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FATE-84-100
REVISION 4

VIPRE CODE MAINTENANCE PROCEDURES MANUAL

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APPROVED

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REVISION 4 NOTE:

This revision makes extensive changes throughout the manual and individual changes are not shown. This is a complete copy of FATE-84-100, Revision 4. Please return Revision 3 to C. W. Stewart, P.O. Box 999, Battelle Northwest, Richland, Washington 99352.

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VIPRE CODE PACKAGE MAINTENANCE PROCEDURES MANUAL

1.0 INTRODUCTION

This manual describes procedures for maintenance and control of the VIPRE code package. These procedures shall be followed in maintaining publicly released versions of VIPRE and other versions as required by the sponsor, the Electric Power Research Institute (EPRI). No version of the VIPRE code package shall be maintained under this procedure without written approval from EPRI.

1.1 PROCEDURE MANUAL

- 1.1.1 The Battelle VIPRE project manager is responsible for preparation, control, and review of the manual and revisions under the provisions of the Battelle Quality Assurance Manual (PNL-MA-70), and the VIPRE project QA plan (APC-012).
- 1.1.2 The original manual and revisions shall be approved by the Section Manager, Battelle Fluid and Thermal Science Section, Quality Engineer, and EPRI. Approval shall be indicated by the responsible person's signature on the cover page.
- 1.1.3 The project manager is responsible for control of distribution of this manual and revisions.
 - 1.1.3.1 Each person performing work that uses the procedures in this manual shall be given a controlled copy.
 - 1.1.3.2 Controlled copies of the manual shall be given a unique control number before being assigned to an individual. A record of distribution (Section 5.1) will be maintained and revisions will be distributed to holders of controlled copies.
 - 1.1.3.3 Uncontrolled copies of the manual shall be distributed on request. These copies will not be numbered or recorded, and will not be updated when revisions are made.

- 1.1.3.4 Controlled copies shall be marked "CONTROLLED COPY NO. ____" on the title page. Uncontrolled copies shall be marked "UNCONTROLLED COPY" on the title page.

1.2 VIPRE CODE PACKAGE

- 1.2.1 A VIPRE code package shall be described by its currently published code manuals, as revised.
- 1.2.1.1 A list of the code manuals for each code package shall be maintained by the project manager.
- 1.2.1.2 In cases where selected components of a code package are maintained under this procedure, the project manager shall indicate those components on the list prescribed in 1.2.1.1 above.

1.3 RESPONSIBILITIES

- 1.3.1 The persons who perform the functions of this procedure are the project manager, the code custodian, and individual developers. Their responsibilities are described as follows:
- 1.3.1.1 The project manager is responsible to EPRI for meeting the technical and schedule requirements of this procedure. The project manager also schedules and assigns participants for internal reviews and has internal approval authority as defined for this procedure.
- 1.3.1.2 The code custodian is responsible to the project manager for maintaining the tape and disk files of the code package and preparing and maintaining the QA documents in accordance with this procedure.
- 1.3.1.3 Individual developers assigned to the VIPRE project are responsible to the project manager for developing and testing error corrections to the code package. They also participate in internal reviews as assigned by the project manager.

- 1.3.2 The project manager shall assign and maintain a list of qualified persons assigned to perform the responsibilities of code custodian and developers as described in Section 1.3.1 above.

1.4 CONTROL OF DOCUMENTS AND RECORDS

The records prescribed by this procedure are listed in Table 1. Other records maintained by the project shall be listed in the Project File Index. The responsible individual shall maintain these records as provided in the Battelle Quality Assurance Manual (PNL-MA-70), the VIPRE Project QA Plan (APC-012) and this procedure manual.

- 1.4.1 Records in use shall be stored in a location that is readily accessible. When ready access is no longer required, the project manager may move records to long term storage.
- 1.4.1.1 Records in long-term storage shall be retained in a repository with a two hour fire rating or at dual facilities and shall be properly identified.
 - 1.4.1.2 Prior to long-term storage the project manager shall inventory the records to insure that all those identified have been accumulated and are complete and legible.
 - 1.4.1.3 Records shall be maintained as described in the project Records Inventory and Disposition Schedule (RIDS).
 - 1.4.1.4 The project manager shall maintain a log of records and data placed in long-term storage. The log shall include the storage receipt number and retention period.
- 1.4.2 At the termination of the VIPRE project, the project manager shall deliver all quality assurance records to EPRI.

