International Atomic Energy Agency INDC(NDS)-454

INDC INTERNATIONAL NUCLEAR DATA COMMITTEE

IAEA INTERNATIONAL DATABASE ON IRRADIATED NUCLEAR GRAPHITE PROPERTIES

5TH MEETING OF THE TECHNICAL STEERING COMMITTEE
(3-4 September 2003, IAEA Headquarters, Vienna, Austria)

Prepared by:

D. Humbert[a] and A.J. Wickham[b]

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March 2004

Abstract

This report summarizes the Consultant Meeting "5th Meeting of the Technical Steering Committee for the International Database on Irradiated Nuclear Graphite Properties" held on September 3-4, 2003 at IAEA Headquarters in Vienna. The purposes of the meeting were to review the matters and actions identified in the previous meeting, undertake a review of the current status of the database and to make recommendations for actions for the next year. The purposes of the meeting were fully met. This report contains the current status of the identified actions as well as a summary of the recommendations on enhancements to the database.

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March 2004

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Appendices

IAEA Consultants Meeting, "5th Meeting of the Technical Steering Committee for the International Database on Irradiated Nuclear Graphite Properties"

IAEA Headquarters, Vienna, Austria
3rd-4th September 2003
Executive Summary

Chairman: A.J. Wickham
Scientific Secretary: D. Humbert

Preamble

An IAEA Consultants' Meeting was held by the Technical Steering Committee for the International Database on Irradiated Nuclear Graphite Properties at IAEA Headquarters, Vienna on September 3rd-4th, 2003. First welcoming statements for the closed session were given by R.E.H. Clark (IAEA) on behalf of the IAEA, and by A.J. Wickham (UK, Steering Committee Chairman). It had been decided that the first morning session, where administrative and financial points were discussed, would not be open to Observers. The following were present: A.J. Wickham (UK, Chairman), D.Humbert (IAEA, Scientific Secretary), R.E.H. Clark (IAEA), K. Sheikh (IAEA, closed session only), G. Haag (FZJ Germany), A. Smaizys (LEI Lithuania), T. Burchell (ORNL, USA), and J.G. Van der Laan (Netherlands, NRG). Although attending as an Observer on behalf of France, J.C. Robin (CEA) was present at this 'closed' session because he was preparing a case for CEA managers to consider full Membership. Japan was unable to provide a representative for this CM[1].

Observers from Russia and China had been invited, but had not responded (in the latter case because of the SARS situation).

The Chairman welcomed Mr. Smaizys as the new representative for Lithuania and made reference to the valuable contribution of Mr. Levinskas.

Confidential information (*e.g.* financial data) which are available only to the IAEA and to Official Representatives of the Member States of the Database are contained in a separate Confidential Addendum.

[1] The Chairman subsequently spoke about this lack of representation with managers at JAERI Oarai plant. It was clear that changes in management and in policy (forthcoming privatisation) had led to an unexpected decision not to participate further, at least until certain data evaluation work was completed. As no such evaluation work has been agreed by the Committee, the Chairman persuaded JAERI to send a representative to the 2004 CM to present a case for it. It was then amicably agreed that JAERI would now continue to provide a permanent representative on behalf of the Japanese membership to the Database activity. The invitation for 2004 should be sent to Dr. Masahiro Ishihara at JAERI Oarai site. The representative may be himself, Dr. Tatsuo Iyoku who is head of the HTTR operations, or Dr. Junya Sumita.

Session 1: Closed Session (Administrative Matters)

1. *Discussion on Arrangements by which IAEA collects Voluntary Contributions for this Project from the Sponsors, Difficulties Encountered, and Future Prognosis*

Mr. Humbert presented an overview of the contributions from the different sponsors since 1999 (see table 1 in Addendum). Details are available in the Restricted version of the report.

2. *Current Financial Situation*

An income and expenditure account for the calendar year 2003 was presented by DH (see table 2 in Confidential Addendum). A statement of the expected income from sponsors for year 2004 at the time of the Consultants' Meeting is also given as Table 3.

