Cefas

Radiological Habits Survey: Amersham, 2004

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Radiological Habits Survey: Amersham, 2004

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SUMMARY

This report presents the results of a survey conducted in 2004 into the habits and consumption patterns of people living, working and pursuing recreational activities in the vicinity of the GE Healthcare Ltd site, located at the Grove Centre near Amersham, Buckinghamshire. GE Healthcare Ltd, formerly Amersham plc, was bought by General Electric and now trades under the name of GE Healthcare Ltd. It manufactures radioactively labelled materials for use in research and medical diagnostic kits and is licensed for the purposes of installing and operating certain activities prescribed under the Nuclear Installations Act, 1965 (as amended). Under the Radioactive Substances Act, 1993 it is authorised to discharge gaseous radioactive wastes via stacks to the atmosphere and liquid radioactive wastes to the sewers serving the Maple Lodge Sewage Treatment Works. Liquid releases from the sewage works enter the Grand Union Canal at the section where the canal and the River Colne are merged together. The site also contains sources of direct radiation.

Potential exposure pathways related to the site include:

- consumption of locally sourced aquatic and terrestrial foods
- occupancy of canal or river banks
- handling fishing gear and canal or river sediment
- occupancy in or on fresh water
- consumption and use of groundwater
- off-site transfer of contamination by wildlife
- occupancy of buildings and the surrounding areas relating to direct radiation
- occupancy in close proximity to sewage sludge or dried sewage sludge (termed sewage cake bio-solids) from Maple Lodge Sewage Treatment Works
- occupancy of land, to which sewage cake bio-solids have been applied
- consumption of food which has been produced on land fertilised by sewage cake bio-solids

Individuals from the local population were interviewed and the data obtained are presented and discussed. Data for 486 individuals were collected. (Although observation numbers go up to

487, number 450 has been deleted.) Gamma dose rate measurements were taken to supplement those made in routine surveillance programmes.

For foods potentially affected by gaseous discharges, high consumption rates were found in three food groups: other vegetables, root vegetables and freshwater plants. For other local foods potentially affected by gaseous discharges, consumption was noted in the following groups: green vegetables, potato, domestic fruit, milk, cattle meat, pig meat, sheep meat, poultry, eggs, wild/free foods, rabbits/hares, honey, wild fungi, venison, freshwater fish and freshwater crustaceans.

The only identified consumption of foods potentially affected by liquid discharges and therefore from the aquatic survey area was for poachers who were reported to consume some foods, including fish from the Grand Union Canal. No quantitative data was available for this pathway.

In the aquatic survey area the main activities were travelling or living on barges, canoeing, canal maintenance, angling, cycling, walking, dog walking and jogging. Reported incidents of children playing in the River Colne were heard. No pathways relating to handling fishing gear (eel nets, etc) or sediments were identified. For occupancy of watercourses affected by gaseous discharges, the activities observed were river maintenance, paddling, working at a watercress farm and trout angling.

At the Maple Lodge Sewage Treatment Works, through which the liquid radioactive waste discharges from the Amersham site pass, some employees spent time in close proximity to sewage sludge or sewage cake bio-solids. The dried sewage cake bio-solids were distributed to farms to be used as a fertiliser.

In the terrestrial environment, up to 5 km from the site, the main activities were farming, allotment maintenance and beekeeping. Consumption and use of groundwater was investigated. No one was found to be consuming water from private springs or boreholes but

livestock had access to surface water at three farms. Transfer of radioactive contamination from the site into the surrounding area by animals was investigated but none was found.

Occupancy habits within 1 km of the site perimeter included those related to residential, educational, work and recreational activities. The highest occupancies were associated with residences.

The data from the survey are presented in full for each individual in order to assist in assessments of the additive effects of exposures from multiple pathways. Additionally, the information recorded during interviews was processed in two different ways to identify high rates appropriate to the various aquatic and terrestrial pathways. One method estimated a representative figure for each pathway by selecting a group at the upper end of the distribution of observations. The other chose the 97.5 percentile rate from the distribution.

Comparisons are made with the results from the previous aquatic and terrestrial surveys. No previous direct radiation surveys have been undertaken at Amersham.

