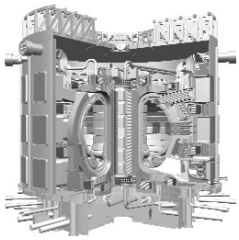

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ITER UPDATE

Information from the Editor

Following up the meeting of delegations on 21 February 2004, a meeting of technical experts took place in Vienna on 12–13 March aiming to reach a joint appreciation in common terms on key topics related to the siting of ITER construction. There is no formal published outcome for this meeting, but an informal internal summary indicated that:

— The presentations, which included much new material, were helpful to furthering the process of understanding.
— Similarly, the discussions between the two site proponents and involving the non-site proponents also illuminated the various issues on the table.
— This meeting brought to an end the joint technical discussions that have been supporting the site decision process.
— There was also a general appreciation for the great effort made by both sets of site advocates and for the helpful role of the IT leaders at this intense meeting.
— Finally, there was a difference of view among the delegations on the nature of the outcome of this two-day technical meeting. Some delegations had the expectation that there would be discussions on each of the nine topics addressing an agreed set of 'common terms' with sufficient detail that each delegation could make its own judgement about the factors at the two sites. Those delegations found the outcome to meet their expectations. Some other delegations had the expectation that a report would be developed appreciating jointly in common terms the two sites on each of the nine points, leaving to each proponent the right to formulate appreciations on its own proposal. These delegations regretted the lack of a written outcome of the meeting.

Meanwhile the participants in ITER negotiations, in particular Japan and Europe, are continuing discussions with a view to reaching a conclusion on the choice of the ITER site.

INITIAL MEETINGS OF THE RE-ESTABLISHED TEST BLANKET WORKING GROUP

by Dr. L. Giancarli, Chairman, ITER Test Blanket Working Group

The ITER Test Blanket Working Group (TBWG) was first established in 1995. Its activities covered successively the final part of the ITER EDA and the extension period, the main results being a preliminary assessment of the breeding blanket testing capabilities of ITER and a proposal of a coherent test blanket programme, reported in 2001, that optimized the sharing of the three available testing ports between the three Parties present in 2001 (EU, JA and RF) taking into account the different coolant characteristics.

The TBWG was re-established by the ITER Interim Project Leader in September 2003, with the support of the Participant Team Leaders. It is now comprised of four members from the ITER International Team and up to three members from each of the six ITER Participant Teams. The International Team delegation is led by Dr. V. Chuyanov, who has also been appointed as TBWG Co-Chair, while the six Participant Team delegations are led by Prof. M. Abdou (US), Dr. M. Akiba (JA), Dr. A. Cardella (EU), Dr. B.G. Hong (KO), Dr. C. Pan (CN) and Dr. Y. Strebkov (RF).

The revised TBWG charter defines the four missions of the activities: i) provide the Design Description Document (DDD) of the Test Blanket Module (TBM) systems proposed by the participants, including the description of the interfaces with the main ITER machine, ii) promote cooperation among participants on the associated R&D programmes, iii) verify the integration of TBM testing in ITER site safety and environmental evaluations, and finally, iv) develop and propose coordinated TBM test programmes taking into account ITER operation planning. TBMs have to be representative of the breeding blanket for DEMO (the next reactor after ITER), capable of ensuring tritium-breeding self-sufficiency and of accommodating high-grade coolants for electricity production.

Two meetings have been held so far by the new group: TBWG-11, held at the ITER-JWS Garching on 22–24 October 2003, and TBWG-12, held at the ITER-JWS Naka on 10–11 March 2004. Besides the TBWG members, several other experts also participated in the meetings.

Three equatorial ports are still available in ITER for TBM testing but have now to be shared between the six potential Parties. Significant collaboration and programme integration between Parties has now become a necessary condition for a successful testing programme. The first meeting was mainly devoted to the re-evaluation of the ITER parameters available for testing, to the presentation of the breeding-blanket-related R&D activities performed and/or planned by the Parties, and to the identification of the blanket lines expected to be tested in ITER.

During the D-T phase (inductive operation), typical operating conditions for TBMs include a surface heat flux of 0.27 MW/m^2, a neutron wall load of 0.78 MW/m^2, with a pulse length of 400 s and a duty cycle of 25%. In the meeting, it was concluded that these conditions allow significant TBM tests which are unique and essential on the way to breeding blanket development. TBMs will be associated with relevant cooling and detritiation systems, which will allow the demonstration of blanket functionality in a real fusion environment. Other main testing objectives are the validation of theoretical predictions on the blanket performance by using specific instrumentation and appropriate “act-alike” TBM designs. “Act-alike” TBMs are necessary in order to take into account the relatively limited test operating parameters compared with the expected DEMO operating parameters. The low neutron fluence in ITER will not permit testing of long term irradiation effects on materials; on the other hand, it is recommended to install TBMs from the beginning of the initial H phase because valuable results on safety and TBM system operations could already be obtained at that time.