The Meeting agreed that incomes would now be sufficient to face the future expenses of the database (new developments on the interface, revision of old data, collection of new data, issues of CD-ROMs).

The Chairman drew attention to the future problem that no sponsorship funding could be guaranteed indefinitely and that all members needed to think about possible sources of future income. Mr. Haag suggested that one route to future funding might be to let additional Member States join with a financial contribution rather than a contribution of data. This has implications for the Working Arrangement and may also cause problems for some existing Member States.

3. *Issue of Contracts by IAEA*

Details are available in the Restricted version of the report.

4. *Data Security*

The committee agreed that documentation on the database should be at the **Restricted Level** within the defined levels of classification within the IAEA. It is noted that this is an IAEA internal classification and does not have any direct correlation with any classification systems external to the IAEA nor with the classification of graphite data as described in the Working Arrangement. This level accurately reflects the requirements for protection of the database as expressed by the database Members. Members were asked to note that the classification of any document as Confidential or higher would prevent the Agency from distributing it and some Agency officers even from handling it.

Mr. Clark explained that a corollary of this decision was that this and future meetings of the Database Technical Steering Committee would now formally be known as Consultants' Meetings (CM).

5. *Graphite Database Web Site*

Mr. Humbert had reviewed the Graphite website (now *http://www-amdis.iaea.org/graphite/*) and had updated the homepage, sponsor page and members page. Participants of the meeting were asked to review these pages and propose corrections and improvements. Mr. Humbert will stay web manager of the site (replacing Dr. Jeff Stephens).

"Hits" on the homepage are quite significant: around 500 in 2001, 1000 in 2002 and at present time about 1400 for 2003. Access to this page is done mostly through search engines (such as Google or Yahoo) and robots, as this page is nowhere referenced. The page has been moved from an earlier site address and a redirection from the old URL to the new one is effective.

IAEA (A&M Data Unit) agreed to put a link on the graphite site to sponsors own websites, and hoped that the Sponsors would reciprocate.

Action 1: (All) Review the above website page and send comments to Mr. Humbert.

Action 2: (Mr. Humbert and Sponsor's representatives) To place hyperlinks to the Sponsoring organisations on the Database webpage.

Session 2: Open Session ***(remainder of First Day)***

The following additional delegates joined the Meeting as Observers: G. Heys (HSE NSD, UK); M. Srinivasan, NRC, USA); F. Gerstgrasser (SGL Carbon, Germany); P. Homerin (Graftech, France), and S-H Chi (KAERI, Republic of Korea). Mr. A. Nichols (IAEA) joined briefly to welcome all delegates on behalf of the Agency.

The Chairman outlined the business of the earlier "closed" session for the benefit of those who had just joined the meeting, explaining that it had been decided that it was inappropriate to discuss financial details of sponsorship and contracts in an open meeting.

The Agenda was agreed, and the Minutes of the 2002 TCM were accepted.

All Actions had been addressed as follows:

1. Copies of the Minutes of the 2002 Meeting were sent by IAEA to M. Robin (CEA), M. Barbier (CEA), M. Piotrowski (EdF) and Mr. Rahmani (EdF). The Chairman asked that this be continued again in respect of Mr. Rahmani (Mr. Robin of CEA would receive the 2003 Minutes automatically).

Action 3: (Mr. Humbert) To send the 2003 CM Minutes to M. Rahmani of EdF CIDEN, Villeurbane, France in addition to the normal distribution.

2. Mr. Clark had written to CEA inviting them to consider possible formal membership for France. M. Robin of CEA was present.

3. Mr. Burchell was continuing to encounter difficulties with Hanford data, but was pleased to Table a considerable quantity of these data together with other data on H329 and H429 graphites extracted under contract to NRC. Mr. Srinivasan of NRC had agreed that these data should be added to the Database as soon as possible.

