# NUMO International Technical Advisory Committee (ITAC)
# Short Record of the ITAC-9 Meeting
# Tokyo, 17-19 January 2006

## General Remarks

The meeting agenda was well structured and was noticeably wider in scope than previous meetings. A special focus of the meeting was an examination of "Communication and confidence-building" (Block 3), a topic which is clearly critical for NUMO's motivation of volunteers.

## Block 1: Highlights of NUMO activities since ITAC 8

### Public Relations and site planning activities in NUMO (M. Kuba)

The presentation provided a general update of progress, with a focus on comparison of activities in 2004 and 2005. Continued efforts to establish NUMO in the public vision include programmes of information via the media and direct contact. An animated 15 second TV spot was presented, which has been broadcast by many TV stations.

ITAC appreciated being updated on this important area and were again impressed with the wide range of PR work. In response to a question about how results of such effort could be assessed, Kuba-san mentioned that an annual opinion poll is carried out. There have also been direct tests of adverts by street-level surveys. More results will be reported at next ITAC.

The extended interval between first expression of interest by potential volunteer communities and first discussions with NUMO seems to be a problem - could it be of value to encourage the community to delay decision for a set time in order to allow time for more information to be presented and any questions answered by NUMO? It seems that the actual problem is the present top-down decision-making process; NUMO is hence trying to make a more focused effort to involve the general public as early as possible in the volunteering process.

### Current situation in the Science and Technology Department (K. Kitayama)

The NUMO Structured Approach (NSA) to programme development was presented in some detail. The tailoring of repository concepts to sites during the literature study phase was used to illustrate the general concept, which could also be applied to later stages. Such an approach combines clear structuring with the flexibility to respond to changes that may occur (expecting the unexpected!).

The decision-making process was also discussed, which is particularly important given NUMO's commitment to openness and transparency. This is facilitated by a requirements management system (RMS) - which is planned to be implemented together with a Knowledge Management System (KMS), under an over-arching Quality Management System (QMS). This will be complemented by a system for collecting,

management and archiving of documents. The RMS will be applied to both strategic and technical decision-making. This is facilitated by a clear hierarchical structure.

ITAC recognises the importance of an RMS for a complicated project to ensure consistency, but how requirements are refined with time is important. Change management is an important component of the RMS, providing a clear record of past decisions and the basis for such decisions. The feedback when lower-level requirements produce problems is important, allowing refinement or alteration of the upper level requirement. In an RMS hierarchy, it should be noted that repository subsystems may not be independent. Clear documentation of dependency is thus important, along with levels of confidence in requirements, to ensure the flexibility to adapt the overall programme as needed.

ITAC considered the NSA with the conceptual framework of RMS-KMS-QMS-DMS (Document Management System) is good in principle. The extent to which systematic approaches of this type have been applied in other national programmes is extremely variable and ITAC would like to be kept abreast of the details of the status of its development. Implementation of these systems is encouraged as early as possible for NUMO to derive maximum benefit in coordinating and documenting their programme. However, international experience has shown that formal systems are tricky to implement and, during early stages, should be checked to be sure that they function as intended without an unacceptable drain on resources or problematic impacts on schedules.

In terms of the overall programme, there seems to be a need of closer integration of individual waste disposal projects in Japan. This could be assisted by an annual R&D symposium organised by NUMO. Such integration could be associated with advance planning, to ensure that required budgets and other resources are available.

**Progress towards developing NUMO working standards (M. Takeuchi, J. Andersson and T. Kato)**

This work was initiated because of the current lack of regulations for HLW disposal. It complements the siting factors already developed by the siting group for the next key milestone of selecting Preliminary Investigation Areas (PIAs) following the Literature Survey.

ITAC thought the workshop described was a good idea, the participants well chosen and ITAC members were very interested in the materials produced. Full publication may be premature, but key issues might usefully be summarised in a discussion paper and/or in presentation material placed on the NUMO web site.

It should be noted that the laws and standards considered should include not only "nuclear" legislation, but also relevant environmental and safety material, which may already contain specified standards. National laws are also complemented by relevant international conventions, some of which are already reasonable well established. These should be considered at as early a stage as possible.

In principle, much of the content of the "higher level" standards should already be formulated within the QMS and RMS; care should be taken to avoid confusion or inconsistency. These should also be consistent with published repository design philosophy and design factors. It was emphasised by NUMO that these Working Standards are a temporary measure until the time that formal safety standards are promulgated in Japan, but will be included in the RMS.