Suggestions are made for changes to environmental monitoring programmes on the basis of the information collected during the survey.

1 INTRODUCTION

The public may be exposed to radiation as a result of the operations at the Amersham site from discharges of liquid or gaseous radioactive wastes into the local environment, or from radiation emanating directly from the site. This report provides information about activities carried out by members of the public, which may influence their radiation exposure. The study has been funded by the Environment Agency, the Food Standards Agency and the Health and Safety Executive in order to support their respective roles in protecting the public from the effects of radiation.

1.1 Regulatory framework

The Environment Agency regulates discharges of waste under the Radioactive Substances Act 1993 (RSA 93) (UK Parliament, 1993) as amended by: the Environment Act 1995 (EA 95) (UK Parliament, 1995a); by legislation implementing the European Union (EU) Basic Safety Standards (BSS) Directive 96/29/Euratom (CEC, 1996); and by the Energy Act 2004 (EA 04) (UK Parliament, 2004). This Directive takes account of Recommendations of the International Commission on Radiological Protection (ICRP), particularly ICRP 60 (ICRP, 1991). Authorisations under RSA 93 are issued by the Environment Agency after wide-ranging consultation, including the Food Standards Agency. As well as being a Statutory Consultee, the Food Standards Agency has responsibilities for ensuring that any radioactivity present in food does not compromise food safety and that authorised discharges of radioactivity do not result in unacceptable doses to consumers via the food chain. The Food Standards Agency also ensures that public radiation exposure via the food chain is within EU accepted limits. Consultation papers on Statutory Guidance to the Environment Agency on the regulation of radioactive waste discharges were issued by the Department for Environment, Food and Rural Affairs (Defra) in 2000 and the Welsh Assembly in 2002. These draft Guidance documents include, *inter alia*, affirmation that protection of the critical groups of the public is the appropriate radiological protection methodology to use. This report provides information to support assessments of critical groups.

Installation and operation of certain prescribed activities can only take place on sites if they are licensed under the Nuclear Installations Act 1965 (as amended) (NIA 65) (UK Parliament, 1965). The Nuclear Installations Inspectorate of the Health and Safety Executive implements this legislation and is also responsible for regulating, under the Ionising Radiations Regulations (IRR 99) (UK Parliament, 1999), the restriction of exposure of the public to direct radiation from operations occurring on these sites.

1.2 Radiological protection framework

UK policy on the control of radiation exposure has long been based on the Recommendations of ICRP which embody the principles of justification of practices, optimisation of protection and dose limitation. Radiological protection of the public is based on the concept of a critical group of individuals. This group is defined as those people who, because of where they live and their habits, receive the highest radiation dose due to the operations of a site. It follows that, if the dose to this group is acceptable when compared to relevant dose limits and constraints, other members of the public will receive lower doses, and overall protection is provided for.

Dose standards for the public are embodied in national policy (UK Parliament, 1995b), in guidance from the International Atomic Energy Agency (IAEA) in the Basic Safety Standards for Radiation Protection (IAEA, 1996) and in European Community (EC) legislation in the EU BSS Directive 96/29/Euratom. The public dose standards were incorporated into UK law in IRR 99. In order to implement the Directive in England and Wales, the Environment Agency was issued with a direction by the Department of the Environment, Transport and the Regions (DETR) (now part of Defra) in 2000 (DETR, 2000). This includes the requirements that the Environment Agency ensure, wherever applicable,

- all public radiation exposures from radioactive waste disposal are kept As Low As Reasonably Achievable (ALARA);
- the sum of such exposures does not exceed the dose limit of 1 mSv a year;
- the dose received from any new source does not exceed 0.3 mSv a year;

- the dose received from any single site does not exceed 0.5 mSv a year.

Guidance on the principles underlying prospective assessments (i.e. assessments of potential future doses) has been provided by a group of UK public bodies (EA, SEPA, DoENI, NRPB and FSA, 2002). Where relevant, this guidance may also be applied to retrospective assessments (i.e. assessments of doses already received). A recent discussion paper (Camplin *et al*, 2002) has considered different ways in which data collected from habits surveys similar to this study may be used to carry out integrated (i.e. combined pathway) dose assessments.

