

**6th Meeting of the Urban Remediation Working Group
Environmental Modeling for Radiation Safety (EMRAS) Project
IAEA Headquarters, Vienna
19–21 June 2006**

M I N U T E S

1. Scope and Objectives of the Meeting

The Urban Remediation Working Group (WG) of the EMRAS project held its sixth meeting during the period 19-21 June 2006, in Vienna.

This WG has the following overall objectives: (1) to test and improve the capabilities of models to characterise the radiation environment, including external exposure rates and concentrations of radionuclides, in urban areas contaminated with dispersed radionuclides as a function of location and time following a contamination event; (2) to use the results to estimate the doses to humans, including the identification of important exposure pathways; and (3) to evaluate reductions of human exposures that could result from specific countermeasures or remediation efforts.

The goal of the WG is to develop the capabilities of models as tools for decision making to address long-term radiological concerns after an urban contamination event has occurred and to assist in identifying required remediation measures.

The main objectives of the meeting were:

- a) to discuss the proposed hypothetical scenario for deliberate radioactive contamination in an urban environment;
- b) to present and review the preliminary results for the Pripjat scenario (Districts 1 and 4 of Pripjat, in Ukraine);
- c) to review the modelling approaches available worldwide; and
- d) to develop future work plans.

The meeting followed the agenda presented in Appendix A and was chaired by Ms. K. Thiessen (USA) and was attended by fourteen experts from ten countries (see Appendix B).

2. Work performed

2.1. Hypothetical scenario

A draft version of a hypothetical deliberate dispersion scenario was distributed and discussed. The draft version is based on an American town. The WG agreed that this could be used if necessary, but that a more urbanized city—larger buildings, denser population—would be preferable. The WG also discussed the simulation of the starting deposition pattern for the scenario and various issues that should be addressed in the scenario or in the WG report.

2.2. Pripjat scenario

A completed version of the Pripjat scenario (Phases A, B, and C) was distributed to participants in May 2006. Phase A provides an opportunity to model the changes over time of external exposure rates and concentrations of radionuclides in different compartments of an urban environment due primarily to natural processes. Phase B provides an opportunity to model changes over time of similar endpoints in a situation that includes the effects of human

activity. Phase C provides an opportunity to model the effects of various remediation efforts on the changes over time of the radiological situation. Phase A uses information on District 1 of Pripyat, while Phases B and C use information on District 4 of Pripyat. A set of input information (measurements of deposition and of radionuclide composition) was included in the scenario.

Preliminary modelling results for the Pripyat scenario from two participants (T. Charnock, UK, and V. Golikov, Russia) were presented and discussed. Phases B and C have been added to the scenario since the November 2005 meeting. The WG made plans for completing the modelling exercise and the corresponding documentation.

2.3. Overview of modelling approaches

The WG was given an update on the status of the overview of modelling approaches for urban contamination that is being developed by F. Gallay (France). In addition, the WG discussed approaches for modelling specific decontamination methods or countermeasures.

In addition to these main areas of discussion, several presentations were made by

- C. Kaiser (Germany) on “Using monitoring measurements of the radioactive contamination in inhabited areas for decision support in nuclear emergencies”;
- K. Andersson (Denmark) who discussed “Estimation of doses and remediation effects in a dry-contaminated inhabited area.”

In addition, B. Zlobenko (Ukraine) presented information on decontamination measures used after the Chernobyl accident, and D. Trifunovic (Croatia) presented information on use of the Hotspot code for simulating the dispersion and deposition of contamination following a release event.

The WG also discussed the remaining work to be performed before the EMRAS project ends in 2007, as well as documentation of its activities and preparation of a WG report.

3. Outcomes

3.1. Hypothetical scenario

- The WG agreed that more urban characteristics (e.g., part of the downtown area of a large city) would be preferable to the town used in the current draft scenario. The WG chair will try to find some suitable information in the next few weeks. To the extent feasible the city description used for this scenario will be based on a real (but unnamed) city, with modification of the information to fit the WG’s needs or where actual information is not readily available. (K. Thiessen, July 2006)
- The WG agreed that a realistic simulation for the starting dispersion and deposition is desirable. The provisional plan is to simulate the dispersion and deposition using the Hotspot code (D. Trifunovic), with further simulation of the deposition pattern with the IAMM code (Inhabited Areas Monitoring Module; C. Kaiser). Participation by individuals in the FUMAPEX project (A. Baklanov) is uncertain, due to time constraints, but certainly welcomed if possible. A U.S. group that might have suitable information from a previous project will be contacted by K. Thiessen. (K. Thiessen, D. Trifunovic, C. Kaiser, October 2006);
- The WG selected a set of conditions for the hypothetical release, based partly, but not totally, on a generic scenario described by Sohler and Hardeman (2005, J. Environ. Radioactivity 85:171-181). These conditions include a 5-kg explosive and 50 TBq of Cs-137 in powder form. The weather at the time of the event is assumed to be dry, with