TABLE 1. Documents and Records Prescribed by FATE-84-100

Retention	Description	Applicable	Responsible
		Sections	Person
1.	EPRI approval for maintaining a version under FATE-84-100	1.0	Project Manager
2.	VIPRE Code Package Maintenance Procedures Manual FATE-84-100	1.1.1	Project Manager
3.	Log of distribution of FATE-84-100	1.1.3.2	Project Manager
4.	List of VIPRE Code Manuals	1.2.1.1	Project Manager
5.	List of assigned staff	1.3.2	Project Manager
6.	Project File Index	1.4.0	Project Manager
7.	Project Records Inventory and Disposal Schedule	1.4.1.3	Project Manager
8.	Log of records in long term storage	1.4.1.4	Project Manager
9.	Backup tapes	2.2.1	Code Custodian
10.	Tape log and file directories	2.2.2.1	Code Custodian
11.	Change Request Log	3.1.2.2	Code Custodian
12.	VIPRE Change Request File	3.1.2.3	Code Custodian
13.	Error Notification File	3.1.3.4	Code Custodian
14.	New Mod Document	4.2.2	Code Custodian
15.	Master copies of code manuals	5.1.1	Project Manager

2.0 CODE PACKAGE CONFIGURATION AND RESIDENCE

This chapter describes the configuration and location of versions of the VIPRE code package in terms of site, machine, and device.

2.1 VERSION IDENTIFICATION

- 2.1.1 The VIPRE code package shall be identified by name, major version number, release MOD number, computer system, and latest change identifier. For example:

VIPRE-01-MOD-1, VAX VERSION
UPDATED THROUGH CHANGE 16

- 2.1.2 Each code version that is released to EPRI shall print a heading in its output that identifies the code version with the information prescribed in Section 2.1.1 above.

2.2 RESIDENCE

- 2.2.1 The code custodian shall maintain the master copy of the current MOD of VIPRE on computer disk accessible by VIPRE developers at Battelle. A backup copy of the current VIPRE MOD and the most recent previous MOD shall be stored on magnetic media at Battelle and at least one other site.
- 2.2.2 The code custodian shall assure that magnetic tapes stored at Battelle are clearly labeled to identify them by code version, (Section 2.2.1) creation date, and general contents.
- 2.2.2.1 The code custodian shall maintain a log (Section 6.2) of all tapes stored under this section showing their location, identification, status and general contents. A directory of the tape contents shall be filed with the log.
- 2.2.2.2 The tape log shall be retained as long as tapes referenced on it are being stored.

3.0 ERROR CORRECTION

This chapter describes procedures for requesting, developing, testing, reporting, and controlling changes to programs and data in the VIPRE code package for the purpose of error correction.

3.1 ERROR REPORTING

All reports and requests for error corrections shall be submitted in writing to the code custodian for processing.

3.1.1 The error correction request shall contain at least the following information:

- (1) The name, address, and telephone number of the person making the request.
- (2) Identification of the VIPRE code or document version that exhibits the error.
- (3) A description of the problem and the conditions that caused it.
- (4) Input data for a simulation that exhibits the error (not required for documentation errors).

3.1.1.1 The code custodian may reject those requests that do not contain the information specified above, and return them to the requestor without action.

3.1.1.2 A completed VIPRE Change Request form (Section 6.3), an EPSC Trouble Report, or similar form is acceptable for the purpose of Section 3.1.1.1. A VIPRE Change Request form may be prepared from information submitted for use as a cover sheet.

3.1.1.3 If the error correction request satisfies the requirements of Section 3.1.1, the code custodian shall process it in accordance with 3.1.2 below.

3.1.2 The code custodian shall assure that a test simulation is run with the input provided as described in 3.1.1(4) to duplicate the reported error and/or that documentation errors are investigated.

- 3.1.2.1 If it cannot be determined that an error exists with the input provided above, or it is found that the input is in error, no code change shall be made and the change request returned to the originator.
- 3.1.2.2 If the error occurs as described, a documentation error is confirmed, or any other errors occur in the test simulation, the code custodian shall assign the change request with a log number and enter it in the change request log (Section 6.4) and assure that corrections are developed in accordance with Section 3.2 if correction is possible.
- 3.1.2.3 Whether or not an error is found, the code custodian shall enter the appropriate disposition (3.1.2.1 or 3.1.2.2) on the action section of a change request form and file a copy.
- 3.1.3 The code custodian shall supply a list of all code errors logged during a month to the EPRI program manager, the Electric Power Software Center (EPSC), and VIPRE subscribers by the fifteenth of the following month as prescribed below.
 - 3.1.3.1 New code errors for the month shall be reported to EPRI by letter. If no new errors were logged, the letter shall so state.
 - 3.1.3.2 A description of new code errors for the month shall be reported to EPSC by appending such descriptions to a disk file on an EPSC computer. EPSC shall be notified by telephone when the file is updated or that no new errors were logged.
 - 3.1.3.3 The names and addresses of VIPRE subscribers shall be determined by the latest list supplied by the EPRI project manager.
 - 3.1.3.4 The code custodian shall file a copy of the error notification each month as a project record.

