International Atomic Energy Agency

IWGATWR/4-1

INTERNATIONAL WORKING GROUP
ON ADVANCED TECHNOLOGIES FOR WATER COOLED REACTORS

ADVANCED TECHNOLOGIES FOR WATER COOLED REACTORS 1990

PART I

SUMMARY REPORT OF THE THIRD MEETING
OF THE INTERNATIONAL WORKING GROUP
ON ADVANCED TECHNOLOGIES FOR WATER COOLED REACTORS
HELD IN VIENNA, 21-23 MAY 1990

INTERNATIONAL ATOMIC ENERGY AGENCY, VIENNA, 1991

ADVANCED TECHNOLOGIES FOR WATER COOLED REACTORS 1990

PART I

SUMMARY REPORT OF THE THIRD MEETING
OF THE INTERNATIONAL WORKING GROUP
ON ADVANCED TECHNOLOGIES FOR WATER COOLED REACTORS
HELD IN VIENNA, 21-23 MAY 1990

INTERNATIONAL ATOMIC ENERGY AGENCY, VIENNA, 1991

ADVANCED TECHNOLOGIES FOR WATER COOLED REACTORS 1990
PART I
IAEA VIENNA, 1991
IWGATWR/4-1

Printed by the IAEA in Austria
May 1991

FOREWORD

The Third Meeting of the IAEA International Working Group on Advanced Technologies for Water Cooled Reactors was held in Vienna, from 21 to 23 May 1990.

This document contains the summary report of the Meeting.

Part II, which is published separately, contains the papers, which review the national programmes in the field of advanced technologies for water cooled reactors.

EDITORIAL NOTE

In preparing this material for the press, staff of the International Atomic Energy Agency have mounted and paginated the original manuscripts and given some attention to presentation.

The views expressed do not necessarily reflect those of the governments of the Member States or organizations under whose auspices the manuscripts were produced.

The use in this book of particular designations of countries or territories does not imply any judgement by the publisher, the IAEA, as to the legal status of such countries or territories, of their authorities and institutions or of the delimitation of their boundaries.

The mention of specific companies or of their products or brand names does not imply any endorsement or recommendation on the part of the IAEA.

CONTENTS

SUMMARY OF THE MEETING

The Third Meeting of the IWGATWR was held at the Agency's Headquarters in Vienna, 21-23 May 1990. The meeting was attended by 20 participants from 12 countries; Argentina, Canada, China, Finland, France, Federal Republic of Germany, Italy, Japan, Sweden, United Kingdom, USSR, and USA. For the first time United Kingdom as Member Country of the IWGATWR attended the meeting. The Czech and Slovak Federal Republic attended the meeting as an observer expressing its strong interest in becoming a member of the IWGATWR.

The meeting was chaired by Mr. E. Aalto from Imatran Voima Oy, Finland.

The following paragraphs refer to the items of the Agenda.

1. Opening and Introductory Remarks

The meeting was opened by Mr. B. Semenov, Head of the Department of Nuclear Energy and Safety. Mr. Semenov stressed that a lot of experience has been accumulated in the area of water-cooled reactors, offering a sound basis for development of advanced reactors. He asked IWGATWR Members to review and discuss the status and progress of national programmes and to recommend to the Scientific Secretary a comprehensive programme for 1991/1992, which would support technology development programmes in IWGATWR Member States.

Approval of Agenda
The provisional agenda was approved.

2. Summary of Activities in the Framework of IWGATWR since the Second Meeting, June 1988

IAEA provided the IWGATWR members with summaries of all activities that have been performed in the framework of IWGATWR and related IWGs since its last meeting in 1988.

2.1. Approval of Summary Report Part I, II of the second IWGATWR meeting
Both reports were approved.

2.2. IAEA reports and meetings
The Secretariat informed the group about publications, summaries of meetings and CRPs in the framework of the IWGATWR.

