NEWSLETTER

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International Union of Radioecology

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Contents

The IUR Board indicates a strong need for promoting and supporting science in the field of radioecology.

The IUR Board meeting held in Brussels in February this year, addressed the need for promoting renewed interest in radioecology. The trend indicates an unfortunate decline in the funding of scientific work in Radioecology worldwide. The Board thought it would be very important to focus on actions to promote increased resources for scientific work in radioecology, since there are unsolved tasks with importance for society, industry, authorities and scientific disciplines.

The short-term action so far was to launch the partnership with JER (Journal of Environmental Radioactivity) to strengthen radioecology internationally. Building on the basis of this initiative, IUR needs in future to be more active in creating a platform for other research partnerships, especially in new areas of radioecology and cooperation with other environmental sciences.

IUR initiative and leading role have contributed to enhanced awareness and focus on the protection of the environment

The topic of environmental protection has been addressed in several organisations lately. After the IUR established a task group on this issue in 1998, the issue has been mentioned with increased frequency in different organisations, such as IAEA, OSPAR, the London Convention , AMAP and in international conferences. Protection of flora and fauna from radiation is part of the EC fifth framework. IUR took the initiative in 1999 to promote the development of proposals on the topic of assessing and protecting flora and fauna in connection with radiation. IUR has hosted several meetings that led to submission of proposals by several EC and Russian institutes to the fifth framework. The two projects EPIC (Environmental Protection from Ionising Contaminants in the Arctic) and FASSET (Framework for Assessment of Environmental Impact) are now at a stage of final negotiations with the European Commission.

During the joint cooperation between IUR/EULEP/EURADOS, an IUR task Group was involved in the development of the outline for a "framework for protection of the environment". Dr. Jan Pentreath participated in this group and shared his thoughts (Jan Pentreath, 1999) on this issue. The finding is summarized in this Newsletter on page 7-9.

IUR will also present ideas on the framework of protection of the environment at IRPA-10 in Japan. At the IRPA conference a full session has been dedicated to this topic and the General Secretary of IUR will put forward the thoughts of IUR in the presentation:
Delivering a System and Framework for the protection of the environment from ionising radiation

IUR has also been an observer in the Arctic Council, Arctic Monitoring and Assessment Programme with a special focus on assessing and protection of the flora and fauna.

Successful completion of a trilateral cooperation in the field of environmental transfer

The trilateral cooperation between IUR/EULEP/ EURADOS was brought to a successful finalization through the Avignon Workshop. The report to the EC was finished in April by the organisations.
The Avignon Workshop was visited by 78 scientists from 22 countries and stimulated cross-disciplinary discussions. It was important that these three organisations, which focus on different aspects of radiation protection, could be joined in a common project.

In this Newsletter the summary of the IUR Actions in this joint cooperation is given on page 7-13.

Creation of new Task Groups

A number of new Task Groups have been identified and are by the IUR Board proposed to the Members of the IUR.

The list is as follows:

1. Priorities and Perspectives for Radioecology
2. Application of radioecological assets for Dose and Risk Assessment and other aspects of radiation protection
3. Exposure and Effects in Biota
4. Integrated Rehabilitation of Contaminated Areas
5. Natural radiation/T.E. NORM
6. Arctic and Antarctic Regions
7. Tropical Zones
8. Mediterranean /Fruit Peculiarities
9. Application of Radioecology to other Contaminants (AROC)

Members of the IUR Board of Council have taken the responsibility to supervise the Task Groups and to take action to find out about the availability and to select a Chairperson for each to this task Groups. Some of them have made a description of their opinion and objectives with respect to these Task Groups, which you will find here below!

Any IUR member who is interested in joining these new task groups should contact the relevant Board Member or the IUR Secreatriat.

1. Priorities and Perspectives for Radioecology

This Group has been active during a good deal of time in the end of the 80s and beginning of the 90s and has produced a report which was up-to-date for that period.

As was said in the Message from the Board, the time has come for an exhaustive reflection on the future of radioecology, the objectives to be pursued, the problems remaining to be solved and the ways to reach these goals.

A reflection group on these perspectives could find guidance in some bookmarks which arose during the Board Meeting, such as the problem how to make closer links with radiation protection and with other environmental sciences and equally the question of natural radiation and of radon as a topic for the IUR.

Gilbert Desmet

3. Exposure and Effects in Biota

Consideration of radiation doses to biota other than humans has become an increasingly important topic over the last year, and is one subject area where the IUR has taken a considerable interest. The basis for the working group on this topic will be the conclusions arising from the studies conducted under the concerted action reported on pages 7-9. Any IUR member interested in participating in the group whould contact Per.strand@nrpa.no

4. Integrated Rehabilitation of Contaminated Areas

A research on "the Chernobyl accident and other accidental situations" and application of countermeasures and rehabilitation practices has led to remarkable achievements. They includethe further evaluation of long-term effect both of the accident itself and of the impact of the countermeasures taken on affected ecosystems. Many outstanding reports and scientific papers have been produced. Little effort yet has been made to really extract the generic findings from all this precious research and to "translate" this information in a structure that is legible and useful for different levels of user. These levels are spanning the interested non-radioecological researcher, the

environmental engineer and manager, the local authority and land-user, and eventually the political decision-maker and funding organisations. There is also still an open challenge to comparing different economic and socio-cultural situations for a further extraction and use of the so-called "Chernobyl" results!

Creation of a Task Group dealing with the intelligent assessment of the results of all rehabilitation practices and techniques applied seems thence

Gilbert Desmet

6. Arctic and Antarctic studies

Recently, there has been considerable interest in radioactive contamination in the Arctic. In particular, currently available information has been collated under the AMAP (Arctic Monitoring and Assessment Programme) and also reported in the International Conference series on Radioactivity in the Arctic, the last meeting of which was held in Edinburgh in September 1999. Such studies have shown that the Arctic and its inhabitants are particularly vulnerable to contamination, especially to radiocaesium, because of the high transfer to terrestrial foodstuffs, the long ecological half-lives and the diet of Arctic inhabitants, especially indigenous people. In this task force, the IUR seeks to provide a forum for discussion of recent research in these ecosystems, for discussing various problems associated with nuclear facilities in the Arctic and for developing ideas for future work. IUR members who are interested in participating in this group are asked to contact Brenda Howard (bjho@ceh.ac.uk).

Brenda Howard

9. Application of Radioecology to other Contaminants - AROC

For radioecologists the time has come for uniting the concepts of radioecology with other areas of sciences connected to environmental research (chemoecology).

It is obviously essential to continue to complete the genuine radioecological tasks of developing the general conceptual model of the effects of long-term (chronic) exposures to ionising radiation upon all levels of organisation of nature (organisms, populations, communities, ecosystems, biosphere).

In connection to what is said in the Message by the Board in this Newsletter it is considered to be very important to address the complex problem of uniting radioecology and chemoecology. It is suggested to make a comparative **ecological equidosimetric** assessment (on the basis of Gy/y & Sv/y) of the most sensitive ecological effects caused by physical (including ionising radiation), chemical and biological contaminants. The above-mentioned radioecological model needs to be extended to cover studies of the effects induced by all kinds of pollutants to produce the radio-chemo-ecological model. It would possibly allow a more objective and quantifiable look at real environmental problems.

Development, in the nearest future, of a detailed substantiation of this "**equivalence**" approach, both in experiments and in conceptual modelling, to comparing nuclear and non-nuclear pollutants and their impacts on ecosystems is therefore proposed. In addition, we have to create a comparative theory of the ecological equivalence of all kinds of deleterious substances and influences (electromagnetic, mechanical, chemical etc.).

Gennady G. Polikarpov

Annual IUR General Assembly

Time: Saturday 26th August 2000

Location: University of Agricultural Sciences, 8361 Keszthely, Deák Ferenc str. 57

Hungary

The European Society of Nuclear Applications (**ESNA**) has been so kind to accept to host the Annual IUR General Assembly.

Further information about the Programme and on practical arrangements will be made available through the IUR *e*-letter and at the IUR Website (http://www.iur-uir.org), or directly at the IUR Secretariat: iur@nrpa.no.

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The new WEB address for IUR and Radioecological matters is:

http://www.iur-uir.org

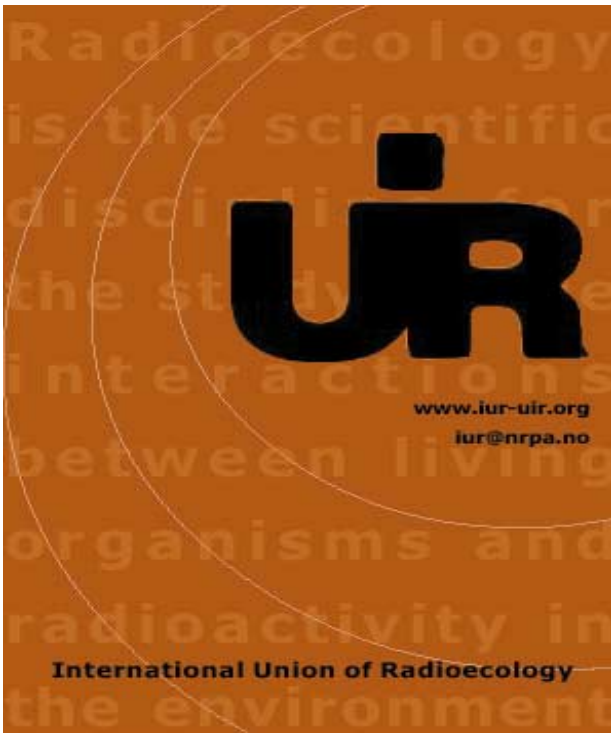
The Website contains information about:

The Website is intended to be interactive through its Message Board, where questions can be asked bu any IUR member and answers be given by other members. A certain control will be exerted to protect the intellectual quality of the Messages!

If you have any interesting information that you want to bring the IUR Website, please contact

iur@nrpa.no

A new leaflet for the International Union of Radioecology has also been produced, the design of which corresponds with the IUR Website.



If you want to be included in the links, please send details to the IUR secretariat

The IUR budget and balance for 1999 and 2000 are currently being checked and validated by the IUR accountants in Brussels. It is not therefore possible to give detailed information at present. However, the financial position of the IUR has substantially improved over 1999, and during the IUR Board meeting in February the decision was made to allocate some resources to funding work under the various task groups now being set up. Some priority will be given to the doses to biota and Arctic/ Antarctic studies to reflect the sources of income over 1999. The summaries should be available within the next month and will be circulated when available, as well as being published in the next newsletter. Meanwhile, any IUR member can contact the treasurer to acquire relevant information if they wish.

