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COVER SHEET

FOR TRIP REPORTS SUBMITTED TO THE

OFFICE OF ENERGY RESEARCH

Destination(s) and Dates for
Which Trip Report Being Submitted: West Germany -- September 6-20, 1990

Name of Traveler: T. C. Reuther

Joint Trip Report | | Yes

|x| No

If so, Name of Other Traveler(s): _____

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FOREIGN TRIP REPORT

ORNL/FTR-3788

DATE: October 12, 1990

SUBJECT: Report of Foreign Travel of T. C. Reuther, Metals and Ceramics Division, Oak Ridge National Laboratory, to FRG

TO: Alvin W. Trivelpiece

FROM: T. C. Reuther

PURPOSE: The general purpose of this travel was to advance provisional planning of an activity to coordinate research and development (R&D) activities on fusion materials among the existing fusion materials R&D programs of the International Thermonuclear Experimental Reactor (ITER) parties in accord with earlier discussions with the ITER Management Committee (IMC). This was to be accomplished in meetings with the Executive Committee for the International Energy Agency (IEA) Implementing Agreement on Fusion Materials and with the ITER management and staff.

SITES VISITED:			
	9/6-11/90	Kernforschungcentral, Karlsruhe (KFK), Karlsruhe, FRG	Dr. Karl Ehrlich
	9/12-20/90	ITER Team, Garching, FRG	Dr. K. Tomabechi Dr. D. L. Smith

ABSTRACT: The objective of this travel was to advance provisional planning of an activity to coordinate research and development (R&D) activities on fusion materials among the existing fusion materials R&D programs of the ITER parties. This objective was accomplished in discussions with the Executive Committee for the IEA Implementing Agreement on Fusion Materials in Karlsruhe, Germany, and with the ITER management and staff in Garching, Germany. The IEA Executive Committee deferred substantive consideration of the topic at the insistence of the Ex-Officio member from European Community (EC), Brussels. Discussions with ITER management and staff were positive. It was noted that the draft ITER Long-Term Technology Research and Development Plan contains recommendations for major program effort in materials R&D and includes recommendations for coordination among the existing programs of the parties to meet those materials R&D needs. ITER management discussions were in the context that decisions on specific activities for the ITER engineering design activity (EDA) must await formal action by the parties on the ITER EDA.

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COMPREHENSIVE TRIP REPORT

Discussion

A. Meeting of the Executive Committee for the International Energy Agency Implementing Agreement on a Programme of Research and Development on Fusion Materials, September 10-11, 1990, Kernforschungcentral, Karlsruhe

The traveler participated in the subject meeting for the purpose of discussing with the Executive Committee the potential interest of the International Energy Agency (IEA) Fusion Materials Program in considering participation in a coordinated materials research and development activity in support of the ITER Engineering Design Activity. A report of those discussions and on a second ITER relevant matter, potential USSR involvement in activities of this IEA Implementing Agreement, follow.

Other topics covered in the Executive Committee meeting will be reported in the joint trip report of the DOE representatives, Drs. R. E. Price and F. W. Wiffen, to the Committee.

1. Potential Interest in Coordination of Fusion Materials R&D Activities in Support of ITER Design

The traveler outlined the general nature of a potential ITER materials coordination activity[1] with the Executive Committee at their previous meeting and with individual members of the Executive Committee prior to this meeting. While those discussions were exploratory and strongly provisional,[2] the general response was favorable. In this meeting, other business before the Committee forced the ITER materials discussion into the final minutes of the meeting.

Following an abbreviated presentation of the concept by the traveler, the Ex-Officio member of the Committee from the Commission of the European Community (CEC), Dr. J. Darvas, expressed strong objections to consideration of any potential association of the IEA Implementing Agreement on Fusion Materials with ITER, even in the most provisional context. Time did not permit rational discussion relative to the position stated by Dr. Darvas,

[1]The proposed ITER activity would establish coordination among the existing fusion materials R&D programs of the ITER parties in support of ITER design. The ITER managing directors gave provisional endorsement (see footnote #2) of this proposal in discussions with this traveler in February 1990.

[2]"Provisional" in the context that no formal mechanism yet exists for the management or conduct of the engineering design activities (EDA) phase of ITER; thus, the endorsement of the materials R&D coordination activity by the ITER IMC per discussion of the IMC with this traveler in February 1990 was explicitly provisional subject to determination and implementation of ITER-EDA. Consideration of the issue was presented to the Executive Committee in that context of "provisional." Discussions were intended to be preparatory, not programmatic.

and since the Committee may act only with unanimity, the traveler withdrew his request that the Executive Committee give consideration to the potential of provisional coordination of R&D activities of the IEA program with that of ITER at this time. Any other course would have placed the EC member, Dr. Karl Ehrlich of KFK, in an awkward position, and a negative decision would have made later reconsideration of the topic more difficult.