The R&D activities carried out in the past decades by the ITER Parties have led to the selection of five blanket lines to be tested in the first ten years of ITER operations: 1) He-cooled ceramic/Be blankets using ferritic-martensitic steel (FMS) structures, pebble-beds of Li-based ceramics and pebble-beds of porous Be, 2) He-cooled or dual-coolant (He) liquid eutectic Li-Pb blankets with FMS structures, 3) water-cooled pebble-bed ceramic/Be blankets with FMS structures, 4) self-cooled Li blankets with V-alloy structures, and 5) self-cooled or dual-coolant (He) molten salt blankets using FMS structures. More advanced blankets using, for instance, SiC/SiC structures, could be envisaged at a later stage if the ongoing long term R&D is successful.

Five Working Sub-Groups (WSGs), corresponding to the five blanket lines given above, have been established in order to evaluate the status of the design and R&D activities for each line, to propose a development strategy to be performed by each interested Party, and to define an appropriate testing programme able to demonstrate the eligibility of each line to be used as breeding blanket in DEMO. One of the most important objectives for the WSGs is to evaluate the requirements in terms of space and time for each testing programme in order to reach an agreement between the Parties on the provisional sharing of the use of the three testing ports. The nominated WSG leaders are L. Boccaccini (EU), Y. Poitevin (EU), M. Enoeda (JA), I. Kirillov (RF) and D.K. Sze (US). Each interested Party has nominated its representatives in each WSG.

The second meeting was mainly devoted to the presentation and the discussion of the preliminary proposals by each WSG. For each blanket line, the proposed strategy is to test a series of “act-alike” TBMs, using DEMO-relevant technology, for addressing separately individual effects and to facilitate the interpretation of results, with a final global “look-alike” TBM for functional demonstration. For some blanket lines, several Parties are proposing their own design, which leads to independent testing programme proposals. For instance, in WSG1 (He-cooled ceramic/Be blankets), EU, JA and RF intend to test their own designs, CN has yet to complete the assessment, while KO and US want to give substantial support to the other Parties’ proposals.

Of course, all the proposals have a strong impact on the definition of the sharing of the testing port allocation. No agreement has yet been possible, although some main principles have been accepted. It is foreseen to test He-cooled ceramic/Be blankets in the first port, water-cooled ceramic/Be blankets and He-cooled (and/or dual-coolant) Li-Pb blankets in the second, and Li/V blankets, molten salt blankets and other He-cooled blankets in the third. The definition of port allocation is extremely important to define all necessary connection lines with the other parts of the ITER buildings. More flexibility is obviously allowed for all the TBM systems which can be fully accommodated in the port cell and cask. An agreed provisional decision on test port allocation is expected at the next TBWG meeting, which is scheduled for July 2004.

The outcome of the discussions has clearly shown that WSGs are an effective instrument for exchanging information from the Parties, for identifying common interests and generating ideas for collaboration. The Parties now have available the information to identify partners for any given R&D issue and to collaborate either bilaterally or under more general international agreements.

During the March meeting, the question of the definition of DEMO was also addressed. This definition depends on the Parties' strategy for the development of fusion power as an energy source. Despite some differences mainly related with time schedule aspects, a minimum set of DEMO specifications, directly affecting the requirements for breeding blankets and thus for the TBMs, has been agreed. The most severe ones are: i) the need for tritium-breeding self-sufficiency, ii) the achievement of a reasonable thermal efficiency compared with other sources, iii) the use of low activation materials, and iv) blanket availability greater than 50%.