Fees 2000

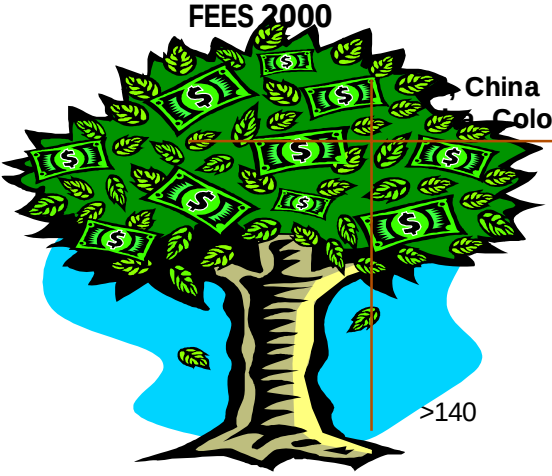
Most members have been contacted about payment of the fees for 2000. If you have not paid, please could you do so, preferably by providing the treasurer with credit card details. If you want to arrange other methods of payment please contact the treasurer.

New members

Since November 1999, the Executive Committee has accepted 21new members to the IUR:

Youngguan Zhu	Australia
Tang Shirong Tang	China
Jean-Claude Barescut	France
Sylvie Roussel-Debet	France
Karine Beaugelin-Seiller	France
Quafae El Ganaoui	France
Nadia Pérot	France
Philippe Calmon	France
Pascal Santucci	France
Christelle Adam	France
Bela Kanyár	Hungary
Yong Ho Choi	Korea
Helene Stensrud	Norway
Ingar Amundsen	Norway
Lavrans Skuterud	Norway
Birgitta Åhman	Sweden
Klas Rosén	Sweden
Andrew N.Tyler	UK
Oleksiy Shevchenko	Ukraine
Viktor Dolin	Ukraine
Randall Morris	USA

FEES 2000



China, Colombia	Central Europe	Other countries			
	$	EURO	$	BEF	£
	10	20	21	800	13
	20	50	53	2000	32
	30	70	74	2800	45
	30	70	74	2800	45
	10	20	21	800	13
	0	0	0	0	0
>140	>200	>400	>420	>16000	>260

OBITUARY

Ivan Bucina

05.04.1929 -14.01.2000

Ivan Bucina, member of the Czech Radioecological Society and International Union of Radioecologists, died suddenly on 14 January 2000 at the age of 71.

He studied chemical engineering at the Institute of Chemical Technology in Prague during the years 1949 to 1953. In 1956, when the then Czechoslovakia nuclear programme was launched, he entered a post-graduate course of nuclear physics and engineering at the Charles University in Prague. After finishing it, he spent few months at the Khlopin´s Radium Institute in St. Petersburg, Russia, where, in the department of Prof. Aglintsev, he studied dosimetry and metrology of ionising radiation. Afterwards, he joined the newly formed Institute of the Research, Production and Application of Radionuclides (UVVVR), where he became, at the age 29, the head of the Department of Dosimetry. Ivan Bucina, surrounded by a group of young, gifted scientists, had remarkable success in production of radionuclide standards, development of personal dosimetry, measurements of radionuclide activity and construction of pressurised ionisation chamber for the measurement of the dose.

After 1968, when the attempt to reform the communist regime in Czechoslovakia failed, Ivan Bucina was forced to leave UVVVR. He worked for some time in a nuclear medicine department and later on, he joined Centre of Radiation Protection of the Institute of Hygiene and Epidemiology. The Centre was recently transformed to the National Radiation Protection Institute and Ivan Bucina worked here till his very last day. During these 27 years in radiation protection, Ivan was engaged in many activities – metrology of X-rays, introduction of the use of modern quantities for the evaluation of the dose from X-ray diagnostic, in neutron dosimetry, internal dosimetry – where he, together with other colleagues was involved in preparation of ICRP Recommendation 54.

Much of his effort was devoted to the radiation protection and safety of nuclear power plants. Ivan was engaged in development of off – site emergency plans since the end of the seventies. Under his guidance, the basis of today's radiation monitoring network of the Czech Republic was prepared already before the Chernobyl accident. Therefore, it was possible to accumulate enormous amount of good quality data about the contamination of environment of Czechoslovakia during and after the Chernobyl accident. Such data were successfully used e.g. in the IAEA Model Validation Exercise VAMP. Ivan was brilliant not only in planning, but especially in the analysis of data – his wide knowledge of physics, chemistry and statistics together with common sense enabled him to make – without any information from outside – very early, quite precise, estimation of the nature and development of Chernobyl accident.

After 1989, he participated in many international events, and in many IAEA committees and EU projects. Ivan was very well known in the scientific community for his active participation in discussions; his speciality was to find out immediately a weak point in anybody's presentation or paper and comment on it amusingly.

Ivan ´s life was, as of many other Central European inhabitants, strongly influenced by political events of the 20th century. In 1943, in the country occupied by German Nazi, he was forbidden to proceed with his high school education because of his Jewish ancestry. Also the occupation of the Czechoslovakia by the Soviets in 1968 interrupted his successful scientific career in dosimetry and metrology. He was allowed to work in another place, however, with a lot of restrictions. He was not allowed to travel abroad and for some time, he was not allowed to publish scientific papers. There are many publications where Ivan´s contribution is masked under an anonymous " collective of authors". Lot of guidances and methods written by Ivan, were issued without names of authors at all. He seemed not to be influenced by all these restrictions. Thanks to his brilliant mind connected with sense of good humour, he had been for many years taken by people as a natural leader. Ivan is greatly missed by all his colleagues at home and abroad.

Irina Malatova

Below are the summaries of work of the EULEP/EURADOS/UIR Concerted Action *«Environmental and occupational dosimetry: An integrated approach to radiation protection covering radioecology, dosimetry and biological effects»*
At the workshop in Avignon in November 99, the trilateral cooperation between EULEP/EURADOS/UIR was brought to a successful finalisation.

Environmental and occupational dosimetry: The assessment of dose and effects in non-human systems.

P.Strand, J.Brown, J.Pentreath, D.S.Woodhead, I.Kryshev, C-M.Larsson, S.Bergmann, D.Jackson, A.A.Cigna

Introduction and objectives

Traditionally, in the field of radiation protection, the focus has been on man; it is only occasionally that the potential effects of increased radiation exposure on the environment, excluding man, have been explicitly assessed. The need to address this topic has recently grown in order to increase scientific understanding and to improve the knowledge base in such a way that decisions concerning environmental protection are more transparent. The objective for the IUR within the IUR/EULEP/EURADOS concerted action was to address the topic of doses and effect on non-human systems. This objective was achieved by dealing with three major tasks :

1. a review of the available literature and an assessment of present knowledge;
2. an examination of possible approaches including the need for a framework for assessing the consequences of exposure of biota to radiation; and,
3. an identification of gaps in present knowledge and the proposition of directions for future research.

Results

1. Present knowledge concerning doses and effects in non-human systems.

The Concerted Action was initiated in 1998. During the first period, the task involved the collation and evaluation of existing data on the effects of exposure of plants and animals to ionising radiation and on methods for assessing the doses resulting from environmental contamination. A number of participants were involved, both EC and non-EC, in the formation of a core expert group chaired by Arrigo Cigna. The Mol Topical Meeting (Mol, 1-5th June 1998) provided the first opportunity for the group to meet and discuss progress. Seven papers were presented that were relevant to the task, and included a study on the genetic effects in plants growing in areas affected by Kyshtym and Chernobyl and research on doses and effects in the Chernobyl NPP Cooling pond. An open discussion was also held where a number of themes were considered. One discussion related to whether the individual or populations should be the target of concern when considering radiation impact assessments for biota. Earlier data, also presented at the meeting, demonstrated that the biological effects of acute irradiation show a very large range of sensitivities between species and also within species.

One of the main conclusions to emerge from the first phase of the task was that a more coherent approach was required with respect to the assessment of doses to biota and the protection of the environment from ionising radiation. It was agreed that the time was right to place the *ad hoc* research data and exhaustive reviews into a structured framework thereby providing the necessary conditions for an evolution in our understanding of the problem and a basis for the development of transparent, scientifically-based environmental protection criteria. Two working Groups were convened in quick succession (Oslo, April 1999; Stockholm, June 1999) with the aim of assessing the work conducted up to that point, both within the Concerted Action and externally, and exploring the need for further research within this scientific discipline. An outline framework plan was presented by Jan Pentreath at the Oslo Meeting as a basis for development. It was generally agreed that this provided a significant step forward in the attempts within the scientific community to structure the available information for use in environmental impact assessments for radioactive materials in contaminated areas.

2. Development of a framework for assessing the impact of radionuclides in the environment.

In order to develop a coherent and logical environmental impact assessment methodology for ionising radiation, a framework, within which models can be applied and results analysed, is prerequisite. A number of components, which could form the basis of such a system, have been considered including :

- a set of reference organisms - clearly not all the species of organisms native to the area around a radionuclide release point can be considered; this necessitates an informed selection procedure.

- a set of quantities and units to express a dose to biota. In current practice, doses are expressed in Grays per unit time. This approach clearly excludes the relativity of the biological effects arising from equal absorbed doses of different radiation types.
- a reference set of dose models for a number of reference flora and fauna. Existing calculation methodologies allow the estimation of dose rates to organisms with varying geometries. Consensus is required in adapting these algorithms for use within an environmental protection framework.
- a set of dose rate-effects relationships for real examples of the reference organisms. These could include data from situations of both low exposure, e.g., cytogenetic effects, and high exposure, e.g., lethal or other deterministic effects.

The choice of reference organisms could be based, amongst others, on criteria such as (a) organisms which, by virtue of environmental transfer and concentration factors, have the greatest potential for exposure; (b) organisms which have a high radiosensitivity; (c) organisms which are important to the healthy functioning of the community or ecosystem; and, (d) organisms which are common.