**Block 2: Related meetings and R&D**

**Technical Management of Preliminary Investigation (PI) (A. Deguchi)**

The focus of work on planning PI programmes is associated with the key decision of Detailed Investigation Area (DIA) selection. The site data must provide a basis for assessment of geological stability and also input for Repository Concept (RC) development and associated Performance Assessment (PA). A distinction is made between PI planning and PI management; separate manuals for each of these areas have been commissioned from the International Training Centre (ITC). To demonstrate applicability, these manuals will be applied to model sites derived from literature data.

ITAC noted that this was a reasonable first stage of preparation for PI fieldwork, as was the separation of topics for these manuals. ITAC members have particularly wide experience in this area and could, if required, review such manuals.

A question that arose was how the input of RC / PA groups could be brought in - especially in the case where the fieldwork results in surprises. At present, emphasis is on completing the study within tight time limits. Some perturbations can be handled - if they are fundamentally geotechnical. Surprise findings are trickier, and can be considered later - but they should not be forgotten. These points should, in any case, be emphasised in the manuals - either directly or in later revisions to these manuals.

ITAC considered that costing and budget management are important components of the planning of fieldwork and should be included as soon as practicable. As subsequent clarification, it was noted that the NUMO viewpoint is that ensuring that the required information can be obtained efficiently, within the tight project deadlines, is the main focus at present. The importance of budget management is recognised but, under the present boundary conditions, is considered a secondary issue.

**Demonstration and Validation of PI technology (A. Hatori)**

This project aims to demonstrate key technology under relevant conditions, train staff and also increase public confidence in NUMO's technical competence. It will focus on particular single borehole tests, but the associated drilling and characterisation programme will bring a wider range of experience, as this will be analogous to the type of testing programme which will be carried out during PI.

The necessity of having explicit acceptance of the local municipality for a purely

scientific project of this nature was noted by ITAC as being unusual, but this reflected the sensitivity of all NUMO field work. The work would go ahead unless there was direct opposition; in which case it might be carried out elsewhere.

**Hydrogeology of tectonically active areas (J. Goto)**

Information was provided on a new collaborative project with Sandia. With a focus on application to repository implementation, NUMO is planning to integrate the range of relevant hydrogeological experience available in different Japanese organisations.

ITAC comments:

- Potential overlaps with the PI manuals project and International Tectonics Meeting (ITM) are worth examining and clarifying.
- The role of Lawrence Berkeley National Laboratory (LBNL) caused some confusion, but was clarified subsequent to the meeting. LBNL is carrying out a literature study of advanced national site characterisation work to identify key parameters for PA, successes and failures in determining such parameters and establish the capabilities of new and emerging characterisation technology. This is complementary to the Sandia work, which formed the bulk of the presentation.
- The objectives of the hydrogeology work need to be seen in a wide context; i.e. not only direct impact on repository system but also as a part of site understanding. At present, focus is on selection of DIAs, but the R&D may be have a wider application
- The constraints on lower limit of groundwater velocities of interest may be worth developing, setting constraints on where the parameters have direct project relevance.
- Some international projects may be of relevance.

**International Near-Field (NF) processes workshop (K. Wakasugi)**

A summary of key output from the workshop, in which international experts reviewed the output of domestic working groups, was presented. The NF studies were aimed to identify key issues which might be relevant to the evaluation of the interaction between barriers in alternative repository concepts / sites - but based entirely on "H12" designs.

ITAC considered an international review of domestic projects to be valuable; it serves also to establish contacts between domestic and international experts. The evaluation of individual, material-specific processes in isolation before iterative evaluation by a PA team is an understandable starting step, given the body of detailed studies done to date by Japanese specialists. It may, however, be less efficient than starting the process by sensitivity analysis of the vast amount of data available to identify a comprehensive list of processes and prioritise them. The proposed move from a limited number of processes studies to a PA evaluation is probably premature before critical missing processes are identified. The PA evaluation workshop could, however, be valuable if it focused on total system understanding and, in particular, avoided constraints set by the availability of codes and models at the time of H12. In any case, care must be taken not to over-emphasise post-closure performance without parallel consideration of operational practicality requirements.

With regard to this last point, it was noted by ITAC that all emphasis at the Engineering Barrier System workshop was on post-closure performance This, unfortunately avoided considering many other issues that are currently identified as critical concerns and that may even constrain the repository system that needs to be examined for long-term safety. Physical processes that were identified in the H12 study also appeared to get less emphasis.

