



MEETING OF THE ITER COUNCIL

by Mr. M. Drew, ITER EU Contact Person

A meeting of the ITER Council took place in Toronto, Canada, on 27-28 February 2001 (Canada participates in the ITER EDA as an associate of the EU Party). The delegations to the Council were led by Dr. U. Finzi, Principal Adviser in charge of fusion R&D in the Directorate-General for Research of the European Commission, Mr. T. Sugawa, Deputy Director-General of the Research and Development Bureau of the Ministry of Education, Culture, Sport, Science and Technology of Japan, and Academician E. Velikhov, President of the RRC "Kurchatov Institute". The European delegation was joined by Canadian experts including a representative from the Canadian Department of Natural Resources.

The Council heard presentations from Dr. H. Kishimoto on the successful completion of the Explorations concerning future joint implementation of ITER, and from Dr. J.-P. Rager on the ITER International Industry Liaison Meeting held in Toronto in November 2000.

Having noted statements of Parties' status, in particular concerning the readiness to start negotiations and the progress toward site offers, the Council encouraged the Parties to pursue preparations toward future implementation of ITER along the general lines proposed in the Explorers' final report.

The Council also noted the readiness of the RF and EU Parties to instruct specified current JCT members to remain at their places of assignment after the end of the EDA, in preparation for a transition to the Co-ordinated Technical Activities foreseen as support to ITER negotiations.



Participants in the Meeting

The Council was pleased to hear that meetings with the Director of the ITER Parties' Designated Safety Representatives had started, and commended the progress toward achieving timely licensing processes with a good common understanding. The Council noted with appreciation the Director's view that no difficulties of principle in the licensing approach had been identified during the informal discussions with the regulatory representatives and it stressed the importance of providing appropriate information on safety, environmental, and waste management aspects of ITER for wide external consideration.

Taking note of the TAC Report and recommendations, the Council accepted the Draft Summary ITER Final Design Report. The Council commended the Director with the support of the JCT, the Home Teams, and Industrial Participants for their efforts to enable preparation of the Draft ITER Final Design Report in a timely manner.

The Council noted with appreciation the conclusion of the TAC that "*ITER-FEAT is now ready for a decision on construction*" and the achievement of the 50% cost reduction target set in 1998. Recognizing the enhancement of the project in terms of the strengthening of the Physics Basis and the accuracy of the cost evaluation, the Council stressed the importance of maintaining the momentum of the Project.

The Council considered the TAC obligations fulfilled and expressed its thanks to TAC for its consistent contribution in providing independent assurance of the scientific and technical coherence of the Project.

The Council agreed to transmit the Draft Summary ITER Final Design Report and supporting technical basis to the Parties for their consideration and domestic assessment with a view to providing comments to the Director by the middle of April. This will lead inter alia to the synoptic Summary of the ITER Final Design Report suitable and available for wide distribution under the responsibility of the Director.

The Council took note of the MAC Report and Advice and accepted its recommendations including, in particular, a recommendation on the proposed establishment of an ad hoc body for the exercise of continuing joint administrative responsibilities that cannot be completed within the duration of the EDA.

At the invitation of the IAEA, the Council agreed to meet in Vienna on 18-19 July 2001. The Council also underlined the need to commemorate the conclusion of the EDA and recognize the forthcoming developments of the Project in a way that would provide the appropriate external visibility to the Project. The RF Delegation invited the Parties to celebrate the completion of the EDA in Moscow. The Contact Persons will consult on finalizing arrangements and developing a programme. (Editor's Note: This event is scheduled for 7-8 July)

ITER EDA STATUS

by Dr. R. Aymar, ITER Director

This article summarizes the progress made in the ITER Engineering Design Activities in the period between the Moscow ITER Meeting in June 2000 and March 2001.

Overview

The Project has focused on drafting the Plant Description Document (PDD), which will be published as the Technical Basis for the ITER Final Design Report (FDR), and its related documentation in time for the ITER review process. The preparations have involved continued intensive detailed design work, analyses and assessments by the Home Teams and the Joint Central Team, who have co-operated closely and efficiently.

The main technical document has been completed in time for circulation, as planned, to TAC members for their review at TAC-17 (19-22 February 2001). Some of the supporting documents, such as the Plant Design Specification (PDS), Design Requirements and Guidelines (DRG1 and DRG2), and the Plant Safety Requirement (PSR) are also available for reference in draft form. A summary paper of the PDD for the Council's information is available as a separate document.