A new strategy is proposed that includes 3 key components :

(a) *Exposure pathways and retention of radionuclides by biota.*

The study of exposure pathways should be based on the acquisition and synthesis of information concerning the characteristics of selected ecosystems, particularly those that could be expected to influence the behaviour of radionuclides and their uptake by the biological components. Expert judgement can then be applied to the available information and knowledge of the environmental behaviour of radionuclides in the chosen ecosystems. Combined with modelling studies, e.g., the currently available equilibrium and dynamic models, the organisms likely to experience enhanced exposure can be identified. Integrating these findings with a selection based on other relevant criteria, e.g., radiosensitivity, would allow reference organisms to be defined. Finally, simple reference models can be developed for the simulation of radionuclide migration and uptake to the whole organism (and organs if applicable) for these reference species living in representative terrestrial and aquatic ecosystems.

(b) *Dose calculation.*

For these defined reference organisms, corresponding radiation dosimetry models can be developed. These could be designed to permit the estimation of the actual or potential absorbed dose-rates to the organisms, from internal and external sources of a, b?and g-radiation, given information on the distributions of natural and contaminant radionuclides in their local environment. The final output could be a tabulation of absorbed dose rate coefficients (Gy s^{-1} per unit radionuclide concentration in the relevant environmental compartment) for each reference organism for the radionuclides of concern in radioactive waste management. A review could be made of the approaches that have already been adopted for the estimation of radiation dose to non-human biota to determine if these are appropriate or can form a basis for development. Work in terrestrial environments has been less extensive than for aquatic environments. Several problems require a solution, including the development of models to account for density differences between the organism and the surrounding atmosphere. Monte Carlo methods may be required to derive dose coefficients. The requirement for additional target organs and tissues in some species could also be considered. The output from the dosimetry models can be given in terms of absorbed dose rate. It is recognised, however, that a-particles (high LET) are likely to be more effective in causing damage than b- and g-radiation (low LET) for equal absorbed doses. The available information on the relative effects of these radiation types on the endpoints of concern in the natural environment could be reviewed to determine whether a sufficient basis exists to develop a dosimetric quantity corresponding to the “equivalent dose” (absorbed dose x radiation weighting factor) employed in human radiological protection practice.

(c) *Dose (rate)-effect relationships.*

Endpoints of concern in individual generic organisms could be defined and dose rate/ response relationships for the chosen endpoints tabulated. This would involve the integration of data from earlier reviews and assessments of the potential impacts of radiation in the environment, of the wider radiobiological literature, and of newly-available information from Eastern Europe, e.g., papers reporting the impacts on the environment of the Kyshtym and Chernobyl accidents can be included as they become available. It is probable that the effects of radiation of interest will include, but not be restricted to, changes in mortality, fertility, fecundity, mutation rate. The available information can be organised into a format that will indicate the approximate dose rate - response relationships and, therefore, the threshold dose rates at which minor radiation effects can currently be expected to become apparent in the defined biological processes in the selected generic organisms. An attempt could be made to quantify the intrinsic

(i.e., the radiobiological) uncertainty in these threshold dose-rates (e.g., due to the extrapolation of laboratory data to natural conditions) and to indicate possible modifying influences (e.g., the influence of natural environmental variables, or interactions with other, non-radioactive, contaminants).

As a result of this work, it will be possible to recommend the appropriate level in the biological hierarchy (over the range from cell to ecosystem) at which protective action should be directed. It will also be possible to propose minimum/threshold dose rates at which effects in the environment would be expected to be minimal with a high degree of confidence. Any assessment should include the sources of uncertainty in the proposed dose rates and the effects that this might have on the degree of assurance that the desired level of environmental protection could be achieved.

Conclusion

The extensive literature review and evaluation conducted in the first part of this Action led to the conclusion that a framework was urgently required in order to structure the knowledge derived from earlier studies. The second part of the action has therefore involved a preliminary development of an environmental radiation protection system, which could be adopted in order to direct future scientific research. The key components of the framework include the derivation/development of relevant quantities and units, reference organisms, environmental transfer models, reference dosimetric models and tabulated dose rate/ effects information for reference organisms. The final system would allow regulators to explicitly and transparently demonstrate a commitment to environmental protection and provide a basis for developing standards against which to test for compliance for current and future radioactive waste management practices.

Countermeasures: Radioecological and social impacts

Gabriele Voigt*

(chair of the countermeasure action group of the EULEP /EURADOS/ UIR concerted action)

*GSF-Institute of Radiation Protection, Neuherberg, Germany

A considerable number of publications review the effectiveness of countermeasures, particularly those used after the Chernobyl accident. These were mainly, but not exclusively, focused on agricultural and semi-natural ecosystems. The most notable include the REACT proceedings [1] the IAEA handbook of countermeasures [2] and reviews arising from the EC post Chernobyl projects [3, 4]. However, in recent years it has increasingly been recognised that the choice of countermeasures should be based on a balance between the potential benefits and negative consequences. As a result, a re-evaluation of countermeasures incorporating factors such as long-term considerations, secondary effects, socio-economic interactions and the difference between a theoretically applicable countermeasure and its usefulness in a real situation has been initiated [5, 6, 7]. The objectives of the EULEP/EURADOS/UIR concerted action in the 4th EC Nuclear Fission Safety Programme was therefore to provide information on social and radioecological impacts of commonly used countermeasures which can be easily distributed for use by stakeholders.
The work consists of three major parts:

1. A list of generic aspects which need to be considered in selecting an appropriate countermeasure in a specific situation.
2. An electronic information system of potential countermeasures including a reference list with key references on the countermeasures considered.
3. Issues for consideration in future research programmes.

1. Generic aspects

The major decision is whether a countermeasure is required. Usually this will be indicated following a dose estimate and a risk assessment of the affected population. The intervention limits for doses or activity concentrations in food at present used by national and international bodies is discussed. However, decisions will need to take account of deposition scenarios/conditions (such as the type of deposit and its bioavailability), the radionuclide inventory deposited and many other factors. In particular, the contribution of doses via different pathways (internal and external), and the way it changes in space and time after an accident, has to be taken into account. For these purposes, the concept of 'radioecologically sensitive areas' can contribute considerably in better targeting countermeasures, especially in the long-term. In addition to dose reduction, countermeasure actions generally can increase the confidence of the population. A typical example of such an approach is the provision of leaflets and information on the relative uptake of radiocaesium by different species of mushrooms and their identifying feature which enables people to control and reduce their own ingested dose due to mushroom consumption [8]. Another example is the provision of free radioactivity measurement facilities and an interpretation service to allow the public to check the radiation levels in their own foods [9].

2. Electronic information system of potential countermeasures

- The electronic information system produced during the concerted action provides information on countermeasures for different ecosystems and environments (intensive agriculture, extensive agriculture, aquatic systems and forests) and direct actions which can be carried out by affected populations (excluding urban countermeasures). The following criteria have been addressed when assessing the applicability (effectiveness + practicability) of the countermeasures within the information system: Technical requirements and limitations
- Capacity (e.g. limitations due to equipment availability)
- Exposure pathways during implementation
- Potential environmental impact (secondary effects)
- Economics (direct and indirect costs)
- Social and ethical acceptability.

The electronic information system is available as an Excel spreadsheet via the IUR.

Perspectives for future research

Different items where future search is needed has been identified. In summary these are:

- Consideration of non-accidental contamination
- Social / Ethical considerations
- Implementation of integrated catchment approaches or Environmental Decision Support Systems
- Improvements on prediction of soil sorption properties/bioavailablity
- Dose thresholds
- Appropriate cost-benefit analysis
- Creation of an expert system for optimisation of countermeasures dependent on site and time.

Acknowledgements

The chair of this action group is grateful to the contributions of K. Eged, J. Hilton, B. J. Howard, Z. Kis, A. F. Nisbet, D. H. Oughton, B. Rafferty, C.A. Salt, J.T. Smith and H. Vandenhove and comments and contributions to the electronic information system of different IUR members.

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ENVIRONMENTAL TRANSFER ACTION GROUP

Members: Claus Bunnenberg, Franca Carini, Peter Coughtrey (Chairman 1997- June 1999), John Sandalls (Chairman August-December 1999) and Christian Vandecasteele. Chris. Fayers represented EULEP and EURADOS.

Based on the premise that reliable assessments of the consequences of releasing radionuclides to the environment call for an understanding of the transport of radionuclides from source to man, the Group set out to answer the question '*what do we know and what do we need to know about the movement and fate of radionuclides in the environment?'* The Group's **objective** was therefore to identify combinations of systems and radionuclides where data for input to calculations/ models are inadequate and where there is room for a significant improvement. Special attention

was paid to natural and semi-natural ecosystems and non-uniform spatial distribution of contamination of the type resulting from the deposition of 'hot particles' from Chernobyl. There was no intention to carry out any experimental work: the relevant key words were collate, review, consolidate and recommend. The objective will have been achieved if a base is established which acts as a springboard for work which ultimately reduces uncertainties in retrospective and predictive calculations quantifying the radiological impact of radionuclides discharged to the environment.

In a round-table discussion at the Group's first meeting, topics for preliminary consideration were identified and a 34-question questionnaire was circulated to 20 members of the IUR. Some examples of questions asked were as follows.

- How would you assess a soil with respect to its sensitivity to potential contamination from radiocaesium and radiostrontium fallout?
- Can the addition of clay minerals to a soil be a practicable means of attenuating root-uptake of radiocaesium?
- Is it realistic to include countermeasures in current assessment models?
- Are soil fauna important in redistribution of radionuclides deposited on undisturbed land?
- Does caesium form chemical complexes in soil?
- Is further work on low energy beta emitters called for?

At this point it became clear that in some cases there was a risk of duplication since the same topics were already being considered elsewhere. It was therefore decided to eliminate those topics but to make cross-references so that those studies would not be overlooked (see below). From the responses to the questionnaire, a number of topics were selected for state-of the-art review within the Group or through contributions from IUR members who had expressed a willingness to support the Action. The topics finally reviewed were:

- Soil-to-Plant Transfer.
- Radionuclides in Forests.
- The Influence of Soil Fauna on the Redistribution of Radionuclides in Soils.
- The Role of Soil Microbiota in the Behaviour of Radionuclides in Forests.
- Uptake of Radionuclides by Fruits.
- The Consequences of Discharging 'Hot Particles' (of the type accidentally discharged from Chernobyl in April 1986) to the atmosphere.
- Radioisotopes in Fresh Water.
- Intercomparisons of models describing the behaviour of radionuclides in the environment.

Topics originally selected for review within the Group but later found to be covered by other CEC-designated expert groups were:

- Radioecological Sensitivity (the subject relates to the vulnerability of the biosphere to radioactive contamination and the potential for contamination of the food chain). Contact Per Strand, NRPA, Norway.
- Agricultural Countermeasures: Radioecological and Social Impacts. Contact Gabriele Voigt, GSF, Germany.
- Time-dependent Transfer of Radionuclides from Soils to Plants. Contact Nick Mitchell, Mouchel, United Kingdom.

