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Agence internationale de l'énergie atomique
Международное агентство по атомной энергии
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6th EMRAS NORM Working Group Meeting

6–10 November 2006

IAEA Headquarters, Vienna

MINUTES

The format of the EMRAS Combined Meeting was as on previous occasions. There were plenary sessions to open and close the meeting on the Monday and Friday mornings. On Tuesday and Wednesday the Working Group (WG) Leaders each made a short presentation to a plenary session on the progress of their specific group the previous day. There was no plenary session on the Thursday.

Day 1

In the Monday plenary session a brief summary of the WG activities since the previous combined meeting was presented by each group leader. For the NORM WG this included the outcomes of the WG meeting in Cyprus in May 2006. The major highlights and outcomes of that meeting were summarized as:

- Progress in the development and testing of hypothetical scenarios
 - Point source scenario
 - Area source scenario
 - Area source + river scenario
- A site visit to look at a disused phosphogypsum dump;
- Development of data sets for real scenarios, to facilitate model testing and intercomparison.

It was pointed out that the models that have been used so far to test the hypothetical scenarios include CAP88, COMPLY, PC-CREAM (point source scenario), and DOSDIM + HYDRUS, RESRAD-ONSITE, RESRAD OFFSITE (area source scenario). Preliminary results of the model testing had been presented and the implications for modification and further development of the scenarios had been discussed in Cyprus. In particular it was decided that further work should include:

- Looking at the effect of changes in wind direction on the model predictions
- Comparing predictions from different models (for the same scenario)

Another outcome of the Cyprus meeting was the decision to develop a scenario for a lignite power station. This was done prior to the current meeting and it had already become apparent that the scenario needed more careful specification, to facilitate the modelling work. Yet a further outcome of the Cyprus meeting was a decision by the WG to submit a presentation to the NORM V meeting in Seville, in March 2007.

In the afternoon WG session results were presented by two modellers who had applied the same model (PC-CREAM) to the point source scenario – the results obtained by the two modellers were identical. Results were also presented by another modeller who applied the CAP model to the scenario. Comparing the predictions of the two models showed that:

- the total predicted doses were similar in magnitude as a function of distance from the point source
- doses from individual exposure pathways were not the same for the two models

The WG agreed that further work was needed to clarify this issue, and also to produce predictions for the radionuclide concentration in drinking water, soil and foodstuffs.

One modeller presented results from the application of the RESRAD-OFFSITE model to the area source scenario.

The outcome of the first day's discussions were summarised as:

- the results presented were all in terms of dose; this is adequate for regulatory purposes, but the modellers also need to present predicted radionuclide concentrations to facilitate the comparison of model predictions with the results of measurement programs;
- the specification of the source term needs to be tightened (including such parameters as Kd, leaching rates, etc), to ensure that all modellers are using the same input parameter values;
- there is a need to determine which parameters are the most important – this can be strongly site-dependent.

The day's sessions were observed by two representatives of the Florida Institute for Phosphate Research, who gave the WG a short, informal presentation on the issues encountered in working out and evaluating strategies for managing phosphogypsum in Florida, where there are at least 40-50 phosphogypsum stacks that will require management, including remedial work, and expressed their interest in the model evaluation methodologies being explored by the WG. It was pointed out that one possible application of the EMRAS work that would be of great interest to the Florida phosphate industry would be to model the life-cycle of a waste-disposal facility. Another issue that was discussed is the establishment of public confidence in the overall management of NORM residues, in particular through the continual checking of model predictions.

Day 2

Results of the application of the DOSDIM + HYDRUS model to the area source scenario were presented. A comparison of these results with those from the RESRAD-OFFSITE calculations showed that there were some significant differences between the predictions of the two models. The WG noted that many of these differences were due to the lack of precise specification of the source term, and that the two models had used different values for a number of the input parameters. It was also noted that the HYDRUS model, which calculates the groundwater dispersion within the DOSDIM model, is extremely sensitive to the values of the soil parameters. The WG noted that this implies that it is therefore necessary to carefully characterise the site as well as the source term. It is not sufficient to characterise just the source term, we also have to characterise the site carefully. In particular the soil parameters, as these affect the rate at which radionuclides transfer from the waste to the underlying aquifer. The depth of a well used to extract drinking water from the aquifer also has to be specified as this can affect the model predictions, because of the evolving groundwater plume (in both time and space).

The WG then discussed the power station scenario, and compiled a list of the data required to complete the specification of the scenario so that model testing can commence.

The working group noted that one of the ongoing issues for the group is that although there are data available for many sites, these data are frequently not in a form suitable for model testing. This is due in part to historical factors, in that the lack of awareness of the potential radiological risks associated with the long-term management of NORM residues resulted in little or no effort to compile data for testing and validating models.

The working group resolved to continue looking for real scenarios, with the proviso that this must be completed in time for the scenarios to be discussed, circulated and tested before the end of the EMRAS program in 2007.