A) Publications

- Status of Advanced Technology and Design for Water Cooled Reactors: Light Water Reactors (IAEA-TECDOC-479, published in October 1988).

- Status of Advanced Technology and Design for Water Cooled Reactors: Heavy Water Reactors (IAEA-TECDOC-510, published in July 1989).

The Secretariat expressed its thanks to all who have contributed to the establishment of these reports. Both reports have been very well received. Due to a strong demand, TECDOC-479 had already to be reprinted. Both reports were sent to IWGATWR members, alternates and representatives.

B) Meetings

- Technical Committee Meeting on Passive Safety Features in Current and Future Water Cooled Reactors, Moscow, USSR, March 1989. The meeting was attended by about 80 experts from 26 IAEA Member States. The objectives of the meeting were to review and discuss passive safety systems and features of current water-cooled reactors and to exchange information about new passive safety systems currently under development. In several papers the current state of the AST in PWR and BWR designs was presented, with special attention paid to a review of inherent and passive safety features incorporated into existing reactors as for example the German Siemens/KWU PWR-1300, French PWR with 900 MW and 1300 MW output, Japanese 1300 MW PWR and BWR, Soviet VVER-440 and VVER-2000, etc. In the course of the final round table discussion each of the Session Chairmen recollected the main findings and conclusions raised in the papers presented in his Session. Proceedings of the meeting have been published by the IAEA. (IWGATWR/3, Vienna, November 1990).

- Technical Committee Meeting on Technical and Economic Aspects of High Converters, Nuremberg, Federal Republic of Germany, March 1990. The purpose of the Technical Committee was to provide an opportunity to review and discuss worldwide studies for the implementation on High Conversion Reactors. The Technical Committee was followed by a workshop to discuss in more detail aspects on physics, on thermal-hydraulics and mechanical design and on economic and licensing aspects.

Any future development of new nuclear power stations has to consider two aspects:

- New stations have to be at least competitive in economics with nowadays PWRs, or preferably even lower in costs to take into consideration other energy sources.

- These new plants must be considered under the very stringent limitations of present day safety considerations and public acceptance.

There seems to be the following consensus reached in the community:

For physical/thermal-hydraulic reasons, the originally envisaged very tight lattice has to be widened up relatively close to a PWR, but with hexagonal lattice.

Relatively little information has been presented in economics. The main reason is that High Converters are not expected to be introduced until early next century.

Several benchmarks were recommended in the area of physics, thermal-hydraulics and mechanical design.

- Consultants Meeting on Description of Safety Related Terms, Vienna, October 1988.

During the Consultants Meeting a Working Paper on "Description of Safety Related Terms" has been established for distribution to IWGs for other reactor lines. Currently comments from these IWGs are being collected.

C) Co-ordinated Research Programmes (CRPs)

- CRP on the Establishment of Thermophysical Properties Data Base for Light and Heavy Water Reactor Materials. The purpose of the consultancy was to review the current status on the basis of comments from Member States and IWGATWR members and to redefine the CRP programme for establishment of Thermophysical Properties Data Base for Light and Heavy Water Reactor Materials. The meeting was attended by 3 consultants. The consultants recommended to modify the CRP programme.

  The meeting produced the Final Consultants Report on Updated CRP Programme for the Establishment of Thermophysical Properties Data Base for Light and Heavy Water Reactor Materials. This consultants report contains the background information on related CRP programme. Consultants reviewed the initial proposal of CRP, responses of IWGATWR members, reports on the work in 1990 and the new proposals for participation in the CRP. The consultants recommended that the initial CRP should be divided into two parts, where the first part devoted to the establishment of thermophysical properties data base should be realized immediately and the part devoted to thermal hydraulic data base should represent the next phase.

IWGATWR recommended the Scientific Secretary to produce updated documents on Status of Advanced Technology and Design for Water-Cooled Reactors. These documents could provide Member States very good feedback in advanced technology.

