

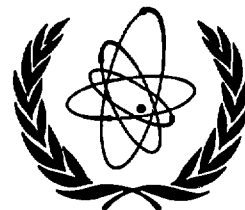
## INTERNATIONAL THERMONUCLEAR EXPERIMENTAL REACTOR



## ITER EDA NEWSLETTER

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INTERNATIONAL ATOMIC ENERGY AGENCY, VIENNA, AUSTRIA

**SEVENTH ITER COUNCIL MEETING****by Dr. V. Vlasenkov, ITER Council Secretary**

The 7th ITER EDA Council Meeting took place at the Naka Joint Work Site (JWS) on 14-15 December 1994. Six Council Members attended the meeting; the total number of participants was 35. In the absence of the Council Chair (Acad. E.P. Velikhov attended the Gore-Chernomyrdin meeting in Moscow), Dr. Yoshikawa, Council Co-Chair, presided over the meeting.

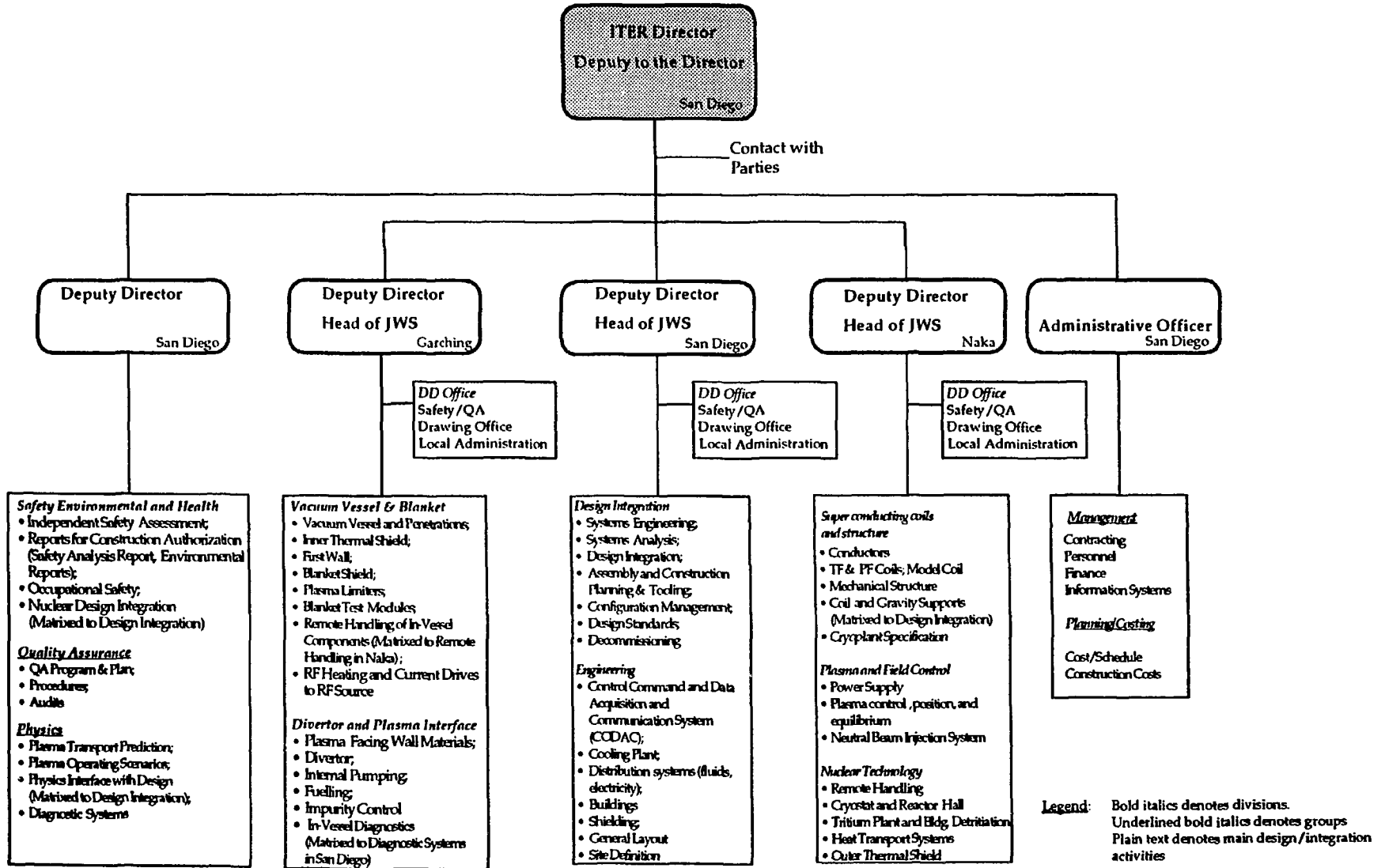
The Council took note of the newly appointed Director's Status Report.

