J. STRAHL INFO
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EN/S/2545

18th December, 1987

cc: J. COLEMAN-NE-2 INFO
J. DIECKHONER/ACTION
R. BROWNING/NRC INFO
R. COLEMAN ACTION

Jim Please Comment ASAP.

To all Members of the RWMC Consultant Group on the Status of National Programmes on Geological Disposal

Dear Carl,

I am referring to our discussions at the meeting of the Consultant Group last October concerning the possibility of issuing an International Statement on the question of site selection and characterisation for radioactive waste repositories. These discussions are recorded under items 19, 20 and 21 of the Summary Record of the meeting [RWM/DOC(87)9].

The Secretariat has prepared the attached Draft Statement which is attached for your consideration. For the time being, this "Draft Collective Opinion of the Secretariat" is obviously very preliminary and we are anxious to know whether we have adopted the right approach. In order to help you in preparing your comments, I would like to point out again that, from the Secretariat perspective, it would be difficult to issue such a statement without being in a position to quote the technical basis behind it. This is why I suggested at the meeting that it would perhaps be appropriate to make it in the form of an elaborated press release on the occasion of the publication of the NEA Report on "In-Situ Research and Investigations" rather than as a political statement as such. We have given some more thought within the Secretariat to its publication and the following ideas have been suggested:

- Issue it in the form of a press release at the time of the publication of the Report on "In-Situ Research and Investigations", which could coincide with the date of the next RWMC meeting;

- Proceed as above, but in addition include the Statement in the In-Situ Report as a preface;

./...

Mr. C. COOLEY
Office of Civilian Radioactive
Waste Management
US Department of Energy
Forrestal Building, RW-40
Washington D.C. 20585

United States

c.c.: US Delegation to the OECD

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- Proceed as above, with or without the Statement as a preface in the report, but with its publication in the NEA Newsletter and in the NEA Nuclear Waste Bulletin, which would ensure its wide distribution.

We would be very glad if we could get your reactions on both the text of the Draft Statement and the methods for its distribution. I must add that we may be constrained by what we actually include in the Statement in the sense that, if it ultimately looks like a clear policy statement, the procedure for its clearance within NEA may get somewhat more complicated.

As the RWMC Bureau will discuss this matter in Paris on 29th January 1988, I would appreciate very much if I could hear from you as soon as possible, and preferably not later than 25th January 1988.

May I take this opportunity to remind you that your respective contributions on national programmes should be distributed to each member of the Group by 15th January 1988. Based on your reactions to these contributions and on the comments on the Draft Statement, we will decide following the RWMC Bureau meeting whether there is a need for another meeting of the Consultant Group, possibly just before or after the TRCUD meeting in Vienna, which is planned from 15th to 19th February 1988.

Best seasons greetings,

& Personal regards

Yours sincerely,

J.-P. Olivier
Head, Radiation Protection and
Waste Management Division

POSSIBLE RWMC STATEMENT

(1st Draft - 17th December 1987)

APPRAISAL OF THE GEOLOGICAL DISPOSAL CONCEPT

Three years ago, the Radioactive Waste Management Committee (RWMC) of the OECD Nuclear Energy Agency (NEA) published a report providing an appraisal of the technical status of radioactive waste management [1]. That report presented the collective view of the RWMC on the main scientific and technical issues in the field of radioactive waste management, particularly from the point of view of waste disposal and the associated long-term safety aspects. The fundamental conclusion of the RWMC was that detailed short- and long-term safety assessments were feasible which would give confidence that safety criteria and requirements could be achieved with available technology, and at a reasonable cost. The RWMC also recognised that R&D would have to continue to collect site-specific data and to refine safety studies, and that periodic re-assessments of waste management practices and policies would need to be made to account for evolving knowledge.

More recently, a report has been prepared by the NEA on the status of in-situ research and investigations for geological disposal in OECD Member countries [2]. The report notes that considerable national and international progress has been made since publication of the "Collective Opinion" [1] in furthering the development of the geological disposal concept for radioactive waste. Significant programmes and activities have been initiated and enhanced in the inter-related areas of in-situ research, data analysis and modelling, repository engineering design and performance assessment. In particular, in-situ research and investigations have become an integral and essential part of national programmes for site selection and repository development.

Geological Disposal-Concept and Rationale

The objective of geological disposal is to isolate long lived radioactive waste from the human environment for a period of time such that any subsequent release of radionuclides from the repository will not result in significant radiation risks. This can be achieved by designing multi-component systems, where the repository, together with the geological formation, provide multiple barriers to radionuclide release and transport. The emplacement of packaged waste at depths in sufficiently stable and impermeable rock can ensure that the waste will remain undisturbed and isolated until radioactive decay has reduced its radioactivity to negligible levels.