2.3 Summary of other major activities at IAEA related to IWGATWR:

A) Publications

- Use of Nuclear Reactors for Seawater Desalination (IAEA-TECDOC-574, Vienna, September 1990)

- IAEA Bulletin

  The 3rd 1989 issue of the IAEA Bulletin was devoted to a description of advanced reactor designs. Several IWGATWR members contributed to different articles, for which the Secretariat expressed its thanks.

B) Meetings

The Secretariat informed the IWGATWR about major results and conclusions of the Scientific Programme of the last General Conference in 1989. The Scientific Programme was titled "The Next Generation of Nuclear Power".

One of the major conclusions made at this meeting was that further development and possible future deployment of advanced reactors does not only depend on technological issues, but also on institutional issues, such as licensing and societal acceptance.

Increase of activities in advanced reactors was recommended. The programme should address both technical and institutional issues. As a follow-up of these recommendations the Agency convened in November 1989 a small Consultants Meeting on "The Next Generation of Nuclear Power and the Role of the IAEA".

The consultants reviewed different options for suitable Agency activities and finally recommended that - inter alia - a document be prepared on requirements for advanced reactor systems. The document should contain a summary on what users of NPPs require from a next generation reactor and could therefore serve as a guide for vendors in the design process. The document should not deal with how requirements could be achieved since this would be totally the tasks of vendors.

Similar documents have already been prepared by utility groups and other organizations, which, however, only deal with one specific reactor line or which contain utility input only from one country. The proposed document has been proposed to be established with international input and without concentration on a specific reactor line. During the discussion about this document Mr. Lang described the concerns of the USA regarding this activity. The majority of the group supported the establishment of this document, which will be subject for review at two further consultants meetings in 1990 and a Technical Committee in China in October 1990. The IWGATWR requested to be kept informed about the development of the user requirements document.

In the framework of the IAEA activities on in-core fuel management, two technical committees have been organized. The main purpose of these meetings was to review and discuss selected core physics aspects of water-cooled reactors. Of particular importance were the many contributions being made by users of the VVER type reactors. Three CRPs have been established which contain the PWR, BWR and VVER. Chairman concluded that activity should be concentrated not only on technology but also on specific scientific topics.

3. Progress Report on Development Programmes in Member States

IWGATWR Members and Mr. Podest as the observer presented the papers describing the status and progress on technology development and results achieved since the last meeting in Member States. Papers are included in Part II of the Summary Report of the 3rd IWGATWR meeting.

4. IWGATWR 1990/92 Programme Formulation

4.1 Meetings on Planned Activities NPTD Section in 1990

Finland, 3-6 Sept.	SPM on Methods and Technologies for Cost Reduction of Water-Cooled Reactor Power Plants (I3-SP-633-12)	Mr. J. Krett

VIC, C07-VI 24-26 Sept.	Technical Committee on Nuclear Process Steam Application (I3-TC-724)	Mr. V. Krett
Chengdu, CRP, Sept.	Technical Committee on Design and Safety Requirements for Next Generation of Water-Cooled Reactors (I3-TC-63307), postponed from 1989.	Mr. J. Kupitz

4.2 Other IAEA Activities of Interest to the IWGATWR

4.3 Non IAEA International Meetings of Interest to the IWGATWR

The Secretariat provided the IWGATWR Members with detailed information about IAEA and non IAEA international meetings.

4.4 IWGATWR Meetings for 1991/92

At the second IWGATWR Meeting in June 1988 recommendations for future Agency meetings and topics were made by participants. Reviewing these recommendations and additional proposals prepared by the Secretariat the IWGATWR recommended the following list of activities for 1991-93:

	proposed date	proposed location
1991		
- Specialists Meeting on Safety Related Terms - Description and Deeper Understanding	MAY/91	VIC (USA)
- Preparatory Consultants Meeting for above mentioned meeting	III/IV/90	VIC
- TCM on Materials for Advanced Water Reactors	MAR/91	VIC (CSFR)
- TCM on Progress in Development and Design Aspects of Advanced Water-Cooled Reactors (Plant layout, components, systems, simplifications, safety characteristics)	SEPT/91	Italy
1992		
- TCM (SP) on Integral Design Concepts	III-IV/92	VIC (UK)
- 4th IWGATWR Meeting	MAY/92	VIC (CSFR)
1993		
- TCM on Technical and Economic Performance of Advanced Water-Cooled Reactors	II/93	VIC (Japan)
- TCM on Thermohydraulics Investigations and Thermophysical properties for Advanced Water-Cooled Reactors.	1993	Open.

