



UNITED STATES DEPARTMENT OF COMMERCE  
National Bureau of Standards  
Gaithersburg, Maryland 20899

April 27, 1988

Mr. Charles Peterson  
Technical Review Branch  
Division of High-Level Waste Management  
Office of Nuclear Materials Safety and Safeguards  
U.S. Nuclear Regulatory Commission  
Washington, DC 20555

Dear Mr. Peterson:

As a result of our meeting of April 20, 1988, on ways of improving NBS reviews of HLW literature, we have the following recommendations to make on the format of reviews to be conducted by the NBS. Below you will find a list of changes and a description that will be used for advising reviewers on the information to be contained in sections.

1. Add a section titled PURPOSE.

Purpose -- If the author states the purpose, give that; if not, give your perception of what the purpose must have been.

2. Add a section titled CONTENTS.

Contents -- List the number of pages, figures and tables, and some breakdown (as appropriate) of subsections, e.g. literature survey 15 p, test methods 2 p, discussion 1 p.

3. Add a section titled CONCLUSIONS.

Put the conclusions of the author in quotes whenever the author's words are used without interpretation or paraphrasing.

4. In the section on APPLICABILITY TO LICENSING, make the following change in the title:

Change (c) General Comments on Licensing to (c) Comments Related to Licensing.

5. Create a new section titled RECOMMENDATIONS.

Recommendations -- Especially list what additional tests should be conducted or what types of additional data are needed to resolve selected issues or questions. Any newly identified problems will be used to update a list of NBS identified materials problems that includes statements on the types of additional data, models, etc. that are needed to answer outstanding questions.

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7. In the section on AMOUNT OF DATA, the NBS has been listing all captions on tables and figures; we will continue the practice (as described on the Waste Package Data Review Form Guidelines, provided that adequate support staff is available for this purpose.

Please review our suggested changes and advise me of any pertinent NRC views on this topic, so that we may plan to implement any changes that seem warranted.

Sincerely,



Charles G. Interrante  
Program Manager  
Corrosion Group  
Metallurgy Division

## Waste Package Data Review Form Guidelines

### DATA SOURCE

Full document reference. This section may be completed for the reviewer before he/she receives the document. If completing this section yourself, use the following format:

#### TECHNICAL REPORT:

Pitman, S. G., "Slow-Strain-Rate Testing of Steel," Rockwell Hanford Operations, SD-BWI-TS-008, August 1984.

#### CONFERENCE PAPER:

Abrajano, T. A., Jr. and Bates, J. L., "Transport and Reaction Kinetics at the Glass: Solution Interface Region: Results of Repository-Oriented Leaching Experiments," in Materials Research Society, 1983 Symposia Proceedings, Vol. 26, Scientific Basis for Nuclear Waste Management, McVay, G. L. (editor), North-Holland, 1984, p. 533-542.

### DATE REVIEWED

Give the date the document review was completed. Add an additional date each time that the review is revised, e.g. 11/25/86; Revised 12/01/86.

### PURPOSE

If the author states the purpose, give that; if not, give your perception of what the purpose must have been.

### CONTENTS

List the number of pages, figures and tables, and some breakdown (as appropriate) of subsections, e.g. literature survey 15 p, test methods 2 p, discussion 1 p.

### TYPE OF DATA

- (1) Scope of the Report, e.g. Experimental, Theoretical, Literature Review, Data Analysis.
- (2) Failure Mode or Phenomenon Studied, e.g. Corrosion, Creep, Fatigue, Leaching, Pitting, Hydrogen Embrittlement, Debonding, Dealloying

## MATERIALS/COMPONENTS

Description of the material studied, e.g., 304L stainless steel, brass, zircaloy cladding, welds in 316 stainless steel, packing material, basalt. Also describe, if specifically addressed, component parts, e.g. the screw-type cap on a waste cylinder.

## TEST CONDITIONS

- (1) State of the material being tested -- cold worked or annealed 304L stainless steel, thermo-mechanical history of the material (or component) studied.
- (2) Specimen Preparation -- prestressed, precracked, size, type of specimen.
- (3) Environment, pressures, and other test parameters of the material being tested, e.g. aqueous environment, radioactive surrounding, electrolytes or corrosive agents present, temperature and pressure (externally applied or not) during the test.

## METHODS OF DATA COLLECTION/ANALYSIS

This section includes data measurement methods and types of data measured, as well as data analysis techniques, e.g. electron microscopy, weight loss vs time, slow strain rate tensile test, x-ray diffraction, differential thermal analysis, A.C. electrical resistivity using a Wheatstone bridge, mass spectroscopic chemical analysis of the corrosive environment, Latin Hypercube method, Monte Carlo techniques.

## AMOUNT OF DATA

This section includes the number of tables and graphs together with their titles and axes (including the range in values). If a listing of figure and table titles is provided, the reviewer should add the limits given on each axis, i.e. for temperature, or other explanatory information as appropriate.