Marine ecosystems, low energy beta emitters, alpha emitters and assessment of individual models were selected for review but the Group failed to identify experts able/willing to contribute.

In November 1999, the Group's work figured prominently at the EULEP/EURADOS/IUR Workshop on Environmental Dosimetry in Avignon -the proceedings of which will be published in the J. of Radiation Protection Dosimetry.

The contractual requirements were completed in January 2000 and the required short report submitted to the co-ordinator of the Joint EULEP/EURADOS/IUR Concerted Action.

The detailed reviews have been completed and will be the subject of an IUR document to be published by early summer of this year. The reviews focus on state-of-the art of the various topics and makes recommendations for future study.

The Action Group gratefully acknowledges the support of all those IUR members who responded so enthusiastically to the questionnaire. Our grateful thanks also go to John Hilton, Brenda Howard, Oksana Kostyuk, Thomas Reisen, Brit Salbu and Barbara Watkins, all of whom contributed to the extended report to be published by early summer.

THE FLUX DATABASE CONCERTED ACTION

by

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This article summarises the UIR action on the development of a flux database for radionuclide transfer in soil-plant systems. A full paper describing the background to the initiative, specific features of the database, supporting documentation and findings from the working group's activities has been prepared and will be published shortly. The aim of the UIR flux database working group was to bring together researchers to collate data from current experimental studies investigating aspects of radionuclide transfer in soil-plant systems. However, the database incorporates parameters describing the time-dependent transfer of radionuclides between soil, plant and animal compartments. This initiative has become known as the radionuclide flux database.

INTRODUCTION

The concepts behind the flux database were first discussed in a paper sent to potential funding agencies in the fall of 1994. Subsequently, the term flux(es) has been applied differently in a number of radioecological studies (Alexakhin *et al.*, 1996; Belli *et al.*, 1996; Gerzabek *et al.*, 1998; Wright *et al.* 1997) and Desmet (1996) discussed the term in relation to the rate of flow of matter and energy through and between ecosystems. The term also has wider application in other related disciplines, for example, in deposition and plant uptake studies of gases and in chemical transport within catchments.

THE DATABASE

Initially, it was intended to populate the flux database (RADFLUX) solely with rate constants (e.g. units: s^{-1}) representing net transfer between a donor compartment (field name "parameter from" in Table 1) and a receiving compartment (field name "parameter to"). These parameters are used in multi-compartmental models represented mathematically as a set of first-order linear differential equations. The values are simple to derive from observations on the fraction of a compartment transferred over a given time period.

Emphasis was placed on expressing data entries as time based parameters in order to focus data collection, analysis and subsequent use in models, on the dynamic nature of radionuclide transfer in all systems of interest. The database fields are shown in Table 1. Some fields use codes to describe attributes of the experiment and these are detailed in a Help file.

Compromises were subsequently made to account for the views and experience of the working group. It was decided that other parameters could be used as long as they were a function of time and described transfer between compartments (for example, Bq m^{-2} d^{-1}). It was also decided that previous data collected by UIR would be made available through RADFLUX even when a flux could not be derived. Lastly, it was decided to simplify the derivation of values for intermediate compartments whereby, for the purpose of data entry, transfer was assumed to be stepwise (that is, *A* to *B* and then *B* to *C*) rather than concurrent (*A* to *B* to *C*) or independent (*A* to *B* and *A* to *C*). Such assumptions are detailed in the database Help file.

Existing data have been incorporated and the flux database now contains about 17,000 records. We have included readily available data both from the earlier UIR soil-plant transfer factor data set and the more recent tropical/sub-tropical data set provided from the IAEA/UIR Coordinated Research Programme entitled "Transfer of radionuclides from air, soil and freshwater to the food chain of man in tropical and subtropical environments". The remaining components of the data set come from that collated by MAFF since 1980 and flux data derived from experimental programs of working group members.

A cross-referencing system allows linked data to be identified for example: time series data; situations where more than one receiving compartment exists; replicates in an experimental treatment; and, where a reverse flow (reflux) is determined. Supporting information about the two compartments (mass or volume, soil depth, concentrations) and the experimental methods (study period, elapsed time since radionuclide deposition) allows the database user to calculate alternative parameters such as the amount of activity in each compartment (for example, activity distribution) or simple ratios between compartments (for example, soil-plant transfer factors).

A proforma was been designed in Microsoftâ ExcelÔ to allow researchers to submit data in a standard format. The proforma has an associated help file, which includes frequently asked questions and a glossary. For further details on submitting data please email nick_mitchell@mouchel.com (the gap between nick and mitchell is an underscore). Any further contributions will be included in the distributed database.

CONCLUDING REMARKS

The data in RADFLUX represent current experimental work and a source of historic information. Flux data have been taken from reviews of the literature and existing transfer factor databases collated by the UIR have been included. RADFLUX is an important development providing a unique source of information for modelling activities. It provides simple parameters from basic experimental data that can be used to

derive the amount of activity that is transferred between compartments in time without having to make assumptions concerning the experimental conditions. Such assumptions can reduce the reliability of models.

The approach taken in RADFLUX does not constrain what is done with the results of experimental studies and this is a major advantage of the database. Published reports often condense what has been achieved or present data in a format that allows comparison with other published work, e.g. a concentration ratio. This prevents others taking maximum benefit from the data and can lead to the need for those who use the data to guess at measurements or details that although recorded are not presented or discussed. The database also provides the kernel of a flexible reporting system that could be used by investigators.

The authors would like to acknowledge the support of the European Commission, the UK Ministry of Agriculture, Fisheries and Food and that of the Industry Management Committee of the UK Health and Safety Executive. Their substantial support and input to the flux database has contributed greatly to its success. The authors would also like to express their gratitude for the moral support and data contributions from working group members that will ensure the successful use of the flux database.
(Gerrassimos Arapis, Franca Carini, Arrigo Cigna, Martin Frissel, Peter Kiefer, Ionnis Massas, Friederike Strebl, Christian Vandecasteele, Fokion Vosniakos, Penny Wadey, Barbara Watkins, Simon Wright, Teresa Sauras Yera and Gregor Zibold]

For further details on the working groups' activities and additional detail about the database see UIR reports by Mitchell and Donnelly (1998, 1999). The database will be available through UIR in July 2000.

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Table 1: Summary of database fields.

Record_ID	Soil code	Animal code	Mass units
Soil plant animal	Soil type	Animal type	Conc from
Date	Soil bulk density	Treatments	Conc from units
Location	Soil depth	Parameter from	Stats conc from
Study type	Soil quality	Parameter to	Conc to
Ecosystem	Soil pH	Parameter value	Conc to units
Radionuclide source	Soil organic carbon	Parameter range min	Stats conc to
Element	Particle size	Parameter range max	Stable element data
Radioisotope	Plant code	Parameter units	Data grading
Chemical form	Plant type	Stats parameter	Reference
Contamination started	Crop established	Replicates	Cross reference
Contamination ended	Crop harvested	Mass from	Comments
		Mass to	

Note: Column order of fields above relates to that in the database entry proforma

Criteria, Evaluation Methods, and Radioecological Research Initiatives at the U.S. Department of Energy

Stephen L. Domotor
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Relevance of Radioecology

The U.S. Department of Energy (DOE) operates a large complex of sites and facilities, many of which are contaminated from the historical production of nuclear weapons components and associated disposal of waste products, and which are now undergoing remediation and decommissioning. Facilities and reactors associated with commercial nuclear power in the U.S. are also aging, and many will require decontamination and decommissioning. Decisions will be made on whether or not cleanup is necessary, and if so, to determine the cleanup options for lands and structures at these sites and facilities. These decisions will require consideration of (1) risks to the natural environment (e.g., biota and resources) from radioactive contamination, (2) doses, risks, and remediation costs to the public associated with future use scenarios for the contaminated lands and structures, and (3) potential damage caused to the environment from remediation efforts.

Basic research in radioecology has been invaluable in providing a fundamental understanding of atmospheric, geochemical, physiological, and ecological processes effecting the fate, transport, and distribution of radionuclides in our environment. Indeed, basic radioecological concepts and empirical data from this research are used heavily in pathway analysis models to assess doses and risks associated with environmental cleanup alternatives, and to reconstruct doses resulting from historical contamination. The future of radioecology in the U.S. may be in mission-oriented basic and applied research that can be directly linked to specific end-user needs, and whose results will support better assessment of cleanup alternatives and management of risks for these contaminated sites.

Examples of Research Needs and Ongoing Radioecological Research

Examples of research needs to support better assessments of cleanup alternatives, and to provide new approaches to cleanup, include:

- Transport kinetics, empirical data, and quantitative relationships between radionuclides and media or processes (e.g., ratio quantities such as concentration factors; distribution coefficients; resuspension factors) which are time and condition-specific for ecosystems facing possible cleanup.
- Modifying or synergistic effects of chemical contaminants on the transport and behavior of radionuclides in ecosystems facing possible cleanup.
- Determining the most sensitive and significant measurement endpoints for non-human receptors (e.g., for cleanup activities where ecological risk assessments of radiation as a stressor is warranted). Effects of alpha emitters on biota, and appropriate weighting factor for alpha radiation in biota.
- Process-level studies on the mechanisms within different ecosystems facing possible cleanup (e.g., freshwater; marine; arid terrestrial; humid terrestrial) which control the transport of radionuclides through the environment and within organisms.

Examples of ongoing research at DOE sites and facilities that relate to cleanup are provided below. Principal investigators and key contact points are provided to foster interaction with International Union of Radioecology (IUR) members, and you are encouraged to make contact:

Phytoimmobilization Study of Heavy Metals and Radionuclides: A two stage process for remediating soil is being tested. In stage one, contaminants are removed from the soil by plants with a high efficiency for contaminant uptake. In stage two, when plant senescence and decomposition occurs, the contaminants are chemically immobilized by mineral amendments that were added to the soil. Several plant species are being tested for their ability to take up contaminants, and combinations of mineral amendments (apatite, zeolite, metallic iron, gypsum, and pyrite) are being evaluated for their ability to adsorb and retain the contaminants of concern (Ba, Co, Cr, Hg, Th, and U). Tom Hinton (Savannah River Ecology Laboratory, SREL), Anna Knox (SREL), Dan Kaplan (Westinghouse Savannah River Company, WSRC, Aiken, SC), Rebecca Sharitz (SREL), and Steve Serkiz (WSRC).
Contact Tom Hinton, University of Georgia, Savannah River Ecology Laboratory, Aiken, SC 29803. USA . Ph 803-557-7454; Fax 7324; thinton@srel.edu

Cesium Dynamics Within a Lake Ecosystem: Stable Cs was added to the epilimnion of a temperate lake. Samples of water, sediments, plankton, invertebrates, fish, and aquatic plants are routinely taken so that rates of transfer among system components can be determined. The ability of the pond to naturally attenuate cesium is being examined, and models that predict the long term dynamics of Cs within the system are being evaluated . Samples are assayed for Cs by ICP-MS and neutron activation analysis. Tom Hinton (SREL), John Pinder (SREL), Ward Whicker (Colorado State Univ.). Contact Tom Hinton (see above).