4. Action on overdue sponsorship payments covered above.

5. The specification for the software upgrade had been agreed and the contract was (just) in place. Mr. Hacker (IDD) had completed a significant body of work in advance of receiving the formal contract and it would be presented to the CM on the second day.

6. Mr. Levinskas had encountered copyright problems with his plans to provide translations of Russian papers. It was agreed that Mr. Smaizys should seek to make some progress with a limited number of documents if possible, using Database funding.

Action 4: (Mr. Smaizys) To proceed with a limited amount of translation work if possible, using Database funding at the approximate levels previously agreed per document by Mr. Levinskas.

7. Details of the TWGGCR Meeting had been provided, and Mr. Haag and the Chairman had attended.

18th Meeting of the TWGGCR, Istanbul, June 2003

The Chairman presented a new report on the activities of the Graphite Database since the previous TWGGCR which had been held in South Africa in the absence of any delegate from the Database TCM. On the previous occasion a paper critical of the PBMR Co. policy had been offered from the Database TCM and, in the absence of proper presentation in context, had not been well received. The Chairman was given the opportunity to re-present and explain this earlier report, emphasising that the concerns about the lack of data for design purposes of HTR reflectors were intended to help and assist companies involved to minimise the potential risks encountered and to learn from the lessons previously obtained on older plant. For PBMR Co., Mr. J. Slabber accepted the report in Istanbul and also the Chairman's assurance, and it was pointed out that certain design changes had now been implemented to the PBMR along with a commitment to commission some graphite irradiation tests to support PBMR development.

With the commitment to safe and successful development of new graphite reactors agreed by all parties, the Chairman went on to give a short demonstration of the existing Graphite Database for TWGGCR members who were unfamiliar with it, using non-confidential data for illustration. This appeared to have been well received.

Membership of the Database

The Chairman mentioned the position of the Japanese membership already referred to above, (*subsequently resolved, see earlier footnote 1*). He said that he hoped to welcome France into full membership before too long. No other applications had been received.

The Chairman reported that Japan had indicated by e-mail an expectation that a data evaluation would take place as part of the Database activity, and that they had planned not to participate any further until this was complete. As no other Member was aware of any commitment to evaluation, the Chairman agreed to discuss this situation on a forthcoming visit to Japan.

Outstanding Issues from Previous Meetings

1. DPA Conversion Factor. A lengthy discussion on this topic led to agreement on a value of 7.62×10^{20} relative to EDN, to be added to the Table present in the Database[2]. Outstanding concerns and a further factor need to be confirmed at the 2004 CM.

Action 5: (All) To consider the dose conversion factors agreed for DPA and proposed for ^{54}Fe, for ratification at the 2004 meeting.

2. Promised and Requested Data

3. Extension of Database Scope

4. Prioritisation

these three topics are taken together:

It was clear that much data remained available for inclusion in the database including:

- Data from Japan (Level 2 Restricted) already made available in 2002 but not yet included
- Data from NRC compilation, from Hanford and further data from GA reports (USA)
- Further data from BNFL and British Energy (UK) for their respective Level 2 Restricted files, together with additional data from BR-2 experiments
- Considerable quantities of German data under preparation by Mr. Haag, much of which is previously unpublished and which includes a body of data from the Petten reactor

The meeting was persuaded that the Japanese L2R data should receive the highest priority for inclusion in the next edition of the Database, followed by data currently in preparation by Mr. Haag, after which the USA data would be input.

In view of this workload, and with due consideration to the funding provisions, it was agreed that work on pyrocarbon materials, matrix materials (treated as graphite), and fuel-compacts should be deferred. Mr. Chi was encouraged nonetheless to consider the preparation of some ion-irradiation data on suitable graphites, which would form part of the hoped-for Korean Membership commitment. If the most up-to-date template was used for such preparation, it could be entered into the system very quickly.

Action 6: (Mr. Hacker, Mr. Haag, Mr. Burchell) to prioritise and prepare data according to the wishes of the meeting.

