

**The IAEA's Programme on  
MODelling and DAta for RAdiological IMpact ASsessments  
(MODARIA)**

**S U M M A R Y**  
**of the**  
**Third MODARIA Technical Meeting**  
**IAEA Headquarters, Vienna**  
**10–14 November 2014**

This meeting, like the two previous MODARIA Technical Meetings (TMs), brought together around 150 people from over 40 countries to participate in the work. The topics covered were very varied ranging from the effects of long term environmental and climate change on radionuclide transfer, to the effects of the accident at the Fukushima Daiichi Nuclear Power Plant and modelling the impact of radiation on biota. Although many people had attended previous MODARIA TMs there were some new attendees who also found the meeting useful and interesting. It is good to have both continuity and fresh ideas through attendance of new and returning people.

The participants have a wide range of backgrounds: regulators, operators, radioecologists, radiation protection experts and environmental consultants. This range helps promote a balanced discussion and helps to ensure that the work of the group remains focussed on the aim to improve capabilities in radiation dose assessments within the overall framework of the IAEA system of protection. The attendance of people from a wide range of IAEA Member States also helps to ensure that the final outcomes of the programme are widely applicable. As previously, the enthusiasm of the participants is inspiring. Significant progress had been made in the various Working Groups between meetings indicating a dedication to the work both by the participants but also their organizations.

The MODARIA TMs, started with a plenary session to introduce the programme and giving the Working Group Leaders the opportunity to report on the activities and achievements of their respective groups since the last TM (held in November 2013) and any subsequent Interim Working Group Meetings held during the first half of 2014. Much of the rest of the meeting was then used for detailed discussions in the Working Groups.

During a further mid-week plenary session three presentations, which complemented the work of MODARIA were given. Sergey Lukashenko, National Nuclear Centre of the Republic of Kazakhstan, gave a very interesting presentation on the Semipalatinsk Test Site, detailing the current situation with levels of radioactivity and assessments to consider whether land, in the wide area affected by the nuclear weapons tests, could be released for different uses. Diego Telleria (IAEA) presented the work that is ongoing to produce new IAEA Safety Guides on control of exposures to the public and the environment. These Safety Guides are central to the work of MODARIA and the presentation led to a number of questions. Finally, Gerhard Proehl (IAEA) gave a presentation on the plans for a new IAEA model test and comparison programme intended to follow on when the current MODARIA Programme finishes in 2015. The aim was to raise possible areas for future work and to ask people to start thinking of ideas for discussion in the Working Groups and for submission to the Secretariat. The final meeting of MODARIA in November 2015 will then be an opportunity to present these ideas and for them to be discussed.

In the final plenary session on the last morning Working Group Leaders described the progress made during the week and their plans for the next year; there were also some ideas for the next programme presented. This final plenary session is important to enable participants to hear about the work that is going on in working groups that they have not been able to attend.

The aim at the end of the programme is for a series of technical reports (IAEA TECDOCS) to be published giving guidance on the various topics considered under MODARIA. Work of MODARIA has been presented at scientific conferences and some related scientific papers have already been submitted, and in some cases published. It is important that the good work being carried out by the groups is reflected in material that can be used by the IAEA and Member States, so this progress is important. The work of MODARIA is carried out under four themes and the progress on each is briefly outlined below.

### **Remediation of Contaminated Land**

There are three working groups carrying out work on this area. The first group is preparing advice on the decision aiding process for remediation strategies including the consideration of stakeholder involvement and the use of various tools which could be used to assist in the process. Work is well advanced to produce a final report and additional experts have been bought into the group to provide advice and relevant experience. The second group is concerned with exposures in the urban environment and has a varied programme covering dispersion in and to urban areas, as well as remediation in an urban environment. Two major model/ measurement comparison studies for the dispersion cases are coming to a close and have produced some interesting results. An urban contamination case study is also underway using information available for an urban area affected by the accident at Fukushima Daiichi. This case study will have to be limited given the time available but it is hoped to continue this work during the next programme. The final group under this theme is considering the application of models for assessing radiological impacts from NORM and legacy sites. A methodology is being developed together with a modelling tool that can be applied to a variety of situations. In addition some case studies are being carried out.

### **Uncertainty and Variability**

The four groups working in this area cover a range of different topics starting with an analysis of radioecological data in IAEA technical reports. This makes use of new information and also different analyses to give further guidance on the use of the parameter values in different situations. The group considering uncertainty and variability for routine release assessments has made significant progress in producing a report giving guidance on this topic. As part of the work various model/model comparisons are being carried out for real situations although unfortunately it is not possible to compare them with measured levels in the environment as they are all less than detection limits. Dealing with a longer timescale, there is a group developing a common framework for addressing environmental change in relation to assessments of radioactive waste disposal facilities. This group has again made significant progress in dealing with a complex area. The final group under this theme are considering models for accidental tritium releases. Although this group has fewer members than the other groups they are all very committed and have the advantage of being able to compare the model estimates with relevant measurements in the environment from experimental studies. The intercomparisons are complete and the results, which are promising, are being analysed.

### **Exposures and Effects on Biota**

Two related groups are working in this area and they work closely together (and where necessary with the group on radioecological data). The first group considers biota modelling aiming to demonstrate that simple models are adequate for the purposes of radiation protection. They are considering areas of heterogeneous contamination, the use of Voxel phantoms for different biota and model comparisons for the Fukushima situation. The other group is considering models for assessing radiation effects on populations of wildlife species, which is of interest as the aim is to protect at the species/population level but much of the information and data is at the individual level. Both of these groups are making very good progress with well-developed plans for papers and a final report.

## **Marine Modelling**

There is only one group in this area considering the transfer of radionuclides accidentally released into the marine environment. Two scenarios have been considered, firstly the releases to the Pacific Ocean due to the accident at the Fukushima Daiichi Nuclear Plant and secondly the contamination of the Baltic Sea following the Chernobyl accident. Model/model comparisons have been carried out for the two situations producing some interesting results and conclusions. Agreement is good for the Baltic Sea but less so for the Pacific Ocean, reflecting the more complex dispersion conditions that prevail in the Pacific. It is also intended to do some model/measurement comparisons which will hopefully improve modelling in this area.

In summary, another very interesting week covering a wide range of relevant topics in the field of environmental radiation dose assessment with enthusiastic, committed participants heading towards some useful reports to aid the IAEA's work in this area.

Jane Simmonds  
MODARIA Chair

18 November 2014