Two possible real scenarios were noted:

- Huelva – the aim in this case would be to provide enough data to allow modellers to predict the flux of phosphogypsum into the Rio Tinto via the groundwater pathway – this would also provide a source term that the Aquatic WG could use if they wished to apply their models to this situation;
- Uranium mine scenario - The WG briefly discussed the provision of data for this scenario.

Day 3

On the third day a presentation was given by Dr Charley Yu, the RESRAD program manager at Argonne National Laboratory. It was on the application of the latest version of the RESRAD-OFFSITE program to the area source + river scenario. This was of great interest to the WG as several members of the group had been working with this program and had encountered some difficulties in applying the program to the two hypothetical area source scenarios.

As a result of this presentation the interested members of the WG were able to obtain executable copies of the latest version of the RESRAD-OFFSITE code and agreed to use this code to refine the testing of the two area source scenarios and to compare the results with the DOSDIM results.

Another outcome of this presentation was the realisation that some of the parameters specified in the scenarios need to be changed, and that it is not sufficient to allow the modellers to use the default values specified in the different models they apply to these scenarios, because the use of different parameter values precludes comparison of the model predictions. In particular, the dietary parameters and K_d values (distribution coefficients) need to be fully specified. Therefore the WG resolved to be much more specific in the definition of the values of the parameters to be used to characterise both the source term and the disposal site.

The WG then turned its attention to the documents that need to be prepared in the next six months:

First draft of final WG report (TECDOC format)

A preliminary draft of this report was tabled by the chair, and the WG members discussed this draft and made several suggestions as to the structure and content of the document.

NORM V conference in Seville, March 19-22, 2007

The WG has had a poster presentation accepted for this conference. The content of this presentation was discussed and a timetable was agreed for the preparation of the poster and the accompanying paper (for publication).

IAEA conference on "Environmental Radioactivity: From Measurements and Assessments to Regulation" in Vienna, April 23-27, 2007

Each WG has been asked to make a presentation at this conference (<http://www-pub.iaea.org/MTCD/Meetings/Announcements.asp?ConfID=145>). The WG discussed the content of this presentation and agreed on a timetable for preparation of a set of slides and a written paper. It was agreed that the work will be presented by Dr. Koukoulou.

Day 4

The morning session was attended by Mr Sylvain Saint-Pierre, from the World Nuclear Association in London. The WG discussed the possibility of obtaining data for real scenarios from uranium mines, because these operations have been closely monitored for many years whereas for many other operations involving NORM the requirements for systematic monitoring have not been so clear, and well-documented and validated data sets have proved difficult to find.

The WG discussed possible options for the next WG meeting. At this stage the options include:

- Florida – the Florida Institute for Phosphate Research has offered to host the meeting, probably in May, 2007.
- Vienna - the possibility of holding the meeting the week after or the week before the Environmental Radioactivity conference was discussed, but the consensus of the WG members was that this would not be practicable for most people. The fall-back position would be to hold the meeting in Vienna in May, 2007.
- Mestre, Italy – the scientific secretary undertook to contact the Italians and ask if they would be interested in hosting a meeting, in May 2007.
- There were some indications from individual members of the WG that other venues might be possible, but it was agreed that the most acceptable times for the meeting are May 7-10 or May 21-24, 2007.

Plans and proposed timetable for the work to be done before the next WG meeting

The WG agreed on a plan and timetable for the next 6 months:

- Hypothetical Scenarios
- Revise hypothetical area source (+river) scenarios in light of this week's presentations by November 30, 2006;
- Rerun models and circulate results to WG members by January 31, 2007;
- Collate and compare results in time for the next WG meeting;
- Real scenarios
- Power station scenario – provision of additional data to complete specification by November 30, 2006;
- Model testing to be completed by January 31, 2007;

- Finalise specifications for possible real scenarios
- Huelva – flux to river calculations – to be completed by November 30, 2006;
- Phosphogypsum scenario (Greece) - to be completed by November 30, 2006;
- Uranium mine (Argentina) – to be completed by 31 December;
- Run models for real scenarios and circulate results to members of the WG by March 31, 2007;
- Collate and compare results in time for the next WG meeting;
- Revised draft (TECDOC) report for next WG meeting in May, 2007
- Slide presentation for the April 23-27, 2007, Vienna conference to be circulated to WG members by 30 November, 2006;
- Draft paper for the April 23-27, 2007, Vienna conference to be circulated to WG members by 15 January, 2007
- Draft poster presentation for the March 19-22, 2007, NORM V conference in Seville to be circulated to WG members by 15 January, 2007
- Draft paper for the March 19-22, 2007, NORM V conference in Seville to be circulated to WG members by 15 January, 2007;
- Final version of paper for the March 19-22, 2007, NORM V conference in Seville to be prepared by 31 January, 2007;
- Next WG meeting – May 7-10 or May 21-24

Target for EMRAS combined meeting, November 5-9, 2007

Final draft (TECDOC) report for November 2007 meeting