3.2 ERROR CORRECTION

Interim error corrections shall be developed if possible as a service to VIPRE subscribers, who may obtain them when available upon request. However, their installation and application shall be at the user's risk since such corrections are not fully verified until a new MOD is released in accordance with Section 4.0.

4.0 RELEASE OF A NEW MOD

New MODs of VIPRE are publicly released from time to time to incorporate the error corrections and modifications developed as described in Section 3.2. Procedures are prescribed in this chapter for creating, testing, review, and documentation of each new MOD.

4.1 INITIATION

4.1.1 A new MOD shall be created at the written direction of EPRI. The new MOD creation procedure shall begin with a review of the following items by the project manager and at least one other qualified person. This group shall be referred to throughout this section as the "reviewers".

- 1) The set of all code modifications and corrections developed since the last MOD under Section 3.2 (revision set) and the corresponding individual test cases.
- 2) Standard test cases and other data sets revised since the last MOD.

4.1.2 The reviewers shall provide the code custodian with an approved code revision set and a set of test case input to validate the new MOD.

4.1.2.1 The approved revision set shall consist of all code modifications and corrections developed since the last MOD that are approved by the reviewers for inclusion in the new MOD.

4.1.2.2 The test case input shall include at least the standard test cases revised since the last MOD.

4.1.2.3 EPRI shall approve the selected test cases in writing before they are used to validate the new MOD.

4.2 TESTING AND REVIEW

4.2.1 The code custodian shall assure that a test version of the new MOD is created by applying the approved set of code revisions to the current MOD and that the new version is tested on each computer system it is to be released on using the approved test input.

4.2.1.1 The reviewers shall check the listings of the test version source and test case output from each computer system to insure the following criteria are satisfied:

- 1) The results of the standard test cases are identical to those of the current MOD, or, if different, all differences are documented in the new MOD Document (NMD - Section 4.2.2) as the result of error correction, or approved test case revision.
- 2) The test case output from each computer system agrees to five significant digits or the reason for the difference is explained in the NMD.

4.2.1.2 When the review is satisfactory, as indicated by the reviewers' signatures on the front page of the listings, the following actions shall be performed by the code custodian:

- 1) Copy the new MOD and revised standard test cases into the Battelle master computer files and purge the existing MOD (Section 2.2.1).
- 2) Create backup tapes of the new MOD.
- 3) Transmit a version of the new MOD for each computer system to EPRI or other organization designated by EPRI for distribution.
- 4) Complete and file the new MOD document in accordance with Section 4.2.2 below.

4.2.1.3 If the review is not satisfactory the reviewers shall document the deficiencies and necessary remedial action. The code custodian shall assure that the code revision set is modified as necessary and the test cases are rerun until all discrepancies have been corrected. Subsequent reviews shall be documented as above or as in 4.2.1.2.

4.2.2 A New MOD Document (NMD) shall be compiled by the code custodian for each new MOD released. The NMD shall contain at least the following items:

- 1) List of all code revisions as revised in 4.2.1.3 above that are approved for inclusion in the new MOD.
- 2) EPRI approvals of test cases from Section 4.1.1.2
- 3) Final test case output from Section 4.2.1.2 above for each computer system.
- 4) Final code source listings on paper, computer tape, or microfilm for each computer system.
- 5) Documentation of deficiencies and resolution from Section 4.2.1.3.
- 6) Copies of transmittal documents to EPRI or other designated organization.
- 7) Copies of code manual revisions as printed by EPRI.

5.0 CODE MANUAL REVISION

The procedures in this chapter shall apply only to those manuals that define a VIPRE code package and are listed by the project manager under Section 1.2.1. Revisions to the VIPRE code manuals shall be prepared and submitted to EPRI when a new MOD is created if such revisions are required.