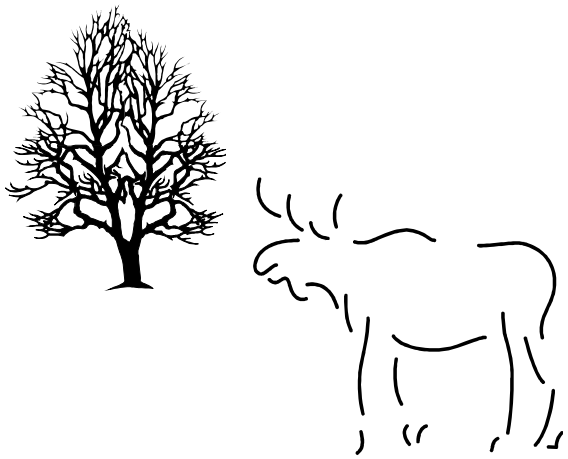
Particle Size Distributions & Seasonal Trends of Pu, Am, Cm and Th in a Pond: Examines the contribution of the colloid fraction to the speciation of actinides in freshwater systems. Preliminary results suggest that 85 to 100% of the Pu, Th and Am is attached to the colloid fraction in samples taken from both surface and deep waters (10 m). These results are opposite those conducted in marine systems, where the actinides remain in a soluble form. The goal is to understand the seasonal dynamics of actinides in freshwater systems. Jim and Monica Alberts (Univ. of Georgia), Mike Schultz and Bill Burnett (Florida State Univ.), Tom Hinton (SREL). Contact: Tom Hinton (see above).

Remediation Technologies for Aged Radionuclide Contaminated Sediments: Chemical chelating agents and biodegradable plant derivatives such as cyclodextrins and phytic acids are being evaluated as selective extractants for possible use in remediation of aged radionuclide-contaminated sediments. John Seaman (SREL), Vijay Vulava (SREL), Andrew Sowder (SREL), and Paul Bertsch (SREL). Contact John Seaman, Advanced Analytical Center for Environmental Sciences, Savannah River Ecology Laboratory, PO Drawer E, Aiken, SC 29802; Ph: 803-725-0977; Fax: 3309; Email: seaman@srel.edu

Suitability of the VAMP Model for Predicting Radiocesium Concentrations in Water and Fish of Two Warm Temperate Reservoirs: The VAMP model, developed using data from seven Chernobyl-contaminated lakes in Europe, was designed to predict radiocesium dynamics in a broad range of lake types. This work tests the model's ability to predict radiocesium dynamics in two warm temperate reservoirs (Par Pond and Pond B) on DOE's Savannah River Site (SRS). Model predictions are being compared to measured radiocesium concentrations in fish and water at intervals of one to three decades after radiocesium inputs ceased. Dr. Gregory P. Lewis (SREL, Drawer E, Aiken, SC 29802, USA; phone: 803-725-5892; FAX: 803-725-3309; e-mail: lewis@srel.edu), Dr. Barbara E. Taylor (Savannah River Ecology Laboratory, Drawer E, Aiken, SC 29802, USA; phone: 803-725-9609; FAX: 803-725-3309; e-mail: taylor@srel.edu)

Determining Significant Endpoints in Ecological Risk Analyses: Establishes a protocol to assess risks to non-human biota at higher levels of biological organization by relating molecular damage to more relevant responses that reflect the health of populations. The approach is to couple changes in metabolic rates and energy allocation patterns to meaningful population response variables, using novel biological dosimeters in controlled, manipulative dose/effects experiments. Two of the necessary tools to address these complex problems have been developed: (1) a molecular probe that allows use of chromosome aberrations in exposed turtles as a biological dosimeter, and (2) an outdoor irradiation facility containing 50 mesocosms for conducting controlled, manipulative dose-response experiments under chronic, low-level conditions. Information generated from this line of research could transform how the significance of sublethal damage is viewed and, in turn, provide information essential to sound remediation decisions at DOE sites. Key goals are to: (1) determine what the appropriate response variables are in ecological risk analyses for a variety of organisms; (2) determine if organisms in contaminated environments have altered metabolic rates that reflect the cost of adjusting to increased stress; (3) determine how much excess molecular damage is required, beyond the spontaneous mutation rate, for higher-level effects to be observed in individuals and populations; (4) determine if there is a measurable relationship between sublethal chromosome damage and ecologically relevant life history parameters (such as age-specific survivorship, reproductive output, age at maturity and longevity); (5) determine if there are synergistic effects when animals are exposed to both toxic and radioactive contaminants; and (6) determine if information generated from this line of research could transform how the significance of sublethal damage is viewed and, in turn, provide information essential to sound remediation decisions at radioactively contaminated sites. Tom Hinton (SREL), Justin Congdon (SREL), David Scott (SREL), Joel Bedford (Colorado State University), Ward Whicker (CSU). Contact Tom Hinton (see above).

Fate and Effects of Radionuclides on Plants and Animals Inhabiting Contaminated Environments: Ongoing studies at SREL seek to understand the cycling, accummulation and effects of radionuclides in terrestrial and aquatic organisms. Studies are presently underway at DOE's Savannah River Site and at the International Radioecology Laboratories in Chornobyl and Slavutych, Ukraine. Current work includes measurement of radiocesium and other radionuclides in plants, mammals, fish, and other wildlife to determine biotic and abiotic factors that influence concentrations, transfer coefficients between ecosystem components, determination of the ecological half-life of radiocesium in natural



systems, and estimation of radiation dose to free-living animals and plants in contaminated environments. Chronic exposure to radiation may also cause morphological and genetic changes in individuals and populations. A major focus is to develop and test methodologies to measure genetic effects by using microsatellite and mitochondrial DNA, and application of transgenic model systems. SREL faculty participants: I.L. Brisbin, Jr., R.K. Chesser, T.C. Glenn, C.H. Jagoe, M.H. Smith. University of Georgia, Savannah River Ecology Laboratory, Drawer E, Aiken SC 29802 USA. Ph 803-725-2472. Email-last name +@srel.edu

Uptake Parameters of Contaminants and Species Important to Idaho National Engineering and Environmental Laboratory (INEEL) Ecological Risk Assessment: Provides (1) site-specific data on plant uptake for risk assessments, reducing the dependence on values estimated from other sites and other species, and (2) a method of estimating these parameters from site-specific data when other contaminants, soil types, or plant species are contemplated as risk assessment endpoints. Objectives are to: (1) determine the equilibrium plant-soil concentration ratio for ^{63}Ni, ^{99}Tc, ^{137}Cs, and ^{244}Cm in four soil types and three plant species existing on the INEEL, (2) determine the bioavailability of the contaminants of interest in the soil types of interest, and (3) combine these data to develop equations or adjustment factors for transforming plant contaminant uptake data from experiments conducted in one soil type to an estimate of uptake for similar contaminants in other soil types. Randall C. Morris (Environmental Science & Research Foundation, Inc, ESRF, P.O. Box 51838, Idaho Falls, ID 83405-1838, USA, Richard Brey (Department of Physics and Health Physics, Idaho State University, Campus Box 8106, Pocatello, ID 83209, USA), and Nancy Hampton (Idaho National Engineering and Environmental Laboratory, P.O. Box 1625, Ms 2213, Idaho Falls, ID 83415, USA).

The Fate of Radionuclides in Plastic Lined Ponds and Potential Dose to Persons Consuming Waterfowl from Those Ponds:. Research to determine the fate of radionuclides released as liquid effluent to two double-lined evaporation ponds at the Test Reactor Area (TRA) on DOE's INEEL. Special attention is being placed on waterfowl uptake and transport of radionuclides and potential dose to individuals who may consume them. Prior to this research, no data existed on radionuclide cycling in a lined-pond system. Because of the limited amount of sediment, radionuclides may be more available to waterfowl and other birds. Ronald W. Warren and Randall C. Morris, Ph.D. (ESRF; P.O. Box 51838, Idaho Falls, ID 83405-1838, USA).

Uptake of Contaminants by Vegetation and Burrowing Activity on a Decommissioned Radioactive Waste Pond Complex: Research is being conducted to quantify contaminant uptake by vegetation and burrowing organisms on decommissioned radioactive waste ponds at the TRA on the DOE's INEEL. Three liquid radioactive waste leaching ponds received an estimated 53.5 kCi of activity between 1952 and 1993. All ponds were taken out of service in 1993 and two were closed in late 1993 and early 1994 with a simple soil cover containing no biobarriers to inhibit root infiltration or burrow penetration. Vegetation species and biomass were determined for those two pond covers and samples of vegetation were analyzed for gamma emitting radionuclides, ^{90}Sr, ^{238}Pu, $^{239/240}$Pu, ^{241}Am, and selected trace metals. The covers were also surveyed for burrowing activity. Uptake of radionuclides by vegetation and burrowing activity was occurring across both the covers. During 1999 an engineered cover incorporating a human intrusion barrier (a basalt riprap layer on surface) was put in place over one pond and a cover incorporating both human and biota intrusion barriers (basalt riprap over a gravel/cobble layer) was put in place over the two remaining ponds. Data collected in 1999 show a marked increase in small mammal density and diversity on the cover using only the human intrusion barrier compared with the previously used soil-only cover. Ronald W. Warren (Environmental Science and Research Foundation Inc.,101 S. Park Ave., Suite 2, Idaho Falls, ID 83404)