a wind speed of 5 m/s in the prevailing direction for the city. Release height is assumed to be ground level. Deposition velocities are assumed to be 0.3 cm/s for the respirable fraction and 8 cm/s for the non-respirable fraction. The respirable fraction is assumed to be 0.5, and the airborne fraction (aerosolization fraction) is assumed to be 0.3. The hypothetical release will be located in a square or public area surrounded by buildings. The scenario description will include the position of the deliberate dispersion event, receptor locations with the distances from the dispersion event, and the heights of the buildings. (K. Thiessen, October 2006)

- The section of the WG report dealing with the hypothetical scenario will include a description of the limitations of this modelling exercise, including the limitations of the simulation used to create the initial deposition pattern for the exercise. In addition, of the various possibilities for deliberate dispersion events and other dispersal events, the WG has selected only one for use in an exercise. The scenario description will acknowledge several aspects of urban contamination that are not dealt with in the hypothetical scenario but which could be important to consider in real situations. These aspects include redistribution of contaminants via drainage and sewage systems (both storm water and waste water) or ventilation systems, exposures to remediation workers, and waste disposal issues. (K. Thiessen, October 2006)
- The WG report will also include a description of other radionuclides that could be used in RDDs (besides Cs-137, as used in the hypothetical scenario). Some countermeasures would have similar effectiveness for various radionuclides, while others would be expected to have different effectiveness depending on the radionuclide; data on the effectiveness of certain countermeasures might not be available for some radionuclides. M. Steiner (Germany) will draft an initial version of this section. (M Steiner, K. Thiessen, October 2006)
- The WG plans to complete and distribute the scenario description (city information, dispersion simulation) by the end of July. The goal for completion of an improved deposition map is early October. Model calculations and documentation are requested by the end of October, for discussion at the November 2006 meeting. The report section will be partially drafted by the November meeting, with completion of the draft report planned prior to the spring/summer meeting in 2007. (K. Thiessen, October 2006)

3.2 Pripjat scenario

- Two participants (T. Charnock and V. Golikov) presented their preliminary calculations, including the effects of various remediation efforts. At least one more set of calculations is anticipated for the November 2006 meeting. All model predictions are to be submitted by 2 October 2006. In addition, documentation of the models and parameter values should be submitted by the same date. A format for the model documentation is provided in the draft WG report (minutes from the November 2005 meeting) and is recommended to be followed. (T. Charnock and V. Golikov, K. Thiessen, October 2006)
- Test data (measurements) for a few points are available for dates in the late 1990s. In addition, the originators of the Pripjat scenario plan to make some additional measurements (A. Arkhipov and S. Gaschak, September 2006)
- Prior to the November 2006 meeting, the model predictions will be compared with each other and with the available measurements. (T. Charnock and V. Golikov, K. Thiessen, October 2006)

- At the November 2006 meeting, the WG will discuss the results of the comparisons. Following the November 2006 meeting, participants will be asked to describe lessons learned from the modelling exercise and comparisons, together with any revisions in models or parameter values that are indicated or actually made, based on those comparisons. (Urban WG, 6-10 Nov 2006).
- The available sections of the Urban WG report dealing with the Pripjat scenario will be drafted prior to the November 2006 meeting. The remaining part of the WG report will be completed following the November 2006 meeting, prior to the spring 2007 WG meeting.

3.3 Overview of modelling approaches

- F. Gallay (France) has nearly completed a review of modelling approaches for the assessment of recovery options in contaminated urban environments. This literature survey, which is prepared as an IRSN report, will be distributed to WG participants later this summer. (F. Gallay, Sept 2006)
- English and French versions of the report will be included on a CD accompanying the main WG report (this CD will also contain complete versions of the scenarios, with all supporting files). (F. Gallay, K. Thiessen, spring 2007)
- A condensed version of this report will be used as part of Chapter 2 (“Modelling”) of the WG report, along with descriptions of the models and parameter values actually used in the WG’s exercises. An additional part of Chapter 2 will be a short summary of information sources (published information and online sources) for use in modelling countermeasures (e.g., decontamination factors and the situations for which they are relevant). (F. Gallay, Oct 2006)
- Contributions to this summary are anticipated from K. Andersson (Denmark), T. Charnock (UK), B. Zlobenko (Ukraine), V. Golikov (Russia), and F. Gallay (France) (2 October 2006)

