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TDB-6

GUIDELINES FOR THE INDEPENDENT PEER REVIEW OF TDB REPORTS

Hans Wanner

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Le Seine-St. Germain
12, Bd. des Îles
F-92130 Issy-les-Moulineaux
FRANCE

Guidelines for the Independent Peer Review of TDB Reports

The reports resulting from the critical reviews of chemical thermodynamics within the NEA-TDB project are reviewed independently by qualified experts. The independent peer review is performed according to the procedures outlined in the present document.

1 Terminology

The independent peer review of the NEA-TDB reports on the critical review of chemical thermodynamics is in fact a “peer review of a peer review”. Hence, there are two fundamentally different groups of peer reviewers: those who are the authors of the reports on the critical review of chemical thermodynamics, and those who review these reports independently. We will use the term “author” for the primary reviewers (as they are indeed the *authors* of the NEA-TDB reports) and the term “reviewer” for the independent reviewers (as they *review* these NEA-TDB reports) in this document, to avoid ambiguities and misunderstandings.

The term “key element” is used for the element the NEA-TDB review focuses on. Uranium, for example, is the key element in the NEA-TDB report on uranium thermodynamics. The term is mainly used in conjunction with auxiliary data, *i.e.*, data on chemical species that do not contain the key element but that are needed in the evaluation of the key element data.

2 Introduction

The reports to be reviewed contain detailed discussions of the data selection resulting from the critical review of the chemical thermodynamics of a particular element. The purpose of the additional peer review described in the present document is to receive an independent view of the judgements and assessments made by the primary reviewers, to verify assumptions, results and conclusions, and to check whether the relevant literature has been exhaustively considered. The independent peer review is performed by scientists having technical expertise in the subject matter to be reviewed, to a degree at least equivalent to that needed for the original review. The number of experts to carry out the independent peer review will typically be between four and eight.

3 Selection of the Reviewers

After having performed a critical and exhaustive assessment of the available literature, the authors of the NEA-TDB reports will naturally be in an excellent position to identify specialists who have the technical expertise required to carry out a peer review of these reports. In this context, it is essential to realize that, given the basic, scientific nature of the NEA-TDB reports to be reviewed, the authors in general have a strong interest in receiving critical comments from other knowledgeable scientists, and to discuss and compromise on specific points where there may be disagreement or misunderstandings. It is therefore very unlikely that the authors try to suggest reviewers who *a priori* agree with their assessments.

After consultation with the team of authors, its Chairman will present a list of potential reviewers to the NEA-TDB Project Coordinator. The qualifications of the scientists suggested as reviewers will be verified and recorded by the NEA-TDB project coordinator. The NEA-TDB project coordinator will contact the reviewers suggested and will ensure that they are willing and able to perform the review work requested. The peer reviewers will then be submitted to the TDB Executive Group and Management Board for final approval. The NEA-TDB project coordinator will also make sure that all the sections of the reports to be reviewed are adequately covered by the proposed team of reviewers. The peer review records will be permanent records maintained by the United States Department of Energy (US-DoE), and can be handed out to similar bodies in other countries on request.

After agreement between the NEA-TDB Project Coordinator and the Chairman of the team of authors, the complete list of reviewers will be presented to the TDB Management Board for approval. The Executive Group should be consulted by the Project Coordinator prior to submission of the names to the Management Board.

Finally, the NEA-TDB Project Coordinator will provide each reviewer with a detailed list of the sections for which the reviewer is responsible. This list will be provided on the form represented in Figure 1.

4 Peer Review Procedure

A detailed outline of the scope of each reviewer's task is distributed by the NEA to all the members of the review team. Publications referred to as "in press" in the report to be reviewed are supplied by the NEA. Each reviewer also receives from the NEA, for each peer review subject, a form called the "Peer Review Comment Record" (Figure 2) and its continuation form (Figure 3), where any comments by the reviewer may be documented in the column "Reviewer's Comments". Copies

of the continuation form (Figure 3) are used for more comments if the available space on the supplied sheets is insufficient. If a reviewer has no comment, this is documented on the Peer Review Comment Record. After completion of the review, the Peer Review Comment Records are submitted to the NEA.

The Peer Review Comment Records are then sent to the relevant authors by the NEA, and, for information, to the Members of the Executive Group. The author presents, in the column "Resolution" (Figures 2 and 3), his solution to the comments and questions raised by the reviewer and sends the Peer Review Comment Records back to the NEA. It is assumed that this process takes no longer than two months.

