - A. Chowdhury  
B. Sagar, B. Baca, R. Johnson

THIS OUTPUT IS PRODUCED BY THE COMPUTATIONAL MODEL

----- P O R F L O - 3 -----

FOR TRANSIENT OR STEADY STATE ANALYSIS  
OF FLOW, HEAT AND MASS TRANSPORT  
IN VARIABLY SATURATED POROUS OR FRACTURED MEDIA

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OR 509-376-8080 USA

VERSION 1.2 DATED: 12 AUG 1992

DATE OF RUN: 8/12/1992 - TIME OF RUN: 15:57:55

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RECORD OF INPUT DATA STREAM

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** RECORD NO. 1 KEYWORD ***** TITLE EXAMPLE 1 - VERTICAL INFILTRATION WITH RAINFALL
** RECORD NO. 2 COMMENT ***** /
** RECORD NO. 3 KEYWORD ***** GRID 3 BY 3 BY 16 $ 144 nodes
** RECORD NO. 4 COMMENT ***** /
** RECORD NO. 5 KEYWORD ***** SCREEN ECHO
** RECORD NO. 6 COMMENT ***** /
** RECORD NO. 7 KEYWORD ***** Z ROOF 3: MIN=-30, MAX=0
** RECORD NO. 8 COMMENT ***** /
** RECORD NO. 9 KEYWORD ***** ROCK DENSITY 1, POROSITY = 0.52
** RECORD NO. 10 KEYWORD ***** HYDRAULIC PROPS SS = 0.05, (KX, KY, KZ) --> 3*3.125
** RECORD NO. 11 KEYWORD ***** PROPERTIES FOR P AT CELL FACES: GEOMETRIC
** RECORD NO. 12 COMMENT ***** /
** RECORD NO. 13 KEYWRO ***** UNSATURATED FLOW CHARACTERISTICS: COREY 6 BROOKS
** RECORD NO. 14 KEYWRO ***** CHARACTERISTIC: HREF=5.4, LAMDA=0.2
** RECORD NO. 15 KEYWRO ***** CONVERGENCE FOR P: MODE 2; VALUE=0.00001 MAX ITERATIONS=20
** RECORD NO. 16 COMMENT ***** /
** RECORD NO. 17 KEYWRO ***** INITIAL P -130.54 EVERYWHERE (6*0) ROOF 1: GRADx=0, GRADy=0, GRADz=1
** RECORD NO. 18 COMMENT ***** /
** RECORD NO. 19 KEYWRO ***** BOUNDARY CONDITIONS FOR P: INDEX -1, TYPE 2
** RECORD NO. 20 KEYWRO ***** BOUNDARY CONDITIONS FOR P: INDEX +1, TYPE 2
** RECORD NO. 21 KEYWRO ***** BOUNDARY CONDITIONS FOR P: INDEX -2, TYPE 2
** RECORD NO. 22 KEYWRO ***** BOUNDARY CONDITIONS FOR P: INDEX +2, TYPE 2
** RECORD NO. 23 KEYWRO ***** BOUNDARY CONDITIONS FOR P: INDEX +3, TYPE 2 FLUX = -1 4125 cm/hr
** RECORD NO. 24 COMMENT ***** /
** RECORD NO. 25 KEYWORD ***** REFERENCE POINT 2,2,2 PRINT EVERY 1 STEP
** RECORD NO. 26 COMMENT ***** /
** RECORD NO. 27 KEYWORD ***** WINDOW 2,2,1 TO 2,2,100
** RECORD NO. 28 COMMENT ***** /
** RECORD NO. 29 KEYWORD ***** OUTPUT W,P,THETA ON XZ PLRN
** RECORD NO. 30 COMMENT ***** /
** RECORD NO. 31 KEYWORD ***** HISTORY W,P,THETA 2,2,2 2,2,8 2,2,15 FREQUENCY = EVERY 1 STEP
** RECORD NO. 32 COMMENT ***** /

```

=====> UNIT 3 OPEN FOR 1/0 IN UNFORMATTED MODE; FILE NAME: timehis

