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ITER MANAGEMENT ADVISORY COMMITTEE MEETING IN NAKA

by Dr. M. Yoshikawa, MAC Chair

The ITER Management Advisory Committee (MAC) Meeting was held on 17 December 1999 in Naka, Japan.

The main topics were the ITER EDA Status, Task Status Summary and Work Program and a schedule of ITER meetings.

ITER EDA Status

MAC noted the Director's ITER EDA Status Report in the period between the PDs Meeting in Grenoble (July 1999) and November 1999.

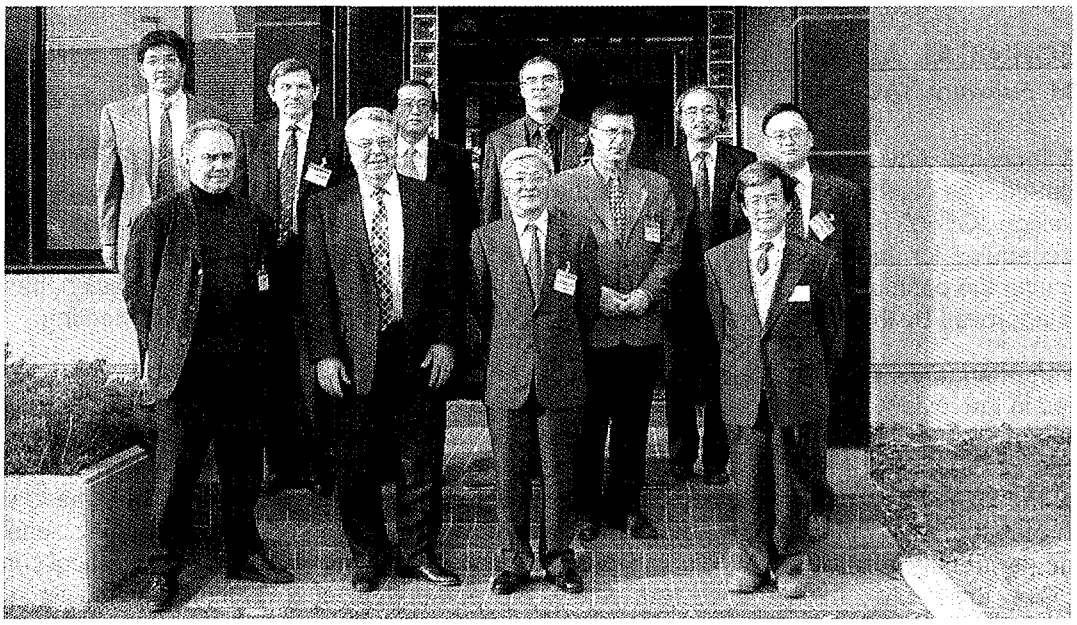
MAC noted that the procedures concerning the revalidation of the ITER EDA Agreement in the three Party configuration were initiated on 13 December 1999 at the IAEA.

MAC took note of the present situation of the ITER Joint Fund presented by the Director, who hoped that the outstanding decisions concerning the Joint Fund would allow approval of the 1999 Budget before the end of this year.

Task Status Summary and Work Program

MAC took note of the Task Agreements Status Summary and compiled a list of Task Agreements per Party.

MAC reviewed and supported the two new Design Task Agreements the credit of which is more than 500 IUA or 2.5 PPY. MAC took note of seventeen new Design Task Agreements including VHTP for which credit is not more than 500 IUA or 2.5 PPY per task.



Participants in the Meeting

MAC reviewed and supported the modifications of Task Agreements made since the previous MAC Meeting (July 1999) the credit changes of which are more than 500 IUA or 2.5 PPY, or more than 20%. MAC took note of the modifications of Task Agreements since the MAC Meeting in July 1999 the credit changes of which are not more than 500 IUA or 2.5 PPY, or not more than 20%.

MAC reviewed and supported the Design Task sharing proposals among the three Parties for the 2000-01 Comprehensive Task Agreements.

Schedule of ITER Meetings

MAC reviewed and supported the plan of Technical Meetings and Workshops. MAC noted that as far as possible before each Expert Group Meeting an international pre-meeting on generic tokamak physics issues is proposed in order to favor continued interaction with US physicists in areas of common interest.

