

NATIONAL DOSE ASSESSMENT WORKING GROUP

PAPER 2-01: SUB-GROUP ON RETROSPECTIVE DOSE

1st Meeting held on 31st October 2002, EA offices, Warrington.

1. Present

Chair	Rob Allott	EA
Regulators/agencies	Paul Dale	SEPA
	Paul Tossell	FSA
	Stephanie Haywood	NRPB
Industry	Tim Parker	BNFL
Specialists/NGOs	John Hunt	CEFAS
Secretariat	Ciara Walsh	NRPB

2. Introduction and Terms of Reference

The draft agenda was agreed.

The original terms of reference are listed below:

The aim of the sub-group is to assist in the development of a suitable methodology for use by the Environment Agencies in fulfilling their responsibility to assess and report total doses.

In particular the sub-group will:

- Comment on the EA report on 'The development of a methodology to assess population doses from multiple sources and exposure pathways of radioactivity'.
- Suggest changes and improvements that might be made to the methodology.
- Review any trials of the methodology.
- Consider related issues such as the use of measurement data in retrospective assessments including values less than reporting limits.
- Consider methods for defining the critical group (e.g. the Hunt and Shepherd approach or using the 97.5th percentile).
- Discuss and propose plans for regular reporting of total retrospective doses to members of the public.
- Provide advice on the implementation of the total assessment methodology to encompass both nuclear and non-nuclear sites.

The working group should consider the timescales for their work and provide a timetable for the second meeting of NDAWG (autumn 2002).

It was agreed that the terms of reference were focussed on the needs of the EA, and that it may be more useful to change the terms of reference to give a wider perspective to the sub-group. The focus of the group will become 'Key principles of retrospective assessments' and the EA requirement will be a subcategory of this.

Tim will draft the revised terms of reference for circulation to the group. If possible these will be circulated and agreed before the main NDAWG meeting on the 21st November 2002.

Action RD_Subgroup 1.1 Tim to draft new terms of reference for comment by the subgroup before 21st November 2002.

Rob said that it was the plan of the regulators (EA, FSA and SEPA) to provide in the future a single report summarising retrospective doses, that would subsume and extend the remit of the current RIFE report into a report covering all exposure pathways. This discussion raised issues of consistency of approach. One conclusion from the CEDA workshop was that there was merit in having more than one approach, although there should be close collaboration. The industry welcome collaboration between the regulators and the proposal of a future single report but agree that NRPB should remain independent of the regulators assessments. It was requested that this point be raised at the NDAWG main meeting in November 2002.

Action RD_Subgroup 1.2 Rob to mention the industries' view on collaboration between the regulators at the main NDAWG meeting while reporting on the progress from the subgroup.

3. Legal and other requirements for total dose assessment (eg BSS Directive and Directions on Environment Agencies)

The directions to the EA and SEPA were outlined, and there was discussion on the subtle differences between the directions to both agencies. It was agreed that ACOP IRR99 allowed the EA to consider the total dose to representative members of critical groups rather than the maximum exposed individual, ie. the mean dose to the critical group. This is consistent with the ICRP approach.

It was also agreed that this is an issue to raise at the main NDAWG meeting as it would be useful to have a recommendation from NDAWG.

Action RD_Subgroup 1.3 Rob to ask NDAWG to issue a recommendation on whether the dose limit applies to the maximum exposed individual or to representative members of the critical group (the mean).

There was also discussion on what sources should be considered by this group and it was agreed that exposures due to releases from practices as defined in the BSS would be considered. However it is acknowledged that consideration of other sources (e.g. produced waters from the Oil and Gas industry) may be required.

4. Review and comments of Agency R&D project on total dose (P3-070)

4.1 Screening approaches

There was a general consensus that the screening approach adopted in P3-070 would require modification before it could be used in a further trial.

There were several suggestions for a screening approach:

In the screening methodology proposed in P3-070, allowance for aggregated discharges to atmosphere is accommodated by an average number of additional sites around the site being assessed. It was agreed that realistic consideration of the actual number of sites discharging in close proximity to one another or to a single sewage treatment works was a better approach.

Rob proposed another modification to the screening methodology which is to set the screening threshold for each contributor to an aggregated dose based on an overall total dose screening value (say 20 microsievert/y) divided by the number of contributors. Thus if there are 5 sites discharging to a sewage treatment works the screening level for each site's contribution would be $20/5 = 4$ microsievert/y.

Stephanie suggested an approach that would remove the need for a screening approach: the dose per caput in any grid square in the UK could be calculated from each source, and combined with the critical group dose from local sources. This is similar to what was done for the regional assessment in P3-070, however Stephanie suggested that by using GIS and creating a software tool, no sources had to be screened out. Rob noted that the EA have a database of authorisations by postcode and their respective discharges, which in theory could be loaded into this tool to calculate the total dose in any grid square. Tim welcomed this tool, however Rob felt the cost may be too prohibitive.

Action RD_Subgroup 1.4 **Stephanie to investigate whether software to calculate total dose using GIS is practicable and to consider the total cost of development.**

The meeting discussed the need for further example calculations. It was agreed it would be useful to consider an area such as Teeside, with a significant number of small users.

It was also agreed that there are a number of issues to be considered such as screening criteria and a detailed methodology for EA inspectors to use. The screening methodology presented in P3-070 includes pointers but the group considers it unworkable.

The regional approach presented in P3-070 was discussed and no serious issues were raised.

4.2 Detailed approach

Rob summarised the detailed approach taken in P3-070 and noted that the trial reported for the Sellafield area used a set of constructed habit data. Rob presented a reassessment using 'real' habit data (although this has to be confirmed) and calculated a significantly lower dose. As this assessment has yet to be checked, the result of the dose assessment will not be included in this record note of the meeting.