5.1 REVISION CONTROL

- 5.1.1 The project manager shall maintain master copies of the latest approved version of each volume of VIPRE code manuals. Master copies shall be retained until the changes they contain are published under Section 5.2 below. At that time the new versions (revised pages replaced) shall become the master copies.
- 5.1.2 The project manager shall assure that all changes are edited manually into a copy of the master documents.
 - 5.1.2.1 Significant code manual changes arising from error reports shall be documented and reviewed under Section 3.1 and shall be reviewed by EPRI under 5.2.1 below.
 - 5.1.2.2 Minor changes to the manuals that do not alter their basic meaning or organization (e.g., correction of typographical errors, editorial changes for clarification, renumbering of pages or figures, etc.) shall be reviewed by EPRI under Section 5.2.1 below.

5.2 REVIEW AND TRANSMITTAL

- 5.2.1 Upon EPRI request, or when EPRI has directed Battelle to create a new MOD of the code, the project manager shall compile draft replacement pages, if any, from document changes accumulated since the previous MOD.
 - 5.2.1.1 When complete, the project manager shall transmit the draft replacement pages to EPRI for review.

- 5.2.1.2 The project manager shall incorporate EPRI comments and corrections into the draft replacement pages and resubmit them to EPRI for further review as necessary.
- 5.2.2 When EPRI is satisfied that their comments have been resolved, the draft replacement pages shall be copied to EPRI mats and delivered to EPRI for final printing and distribution. Final EPRI approval is indicated by receipt of the published revision package.
- 5.2.3 A copy of the code manual revisions as printed by EPRI shall be included in the new MOD document under Section 4.2.2.

6.0 FORMS

This section contains forms referred to in previous sections of this manual. A brief description of the purpose of each form is provided below.

6.1 CONTROLLED DOCUMENT LOG

The Controlled Document Log is used to record the distribution of a given controlled document and its revisions (Section 1.1.3.2).

6.2 DOCUMENT LOG

The Document Log records creation, content, and changes in the location of documents generated by procedures in this manual. It is used to record backup tapes (Section 2.2.2.1).

6.3 VIPRE CHANGE REQUEST

The Change Request may be used to report code errors (Section 3.1.1.2).

6.4 VIPRE CHANGE REQUEST LOG

The VIPRE Change Request Log records each change request received and its disposition from receipt to installation of a change to the code (Section 3.1.2.2).

TITLE _____

[illegible]

DOCUMENT LOG

Page _____

TITLE _____

[illegible]

VIPRE CHANGE REQUEST

No. _____

1. VERSION ID. _____ OPERATING SYSTEM _____

2. REQUESTOR _____ PHONE ____/____

ADDRESS:

3. DESCRIPTION (attach continuation sheets if necessary)

To be completed by Battelle

DATE RECEIVED _____ ASSIGNED TO _____

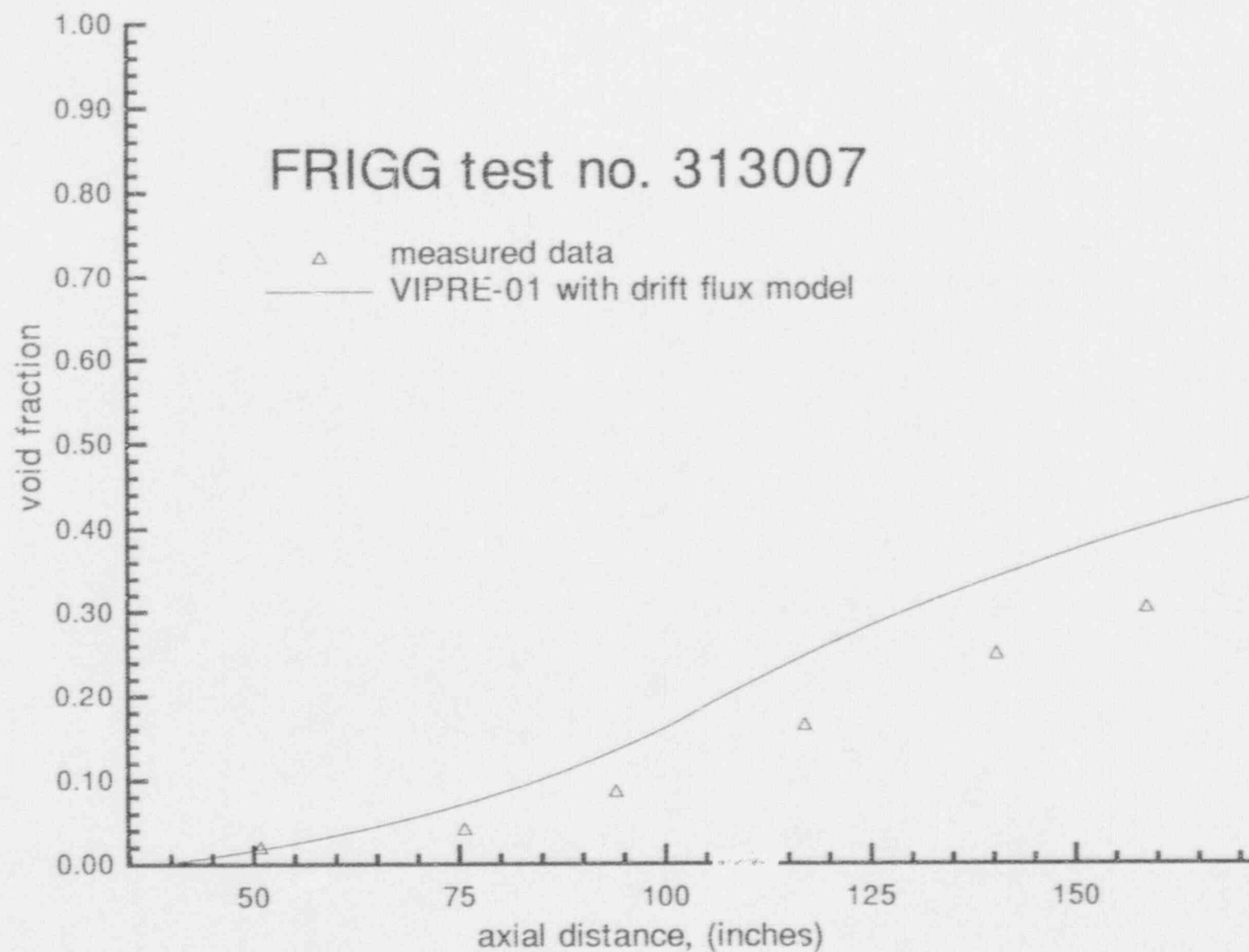
ACTION:

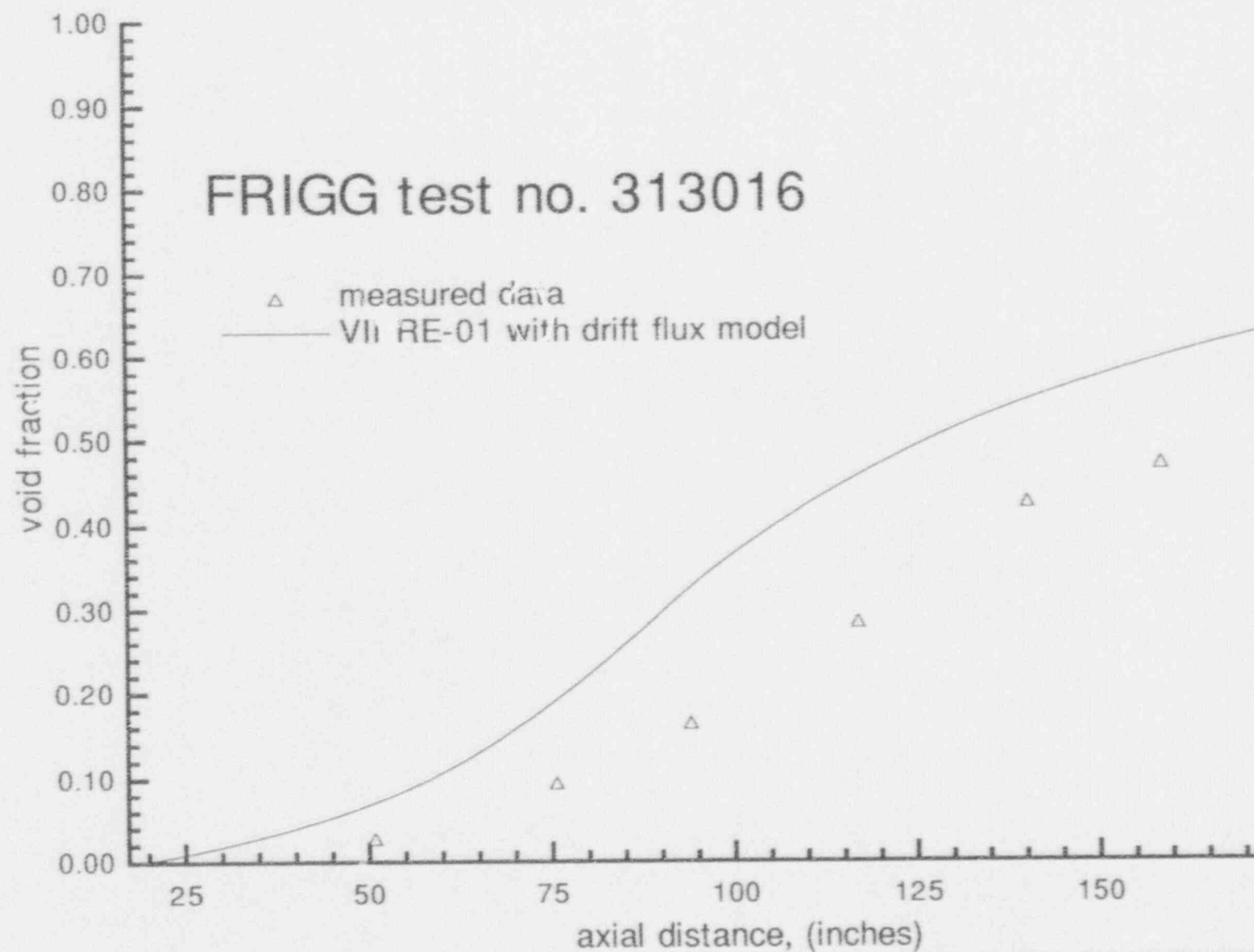
Change Reviewed by _____ Date _____

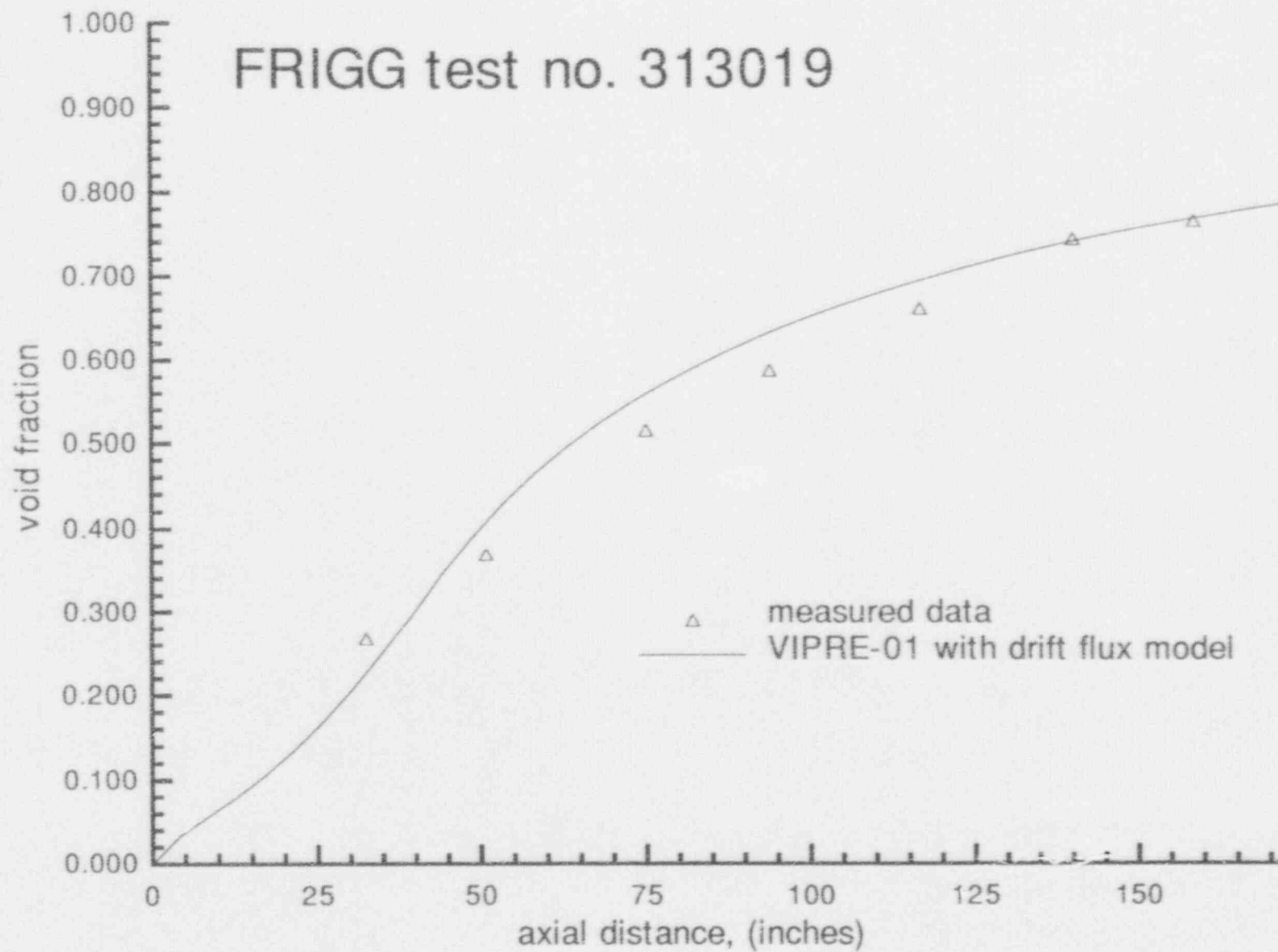