4.5 IWGATWR publications

The Secretariat proposed to the IWGATWR the establishment of the following Status Reports:

- Development Needs for Future Design Concepts
- Passive Safety Systems in Water-Cooled Reactors

The IWGATWR preferred a timely updating of the two Status Reports on Water-Cooled Reactors to the preparation of new documents.

5. Various

The nomination of the representative of the Czech and Slovak Federal Republic for membership in this IWG was recommended.

6. Date and Venue for Next IWGATWR Meeting

The Secretariat proposed to convene the next IWGATWR in about one year. Suggestion of IWGATWR was to convene the IWG meeting every two years. The next meeting will be held in 1992 in Vienna or CSFR.

In his closing remarks Mr. Aalto expressed thanks to the participants and observers for their active participation with fruitful discussion and recommendations and thanked the (Agency) Secretariat for effective organization and preparation of this meeting. Mr. Kupitz expressed the Agency's thanks to the chairman for his effective guidance through the meeting and to the participants for their input for activities on advanced technologies for water-cooled reactors, which may become an important part of the Agency's future programme.

OPENING REMARKS

B. Semenov
Department of Nuclear Energy and Safety,
International Atomic Energy Agency,
Vienna

It is a great pleasure for me to welcome you, on behalf of the International Atomic Energy Agency, to the 3rd Meeting of the IAEA International Working Group on Advanced Technologies for Water-Cooled Reactors.

The last IWGATWR Meeting has been organized outside the IAEA Headquarters in Helsinki, Finland. I would like to take this opportunity to express our thanks to the host of the last meeting held in Finland, particular to the meeting chairman, Mr. Erkki Aalto from Imatran Voima Oy. I would also ask him to chair this 3rd meeting.

Supplied data to IAEA PRIS (Power Reactor Information System) show us, that by the end of 1989 there were 426 reactor units connected to the grid in 26 countries. 83 % of these units are water cooled reactors, that are 239 PWRs, 88 BWRs and 27 PHWRs. It means that many countries are already heavily reliant on nuclear power and in particular on water-cooled reactors, which will continue to be the main stream of nuclear energy among all lines of nuclear reactor types within the foreseeable future.

Data from the IAEA PRIS systems show also that nuclear energy has already reached a very high level in reliability, availability, performance and safety. Technology development, however, in all areas is never standing still but is always progressing and this is also valid for nuclear power technology development.

A tremendous amount of experience has been accumulated during the development, design, construction and operation of water-cooled reactors, offering a sound basis for further technology improvements and the development of new design concepts.

Advanced designs that are being investigated aim at the further enhancement of economy, reliability and safety.

These designs include:

- large sized water reactor designs as a result from a continuous upgrading and evolutionary technology improvements of current models.
- medium sized evolutionary designs which incorporate to a large extent passive safety systems
- high converters for better fuel utilization
- innovative design concepts which are mostly based on the PIUS-concept.

I suppose you will propose and recommend to the IAEA a comprehensive programme in above mentioned directions for enhanced cooperation and exchange of information among Member States.

The purpose of your IWGATWR Meeting is also to review and discuss the status and progress of national programmes made since the last IWG in June 1988 in advanced technology development and design trends for existing and new water reactor designs. We would also very appreciate getting your recommendations for the 1991/92 IAEA Programmes which may mainly consist of meetings, publications and CRPs.