Sometimes a synthesis is preferable to a listing of table and figure titles:

Five tables of temperature and time data for five molten-glass pouring operations, each table including the data from ten sensor locations. The temperatures ranged from 1100°C to 0°C over a time period of 24 hours.

### UNCERTAINTIES IN DATA

Included here are error bars and uncertainties in the data as stated by the author. This also includes qualitative statements by the author on the reliability of the data:

The author states that, "Temperatures carry an accuracy of +5°C while the times are reported to within +15 sec. It was felt that under real glass pouring operations (without well controlled crucible cooling) the temperature-time curves will be shifted to somewhat higher temperatures than shown here."

### DEFICIENCIES/LIMITATIONS IN DATABASE

Statements by the author on the applicability of the data are given here:

The author states "Extrapolation of the temperature-time (time < 24 hrs) data presented here to times in excess of 100 years should not be performed." The data presented here is useful only for indicating trends and qualitative parameter relationships, not for the purpose of presenting absolute values.

### KEY WORDS

These are to be checked off on the keyword checklist. In general, these keywords should reflect the information given in the above categories discussed above. Additional keywords, which are truly different from terms on this list, should be added to the list under the category "other" which appears at the end of each keyword list.

### CONCLUSIONS

Put the conclusions of the author in quotes whenever the author's words are used without interpretation or paraphrasing.

### GENERAL COMMENTS OF REVIEWER

The reviewer's general comments on the document. This category is wide open as far as content. It contains information the reviewer did not enter into any of the above categories, but which is considered important for the reader to know. It is also in this section that the reviewer would put any of his/her comments on the deficiencies and uncertainties in the data and analysis:

This is a very comprehensive review of the literature on the temperature sensitization of stainless steels. Even though it neglects the definitive work of Bertocci, Shull, Kaufman, and Escalante [Phys. Rev. J13, (1979), pp. 15-358] in this area (presumably because of the difficulty in locating this document), this review still considers a sufficiently large number of other investigations to provide a good understanding of the present status

of the field. The one discordant note here, however, is that it would have been a much more useful review if stainless steel types 301, 303, 304, 316, and 440°C had also been addressed.

Statements such as, "Further tests in this area are needed," or "More data is required," require an explanation. To state the need is valuable; such statements, however, do not provide enough information.

Abstracts taken from the document to be reviewed will be attached to the review. The abstract is also available in the database. Therefore, references to the abstract may be made.

#### RECOMMENDATIONS

Especially list what additional tests should be conducted or what types of additional data are needed to resolve selected issues or questions. Any newly identified problems will be used to update a list of NBS identified materials problems that includes statements on the types of additional data, models, etc. that are needed to answer outstanding questions.

#### RELATED HLW REPORTS

The report number(s) of any report(s) known to be directly related to the report being reviewed should be entered here so that these reports may be cross-referenced in the database.

The reviewer might also indicate any other reports taken from the reference list (in the report being reviewed) that should be acquired and included in the database.

#### APPLICABILITY OF DATA TO LICENSING -- READ, BUT DO NOT COMPLETE THIS SECTION, NOT TO BE FILLED IN BY THE REVIEWER

Indicated here is the licensing issue addressed by this paper. It is either (a) a specific Listed licensing Issue in an NRC Site Characterization Plan (ISTP) or (b) a new issue not yet identified in an ISTP.

The ranking of the paper is determined as follows: The "Key Data" box is marked if the paper contains data that is of sufficient quality that it must be considered by NRC in an evaluation of a license application. Such a paper must meet at least one of the following criteria: (1) it is an in-depth review of the pertinent literature, (2) it contains data that is found to be especially significant after being assessed for scientific merit and quality, or (3) it contains data with such a small uncertainty that it must be considered in a performance evaluation of a license application. If the paper does not meet any of the above three criteria, it is indicated as "Supporting Data".

Reviewer's comments on the listing of the document may be included with the appropriate Issue Listing in subcategory (a) or (b).

AUTHOR'S ABSTRACT

The author's abstract is given whenever available. Usually, it presents key numerical data. Whenever it does not, the reviewer is asked to furnish key numerical data within the review. These key data may be placed in any appropriate section of the review.

NBS Review of Technical Reports on the High Level Waste Package  
for Nuclear Waste Storage

DATA SOURCE

- (a) Organization Producing Data
- (b) Author(s), Reference, Reference Availability

DATE REVIEWED:

REVIEWER:

PURPOSE

CONTENTS

TYPE OF DATA

MATERIALS/COMPONENTS

TEST CONDITIONS

METHODS OF DATA COLLECTION/ANALYSIS

AMOUNT OF DATA

UNCERTAINTIES IN DATA

DEFICIENCIES/LIMITATIONS IN DATABASE

KEY WORDS

CONCLUSIONS

GENERAL COMMENTS OF REVIEWER

RECOMMENDATIONS

RELATED HLW REPORTS

APPLICABILITY OF DATA TO LICENSING

[Ranking: key data ( ), supporting data ( )

- (a) Relationship to Waste Package Performance Issues Already Identified
- (b) New Licensing Issues
- (c) Comments Related to Licensing