

Habits surveys and assessment of total dose

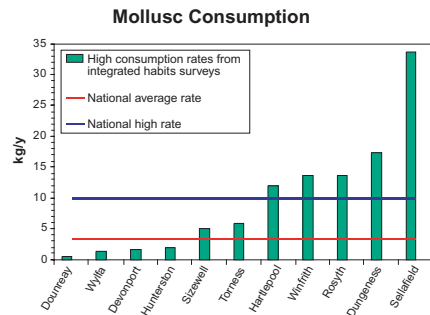
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Habits surveys

- Prospective and retrospective assessments
- All major nuclear sites in UK
- Interviews with potential high-rate individuals
- Integrated across external, food, water and inhalation pathways
- Targetting local food, common and unusual habits
- Relationship with local population – confidence building
- Database and Data Protection
- Adults and children

National and site-specific rates



Uncommon pathways

Sea mouse (*Aphrodite aculeata*)



Goat's milk



Razor shell (*Ensis siliqua*)



Signal crayfish (*Pacifastacus leniusculus*)



Interviews with local people



Site specific issues

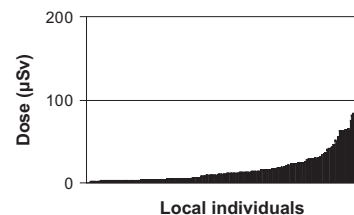


Options for total dose assessment

- Five alternatives evaluated and tested on RIFE monitoring data
- Sum across all major pathways
- Selection of 'most exposed' doses

Option	Process
A. INDIVIDUAL Full calculation of dose to each individual in habits survey; dose for comparison with limit derived by cut-off method	<ul style="list-style-type: none"> • Combine the data from the most recent site-specific habits survey with concentration and dose rate data to determine doses to each individual • Select individuals with doses above 1/3 of the maximum dose • Average the doses to these individuals
B. INDIVIDUAL PLUS As A, but in year 1, derive average rates of consumption and occupancy by the critical group and apply these to future years	<ul style="list-style-type: none"> • In year 1, combine the data from the most recent site-specific habits survey with concentration and dose rate data to determine doses to each individual • Select individuals with doses above 1/3 of the maximum dose • Average the consumption and occupancy habits in each pathway for these individuals, including zero habits <p>Use this derived set of habits data to determine doses by summation over all pathways until a new survey is available</p>
C. CONSTRUCT In year 1, construct a secondary habits dataset made up of all those individuals with habits rates defined to be critical ones, then average the rates and apply these to future years	<ul style="list-style-type: none"> • For each pathway, determine those individuals who have consumption and occupancy rates above 1/3 the maximum rate • Construct a secondary database of all such individuals and their rates for all pathways • Average the rates excluding zeros • Use this derived set of habits data to determine doses by summation over all pathways until a new survey is available
D. TOP-TWO In year 1, derive critical and average rates for each pathway and apply these to future years. Determine doses using the Top-two method previously adopted for terrestrial pathways	<ul style="list-style-type: none"> • For each pathway determine critical consumption and occupancy rates by averaging those rates higher than 1/3 the maximum rate. Apply these until a new survey is available • Divide critical rates by three to obtain average rates. This simplifying assumption has been chosen to correspond to observations made with national habits survey data. Other group specific factors could be used. • Calculate doses for all sets of rate combinations that include two critical rates and the remainder as averages • Use the set of habits which gives rise to the highest dose for comparison with the dose limit
E. PROFILING In year 1, derive profiles of habits rates that correspond to high consumers for each pathway and apply these to future years. Calculate doses for each profile and select the highest dose.	<ul style="list-style-type: none"> • Starting with the first pathway, use the cut-off method to determine critical individuals. Average the consumption and occupancy rates of each of these individuals and assign the habits rates determined as 'Profile A' • Repeat for the second pathway (Profile B), and subsequent pathways. Use these data until a new survey is available • Use the habits profiles to calculate doses • Use the set of habits which gives rise to the highest dose for comparison with the dose limit

INDIVIDUAL method doses at Sellafield



Criteria and ranking

- Reproducibility** – can the approach be easily used for an independent reassessment?
- Rigour and realism** – how good is the match with reality?
- Transparency** – a measure of the ease with which others can understand how the calculations are performed and what they mean.
- Homogeneity** – is the group receiving the dose relatively homogeneous with respect to age, diet and those aspects that affect the dose received? This feature has been recommended as being one to use when defining a critical group.

Paired comparison exercise

Option	Feature	Reproducibility	Rigour and realism	Transparency	Homogeneity	Total score
A. Individual		0	4	2	1.5	7.5
B. Individual plus		3.5	2	3	1.5	10
C. Construct		3.5	1	1	0	5.5
D. Top-two		1.5	0	0	3	4.5
E. Profiling		1.5	3	4	4	12.5

Dose comparisons (µSv)

Site	Rife baseline			Profiling Method
	Direct	Liquid	Gaseous	
Aldermaston & Burghfield	Bkgd	1.2	2.2	<5.0
Amersham	240	<5.0	17	240
Cardiff	Bkgd	17	18	12
Devonport	N/A	<5.0	<5.0	<5.0
Downreay	<10	6.6	7.8	11
Hartlepool	<20	<5.0	<5.0	21
Hunterston	<90	10	22	100
Sellafield	Bkgd	630	36	600
Winfrith	Bkgd	<5.0	<5.0	<5.0
Wylfa	<10	<5.0	<5.0	11

Way forward for NDAWG?

- Position paper on retrospective assessments now published
- Main emphasis to be improvements in use of habits data in prospective assessments. Consider local and national data, approach in other countries and IAEA guidance, solid waste disposal, possible need for additional survey data
- Other issues: review approach for non-nuclear sites, data for non-critical groups and generic data for food, improvements to Total Dose methods, implication of ICRP representative individual, data for short-term releases, freshwater fish and sewage farm workers

Acknowledgments

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