SCHEDULE OF TECHNICAL MEETINGS AND WORKSHOPS FOR ITER

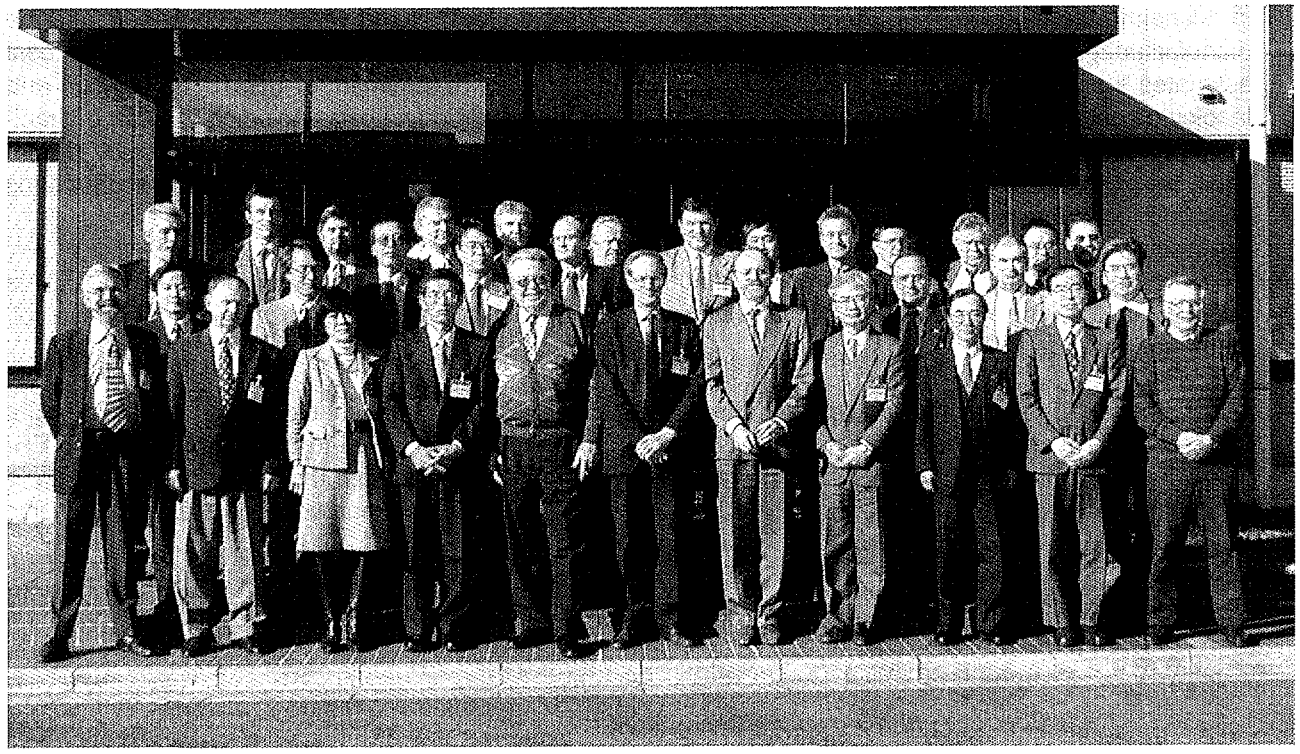
Date	Meeting/Activity	Location
10–11 Jan, 2000	MHD, Disruption and Control Expert Group	Naka
24–25 Jan, 2000	*ITER Physics Committee (for MAC information)*	*Naka*
31 Jan–4 Feb, 2000	Technical Meeting on Materials for In-vessel Components	Garching
27–31 Mar, 2000	3rd Combined Workshop of the Core Confinement & Internal Transport Barrier, Confinement Database & Modeling, and Edge Pedestal Physics Expert Groups	Naka
14–18 Feb, 2000	Safety and Environment	Garching
23–24 Feb, 2000	Nuclear Analysis for the Final Report	Garching
10–14 April, 2000	12th Diagnostics Physics Expert Group	Moscow
13–17 Oct, 2000	4th Combined Workshop of the Core Confinement & Internal Transport Barrier, Confinement Database & Modeling, and Edge Pedestal Physics Expert Groups	Garching
Autumn 2000	13th Diagnostics Physics Expert Group	Garching

ITER TECHNICAL ADVISORY COMMITTEE MEETING

by Prof. M. Fujiwara, TAC Chair

The ITER Technical Advisory Committee (TAC) meeting took place on December 20–22, 1999 at the Naka Joint Work Site. The objective of this meeting was to review the document "Technical Basis for the ITER-FEAT Outline Design (ODR)" issued by the Director on December 10. It was also aimed at providing the ITER Meeting scheduled for January 19–20, 2000 in Tokyo with a technical assessment of the ODR and recommendations for the optimization of the anticipated plasma performance and engineering design, based on the guidelines approved by the Council in June 1998 and recommendations of the last TAC meeting.

