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OFFICE OF CIVILIAN  
RADIOACTIVE WASTE MANAGEMENT  
IMPLEMENTING LINE PROCEDURES

TITLE:

Technical Analyses

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of 1

ASSOCIATE DIRECTOR, OCRWM

Date:

*L. B. ...* 5/24/90

Director, OGA

Date:

*...* 5/29/90

## 1.0 PURPOSE

The purpose of this procedure is to provide a mechanism for documenting the direction, process, and results of technical analyses performed by DOE/HQ, or by direct-support contractors, in support of technical or design reviews or other DOE/HQ activities.

## 2.0 SCOPE

This procedure applies to technical analyses performed in the context of Technical Review (QAAP 3.1), Design Review (QAAP 3.2), Peer Review (QAAP 3.3), DOE/HQ Technical Assessment Reviews (ILP 22.3.3), and the Preparation of Technical Documents (QAAP 3.5). The technical analyses may consist of standard mathematical or statistical analyses as well as scientific or engineering modeling calculations (see Section 3.2). Depending on the nature of the analyses to be performed, the appropriate portions of this procedure shall apply. This procedure refers to both quality affecting and non-quality affecting activities.

## 3.0 REFERENCES AND DEFINITIONS

### 3.1 REFERENCES

3.1.1 QAAP	3.1	Technical Review
3.1.2 QAAP	3.2	Design Review
3.1.3 QAAP	3.5	Preparation of Technical Documents
3.1.4 QAAP	17.1	QA Records Management
3.1.5 QAAP	2.2	Personnel Certification
3.1.6 QAAP	2.3	Establishing Quality Assurance Controls
3.1.7 QAAP	3.3	Peer Review
3.1.8 ILP	-.-	Software Control
3.1.9 ILP	22.3.3	DOE/HQ Technical Assessment Review
3.1.10 QAAP	2.1	Indoctrination and Training

U.S. DEPARTMENT OF ENERGY  
WASHINGTON, D.C.

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### 3.2 DEFINITIONS

- 3.2.1 Standard Mathematical/Statistical Analyses: Calculations that are routinely performed by scientists and engineers and that do not involve the use of complex computer codes. This definition also includes standard statistical and mathematical techniques such as regression analyses, curve fitting, etc., done by methods contained in computer libraries of statistical and mathematical techniques.
- 3.2.2 Scientific/Engineering Modeling Calculations: Calculations that involve the use of complex computer codes to model physical processes or phenomenon.
- 3.2.3 Analyst: The person or persons performing the analyses described in Section 3.2.1 or 3.2.2.
- 3.2.4 Task Leader: In the case of an analysis requiring contributions from more than one analyst or multidisciplined efforts, the task leader is the person responsible for coordinating, integrating, and completing the analyses.
- 3.2.5 Checker: The person responsible (but independent of the original analyses for reviewing and checking calculations for standard mathematical/statistical analyses.
- 3.2.6 Calculation Documentation Package: A file containing all completed calculations, computer inputs/outputs, and other descriptive information documenting how the analysis was performed. Such information is listed in sec 6.11.
- 3.2.7 Verification: The process of checking the correctness of analyses done with complex computer codes
- 3.2.8 Analysis Definition Form (ADF): The form used to define the scope of the analysis and its intended use and to track the analyses through to completion.
- 3.2.9 Verification Documentation Package: A file containing the documentation of the verification work performed to check the correctness of scientific/engineering modeling calculations.

### 4.0 RESPONSIBILITIES

- 4.1 Technical analyses are typically initiated by managers/supervisors responsible for the technical activity at the branch chief level, either at the direction of management levels above the branch chief or at the discretion of the branch chief. In the case of technical analyses initiated in the course of technical or design review



(QAAPs 3.1 and 3.2), a reviewer may initiate a technical analysis. If in this case, the analysis involves a significant time or resource commitment, the initiator of the analysis should obtain the concurrence of the responsible managers/supervisors before proceeding.

- 4.2 When technical analyses are initiated by a branch chief, it is the responsibility of the manager/supervisor to (1) select the analyst or team leader, and describe the scope of the analysis(es) on the appropriate ADF for either standard mathematical/statistical analyses or scientific/engineering modeling, (2) ensure that the analyst(s) and team leader are qualified (see reference 3.1.5), and (3) determine if the analysis is a quality-affecting activity according to Ref 3.1.6. The responsible manager/supervisor may also be asked to concur on the purpose and scope of analyses initiated by their staff members, as described in section 4.1.

- 4.3 It is the responsibility of the analyst to perform the analyses and document the results according to the appropriate portion of this procedure. It is also the responsibility of the analyst to have the results of the analyses verified as appropriate based on the intended use of the results for the case of scientific/engineering modeling calculations. The analyst is also responsible for identifying an appropriate checker to review the analysis calculations for the case of standard mathematical/statistical analyses.

