

RADIOACTIVE WASTE PROGRAMS AND THE OECD NUCLEAR ENERGY AGENCY

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ABSTRACT

The purpose of NEA is to promote the development of peaceful applications of nuclear energy through cooperation between its 24 Member countries and harmonization of national practices and decisions. The radioactive waste management program receives a high priority in the program of work of the NEA and its principal objective is to develop comprehensive and integrated methodologies to assess the long term safety of radioactive waste disposal systems and to increase confidence in the application and results of these assessment methodologies.

Although the NEA's main activity in the radioactive waste management program remains in the area of geological disposal of highly radioactive waste, the methodology developed for the safety assessment of disposal of highly radioactive and extremely long-lived waste material will provide confidence in the disposal of low level radioactive wastes and/or even in the disposal of highly hazardous chemical materials.

Another special interest shown by OECD Member countries is the subject of separation and transmutation of actinides and fission products. An Information Exchange Program on Actinide Separation and Transmutation was instituted as an NEA activity, to run for five years from 1990.

WHAT IS THE OECD/NEA?

The OECD Nuclear Energy Agency (OECD/NEA) - initially established as the European Nuclear Energy Agency in 1957/58 - has for 15 years had the same membership as OECD. It is, in fact, the specialized branch of the OECD for dealing with all nuclear energy matters.

The purpose of NEA is, of course, to promote the development of peaceful applications of nuclear energy through co-operation between its Member countries and harmonization of national practices and decisions. As compared to the International Atomic Energy Agency (IAEA) and Euratom (CEC), born at the same time, NEA is less political in nature, much smaller in size (of the Secretariat - in total, 40 staff at professional level) and budget (limited to the expenditure for the Secretariat function, without any research or assistance funds), but operates on a more flexible and selective basis. Given its membership, it provides to the advanced industrialized countries (about 80 per cent of the nuclear power capacity in the world) with free market economies:

- a forum for exchanging information and views on all aspects of nuclear energy: scientific, technical, safety, economic and legal;
- a framework for consulting on regulatory practices and policies, harmonizing scientific and technological development strategies, adopting safety/radiation protection standards, concluding conventions, etc.;
- an instrument for conducting joint studies, forecasts and evaluations, or coordinated research bringing together the best experts available internationally on a large number of specific subjects of mutual interest;
- a stepping-stone for launching autonomously financed and operated joint projects among a more or less restricted group of interested Member countries.

Currently, the main lines of the NEA's program structure could be described as follows:

- the largest sub-program (nearly half of the resources) is devoted to "Safety and Regulation" covering radiation protection, safety of nuclear installations

(mainly reactors), licensing regulations and radioactive waste management with a number of related joint projects.

- the sub-program "Nuclear Development" embodies work on uranium in co-operation with IAEA, forecasting work, economic and technical studies, and involves most of the links and joint actions with the International Energy Agency (IEA) and the Environment Committee of the OECD;
- the sub-program related to all "Scientific Work" either in nuclear physics or in processing of neutron data, computer programs and chemical data in relation to the environmental question;
- the sub-program on "Public Information and Communication" combined with External Relations and the Central Secretariat of the Agency;

In addition to the exchanges and studies conducted in each sub-group, a number of diversified actions are organized, on an ad hoc basis, such as seminars, specialist meetings, coordinated research programs, evaluation and comparison of computer codes, information exchange systems, promotion of joint projects, etc. Participation in such exercises, although open to all OECD Member countries, may be of interest to a limited group of countries only. Joint projects are usually managed by a national "operating agent" under the supervision of a Board made up of representatives from participating Members.

It is important to emphasize that NEA is an intergovernmental body but that the interests (and expertise) of utilities and industry are often represented in operational activities and joint projects of the Agency through participation of experts from the private or semi-public sector designated by their government for that purpose.

MAIN ORIENTATIONS OF THE NEA'S PROGRAM

In view of the limited resources available to NEA, the program in each of these broad areas is made up of a selection of a few subjects relevant to key issues in the field of nuclear energy and of a large number of items of a more topical nature.

Particular attention is therefore paid to the definition of priorities and agreement among OECD Member countries on the main orientations of the activities.

In 1990, the NEA reviewed the long-term orientations of its work (for the next 5 to 10 years) and the conclusions reached may be summarized as follows:

- international co-operation through NEA should aim at better coordinating strategies for nuclear energy availability in the future and for nuclear safety assurance; an optimum balance should be maintained between development and regulatory/protection objectives;
- the NEA should reinforce its contribution to the broader programs of the OECD dealing with energy and environment policies (reduction of atmospheric pollution, technologies for preserving the environment, socio-economic impacts of technology);
- high priority should continue to be attached to safety and radiation protection objectives;
- technological advances of interest to safety, reliability and competitiveness of nuclear industry should be kept under review to identify potential routes for coordinated or joint actions;
- as public confidence is a prerequisite for sustainable development in the nuclear energy field, more prominence should be given to the dissemination of information on the results achieved through international co-operation;
- links should be established with non Member countries, in particular on safety issues of mutual interest without duplicating activities best undertaken by the IAEA or CEC.