Mr. Smaizys made a strong plea for the inclusion of the needs of those committed to decommissioning in the Database. The Chairman commented that this had been discussed before, but the issue had been deferred because it was felt that reactor data in this area tended to be unique and not easily translated to other reactors. However, he had received signals

[2] Subsequent to the Meeting, M. Van der Laan discussed some outstanding doubts about the data source for this factor, and agreed to resolve them with Mr. Burchell, the agreed factor to stand for the meantime. Subsequent work by Mr. Haag on new data has revealed the need for agreement on a factor for conversion of doses measured as ^{54}Fe dosimeters, for which a factor of 0.9 is considered as the best factor available by the reference concerned.

recently from EdF (in anticipation of French membership), UKAEA in UK and earlier from PNNL in the USA that there were significant interests in this area, and perhaps the meeting could be persuaded that it should involve the Database in this area nonetheless.

It was agreed that consideration should be given to setting up a parallel database activity in this area which did not compromise the main thrust of work. This might need to find separate funding, from Member states directly or otherwise. Mr. Smaizys was asked to consider drawing up a plan for such an activity to be presented at the 2004 CM. The Chairman asked Mr. Robin if CEA and EdF might especially consider a contribution in this area.

Action 7: (Mr. Smaizys) To consider preparation of a proposal for a separate Database activity on decommissioning, to be presented and discussed at the 2004 CM

Action 8: (All) To consider how the Database activity might be expanded to accommodate the needs of those involved only in decommissioning of existing graphite reactors.

5. Database Security (standing item)

Members were content with the position. Mr. Robin asked for some clarifications in order to support the case for a French application for Membership. The Chairman commented that much of the security provision in place had been proposed by Mr. Bastien, formerly of CEA.

Database Development

The specification for the upgraded software, developed from the discussion at the 2002 TCM, is attached to these Minutes. Much greater detail had been discussed in separate meetings involving the Chairman, Mr. Haag, and Mr. Hacker of IDD. The Chairman had provided copies of notes of these additional meetings for Members, and asked that they familiarise themselves with the contents before a discussion with Mr. Hacker which would take place on the second day of the CM.

Mr. Haag made a strong case for retention of a paper or (later) .pdf or .jpg copy of all references arriving for data extraction and, where possible, the recovery of such a copy of the data sources already employed. This had always been an original aim of the Database, and there were occasions when sight of the original reference was invaluable. The meeting agreed that this should be done, but without prejudice to progress in the continued input of new information.

Session 3: Open Session *(second day)*

P. Hacker (IDD, Bristol, UK) and M. Methnani (IAEA) joined the meeting.

Database Development (continued)

Mr. Hacker demonstrated the progress that he had already made in re-configuring the Database Software to accommodate the wishes of the Members as discussed at the 2002 TCM. This showed particularly the functionality of the search against data parameters, which

has been extremely limited and frustrating to use in the existing editions of the Database because of the need to be aware of the contents of a reference before it can be searched.

The meeting welcomed Mr. Hacker's presentation and agreed that it went a long way towards their goals.

A long debate ensued on the detail of the upgrade and in particular on the searchable categories which needed to be added. A lengthy list was agreed, together with a number of sequencing issues on the search-category window[3].

A major issue raised by this discussion was the need to "retro-fit" existing Database entries to enable searching by new categories. This would be a significant volume of work in its own right.

A number of special issues were also identified, such as the situations where a sample had received more than one irradiation but this had not been identified when the data were first submitted. The issue of a unique sample number for such samples was necessary, distinguishing between the effects of the first and second (and total) irradiations when the data were presented.

Other small issues such as the identification of originating countries for data as "Various" due to insufficient information provided at the time of presentation to IDD, would also be addressed. The "vanishing" graphite toolbar would vanish permanently. Zeros and blank entries must be distinguishable.

One fundamental decision which was taken after much debate was in regard to data source, previously known in Database language as a "Volume", as a "***Reference***". This would avoid confusion in the categories table with the geometrical size of the sample.