Now I have the pleasure to be able to thank Mr. Aalto for having accepted the responsibility of chairing this meeting. Before giving him the floor I would like to thank you again for coming to this meeting.

LIST OF PARTICIPANTS

Mr. Erkki AALTO	Imatran Voima, IVO Engineering P.O. Box 112, Rajatorpantie 8 SF-01601 Vantaa, Finland
Mr. Héctor ANTUNEZ	Depto Reactores - CAC Comisión Nacional de Energía Atómica Avenida Libertador 8250 1429 Buenos Aires, Argentina
Mr. J.A. BOARD	Manager, New Projects Group Nuclear Electric Plc, Booths Hall Chelford Road, Knutsford, WA16 8QG Cheshire United Kingdom
Mr. B.V. BUDYLIN	USSR Ministry of Nuclear Power Engineering and Industry Staromonetny Pereulok 26, Moscow, USSR
Mr. M. CRIJNS	Nuclear Power Technology Development Section Division of Nuclear Power International Atomic Energy Agency (IAEA) VIC, Wagramerstr. 5, P.O. Box 100, A-1400 Vienna
Mr. M. DENNIELOU	EDF - Direction de l'équipement SCE études et projets thermiques et nucléaires 12-14 Avenue Dutrievoz, F-69628 Villeurbanne Cedex France
Mr. V.G. FEDOROV	First Deputy of Chief Designer Experimental Design Bureau, "Hydropress" 142100 Podolsk, Moscow District, USSR
Mr. I.H. GIBSON	Atomic Energy Authority Winfrith Technology Centre, Dorchester DT2 8DH Dorset, United Kingdom
Mr. Martin J. HOUGH	Nuclear Electric Plc, Sudbury House 15 Newgate Street, London EC1A 7AU, United Kingdom
Mr. Yoshihiko KANEKO	Director, Department of Reactor Engineering Tokai Research Establishment Japan Atomic Energy Research Inst. 2-4, Shirane Shirakata, Tokai-mura Naka-gun, Japan
Mr. V. KRETT (Scientific Secretary)	Nucl ar Power Technology Development Section Division of Nuclear Power International Atomic Energy Agency (IAEA) VIC, Wagramerstr. 5, P.O. Box 100, A-1400 Vienna
Mr. J. KUPITZ (Scientific Secretary)	Head, Nuclear Power Technology Development Section Division of Nuclear Power International Atomic Energy Agency (IAEA) VIC, Wagramerstr. 5, P.O. Box 100, A-1400 Vienna

Mr. P. LANG	Office of Nuclear Energy U.S. Department of Energy, Mail Stop NE-42 Washington, D.C. 20545, USA
Mr. LERIDON	C.E.A., Centre de Cadarache DRN/Deparcemen d'Etudes des Reactores 13115 St. Paul Lez Durance, France
Mr. J. LIPSETT	Atomic Energy of Canada Ltd., Research Company Chalk River Nuclear Laboratories Chalk River, Ontario, KOJ 1JO Canada
Mr. P.J. MEYER	Siemens AG; Group KWU, Department U 5212 Hammerbacherstrasse 12 + 14 P.O. Box 3220, D-8520 Erlangen, Germany
Mr. T. MIWA	Director, Nuclear Power Engineering Test Center Shuwa-Kamiyacho Bldg. 4-3-13 Toranomon, Minato-ku, Tokyo 105, Japan
Mr. Wataru MIZUMACHI	Manager, Plant and System Planning Department Toshiba Corporation, 3 Shin-Sugita Isogo-Ku Yokohama, Japan
Mr. E. MOECK	Chalk River Nuclear Laboratories Chalk River, Ontario KOJ 1JO, Canada
Mr. Luigi NOVIELLO	Deputy Director, Standard Nuclear Station Design ENEL DSR, Via G.B. Martini, 3 I-00198 Rome, Italy
Mr. T. PEDERSEN	Reaktordivisionen, ASEA-ATOM, P.O. Box 53 S-721 63 VASTERAS, Sweden
Mr. Milan PODEST	Nuclear Research Institute 25068 Rez Near Prague Czech and Slovak Federal Republic
Mr. SHEN, Wenquan	Director, Division of Science and Technology Bureau of Nuclear Power China National Nuclear Corporation P.O. Box 2102, Beijing, China
Mr. V.A. VOZNESENSKIY	I.V. Kurchatov Institute of Atomic Energy 42 ulitsa Kurchatova, P.O. Box 3402 123182 Moscow, USSR

