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MS 623SS

PROJECT CONTROL

from Bob Cook, BLWP

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COMMENTS ON GENERIC TECHNICAL POSITIONING PEER REVIEW BY
FORSCHER AND ALTMAN--4-86

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(Return to WM, 623-SS)

1. The INTRODUCTION suggests that peer reviews are only intended to validate design procedures or the selection of materials for items to be constructed to fulfill functional objectives. This is too narrow, since peer reviews may be administered by organizations performing a quality assurance function to over check--verify--a validation activity accomplished by the organization responsible for design, including R&D. I propose the following revision of the first and second paragraphs of the subject draft GTP to clarify the appropriate use of peer reviews.

"The peer review process is usually employed as part of 'those planned and systematic actions necessary to provide adequate confidence,' and accomplished by persons and organizations performing functions of attaining quality objectives in the work under review. This "work" may be any design activity, including but not limited to preparation of (1) a plan; (2) a procedure for collecting raw data during research and development (including site explorations), construction and/or operational phases of a project, i.e., a test procedure; (3) a report containing interpretations of raw data, prepared without the benefit of a validated design procedure for the interpretive process; (4) a report concerning materials selection, and (5) contractual documents and other forms of direction between organizations, groups and individuals having authority to make or change design and/or to make or specify design decisions, design strategy, design margins, etc., generally affecting the quality of an activity or an item.

The major difference between peer reviews and other engineering and scientific reviews, for example, design reviews, readiness reviews and test completion reviews, is the degree of judgement that entered into the work to be reviewed--in general work not accomplished by detailed procedure. Thus, peer reviews generally are used to "validate" design procedures while other engineering and scientific reviews generally "verify" that work has been accomplished in accordance with procedures. However, peer reviews may also be used by an organization performing a quality assurance function to "verify" the "validity" of design procedures, just as design reviews may be used by organizations performing functions of attaining quality objectives in the first place, with no verification function intended or specified to meet quality assurance plan requirements.

As indicated in the discussion above, it is expected that peer reviews will be used in connection with a number of activities of

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design, including preparation of procedures for site characterization, and performance assessment for geologic repositories. However, this Generic Technical Position (GTP) provides guidance to the Department of Energy (DOE) on methods which the NRC staff currently views as acceptable for the conduct of peer reviews, whether they be used for the verification of validation activities or validation itself. Other methods may be proposed, or used, and would be reviewed for acceptability by the NRC Staff on a case-by-case basis."

This technical position introduces and defines a term "technical review" (see the definitions below.) It is intended to provide a general term which encompasses other verification reviews of activities which are objectively accomplished in accordance with valid procedures. Technical reviews are hence, considered quality assurance functions and are to be distinguished from reviews which are intended to help attain quality objectives in the first place and would not constitute verification.

2. In the INTRODUCTION and elsewhere in the subject GTP the terms "geologic repository" and "repository" are used. Both are terms defined respectively in 10CFR60.2 and the NWPAs and have somewhat different meanings. I recommend that the subject GTP use the term "geologic repository" exclusively to avoid confusion.

3. In the third paragraph of the INTRODUCTION in order to emphasize the fact that project specific nuclear power plant siting and design has involved minimal R&D, since most applicable design procedures have been validated prior to the power plant license application in the past, the following sentence should be added after the first sentence of paragraph 3.

"This is because generic R&D involving peer reviews and other equivalent subjective methodology, resulting in validated design procedures from pre-construction design activities, was accomplished by non-site-specific reactor designers whose R&D activities were not regulated per 10CFR50 Appendix B prior to the application for a construction permit at a specific site."

4. The draft GTP improperly uses the term "technical." (See usage in the INTRODUCTION for examples.) Specifically, the word "technical" connotes engineering and scientific meaning. It is inconsistent with common usage as identified in Webster's to imply by context that scientific reviews are not technical reviews.