It was agreed that Mr. Hacker should complete the software upgrade before the end of 2003 if possible (his contract date), but that there should NOT now be a CD-ROM issued in late 2003 as originally proposed because of the delays which had arisen through funding difficulties. Instead, a new CD-ROM operating with the new software should be targeted for issue in March 2004, incorporating as much new data provided by Mr. Haag as possible.

The Chairman and Mr. Haag would continue to monitor progress closely on behalf of other Members.

The Meeting expressed its thanks to Mr. Hacker for attending and for a presentation which had been very encouraging.

Action 9: (Mr. Hacker) To produce a CD-Rom operating under the new software by the end of March 2003

Action 10: (IAEA) To note the contractual implications of this change both for Mr. Hacker and for Mr. Haag

Action 11: (Mr. Haag) To prepare as much data as possible from those files already held on Excel templates into the new format, for inclusion in the CD-ROM to be issued in

[3] Subsequent to the meeting this list was again reviewed by the Chairman with Dr. Haag and Mr. Hacker, before issue of a final template to enable efficient input of new data. The list is not "closed": new categories can always be added but it was felt that it may sometimes be better to exclude some data in rarely-encountered categories rather than to enlarge the template indefinitely.

March 2004. In particular, to revise data previously issued where multiple irradiation of individual samples had not been previously identified.

It was agreed that the upgrade of the User Guide should again be deferred until the Software Upgrade was completed.

Mr. Burchell commented that his laboratory expected to generate a lot of chemical information about graphites over the next few years, and would like the committee to consider extending the categories of data further in due time. It was agreed that this would be a major Agenda item for the 2004 meeting.

Any Other Business

The Chairman presented information about the forthcoming Fourth International Nuclear Graphite Specialists Meeting in Marugame, Japan, hosted by Toyo Tanso Co. Ltd.

He also proposed that the Fifth such meeting should be held in the UK in September 2004, sponsored jointly by HSE Nuclear Safety Directorate and BNFL Research and Technology. This offer was gratefully accepted.

He then proposed that the 2004 IAEA CM should be held in the same venue immediately after this Fifth specialist Meeting. This was also agreed.

These details are subsequently confirmed as follows:

Fifth International Nuclear Graphite Specialists Meeting INGSM-5)

Location: Plas Tan-Y-Bwlch, Maentwrog, Gwynedd, UK *(this is a conference centre within the Snowdonia National Park, North Wales)*

Sunday 12th September (sessions commence 4.30pm) until Wednesday 15th September 2004

Meeting ends 1230pm but is followed by optional excursion to Wylfa Nuclear Power Station (Magnox)

2004 Committee Meeting for the IAEA Graphite Database

Same location.

Thursday and Friday 16th and 17th September 2004

All enquiries, room reservations etc. for both meetings will be handled through the Chairman (via confer@globalnet.co.uk)

A separate website for INGSM-5 will contain fuller information including suggestions for travel connections – this operates courtesy of Mr. P. Pappano of ORNL, USA, on https://www.ms.ornl.gov/INGSM-5/default.htm

Appendix A

IAEA Consultants' Meeting: "5th Meeting of the Technical Steering Committee for the International Database on Irradiated Graphite Properties"

3rd – 4th September 2003, IAEA, Room C-07-IV, IAEA Headquarters, Vienna, Austria

Chairman: Dr. A.J. Wickham (United Kingdom)
Scientific Secretary: Dr. D. Humbert (IAEA)

LIST OF PARTICIPANTS

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Appendix B

IAEA Consultants' Meeting: "5th Meeting of the Technical Steering Committee for the International Database on Irradiated Graphite Properties"

3rd – 4th September 2003, IAEA, Room C-07-IV, IAEA Headquarters, Vienna, Austria

Chairman: Dr. A.J. Wickham (United Kingdom)
Scientific Secretary: Dr. D. Humbert (IAEA)