A new documentation structure for the Project has been established. This hierarchical structure for documentation facilitates the entire organization in a way that allows better change control and avoids duplications. The initiative was intended to make this documentation system valid for the construction and operation phases of ITER.

As requested, the Director and the JCT have been assisting the Explorations to plan for future joint technical activities during the Negotiations, and to consider technical issues important for ITER construction and operation for their introduction in the draft of a future joint implementation agreement.

As charged by the Explorers, the Director has held discussions with the Home Team Leaders in order to prepare for the staffing of the International Team and Participants Teams during the Negotiations (Co-ordinated Technical Activities, CTA) and also in view of informing all ITER staff about their future directions in a timely fashion.

One important element of the work was the completion by the Parties' industries of costing studies of about 85 "procurement packages," each representing a potential real procurement contract for an ITER component. The results, after analysis and evaluation by the JCT, have provided the basis for a JCT "evaluated cost estimates" report for all packages (Business Confidential) which was presented during a one week meeting at Garching (29 Jan-2 Feb 2001) to an Ad Hoc Group of Parties' costing experts. The summary was included in the synoptic summary paper of the PDD for the Council's information.

A meeting of the ITER Test Blanket Working Group (TBWG) was held in October 2000. The group has continued its activities during the period of extension of the EDA with a revised charter on the co-ordination of the development work performed by the Parties and by the JCT leading to a co-ordinated test programme on ITER for a DEMO-relevant tritium breeding blanket. This follows earlier work carried out during the EDA, which formed part of the 1998 Final Design Report. For a concise summary of the meeting see the separate article on the Test Blanket Working Group's Recent Activities in the ITER EDA Newsletter, Vol. 10, No. 2, Feb. 2001.

Safety

A meeting was held in October 2000 with the ITER Parties' Designated Safety Representatives of regulatory bodies from Europe, Canada, Japan and Russia. This discussion was devoted to achieving consensus on a set of safety principles and environmental criteria and on design requirements in order to provide all Parties expected to participate in the ITER joint implementation with an acceptable level of safety according to their own standards.

Each potential Host Country/Party presented a summary of its licensing approach for ITER and the licensing process that may be followed. No fundamental difficulties have been identified or foreseen along the path toward a full authorization for construction.

During the meeting it was also agreed that it is required to maintain the process continuity and future consultations throughout the dialogues with the regulatory authority in preparation for the licensing process. An ITER Legal Entity should exist to submit the application for the construction authorization. It is mandatory to have a competent 'Design Team' (responsible for the design) to support dialogue with the regulatory authority to take into account the design regulatory requirements, for continuity of the safety organization, and for their transfer to the ITER Legal Entity that eventually obtains the licences.

It has been the Director's understanding that the Partners will need to rely on the Design Authority to give assurance of the ability of the design to fulfill the requirements, based on the dialogue with the regulatory authority in each Host Country (Party), in particular to obtain a full understanding of the risk that the licensing process might be unduly extended.

R&D Progress

The charging experiments of the CS Model Coil and the CS Insert Coil were carried out until August 2000 with excellent performance results achieved, fulfilling all the goals of the technology development of the CS Model Coil, namely, maximum magnetic field of 13 T, operation current of 46 kA, fast ramp-up rate of 0.4 T/s and ramp-down rate of -1.2 T/s from 13 T and a 10,000 cycle test. With this success of the CS Model Coil project, developing the fabrication technology of the ITER CS coil and validating its engineering design, we are now ready technically to initiate construction of the ITER CS coil with confidence.

Fabrication of the TF Model Coil was completed and the coil was delivered to FZK at Karlsruhe to be assembled with an LCT coil and to be tested at the TOSCA test facility. With this achievement one of the main objectives of the project has been reached, namely the demonstration of the feasibility of ITER relevant

coil manufacturing processes and quality assurance methods. The first charging test is expected by mid-June.

The preparation of the review paper titled "Review of the ITER Technology R&D" was pursued. The whole programme of the ITER technology R&D and achievements covering the seven large R&D and nine key R&D areas are summarized in a special issue of the Journal of Fusion Engineering and Design. The manuscript was submitted to the publisher at the end of January 2001 and the printing is expected before the end of the EDA.

Joint Central Team and Support

The status of the Team at the start of February 2001 is summarized in the Table below. There have been some small changes in the number of staff and their distribution among Parties: one Canadian left Naka and ITER, one European moved from Naka to Garching and another one left Garching and ITER; three additional RF members have joined the project at Naka and one left Naka and ITER.