In terms of the specific processes examined, a number of detailed conclusions were reached, but many of these were questioned by ITAC in view of the points above. In particular, recommendations for further R&D studies should be treated with caution until properly placed in the context of pre-closure and post-closure concerns.

**Next generation PA codes and databases (K. Ishiguro)**

H12 PA codes continue to be used at present and are envisaged to be used at the literature study phase. In the future, improved codes are needed to distinguish between alternative repository designs and the different characteristics of specific volunteer sites. A range of potential developments for the near field, far-field and biosphere have been listed and prioritised, based on expected PA requirements at the end of the Literature Survey, PI and DI stages.

ITAC comments included:

- Better justification of goals may be useful, as these may include ability to handle real site properties, distinguish between designs, remove conservatism and maintain position as state-of-the art.
- With well-defined goals, discussion of prioritisation would be valuable and might be worth discussing in detail at a future ITAC.
- NUMO staff should be involved in conceptualisation and code design, even if development work is outsourced.
- Concurrence with NUMO's view that critical areas of international interest at present include incorporation of time dependency and a probabilistic capability.

**Operational systems (Y. Sakabe)**

The assessment of repository operational systems is considered to be a critical input for both RC development and post-closure PA. The H12 design is an obvious starting point, but a major effort to move forward to more realistic designs is considered to be needed. The critical goal is to retain the flexibility needed for the volunteering approach, while also considering practicality and economics. ITAC acknowledged that these 2 areas - operational optimisation and safety - are important topics, but the output from early, very simple studies should be treated with great caution, especially as sites are unspecified and boundary conditions are undefined. In any case, international developments in this area should also be followed.

Consideration of retrievability has been related to the geometry of emplacement. In any case, it is not considered a key issue at present and hence the focus is on emplacement.

The structured approach would allow this to change if there was an alteration of the socio-political context in Japan that required reversibility to be discussed. Mention was made of an international workshop on horizontal emplacement of Prefabricated EBS Modules (PEMs) to be held in Europe.

**Block 3: Public communication; dialogue and confidence building (CB)**

This was an important issue, which seemed a suitable focus for soliciting ITAC input in a special topical session. ITAC hoped that the material presented was of use to NUMO and thought that the presentations of Members and of NUMO may be worth working over to produce a summary of the individual topics raised. Advance notice of specific sub-topics would have been useful and might have led to better focusing of the presentations.

**a) The international presentations, with some key points identified briefly summarised, are listed below.**

**Canada (K. Nuttall):**

- During their study of HLW disposal, Atomic Energy of Canada Ltd. (AECL) carried out public information and consultation programs as required by legislation and the review process for their required assessment of safety and environmental impact. Despite this, their disposal concept, although technically acceptable, was found to be lacking in public support.
- Over the last three decades, there are various examples of successful and unsuccessful public communication in nuclear projects. These indicate that building public acceptance is promoted by several key factors including establishing two-way communication ("listening and learning"), establishing international consensus, and using an adaptive, phased implementation approach which allows for public involvement in project planning and decision making.

**Finland (J. Vira):**

- A key advance was recognising that nuclear waste disposal is not a purely technical issue, which led to initiation of social science studies to identify key concerns. A general recommendation from such work - ensure public dialogue and stakeholder participation in policy formulation and decision-making.
- A dichotomy was noted; the public is aware of a lack of information in this field - but have little interest in acquiring it. The key step was thus seen to be motivating public interest. The “RISCOM” study identified some guidelines to "fair communication", as confidence in communication is essential to such public motivation
- An observation is that nuclear communities were more open to discussion, but even here advantages to host communities had to be emphasised.

**France (B. Faucher):**

- Some principles are clear from French experience; public acceptance is critical for any major project, communication must involve dialogue, CB is slow but loss of confidence is fast and crisis communication is critical.
- Key decisions will be made in France in 2006; a wide range of stakeholders will be

involved and a public debate organised - which is chaired by an independent panel so that the final decision of the French parliament will be based on input from all involved parties with special emphasis on local communities.