MEETING AGENDA

Wednesday 3rd September 2003

09:30 ***Commencement of Closed Session for IAEA and Permanent Representatives only***

Welcome (IAEA: R.E.H. Clark, D. Humbert; Chairman: A.J. Wickham)
Administrative Details for the Meeting

Discussion on Arrangements by which IAEA collects Voluntary Contributions for this Project from the Sponsors, difficulties encountered, and future prognosis

Current financial situation of the project including:
- Current balance
- Debtors (current contracts)
- Income prediction
- Reasonable financial commitment for next financial year and subsequent years

View on financial position to be recommended to the full meeting for future work commitment

Procedure for issue of contracts to our Consultants for this project, following problems with excessive delays (D. Humbert)

i) Contractual Service Agreements
ii) Procurement for Technical Services

Security (restricted documents in IAEA)

Estimated finish time of closed session 1200h (coffee break when appropriate)

12:00 *Lunch*

13:00 **Commencement of Full Meeting including Observers**

Welcome (IAEA: A. Nichols, R.E.H. Clark, D. Humbert; Chairman: A.J. Wickham)

Report to full meeting on Discussion from Closed Session (Chairman)

Review of Agenda

Notes of the Previous Meeting (IAEA) and Actions/Matters Arising
unless covered elsewhere on Agenda

Report on the 18th TWGGCR (Chairman)

Membership of Database
Future Objectives: proposal from Japan for Data Evaluation[4]

leading to

Confirmation of Programme for next year (data input and upgrade of software are already planned).

Outstanding issues from previous meetings:

(i) DPA conversions – need to work towards an agreed conversion factor[5]
(ii) Promised or requested data outstanding – includes Hanford, and further data from UK
(iii) Extension of the scope of the Database to include pyrocarbons, matrix material and fuel compacts, ion-irradiation data
(iv) Prioritisation
(v) Database security (standing item)

Database Status (Haag/Wickham)

(i) Overall review of developments/progress since last meeting (Chairman)
(ii) Data awaiting input *and*
Issues raised by them (short revision of discussion from 2002 - Haag)
(iii) Report on Meetings in UK with Software Contractor (papers to be provided by Chairman)

Estimated Finish Time 1730h: these items may over-run to second day

A communal evening meal is proposed, as usual

[4] this is likely to be a brief discussion of the position, in the absence of a representative from Japan on this occasion

[5] there has already been a somewhat elliptical discussion on this issue lasting over three years. Despite some contrary observations, the determination of a correct factor does appear to need agreement on the displacement energy of the carbon atom. Hopefully this discussion can lead this time to an agreed position which can be presented in Japan at INGSM-4 and incorporated into the Database conversion table, since the dpa is the ASTM standard for the EU graphite irradiation experiment, at least, and is being used to define materials doses in other HTR projects.

Thursday 4th September 2003

09:00 *Dr. Paul Hacker of IDD Ltd, Bristol, UK (Software Contractor) joins the Meeting*

Review of Software Upgrade (with practical demonstration)

Members should note that the contract to IDD has only recently been awarded, and therefore the intention to have this work completed by the time of this meeting could not be realised. However, IDD have already made significant progress and will demonstrate the possibilities. We will then review the proposed changes systematically alongside the reports of the earlier discussions taken on the first day of the TCM. The objective here is to provide IDD with complete and fully clarified requirements by mutual discussion, and then the scope of the contract can be clarified with IAEA if significant changes arise from this discussion.

Agreement of Data Input and Software Upgrade timescales (Members/IAEA/IDD).

Document Archiving Options

Review existing proposals (Haag)
Use of WinDream – information from Dr. Fachinger of FZJ Germany
Permissions from Pergamon re Carbon Journal – consideration of others?
Progress with Lithuanian translations of Russian literature

12:00 *Lunch*

13:00 **Continued**

Upgrade of User Guide (*previously postponed until Software Upgrade in progress*)

Fourth International Nuclear Graphite Specialists Meeting[6] (Marugame, Japan, 13th – 16th September 2003)

Proposals for Fifth International Nuclear Graphite Specialists Meeting[7] and Appropriate Topics

Proposals for 2004 TCM

Any Other Business[8]

Close of Meeting

Estimated Finish Time 1700h with appropriate breaks for coffee and lunch

[6] International Nuclear Graphite Specialists Meetings are not Official IAEA activities but are organised in association with the Database TCM.