Thirty-seven attendants, including nine TAC members, ten invited TAC experts and two Home Team Leaders participated in the review. After the introductory remarks made by the Chairman, the Director summarized the conclusions of the meetings held after the last TAC, as a background, and also made an overview talk on the descriptions of ODR. The Joint Central Team staffs then gave a total of eleven presentations, covering all aspects of the ITER-FEAT design, including safety considerations. The presentations were made on the first day of the meeting. After detailed discussions on the second day in two separate groups viz., one group for the plasma performance and control including diagnostics and the other for magnets, in-vessel components, plant facilities, assembly / maintenance and safety, the preparation of a draft report and its review was performed on the third day. Here, it was considered essential to discuss the safety issues together in the latter group. The following excerpt from the TAC report summarizes the conclusions of the meeting.



Participants in the Meeting

Overall assessment and key recommendations from TAC

TAC appreciates the convergence of the device parameters from IAM and LAM, which has been successfully achieved in accordance with the TAC recommendations in February, 1999. TAC thereby greatly acknowledges the dedicated effort and the intensive design work done by the Director, JCT and Home Team members, since February 1999.

TAC fully endorses ODR and notes the progress made in reducing the remaining physics uncertainties and in achieving the objectives within the cost constraints. TAC finds that the ODR satisfies the detailed technical objectives provided by the SWG and endorsed by IC in 1998, and provides a sound basis for further detailed design.

The ODR was intended to establish the technical feasibility of the device, but not necessarily at minimum cost. The current cost estimate discussed in ODR is 56% of FDR. TAC recommends that every effort should be made to reduce the cost further to around 50%, in accordance with the operational requirements. However, TAC warns that the move towards cost reduction should not jeopardize the feasibility and necessary engineering margins for ITER-FEAT.

Following are the technical recommendations agreed upon in the meeting and issues of controversy noted by TAC:

(1) TAC considers that the profile sensitivity of all the scenarios including the pedestal size should be studied to understand the variations in operating domains and the influence on achieving the objectives. Due consideration shall be devoted to plasma performance degradation near the operating boundaries (n / nGW, PLH, etc.), and compatibility with successful divertor operation should be analyzed.

(2) The divertor is a critical component of the device. Issues related to the scaling of the SOL width and to the life-time of the target due to ELMs are recognized. The scaling of the basic assumptions made in modeling should be validated on a range of experimental devices, and the implications for the divertor design and the compatibility with the various operating scenarios should be evaluated. In TAC's view, R&D's on ELM control methods should also be vigorously pursued.

(3) In relation to the magnets, TAC recommends that R&D work on NbTi strand should be continued, and the manufacturing capability of the NbTi and Nb3Sn strands should be assessed, together with the cost estimates that meet the reference specifications. In addition, the assessment of SS316LN, titanium and Incoloy as candidate jacket materials for the CS conductor should be finalized, including the use of titanium in the TF insert coil. The TFC design with radial plates seems feasible. However, it is necessary to continue the extended analysis of both the radial plate and square conductor options. TAC also recommends finalizing the blanket cooling design.