## 5.0 GENERAL

- 5.1 Technical analyses may be performed (1) as part of formal DOE/HQ review controlled under References 3.1.1 and 3.1.2, (2) as part of the preparation of technical documents (Ref. 3.1.3), (3) to develop guidance to the Project Office or DOE/HQ contractor(s), or (4) to assess the status of technical and regulatory issues and develop assessments to be used for issue resolution and licensing.
- 5.2 This procedure consists of two parts corresponding to the type of analyses to be performed. Analyses involving computer codes for modeling physical processes or phenomena are done according to Sections 6.1-6.3 and 6.8-6.21, while calculations that do not involve computer modeling are performed and documented according to Sections 6.1-6.7 and 6.21.
- 5.3 This procedure will apply to analyses that support quality affecting activities as identified by the party initiating the analyses (ref. 3.1.6). Analyses may be performed according to this procedure, even though the analyses support non-quality-affecting activities, if the analyses are expected to be used subsequently in quality-affecting activities, or at the discretion of the analyst or team leader.



- 5.5 Standard mathematical/statistical analyses must be checked by an independent analyst. At the discretion of the responsible branch chief, scientific/engineering modeling analyses may require verification. Modeling analyses will require verification if these analyses directly support quality affecting activities. Analyses intended to become part of the license application will require verification. The decision on the need to verify modeling analyses will be made either before the analyses are initiated (Sec. 6.1), or after inspection of the results of the analyses by the responsible manager/supervisor.
- 5.6 Verification of modeling results can be performed by (1) Technical Review (QAAP 3.1), (2) replication of the analyses, in part or in total, by an independent analyst among DOE/HQ staff or their contractors, or by Project Office staff or their contractors, or (3) Peer Review (QAAP 3.3). Peer review may be used to verify analyses when the adequacy or suitability of analysis assumption, methods, or interpretations cannot be established by other means.

#### 6.0 PROCEDURE

- 6.1 The person initiating the analysis (typically the manager/supervisor) will fill out the ADF (Attachment A) by indicating (1) the type of analysis involved and the need to verify the analyses for the case of scientific/engineering modeling analyses (line 1 on the ADF), (2) whether the analysis is a quality-affecting activity (line 2 on the ADF), and (3) the scope and purpose of the analysis (line 3 on the ADF). The initiator will sign (name and position title) and date the ADF and enter an identification number for the analysis on the ADF. If the analysis supercedes an earlier analysis, the identification number of the earlier analysis is indicated on the ADF also. Identification numbers should consist of the initials of the appropriate organization responsible for the analyses (such as a branch) followed by the initials of the analyst and a number. Subsequent analyses by the same analyst should be identified with consecutive numbers so that each analysis will have a unique identification number. Quality Assurance controls on software appropriate for the analyses are determined and applied according to reference 3.1.8.
- 6.2 Upon receipt of the ADF directing the analyses, the analyst, or task leader, will indicate that the purpose and scope of the analysis is sufficiently well defined for the analyses to proceed by signing (name and position title) and dating the ADF (line 5). In the event that the description of the analysis (line 3) is unclear, the initiator of the analysis and person concurring will confer to further define the scope and purpose of the analyses before completing the concurrence.



- 6.3 After concurrence is completed, the analyst, or task leader, will perform the analyses and document the results as appropriate for the type of analyses performed. The analyst, or task leader, will perform the analyses using techniques appropriate for the work.
- 6.4 Upon completion of the analyses, the calculation documentation package will be prepared by the analyst, or task leader, in sufficient detail to allow the analyses to be reviewed and checked by an independent party (checker) without recourse to the analyst for explanation of unclear or missing information. The analyst, or task leader, will identify an independent analyst to review and check the calculations.
- 6.5 The written calculation documentation package will be forwarded by the analyst or task leader to the checker. The checker will (1) review the calculations and certify that the calculations are correct, (2) sign and date the ADF on line 8, and (3) return the calculation documentation package to the analyst or task leader.
- 6.6 In the event that an error is found, the checker will confer with the analyst, or task leader, to correct the error or to clarify any unclear portions of the calculation documentation package before signing the ADF. Upon completion of the analysis, the completed calculation documentation package is maintained according to ref. 3.1.4, for those analyses judged to be quality affecting.
- 6.7 If additional work is found to be needed, the directions for additional work are given on a new ADF. The review and approval process for any further work follows the sequence given in Sections 6.4-6.7.
- 6.8 As for the case of standard mathematical/statistical analyses, scientific/engineering modeling analyses will typically be initiated by the responsible manager/supervisor, but may also be initiated by staff other than the manager/supervisor. The process of defining and obtaining concurrence on the purpose and scope of the planned analyses follows that described in Sections 6.1-6.2.
- 6.9 The decision to require verification of scientific/engineering modeling may be made at the time the analyses are initiated or after inspection of the completed results (see Section 6.1). If the decision is made at the time the analyses are initiated, the responsible branch chief will indicate the need to verify the analysis in line 1 of the ADF and indicate the method chosen on line 9. If the decision is deferred until completion of the analyses, no entry is made in line 1 of the ADF and the decision is indicated at a later time on line 9 of the ADF.