**Germany (K. Kuhn):**

- Focused on negative experience, related to the political situation associated with the government responsibility for waste disposal. Present problems were initiated by a coalition government including anti-nuclear groups (1998-2005). A key argument for the anti-nuclear groups is the lack of a solution for waste - hence they have little interest in solving this problem before a nuclear phase-out.
- A special group (AkEnd) was established (1999) to develop the site selection procedure for a "best possible" site for all types of waste. It operated for three years with wide public involvement. Recommendations were reported at the end of 2002, but no action was taken by the Federal Government as utilities refused to pay for a new site selection procedure. Recent federal elections resulted in a new coalition government - but with a remaining commitment to nuclear phase out. The disposal of waste is an issue that is identified for urgent action - but how this might occur is presently unknown.

**Sweden (J. Andersson):**

- A major rethink in '90s resulted in a volunteering approach, openness in decision-making and emphasis on active dialogue. Already from the mid 1980s, the R&D programme has been reviewed by the authorities with eventual approval by the Government and is, in this process, also open to comment by all interested parties. Project “DIALOGUE” involved testing of the Environmental Impact Assessment (EIA) process with participation of concerned parties and was an important stimulus for change in legislation to make such consultation a clear requirement for EIA.
- Regardless, experience during feasibility studies was negative in non-nuclear communities, with opposition growing with time and projects being rejected in local referenda.
- Positive experience in nuclear communities was possibly related to the longer period to build up nuclear understanding, but also needed responses to many practical concerns of the population - such as involvement in the decision-making process and socio-economic issues. General confidence in the regulators possibly also helped.
- Successes were attributed to technical strengths, well-defined site management, openness, strong regulators and informed (nuclear) local municipalities with a veto option - but luck maybe also played a role.

**Switzerland (I. McKinley):**

- The top level aims are a consistent communication strategy and communication tools focused on the needs of specific audiences.
- Lessons learned include the need for clear identification and focus on issues of concern, use of opportunities for "visceral" communication and involvement of key technical staff, remembering the importance of neighbouring communities, taking wider social issues into account when making major decisions and treating input from “marketing” professionals with caution.
- Recommendations include consideration of regional involvement of utilities,

targeting of schools for long-term education initiatives and a regional focus on building personal contacts with decision-makers.

**UK (N. Chapman):**

- First Nirex L/ILW projects; heavy local opposition caused first site to be dropped and subsequent sites were in politically sensitive locations and dropped before a general election. Local communication became better developed, but remained unsophisticated.
- Move to deep Nirex projects; original openness was replaced by secrecy until relatively late in the siting process. The consultation process attempted to identify key issues, but responses were mixed with negative feedback with respect to the extent of those involved and the lack of opportunity for others. Nirex took limited notice of criticisms - which contributed along with many other reasons to Nirex later failure at a public enquiry, which effectively put the entire programme on hold.
- Since then, a new process for developing consensus in the waste disposal programme has been initiated. A special committee (CoRWM) was established and has had a very intense consultation programme; responses have been limited, however, and dominated by anti-nuclear groups. It will soon make recommendations on waste management options, but will not consider the site selection process. Such input will be important for the review of nuclear power policy expected later this year.

**US - Waste Isolation Pilot Plant (WIPP) (E. Webb):**

- Public hearings are held before any major decision or oversight activity, to encourage participation. Four "Dockets" (libraries of all relevant documents) are maintained, 3 at locations in New Mexico and 1 in Washington DC, which provide open access to all such material. Interaction with the Environment Protection Agency (EPA) is possible via a hotline, which allows feedback to be requested from EPA staff.
- At the time when Federal regulatory authority for mixed waste was transferred from the Environmental Protection Agency to the State of New Mexico, an independent technical review group was formed at Department of Energy (DOE) expense known as the Environmental Evaluation Group (EEG) and was housed at the best technical university in New Mexico. This organisation provided technical review of both DOE and State regulatory work and was often critical of both, however this organisation’s independent work enhanced state regulatory and DOE credibility. Such credibility was enhanced by support by strong leaders at local, state and national level.

**US - Yucca Mountain Project (YMP) (M. Apted):**

- Focus on Public Outreach to establish DOE cooperation and credibility with the local community: site selection was based on the 1982 Nuclear Waste Policy Act and subsequent amendments, with decisions made at Presidential, US Congress, and impacted State (Nevada) level, rather than by the local community of Nye County. Selection of YM for sole site characterisation in 1987 caused strong opposition at the State-level, resulting in continuing opposition by the State of Nevada but not necessarily by the local communities.
- Outreach programme emphasis is on tours, a visitor centre and a "speakers bureau", but the DOE’s YMP website is the main window and provider of information. The user-friendly website provides (1) all salient facts about the YMP, including Mission

Statement and commitment to Quality, presented in a program-wide 'map' of activities, (2) access to key technical documents, (3) a wide range of community-based information (special focus on materials for schools / children) and (4) links to other national repository programs, news and other general interest web sites.