Transport of Radionuclides by Barn Swallows (Hirundo rustica): Barn swallows are common at the DOE's INEEL and are known to nest near many wastewater ponds found on site. In a 1976 – 1978 study, barn swallows nesting at the Test Reactor Area (TRA) were found to contain over 20 fission and activation products which were responsible for an estimated dose rate to the birds of 0.2 mGy/d. Radionuclide concentrations in their nesting materials were found to average 379 Bq/g which related to mean external dose rates in the nests of about 400 times that in control nests located 100 km south of TRA. Current research at the TRA, the Idaho Nuclear Technology and Engineering Center (INTEC), and the Test Area North (TAN) facilities is quantifying barn swallow transport of radionuclides

from waste sites (nest materials) and from the INEEL (tissues). Since the 1970s, changes in waste management practices have led to large reductions in radionuclide concentrations in both the barn swallows and their nesting materials. The 1995 - 1997 average exposure rates in swallow nests were at least 53 times lower, average concentrations in nest materials were at least 49 times lower, and average concentrations in barn swallows were about 123 times lower. Ronald W. Warren (ESRF) 101 S. Park Ave., Suite 2, Idaho Falls, ID 83404)

Dose Standards and Methods for Demonstrating Protection of Biota

Environmental risk assessors have often relied on demonstration of human protection to infer ecological protection. The International Commission on Radiation Protection (ICRP) statement that "...if man is adequately protected then other living things are also likely to be protected" assumption is being re-considered, particularly in cases where human access to the contaminated area is restricted. DOE currently has in place a dose standard of 10 mGy/d for the protection of aquatic animals, and is considering inclusion of dose standards for protecting populations of both aquatic and terrestrial biota in proposed rule 10 CFR Part 834, "Radiation Protection of the Public and the Environment". DOE has decided not to promulgate these criteria until guidance for demonstrating compliance with the standards has been developed. In this regard, DOE is developing a Technical Standard (i.e., methodology, implementation guidance, and electronic calculational tools) which provides a *graded approach* for evaluating radiation doses to aquatic and terrestrial biota to be used in demonstrating compliance with biota dose limits. The graded approach consists of: (1) a screening methodology that provides limiting radionuclide concentration values (termed "Biota Concentration Guides", or BCGs) in soil, sediment, and water – such that the dose limits for biota are not exceeded, (2) refinement of the screening methodology to allow for use of site-specific parameters and receptor information in analysis methods employing kinetic modeling and allometric relationships; and (3) guidance for conducting site-specific biota dose assessments within an ecological risk assessment framework (Figure 1). The development of the graded approach is being coordinated through DOE's Biota Dose Assessment Committee (BDAC). The BDAC is a topical committee established under DOE's Technical Standards Program. The BDAC (1) assists the Department in conceiving, developing, and promoting methods and guidance for application in assessing radiation doses to biota, and (2) provides a major forum within DOE for obtaining technical assistance, discussing technical issues, and sharing lessons learned regarding biota dose standards and assessment methods. An internet-accessible database of environmental parameters typically used in biota dose evaluations is also under development. The Technical Standard is expected to be available in mid-2000. Contact Stephen Domotor (Stephen.Domotor@eh.doe.gov) for further information.

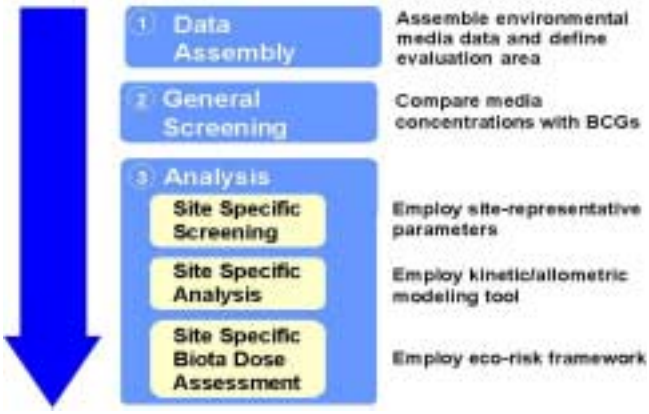


Figure 1 Overview of the DOE Graded Approach for Evaluating Radiation Doses to Aquatic and Terrestrial Biota

Closing Thoughts

In light of competing and diminishing resources, a more holistic approach to identifying mission-oriented research priorities, and exchanging research results to facilitate their application in cleanup methods and computer models, may be needed. Forums or "focus areas" which bring together researchers, methods and model developers, regulatory experts, stakeholders, and specific end-users and decisionmakers who must assess and manage the risks associated with cleanup activities, should be useful in this regard. This coordinated interaction would provide radioecologists with opportunities for communicating the benefits of basic and applied research to site cleanup problems; it would also give radioecologists a better appreciation for end-user and stakeholder issues and concerns regarding cleanup. Partnerships and collaborations within the research community, and across government organizations, would provide opportunities for leveraging existing expertise and limited resources, and for fostering linkage and application of individually-funded research to needs which are common across organizations. These two points are being used to guide the future direction of DOE's BDAC, and we are currently broadening the committee to include representatives from other governmental organizations.

CONCEPT OF PROGRAM ON THE CONSEQUENCES OF THE CHORNOBYL CATASTROPHE MINIMISATION: 2000-2005

V.Bebeshko, G.Desmet, I.Los', V.Kholosha, V.Poyarkov, B.Prister, D.Robeau, V.Shestopalov

1. Introduction

During 14 years that passed since the accident at Chornobyl NPP, the radiation situation of the contaminated area has been improved. This was facilitated by natural processes and implementation of the program of measures to limit the spread of radionuclides beyond the Exclusion Zone borders, countermeasures in agriculture production, decontamination works, etc. A number of measures on medical and social protection of the decontamination workers and the affected population was implemented; the exposure of the people living in the contaminated areas was therefore decreased. The situation has been stabilised to some extent so it is possible to consider the effectiveness of the applied countermeasures and to plan the future activity.

The starting point for the following consideration should be the fact that the Chornobyl accident mitigation will remain a high priority for the government policy in Ukraine for many years, according to the Ukrainian Constitution's article #16. The necessity of increasing the world community role and participation in the protection of the affected people was stressed in the report by the UN Secretary General at the 54th session of the UN General Assembly in November 1999.

In 1996-2000, the works on accident mitigation are being carried out according to the "National Program on the Consequences of the Chornobyl Catastrophe Minimisation". The Program will be completed this year and a new Program for the period 2001-2005 will be developed . When developing this new program , it is important to take into account the agreed objective assessment of the existing radiological and social situation, implemented countermeasures, and detailed scientific, economic, and social substantiation of the directions of the consequence minimisation actions that are planned to be carried out.

That is why, at the first phase of the development of the "Concept and Priority Directions of the Chornobyl Catastrophe consequences Minimisation Program for 2000-2005", according to the BISTRO TACIS Project "Determination of the Directions Priority and Development of the Long-Term Concept of the Program on the Chornobyl Catastrophe Consequences Minimisation for 2000-2005", a peer review was carried out, of the actual situation concerning the Chornobyl catastrophe

consequences and the effectiveness of the adopted countermeasures. On the basis of this analysis, the top-priority directions of the future minimisation of the catastrophe consequences were proposed. The draft of this report was sent to Verkhovna Rada of Ukraine, the Cabinet of Ministers of Ukraine, the Ministry of Emergency situations and Protection of the Population of the consequences of the Chornobyl accident, the Ministry of Environment Protection and Nuclear Safety, the Ministry of Health, the Ministry of Energy and others. Their comments were taken into account in the current work, and the final version of the report was prepared after a number of co-ordination meetings.

It is important that leading Western experts also participate in the development and expertise of this report. At the next phase, this will facilitate the planning of the actions that are agreed both at national and international levels.

During the next phase of the works, the tasks of each of the priorities will be developed and substantiated. These logically constructed tasks are put into the task trees reflecting their interaction and priority. The important role in these tasks is the strengthening of the quality control system of the already achieved results and planned measures. The Program concept defines the main demands to the "National Program of the Chornobyl Catastrophe Consequences Minimisation for 2001-2005". Leading scientists and experts, members of Ukrainian Parliament, representatives of the government and public organisations participated in its development. "Concept and the Top-Priority Directions of the Program on Chornobyl Catastrophe Consequences Minimisation for 2000-2005", developed in this way will constitute the basis of the "National Program on Chornobyl Catastrophe Consequences Minimisation for 2001-2005".

2. Goal and Top-Priority Tasks of the Program of Chornobyl Catastrophe Consequences Minimisation for 2000-2005

2.1 Goals of the Program

1. Maintaining the health of the people that suffered as a result of the Chornobyl catastrophe;
2. Reinforcement and maintenance of the nuclear safety barriers, radiation protection of the population in the contaminated territories, restriction of radionuclides proliferation beyond the exclusion Zone;
3. Social protection of the population and economical rehabilitation of the contaminated territories, their transfer to the category of "clean".

2.2. Top-priority Tasks for the Goal of Health Maintenance of the People that Suffered from the Chornobyl Catastrophe.

On the basis of the experience gained during 14 years of the works on medical consequences of the accident, the following strategic directions of radiation medicine research are worth developing:

- Development and implementation new effective health monitoring techniques, treatment of the radiation and psychologically induced illnesses, and prophylactic of removed stochastic and non-stochastic effects of the exposure in the people from the groups of higher onco-hematological and genetic risk.
- Implementation of new, highly effective methods of physical, psychological, social rehabilitation with the goal of maintaining and improve in the affected people's quality of life.
- Effective usage of existing Ukrainian sanatoria-prophylactic institutions for the rehabilitation of people with the most widespread and debilitating forms of pathology.
- Modernisation of the methodical-regulation and material base of the treatment and prophylactic institutions of Ukraine for pro vision for guaranteed medical aid to the affected population.
- Development and improvement of dose reconstruction (including doses for the thyroid gland and bone marrow), initially for the participants of ACR in 1986 and children affected at the early iodine stage, for the valid estimation of the removed stochastic and nonstochastic effects of the exposure.
- Improvement of the expertise linking the illnesses to the dose of ionising radiation and other agents of the accident in all categories of the people affected in the "far-field" .
- Creation of a state information computer network for supply of diagnostic and treatment services to the affected population, accounting for the risk priority, pathology kind, and exposure doses.
- Estimation of effectiveness of the clinical-

epidemiological register of the affected people for evaluating the impact of countermeasures in terms of a decrease of the morbidity, invalidity, and death rate among the critical groups of the ACR participators, child and adult population of Ukraine.

2.3 Top-priority Tasks for the Achievement of the Goals of Reinforcement and Maintenance of the Radiation Safety Barriers

2.3.1. Radiation protection of the Population in the Contaminated Territory
The main direction of radiation protection of Ukrainian population from the Chornobyl catastrophe consequences is the production of the "clean" food products.

