

NATIONAL DOSE ASSESSMENT WORKING GROUP

PAPER 7-07: REPORT BACK FROM SUB-GROUP ON MODELLING

1st meeting held on 13 April 2005, Aviation House London.

Present

Chair	Rob Allott	EA
Regulators/agencies	Ruth Binny	FSA
	Ellis Evans	FSA
	Ray Kowe	HPA
	Jane Simmonds	HPA
Scientific Consulting	Marcus Grzechnik	CEFAS
	Ciara Walsh	Nuclear Technologies

1. Terms of reference and membership

The Chairman welcomed members to the first meeting of the subgroup, membership of the subgroup was agreed upon.

The NDAWG steering group have drawn up terms of reference for the subgroup, these are:

The aim of this sub-group is to consider issues relating to modelling the transfer of radionuclides through the environment, as part of the assessment of the radiation doses from routine releases of radionuclides. In particular it will:

- Identify the environmental media and radionuclides for which reliable models and data exist. This should be in the context of assessing doses from routine releases and the low levels of doses that are generally found.
- Identify the environmental media and radionuclides for which the models and data are not considered adequate for routine release dose assessment.
- To identify areas of further work and priorities to improve modelling based on the significance of doses from actual discharges from both nuclear and non-nuclear industry.

Action 1.1 Subgroup members are asked to comment on these terms of reference.

Jane stressed that the subgroup was focussed on routine releases distinguishing between continuous and short term releases and would not consider accidental releases or solid waste which may be future issues for the main NDAWG group.

The subgroup would draw upon experience of other groups. Ciara informed members that the atmospheric dispersion modelling liaison group (ADLMC) were

carrying out a similar study and that there might be some crossover. It was agreed that this subgroup would draw on experience of other groups.

2. Principles/criteria/standards for determining acceptability of models

Members were unaware of any international standards on model acceptability.

Ellis asked if the subgroup were happy with the use of conceptual models. Rob replied that the subgroup would be looking at the acceptability of the use of models within the context of an assessment framework for comparing deterministic doses against dose limits. Members agreed that 'adequate' may be a better term than 'acceptable' in this context.

Ellis asked if the subgroup should consider uncertainty and probabilistic assessments. Jane commented that the subgroup on uncertainty and variability in dose assessments was looking at this aspect of assessments and in addition the modelling subgroup would not be looking at the issue of habits as this is tasked to another NDAWG subgroup. The modelling subgroup will focus on models for transport through environments. The subgroup will look at model processes and not necessarily at specific tools for calculating them.

The subgroup would be looking at individual dose but not collective dose. The group will not consider the adequacy of models to estimate dose coefficients.

Rob said the subgroup would be trying to establish standards for looking at the adequacy of models for regulatory purposes, for example measurements may be required in circumstances where confidence in the use of models is not sufficiently high and/or discharge data are not sufficiently reliable. Such standards would also provide a means to decide where models are acceptable and in these cases there may be less reliance on measurements for minor pathways.

Models will be validated against measured data, the general consensus is that a factor of 3 is viewed as adequate, whereas a factor of ten or more would generally be felt to be inadequate, depending on the estimated level of dose.

3. Matrix of pathways for releases to air, water and sewer.

Rob presented his initial matrix for investigating the adequacy of models. There are separate tables for release to air and water. The release to water includes both freshwater and marine. Release to sewers is a separate issue that will be considered by the subgroup at a later date as it is an agenda item for the April main NDAWG meeting.

Members advised the following amendments/additions to the columns and rows of the matrices:

Releases to air: columns – comments, importance to dose (with H high, M medium and L low categories), public perception (H,M,L), in addition the transfer to food should consider deposition to plants, uptake from soil to plants and transfer to animals; rows – general continuous releases, general short term releases.

Releases to freshwater/marine: columns – comments, importance to freshwater dose (H,M,L), importance to marine dose (H,M,L), public perception (H,M,L), dispersion freshwater, dispersion marine, transfer to freshwater sediments, transfer to marine sediments, transfer to fish/shellfish, fish/shellfish dose, irrigated food and animals drinking water.

In addition sodium-22 and sodium-24 would be removed from the matrices, the noble gases would be grouped together with the exception of radon, the iodine isotopes will be grouped and the caesium isotopes will be grouped together. Europium-154 should be added to table for freshwater and marine.

Members then filled in the matrices, indicating inadequacies in the models/data and where further work was necessary

4. Prioritisation of further evaluation of model adequacy

Members concluded that the purpose of the matrices was to identify: future areas for work; key areas of uncertainty in dose assessments.

With key priority areas being:

1. NRPB-R91 charts for short and medium dispersion of radionuclides reproduced for continuous releases using ADMS, AERMOD.
2. Speciation between gaseous, particulate and chemical form (eg iodine, sulphur-35) which can affect deposition rate and can cause large modelling uncertainties for air releases.
3. Transfer to plants from aerial deposition for sulphur-35 requires development.
4. Iodine-129 uptake in plants and milk following deposition of activity from air.
5. OBT models for aerial dispersion need to be examined.
6. Models for short term aerial releases are not well developed.
7. Freshwater dispersion and transfer to sediments (iodine important for external dose).
8. Transfer to fish for phosphorus.
9. Americium-241 not well modelled in marine + others.
10. Relationship of bed sediments to where people are exposed for marine and freshwater.
11. Concentration factors for fish farms may be dependent on diet and water throughput.
12. Freshwater fish consumption rate not well validated.

Action 1.2 Subgroup members are to comment on the matrices and to seek comments from colleagues by the end of May.

5. Future work plan

The matrices will be included in a paper to be prepared for the November NDAWG which will highlight inadequacies in modelling and indicate areas where more work is needed to be done. The paper will need to include references to other work to justify the decisions made.

Action 1.3 Rob to prepare an outline of the modelling paper for subgroup members to contribute to.

6. AOB

None.

7. Date of next meeting

Sometime late September was suggested as the date for the next meeting.

8. Summary of Actions

Action 1.1 Subgroup members are asked to comment on these terms of reference.

Action 1.2 Subgroup members are to comment on the matrices and to seek comments from colleagues by the end of May.

Action 1.3 Rob to prepare an outline of the modelling paper for subgroup members to contribute to.

Ray Kowe, 14 April 2005