The Director asked the new Administrative Officer, Dr. R. Iotti, to present the Executive Brief Project Management Plan, including information on the envisaged structure of the ITER Joint Central Team (JCT) (see graph overleaf).

The Council invited the Director to consult with the Program Directors on the scope and the major cost and planning assumptions that should underlie the work to be done for the Interim Design Report (currently scheduled for presentation to Council for its approval at its next meeting), specifically including the review of resources and deliverables for the EDA.



*Participants in the Meeting*



Envisaged detail of the ITER JCT Structure

The Council, noting the MAC-7 Report and Advice, accepted the Director's proposals on:

- the ITER R&D Programme Developments and Task Sharing;
- the 1994 ITER Joint Fund Budget Proposed Transfers and Amendments to the Joint Fund Financial Rules;
- the ITER Joint Fund Revised 1995 Budget Proposals;
- the Proposed Amendments to the Guidelines for the Implementation of Task Assignments;
- the Proposed Changes to the Main Structure of the JCT.

The Council also approved the charter of the Test Blanket Working Group.

The Council endorsed the MAC-7 recommendation concerning interim increases in design resources within overall limit already established by the Council and set out in IC-5 ROD Attachment 13. This endorsement included a recognition of the linking of the number of JCT personnel and the number of JWS support staff. Further, within this endorsement of reallocations within the overall resource limit, the Director called the Council's attention to the likely need to increase Home Team design resources and will make a specific proposal on resource requirements at IC-8.

The Council also endorsed the MAC-7 recommendation concerning the main milestones for the EDA and noted that the overall schedules and intermediate technical milestones for the EDA would be covered in the report on resources and deliverables to be submitted for Council approval at IC-8.

The Council noted the MAC statement of concern regarding the ITER Workshops and Technical Meetings and invited the Director to review the number of future proposed meetings in the light of the criteria contained in the MAC-7 Report. The Council also noted the Director's intention, following his recent meeting with the Designated Persons for Physics R&D, to continue the current number of physics experts groups through the end of 1995.

The Council took note of the TAC-7 draft Report and accepted the TAC proposal for the Interim Design and Cost Review (IDCR).

The Council endorsed the TAC view that the identification of an appropriate concept of the breeding blanket for ITER's Enhanced Performance Phase, leadership of its design, and its testing should be the responsibility of the Director. Furthermore, the Council determined that the breeding-blanket-specific research and development in the EDA is also the responsibility of the Director.

The Council accepted the CPs' intention to provide specific recommendations at IC-8, having consulted with the Program Directors in early 1995, on:

- Tentative sequence of events in the decision making process
- Options for major events during that process
- Outline of principles of construction cooperation to be contained in the elements of formal arrangements

The Council noted that the Parties have formally designated their representatives to the Special Review Group (SRG), chaired by Dr. K. Tomabechi.

On the basis of a request by the IAEA, the Council requested the Director to provide the Agency with a brief evaluation of the worth of the contribution being made by the Agency's Atomic and Molecular, Plasma-Material Interaction, and Fusion Nuclear Data Programs to ITER.

The Council assigned Further Tasks to MAC, TAC, CPs and SRG.

Noting the Director's concerns regarding visas, the Council assigned CPFPs to work on the remaining visa problem of JCT members travelling between several countries, specifically to clarify existing processes and then, if needed, to consider with the competent authorities possible improvements to such procedures.

The Council agreed to hold its next meeting, IC-8, in San Diego on July 26-27, 1995.