The position taken by Dr. Darvas was a total surprise to the traveler. Dr. Darvas asserted that the IEA program should be focused on only the long term, not on applied issues like ITER. This attitude is at odds with the ongoing program of the Agreement and with the unambiguous charter to the Executive Committee pursuant to Fusion Power Coordinating Committee (FPCC) endorsement of the Amelinckx Panel report, the basic charter of the Agreement and evolving R&D programs of the Agreement. The Amelinckx Panel report explicitly emphasized that a "common programme" should focus on development and applications in support of the design of a reactor project. Ongoing activities of the Agreement include a common database (explicitly for use in design), the BEATRIX experiments on tritium breeding materials (which are central to data for ITER blanket design), the "Oak Ridge Matrix" on the properties of stainless steel, analysis of the merit of graphite for reactor applications, and cooperation in ceramic materials testing. This enumeration is not to suggest that the IEA program should not direct effort toward the long term, but it certainly has not been the policy of the Executive Committee or the FPCC to focus only on the long term.

It is noted that the Terms of Reference of the ITER project specifically provide for potential participation from among the programs of the ITER parties including bi- and multilateral programs. Also, the report of the "Critical Task Analysis" (dated 4 September 1990) of the ITER Long-Term Technology Research and Development Plan (dated 14 August 1990) explicitly calls for coordination of the ITER materials tasks with complementary programs of the parties.

In the context of this background, it is difficult to comprehend the objections of considering discussion of potential cooperation as expressed by Dr. Darvas. The traveler urges the Office of Fusion Energy to seek clarification of this issue within the Executive Committee and with the FPCC.[3]

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[3]The traveler had an opportunity to discuss this situation with Dr. Darvas at the IAEA Conference on Plasma Physics in Arlington, Virginia, on October 4, 1990. Dr. Darvas acknowledged that his objections had been largely a result of his lack of familiarity with the earlier discussion of the suggested activity (he was not at the previous meeting and I had not discussed it privately in advance with him as I had with the regular members). He also noted his general concern with implicit references or assumption regarding the pending, but still undefined, ITER-EDA. We also touched on his objection to consideration of potential involvement of the USSR in the IEA program. He had simply failed to realize that the objectives of the Executive Committee had been to examine the provisions of the IEA that would have to be addressed if there were to be any such development, not to directly initiate action on the matter. We agreed that both issues could be reexamined by the Executive Committee at a later time.

2. Consideration of Possible Participation of the USSR in Activities of the IEA Implementing Agreement

In discussions and actions of the Executive Committee in its meeting of December 1989, the issue of potential USSR participation in activities of the Agreement were considered. Those discussions were entered into (1) in the context of materials R&D support for ITER, especially in the evolution of a design database for ITER; and (2) in the context of known interest in the USSR on the subject of a 14-MeV neutron irradiation testing facility for fusion materials. The latter was made well known with the USSR participation in the IEA workshop on that subject that was hosted by DOE/OFE in San Diego in February 1989. In the December 1989 meeting, the Canadian member of the Executive Committee, Dr. Gill Phillips, accepted a charge of the Committee to explore the legal and administrative issues and provisions that would have to be considered if the Executive Committee were to develop recommendations or otherwise consider further actions relative to such potential USSR participation in any activities of the Agreement.

The report of Dr. Phillips was effectively preempted by the objections of Dr. Darvas.

Both the report of Dr. Phillips and discussion by the Executive Committee on the issue of USSR participation were frustrated by a shortage of time and by the objections of Dr. Darvas. His arguments seemed to be a mix of bureaucratic and philosophical, i.e., the IEA programs are for IEA members and the USSR is not a member; therefore, no arrangements can be made to provide for Soviet participation. Dr. Phillips had told the traveler privately that his report was strongly positive that both procedures and precedents exist, but he was not given an opportunity to make his report. The Executive Committee did take action to arrange for USSR participation in a technical symposium on low activation materials; however, the substantial issue of examining mechanisms for potential programmatic involvement with the USSR was not given meaningful discussion.

As a (previous) nine-year member of the Committee representing DOE, the traveler was quite taken back by the noncooperative attitude of Dr. Darvas. But as an observer and guest who was in attendance to discuss the ITER specific topic, the traveler was constrained from entering into discussion of the USSR issue. Still part of that issue is ITER related and the issue was a principal topic on the planned agenda in specific follow-up to the actions taken in the previous Executive Committee meeting. (The traveler did have a later opportunity to discuss this topic with Dr. Darvas privately; see footnote #3.)

B. Discussions with ITER Management and Staff, Garching, September 17-19, 1990

The purpose of these discussions was twofold: (1) to report to and discuss with the members of the ITER-IMC on the evolution of provisional planning for a potential activity to coordinate fusion materials R&D activities among the programs of the ITER parties in support of ITER design and (2) to explore the perspective of the members of the IMC regarding the scope of a "materials engineering function" for consideration in the ITER-EDA. The IMC members had earlier requested the traveler to formulate a suggested outline of such an activity and the present discussions were for the purpose of exploring preliminary ideas with the IMC and some ITER staff.

