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INTERNATIONAL ATOMIC ENERGY AGENCY
UNITED NATIONS EDUCATIONAL, SCIENTIFIC AND CULTURAL ORGANIZATION
INTERNATIONAL CENTRE FOR THEORETICAL PHYSICS
I.C.T.P., P.O. BOX 586, 34100 TRIESTE, ITALY, CABLE: CENTATOM TRIESTE



UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION



INTERNATIONAL CENTRE FOR SCIENCE AND HIGH TECHNOLOGY

INTERNATIONAL CENTRE FOR THEORETICAL PHYSICS 34100 TRIESTE (ITALY) VIA GUGLIELMO 9 MAGNATICO PALACE P.O. BOX 586 TELEPHONE 380-2072 TELEFAX 380-2073 TELEX 40049 IPH I

**"Second Workshop on Radon Monitoring in Radioprotection,
Environmental and/or Earth Sciences"**
25 November - 6 December 1991.

19409

Final Report

Thanks to the substantial contribution of the ENEA/DISP together with the participation of ICS and the Regione Friuli-Venezia Giulia, the ICTP was able to hold the "Second Workshop on Radon Monitoring in Radioprotection, Environmental and Earth Sciences", from 25 November to 6 December 1991.

In spite of the limited financial resources (less than US\$ 50,000.00) the event was quite successful also thanks to the full commitment of the participants, directors, lecturers and staff.

The scientific programme along with the list of participants (a large majority from Italy and Eastern Europe) is attached. Among the various topics treated, I found particularly interesting those devoted to the new developments in instrumentation (silicon detectors) where some collaboration with the ICTP Microprocessor Laboratory might be started and to the possibility of a European network for measuring radioactivity.

One should also mention a joint session held during the second week (i.e. 1-6 December), in which both our participants and those present at the parallel Workshop on Earthquake Prediction took part. It led to a fruitful exchange of information. In particular, detailed discussions were launched on the role of the anomalous emission of Radon as a possible earthquake precursor. Some of the best scientists active in the field were present.

An important part of the activity was represented by the presence, during the entire Workshop, of the ENEA/DISP Mobile Laboratory, with advanced equipment and a full staff of researchers and technicians. This reconfirms the keen interest of the ENEA to continue its collaboration with the ICTP.

As a further hint of this, during the opening and closing sessions, two high-ranking representatives of the ENEA/DISP were present, Dr. C. Sennis and Dr. A. Susanna, respectively.

In a separate note, I would like to add some specific proposals concerning future developments of this collaboration.

For 1993, the Workshop could have the format of a Radio-Ecology School, with practical field-work sessions in collaboration with Regional centres.

In conclusion, I am glad as ever to acknowledge the collaboration of the technical staff at the ICTP. The secretarial work done by Ms. L. Iannitti, has been priceless. The ENEA people (not the only ones) do really envy us for having such an efficient secretarial support, not to mention our facilities and structure.



Prof. G. Furlan
Local organizer



INTERNATIONAL CENTRE FOR SCIENCE AND HIGH TECHNOLOGY

34100 INTERNATIONAL CENTRE FOR THEORETICAL PHYSICS 34100 TRIESTE (ITALY) VIA GORGANO, 9 ADRIATICO PALACE P.O. BOX 58 TELEPHONE 3402072 TELEFAX 3402073 TELEX 46044 ICFI

**"Second Workshop on Radon Monitoring in Radioprotection,
 Environmental and/or Earth Sciences"
 25 November to 6 December 1991**

cc. Salam
 Bertocchi
 Michelich
 Forti
 Kousminev
 (ICS)

Final Programme

Week 1

MONDAY, 25 November

- 8:30 - 9:00 Registration - Lobby - Main Building
- 9:00 - 10:00 **OPENING SESSION:** Chairperson: G. Furlan (ICTP)
 Welcome Address from ENEA-DISP, Friuli Venezia-Giulia Region, and ICS.
- 10:00 - 10:30 **Coffee Break**
 Chairperson: S. Piermattei
- 10:30 - 11:30 J. SINNAEVE - "The European Radon Programme".
- 11:30 - 12:30 W. LOWDER - "Natural Environmental Radioactivity with particular regard to Radon Gas and Cosmic Rays".
- 12:30 - 14:00 **Lunch Break**
- 14:00 - 15:00 G. CAMPOS-VENUTI - "Present and Future Radioprotection Recommendations within the European Community with special regard to Radon".
- 15:00 - 16:00 F.T. CROSS - "A View of Experimental Radon-Induced Effects in Animals".
- 16:00 - 17:00 F. STEINHAUSLER - "Review of the Latest Findings of Population Exposed to High Background Natural Radioactivity".