1. Products should have a level of radiation contamination within the permissible limits defined for the prevention of excess exposure dose.

2. The majority of the radionuclides that were dis persed by the accident resulted in contamination levels that are still low enough to permit agricultural activity. Their incorporation in food chains, though it does not cause an excess of the marginal exposure doses in individuals, nevertheless results in low collective doses .

The measures at reducing population exposure always interfere with the daily life of the people therefore their evaluation should take account of, not only the radiological, but also the economic and socio-psychological consequences of their introduction .

2.3.2 Increase protection of the Exclusion Zone with the goal of minimising the spread of radionuclides beyond its boundaries.

- maintenance of the radiation safety barriers in the Exclusion Zone as a whole with the goal of limitation and gradual decrease of radionuclides proliferation to the inhabited territories,
- strengthening of the internal safety barriers of the object "Shelter", places of radioactive wastes localisation, water protection constructions, contaminated forests, etc.,
- improvement of the regulation basis directed to the provision of the main function of the exclusion Zone: radiation safety barrier between the radioactivity source in the Zone and inhabited territory.

2.4 Top-priority Tasks of the Population Social Protection, Rehabilitation of the Contaminated Territories

The Chornobyl catastrophe affected the fate of millions of people. The law of Ukraine "About Status and Social Protection of the Citizens that Suffered as a Result of the Chornobyl Catastrophe" (here-after the Law on Status) determines the main regulations and priorities concerning fulfilling Constitutional rights of citizens.
Thus, the main tasks of the social population protection are now:

- Further provision for the social protection of the citizens that suffered as a result of the Chornobyl catastrophe according to the actual legislation.
- Creation of the conditions for economic rehabilitation and development of the economy of the contaminated territories, larger involvement of the Regions in provision for social protection of the affected population and economic rehabilitation of the contaminated territories, improvement of the procedure of the contaminated territories transfer to the category of "clean".
- Improvement of the legislation and standard basis for provision of a more effective social protection of the population and rehabilitation of the contaminated territories, accounting for the economic possibilities of the state and existing autorehabilitation processes.
- Increase of the level of radiological knowledge and information of the population of the contaminated territories, support of the necessary level of radioecological knowledge among the persons that implement the tasks of the National Program.

3. Criteria and Procedures of the Works Foreseen by the Program Implementation

3.1. Provision of Radiation Monitoring Over the Territories of the Radioactive Contamination Zones

Generally, the main goal of monitoring, as a basis of decision-making support, could be specified as follows:

- support for decision-making on provision of radiation protection of a human being (population);
- efficacy or effectiveness estimation of the exposure dose reduction measures that are realized or have been realised;
- provision of available data to medical, epidemiological, ecological, social, etc. studies on effectiveness factors, exposure

doses and their dynamics or studies on refinement of dosimetric, radioecological models or certain methodological aspects of the monitoring itself.

3.2. Scientific Management and Guidance of the Implementation of the Program

For correction of the strategy and tactics of the research works for the following decade, it seems worthwhile to extend the number of generalising works in the following directions:

- analysis of the effectiveness and optimisation of the future use of direct and indirect countermeasures,
- dynamics of the Chornobyl catastrophe impact upon the health of the affected people and their medical aid
- analysis of the existing radioecological monitoring system and development of the ways of its optimising it,
- analysis of the existing legal-standard basis concerning protection of the affected population and development of proposals on its improvement in accordance with new information,
- extension of the use of economic approaches to the development of the affected regions,
- comprehensive assessment of the Chornobyl exclusion zone and the evacuated zone as a source of radioecological risk, assessment of the main protective barrier, and assessment of idespread rehabilitation techniques including auto-rehabilitation processes.

Most of the applied scientific, design, and technological achievements of Chornobyl scientific program were obtained through the theoretical, basic studies in the research fields of different departments that continued from the early years when science in general received relatively stable budgets. Recently however, because of a catastrophic decrease of science financing, such research is considerably reduced, and respective scientific schools are been dissolved. Under such conditions it is worthwhile to bring together these applied and pilot theoretical studies, that are necessary for the applied research, under the umbrella of one complex integrated program. This is a parallel of the structures that apply to the management of science in advanced Western Institutions and Companies that aim at practical results, but, to achieve this, give financial support to the necessary theoretical studies.

It is necessary to:

- to identify and study, on a more refined level, the components of the processes and consequences of the Chornobyl accident that affect the people's health and the state of the environment,
- to improve the system of countermeasures with the priority of extending the indirect measures aimed at the production of clean productsand the development of the economy of the affected regions.
- to provide more scientific substantiation of expenditures
- to generally optimise the use of the numerous results on the minimisation of the Chornobyl accident consequences and to putting them into the general practice of prevention and removal of the consequences of extraordinary situations.

On the basis of the huge amount of the scientific materials, it is obviously necessary to extend the development of the models of radionuclide behaviour in the environment under post-accident conditions. This will provide for scientifically grounded prognosis of the radiation situation for the future. At present, Ukraine has a world priority concerning the solution of the problems that appear while overcoming the consequences of the accidents similar to Chornobyl. Extensive research experience that was accumulated during the years of crisis - environmental monitoring, medical studies, etc. - should be adapted for use in the development of preventive and emergency response systems.

Taking into account all that has been learned to date, it is necessary to develop an integrated approach as well as an integrated objective of minimisation of the consequences of Chornobyl. The components of such a system are:

- increase of the level of radiological knowledge, concerning different accidents, means and ways of collective and individual protection, of the administrative structures clerks, legislative bodies, mass media, students, population;
- development of a decision-making system and models for optimising the interaction of administrative and legislative structures, different departments, services, state and public Non-Governmental organisations and mass media, during pre-accident, accident, and post-accident periods;
- special study of the population perception of the consequences of exposure and the

impact this has on health.

3.3. Personnel Provision for the Program Main Tasks Implementation

One of the Program tasks of highest priority is the provision with qualified personnel.
Qualified workers should not only plan the measures, but specialists that have sufficient knowledge in the field of radioecology, radiation protection, etc. should carry out the tasks at all the links. This is even more important as the program is very knowledge-intensive. Such activities include work in the "Shelter" and exclusion Zone, where those involved are exposed to elevated radiation levels, as well as countermeasures' implementation in agriculture, people treatment, radiomonitoring management and guidance.
The main tasks involved in providing qualified staff are:

- Training and retraining of the specialists;
- Increase of the qualification of the managers;
- Increase of the qualification of specialists;
- Presentation of results in monographs, textbooks and teaching aids;
- Proliferation of the experience for the effective implementation of the priority tasks of the Program;
- Direction of educational plans and training of specialists to support advanced knowledge in the field of radioecology, radiation protection, radiometry, radiobiology and radiation medicine.

4.Conclusion

The new, long-term phase of the programme for the minimisation of the consequences of the Chornobyl catastrophe begins. During this stage, it is necessary to develop and implement the programs of the further social, medical, and psychological rehabilitation of the population; in essence to complete the radiation and economical rehabilitation of the most affected settlements and territories.
It is worthwhile to acknowledge that the main weakness of the earlier phases of the programme was a lack of clear-cut priorities . Frequently the works were carried out simultaneously in all directions regardless of insufficient financing. This led to incomplete fulfilment of urgent measures and a decrease in the effectiveness of countermeasures.

Under the conditions of economic crisis prevalent in the Ukraine, the resources of the Program are being reduced. The draft Budget of the Ukraine for the next year foresees further significant decrease of financing of measures on social protection of the population that suffered as a result of the accident, the works in the Exclusion Zone, scientific support of the Program for the minimisation of the consequences of the Chornobyl catastrophe.
Priority financing of the most important chapters and tasks of the National Program on minimisation of the consequences of the Chornobyl catastrophe should become the main organisational principle of its implementation. The developed Concept will become the basis of the National Program built on the basis of priorities and implementation procedures agreed with all the authority branches.The huge experience accumulated during the mitigation of the Chornobyl accident's consequences could serve as a basis for a system of scientific back-up for decision-making in the event of nuclear and other technological accidents. The creation of such a system, based on procedures for assessing and monitoring accidents, which are unified at regional and international levels, is an important task. It will be a good example of how the Chornobyl disaster, which has brought so much distress and suffering, can make a positive contribution to the development of society.

JAPAN hosts several international conferences with topics related to Radioecology in 2000:

The 10th International Congress of the International Radiation Protection Association, IRPA-10: Hiroshima, May 14-19

The IES International Meeting on the Distribution and Speciation of Radionuclides in the Environment: Rokkasho, Aomori, October 11-13

The 8th International Conference on the Low Level Measurements of Actinides and Long-lived Radionuclides in Biological and Environmental Samples: Oarai, Ibaraki, October 16-20

International Union of Scientific Societies Working Group MO 3rd International Symposium

Soil Mineral-Organic Matter-Microorganism Interactions and Ecosystem Health

22-26 May, 2000, Naples-Capri, Italy

Pre-registration, as soon as possible and Abstract submission deadline 15th November

You can read more about this Symposium which is organised by the International Union of Soil Sciences (IUSS), the University of Naples and the Societa Italiana della Scienzia del Suolo (SISS) at the following Website:

http://www.unina.it/ismom2000

Among the 6 themes there is one that may interest in particular IUR members: **Bioavailability a of metals or toxic substances adsorbed on mineral-organic components**

5th International Conference on High levels of Natural Radiation and Radon areas: Radiation Protection and Health Effects

4-7 September 2000, Munich, Germany

You can read more about this Symposium which is organised by BfS, GSF, in co-operation with IAEA, UNSCEAR, WHO, European Commission-DGXII and the Bundesministerium für Umwelt, Naturshutz und Reaktorsicherheit.

The Conference will include sessions devoted to the investigation of global natural radiation areas, radon in the environment, biological effects, combined effects, natural radiation environment and related issues in radiation protection.