Geological disposal is designed as a totally passive disposal system with no requirements for continued human involvement for its safety. It is not necessary to maintain post-closure surveillance or monitoring systems because of the inherent safety of geological isolation based on long-term stability of the host rock and remoteness from man which significantly decreases the likelihood of inadvertent human intrusion. In practice, underground water circulation is the main natural phenomenon which can bring radioactive materials back to the biosphere, and the careful choice of a geological site associated with suitable repository design features can make

the probability of this process very low indeed. Predictive modelling of possible radionuclide transport through groundwater movements and its radiological consequences forms the basis for evaluation of the long-term safety.

Geological disposal is also a flexible concept, which could be implemented with currently available technology, due to the variety of suitable geological media, such as salt, crystalline rocks, clays, shales, basalt and tuff, and the extensive experience available in underground mining and civil engineering.

Current Status and Role of In-Situ Research

Initially, research has been concentrated on generic issues involved in the long-term safety and feasibility of geological disposal including development of investigation techniques. More and more emphasis is now placed on concept implementation, i.e., demonstration that a facility can be constructed at a suitable site, and operated and closed safely at acceptable cost. This emphasis includes the development of procedures for conducting site investigations, detailed design and feasibility studies and performing safety assessments. An integral part of each of these involves the need to conduct in-situ research, at either reference or actual repository sites, so that appropriate site investigation techniques are made available, detailed designs can be demonstrated to meet design standards and sufficient information is available for performance assessment models to predict post-operational safety with confidence. In this respect, a distinction can be made between underground research laboratories of the first generation, such as Stripa, Grimsel and the Canadian URL, and those of the second generation such as the one planned in France, whose main purpose is the characterisation in-situ of a potential repository site and its final selection.

As noted in the NEA "Status Report on In-Situ Research and Investigations" [2], demonstration of concept feasibility is becoming increasingly dependent upon in-situ investigations conducted on a host-rock or a site-specific basis. In-situ experiments and investigations can help increase confidence in geological disposal in four main ways.

The first involves provision of field data to facilitate the validation of performance assessment models, i.e., comparing site-specific observations with numerical model predictions to test the ability to predict specific phenomena as part of a safety assessment. With the recognition that possible variations in conceptual assumptions and parameter values can yield major differences in results of performance assessments, it has been found desirable to reduce these process and parameter uncertainties and obtain more accurate data. This can be achieved by specifically designed model validation exercises conducted through laboratory experiments, large-scale in-situ experiments and the study of natural analogues. In-situ experiments are particularly valuable in addressing complex effects related to thermal-mechanical-chemical-hydraulic phenomena, as well as waste form and packaging properties, and behaviour of backfilling and sealing materials. Excavation effects on geological media can also be evaluated.

A second aim of in-situ research involves the demonstration of repository design, construction, operation and closure. Such activities are designed to demonstrate that specific technologies exist to implement a given

disposal concept at a specific disposal site or in a particular host rock, and also to optimise the components of a disposal system.

A third benefit of in-situ research involves the development of methods and instrumentation for specific site investigation and characterisation techniques. Detailed characterisation of proposed repository sites are necessary to develop site-specific designs and performance assessment models incorporating the appropriate data. The geological, hydrological, geochemical and geomechanical features relevant to design and safety analyses require the development of specific, in some cases non-destructive and remote site investigation techniques. Two techniques recently developed are radar and cross-hole sismic investigations.

Finally, in-situ research and investigations are essential for providing data for use in performance assessments. Extensive field studies are being conducted to provide data on a variety of environmental parameters, such as groundwater flow patterns and geochemical conditions. Information on interactions between repository environments and waste packages is also being obtained from in-situ studies, as a complement to the traditional laboratory studies.

In-situ research facilities are therefore viewed as essential in order to accumulate data and knowledge on host rock formations being considered for disposal facilities, and to characterise and qualify potential repository sites. Investigations and tests in underground laboratories constructed in different geological formations have, and will continue, to yield valuable information for evaluating detailed disposal concepts. The RWMC views the increasing emphasis being placed on in-situ research and investigations as being appropriate and necessary to enhance the level of confidence placed on the deep geological disposal concept.

Site Selection and Characterisation

The RWMC notes that, with the increasing emphasis being placed on concept demonstration and site-specific activities, an important issue emerging involves the decision criteria for repository site selection and characterisation. This issue involves not only decisions on concepts, rock formations and specific sites, but also decisions on the limits on information needs. As well, decisions are not solely influenced by technical and scientific findings, but also involve consideration of political and social factors.

With respect to information needs, it is essential that suitable techniques and criteria be developed to enable authorities to make decisions on how much, and at what level of detail, data and information need to be collected, and on which parameters and processes need to be given priority in research. Clearly, a balance needs to be achieved between the safety, regulatory and licensing requirements, and the resources available for research and assessments.