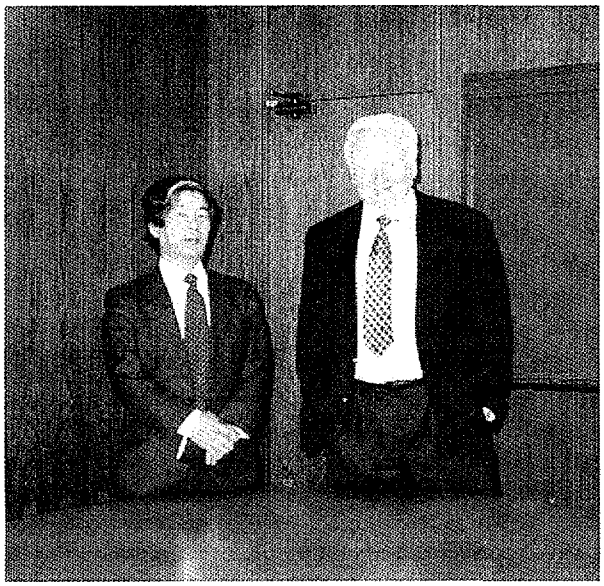
(4) It has been noted that ODR includes a limited number of design options for some components. The JCT is encouraged to pursue the design selection with emphasis on improving the options presented, in close collaboration with the HT's.

(5) TAC recommends that comprehensive and integrated safety assessments should be conducted in future to be consistent with the detailed design work, with particular attention paid to the licensability of ITER-FEAT. Further refinement on the estimation of the source terms arising from the radioactive inventory is encouraged in order to characterize the nuclear aspects of ITER and to improve the safety and licensing process in the Parties.

(6) TAC understands that the site requirements described in ODR are technically relevant to the specific design option given in ODR.

MEETING OF THE ITER SWG-P2 IN VIENNA

by Prof. K. Pinkau and Dr. H. Kishimoto, Co-Chairs



The SWG-P2 Co-Chairs, Prof. K. Pinkau and Dr. H. Kishimoto

At their Meeting in Cadarache, March 10–11, 1999, ITER Council Members reconstituted the Special Working Group established under Protocol 2 to the ITER EDA Agreement (SWG-P2). The SWG-P2 held its final Meeting at the IAEA in Vienna from December 6–9, 1999, in order to report to the ITER Council in Tokyo on 19–20 January 2000.

With the aim of joint implementation, the Special Working Group has established a common understanding in the areas of Benefits, Contributions, Legal Framework, Siting, Licensing and Decommissioning, Finance and Accounting, Procurement, Staffing, Participation, Accession and Withdrawal. This is a complex process, because straightforward sharing is not possible due to the fact that ITER has to be sited in one Host Party, and the high degree of integration of a single ITER device requires also the integration of different cultural, scientific and technical traditions.

The SWG-P2 sees its work integrated into a Tentative Sequence of Events leading towards ITER construction. This Sequence of Events is synchronized among the ITER Parties' programmatic and budgetary cycles. The SWG-P2 Report on Joint Implementation of ITER (see excerpts from this Report on the following pages), therefore, prepares a phase of Explorations which should lead, in due course, to a decision to start negotiations.

This Report was presented to the Members of the ITER Council at their Meeting in Tokyo on 19–20 January 2000. The Meeting endorsed the Report for transmission to the Parties and thanked the Co-Chairs and all participants for the successful efforts.

Excerpts from the Report of the ITER SWG-P2 to the ITER Council on Joint Implementation of ITER[1]

Joint Implementation

The technical challenge of realizing ITER and its estimated cost and duration make ITER one of the most significant single civil R&D projects in the world, and calls for a pooling of technical expertise and sharing of resources world-wide.

Taking into account the genesis of ITER as an initiative at summit level (in 1985 and 1986 and at the Birmingham G8 meeting, May 1998), the international nature of both the energy/environment problem and the fusion research effort so far, and the success of international collaboration on ITER phases of "Conceptual Design Activities" (CDA) and the ongoing EDA, the SWG-P2 recommends and has entirely focused on joint implementation of the Construction, Operation, Exploitation and Decommissioning Activities (COEDA) of ITER, which is expected to involve a balance of cost-sharing and status in governance, and a fair return in benefits.

Benefits

The Parties will share scientific and technological benefits from the construction, operation and exploitation of ITER. The scientific output of ITER will be open equally to all Parties and they will jointly develop an understanding of fusion science and technology, including industrial know-how and spin-off in meeting ITER's overall programmatic objective. By participating in a joint implementation of ITER, each Party will make optimum use of past investments in fusion and will incur lower costs relative to those of undertaking ITER in a solely domestic programme.

The Host Party obtains the prestige of having been chosen to host an international project of highest quality and visibility. This report does not address the issues of possible general economic benefits from a participation as Host or otherwise in the implementation of ITER.