```

** RECORD NO. 33 KEYWRO ***** MATRIX SWEEP IN Z DIRECTION P=1
** RECORD NO. 34 COMMENT ***** /
** RECORD NO. 35 KEYWORD ***** SAVE NOW $ INITIAL CONDITIONS
** RECORD NO. 36 COMMENT ***** /
** RECORD NO. 37 KEYWORD ***** SOLVE FOR 2.5 HOURS IN STEPS OF 0.05 HOUR

```

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Date Received: 12/10/92

# INFORMATION RELEASE REQUEST

Reference: WHC-CM-

II Types of Release	<input type="checkbox"/> Speech or Presentation <input type="checkbox"/> Full Paper (Check only one suffix) <input type="checkbox"/> Summary <input type="checkbox"/> Abstract <input type="checkbox"/> Visual Aid <input type="checkbox"/> Speakers Bureau <input type="checkbox"/> Poster Session <input type="checkbox"/> Videotape	<input type="checkbox"/> Reference <input checked="" type="checkbox"/> Technical Report <input type="checkbox"/> Thesis or Dissertation <input type="checkbox"/> Manual <input type="checkbox"/> Brochure/Flier <input type="checkbox"/> Software/Database <input type="checkbox"/> Controlled Document <input type="checkbox"/> Other	ID Number (include revision, volume, etc.) WHC-EP-0385 List attachments: Copy of report Date Release Required: 9/30/92
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Title: PORTPRO-3: A Mechanism for Model for Fluid Flow, Heat, and Mass | Unclassified Category | Impact Level

Cor. I: New or novel (patentable) subject matter?  No  Yes  
 If 'Yes', has disclosure been submitted by WHC or other company?  No  Yes Disclosure No(s).  
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Classification/Uncontrolled Nuclear Information	<input type="checkbox"/>			
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Other Program/Project	<input type="checkbox"/>			

Information conforms to all applicable requirements. The above information is certified to be correct.

References Available to Intended Audience:  Yes  No  
 Transmit to DOE-HQ/Office of Scientific and Technical Information:  Yes  No  
 Author/Requestor (Printed/Signature): Niall W. Kline | Date: 9/14/92  
 Intended Audience:  Internal  Sponsor  External  
 Responsible Manager (Printed/Signature): R.T. Hieno / R.T. Hieno | Date: 9/24/92

INFORMATION RELEASE ADMINISTRATION APPROVAL STAMP  
 Stamp is required before release. Release is contingent upon resolution of mandatory comments.  
  
 Date Cancelled: \_\_\_\_\_ | Date Disapproved: \_\_\_\_\_

04. Originator/Requester: M. Ahola		Date: 02/09/94
<p><i>below NR 2/12/94</i></p> <p><input type="checkbox"/> Enhancements made</p> <p><input type="checkbox"/> Corrections made</p>		
Name	RO/RW	A/C/D
07. Element Manager Approval: <i>RG Baen</i>		Date: <i>2/15/94</i>
08. Remarks:		
<p>A copy of the software package PORFLOW1.11 CNWRA Ver. 1.1 was retained by the Principle Investigator for use in the CNWRA work center; therefore, a new release was not necessary.</p> <p style="text-align: right;"><i>RL NR 2/15/94</i></p>		

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Reviewed on 2/9/94  
and suggestions  
noted.  
Mishko Anola

# PORFLOW Fortran Program Static and Dynamic Analysis

June 29, 1993

Earl S. Marwil  
John E. Tolli

Scientific Computing Unit  
Idaho National Engineering Laboratory

## 1. Introduction

This analysis was performed on the Cray version of the software as provided by Southwest Research Institute (SwRI).

Several sample problems were supplied along with the source code. The program was analyzed using the Craft (Cross Reference Analysis of Fortran) tool, FORWARN, the Fortran 77 analyzer, and PC-Metric. These tools provide static analysis, coverage analysis, and Complexity analysis.

One sample problem was used (porladat). The sample problem does not execute when PORFLOW is loaded with a core preset of indefinite. The program was re-loaded with a core preset of zero to run the sample problem.

## 2. References

- [1] B.N.H. Marshall and E.S. Marwil, Cross Reference Analysis of Fortran (CRAFT), EG&G-CATT-9198, EG&G Idaho, Inc., July 1991.
- [2] Fortran 77 Analyzer User's Manual, National Bureau of Standards, NBS GCR 81-359, 1981
- [3] FORWARN User's Guide, Quibus Enterprises, Inc., July 1991.
- [4] PC-Metric User's Guide, SET Laboratories, Inc., 1987.

## 3. Functions

The PORFLOW program contains 101 Fortran routines.

PORFLOW has no alternate entry points.

PORFLOW has 1 extraneous routine: "autodt".

## 4. Common Block Irregularities

There are 76 common blocks in the PORFLOW program.

There are inconsistent declarations for common blocks "cdebug" and "thead".