Approval for New MOD _____ Date _____

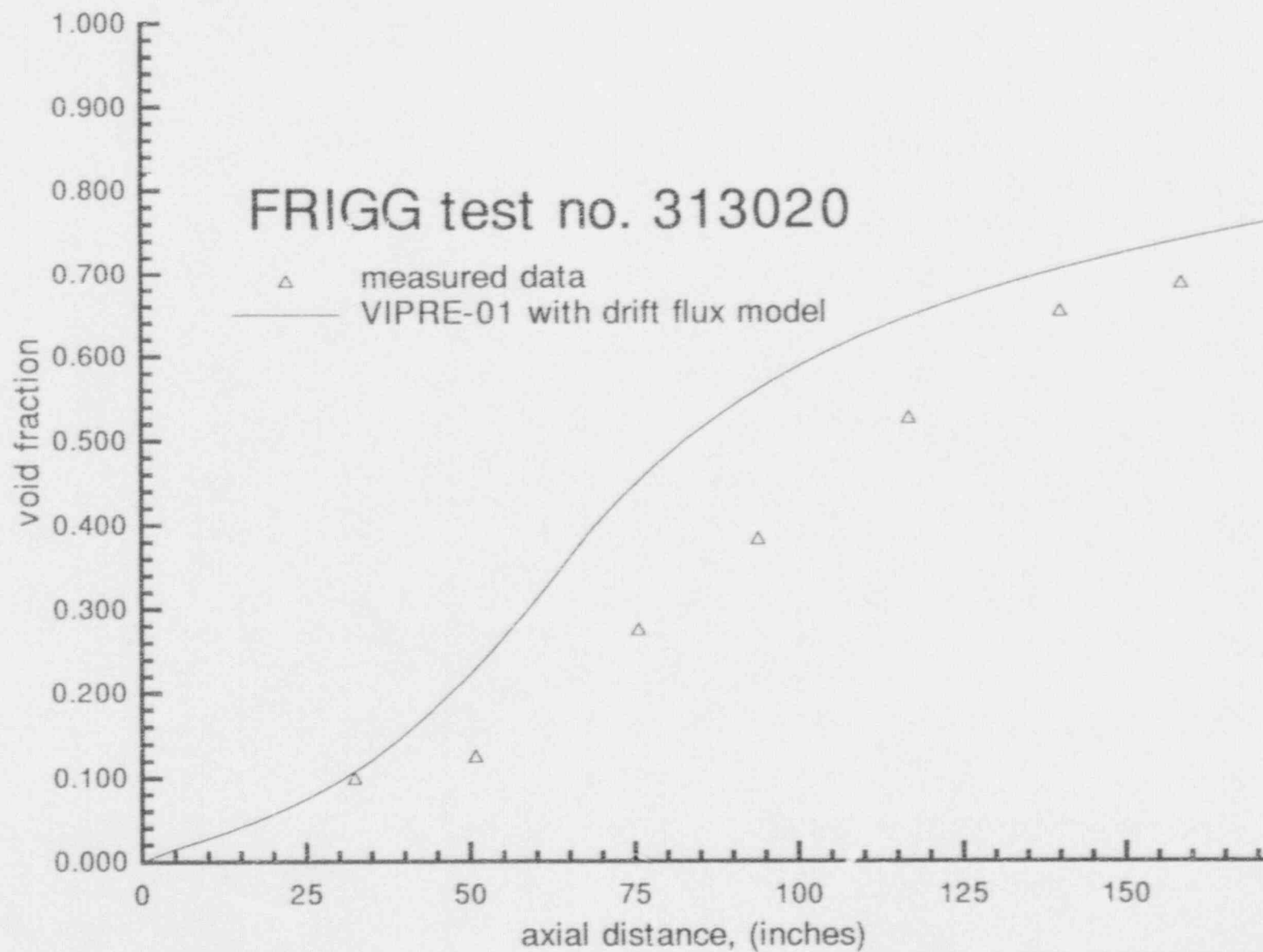
Project Manager

Attachment 3