5. Concerning Section II, REGULATORY FRAMEWORK, the second paragraph of the GTP appears to incorrectly delimit the application of Section 3.8 of the QA Review Plan to verification activities and, by inference, excludes validation activities. This is inconsistent with the INTRODUCTION of the draft GTP which notes that peer reviews are primarily used for validation, although verification of validation is also a potential use for

peer reviews as I noted in my rewrite of the first two paragraphs. I note that Section 3.3 of the QA Review Plan requires that organizational responsibilities for verification and validation be identified. (This provision is consistent with clearly distinguishing between "doer" and "checker" activities.) I consider that the use of specific peer reviews per requirements of 3.8 must clearly be designated as a verification or validation function in accordance with requirements of Section 3.3. Section 3.3 should be sited in the REGULATORY FRAMEWORK in this regard. To resolve these concerns the second paragraph of REGULATORY FRAMEWORK should be revised as follows:

"The NRC QA Review Plan (June 1984) (Section 3.8) provides for the use of peer reviews in connection with certain design or design activities to comprise some of the planned and systematic actions necessary to provide adequate confidence that the geologic repository and its subsystems or components will perform satisfactorily in service. These peer reviews can serve a performing function of attaining the quality objective of valid design procedures and/or the quality assurance function of verifying the adequacy of validation activities.

In accordance with the NRC QA Review Plan (Section 3.3) organizational responsibilities are to be described for preparing, reviewing, approving verifying and validating design and design information documents. Since peer reviews may serve to either validate or verify, responsibilities for peer reviews must be clearly identified."

6. The last paragraph of the draft REGULATORY FRAMEWORK does not constitute regulatory framework since it refers to a DOE document in lieu of an NRC regulation or the review plan. In addition it adds nothing to the GTP. This paragraph should be deleted. If it is considered necessary to refer to requirements for audits and record retention and management or other QA requirements, the GTP should refer to appropriate sections of the NRC QA Review Plan.

7. Section III, DEFINITIONS should be eliminated and a reference made to the standard glossary for all the GTP's. As I recommended in my February 24, 1986 memorandum containing BWIP Site comments, observations and recommendations, I consider that "validation" and "verification" are both key terms requiring definition. However, the definitions suggested in Section III of the subject GTP are too general and do not relate to the independent roles of "doers and checkers" spelled out in Part 50 Appendix B, I Organization. Accordingly I recommend that the definitions contained in Attachment A to these comments be used. It is noted that Attachment A includes the definition of the term "design procedure" which I have used in my comments and proposed revisions to the subject GTP and which I have previously recommended be incorporated into the glossary.

8. If considered appropriate to retain the definition after reviewing the following comment, the definition of "Technical Review" should be expanded to cover its role of verification. Also the idea that technical reviews are intended to verify that activities controlled by procedures are in fact in compliance with those procedures and pertinent specifications, design bases, etc. should be included. The following definition is recommended.

Technical Review A documented single or multidisciplinary review, intended to provide verification, performed by technically qualified personnel who are independent of the original work performed, consistent with quality assurance requirements. Technical reviews consist of analyses and evaluations of, for example, technical documents, records, and/or data--in general design--all of which have been produced in accordance with procedures. Technical reviews assess the technical applicability, correctness, adequacy and completeness of the design information reviewed and assure it was produced in compliance with requirements, and is otherwise consistent with, all applicable requirements and pertinent procedures. Technical reviews among other things determine the accuracy of work.

9. I note that the title of the subject GTP only covers "peer reviews." Considering the provisions specified concerning "technical reviews," see item 4 under the Staff Positions section, I recommend that the title be expanded to cover "technical reviews."

An alternative change would be to delete all reference to technical reviews, including deleting the definition. A separate GTP is warranted to cover these types of reviews and to incorporate all necessary requirements for these reviews. Item 4 is inadequate by itself. It does not comprehensively specify requirements for technical reviews. If this alternative is chosen, the last paragraph of the INTRODUCTION which I proposed above in comment 1 should be deleted.