This approach uses integrated habit data where a complete set of habits (aquatic and terrestrial) is available for every individual surveyed. The total dose to each individual is calculated and ranked to derive the critical group.

This led to a discussion on the composition of the critical group and the definition of critical group habit data. Tim noted that the critical groups and critical group habit data presented annually in RIFE are not easily reproduced - the methods of calculation are not transparent. In the current method of calculating critical group habit data, a number of individuals with extremely high consumption rates of foods with low dose contributions will skew the average and critical rates and these individuals may not be a member of the critical group. Use of total doses to an individual calculated using integrated habit data sets could eliminate this problem. If the critical group is defined from the ranked individual doses, the mean of those individuals' consumption rates for each food group could be taken as the critical group consumption rates.

It is noted that integrated habit data sets are now being collected, however it will be several years before data sets are available for every site of interest.

The grouping of foods into food types was discussed and it was agreed that fish could generally be considered as a food type although in certain areas more specific consideration would need to be given to different species, for example flounders should be considered separately in the Cardiff area. Similarly, in some cases it may be better to consider individual species of crustaceans and molluscs. It was noted by the group that it would be useful to decide on food type categorisations and use these categorisations for habit surveys and methodologies.

4.3 Treatment of missing data and detection limits

The discrepancy between the advice given by NRPB and P3-070 for assessing retrospective dose when there is missing data was noted. NRPB recommends using modelling to infill data when monitoring data is not available, or when the activity concentrations in environmental media are below the limit of detection. P3-070 presents methods to infill data, and recommends modelling should be used as a last resort. The group agreed that it was not possible to give prescriptive instructions and that modelling or interpolation of monitoring data may both be valid approaches to take in different circumstances.

4.4 Methods for defining the critical group

The method of selecting the critical group was discussed and focussed around two methods: Hunt and Shepherd method (those individuals with a dose within a factor of three of the maximum dose) and the fixed (97.5th) percentile method.

John argued that the choice of any fixed percentile number is purely arbitrary in this situation: unlike some other surveys we are not dealing with a randomly selected distribution, but actively seeking the top people. Moreover a fixed percentile is in principle illogical here because one could simply reduce the critical group mean by interviewing more low-exposed people. We need to concentrate on the top end of the distribution. ICRP have provided us with a homogeneity criterion for the critical group and the chosen method should be based on it.

The homogeneity in critical groups and the NRPB advice on "normal behaviour" was discussed.

The view of those present was sought, and SEPA and FSA were still to finalise their opinions on this matter. BNFL are willing to use the approach suggested by ICRP and felt the Hunt and Shepherd method was appropriate. CEFAS and EA support the use of the Hunt method. NRPB are producing an advice document on critical groups in the first six months of 2003. Stephanie noted that this document would be circulated widely for consultation, and it was agreed that this consultation process would include NDAWG. If the document is sufficiently advanced, a pre-consultation version could be circulated to the Spring meeting of NDAWG.

5. Other relevant work on total dose assessments

NRPB produced a report commissioned and funded by EC DG Environment "Guidance on the realistic assessment of radiation doses to members of the public due to the operation of nuclear installations under normal conditions". A summary document was subsequently published as recommendations from a group of experts set up under the terms of Article 31 of the Euratom Treaty.

John commented that the recommendation about dismissing beta emitters is not correct for all situations.

It was noted that this document may be useful when discussing principles for retrospective assessments, which will be considered by this subgroup.

6. Future work programme and way forward for establishing best practice methodology

The following topics will be considered by this subgroup:

6.1 A retrospective principles document.

The EA are reluctant to embark on a large study similar to the principles document for prospective assessments. However, the discussions at this meeting have raised ideas that would be interesting to follow up. Issues that will be covered under this topic include:

Missing data. In the absence of radionuclide specific data it would be useful to have a list of surrogate radionuclides to use.

Direct radiation

Screening

Dose to an individual or mean dose of critical group to be used for comparison with dose limit

Rob agreed to draft an outline of the principles document and then each member of the subgroup will consider the issue and provide a justification for each principle.

Action RD_Subgroup 1.5 Rob to draft outline of principles document for circulation to other members of the subgroup.

6.2 Further trial of P3-070 methodology

It was agreed that any total dose methodology should be trailed before a rollout programme is started. This subgroup is concerned at directing the way the methodology works as opposed to the implementation of the methodology. Rob has developed a spreadsheet to re-examine the detailed site assessment of Sellafield and he proposed using this for a further trial of the Teeside area. This area has discharges from many small users and hospitals with limited monitoring data available. Other sites agreed on were Aldermaston, Cardiff and a reassessment of the Sellafield area.

Rob will ask CEFAS and FSA whether any integrated data or monitoring data are available to carry out this field trial, preferably in a form that could be easily used in the spreadsheet Rob had previously created.

Action RD_Subgroup 1.6 EA, CEFAS and FSA to collaborate to provide Rob with any available integrated habit data and/or monitoring data for Teeside, Aldermaston and Cardiff areas for use in a future trial.

7. Topics to be discussed at the next meeting

The following topics will be discussed at the next meeting:

- Principles document (retrospective)

- Trials of the methodology at other sites
- NRPB critical group draft document
- EA proposed screening method

8. Date of next meeting

The next meeting will be held in March 2003 at FSA, Aviation House, London.

9. Summary of Actions

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Action RD_Subgroup 1.2 **Rob** to mention the industries view on collaboration between the regulators at the main NDAWG meeting while reporting on the progress from the subgroup.

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Ciara Walsh 5th November 2002