JCT - Status by Joint Work Site and Party at 1 February 2001

by Site	Garching	Naka		Total
	45 *	50		95 *
by Party	EU	JA	RF	
	37 *	33	25	95 *

* includes two Canadians provided through the Canadian association with the EU Party.

The JCT numbers have been supplemented by VHTP's (~3-4 PPY from RF, and ~4-5 PPY from EU, in average per year) and other temporary attachments to the JCT.

Task Assignments

The tables below summarize the status of R&D and Design Task Agreements. More details and commentary are presented in the specific papers to MAC.

Number of Task Agreements (cumulative)

TA Status	R&D Number	Design Number
Task Agreements committed (EU,JA,RF)	643	539
Task Agreements completed	486	432
Task Agreements ongoing	157	107
US (to 7/99)	173	162

Task Agreements Summary Values per Party

Party	R&D (IUA)	Design (PPY)
EU	232,341	293.04
Japan	224,815	267.98
Russia	92,953	230.45
US(to 7/99)	108,023	170.71
Total	658,132	962.18

Joint Fund

Following notification from the JA Party that it had completed the procedure to confirm the validity of the ITER EDA extension, it has been possible for the ITER Council to regularize outstanding Joint Fund matters, including approval of the Accounts for 1998, the Revised Budget for 1999, the Accounts for 1999 and the Budget for 2000.

The ITER Director has requested the current Joint Fund Agents to submit their accounts for 2000 promptly so as to assist planning of an orderly wind-up of the Joint Fund arrangements at the end of the EDA duration.

The ITER Council was invited, after MAC advice, to consider the overall policy and arrangements for winding up the Joint Fund at the end of the EDA, including proposals on the possible disposition and use of residual Joint Fund property and cash. As agreed at the ITER Meeting in Moscow, 29-30 June 2000, the issues of the unspent appropriations at the end of 2000 and of the provisional Joint Fund Budget for January - July 2001 will be addressed in the context of the policy conclusions.

ITER Physics

The seven ITER Physics Expert Groups are in full operation and the arrangements for continued interaction with US fusion scientists on generic issues of tokamak physics are proceeding smoothly. A new framework, called the International Tokamak Physics Activity (ITPA), is being planned in accordance with a Statement of Position from the IFRC of IAEA supporting the ITPA. It was proposed that the new framework after July 2001 should have a structure similar to ITER Expert Groups. This co-operation will continue and broaden the voluntary physics activities beyond the ITER EDA Agreement. The ITPA will aim at co-operation in development of the physics basis of burning tokamak plasmas; construction, management and updating of databases; and development of scaling and modeling to enhance worldwide tokamak research progress.

The priorities for physics research in 2001 as set forth by the ITER Physics Committee, held on 14 October 2000, are shown in the table below. The main objectives are to strengthen further the physics basis for the inductive $Q = 10$ operating scenario and to explore further and clarify scenarios for new modes of operation that could be used to approach steady-state operation.

High Priority Physics Research Areas

	Research Areas	Issues
*	Finite- β effects in H-mode	Tolerable ELMs ($\delta W/W < 2\%$) with good confinement alternative to type-I ELMs (e.g. type II, type III + core confinement) Stabilization of neoclassical islands at high β and recovery of β
*	Plasma termination and halo currents	Runaway electron currents: production and quenching, e.g. at low safety factor
*	SOL and divertor	Achievement of high n_{sep} and relation of $n_{sep}/\langle n_e \rangle$ in ELMy H-modes, especially at high n and δ Carbon chemical sputtering, re-deposition and deuterium retention/cleaning methods
*	Core confinement	Non-dimensional scaling and identity experiments; effect of finite β and flow shear. Determine dependence of τ_E upon shaping, density peaking etc.