The diversity in host rock characteristics and the complementarity of engineered system components imply that a variety of disposal concepts can be envisaged. Each potential host rock offers advantages and limitations which, however, should not be discussed in isolation, but rather should be assessed

in terms of the total disposal system, including engineering design possibilities. The basic issues involved in site selection and characterisation generally will be similar amongst concepts, host rocks and candidate sites. For example, formations for geological disposal of waste will need to provide a high isolation capability, adequate stability and suitable hydrogeological conditions. Site-specific factors subsequently become important for defining in-situ and laboratory research needs and for confirming the suitability of the site.

The RWMC notes that suitable sites for radioactive waste repositories are available in several types of host rock. The selection of an actual host rock and a repository site implies reliance on both technical and non-technical factors. Among these, the safety issues may appear to be the overriding criterion, one which in theory would determine the selection of the "safest" site. However, it may not be necessary or possible to distinguish between sites or formations solely on the basis of such safety considerations. This would be the case when a number of sites fully satisfy the safety requirements but their safety features are so similar that they cannot really be ranked according to safety. Other factors would pôssibly play a larger role in arriving at a decision on a site or formation considered to be the most suitable.

Concluding Remarks

Based on its review of the current R&D programmes and the results of the feasibility studies already available, the RWMC reaffirms its confidence in the geological disposal option for long-lived radioactive waste. This option appears both feasible and safe in the long-term and the Committee recommends strongly that in-situ research activities be actively pursued as further contribution to the demonstration and implementation of the concept. The Committee also notes that the diversity of potentially suitable geological environments and the need to adapt and optimise repository designs to specific site conditions may result in apparent differences in the solutions finally adopted in various countries without, however, appreciable differences from the safety and environmental point of view.

[1] OECD/NEA, Technical Appraisal of the Current Situation in the Field of Radioactive Waste Management - A Collective Opinion by the Radioactive Waste Management Committee, OECD/NEA, Paris (1985).

[2] OECD/NEA, Geological disposal of radioactive waste: In-situ research and investigations in OECD countries. OECD/NEA, Paris (In press).

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DOCTXT \EN/S/2545 18th December, 1987 \ \ To all members of the RWMC Consultant Group on the \ Status of National Programmes on Geological Disposal \Dear Carl, \ I am referring to our discussions at the meeting of the Consultant \Group last October concerning the possibility of issuing an International \Statement on the question of site selection and characterisation for \radioactive waste repositories. These discussions are recorded under items \19, 20 and 21 of the Summary Record of the meeting (RWMC/DOC(87)9i. \ The Secretariat has prepared the attached Draft Statement which is \attached for your consideration. For the time being, this "Draft Collective \Opinion of the Secretariat" is obviously very preliminary and we are \anxious to know whether we have adopted the right approach. In order to \help you in perparing your comments, I would like to point out again that, \from the Secretariat perspective, it would be difficult to issue such a \statement without being in a position to quote the technical basis behind \it. This is why is suggested at the meeting that it would perhaps be \appropriate to make it in the form of an elaborated press release on the \occasion of the publication of the NEA report on "In-Situ Research and \Investigation" rather that as a political statement as such. We have given \some more though within the secretariat to its publication and the \following ideas have been suggested: \ - issue it in the form of a press release at the time of the \ publication of the report on "In-Situ Research and Investigations", \ which could coincide with the date of the next RWMC meeting; \ - Proceed as above, but in addition include the Statement in the \ In-Situ Report as a preface; \ - Proceed as above, with or without the Statement as a preface in the \ report, but with its publication in the NEA Newsletter and in the \ NEA Nuclear Waste bulletin, which would ensure its wide \ distribution. \ We would be very glad if we could get your reactions on both the text \of the Draft Statement and the methods for its distribution. I must add \ that we may be constrained by what we actually include in the Statement \the sense that, if It ultimately looks like a clear policy statement, the \procedure for its clearance within NEA may get somewhat more complicated. \ \ As the RWMC bureau will discuss this matter in Paris on 29th January, \1988, I would appreciate very much if I could hear from you as soon as \possible, and preferably not later than 25th January 1988. \ \ May I take this opportunity to remind you that your respective \contributions on national programmes should be distributed to each member \of the Group by 15th January 1988. Based on your reactions to these \contributions and on the comments on the Draft Statement, we will decide \following the RWMC Bureau meeting whether there is a need for another \meeting of the Consultant Group, possibly just before or after the TRCUD \meeting in Vienna, which is planned from 15th to 19th February 1988. \ \ Best seasons greetings, \ Yours sincerely, \

/s/ \

J. P. Olivier \
Head, Radiation Protection and \
Waste Management Division

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