The terms of the collaboration must ensure that fair returns accrue to the Parties with respect to successful scientific and technical proposals, experimental opportunities, and industrial contracts.

Contributions

To maintain the international character of the project and to reflect the common interest and shared responsibility to pursue jointly the programmatic objectives, each Party should make a significant contribution to the total cost of the project needed in construction, operation and decommissioning phases. The common area of construction[2], which is estimated at about three quarters of the total capital cost, should be shared among the Parties in a way which is as balanced as possible.

The Host Party should bear the remainder of the capital cost which includes the construction of buildings and infrastructure, as defined in the approved design, and machine assembly. In addition, site preparations to satisfy the "ITER Site Requirements" will be undertaken, in principle, by the Host at its cost.

The annual operation costs (staff, system maintenance and repair, enhancements and electricity, etc), assumed as 6–7% of the construction cost, should be shared among the Parties in ways compatible with the sharing of the construction cost.

The sum of the contributions from each Party foreseen at the time of adoption of the international agreement must cover 100% of the estimated total resources needed throughout the project.

Legal Framework

The decision to construct ITER should be taken, together with the setting in motion of joint implementation, by means of an international agreement, signed and ratified, accepted or approved in accordance with the due process of each Party to secure the highest level of political commitment and stability for the implementation of the project.

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1 Following are separate paragraphs (or parts thereof) quoted from the Report.

2 defined as items that could be produced in any of the Parties and transported to the site.

The international agreement should provide for the establishment of an ITER legal entity (ILE) to be jointly set up and supported by the Parties, with the responsibility to implement ITER. The ILE must have the charge, the structure, the authority and means to implement the project for the Parties. While the ILE will have to comply with the applicable laws and regulations of the Host, the need for the institutional independence of the ILE from the Host authorities is recognised.

The provision of the site and local technical support by the Host Party should be the subject of a site support arrangement between the ILE and the Host.

Within the legal framework, there should be two organs of project management:

- a Council, composed of Parties' designated representatives which will be responsible for the promotion and overall direction of the project, and will exercise overall supervision of its execution; and
- a Director-General, who will be the chief executive officer and the legal representative of the ILE, and who will be responsible to the Council for the execution of the project.

The Director-General must be vested with the managerial powers to lead ITER towards success. He will be assisted by an ILE staff over whom he should have sole managerial authority. He should be responsible for all the technical aspects of the project's execution, for compliance with the Host's regulatory requirements for worker and public safety, and for the protection of the environment.

The balance of the Parties' status in the governance of the Project will be set primarily by the allocation of voting weights in the Council's decision-making process which should take into account the following:

1. decisions requiring consensus;
2. decisions requiring Host Party concurrence; and
3. decisions reached by voting, where the Parties' votes are weighted in relation to their contributions, while no issues may be decided solely by a single Party.

The decision-making process for the scientific programme, which will be based primarily on scientific arguments, should also contain an element to reflect the contributions of each Party.

The international agreement may lead to the ILE being established either under international law or under the domestic (civil or public) law of the Host.

Siting, Licencing and Decommissioning

The Parties wishing to host the ITER facility should make a formal single specific site offer before or at a sufficiently early stage of Negotiations which should confirm the readiness to satisfy the ITER Site Requirements and the extent to which the Site Design Assumptions are met, based on the document approved by the ITER Council.

An early, informal dialogue with regulatory authorities should be established with the aim of developing common views among the Parties on the principles and criteria for ITER safety, also because of its possible impact on licensing of future fusion energy facilities.

With respect to decommissioning, only de-activation[3] should be within the responsibility of the ILE. Responsibility for carrying out the remaining decommissioning steps should rest with the Host Party.

In accordance with normal practice, financial provisions for decommissioning and long term storage and disposal of activated materials which belong to the ILE should be made jointly by the Parties through a fund to be established under the international agreement and built up during operations and safeguarded for this purpose. Any guarantees demanded as part of the licensing process should be the responsibility of the Host Party.

The SWG-P2 points out that components introduced into the ITER facility by a Party and still under the ownership of that Party at the time of decommissioning shall, in principle, be brought back by the concerned

[3] "De-activation" covers actions to put the plant into a safe, stable condition while it awaits dismantling, and includes removal/stabilisation of tritium and residual mobile activation products, removal and packaging of in-vessel components, rendering of all liquid to safe, stable form and protection for components vulnerable to corrosion during the storage/dismantling process.