Attachment 4

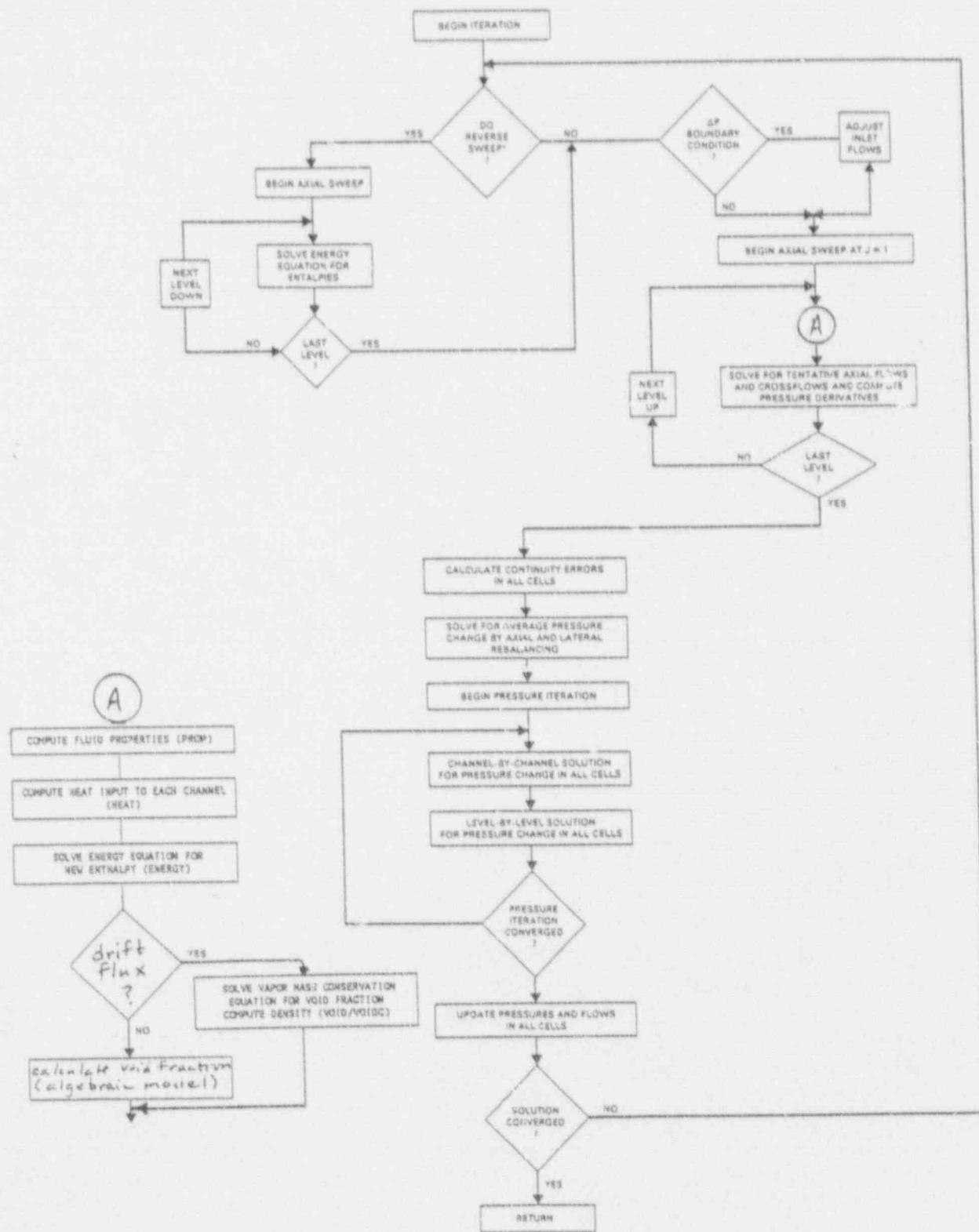


Figure 2.5-4. RECIRC Solution Sequence, with drift flux model
2.5-1