10. The technical positions should be expanded to include the following items:

- a. The application of the requirements should clarify which requirements are intended to apply to Q-list items at level one and which apply to other lower level activities.
- b. The list of items which may be considered in a peer review, item 8 of the Staff Positions, should be expanded to consider the adequacy of verification steps specified in design procedures and the apparent qualifications of personnel and organizations, including the apparent objectivity of management, originally performing the R&D or other information or activity being reviewed. The adequacy of specified personnel qualifications should also be an area which peer reviews may cover.

c. A requirement that peer reviewers not become dominated by one or more members of the peer review group should be specified. The procedures for specifying a chairman for the peer review group and his functions and other procedures for interactions should assure that domination does not occur and that the independence of peer reviewers is maintained. Credibility should be provided through the requirement to comprehensively make and maintain records of all interactions and communications, direct or indirect (i.e., through a third party), between and among peer reviewers during the period the peer review is functional. In addition all communications or interactions between peer reviewers and project personnel in any way connected with the activity or information being reviewed should be recorded and retained. Up-to-date electronic means of recording interactions and communications should be required.

d. An additional requirement should be added that there be no real or apparent conflict of political, personal, financial or career interests of peer reviewers in the results of the peer review.

e. A requirement should be included that controlled notebooks be employed by each peer reviewer to record all pertinent activities, evaluations, rationale, conclusions, etc. Calculations and other information created for the peer review group by outside technicians, for example, computer operators, should be comprehensively incorporated into peer review records and retained.

f. A requirement should be added that peer reviews which serve a verification function should be under the direct control of the cognizant quality assurance manager with all peer reviewers having direct access to the quality assurance manager.

g. A requirement should be included that all records be incorporated into a records retention center or appropriate controlled storage facility within a month of date on which they were created.

11. The Section V, DISCUSSION appears to be largely unnecessary verbage since it duplicates information in the INTRODUCTION. I consider the section should be deleted.

12. A marked up copy of the subject GTP with additional editorial changes is included in this Attachment.

ATTACHMENT A to GTP Concerning Peer Review

1. The terms VERIFICATION or VERIFYING means (1) checking, auditing, and inspecting and other review of activities, subject to procedural control and performed by persons and organizations performing functions of attaining quality objectives; (2) checking, inspecting and other review of structure, system, and component, including barrier, characteristics which are safety-related; and (3) checking, inspection and other review of design, including the peer review of design procedures and/or design, but not including validation activities; all of which [(1), (2), and (3) above] are accomplished by persons or organizations assigned quality assurance functions as required by 10CFR50 Appendix B, Criteria I, "Organization". When used with reference to a computer code and as determined by context, VERIFICATION also means checking and review (accomplished by the persons or organizations responsible for creating or implementing the computer code, but not serving a quality assurance function included in (3) above) to demonstrate that the computer code performs the operations specified in a numerical model. The term VERIFY means to do verification as defined herein.

DISCUSSION:

This definition covers two common usages of the term VERIFICATION. The first definition is consistent with the connotation intended in Appendix B and standard QA usage. It is a "checkers" function and is related to checking specified functions or characteristics whether they be for hardware or design.

It also includes over-checking validation by use of peer reviews. Such an over-checking would be recognized to utilize a quasi-subjective process similar to the process which may have been used to accomplish the validation act in the first place. It is important to note that validation is a function of persons or organizations responsible for R&D. This is a key part of the definition of "validation" below. Verification of validation is to be accomplished, as necessary, by persons or organizations performing quality assurance functions.

In contrast to the definition for "validation" below, verification does not include the records themselves concerning the accomplishment of verification. These records are part of the records under the classification "Quality Assurance Records", discussed under 10CFR50 Appendix B, Criteria XVII.

ATTACHMENT A to GTP Concerning Peer Review

2. The terms VALIDATION or VALIDATING with reference to design means (1) the process, accomplished by persons or organizations responsible for obtaining quality objectives for design, confirming that procedures proposed for collecting, identifying and creating design, considering intended application, are sound, cogent, convincing and telling and having such rationale and being supported, by data such as to compel acceptance as evidenced by consensus of technically competent scientists and/or engineers in the pertinent technical disciplines; (2) the documents and records, including design, which are pertinent to or the result of the process of (1) herein, including evidence of consensus where such consensus exists. When used with reference to a computer code and as determined by context, VALIDATION means the documents and records confirming that a model as embodied in the computer code is a correct representation of the process or system for which it is intended. The term VALIDATE means to do validation as defined herein.