2 THE SURVEY

2.1 Site activity

GE Healthcare Ltd in Amersham, Buckinghamshire, manufactures radioactively labelled materials for use in research and medical diagnostic kits. It is located on the A404 between Amersham and Little Chalfont, approximately 4 km north west of Chorleywood (see Figures 1 and 3). General Electric bought the site, formerly Amersham plc, on 8th April 2004 and trades under the name of GE Healthcare Ltd. The site is known as the Grove Centre, but for consistency with earlier reports is referred to in this report as Amersham.

Under NIA 65 the site is licensed to GE Healthcare Ltd. This allows the installation and operation of certain prescribed activities. Under RSA 93 the company is authorised to discharge gaseous and liquid radioactive wastes. The gaseous radioactive wastes are discharged via stacks to the atmosphere and the liquid radioactive wastes are discharged to the sewers serving the Maple Lodge Sewage Treatment Works (STW). Liquid releases from the sewage works enter the Grand Union Canal (GUC) at the section where the canal and the River Colne are merged together. Details of the amounts of radioactive waste discharged in 2003 have been published (EA, EHS, FSA and SEPA, 2004).

Work involving radioactivity has taken place at Amersham since the 1940's and, unlike a nuclear power station, there are no plans for it to shut down in the foreseeable future (HSE, 2002). Site activity was normal for the duration of the habits survey.

2.2 Survey objectives

The Centre for Environment, Fisheries and Aquaculture Science (Cefas) undertook the survey in 2004 on behalf of the Environment Agency, the Food Standards Agency, and the Health and Safety Executive. The aim of the survey was to obtain integrated habits data related to public

radiation exposure from the Amersham site via aquatic, terrestrial and direct radiation pathways in order to permit realistic assessments of critical group doses.

The last aquatic habits survey conducted by Cefas in the Amersham area was in 1991 and the last terrestrial survey was in 1997 (Tipple and Winpenny, 1998). Data from the aquatic survey are currently being used for dose assessments for the Amersham area (e.g. EA, EHS, FSA and SEPA, 2004). No previous direct radiation habits surveys have been conducted at the Amersham site.

Fieldwork was undertaken in order to obtain site specific habits survey data. These data were used to establish exposure pathways for the local population and the characteristics of those most exposed. General habits survey information for the area was also obtained.

Investigations were carried out to ascertain the following:

- The consumption rates of aquatic and terrestrial foods from within the survey areas
- The production, use and destination of local produce
- External exposure activities on canal or river banks potentially affected by liquid radioactive discharges, handling of fishing gear or handling of canal or river sediments
- Occupancy in or on water in the survey areas (including the Rivers Chess, Misbourne, Colne and the GUC)
- Occupancy in close proximity to sewage sludge or sewage cake bio-solids from Maple Lodge STW
- The consumption and use of groundwater at farms in the terrestrial survey area
- The extent of occupancy within 1 km of the site perimeter, with efforts focused on those properties closest to the site.
- The extent of any unusual practices, which may be relevant, such as the use of sewage cake bio-solids as a fertiliser or soil conditioner and the transfer of contamination off-site by wildlife

2.3 Survey areas

Three survey areas were defined to encompass the dominant activities expected for aquatic, terrestrial and direct radiation pathways (see Figure 1).

The aquatic survey area, shown in Figure 2, included two watercourses - the GUC and the River Colne, from Maple Cross to Denham. More specifically it began at the point where the Maple Lodge STW discharged into the GUC/River Colne. It ended approximately 6 km downstream – on the GUC it ended at Denham Lock and on the River Colne it ended at the confluence with the River Misbourne. In 1991 the survey area included only the GUC from the Maple Lodge STW to the next lock downstream – Copperfield Lock. The decision to extend the survey area on the GUC was taken in order to increase the chance of all activities taking place in water affected by the liquid discharges being observed during the survey. The decision to include the River Colne was taken because even though the Colne is a much smaller watercourse than the GUC, it could still contain liquid discharges from the site. The River Colne meanders around numerous man-made gravel-pit lakes, created through extensive mineral extraction. Water movement from the GUC or River Colne into the lakes, although not impossible via overflow or groundwater movement, would be very limited so the lakes were not included in the area.