Party at its own cost to its home territory. However, at that time, each Party may choose to give up and transfer the ownership over the introduced components to the ILE by agreement. The terms and conditions under which the ILE accepts such components should be defined during the Explorations/Negotiations leading to the international agreement.

Procurement

Within the above provision, components/systems and services for ITER could be procured in one of two ways according to each Party's preference, either as contributions in kind procured and supplied by specified Parties for a pre-determined credit value or procured directly by the ILE using funds contributed by the Parties to its budget ("funded").

On the basis of data from the EDA, all Parties should, as soon as possible, be addressing jointly the issues of the overall percentage shares of contributions and of an initial allocation to each Party of procurements. These shares of contributions should be set out in writing at the time of the adoption of the text of the international agreement.

At least some part of each Party's contributions should be provided in funds in order to ensure efficient work in systems integration.

Whatever the mode of procurement, the Director-General, assisted by the project team should be centrally involved in all technical aspects of the process. For example, the project team could be composed of a central team based at the ITER Site and centers, in each of the Parties who, would directly exercise technical oversight of the procurement of items from within each Party. In turn the Parties should designate domestic agencies who would be responsible for the supply of contributions-in-kind and could support administrative aspects of the funded procurements.

Staffing

The ITER staff should consist of ILE employees (if so decided), staff seconded from the Parties and contract personnel, all of whom shall report to the Director-General.

For the purpose of ensuring wide scientific participation in the Project and of training future generations of fusion researchers, participation of other qualified personnel such as from universities and other institutions will be encouraged under rules to be established by the Council.

Intellectual Property Rights

Intellectual Property Rights (IPR) are part of the benefits. The Parties should designate IPR specialists to jointly develop acceptable IPR provisions for ITER referring to the general principles established for the ITER EDA.

(2) Possible guidelines for consideration/development by the IPR specialists could be as follows:

- As a legal entity the ILE should have the capacity to own intellectual property and should do so under the terms to be established in an IPR annex to the Statutes.
- In accordance with ITER's programmatic objectives, the intellectual property (IP) regime should favour a liberal dissemination of information consistent with the ITER IP terms and conditions. Subject to the other ITER IP provisions already agreed, the scientific results derived from ITER operations should be widely and freely accessible among the Parties for the purposes of fusion R&D for peaceful uses.
- **The technology know-how derived from the construction, operation and decommissioning of ITER should also be shared among the Parties for the purposes of fusion R&D for peaceful uses. But there will be safeguards to protect pre-existing business confidential information and to protect the rights of Parties making contributions-in-kind for the commercial exploitation outside the domain of fusion R&D of intellectual property generated in producing the contribution.**

Participation and Accession[4]

The Parties to the international agreement should be the present EDA participants.

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[4] Terms for possible withdrawal from the participation should be set so as to protect the mutual interests of the project and the remaining Parties, especially during the construction phase.

Expressions of interest during the Explorations/Negotiations phase from other possible participants in joining from the start of the agreement should be treated on a case-by-case basis, taking account, inter alia, of the progress towards convergence achieved among the current participants.

The international agreement should allow for possible third parties to join the Project after adoption of the agreement. Any such requests should be decided by unanimity among the Parties. The international agreement should provide both for full accession of new Parties, under terms such as a significant contribution and commitments, and for other forms of participation such as possible "associate" membership for which lesser conditions of participation and status in the collaboration should be agreed.

Conclusion

In the process and at the conclusion of its discussions, all delegations of the SWG-P2 have agreed that they:

- share a single vision of the ITER goal and of the means to realize it;
- recognize the technical and social import of ITER for the realization of fusion energy;
- reconfirm the common desire to promote construction of ITER through international co-operation;
- recognize that the time is now ripe for initiating international efforts with governmental involvement with the aim to establish a firm international legal framework for joint implementation of the ITER project.

The SWG therefore proposes to the ITER Council, according to the terms of the present report, to recommend to the Parties to start Explorations in early 2000 among the interested parties with the view to reaching, at the time of the Joint Assessment foreseen for summer 2000, a common understanding on the necessary steps for a future decision on the Construction, Operation, Exploitation and Decommissioning of ITER.

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