DISCUSSION:

This definition is consistent with the common definition of the root word "valid". The idea that validation applies to design procedures and is in way of establishing and documenting their quality, considering the subjective assessment of competent engineers and scientists, is noted. The subjective part of their judgement without documentation of their rationale does not constitute validation. Documentation is necessary to achieve validation for the record. The concept that the validation process is subjective only means that part of it is not controlled by procedure. Much of the validation process should be controlled by procedure, including such parts as the selection of personnel for peer review groups, document controls, requirements and procedures for producing records, and the identification and handling of data collected by validated design procedures. All aspects of validation can, however, be verified, including the subjective parts. These can only be verified by other subjective methods.

As can be seen in considering R&D purposes, the status of data--whether it has been collected or identified by validated procedures--is important for subsequent validation of proposed design procedures. Hence the need for using design procedures for site characterization and other R&D and the upgrading of existing data as necessary and possible becomes evident.

ATTACHMENT A to GTP Concerning Peer Review

3. The term DESIGN means (1) specifications, plans, drawings, blueprints, and other items of like nature; (2) the information contained therein; or (3) the research and development data pertinent to the information contained therein. When used with reference to an activity or as a verb, DESIGN means, respectively, the activity or act itself as inferred from the context, involved in producing information listed under (1) and (2) herein.

DISCUSSION:

This definition is consistent with the definition in Sec. 11 (i) of the Atomic Energy Act of 1954 as amended. The inclusion of the part of the definition which covers activities is consistent with common usage which implies the meaning--collecting or creating design (information). In addition since the NRC's rules generally use terms in a manner consistent with the applicable laws, it would be assumed that it was intended that Part 60 also use the term in a consistent manner. This position is specifically implied in the Discussion (Section 3.0) of the NRC Review Plan for Quality Assurance Programs for Site Characterization of High Level Waste Repositories.

4. The term DESIGN PROCEDURE means the description in a document or record of a rational, validated, quantitative or qualitative procedure for collecting or creating design, allowing for appropriate verification of actions accomplished in accordance with the procedure, including procedures for (1) evaluating and assessing the performance of conceptualized and/or defined natural or engineered structures, systems and/or components, including barriers and facilities, (items) relative to their functional goals, objectives and requirements and any other specified requirements, and (2) for accomplishing research and development, including exploration during site characterization pertinent to the items. DESIGN PROCEDURES include computer programs, utilizing models, and other automated processes and procedures, any of which accomplish evaluations, assessments, and interpretations regarding items, including interpretation of data pertinent to the respective items.

DISCUSSION:

The use of this term is consistent with common usage in many engineering projects which do not have R&D phases and which start out with validated design procedures. In addition however, item (2) of the definition specifically identifies that use of validated procedures are considered pertinent to the R&D phase, since the collection of pertinent, valid data is necessary to develop validated procedures identified in (1) of the definition. This usage is rare since application of formal QA controls, meeting 10CFR50 Appendix B requirements, involving procedures for R&D, including exploration, has been rare.

It should be noted that per the definition, design procedures must be validated for their intended application before they become design procedures. The term does not apply to candidate, analytical evaluation and assessment procedures, using models which have not been validated in design procedures and other rationale applied to the assessment of conceptualized items during R&D, including site characterization. Finally, the definition is entirely consistent with the definition of "design" which includes the reference to activities for producing certain (design) information.

Attachment A to GTP Concerning Peer Review

The concept that activities under a QA program should be accomplished in accordance with procedures so that verification, including QC, can be accomplished is commonly held. Hence "design procedure" as defined above allows the wherewithal to accomplish verification of R&D during site characterization, as well as subsequent to R&D, for example, during construction. The fact that R&D and other design activities may be accomplished without the benefit of procedural control is recognized. The information so collected or created is still "design" for example, research and development data, but its validity is not established. Procedures for validating information to whatever extent possible, particularly raw data and interpreted data, for use in subsequent validation of design procedures are themselves design procedures. (See discussion associated with the definition of validation below for further elaboration of its role in design.)