The main characteristic of the program of work of the NEA is to combine a large volume of technical/scientific studies of high quality and project-oriented activities - part of which are conducted in a decentralized way and directly financed by participants on an ad hoc basis - of a policy nature of interest to decision-makers and which may result in international recommendations or conventions.

RADIOACTIVE WASTE MANAGEMENT PROGRAM

As indicated in the previous section, the radioactive waste management program receives a high priority in the program of work of the NEA. This level of priority is justified by significant developments during the last decade in national plans for the implementation of disposal for most types of radioactive waste. Several countries already have low-level waste repositories in operation and a large degree of consensus exists on the suitability of the geological disposal concept for high-level and long-lived waste. In order to proceed further with implementation of disposal plans, site investigations and long term safety or performance assessment activities are essential. In this context, the disciplines of in situ research, geological site characterization and performance assessment have grown considerably, notably through international co-operative efforts.

The NEA's program in these areas is conducted under the guidance of the NEA Radioactive Waste Management Committee (RWMC), a standing committee composed of senior experts and governmental representatives responsible

for implementation. The RWMC provides a unique international forum in the field of radioactive waste management for this grouping of individuals, holding key positions within their own countries, to discuss and - where appropriate and possible - establish consensus on radioactive waste management policy, regulatory, and scientific and technical issues of broad interest to OECD Member countries. To assist in this work the Committee has two advisory groups, one on performance assessment and the other on site evaluation and design of experiments.

A principal objective of the RWMC currently is to assist OECD Member countries with the development of comprehensive and integrated methodologies to assess the long term (post closure) safety of radioactive waste disposal systems and to increase confidence in the application and results of these assessment methodologies. The emphasis of NEA work is in the area of high level waste and spent fuel management, but safety assessment methodologies can be applied to all radioactive waste types and even to chemically hazardous waste.

As mentioned, the RWMC is assisted and advised in the area of performance assessment by the Performance Assessment Advisory Group (PAAG). In addition to its advisory role to the RWMC in coordinating the NEA's program in this area, PAAG provides an international framework for discussion of relevant technical issues - notably those associated with developing and establishing confidence in the reliability of assessment methodologies - and, thereby, avoiding unnecessary duplication of effort between different national programs. PAAG activities have focussed on issues associated with scenario development, model development, data acquisition and regulatory requirements.

In the area of radioactive waste disposal, the NEA sponsors a multifaceted program currently consisting of the following main types of activity:

- As mentioned above, the discussion and exchange of information concerning national policies, programs, and regulations on the management and disposal of radioactive wastes, and the promotion of integrated approaches, particularly with regard to the performance assessment of waste disposal systems.
- The establishment of geochemical data bases, i.e., the Sorption Data Base (SDB) and the Thermochemical Data Base (TDB).

The SDB is a data base of experimentally obtained values of sorption of different radionuclides under various geochemical conditions. It has been sent to laboratories and scientific institutes not only in OECD countries, but also in some non-OECD countries.

The TDB covers the development of consistent data sets of fundamental chemical thermodynamic data for key elements studied in radioactive waste safety assessments. Currently the data sets concern five elements: uranium, americium, neptunium, plutonium and technetium. The evaluated TDB data will become available to OECD Member countries, starting from uranium through to the other elements, one by one, from 1992 onwards.

- The promotion of model and code developments, and benchmarking, verification and validation exer-

cises, bring together at an international level the best national experts on safety assessment modelling, groundwater and radionuclide migration modelling. The meetings are characterized by a free and open debate aiming at improving and quality assurance of the concepts and tools used in safety assessments of radioactive waste disposal systems.

- The sponsoring of international experimental projects, i.e. the Stripa Project and the Alligator Rivers Natural Analogue Project. The Stripa Project is a well-known joint undertaking by seven OECD Member countries based on experimental studies in situ at an abandoned iron ore mine in central Sweden. The Project is sponsored by OECD, providing the legal and overall administrative framework, and it is managed by the Swedish Nuclear Fuel and Waste Management Company, SKB. The Project started in 1980 and the final phase was completed in 1991. The Stripa project has provided a demonstration to decision-makers and the public that concrete technical progress is being made through international co-operation to help solve the problem of nuclear waste disposal. The final results of the Stripa Project studies will be presented at an international symposium sponsored by SKB and NEA, in Stockholm in October 1992.

The Alligator Rivers Natural Analogue Project, in Australia, with the participation of five countries under NEA auspices, includes field studies and modelling of geochemical and hydrological conditions at a uranium ore deposit site. The objective is to contribute to the development of reliable and realistic models of radionuclide migration within geological environments and to increase confidence in long-term safety studies.

- The organization of symposia, workshops, working groups and courses on selected topical subjects, (e.g. symposia on safety assessments and on the Stripa Project, a working group on the identification and selection of scenarios, workshops on human intrusion, on excavation effects, on sealing of repositories, on gas generation and release, on sorption phenomena, etc.).
- The publication of a nuclear waste bulletin, state-of-the-art reports, and workshop and symposia proceedings.