- 6.10 The analyst, or task leader, will conduct the analyses using techniques appropriate for the work. Software controls (ref 3.1.8) will be applied as appropriate for the analyses.
- 6.11 Upon completion of the computer modeling analyses, the results, and ancillary information will be documented in writing in the calculation documentation package. The following information, at a minimum, will be included in the calculation documentation package:
- Code names, version designation, and date
  - Computer-control information needed to run the analyses
  - Input data and their source
  - Operator names, if not the analyst
  - Input/output files as needed
  - Definition of the problem geometry, domain, and boundary conditions as needed to document the analyses.
  - Any verification or validation measures required to perform the analyses
  - Parameter list (including definitions if needed).
- 6.12 Upon completion of the analyses, the calculation documentation package will be prepared by the analyst, or task leader, and appended to the ADF.
- 6.13 Upon receipt of the ADF and calculation documentation package, the responsible manager/supervisor will determine if the analyses require verification, if this decision was deferred at the time the analyses were initiated. If the analyses require verification, the responsible manager/supervisor will determine the method to be used (Sec. 5.6), indicate that method on line 9 of the ADF, and initiate this verification activity.
- 6.14 The analyst, or task leader will identify an independent analyst to perform the verification, if the verification is to be done by DOE/HQ or its contractors. In concurrence with the responsible branch chief, peer reviewers or technical reviewers will be identified if such options are chosen for verification (section 5.6).
- 6.15 Direction to the Project Office for verification activities will be documented in writing. Directions for verification by DOE/HQ staff or contractors can be incorporated into the description of the purpose and scope of the analyses at the planning stage (see Section 6.1) or indicated on the ADF and forwarded to the person(s) responsible for the verification, after the analyses are completed.



- 6.16 Verification of the analyses will be performed by means appropriate to the analyses (mathematical checks of parts, or all, of the computations may be performed, alternate calculations for the problem may be done, etc.). NRC guidance (NUREG 0856) may be used as appropriate for determining what verification methods are to be used considering the intended use of the analyses. The requirements for documentation of the verification conform to the same requirements for the content of calculation documentation package as given in sec 6.11.
- 6.17 If the verification is completed successfully, the person responsible for performing the verification will sign and date the ADF on line 10 and forward the ADF and verification package to the analyst or team leader.
- 6.18 If additional work on the modeling analysis is required as indicated by the verification effort, the problems with the original modeling analyses and additional work required will be described by the person responsible for the verification and appended to the ADF. This description of additional work and the verification documentation package will then be provided to the analyst, or task leader, for completion of the required work.
- 6.19 The analyst and the person responsible for the verification may confer to resolve any confusion about the results of the verification or resolve any controversial aspects of the verification. If controversies cannot be resolved between the analyst and the person responsible for the verification, the responsible manager/supervisor will determine the appropriate work to be performed.
- 6.20 Additional work required will be performed and documented as described for the original analyses, and the documentation again submitted for verification as described in sections 6.15-6.18. If the verification is considered satisfactory, line 10 on the ADF is signed and dated and the verification package is returned to the analyst or task leader.
- 6.21 After the analyses and verification are completed for analyses determined to be quality affecting, records documenting the analyses (ADF and calculation documentation package and verification documentation package) will be preserved according to Reference 3.1.4.



7.0 RECORDS

7.1 For quality-affecting activities, the following records shall be maintained in accordance with ref. 3.1.4

- The analysis definition form (ADF)
- The calculation documentation package
- The verification documentation package

7.2 For analyses judged not be quality affecting, records indicated above shall be processed in accordance with established OCRWM procedures.

8.0 ATTACHMENTS

Attachment A, Analysis Definition Form.



ATTACHMENT A

ANALYSIS DEFINITION FORM (ADF)

I.D. # \_\_\_\_\_

Supercedes

I.D. # \_\_\_\_\_

1) Standard Math/Statistical Analysis      Scientific/Engineering Modeling

\_\_\_\_\_  
\_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

Verification Required

Yes \_\_\_\_\_ No \_\_\_\_\_ Deferred \_\_\_\_\_

2) Quality Affecting: Yes \_\_\_\_\_ No \_\_\_\_\_

3) Scope and Purpose of Analysis:

4) \_\_\_\_\_

Initiator of Analysis (Name)

(Position)

Date

5) Concurrence on Analyses Scope and Purpose:

6) \_\_\_\_\_  
(Name)

(Position)

Date

7) Check completed for Standard Mathematical/Statistical Analyses.

8) \_\_\_\_\_  
Checker                      Date

9) Verification Required: Yes \_\_\_\_\_ No \_\_\_\_\_ If "Yes", indicate method \_\_\_\_\_

10) Verification Completed \_\_\_\_\_  
Verification Analyst                      Date