For example work which is not accomplished by procedure.

GENERIC TECHNICAL POSITION ON

PEER REVIEW

contains interpretation of raw data, accomplished without the benefit of a validated design procedure,

I. INTRODUCTION

The peer review process is usually employed as part of "those planned and systematic actions necessary to provide adequate confidence" in the work under review; where the "work" may be a design, a plan, a test procedure, a (research) report, a materials choice, or a site exploration. The major difference between peer reviews and other technical/scientific reviews, such as design reviews and technical reviews, is the degree of judgment that entered into the work to be reviewed. Thus, peer reviews are meant to "validate" while technical reviews verify. It is expected that some form of peer review will be used in a number of activities connected with site characterization, design, and performance assessment for permanent geologic repositories. This Generic Technical Position (GTP) provides guidance on methods which the NRC staff currently views as acceptable for the conduct of peer reviews. Other methods may be proposed, or used, and will be reviewed for acceptability by the NRC on a case-by-case basis.

The purpose of this GTP is to provide guidance to the Department of Energy (DOE) on the use of peer review as a means for providing adequate confidence in activities, data, and conclusions that will become bases for DOE's license application and NRC's licensing decisions. These activities include, but are not limited to the following: (1) development of plans, (2) development and choice of procedures and methodologies, (3) data taking and recording (data acquisition), (4) data analyses, (5) interpretations and conclusions based on the data, and (6) decision making.

Because of the inherent uncertainty of geotechnical data and their analyses, the need to make projections over thousands of years, lack of unanimity among experts, and the first-of-a-kind nature of repository-related technical issues for which standardized investigative procedures do not exist, more reliance is expected to be placed on the use of peer reviews as a means of establishing technical validity than has been the case in nuclear power plant siting and design. The NRC's regulatory basis for the assurance of quality for the repository program is found in 10 CFR 60, Subpart G. However, neither it nor other implementing standards provide guidance on the use of peer reviews. This GTP provides implementing guidance for what peer reviews are, determining when a peer review is appropriate, qualifications of peers, and guidance for the conduct and documentation of a peer review.

This GTP is applicable to reviews of a technical or scientific nature, and is not meant to be applied to issues of societal or economic nature.

work has been accomplished in accordance with procedures. However, peer review may also be used by an organization in performing a quality assurance function to verify the validity of design procedures.

See Report in comment

add words.

II. REGULATORY FRAMEWORK

The regulatory basis for peer reviews as a quality assurance measure is provided by 10 CFR 60, Subpart G, which states that the repository QA program is to be based on the criteria of Appendix B of 10 CFR Part 50 "as applicable, and appropriately supplemented by additional criteria as required."

The NRC QA Review Plan for permanent geologic repositories (June 1984) provides for the use of peer reviews to meet verification requirements (Section 3.8): "For...activities which involve use of untried or state-of-the-art testing and analysis procedures and methods, or where detailed technical criteria and requirements do not exist or are being developed, a peer review should be conducted. The procedures defining the selection process for a peer group, and the process by which the peer group conducts its review should be described."

DOE's Quality Assurance Management Policies and Requirements (October 1985) states that "an important aspect of quality achievement in the program is the ability to demonstrate the adequacy of technically significant data and documents"... by subjecting them to quality verification activities. "Quality verification activities are to include formal technical reviews, design reviews, peer reviews, and change controls, as appropriate... The results of such reviews [must] be auditable and retrievable from a records management system."

III. DEFINITIONS

Peer

A peer is a person knowledgeable in the subject matter to be reviewed (or a critical subset of the subject matter to be reviewed) to a degree at least equivalent to those who performed the original work.