1. Provisional Planning for Coordination of Materials R&D

In planning for the discussions on coordination of materials R&D, it had been assumed that a generally affirmative expression of interest would have been forthcoming from the IEA Executive Committee; however, as discussed above, that did not happen. Moreover, it was noted that the recently published report on ITER Long-Term Technology R&D Plan contains recommendation for significant ITER-directed funding in support of materials R&D. That development was not assumed in my earlier discussions regarding coordination among existing programs of the parties (on a contributed basis) in support of ITER design. If these technology recommendations were to be implemented, those direct ITER materials tasks would serve as the core of materials support for ITER design rather than that the previously assumed contributed effort. Nevertheless, coordination of ITER materials R&D will be necessary if work is to be accomplished in an effective and efficient manner and if relevant work from among the existing programs is to be integrated with that of the ITER direct R&D support. The traveler was advised by the ITER-IMC to present his proposed plan for coordination of materials R&D for the ITER-EDA before the new management when the latter becomes established.

In considering the question of coordination of materials R&D, it was noted that the "Critical Task Analysis" that was conducted in early September 1990 (draft report dated September 4, 1990) calls explicitly for coordination of the ITER-directed materials R&D tasks with the existing materials programs of the ITER parties.

2. Materials Engineering Function for ITER

In the course of discussions with Dr. K. Tomabechi in February 1990, the traveler was asked to prepare an outline of what he thought a "materials engineering function" for ITER should be. In the present discussions, the traveler met with Dr. Tomabechi, John Gilleland, Chuck Flannagan, and Dale Smith to discuss the preliminary concepts on this topic. The central question was whether the members of the IMC (and some of the senior staff) wished to give serious consideration to the usual (American high tech corporate) structure in which the materials engineering function must be an element in the review and signature approval of final engineering design. The other elements of consultation, advice, and general participation in the technical process of design are rather obvious and are not necessarily at variance with the methods of technical design in the ITER-CDA. However, imposition of the concept of an explicit discipline-based review and approval process as part of ITER-EDA would be substantially at variance with the collegial form of review practices in the CDA.

Tomabechi, Gilleland, and Flannagan were all strongly in favor of the American corporate style and scope of a materials engineering function for ITER-EDA. At the same time, Tomabechi and Gilleland noted they have been satisfied with the review process that was used in the CDA for the purposes of the CDA. It was noted that if ITER-EDA were to be undertaken as a project by a major American, Japanese, or European corporate engineering firm, that firm would have its own materials engineering function. Since ITER-EDA will not be performed by such a single, integrated corporate entity, it would be necessary to create such a function.

The traveler agreed to provide his recommendations on this topic in a written report within the next two months.

3. Other Discussions

The traveler provided Drs. Tomabechi, Gilleland, and Toschi with preliminary observations on the draft ITER Long-Term Technology Research and Development Plan in regard to materials issues, and the traveler agreed to provide comments in writing following a more deliberate review. The central point which received an affirmative response from each of the IMC members was that the plan appeared to follow the now almost traditional (fusion project) scope of setting materials support for the design of magnet, plasma heating, and diagnostic systems apart from those more general materials activities that provide input to general structural engineering design including the first wall, blanket, and plasma facing components. That sense of isolation of those "special purpose materials" applications has been a long continuing problem in the evolution of the design of fusion systems. Several problems occur. It causes a mixing of testing for basic design data and testing for model, scale, and component testing. Historically this has lead to a shortfall of design data. This has been abundantly clear in the evolution of the design of CIT where major shortfalls developed in evolution of the design support for diagnostic systems, for magnet systems design and for the vessel design. The currently proposed plan for Technology R&D for ITER-EDA should be reexamined in this regard and that a comprehensive materials plan and R&D support activity that would cover all components and systems incorporated into ITER-EDA planning.

At the conclusion of the visit with the ITER team, the traveler was invited to sit in on the rehearsal of the ITER oral papers for the IAEA Conference in October. That was a rare opportunity and the traveler was pleased to have the opportunity to interact with the ITER team in that way.

APPENDIX A

ITINERARY

1990

9/6-8	Travel from Rockville, Maryland, to Karlsruhe, FRG (Official travel began 9/7)
9/9	Weekend in Karlsruhe, FRG
9/10-11	Coordinate materials R&D for ITER with members of ITER IEA Executive Committee
9/12	Travel to Garching, FRG
9/13-14	Personal leave in Garching, FRG
9/15-16	Weekend in Garching, FRG
9/17-19	Coordinate materials R&D for ITER with ITER Team Members
9/20	Travel from Garching, FRG, to Rockville, Maryland

END

DATE FILMED

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