3.4 Preparation of Urban WG report

- The available draft material for the WG report will be prepared in a single draft WG report before the November 2006 meeting, so that the material can be distributed prior to the meeting and discussed at the meeting. Parts that can be prepared before the meeting include descriptions of the modelling exercises, model documentation, and some initial presentations of modelling results. (K. Thiessen, Oct 2006).
- Following discussion of the modelling results at the meeting, the sections on the modelling exercises will be completed (as early as possible in 2007, and prior to the WG’s spring meeting). An outline of the WG report, including a format to be used for model documentation, was distributed with the minutes of the November 2005 meeting. B. Batandjieva was asked to send the format to all participants once again. (K. Thiessen, B. Batandjieva)

3.5 Plans for November 2006 meeting and beyond

The WG’s next meeting will take place during the week of 6-10 November 2006, in conjunction with the next plenary meeting of the EMRAS programme. At this meeting, the WG will address the following issues:

- Discussion of the modelling results for the Pripyat scenario, especially in comparison with the test data; completion of this section of the WG report.
- Discussion of modelling results for the hypothetical scenario; completion of this section of the WG report.
- Completion of the overview of modelling approaches.
- General conclusions of the WG, including general findings of relevance for other WGs.
- Plans for completion of the WG report.

The tentative agenda for the meeting will be sent by K. Thiessen in October 2006 (K. Thiessen, B. Batandjieva).

Proceedings of the June Urban WG meeting will be sent on a CD after the meeting (B Batandjieva).



6th Meeting of the EMRAS Urban Remediation Working Group

Meeting Room B0513*, IAEA Headquarters, Vienna
19–21 June 2006

DRAFT AGENDA

Monday, 19th June 2006

09:30–12:00	1. Welcome	Kathy Thiessen, WG Leader (USA) Borislava Batandjieva WG Scientific Secretary (IAEA) Kathy Thiessen
	2. Overview of meeting Scope, objectives and expected outcomes	
	3. Hypothetical scenario	Kathy Thiessen
	3.1. Current status and proposals for future development	
	3.2. Discussion of hypothetical scenario	All WG Participants
12:30–13:30	<i>Lunch break</i>	
13:30–17:30	3.3. “Using monitoring measurements of the radioactive contamination in inhabited areas for decision support in nuclear emergencies” Proposal for the hypothetical scenario	Presentation by Jan Christian Kaiser (GSF, Germany)
	3.4. Discussion of hypothetical scenario (continued)	All WG Participants
	3.5. Plans for completion of hypothetical scenario	All WG Participants
17:30	<i>Close</i>	

Tuesday, 20th June 2006

09:00–12:00	4. “Estimation of doses and remediation effect in a dry-contaminated inhabited area” Proposals for Pripyat and hypothetical scenarios	Presentation by Kasper Andersson (Risø, Denmark)
	5. Pripyat scenario – finalization of description	Kathy Thiessen Andriy Arkhipov (Ukraine) Tom Charnock (HPA, UK) Vladislav Golikov (Russia) Boris Zlobenko (Ukraine)
	5.1. Current status – Modeling results – Intercomparison and lessons learned	All WG Participants
	5.2. Plans for completion of Pripyat modeling exercise – Remediation activities – Intercomparison of modeling results and lessons learned	
12:30–13:30	<i>Lunch break</i>	
13:30–17:50	5.3. Discussion of modeling approaches for modeling of specific decontamination methods or countermeasures	Vladislav Golikov (Russia) Boris Zlobenko (Ukraine) All WG Participants
	6. Update on the Bibliographic Survey Status and activities for finalization	Florence Gallay (IRSN, France)
17:30	<i>Close</i>	

* Please note that due to the asbestos removal project still under way at IAEA Headquarters, a different meeting room number has been allocated since we sent out the invitation letters for this meeting.

Wednesday, 21st June 2006

09:00–12:30	7. Discussion of scenarios (hypothetical scenario, Pripjat scenario) and their documentation in the Urban report	All WG Participants
	8. Plans for future activities	All WG Participants
	- until next Urban WG meeting	
	- until the EMRAS project in 2007	
	9. 4 th EMRAS Combined Meeting – November 2006	All WG Participants
12:30	<i>Close of Meeting</i>	Kathy Thiessen, WG Leader (USA) Borislava Batandjieva WG Scientific Secretary (IAEA)

LIST OF PARTICIPANTS

Experts	Country
R. Zelmer	Canada
D. Trifunovic	Croatia
K. Andersson	Denmark
F. Gallay	France
C. Kaiser	Germany
M. Steiner	Germany
B. Batandjjeva	IAEA
V. Golikov	Russia
T. Charnok	UK
A. Arkhipov	Ukraine
S. Gaschak	Ukraine
B. Zlobenko	Ukraine
K. Thiessen	USA
S. Kamboj	USA