3RD NATIONAL DOSE ASSESSMENT WORKING GROUP

SUB-GROUP ON SHORT TERM RELEASES

3rd meeting held on 2 October 2007, Aviation House London.

Present

Chair	Rob Allott	EA
Regulators/agencies	Paul Dale	SEPA
	Ray Kowe	HPA
	Justin Smith	HPA
	David Webbe-Wood	FSA
Industry	Laurence Austin (via teleconference)	British Energy
Apologies	Claire Johnson	Westlakes Scientific Consulting

1. Minutes of previous meeting 26 September 2006

Action 2.1 Rob to check on the Environment Agency's definition of 'average flow'. **Completed.** Average flow is the mean of the daily averages of flow from the CEH hydrological data.

Action 2.2 David Webbe-Wood to check on the value of average water consumption rate. **Ongoing.** The FSA had used a water consumption rate of 391 litres per year for assessment of exposure to a chemical contaminant, the original source of this value is unclear. David will check the original source document from which this figure is taken.

Action 2.3 Rob to investigate the inclusion of irrigation and the uptake of river water by cows and subsequent transfer of radionuclides to milk as exposure pathways in the river model. **Completed.** Irrigation is included in the river model. The Environmental Agency do not consider uptake of river water by cows in their modelling.

Action 2.4 Rob to revisit the river case study to see if he can get the continuous release assessment closer to the results of the short term release. **Completed.** This will be discussed as an agenda item.

Action 2.5 Subgroup members to consider different discharges which they think might be periodic and to identify where more data might be needed. **Completed.** There is very little data on liquid discharges, discharge from the Harwell site will be covered in one of the agenda items. Rob is awaiting data on liquid discharges from hospitals. Laurence has provided data on gaseous and liquid discharges from several British Energy sites. Atmospheric releases from Cyclotrons will be a future agenda item.

Action 2.6 Subgroup members to check nuclear discharge profiles to rivers and sewers to see how often they discharge related to the quantity discharges and the period over which they discharge. **Completed.**

Action 2.7 Laurence to get data for actual discharges from British Energy and Magnox sites on the period of release and quantities compared to background and to circulate date to subgroup members. **Completed.**

Action 2.8 Claire to find out about aerial discharge release patterns from Amersham. **Ongoing.**

Action 2.9 Justin to determine whether it is possible to identify the 12 hour period in each month where the met conditions give rise to the maximum air concentrations and deposition rates at selected distances using the ADMS model and to investigate the capabilities of the British Energy NECTAR model. **Completed.**

Action 2.10 David Webbe-Wood to provide concentrations in a number of foods for a unit deposition for a range of times between deposition and harvest/slaughter. **Completed.**

Action 2.11 Rob and Justin to revise the various factors affecting short term releases for aerial releases outlined in the first meeting of the subgroup. **Completed.**

2. Short term releases to rivers

Revised assessments

Rob has revised the assumptions in Table 1 of his draft paper 'Short term releases' based on comments received from members at the 2nd subgroup meeting. He has added assessment parameters for irrigation to the Table. He included pessimistic assumptions in the Table to show how extreme assumptions in assessments can be made but he never carried out calculations for these.

There are few discharges directly to river and a plot is shown for UKAEA Harwell. These discharges have 12 month rolling limits with quarterly notification levels. Paul commented that there are no discharges of radioactive materials directly to rivers in Scotland.

Three types of dose per unit release assessment were carried out based on the assumptions given in Table 1 of the draft report "Short term releases to river": one assessment of a cautious short term release and continuous release using the initial assessment method; two assessments of realistic short term releases and continuous releases but using average river flow and 25th percentile river flow for the continuous assessment.

These calculated doses were then applied to a case study for an angling family using the monthly discharge limits for a typical hospital permit (in this case Swindon). The limits for a single month were used in the short term assessment and 11 months worth of limits were used in the continuous releases assessment. The release is assumed to occur into the River Thames at Reading for which a plot of water flow is shown for the year 2004.

For the case study, the short term release assessment dominates the total dose in the cautious scenario and the dose is about 3 times larger than the continuous release yearly dose. The realistic short term release assessment is about 30% of the total dose for the year

when compared to average river flow and about 10% of the total dose when compared to 25th percentile river flow.

Action 3.1 Rob to check if the Swindon hospital uses delay tanks for temporary storage of active liquid effluents

Action 3.2 Paul to provide a plot of typical river flow pattern in Scotland for comparison with the plot of water flow in the River Thames at Reading

One member commented that the assumption that the annual discharge is released in one go in the summer is not realistic and this should be emphasised in the text.

In the paper Rob also carried out a case study which highlights the need for more data on correlation of habits with low river flows and the seasonal variation of other factors such as occupancy, fishing habits and fish catches.

Action 3.3 Rob to check on the validity of the fish consumption rate of 20 kg y^{-1}

Action 3.4 David to look at the national diet and nutrition survey to see if there is seasonal data on fish consumption rates

Action 3.5 Rob and Paul to look at EA and SEPA data on fishing club catches

Rob surmised that if a continuous release assessment is used with monthly limits then the case study indicates that short term releases are not a problem, given that the case study was carried out for a limited number of nuclides. Rob hoped the conclusions of the case study could be included in a future NDAWG guidance document.

Draft NDAWG paper

Action 3.6 Rob to include habits data and assumptions in the next draft of the paper so people can comment on it

Action 3.7 Rob to present summary dose results in the same layout as Justin's atmospheric case study

The introduction should state that one of the aims of the paper is to identify where short term release assessments are likely to be required.

The introduction should also recommend that in a first instance a continuous release assessment should be carried out and an assessment of short term release carried out to address uncertainty.