# CONFINEMENT MODELLING AND DATABASE EXPERT GROUP WORKSHOP

by Dr. J.G. Cordey, Chair, and Dr. D. Boucher, Co-Chair

The Workshop of the Confinement Modelling and Database Expert Group was held in Seville, Spain, 3-4 October 1994. J.G. Cordey, in his opening remarks, reminded the participants that the ITER Confinement Database Activities had been an ongoing activity since the beginning of the Conceptual Design Activities phase. With the start of the Engineering Design Activities, a new framework was established with the subsequent formation of expert groups. The activities of the group have been extended to cover 1-1/2D transport modelling which requires the construction of a multi-machine profile database and extensive model testing. He pointed out that little progress had been achieved so far in these two areas and that a strong commitment was necessary for the modelling activity to be successful.

An overview of ITER physics research needs from the modelling and databases activities was provided by D. Boucher. In particular, the results of an informal meeting of the expert group that took place during the IAEA Conference in Seville were presented. The Group had agreed on the "Objectives and Workplan" which summarized the role of the Group, and the tasks to be performed by it, as well as the deliverables, deadline and task officers for these tasks. Although the broad lines of the ITER Physics Basis in the field of confinement and performance were largely defined, significant improvements were still needed in various key areas: H-mode power threshold, Edge Localized Modes (ELM) physics, refinements of global scaling laws, modelling of energy and particle transport, as well as sawtooth activity.

In various sessions the Group discussed the global databases, a multi-machine profile database and defined a Program Plan for the modelling activity. The results of these discussions are briefly summarized in the following boxes.

## **Global L-mode Database**

S. Kaye, task officer for the L-mode database, reviewed the present status of the database which contains information from: ASDEX, DIII, DIII-D, FTU, JET, JFT-2M, JT-60, PBX-M, PDX, TORE SUPRA and TEXTOR with possible future contributions expected from ASDEX-U, C-MOD, COMPASS, JT-60U, START, TFTR and T-10. Representatives from these tokamak experiments discussed possible contributions from their laboratories, as well as the availability and specificity of their data. Kaye reviewed the analysis of both the total and thermal energy confinement times and the scaling presented at the IAEA Conference. A scaling from T. Takizuka was also presented.

A detailed workplan identifying potential contributions from the above experiments was agreed upon. The analysis of the data will be presented at the next meeting of the Group.

## **H-mode Database**

The latest analysis of the H-mode database in terms of power law scaling and offset linear scaling was presented by O. Kardaun. The issue of closed versus open divertor configuration was important for H-mode both with and without ELM.

F. Ryter and H. Zohm proposed a means of improving ELM characterization and the scaling of its effect on confinement. However, ELM characterization also covers the activity of other expert groups and D. Post proposed to create a Task Force with participants from across several expert groups to co-ordinate work in this important area.

Most JT-60U data points were in the hot ion H-mode regime. It was proposed that more data from other tokamaks in this regime should be added to the database so that a meaningful hot ion H-mode scaling can be derived.

K. Thomsen is task officer for the global H-mode database and T. Takizuka, shortly after the meeting, accepted to be task officer for the newly created global hot ion H-mode, supershot and high beta poloidal database.

### **H-mode Power Threshold and Database**

F. Ryter, task officer for the H-mode power threshold database, presented the status of this database which has been in existence for two years and contains data from ASDEX, DIII-D, JET, JFT-2M, PBXM and, more recently, CMOD, ASDEX-Upgrade, COMPASS and JT-60U. He also detailed the contribution from ASDEX-Upgrade which shows  $P/S \propto nB$  in agreement with at least JET and DIII-D.

D. Campbell presented JET results showing that the observed power threshold was consistent with an  $nB$  scaling and that the threshold was about a factor of 2 higher with the ion  $\nabla B$  drift away from the target. It was also pointed out that corrections for the core radiation and the time derivative of the stored energy should be included when estimating the power threshold.

Results from JT-60U were summarized by Y. Miura, who also presented two scalings obtained by using low density discharges, that showed no density dependence and a strong magnetic field dependence with exponent between 1.25 and 1.5. Proximity to the low density threshold was given as a possible explanation for the absence of density dependence, in those low density discharges.