LIST OF MEMBERS AND ALTERNATES

APRIL 1991

MEMBER

ALTERNATE

ARGENTINA

Mr. Héctor ANTUNEZ
Depto Reactorse - CAC
Comisión Nacional de Energía Atómica
Avenida Libertador 8250
1429 Buenos Aires
Tel. 12 p.m. to 10 a.m.
Greenwich standard time
(54-1)826-2234, other
times (54-1) 752-9747
Telex: 33-26110 cac ar
Facsimile: (54-1) 764-5644

Preferred postal address:
Mr. H.M. Antúnez
Arenales 2626
1425 Buenos Aires

BELGIUM

Mr. Jos REMACLE
Chef de la Section Methodes et
Qualité à Belgatome
Avenue Ariane 7
B-1200 Brussels
Tel.: 773 80 83
Fax.: 773 99 00

Mr. M. BAIRIOT
Belgonucléaire
25 rue du Champ de Mars
B-1050 Brussels
Tel.: 25139690
Tlx.: 22187 NUCBRU B
Fax.: 32-2-5132203

CANADA

Mr. E. MOECK
Chalk River Nuclear Laboratories
Chalk River, Ontario
KOJ 1JO
Tel.: 613-584-3311
Telex: 053-34555
Facsimile: 613-589-203[illegible]

Mr. R. FINDLAY
CANDU-Operations
Sheridan Park Research Community
Mississauga, Ontario
L5K 1B2
Tel.: (416) 823 8006
Telex: 06-982372
Facsimile: (416) 823-9040

PEOPLE'S REPUBLIC OF CHINA

Mr. QIAN, Jihui
Director
South-West Center of Reactor
Engineering Research and Design
P.O. Box 291
Chengdu, Sichuan
Telex: 611021 swcr cn

Mr. SHEN, Wenquan
Director
Division of Science and
Technology
Bureau of Nuclear Power
China National Nuclear Corporation
P.O. Box 2102, Beijing
Tel.: 8012211-3561
Telex: 222315 famni cn
Facsimile: 8012211-3574

CZECH AND SLOVAK FEDERAL REPUBLIC

Mr. Zdenk MLADY
SKODA Concern
Power Machinery Plant
Plzen
Tel.: (42) 19-514/
Tlx.: 154 213 skje c
Fax.: (42) 19-278 555

FINLAND

Mr. Erkki AALTO
Senior Advisor, Nuclear Engineering
Imatran Voima, IVO Engineering
P.O. Box 112
SF-01601 Vantaa
Rajatorpantie 8
Tel. nat. (90) 508 2410
int. +358 0 508 2410
Telex: 124608 VOIMA SF
Fax: +358 0 508 3403

Mr. Ami RASTAS
Teollisuuden Voima Oy
Fredrikinkatu 51-53 B
SF-00101 Helsinki
Tel.: 90-605022
Telex: 651[illegible]4 voima sf
Facsimile: 90-5083403

FRANCE

Mr. J.P. SCHWARZ
C.E.A.
Centre de Saclay
DT/CRE
F-91191 Gif-sur-Yvette
Tel.: 69 08 81 32
Telex: 604641 F
Facsimile: 69 08 48 62

Mr. Yves DENNIELOU
EDF - Direction de l'équipement
SCE études et projets
thermiques et nucléaires
12-14 avenue Dutrievoz
F-69628 Villeurbanne Cedex
Tel.: 78 94 48 10
Telex: EDFEP 305323 F