TUESDAY, 26 November

Chairperson: G. CAMPOS-VENUTI

- 9:00 - 10:00 S. PIERMATTEI - "The Italian National Survey of Radon: Sampling Strategy, Realization and Follow-up".
- 10:00 - 10:30 M.R. MALISAN - "The Regional Survey of Indoor Radon in Friuli Venezia-Giulia (Italy)".
- 10:30 - 11:00 **Coffee Break**
- 11:00 - 11:30 A. MENIN, A. DRIGO & E. CAPRA - "Radon Monitoring in Dwellings and in Water in Localized Areas of Friuli Venezia-Giulia".

- 11:30 - 12:00 J. Planinic et al. - "Radon Measurements in Kindergartens of Osijek"
- 12:00 - 12:30 F. De Guarnini, M. Marinaro & F. Raicich - "Measurements of Environmental Radon Concentrations in Trieste Houses".
- 12:30 - 14:00 **Lunch Break**
- 14:00 - 14:45 G. TORRI - "Radon Monitoring by Passive Detectors".
- 14:45 - 15:30 L. LEMBO & G. SCARPA - "The Assessment of the Indoor Gamma Exposures in the Italian National Survey".
- 15:30 - 16:00 **Coffee Break**
- 16:00 - 16:45 F. BOCHICCHIO, S. MANCIOPPI & S. RISICA - "Unique Experiences in the Italian National Survey run by Several Different Regional Laboratories".
- 16:45 - 17:00 B.B. Bam - "Radon Measurements in the Gran Sasso Underground Laboratory"

WEDNESDAY, 27 November

Chairperson: S.A. DURRANI

- 9:00 - 9:45 M. SOHRABI - "High Natural Radiation Areas with Special regard to Ramsar".
- 9:45 - 10:00 R. Bonetti et al. - "Indoor Radon Concentration Measurements in One High Natural Radiation Area of Italy".
- 10:00 - 10:30 F. Aumento - "Detailed Radon Emanation Mapping in Northern Latium".
- 10:30 - 11:00 **Coffee Break**
- 11:00 - 11:45 SHI LUN-GUO - "Nuclear Track Filters and Applications to Aerosol Sampling".
- 11:45 - 12:30 G. SCIOCCHETTI - "Active Monitoring of Radon and Radon Daughters".
- 12:30 - 14:00 **Lunch Break**
- 14:00 - 14:45 R. ILIC - "Indoor and Outdoor Radon Survey in Slovenia".
- 14:45 - 15:00 D. Azimi-Garakani - "Comparison of Different Radon Calibration Chambers".
- 15:00 - 15:15 A.A.B. Andam et al. - "Monitoring of Radon in Occupied and Residential Environments in Central Ghana".
- 15:15 - 15:30 M. Ramirez & R.M.Z. Tecson - "Measurements of Radon at a Hospital Tunnel System".
- 15:30 - 16:00 **Coffee Break**
- 16:00 - 16:40 F. Abu-Jarad - "Summary of Indoor Radon Research Results by Using Nuclear Track Detectors".
- 16:40 - 17:00 R.C. Ramola - "Radon Studies in Siwalik Himalayas, India".

THURSDAY, 28 November

Chairperson: R. ILIC

- 9:00 - 10:00 A. CIGNA - "Radioprotection Problems of Man-made versus Natural Radioactivity".
- 10:00 - 10:30 G. Furlan - The ICTP Programme of Training and Research in Italian Laboratories.
- 10:30 - 11:00 **Coffee Break**

- 11:00 - 11:45 M.E. BELLI & U. SANSONE - "Environmental Behaviour of Artificial Radionuclides".
- 11:45 - 12:30 H. SURBECK - "The Search for Radon Sources: a Multidisciplinary Task".
- 12:30 - 14:00 *Lunch Break*
- 14:00 - 15:00 S.A. DURRANI - "Natural Radioactivity and Dating".
- 15:00 - 15:30 E. GIROLETTI - "Fractal Analysis of Radon Indoor Time-Series".
- 15:30 - 16:00 *Coffee Break*
- 16:00 - 16:30 V.P. Perevugin - "The Determination of U and Th Concentrations in Soils and Building Materials".
- 16:30 - 16:45 V. Cuculeanu - "Models for interpreting the Deposition Measurements for Rn²²² and Rn²²⁰ Daughters".