J. Connor reviewed COMPASS results which are in agreement with the  $P/S \approx 4.4 \cdot 10^{-3} nB$  scaling. As is the case with JT-60U and JFT-2M, a lower density threshold exists below which no H-mode transitions occur. Results from CMOD, at  $N_e B$  closed to that expected for ITER, also showed  $P/S \propto nB$  but with a lower threshold for ELMy H-mode in ohmic and Ion Cyclotron Radio frequency (ICR) heated discharges. The analysis of the data stressed that dimensional constraints were only relevant if atomic processes did not play a role and that an extended dataset could improve the analysis. Current predictions for ITER lead to an estimated power threshold of between 100 and 200 MW at a density of  $51 \times 10^{19} m^{-3}$ .

Finally, F. Ryter presented the plans for future analysis of the datasets and a means of characterizing the reverse H to L transition.

### **Multi-machine Profile Database**

The definition of a multi-machine profile database that would satisfy the requirements for the development and testing of transport models had been discussed during earlier meetings of the former ITER Database group. The agreed structure was presented by D. Boucher, task officer for this database. The database consists of a set of standard discharge packages – which contain all information needed for the detailed local transport analysis of the discharge – and are stored on a publicly accessible **ftp** server. The server also contains the documentation and software needed to extract and retrieve data therefrom. A discharge from DIII-D, which is available on the server, was given as example.

An outline of the ITER modelling needs was given by D. Boucher with particular emphasis on modelling of the H-mode, ELM, the sawteeth activity – radial extension, frequency, effect on confinement – and models for heat and particle transport coefficients.

Various models were presented at the meeting: multi-mode model, Rebut-Lallia-Watkins and a modification proposed by D. Boucher, Tang-Redi model and models proposed by C. Shieh, A. Taroni, M. Turner and J. Weiland. One task co-ordinator per Party was designated to identify existing transport codes and models and co-ordinate the modelling activity in their respective Parties. J. Connor agreed to be task officer for the overall modelling activity.

A Program Plan for the modelling activity was agreed upon as follows:

- ◆ The four co-ordinators will collect a list of transport models and transport codes and identify individuals that could participate in the modelling activity.
- ◆ The first round of model testing will be performed using the data available on the profile database **ftp** server and should be completed by mid-January 1995. It would allow modellers to familiarize themselves with the profile database server and to define a common way of comparing experiments and the predictions from their models.

- ◆ A second round could begin by mid-February 1995 when the outcome of dedicated experiments using ITER-like discharges should be available and where ITER predictions could be performed using the various available transport models. The second round of results will be presented at the next meeting of the Group.

It was agreed that the Group should meet twice a year and that its next meeting could be organized in March 1995. The second meeting in 1995 could be held in conjunction with an international conference (for example, the IAEA Technical Meeting on H-mode Physics at Princeton in September).

K. Thomsen acted as meeting secretary and the detailed minutes and action lists are available from him on request.

#### LIST OF PARTICIPANTS

EU: G. Bracco, D.J. Campbell, J. Connor, J.G. Cordey, G.T. Hoang, D. Hogewei, O. Kardaun, L. Laurent, J. Ongena, F. Rytter, U. Stroth, A. Taroni, K. Thomsen, J. Weiland

JA: Y. Ogawa, Y. Miura

RF: Y. Esipchuk

US: J. DeBoo, W. Houlberg, S. Kaye, N. Sauthoff, D. Schissel

JCT: D. Boucher, D. Post

### **INTERNATIONAL ORGANIZING COMMITTEE FOR THE SEVENTH INTERNATIONAL FUSION REACTOR MATERIALS CONFERENCE (ICFRM-7)**

**by Dr. G. Kalinin, Member of the International Organizing Committee, ITER Garching Joint Work Site**

On December 12–13, 1994, the first meeting of the International Organizing Committee (IOC) for the ICFRM-7 was held at the ITER Joint Work Site in Garching.

The Conference is planned for September 25–29, 1995, and will take place in the town of Obninsk, Russia, located about 100 km southwest of Moscow. It is the first conference of this series to be held in Russia. Because of the importance of materials for the ITER design and the many related R&D activities now underway, the ITER JCT provided support to the conference organizers by hosting the IOC meeting.