The terrestrial survey area, shown in Figure 3, was defined as the circle to a radius of 5 km from the site centre (NGR SU 984 975) to encompass the main areas of potential deposition from gaseous discharges. The same area was investigated in the 1997 survey. Activities relating to springs and groundwater in this area were also investigated in the 2004 survey.

The terrestrial survey area included two watercourses – the Rivers Chess and Misbourne. Although these watercourses are primarily affected by gaseous radioactive discharges, there are instances (for example during severe flooding in 2000) when storm water overflow containing liquid radioactive discharges can enter the River Misbourne. For clarity and to ensure that the Rivers Chess and Misbourne are considered for gaseous discharge assessments, and in the

event of flooding, liquid discharge assessments, results for these rivers are discussed in Section 4 (Aquatic Radiation Doses) and listed in Section 5 (Terrestrial Radiation Doses).

For direct radiation the survey area, also shown in Figure 3, was defined as the area within 1 km of the nuclear licensed site perimeter at Amersham. No previous direct radiation surveys have been conducted around the Amersham site.

2.4 Conduct of the survey

The fieldwork component of the survey was carried out between 10th August and 20th August 2004, by a survey team of four people, according to techniques described by Leonard *et al,* (1982).

A programme of work was sent to the Environment Agency, the Food Standards Agency, and the Health and Safety Executive before the survey for comment. Prior to the start of the fieldwork, discussions were held between the survey team, Amersham site representatives, the Environment Agency, the Food Standards Agency and the Health and Safety Executive. These discussions provided an outline of the main aims of the survey and highlighted areas or items, which required special attention or effort by the team. On 11th August a meeting was held between the survey team and Amersham site representatives. This served to provide details about site operations, including waste disposal, and information about potential pathways and activities in the area. Further information was sought about wildlife studies and pest control measures in and immediately around the site. Animals could be vectors for transporting radioactive materials off-site and are also potential food items for some individuals.

People with a local knowledge of the survey areas were contacted for information on any aspects relevant to the various exposure pathways. These included British Waterways, the Environment Agency, angling societies, Thames Water, water sports clubs, local councils, allotment and horticultural club secretaries and the local British Beekeepers Association secretary.

A meeting was also held on 11th August 2004 with representatives from Thames Water at the Maple Lodge STW to discuss potential exposure pathways relating to sewage sludge. Further correspondence with Thames Water took place on return to the laboratory to confirm exposure pathways relating to sewage cake bio-solids, which are produced from the sewage sludge. The times spent by employees or contractors in close proximity to these materials were sought. Enquiries were also made into the final use and location of the sewage cake bio-solids.

During the survey, individuals who were identified as having the potential to be exposed to radioactivity from the site were contacted and interviewed. Interviews were used to establish individuals' consumption rates of locally grown terrestrial foods and locally caught fresh water foods, their handling rates of canal and river sediments, their occupancy rates relevant to external exposure and their occupancy rates in and on water. Any general information of possible use to the survey was also obtained. Using the information gained in the interviews, a list of occupations and activities was built up to produce a picture of potential exposure pathways. This then enabled emphasis to be placed on those individuals who were likely to be the most exposed and included barge owners, anglers, allotment holders, beekeepers, farmers and individuals living and/or working close to the site.

The survey did not involve the whole population in the vicinity of Amersham, but targeted subsets or groups, chosen in order to identify the potentially most exposed individuals. However, it is possible that even within a subset or group there may be people that we did not interview at the time of the survey. For example, in a densely populated direct radiation survey area, it is not possible to interview every potentially exposed person. In this case efforts are focussed on the people spending time closest to the site. Therefore, to aid interpretation, the number of people interviewed in each group as a percentage of what we estimate to be complete coverage for that group has been calculated. The results are summarised in Table 1. The 'groups' are described and quantified, and the number of people interviewed given as percentages of the totals. It should be noted that for certain groups, such as anglers, it can be virtually impossible to calculate the total number of people who undertake the activity in the

survey area as many people visit from outside or only visit occasionally during the year. In other cases, it may be necessary to estimate the number of individuals from the number of clubs for example. These cases are explained in Table 1. Overall, although the number of potential interviewees was estimated to be 43000, information was obtained for a significantly smaller number than this. In particular, it should be noted that the survey did not include employees or contractors of the Amersham site whilst they were at work. Dose standards applicable to them are different to those for members of the public.