FRIDAY, 29 November

Chairperson: M. SOHRABI

- 9:00 - 10:00 P.J. McNULTY - "Single-Event Upsets in Microelectronics and the Correspondent Radiation Effects in Biological Systems".
- 10:00 - 10:30 D. Klein - "Applications of PIN Diode for Radon Emanation Studies".
- 10:30 - 11:00 *Coffee Break*
- 11:00 - 12:00 A. FOGLIO-PARA, S. CEROFOLINI & F.S. AGOSTEO - "The Use of Silicon Devices (diodes, RAMs, etc.) for Alpha Particle Detection".
- 12:00 - 12:30 J.U. SCHOTT - "Ionizing Particle Detection by Charged Couples Devices".
- 12:30 - 14:00 *Lunch Break*
- 14:00 - 14:45 I. HUNYADI - "Real-time Monitoring by Silicon Photodiodes".
- 14:45 - 15:10 G. Geczy - "Long-term Radon Studies at the Thermalkarst Region of Budapest".
- 15:10 - 15:30 T. Streil - "A New Radon Monitor System - MEGARAD".

Week 2

MONDAY, 2 December

Chairperson: D. PATELLA

- 9:00 - 10:00 M. MONNIN - "Experiences Accumulated on Radon Monitoring for Earthquake Prediction".
- 10:00 - 10:30 F. BELLA & E. PETTINELLI - "Radon in Spring Water as a Seismic Precursor".
- 10:30 - 11:00 *Coffee Break & Group Photograph*
- 11:00 - 11:45 J. LEBECKA - "Radon Monitoring for the Prediction of Mine Outbursts".
- 11:45 - 12:30 H. FRIEDMANN - "Selected Problems in Radon Measurements".
- 12:00 - 14:00 *Lunch Break*

- 14:00 - 14:15 H.A. Khan - "Radon Measurements for Earthquake Prediction and Location of Geological Faults in Pakistan".
- 14:15 - 14:30 K.K. Dwivedi & S. Ghosh - "Prospects and Potentials of Radon Monitoring in North-Eastern India".
- 14:30 - 15:00 J. Heinicke et al. - Dependence of Radon Anomaly from Seismicity and other Parameters in Bad Brambach".
- 15:00 - 15:30 M. MONNIN & J.L. SEIDEL - "Radon Monitoring for the Study of the Fractured Aquifers".
- 15:30 - 16:00 *Coffee Break*
- 16:00 - 16:30 S.P. Tretvakova - "Investigation of Radon Sub-Soil in the USSR".
- 16:30 - 17:00 M. Singh & H.S. Virk - "Radon Monitoring for Earthquake Prediction at the Guru Nanak Dev University".

TUESDAY, 3 December

Chairperson: M. MONNIN

- 9:00 - 10:00 D. PATELLA - "Analysis of Electrical Phenomena as Earthquake Precursors".
- 10:00 - 10:30 D. Klein - "Radon Emanation and Earth-Tide Movements".
- 10:30 - 11:00 *Coffee Break*
- 11:00 - 11:45 L. MARINI & R. CIONI - "Geochemistry Applied to Volcanic Surveillance".
- 11:45 - 12:30 V.N. NIKOLAEVSKII - "Extraterrestrial Induced Multi-years Cyclicities in Geophysical, Geochemical and Biological Parameters".
- 12:30 - 14:00 *Lunch Break*
- 14:00 - 17:00 Joint Plenary Discussion on Earthquake Prediction and Radon Monitoring (Participants of the two parallel Workshops at ICTP).
Venue: Adriatico - Small Lecture Hall
Chairperson: Prof. V.I. Keilis-Borok
- 14:00 - 14:40 V.I. Keilis-Borok
- 14:40 - 16:00 Free Contributions
V. Kossobokov - Demonstration Sessions
M. Monnin (CNRS/Laboratoire d'Hydrogeologie, Montpellier)
V.N. Nikolaevskii (Academy of Sciences of the USSR, Institute of Physics of the Earth, Moscow)
J. Healy
- 17:30 **GET-TOGETHER** - Adriatico Cafeteria.

WEDNESDAY, 4 December

Chairperson: H.A. KHAN

- 9:00 - 9:45 S. LOMBARDI - "The Importance of the Comparative Study of Rare Gases in Earth Science".
- 9:45 - 10:30 G. MARTINELLI - "Radon Geochemistry and Geophysics in Deep Fluids in Italy".
- 10:30 - 11:00 *Coffee Break*
- 11:00 - 11:45 M. MONNIN & J.L. SEIDEL - "Radon Monitoring for the Study of the Fractured Aquifers".

11:45 - 12:15 D.E. Cherouati & G. Nava - "Reading Techniques of Solid State and Nuclear Track Detectors".
 12:15 - 12:30 R. Barillon - "Evaluation of the Registration Efficiency of the Radon Diffusion Chambers".
 12:30 - 14:00 **Lunch Break**
 14:00 - 17:00 Laboratory Session

THURSDAY, 5 December

Chairperson: G. MARTINELLI

9:00 - 10:00 H.A. KHAN - "Mineral Exploration Based on Radon Measurements".
 10:00 - 10:30 S. Abbad - "Radon Emission versus Meteorological Parameters".
 10:30 - 11:00 **Coffee Break**
 11:00 - 12:00 A.S. PASCHOA - "Comparison between Neutron Induced and Photon induced Fission for Measuring Actinides".
 12:00 - 14:00 **Lunch Break**
 14:00 - 17:00 Laboratory Session.