Peer Review Group

A peer review group is an assembly of peers representing an appropriate spectrum of knowledge and experience in the subject matter to be reviewed, and will vary in size according to the subject matter and importance of the subject matter to safety or waste isolation.

Peer Review

A documented, critical review performed by personnel who are independent of the work being reviewed but have technical expertise equivalent to those who performed the original work. Peer review is an in-depth critique of assumptions, extrapolations, methodology, and acceptance criteria employed, and of conclusions drawn in the original work. Peer reviews determine the adequacy of work.

Technical Review

A documented single or multidisciplinary review performed by technically qualified personnel who are independent of the original work performed. Independent technical reviews are analyses and evaluations of technical documents, material, or data that assess the technical applicability, correctness, adequacy, and completeness of documents, data, and conclusions. Technical reviews determine the accuracy of work.

Peer Review Report

A documented in-depth report of the proceedings and findings of a peer review.

Validation

The documented determination of the adequacy (acceptability) of the work under review.

Verification

The documented determination of the correctness (accuracy) of the work under review.

IV. STAFF POSITIONS

1. A peer review is required when:

validation of design

- the ~~validity of information (e.g., data, interpretations, test results, design assumptions, etc.) or the acceptability of procedures and methods~~ is essential to showing that the repository ~~system~~ meets or exceeds ~~its~~ performance requirements with respect to safety and waste isolation; *and requirements of 10 CFR 60 and validation*

geologic

- the validity of this information cannot be otherwise established through ~~adequate~~ *adequate* means such as testing, ~~or~~ alternate calculations or reference to previously established standards

2. ~~In general,~~ the following conditions are indicative of situations in which a peer review is ~~appropriate or~~ necessary *to achieve to accomplish verification.*

- Critical interpretations or decisions in the face of uncertainty.
- Decisions or interpretations having significant impact on performance assessment conclusions
- Novel or state-of-the-art testing ~~plans~~ *plans* and procedures ~~and~~ analyses
- Detailed technical criteria or standard industry procedures do not exist ~~or~~ are being developed *in the projects' R&D activities.*

and

Design

- Results of tests are not reproducible or repeatable.
- Data or interpretations are ambiguous
- Data validity is questioned--such data may not have been collected in conformance with an established QA program

3. ^{verification required} A peer review is recommended when the validity of a critical body of information can be established by alternate means, but there is disagreement within the cognizant technical community regarding the applicability or appropriateness of the alternate means.

Work performed by DOE and its contractors, which is used in support of the license application shall be subject to technical reviews. Examples of such work are: data collection, ^{development} development of test plans and procedures, and data analyses. ~~This review also includes~~ data and conclusions which are subsequently subjected to a peer review. For routine scientific and engineering work, technical reviews serve as the primary ^{quality control} measure, to provide assurance of the quality of the work. ~~Technical~~

to be the subject of technical reviews

as provided in QA plan

informal calculations

~~Reviews should not be confused with peer reviews.~~

5. ^{with} The number of peers comprising a peer group will vary with the complexity of the work to be reviewed, its importance to establishing that safety or waste isolation performance goals are met, the number of technical disciplines involved, the degree to which uncertainties in the data or technical approach exist, and other factors, including the extent to which differing viewpoints are strongly held within the applicable technical and scientific community concerning the issues under review. The collective technical expertise and qualifications of peer group members should span the technical issues and areas involved in the work to be reviewed. Technical areas more central to the work to be reviewed should receive proportionally more representation on the peer review group.

As a general rule, the size of the peer review group is less important than the professional stature of the peer reviewers, their ability to span the technical issues involved and represent major schools of scientific views, and independence.

