# EMRAS

**Working Group on modelling of naturally occurring radioactive materials (NORM) releases and of the remediation benefits for sites contaminated by extractive industries**

## Minutes of the 2nd Working Group Meeting

held during the 2nd EMRAS Combined Meeting
IAEA Headquarters, Vienna, 8–11 November 2004

It was acknowledged at the outset of the meeting that the WG had been disadvantaged by the fact that for approximately 8 of the last 12 months the group had had no Scientific Secretary, and that this had resulted in the group falling behind in its work program. In particular there had been no working meeting since the initial EMRAS Combined Meeting, held in Vienna in 2003. It was agreed that the group should therefore focus on activities that could be developed quickly and that would contribute significantly to progressing the program of the group.

The major aims of the EMRAS program are to:

1. review scientific data;
2. validate existing models;
   a. compare model predictions with data,
   b. compare models against each other;
3. improve models and reduce prediction uncertainties;
4. improve public protection;
5. revise TRS-364; and
6. publish reports.

Within this general framework the specific aims of the NORM Working Group program are to:

1. review the available literature on modelling of NORM in the environment, and compile a bibliography of relevant documents;
2. compile a list of available models and review the available models;
3. compile a list of NORM industries;
4. compile a list of contaminated sites;
5. develop scenarios for testing and comparing models;
6. make the scenarios available for testing;
7. carry out the testing;
8. evaluate the results; and
9. prepare reports.

The most urgent task is to develop and evaluate scenarios for model testing and evaluation. The group agreed that this task should be approached by concentrating on generic problems rather than specific problems. The comment was made that one task the group has to carry out is to establish the conditions in which NORM is a problem. One example that was given is the issue of groundwater in old (abandoned) mines.

It was suggested that this process could be started by developing several hypothetical scenarios, which could be used for testing and comparing models while a search for "real" scenarios was being conducted. With this in mind the group decided to look at three hypothetical scenarios that would cover most of the important exposure pathways. These scenarios, the relevant pathways, and some possible applications, are tabulated below.

| **Scenario** | **Exposure pathways** | **Applicability** |
|---|---|---|
| Stack discharge | Airborne | Mill, power station |
| Area source | airborne, groundwater | Ore stock pile, waste rock pile, tailings pile, contaminated site, land spreading, landfill |
| Area source + nearby river | airborne, groundwater, surface water | Ore stock pile, waste rock pile, tailings pile, contaminated site |

The group decided that these basic scenarios would allow a range of models to be tested and would also cover most of the situations likely to be encountered in practice. For example, these scenarios could be combined to simulate mining and processing operations with stack discharges (mill, smelter) and area sources (ore stockpiles, waste rock piles, tailings dams and piles). The use of hypothetical scenarios will allow model predictions to be compared.

It was also suggested that the group should concentrate on the more mobile radionuclides, such as radium (relatively soluble), radon (gas), and polonium (easily volatilised). This was agreed in principle.

The group decided that the development and use of these hypothetical scenarios should be a high priority task, and some time was spent discussing the more important parameters to be used for these scenarios. The accompanying spreadsheet summarises the result of those discussions.

The work plan is summarised as follows. The names of the group members with primary responsibility for each task are shown. It is expected that all group members will contribute to those areas in which they have expertise.

**Forward Planning**

— WG meeting – 2nd or 3rd week in May, 2005 – preferably at a NORM site;

— 3rd EMRAS Combined Meetings, IAEA Headquarters, Vienna, 21–25 November 2005;

— Foreground tasks (for next WG meeting):
  - hypothetical scenario details checked, circulated, finalised by 30 December 2004,
  - models chosen for inter-comparison by December 2004, January 2005 (scenarios to be circulated to groups or individuals interested in testing models),
  - hypothetical scenarios tested by 30 March 2005;

— draft report by mid-April 2005;

— Background tasks (to be completed for next plenary meeting):
  - compilation of bibliography,
  - completion of table of world-wide NORM industries and sites,
  - documentation of models tested against hypothetical scenarios,
  - selection of "real" scenarios,
  - preliminary drafting of reports.

**Task allocation**

1. Hypothetical scenarios:
   - *point source*: Eduardo Quintana (Argentina);
   - *area source* (atmospheric): Jürgen Gerler (Germany), Theo Zeevaert (Belgium);
   - *area source* (groundwater + river): Philippe Guetat (France), Danyl Pérez Sánchez (Spain);
2. Bibliography compilation: Richard O'Brien (Australia);
3. Documentation: Richard O'Brien;
4. Real Scenario data collection: all group members;
5. Table of world-wide NORM industries and sites: all group members;
6. List of models: all group members;
7. List of NORM industries: all group members;
8. List of contaminated sites: all group members.