[7] The United Kingdom offers a meeting in September/October 2004 in the UK, with sponsorship from BNFL and HSE. The TCM might also consider holding the next TCM in the UK to precede the Specialist Meeting.

[8] The Chairman would appreciate advance notice of any significant item.

Appendix C

IAEA INTERNATIONAL DATABASE ON IRRADIATED GRAPHITE PROPERTIES

DRAFT SPECIFICATION FOR THE UPGRADING OF THE DATABASE SOFTWARE

1. *USER INTERFACE*: Simplify visual navigation through the system to minimise the number of overlapping screens (previous screens perhaps to minimise automatically?): ideally this will provide a simple pop-up or drop-down menu allowing direct access to any commonly-used screen and thus facilitate use by less-frequent users without continuous reference to the user Guide.[9] It should be obvious on-screen how to re-activate the "Graphite Toolbar" if it has been closed down.

2. *SEARCH FACILITIES:* Devise improved search facilities to enable searching on a range of properties and on groups of such properties. Ideally this will be on any combination of properties selected by the user, but Key Search Properties are defined as graphite identity (*i.e.* manufacturer's code), type, dose and temperature, these lying higher in importance than the actual property data themselves.[10] The first screen encountered should allow the user to define their search requirements explicitly: this could perhaps be a drop-down menu "Search by…?" option. The present property-selection screen often turns up blank output because one is required to "second-guess" what is in the volumes which have been selected. This is not satisfactory.

3. Widen options for properties to include fracture toughness, matrix materials, perhaps fuel-matrix data, and provide additional capacity for further properties to be included.[11] Also include for wider use of annotation notes where attention needs to be drawn to specific issues.

4. Provide for identification of data which are clearly erroneous (e.g. by check calculations) – perhaps to appear in red.

5. Initiate a unique sample code where multiple irradiations of the same sample under different references have taken place.

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[9] The committee feels that the present version of the Database software actually already offers simpler navigation that may appear to the casual user – however, this is rarely intuitively obvious and requires regular use and experience to achieve. This must therefore be improved, but may be a relatively simple task.

[10] In many cases, some or all of this information is missing in existing volumes. A separate contract will cover the re-examination of existing entries in order to complete gaps in such input wherever possible and will be an addition to the routine data-preparation contract. This second contract will fully specify the range of input information required.

[11] Such capacity may already exist.

6. *UPGRADE* software to Access 2000 as a minimum, recommending upon responding to the Invitation to Tender or during the course of the contract to the committee any other improvements thought appropriate where their immediate implementation will be advantageous. An immediate response can be requested where the additional improvement should be implemented simultaneously for reasons of economy and the avoidance of a further major revision.

7. Provide to the TCM Chairman draft revised sections of the User Guide to accommodate all changes, for incorporation into a new edition to be prepared by the committee following the 2003 meeting.

8. Attend a two-day Meeting of Technical Steering Committee, to be held at IAEA Vienna September 3rd/4th 2003, to demonstrate improvements and to participate in an interactive session to determine any other work subsequently necessary under a further contract.

9. These Activities to run concurrently with the continued update of content as provided from the data-preparation contractor and the production of an updated CD-ROM annually, noting the requirement to provide fully-searchable tables in every new case. This will require a review of the input data provided to ensure that this criterion is satisfied.

Where the opportunity presents itself (*e.g.* if the original report is to hand or provided) existing data tables which require improvement to assist the new search function should be upgraded. However, this will ordinarily be achieved under a data-preparation contract awarded separately by IAEA.

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