SOME RECENT ACTIVITIES AND POSSIBLE FUTURE ACTIVITIES IN RELATION TO WASTE MANAGEMENT

While the scientific and technical issues in radioactive waste management have been handled very rigorously and have led to a wide consensus in OECD Member countries on safety approaches and implementation strategies, it remains, nevertheless, that public acceptance issues and their political fall-out have continued to heavily influence national decision-making processes and site selection. Social, non-scientific, factors, mainly difficulties in public opinion at the national and local levels, have often resulted in a deadlock when it comes to selecting and proposing technically adequate waste sites. The NEA is, therefore, giving special attention to dissemina-

tion of information on the technical and scientific results achieved through our activities.

The NEA Radioactive Waste Management Committee and the IAEA International Radioactive Waste Management Advisory Committee have carefully examined the current scientific methods for safety assessments of radioactive waste disposal systems. The Committees have also reviewed the experience now available from using safety assessment methods in many countries, for different disposal concepts and formations, and in the framework of both nationally and internationally conducted studies, and have published, in 1991, an informative document entitled "Disposal of Radioactive Waste: Can Long-Term Safety be Evaluated?". In short, they confirm that safety assessment methods are available today to evaluate adequately the potential long term radiological impacts of a radioactive waste disposal system, on humans and the environment. Furthermore, they consider that appropriate use of safety assessment methods, coupled with sufficient information from proposed disposal sites, can provide the technical basis to decide whether specific information from proposed disposal sites, can provide the technical basis to decide whether specific disposal systems would offer to society a satisfactory level of safety for both current and future generations. This opinion is also endorsed by the CEC Experts for the Community Plan of Action in the Field of Radioactive Waste Management.

This is one example of how NEA, based on its work in technically and scientifically oriented groups, can provide well-founded input for the basis for policy decisions on nuclear waste disposal.

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In some OECD Member countries there have been attempts to apply these assessment systems to mixed wastes (a mixture of radioactive and chemical wastes) and also to collect the necessary scientific background data for assessment analyses.

Another special interest shown by some OECD Member countries is the subject of separation and transmutation of actinides and fission products. In 1988, one of its Member countries proposed that NEA should start some form of international project related to actinide separation and its use. Although this topic was never taken up by the Radioactive Waste Management Committee as a possible way of disposing of highly radioactive wastes, there was, nevertheless, sufficient interest shown for the Nuclear Development Committee and the NEA Data Bank (now supported by the newly-formed Nuclear Science Committee) to consider a possible scientific and technological development program. An Information Exchange Program on Actinide Separation and Transmutation was formally instituted as an NEA activity, to run for five years from 1990. The mandate of this Program sets out its objective as being to "enhance the value of basic research in the subject areas by participating organizations by facilitating the exchange of information on and discussion of programs, experimental procedures and results". The scope of the program includes information on all current and past research

related to a number of specified areas to which participating organizations have free access. The subjects of the information exchange include physical and chemical properties of elements generated in the nuclear fuel cycle; nuclide partitioning technology; and nuclear transmutation.

The exchange was made subject to Member governments' international obligations on non-proliferation. This last proviso was introduced in view of the close relationship, particularly of work on partitioning technology, with some of the items in the trigger list of the Nuclear Suppliers' Group. The program has been limited to NEA Member countries together with the Commission of the European Communities, although, under the terms of the NEA's co-operation agreement with the IAEA, there has been a member of the IAEA Secretariat present at the meetings.

The first major activity under the Program was an Information Exchange Meeting held in Mito City, Japan, in November 1990. The aim was to provide an opportunity for an exchange of information and ideas between all the laboratories and organizations in OECD Member countries where relevant work was going on or being considered. There were eleven countries represented at the meeting, which had more than 70 participants, and 35 papers were presented.

One conclusion of the meeting was that there should be a number of specialist meetings. So far, there have been two such meetings and a further meeting is planned. The first such meeting was arranged by the European Commission's Karlsruhe Laboratory in June 1991 on the subject of fuels and targets. The second meeting was on partitioning technology,

held in Mito City in November 1991. The next meeting is scheduled to take place at the Paul Scherrer Institute in Switzerland, from 24 to 26 March 1992, on the topic of accelerator-based transmutation.

CONCLUSIONS

The level of resources available for NEA's activities has ensured that there is no duplication of work with other organizations and has, rather, encouraged us to establish close co-operation with the IAEA (a formal agreement was concluded in 1960), with the CEC (under a statutory provision) and others. It is the policy of the OECD to continually enhance co-operation with other international organizations in all areas, including that of radioactive waste management.

Although there have been numerous opportunities for contacts with non OECD Member countries, through co-operation and joint meetings and activities with IAEA, there has recently been an increased dialogue between the OECD and Central and Eastern European Economies in Transition, the ex-Soviet Republics and Dynamic Asian Economies, and it is shortly to be expected, with Latin America. NEA, as part of OECD, will have to follow the general directives of the OECD. In this connection, NEA has begun a dialogue with these regions in the nuclear energy field, including the radioactive waste management area.

The NEA will keep contributing to the progress of radioactive waste management by continuing close co-operation between its Member countries and with other international organizations.