The main goal of the IOC meeting was to plan and approve the organizational framework and to review and comment on plans for accommodations and logistics for the conference.

The agenda included the following:

1. information on the status of preparations and on the site;
2. proposal for a schedule;
3. conference fee;
4. proposals for topics and for invited speakers;
5. other business, including answers to numerous questions addressed to the local organizers concerning specifics of the site.

Representatives of ten countries participated in the IOC meeting, which coincided with the ITER Technical Meeting on Irradiation Testing held at Garching the same week. The fact that some of the IOC members were participants in the Technical Meeting as well was one of the reasons for combining the two events.

The IOC meeting was called and chaired by the Chairman of ICFRM-7, Prof. Lev Ryabev, First Deputy Minister of Atomic Energy of the Russian Federation. The conference is receiving strong backing from the government of the Russian Federation; the Russian Academy of Sciences, the Ministry of Education, the Ministry of Science, and the Ministry of Atomic Energy will all provide support and will assure participation by Russian scientists.

The local organizers provided detailed information on the site and on the work done so far to prepare for the conference.

Obninsk is a beautiful provincial town located close to Moscow. It experienced a revival in the 1940s and '50s with the establishment there of the Institute of Physics and Power Engineering, one of the main research institutes in Russia engaged in atomic energy utilization. Participants will be lodged in four hotels and complexes of cottages, all within 15–20 minutes walking distance from the Conference Hall. In addition, there will be shuttle buses to provide rapid transportation.

It was agreed that the conference fee will be \$450. This fee will cover publication of abstracts before the conference, publication of the proceedings, all transportation within the framework of the conference including transportation from the airport in Moscow to Obninsk and back.

The proceedings of ICFRM-7 will be published in the Journal of Nuclear Materials in the same format as for the previous conferences in the series.

The language of the conference is English. The original proposal for two languages, English and Russian, that had been mentioned in the preliminary announcement, was rejected by the IOC.

During the Organizing Committee Meeting the main topics for invited speakers were agreed, and a framework for invited talks was discussed. The conclusion was that invited talks would be either reviews of the principal topics or summaries of original and interesting research results. The list of invited speakers will be considered during the second Organizing Committee Meeting, which will take place in Obninsk.

There was a proposal for the ITER JCT to present three invited reports, which would summarize

- general design and material issues,
- structural materials for in-vessel components, and
- plasma facing materials.

Other presentations are welcome from the ITER JCT along with the invited ones. Dr. V. Chuyanov, ITER Deputy Director and Head of the San Diego Joint Work Site, will co-ordinate participation of ITER JCT staff and presentations on behalf of the ITER JCT. The exact titles and abstracts of presentations will be provided to the ICFRM-7 Organizing Committee before May 1995.



*Participants in the Meeting*

In conjunction with ICFRM-7, there are plans to organize scientific tours of the Institute of Physics and Power Engineering (Obninsk), the Scientific Research Centre "Kurchatov Institute" (Moscow), the Institute of Non-Organic Materials (Moscow), and others. Sightseeing tours to historic places in the Obninsk area as well as in Moscow will be organized both for participants of the Conference and for accompanying persons.

The members of the Organizing Committee were very concerned about providing security for participants and accompanying persons. The Russian organizers gave reassurance on this point. "Obninsk is safer than Moscow and many western cities. There is a low level of crime in the Obninsk area due to the fact that it is a small provincial town and that there is a police school located there", said Dr. Zrodnikov, Deputy Director of the Institute of Physics and Power Engineering.

The representatives of the Local Organizing Committee of the ICFRM-7 assured that all comments and suggestions made by the members of the IOC and by other participants of the meeting will be taken into account. They will do their best to organize a successful ICFRM-7.

## FORTHCOMING EVENTS \*)

- Second Tritium Plant Technical Meeting, Naka, Japan, 1–3 February
- Magnet Technical Meeting, Naka, Japan, 7–10 February
- Diagnostics Technical Meeting, Naka, Japan, 9–10 February
- Disruptions, Plasma Control and MHD Technical Meeting, Garching, Germany, 13–17 February
- Second Power Supply Technical Meeting, St. Petersburg, Russia, 20–24 February

\*) Attendance at all ITER Meetings by invitation only.

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