FRIDAY, 6 December

Chairperson: A.F. SUSANNA

9:00 - 10:00 L. TOMMASINO - "New Trends in Radioprotection and Environmental Monitoring".
 10:00 - 10:45 **CLOSING SESSION: A.F. Susanna & Directors.**
 - Panel Discussions
 10:45 - 11:00 **Coffee Break**
 11:00 - 12:30 **OPEN HOUSE (Laboratory): for the ICTP Staff members.**
 12:30 - 14:00 **Lunch Break**
 14:00 - 17:00 **OPEN HOUSE (Laboratory): for the ICTP Staff members.**

INTERNATIONAL CENTRE FOR THEORETICAL PHYSICS
Trieste, Italy

**Workshop on Radon Monitoring in Radio Protection,
Environmental and/or Earth Sciences**
Trieste, 25 November- 6 December 1991

UNIDO Project US/GLO/89/104
UNIDO Contract No. 91/161/VK

FINANCIAL STATEMENT

(in US\$)

1 DIRECTORS

Guo Shi-Lun	China	2,838.47
Steinhausler, F.	Austria	1,077.93
	<i>Subtotal</i>	3,916.40

2 LECTURERS

Bella, F.	Italy	41.67
Bohicchio, F.	Italy	162.60
Campos Venuti, G.	Italy	162.60
Cigna, A.	Italy	40.65
Cross, F.T.	USA	1,931.48
Durrani, S.A.	United Kingdom	1,406.27
Foglio Para, A.	Italy	41.67
Friedmann, H.	Austria	354.16
Giroletti, E.	Italy	41.67
Hunyadi, I.	Hungary	772.35
Ilic, R.	Yugoslavia	812.35
Khan, H.A.	Pakistan	2,123.67
Klein, D.	France	41.67
Lebecka, J.	Poland	833.33
Lembo, L.	Italy	40.65
Lombardi, S.	Italy	41.67
Lowder, W.M.	USA	1,491.48
Marini, L.	Italy	41.67
McNulty, P.J.	USA	1,467.53
Monnin, M.	France	1,042.25
Nikolaevski, V.D.	USSR	1,291.66
Paschoa, A.S.	Brazil	3,706.83
Patella, A.	Italy	41.67
Shorabi, M.	Iran	2,155.98
Sinnaeve, J.	Belgium	101.63
Surbeck, H.	Switzerland	41.67
	To be carried fwd:	20,230.83

	Brought fwd:	20,230.83
Susanna, A.	Italy	41.67
Torri, G.	Italy	41.67
	<i>Subtotal</i>	<u>20,314.17</u>

3 PARTICIPANTS

Abbad, S.	Algeria	150.00
Abu-Jarad, F.	Jordan	364.02
Andriamanantena, R.	Madagascar	512.19
Azimi-Garakani, D.	Iran	800.61
Belan, T.	Czechoslovakia	402.44
Chalupnik, S.B.	Poland	475.61
Charvat, J.	Czechoslovakia	402.44
Cuculeanu, V.	Romania	475.61
Dousa, P.	Czechoslovakia	475.61
Dwivedi, K.K.	India	768.40
Geczy, G.	Hungary	439.02
Greco, C.V.	Romania	439.02
Kattaa, B.	Syria	402.44
Krizman, M.J.	Yugoslavia	146.34
Moucka, L.	Czechoslovakia	438.11
Myteberi, X.F.	Albania	721.61
Pavlovich, P.V.	USSR	300.00
Perelygin, V.P.	USSR	800.61
Peternel C., M.	Yugoslavia	439.02
Planinic, J.	Yugoslavia	725.61
Ramola, R.C.	India	475.61
Singh, M.	India	439.02
Tecson Zamora, R.M.	Philippines	510.36
Tretakova, S.	USSR	800.61
Tzvetanov, T.I.	Bulgaria	548.78
Varhegyi, A.	Hungary	439.02
Vaupotic, J.	Yugoslavia	146.34
Wysocka Kopecke, M.	Poland	475.61
	<i>Subtotal</i>	<u>13,514.06</u>

4 OVERHEADS (*)

UNIDO share of total overhead charges (inclusive of organization, supervision, technical assistance, secretariat, provision of facilities, etc.)

Total 37,744.63

(*) Overhead costs are not being reported since direct costs do already exceed UNIDO's contractual contribution; they will be covered, together with the overexpenditure, by ICTP's budget.