**b) Input from NUMO**

**Confidence-building (K. Kitayama)**

The stepwise process of CB was illustrated, for the special case of a new organisation like NUMO. During the first step, emphasis was on building up and demonstrating the acquisition of the required experience - effectively NUMO staff "gaining confidence in themselves". The second step, being initiated now, involves widening technical experience and also building key communication skills. The third step involves establishing dialogue - which is a continuous process and aims to establish a true partnership with the host community.

ITAC considers that recognising CB as a key issue is the correct approach for NUMO, but some key background policy needs to be established in advance and communicated uniformly by NUMO staff, since this will directly influence credibility. This will allow communities to know the "ground rules", to avoid possible misunderstanding later.

**Public communication and dialogue (S. Inatsugu)**

Obtaining public trust is recognised as a key goal for NUMO, which has led to a wide range of actions specially aimed to enhance public confidence. Some of these were described in more detail - group interviews, survey of risk perception, risk communication training and quantitative analysis of public perceptions.

ITAC noted that risk communication needs to be carefully coordinated and that particular technical input might usefully be channelled through trained communicators. The risk is that public credibility can be lost by poorly presented or inconsistent messages, particularly to the mass media.

The analysis of public perceptions using a "fuzzy learning" approach is novel within the field of nuclear waste disposal and was of interest to ITAC. This aimed to progress from past conventional statistical analysis of opinions via questionnaires to a more analytical approach based on expression of opinions using ‘natural language’. ITAC noted that a range of statistical methods / models already exist in the social sciences; these were however not considered convincing enough by NUMO, who also wanted to have a Japanese-specific development project with Japanese social scientists to encourage communication between the public and NUMO staff. Here an important link is the involvement of linguists, because of the common confusion caused by terms like risk, hazard and danger - which often mix probability and consequence.

A final topic was the ongoing discussion of transuranic waste (TRU; the term used in

Japan for long-lived intermediate level waste) co-disposal, which could result in important technical challenges - but far greater communication problems for a programme initiated for HLW only. At present, the strategy is to focus on HLW only; it may be possible to introduce TRU if the local community was positive but, otherwise, the project would continue on a HLW-only basis (see also block 4 below).

**International issues, discussion topics and lessons learned (C. McCombie)**

Worldwide, much communication experience has been gained over the last few decades by the nuclear industry - and by the older nuclear waste programmes. There are a lot of common trends - e.g. move from dictatorial decisions through comprehensive but one-way provision of information to consultation and ultimately to participative decision-making. The improvement with time was driven by negative experiences, caused by the failure to respond to changing social requirements. As a new organisation, NUMO has the chance to avoid the mistakes made elsewhere.

NUMO noted commonalities with respect to CB in the presentation. In Japan, compensation is a key concern - how does this fit it with its low profile in the presentations? The impromptu responses from ITAC were provided. The relationship of NUMO to the nuclear industry could also be an issue, given the wide international divergence here. The most successful European programmes in Sweden and Finland are run by organisations directly responsible to the utilities.

When considering how to best implement public consultation, ITAC agreed that the NUMO approach of treating it as a specific project seems useful.

**Block 4: Wrap up**

**TRU**

TRU was introduced as a special topic during the meeting. This is clearly a key issue in Japan at present and is of great importance to NUMO if co-disposal is being considered. ITAC could not produce a sensible review in the very limited time available, but programme overviews could be produced relatively quickly if the specification from the NUMO side was carefully defined. More difficult, however, is the explanation of the thinking behind project concepts, which is generally poorly documented. It should be emphasised that the nomenclature / definition is very variable internationally. Many programmes do not use the term TRU, but rather "long-lived wastes". The key point is that all disposal programmes for HLW or spent fuel are compelled also to consider further waste streams that are long lived enough to require disposal in a deep geological repository. For general background, the reports of the International TRU Workshops and the recent JNC progress report were recommended.

**ITAC**

The situation with regard to NUMO's future expectations for ITAC and DTAC was covered in the introductory presentation. To date, NUMO has been greatly helped by the

input from these committees to support production of the information package for solicitation and to help guide planning of the long-term programme. In the future, NUMO will convene ITAC on an annual basis, complemented by more regular DTAC meetings and by particular ad-hoc groups to provide rapid input on specific topics.