The aquatic, terrestrial and direct radiation elements of the survey primarily targeted pathways relevant to those elements. For example, people in the terrestrial survey were initially questioned because it was known that they grew significant quantities of terrestrial foodstuffs. However, where possible, every interviewee was asked about pathways in each of the three areas. During interviews with representatives from companies, such as Thames Water, it was not possible to collect data for all pathways (such as consumption of local foods) for each employee. In these cases, data were limited to those relating to the primary reason for the interview (e.g. for Thames Water this was the exposure to the sewage sludge or sewage cake bio-solids from the Maple Lodge STW). In Annexes 1 and 2, such individuals only have data for the pathways of primary interest.

In cases where we were unable to establish quantitative data for significant pathways, all available data were recorded so that we could make an estimate of the rates on return to the laboratory. These cases are highlighted as estimates in the relevant sections of the report and collated in Annex 3. In cases where there was not enough data to estimate a rate, qualitative data has been included in the report text and in Annex 3. No observation numbers have been assigned to people or groups of people mentioned in Annex 3, however, Annex 3 will enable pathways or high rates, which may otherwise have been missed, to be more easily incorporated into dose assessments. The types of data included in Annex 3 are for example activities taking place which we have seen or heard reports of, but been unable to interview the individual(s) involved. No individual in Annex 3 is duplicated in Annexes 1 or 2.

Thirty-six person-days were spent investigating the survey areas and interviewing individuals who were relevant to the survey. Observations for 486 individuals were recorded. During the survey, some gamma dose rate measurements were taken to aid assessment of external exposure pathways.

3 METHODS FOR DATA ANALYSIS

3.1 Data recording

Data collected during the fieldwork were recorded in logbooks. On return to the laboratory, the data were examined and any notably high rates were double-checked where possible by way of a follow-up phone call. In rare cases where follow up phone calls are not possible (e.g. mollusc collectors who wish to remain anonymous) the data has to be accepted at face value. The raw data were entered into a habits survey database where each individual for whom information was obtained was given a unique identifier (the observation number) to assist in maintaining data quality.

During the interviews, people could not always provide consumption rates in kilograms per year for food or litres per year for milk. In these cases, interviewees were asked to provide the information in a different format. For example, some estimated the size and number of items, e.g. eggs consumed per year, whereas others gave the number of plants in a crop or the length and number of rows in which the crop was grown. The database converted these data into consumption rates (kg/y for food and l/y for milk) using a variety of conversion factors. These included produce weights (Hessayon, 1990 and 1997 and Good Housekeeping, 1994), edible fraction data researched by Cefas and information supplied by the Meat and Livestock Commission. For the purpose of data analysis, foodstuffs were aggregated into food groups as identified in Table 2. Specific food types relevant to this survey are presented in the subsequent tables.

All consumption and occupancy data in the text of this report are rounded to two significant figures to reflect the authors' judgement on the accuracy of the methods used. In the tables and annexes, the consumption rate data are usually presented to one decimal place. Occasionally this rounding process causes the row totals to appear slightly erroneous ($\pm$ 0.1). Consumption rates less than 0.05 kg/y are presented to two decimal places in order to avoid them appearing as 0.0 kg/y. External exposure data are quoted as integers.

To ensure the quality of the data collected during the survey fieldwork and presented in the report, the following procedures have been employed:

- Experienced scientific staff were used for fieldwork and data assessment. They had been trained in the techniques of interviewing and obtaining data for all pathways, which were relevant to the survey being conducted. Where individuals offered information during interview which was unusual, they were questioned further in order to double check the validity of their claims.
- Where possible, interviewees were contacted again to confirm the results of the initial interview if, when final consumption or occupancy rates were calculated, observations were found to be high in relation to our experience of other surveys, taking into account local factors.
- Data were manipulated in a database using a consistent set of conversion factors.
- Data were stored in a database in order to minimise transcription and other errors.
- Draft reports and data tables were formally reviewed by an experienced consultant in radiological protection.
- Final reports were only issued when the Environment Agency, the Food Standards Agency and the Health and Safety Executive were entirely satisfied with the format and content of the draft.