Contact Prof. Dr. A. Bayer, BfS, Institute for Radiation Hygiene
P.O. Box 1108
D-85758 Oberschleissheim
Germany

email: mailto:abayer@bfs.de

6TH SPERA ENVIRONMENTAL RADIOACTIVITY CONFERENCE

ENVIRONMENTAL CHANGES AND RADIOACTIVE TRACERS

Associated Workshop
Radiological Techniques in Sedimentation Studies
Methods and Applications
First Circular

19 - 23 June 2000
Noumea, New Caledonia

WELCOME

On behalf of the South Pacific Environmental Radioactivity association (SPERA), it is with great pleasure that the organising committee invites you to assist in the 6th biennial Conference: SPERA-2000. The Conference extending from 19 to 23 June will be **hosted by Institut de Recherche pour le Développement (IRD) in the Nouméa Centre, New Caledonia.**

The primary objective of the SPERA-2000 Conference is to provide a forum to discuss how studies of radionuclide behaviour can be used to address environmental issues. This international Conference is aimed at bringing together scientists from all parts of the world and many disciplines for the sharing of techniques and ideas involving the application of radioactivity in environmental studies.

The Conference will include 6 topical sessions:

1. Radioactivity in Atmospheric Studies
2. Radioactivity and Water Column
3. Radioactivity in Sedimentary Studies
4. Radioactivity in Soils and Related Issues
5. Radioactivity and Waste Disposal
6. Radioactivity in Biological Processes

and a Workshop with a specific issue:

Radiological Techniques in Sedimentation Studies: Methods and Applications

WHAT IS SPERA?

The South Pacific Environmental Radioactivity Association is an apolitical body of professionals involved in environmental radioactivity studies in the South Pacific region. 'Me primary objective of SPERA is to facilitate communication among scientists in the field of environmental radioactivity, which involves study of the occurrence, transport, behaviour and impact of radioactive species present in the environment due either to natural processes or resulting from human activities. Environmental radioactivity workshops are held biennially. Other activities of SPERA include the production of biannual newsletter and the organisation of interlaboratory comparison programs. Further information about SPERA may be obtained from either of the following:

In the tropics, significant environmental impacts are observed as a result of the combined effects of specific natural environmental conditions (climate, vegetal cover, geography, etc.) and open cast mining activities. Such impacts, initially of limited extent, strongly increased due to the industrial mechanisation after 1945. In the middle of the seventies, new techniques, such as stabilisation of tailings, conservation of natural merlon and the construction of filtering and decanting dam, were implemented in order to lessen the detrimental effects of open cast mining on the environment.

DATE AND PLACE

From MONDAY, 19 JUNE To FRIDAY, 23 June 2000
IRD CENTRE, ANSE VATA Noumea - New CALEDONIA

CONFERENCE SECRETARIAT SPERA-2000
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BP A5, 98 848 Noumea cedex
New Caledonia

Tel: (687) 26 07 33 / (687) 26 10 00
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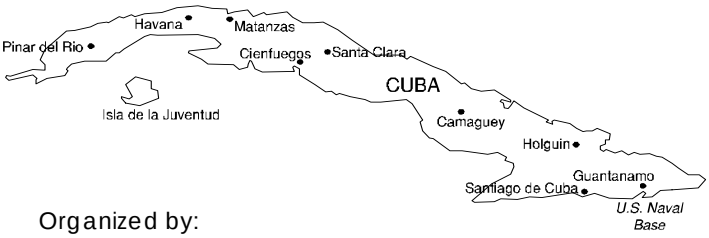
FIRST CIRCULAR

Cienfuegos, CUBA

3 - 5 Julio 2000



Organized by:
Ministry of Sciences, Technology and Environment

Pollution of the Marine Environment has become one of the greatest concerns of Governments, Organizations and the General Public. The Ministry of Sciences, Technology and Environment (CITMA) and the Cienfuegos Government, request Scientists, Engineers, Specialists and The General Public to participate in the First International Workshop on the Managment of Marine Pollution, which will be developed within the framework of The Interantional Fair Friends of the Sea, which is celebrated in the City of Cienfuegos, each year.

The First International Workshop on Management of Marine Pollution will be a great opportunity to exchange experiences between various regional specialists of the world. Participants are encouraged to exchange experiences from their own Country, in transcendent and current topics, within the framework and principles of development.

Nuclear and related techniques on marine environment studies.

1. Pollutant levels, distribution, dispersion process.
2. Natural and manmade radioactivity levels.
3. Marine radioecology.
4. Radioactivity in sedimentary studies.
   - Historical pollutant trends
   - Dating, accumulation rates, residence time of suspended matter
   - Transport and dispersion of pollution
5. Radiological surveillance nets in seas and oceans, design and implementation.

Marine environment Technology

1. Quality models in marine ecosystems.
2. Geographical information systems.
3. Remote sensing of pollutants.
4. Software on the study and management of marine ecosystems.
5. Engineering models on the study of the dispersion process of pollutants.
6. Clean technologies.

Marine environment assessment, biodiversity and environmental education

1. Research in marine science and the sustainable development.
2. Tourism and the growing of the coastal ecosystems.
3. Integrated management in coastal zone.
4. Monitoring plans in coastal ecosystems.
5. Marine ecology, environment education and the communication media.

CONFERENCE CHAIRMEN

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Ministerio de Ciencias Tecnología y Medio Ambiente

Preliminary international scientific advisory committee

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Instituto de Oceanología de Cuba
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ENEA, La Spezia Italia
Dra. Maria Elena Ibarra
Centro Investigaciones Marinas, Cuba
Dr. Joan Albert Sanchéz Cabeza
Universidad Autónoma de Barcelona

ESNA Annual Meeting

The European Society for New Methods in Agricultural Research (ESNA) organises its XXX Annual Meeting The IUR is connected to ESNA and this Annual Meeting because it hosts an IUR Working Group on Soil-to-Plant Transfer. This WG 3 on soil-plant relationships of ESNA is chaired by dr. Martin Gerzabek and dr. Nick G. Mitchell.
Dr. Gerzabek can be contacted at the Austrian Research Centre Seibersdorf, Austria
Fax: + 43 2254 7803653

martin.gerzabek@arcs.ac.at

The IUR through this Soil-to-Plant Working Group has a long-standing relationship with ESNA, where relevant issues for radioecology are discussed with a very open mind and a good sense for objectivity.

ESNA Working Groups deal with:

WG 1. Food Preservation and safety
WG 2. Advanced Methods in Animal Sciences
WG 3. Soil-Plant Relationships
WG 4. Plant Genetics, Breeding and Physiology
WG 5. Quality of Agro-ecosystem
WG 6. Pest Management
The Presidency of the ESNA Committee is in the hands of Prof. Dr. Dennis Baker,

mailto:d.baker@wye.ac.uk

For more information you can contact the ESNA Secretary is dr. Michael Pöschl at his Email:

mailto:poschl@mendelu.cz

The meeting Chairman of the ESNA Confernce is by Prof. Dr. A.S. Szabo

medny@elfiz2.kee.hu

The local organisation of the ESNA Conference is by
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University of Agricultural Sciences, 8361 Keszthely, Deák Ferenc str. 57
Hungary

koc11085@ella.hu

Programme of the Annual ESNA Meeting
AUGUST
25th Friday: registration
26th Saturday: Registration and at 19.00 Welcome reception
27th: Opening ceremony (10-12), WG sessions (15-18), Committee meeting (17-18)
28th Monday: 9-12 WG sessions, 14-16 Scientific visits, 17-18: ESNA sport games
29th, Tuesday: 7-12 WG sessions, 15-20: Excursion
30th, Wednesday: 9-11: WG sessions, 11-12: Committee meeting, 12-13 Closing ceremony

Timofeeff-Ressovsky Centennial Conference

A conference in memory of the Russian geneticist N. W. Timofeeff-Ressovsky will be held September 6-9, 2000 in Dubna (near Moscow). (The International Union of Radioecology is a co-organizer of this conference.) Scientists working on evolution, genetics, radiobiology and radioecology are particularly encouraged to attend. Sections and topics will include genetics (mutation, DNA repair, and phenogenetics), radiobiology (genetic effects of ionizing radiation, modern hit theory, biological effects of low-dose irradiation), radioecology and radiation biogeocenology (ecosystem sensitivity, combined radionuclide and chemical pollution, and biotic rehabilitation), evolution (self-organization of matter, basic aspects of evolution). The working languages will be Russian and English with simultaneous translations. The application deadline is April 15, the abstract deadline May 1. The registration fee is $250, which includes hotel accommodation. For

additional information and registration forms, please see: http://www.jinr.dubna.su/~drrr/Timofeeff/

Advances and Issues in Evaluating Radiation Doses to Ecological Receptors

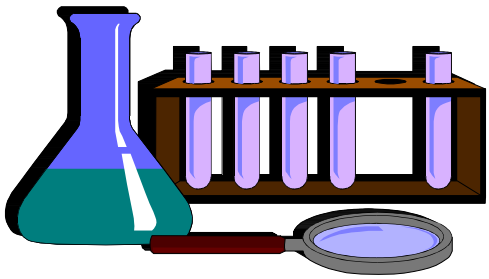
Platform Session Proposed for Society of Environmental Toxicology and Chemistry (SETAC) 21st Annual Meeting

November 12-16, 2000
Nashville, TN USA

Stephen Domotor

I would like to bring to your attention a proposed session for the Society of Environmental Toxicology and Chemistry's (SETAC) 2000 annual meeting. The proposed session number and title are "3AA - Advances and Issues in Evaluating Radiation Doses to Ecological Receptors". SETAC platform sessions consist of ten (20 minute) presentations. Those interested in submitting an abstract for consideration in response to the general call for papers should do so by May 1, 2000. Meeting details, and guidance for preparing and submitting an abstract for this proposed session, can be obtained from the SETAC web site (http://www.setac.org). The abstract for the proposed session is provided below.

Session 3AA: This session will focus on recent advances and the breadth of issues inherent in the assessment of radiological risks to non-human biota, many of which are directly relevant to assessments of chemical stressors. Specifically addressed will be methods for estimating doses to biota (including allometric scaling techniques), transfer factors used to estimate internal (biological uptake factor) and external (sediment and soil Kd) exposures, the relative biological effectiveness of radiation types in non-human receptors, screening tools for rapidly evaluating environmental data, spatial-temporal considerations in delineating an assessment area, ecological risk-based approaches for addressing the issues of radiological exposure and effects, and related on-going research. The U.S. Department of Energy (DOE), through its Biota Dose Assessment Committee (comprised of academia, national laboratory, private sector, and government representation), has developed a graded approach for evaluating radiation doses to aquatic and terrestrial biota. Other agencies, both nationally and internationally, are beginning to address radiation dose limits for non-human biota in earnest. This session will be of interest to scientists, managers, and stakeholders involved in ecological risk assessments in general, and of particular interest to those dealing with radiologically contaminated waste streams requiring an evaluation of radiation as a potential stressor.



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