GERMANY

Mr. [illegible].-J. MEYER
Deputy Director
Siemens AG, Group KWU
Department U 5212
Hammerbacherstrasse 12 + 14
P.O. Box 3220
D-8520 Erlangen
Tel.: 09131-18 2127
Telex: 62929-0
Facsimile: 09131-185712

Mr. K.F. WOLFERT
Gesellschaft für
Reaktorsicherheit (GRS) GmbH
Forschungsgelände
D-8046 Garching
Tel.. (089) 32004-104
Telex: 5215 110 GRS MD

INDIA

Mr. Ch. SURENDAR
Director
500 MWe PHWR Group
Nuclear Power Corporation
of India Limited
S-71 South Site, BARC
Trombay, Bombay-400 085
Tel.: 5550746
Telex: 011-72316
NPB-IN

Mr. V. VENKAT RAJ
Head, Thermal Hydraulic
Studies Section
Reactor Engineering Division
of Bhabha Atomic Research Centre
Trombay
Bombay-400 085
Tel.: 5514910 ext.: 2643
Telex: 011-71017

ITALY

Mr. Luigi NOVIELLO
Deputy Director
Standard Nuclear Station Design
ENEL DSR
Via G.B. Martini, 3
I-00198 Rome
Tel.: 85092135
Telex: 625568 enel dg
Facsimile: (6) 85098601

JAPAN

Mr. Toshiro MIWA
Director
Nuclear Power Engineering Test Center
Shuwa-Kamiyacho Bldg.
4-3-13 Toranomon
Minato-ku, Tokyo 105
Tel.: 03-434-2450
Facsimile: 03-434-6786

Mr. Yoshihiko KANEKO
Director
Department of Reactor Engineering
Tokai Research Establishment
Japan Atomic Energy Research Inst.
2-4, Shirane Shirakata
Tokai-mura Naka-gun,
Tel.: 0292-82-5517
Telex: j 24596

SWEDEN

Mr. Tor J. PEDERSEN
Reaktordivisionen
ABB ATOM AB
S-721 63 Västeras
Tel.: 021/10 70 00
Telex: 40629 ATOMVA S
Facsimile: 021-189 471

USSR

Mr. Boris Vasil'evich BUDYLIN
USSR Ministry of Nuclear Power
Engineering and Industry
Staromonetny Pereulok 26
Moscow
Tel.: 2331718
Telex: 411888 MEZON SU

Mr. V.G. FEDOROV
First Deputy of Chief Designer
Experimental Design Bureau
"Hydropress"
142103 Podolsk, Moscow District

USA

Mr. P. LANG
Office of Nuclear Energy
U.S. Department of Energy
Mail Stop NE-42
Washington, D.C. 20545
Tel.: (301) 353-3313
Telex: 710-8280475
Facsimile: 353-3870/verify 353-3486

Mr. Sol ROSEN
Director
Office of International Programs
Office of Nuclear Energy
U.S. Department of Energy
Mail Stop NE-42
Washington, D.C. 20545
Tel.: (301) 353-3313
Telex: 710-8280475
Facsimile: 353-3870/verify 353-3486

UNITED KINGDOM

Mr. I.H. GIBSON
Atomic Energy Authority
Winfrith Technology Centre
Dorchester DT2 8DH
Dorset

OECD

Mr. Geoffrey STEVENS
Head, Nuclear Development Division
Organisation for Economic
Co-operation and Development
Nuclear Energy Agency
38 boulevard Suchet
F-75016 Paris, France
Tel.: 4524 96 84
Telex: 630668 AEN-NEA
Facsimile: (33-1) 4524 0524

INTERNATIONAL ATOMIC ENERGY AGENCY

Mr. V. Krett
Scientific Secretary
Nuclear Power Technology
Development Section
Division of Nuclear Power
P.O. Box 100
A-1400 Vienna, Austria
Tel: 2360/2820
Fax: 43 1 234564
Telex: 112645 atom a