*	H-mode power threshold	H-mode accessibility in ITER-FEAT, data scatter
*	Good H-mode confinement at high n	Confinement degradation onset density; its dependence on aspect ratio, shape and neutral source
*	Pedestal physics	Scaling of pedestal properties and ELMs Effects of plasma shape on pedestal and ELMs MHD stability analysis of transport barrier
	Internal transport barrier properties	ITB power thresholds vs n, B, q, Te/Ti, V rotation etc. for strong reversed shear ($q_{min}>3$), moderate reversed shear ($q_{min}>2$), and weak shear ($q_{min}>1$). Compatibility with impurity exhaust and divertor Accessibility of ITBs in reactor scale devices at low toroidal rotation, $Ti/Te \approx 1$, and flat density profile, etc.
	Resistive Wall Mode	RWM analysis and experimental verification
	Heating/CD, Steady State	Development of steady state scenarios: active current and pressure control Active control of LHCD coupling Assess fast particle effects (EPMs and ITBs)
	Diagnostics	Continue assessment of possible methods for measurement of q(r) and search for new approaches Continue study of First Mirrors especially effects of deposition and possible mitigating methods Assess impact of RIEMF on magnetic measurements and perform improved measurements on prototype magnetic coils Complete determination of measurement requirements for divertor target and divertor plasma parameters (in collaboration with the Divertor Expert Group), and complete assessment of probable performance of proposed diagnostic methods

* relevant to main scenario (ELMy H)

ITER COUNCIL TOUR OF CLARINGTON SITE

by Dr. D. Dautovich, Managing Director, ITER Canada

The ITER Council meeting was recently held in Toronto on 27 and 28 February. ITER Canada provided local arrangements for the Council meeting on behalf of Europe as the official host. Following the meeting, on 1 March, ITER Canada conducted a tour of the proposed ITER construction site at Clarington, and the ITER Council members attended a luncheon followed by a speech by Dr. Peter Barnard, Chairman and CEO of ITER Canada, at the Empire Club of Canada. The official invitation to participate in these events came from Dr. Peter Harrison, Deputy Minister of Natural Resources Canada. This report provides a brief summary of the events of 1 March.

The tour departed Toronto at 8 a.m. and arrived at the Clarington site an hour later. En route, the tour participants were provided information on the city of Toronto, surrounding communities, and industrial focus in the province of Ontario. The population of Toronto and immediate surrounding communities is about 4.8 million and is growing quickly. Ontario's economy represents 40% of Canada's and is broadly diversified.



Possible ITER Construction Site at Clarington

The Clarington site is comprised of land situated between the Blue Circle cement plant and the Darlington Nuclear Station. On arrival at the site, the tour participants were invited into the Darlington Nuclear Station's information centre where they were provided information about the site and about ITER Canada's preparations for a Canadian site offer. Mayor John Mutton of the Municipality of Clarington warmly welcomed the ITER Council members and the other tour participants and expressed the strong community support for the ITER project to be constructed there.



ITER Council Meeting Participants at Clarington "on the spot" where ITER could be built

The area of the proposed ITER site is 184 hectares. The site has access to a nearby grid and other infrastructure, and is very close to the tritium removal facility where tritium, a material which will eventually be needed by ITER, is stored. The electrical grid at Clarington is very strong and able to directly meet ITER requirements. The site is located on the ocean-going St. Lawrence Seaway, and existing docks used for the construction of Darlington, and currently by the adjacent cement company, would allow the direct transportation of all fully fabricated components for ITER from the country of supply. A rail line also runs through the site. The main features of the site are shown in the site photo on page 7. A photo of the ITER Council Members and other guests attending the tour is also shown. They are standing where the tokamak would be located if ITER were built at Clarington.

Following the site tour, ITER Council Members attended a luncheon and speech given at the Empire Club by Dr. Peter Barnard, Chairman and CEO of ITER Canada. The Empire Club was established in 1903 and is one of Canada's oldest and largest speakers' forums. At the head table were a wide range of supporters of ITER Canada including representatives of the Canadian and Ontario governments, mayors of local municipalities around the site, the chairman of Canada's largest bank, a former Canadian Minister of Finance, a leading environmentalist and presidents of two of Canada's largest construction companies.

In his televised speech, Dr. Barnard announced that ITER Canada's proposal to host ITER was now completed and with the government for review. He also announced that ITER Canada's industrial members have pledged \$23 million to cover the costs of licensing, environmental assessment, site specific design, and participation in negotiations leading to a site selection and implementation agreement. A full capacity audience of about 300 people including the ITER Council guests attended this event.

ITER Council guests voiced their pleasure at having the opportunity to visit the proposed Canadian site for ITER and to learn more about the status of ITER Canada's offer to host.

Items to be considered for inclusion in the ITER Newsletter should be submitted to B. Kuvshinnikov, ITER Office, IAEA, Wagramer Strasse 5, P.O. Box 100, A-1400 Vienna, Austria, or Facsimile: +43 1 2633832, or e-mail: c.basaldella@iaea.org (phone +43 1 260026392).

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