Subsequently, the NEA sends the Peer Review Comment Records back to the corresponding reviewers for approval. The reviewer indicates, in the column "Reviewer's Disposition", whether he accepts the resolution presented by the author concerning the reviewer's comments. He submits, after a period not exceeding one month, the Peer Review Comment Records to the NEA.

The peer review is accomplished if the "Reviewer's Disposition" column of the Peer Review Comment Record contains only acceptances and no rejections. If a reviewer rejects the author's resolution, the NEA may decide to arrange for an oral discussion of the problem matter between the author and the reviewer, or to continue the iteration process between the reviewer's comments and the author's resolutions. In any case, the comments and resolutions resulting from either oral discussions or further iteration by correspondence, are recorded on the Peer Review Comment Records and distributed as described above. If there are points of disagreement between the author and the reviewer which cannot be resolved, the author's view will be maintained with the reviewer's opinion outlined in a footnote in the report. No peer review can be regarded as accomplished unless the resolution is clearly documented and the reviewer has given his written agreement to the final disposition of the comment.

The NEA sends copies of all the Peer Review Comment Records received to the US-DOE for registration. These records can be handed out to similar bodies in other countries on request.

5 Details of the Peer Review

This section summarises the review criteria. Each reviewer is required to read the whole document to be peer reviewed, even though his responsibility as a reviewer is only for a subset of the document. This is essential for the understanding of the scope of the review, the level of detail of the discussions, and for the consistency with other sections.

Each review report on the chemical thermodynamics of a particular element

(the “key element”) contains, in addition to the selected key element data, a table containing the selected auxiliary data. The table of selected auxiliary data contains all the data selected within the NEA-TDB project since its beginning. The selection of new auxiliary data is discussed in a separate chapter. Auxiliary data are needed in the NEA-TDB critical review for evaluations of the data for key element species, and it is essential for the correct application of the selected data set of the key element that the consistent set of auxiliary data presented in the report is used. Since the focus of the NEA-TDB critical reviews is not on these auxiliary data, exhaustive reviews and in-depth evaluations (as they are done for the key element data) have not been performed on the auxiliary data, and the qualification requirements are therefore not the same for key element data and auxiliary data. The following list has therefore been divided in two parts, the first one for the “key element data”, the second one for “auxiliary data”.

5.1 Key Element Data

The review criteria listed below concern the discussion of the data selection and the underlying source references for species containing the key element. The relevant sections of the NEA-TDB reports are the selected data table, the discussion of the data selection and the appendix containing the discussion of selected references. For each selected (or rejected) value, and for each reference considered, the following questions need to be addressed:

- a) **Judgement of reference(s):** Is the judgement of the reference(s) correct? It is recalled that some references are discussed separately in an appendix. Is the justification sufficient for the rejection or acceptance of a reference or a value reported in a reference?
- b) **Quality of evaluation procedure:**
 - Are the methods used and assumptions made for data correction and extrapolation appropriate?
 - Have shortcomings in the experimental or evaluation procedure been spotted and accounted for correctly?
 - Have all the possible and significant side-reactions been taken into account?
- c) **Quality of results:** Are the results of the evaluation, *i.e.*, the selected values, consistent with the expectations? If not, are there errors in the calculations?

- d) **Uncertainties:** Are the uncertainties assigned by the review reasonable?
- e) **Completeness of relevant literature:** Are the underlying source references exhaustive? If not, give missing references.
- f) **Estimated or predicted data:**
 - Is the estimation method used adequate for the purpose?
 - Does the estimated value appear reasonable?
 - Is the uncertainty assigned to the estimated value reasonable?

5.2 Auxiliary Data

It is recalled that the auxiliary data set must be complete at least with regard to the needs for the evaluation of the thermodynamics of the key element. The auxiliary data set is not claimed to be “complete” for application purposes. The relevant sections of the NEA-TDB reports are the selected auxiliary data table and the discussion of auxiliary data selection.

- a) **Quality of selected values:** Are the selected values reasonable? If not, are there errors in the calculations?
- b) **Uncertainties:** Are the uncertainties assigned to the selected values reasonable?
- c) **Consistency with literature values:** Do major discrepancies exist between the selected value and other values published in the literature but not mentioned in the document? In this case, the discrepancies are to be outlined. It is recalled that in the case of auxiliary data the underlying literature need not be exhaustive.
- d) **Completeness of auxiliary system:** Are there any gaps in the set of species used to describe the system given? If this is the case, the missing species (and literature sources) are to be listed along with a justification for their importance in the relevant system. It is recalled that the auxiliary data are only needed for the calculation cycles of the key element data. No additional needs for auxiliary data by the user is anticipated.