It should be made clear that the assumption that the annual discharge is released in one go in the summer is not realistic and it is worth emphasising in the text

Rob refined the definition of short term release for inclusion in the paper:

Scenario	12 monthly release	12 monthly release with quarterly notification	monthly release
Realistic	total activity will be released in one day with a continuous discharge for the rest of the year	¼ of the total activity will be released in one day with a continuous discharge for the rest of the year	1/12 of the total activity will be released in one day with a continuous discharge for the rest of the year
Cautious	total activity will be released in a period of 30 minutes in one day with a continuous discharge for the rest of the year	¼ of the total activity will be released in a period of 30 minutes in one day with a continuous discharge for the rest of the year	1/12 of the total activity will be released in a period of 30 minutes per day with a continuous monthly discharge for the rest of the year

The wording in paragraph 2.4.5 should be revised as it implies that the total annual dose from short term releases could lead to doses of 60 µSv y^{-1} which would require an assessment.

Members agreed that the paper should present short term releases to rivers and not include atmospheric short term releases and will be presented to the main NDAWG in November.

Action 3.8 Rob to release the draft paper on short term release to rivers before 19th October and members to send him comments before the 5th November

3. Short term releases to atmosphere

Justin outlined the revised study for comparison of the radiological impact of a continuous release with a number of short-term releases. It is similar to the previous case study prepared for NDAWG except that the duration of the short-term release considered here is 12 hours rather than 1 hour. It also uses ADMS 4 rather than ADMS 3.

Increasing the short-term release duration from 1 to 12 hours only has a small impact on the maximum inhalation doses calculated here. The increase in the maximum inhalation dose at 5000 m may be due to differences in model versions. Differences of about a factor of 10 are seen in the maximum ground gamma dose which may reflect the significant variation in level of deposition with met data and the averaging effect that occurs over 12 hours.

Differences in the ingestion dose are expected to be similar to those for ground gamma exposure depending on assumptions made concerning harvesting practices.

No account has been taken in the calculations of the more extreme or less extreme habits that may occur for short periods of time.

It is unlikely that all 12 short-term releases will occur during the worst met conditions. If this only happens once in a particular direction then the results for monthly peaks will be reduced.

He has not carried out a case study. Laurence said there may be data on historic authorisations from Torness and Hunterston that may be used to base a case study on.

The table of assumptions for short term releases was then reviewed by members.

Release duration for realistic should be actual/12 hours, for cautious and pessimistic scenarios should be actual/30 minutes.

The release height for all scenarios should be actual/ground level.

Members agreed that the use of 75th percentile data for the realistic and 95th percentile data for the cautious scenarios was correct. There was some discussion as to the complexity of calculating ADMS output using the 75th percentile Pasquill met data. However, it was felt that standard conversion tables, provided by CERC, to go from Pasquill stability category to Monin/Obukov length could be used.

Laurence mentioned atmospheric calculations to estimate the discharge from incinerators used constrained meteorological data within PC Cream in which the critical group were in the plume for a period of one year. Even such a pessimistic assumption gave trivial levels of dose.

Location of local food source should be actual/500 m for realistic short term assessment

Location of critical group habitation should be actual/100 m for annual average and realistic short term assessments.

Food concentrations for the pessimistic scenario should use integrated values for milk and eggs but milk products could be peak values as they could be stored.

The ingestion rates should be site specific data or 95 percentile of national distribution values for top two foods and 50 percentile of other food as default. Milk products should not be included in the cautious scenario.

David commented that another parameter was needed in the table to take into account of seasonality factors such as cropping, harvest and storage.

Fraction of food consumption for the realistic and cautious scenarios should be site specific data or a default value of 1.

Inhalation rates in plume should be light work category for the realistic, heavy worker values for cautious and heavy worker values for the pessimistic scenario.

Action 3.9 Rob to check the value for fraction of time indoors during passage of plume for the realistic scenario

Action 3.10 Justin to check whether the location factor for cloud gamma is 1 for annual average, 0.2 for realistic

The fraction of time indoors for deposited gamma and resuspension for annual average should consider adults at home and children at school.

Action 3.11 Justin to check on the indoor dose reduction factor for resuspension for annual average dose

Annual average values for inhalation rate from resuspended material should be used for all scenarios since they are used over a long time period.

There was some discussion on how Justin can usefully use Laurence's data to show discharge patterns from a typical site. One way might be to consider multiple releases from a site for a 52 week release multiplied by a factor for a 30^{O} sector. (Not sure about this last sentence could just say I'll consider carrying out a case study using Laurence's data)

Action 3.12 Justin to email Laurence if he requires actual short term discharge data as there are more detailed records available

Members agreed that Justin should present a case study of a typical site and have a case study with a cyclotron. A draft of the paper on short term atmospheric releases will be discussed at the next subgroup meeting in the New Year (2008) and will be presented at the April 2008 main NDAWG meeting.

4. Forward work plan

Members considered items for future work for the subgroup including:

Non river pathways (sewers) - this pathway is expected to be more important for workers but not for the foodchain.

Discharge to estuaries - there has been some work done in this area which can be used as a starting point.

Cyclotrons - these will be considered in a case study for the paper on atmospheric short term releases.

Multiple discharges from actual sites - Heysham 1 and 2 are the only operating nuclear sites that could give rise to multiple discharges, though cyclotrons may also be considered in this category.

CFIL's - the subgroup needs to consider whether short term assessments are appropriate for assessing against CFIL's.

5. AOB

None.

6. Date of next meeting

The next meeting of the subgroup will take place in the week beginning Monday 25th February 2008.

7. Summary of Actions

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Action 2.8 Claire to find out about aerial discharge release patterns from Amersham.

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Ray Kowe, 5th October 2007