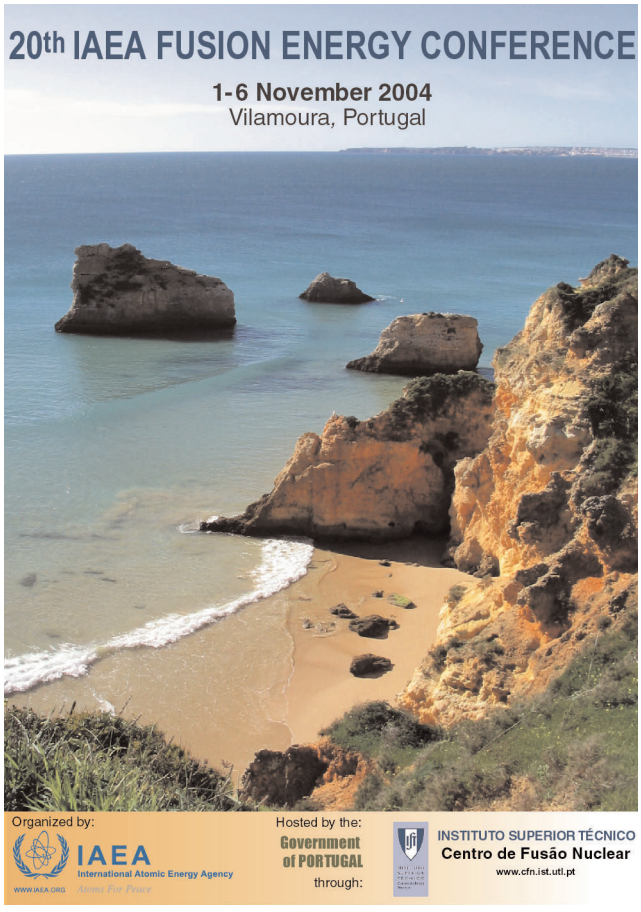
In conclusion, these first two TBWG meetings have shown that the testing programme in ITER can give considerable benefits to the breeding blanket R&D. The coordination of the testing activities proposed by the various Parties and the interest expressed by the Parties in collaborating on the most critical R&D items for each blanket line offer a good perspective for the breeding blanket development of DEMO.

TBWG Members: M. Abdou (US), M. Akiba (JA), L.V. Boccaccini (EU), A. Cardella (EU), S.Y. Cho (KO), V. Chuyanov (ITER), M. Enoeda (JA), K. Feng (CN), L. Giancarli (EU), R. Haange (ITER), B.G. Hong (KO), K. Ioki (ITER), M. Iseli (ITER), I.G. Kirillov (RF), C. Pan (CN), G. Shatalov (RF), Y. Strebkov (RF), D.K. Sze (US), S. Tanaka (JA), M. Ulrickson (US), Y.C. Wu (CN). TBWG Secretary: S. Hermsmayer (EU).

TWENTIETH IAEA FUSION ENERGY CONFERENCE

1–6 November 2004, Vilamoura, Portugal

Recognizing the increasingly prominent role that energy plays in the world and the expectation that nuclear fusion can provide an abundant energy source, the International Atomic Energy Agency (IAEA) supports the exchange of scientific and technical information on fusion research through conferences, meetings and projects. The 20th IAEA Fusion Energy Conference (FEC 2004) provides a forum for elaborating the excellent progress that is being made in fusion experiments, theory and technological developments. FEC 2004 will be organized in cooperation with the Centro de Fusão Nuclear, Instituto Superior Técnico, Lisbon, Portugal. It will take place during 1–6 November in



Vilamoura, on Portugal's south coast, facing one of the largest deuterium reservoirs of the world: the Atlantic Ocean.

This is a special year, in which the scientific community is anxiously awaiting a decision on the ITER site. No doubt exists that a huge effort and long term commitment have been necessary to bring us to where we are today — ready to initiate ITER construction. FEC 2004 will be a great opportunity to look at the work done and to prepare for future challenges.

International commitment will play a fundamental role in fusion activities during the ITER era. Challenging organizational structures have to be implemented in order to derive the maximum effectiveness from the joint scientific effort devoted to ITER, the world's largest international fusion project. Colloquiums like the IAEA Fusion Energy Conference create the necessary atmosphere for all participants to exchange views and ideas that might very well be the background for further achievements in the quest for a clean and endless energy source for peaceful applications.

FEC 2004 will cover the following topics:

— Overviews
— Magnetic Confinement Experiments
— Magnetic Confinement Theory and Modelling
— ITER Activities
— Inertial Fusion Experiments and Theory
— Innovative Concepts
— Fusion Technology and Power Plant Design
— Safety, Environmental and Economic Aspects of Fusion

At the same time, a series of satellite meetings and fusion related exhibitions will take place.

For more information please visit the conference web site:
http://www-pub.iaea.org/MTCD/Meetings/Announcements.asp?ConfID=116

Items to be considered for inclusion in the ITER ITA Newsletter should be submitted to C. Basaldella, 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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