6. Each peer reviewer ^{shall} should have recognized technical credentials in the technical area he or she has been selected to cover. The technical qualifications of the peer reviewers in their review areas of expertise should be at least equal to the technical qualifications of the persons who performed the work or analysis under review. The prestige of each peer, and hence of the peer review group as a whole, relates to the importance of the subject matter to be reviewed. Peers should represent a diversity of views but must have recognized technical/scientific credentials that can be verified.

redundant

7. Members of the peer review group should be independent of the original work to be reviewed. Independence in this case means that the peer (a) was not involved as a participant or technical advisor in the work being reviewed, and (b) has no past, existing, or anticipated financial stake in the work being reviewed. The independence criterion is not meant to exclude eminent

and has no other actual or perceived conflict of interest
 Political, personal, financial or career interests.

those who involve in valid by subject peer review means

consistent with the requirements which follow.
electronic means & other comprehensive recording techniques to provide credibility of the peer review process.

scientists or engineers upon whose earlier work certain of the work under review is based, so long as a general scientific consensus has been reached regarding the validity of their earlier work. Nothing in this section is intended to impede full and frank discussions between the peer reviewers and the performers of the original work during the review, however all such discussions shall be recorded by

8. The peer review process may vary from case to case, and shall be determined by the chairman of the peer review group, consistent with the guidance provided in this GTP. In meetings and/or correspondence the peer review shall evaluate and report on all specified items. Such items may include:

- Validity of assumptions
- Alternate interpretations
- Uncertainty of results, *with quantitative estimates when specific consequences if wrong?*
- ~~Appropriateness and limitations, of methodology and procedures being validated/verified.~~
- Correctness of application
- Correctness of calculations *beforehand with or without valid procedure*
- Validity of ~~conclusions~~ *design procedures and design decisions including range of application*

Procedures shall be developed for the peer review process to implement the guidance and staff positions in this GTP. ~~Written minutes~~ *Completed minutes* should be prepared of meetings, deliberations, and activities of the peer review process.

A written report documenting the results of the peer review ~~must~~ *shall* be issued. It is usually prepared under the direction of the chairman of the peer group, and is signed by each member individually. It should clearly state the work or issue that was peer reviewed and the conclusions reached by the peer review process (item 7 above), including minority positions. A listing of the reviewers and their qualifications should also be a part of the peer review report.

The report should also include individual statements by peer review group members reflecting dissenting views or additional comments as appropriate.

V. DISCUSSION

Peer review is a way of providing assurance that the work performed and data collected during site characterization will have an acceptable and demonstrable degree of quality. With routine day-to-day scientific and engineering work, assurance is normally achieved through design and technical reviews. However, due to the first of a kind nature of a repository, state-of-the-art testing, and inherent uncertainty in geotechnical and scientific work, peer review is a management tool whereby assurance can be reasonably achieved for certain technical and programmatic judgments.

unnecessary verbiage basically duplicates intro

equivalent
important of characterization especially with personnel selection and peer review process. Adequacy of reviewer's qualifications being reviewed.

As stated in the NRC Review Plan (June 1984), "DOE has overall responsibility for achieving and assuring the quality of high-level waste repositories." Thus, DOE has the responsibility to have, conduct, and document the peer review process in accordance with the guidelines set forth in this GTP. Failure to demonstrate adequate quality could lead to serious problems and delays in the repository program. The ultimate test for data, materials, assumptions, technical documents, etc., will be during the licensing proceedings. The function of the quality assurance organization in the peer review process is to verify that a peer review was conducted, when appropriate and that a qualified peer review process was followed.

During the site characterization phase, the staff expects that the results of peer reviews will be used as aids to the decision making process associated with testing, analysis, and interpretations of the geotechnical investigations. As contrasted with testing of metals and other materials, standard and conventional test methods for testing of geologic media either do not exist or are severely limited. There is inherent uncertainty in making projections of performance over thousands of years. The host materials are not homogeneous, the testing methods are not simple and test and analytic results are not precise. These facts necessitate independent interpretations by people with specialized experience in order to provide an additional measure of assurance for critical design assumptions, data, or analytic results.

The intent of a peer review is to pass judgment on the technical adequacy of the work or data submitted for review, to identify aspects of the work on which technical consensus exists, to identify aspects on which technical consensus does not exist, and to identify aspects of the reviewed work which the reviewers believe to be wrong or which need amplification. A peer review provides assurance in cases where scientific uncertainties and ambiguities exist, but in which technical and programmatic judgments and decisions still must be made.