The habits data are structured into groups of activities with similar attributes. For example, when considering terrestrial food consumption, all types of root vegetables are grouped together in a food group called ‘root vegetables’. Similarly, for aquatic food consumption, all crustacean species are grouped as ‘crustaceans’. For external exposure over intertidal, canal or river bank sediments, occupancy over a common substrate, (for example, sand) is chosen. The choice of a group of activities is made when it is reasonable to assume that consistent concentrations or dose rates would apply within the group. In addition to grouping of activities, ingestion data are structured into age groups because different dose coefficients (i.e. the factors which convert intakes of radioactivity into dose) can apply to different ages. These age groups are from 0 to 1.0 y of age (called 3 months old); more than 1.0 y to 2.0 y (called 1 year old); more than 2.0 y to

7.0 y (called 5 year old); more than 7.0 y to 12.0 y (called 10 year old); more than 12.0 y to 17.0 y (called 15 year old). Individuals over 17 are treated as adults. These age groupings are consistent with those used in ICRP 72 (1996). For direct radiation pathways the data are grouped into distance zones from the site perimeter as a coarse indication of the potential dose rate distribution due to this source of exposure. The bands used were: 0 – 0.25 km, 0.25 – 0.5 km and 0.5 – 1 km. These distance bands are also useful when assessing exposure to gaseous discharges.

3.2 Data analysis

The main output of the study is the statement of individuals' consumption and occupancy rates given in Annexes 1 and 2. Annex 3 contains qualitative or estimated data to supplement Annexes 1 and 2. These can be used by those undertaking radiological assessments of the effects of the operation of the Amersham site – taking into account the concentration and/or dose rate distributions in space and time relevant to the assessment. It is only with the outcome of such an assessment that the critical group can strictly be defined as those most exposed.

In addition to providing the data in the Annexes, we have also analysed them to provide estimates of rates of occupancy and consumption which can be regarded as typical of those most exposed prior to a formal assessment being undertaken. Two approaches are used.

Firstly, the 97.5 percentile rate was calculated for each group using the Excel mathematical function for calculating percentiles. This method accords with precedents used in risk assessment of the safety of food consumption. Mean and 97.5 percentile rates based on national statistics have been derived by the Ministry of Agriculture, Fisheries and Food (MAFF) (now part of Defra) and the Food Standards Agency (Byrom *et al,* 1995 and FSA, 2002), and these are referred to as generic rates in this report. Secondly, the 'cut-off' method described by Hunt *et al* (1982) was used. With the 'cut-off' method, the appropriate high rate was calculated by taking the arithmetic mean of the maximum observed rate and all rates observed within a factor of three of the maximum value (termed the lower threshold value). It accords with the

principle expressed by ICRP (ICRP, 1984) that the critical group should be small enough to be reasonably homogeneous with respect to age, diet and those aspects of behaviour that affect the doses received. In this report, the term critical group rate is used to represent the data derived by the 'cut-off' method for ease of presentation. A separate critical group rate was calculated for each food group or activity identified in the survey.

In exceptional cases the 'cut-off' method can result in only one member of the high rate group. In this case, judgement is used as to whether to include other individuals in the group.

In previous aquatic surveys (those undertaken prior to 2002) a factor of 1.5, instead of 3, was used to define the cut-off value for intertidal (or in this case, canal and river bank) occupancy and handling. However, it is now considered appropriate that the same factor of 3, as for consumption, is used. The factor reflects variations in the doses likely to be received due to natural variations in the interactions of radiations with tissues caused by, for example, differences in anatomy.

For ingestion pathways, high rates for children have been calculated from the survey data. However because few child consumers were identified, as shown in Table 1, the rates should be viewed with caution. For assessment purposes, an alternative, theoretical approach may be taken which involves scaling the critical group rates for adults by ratios. These ratios are given in Annex 4 and have been calculated using generic 97.5 percentile consumption rates.

Selection of 97.5 percentile and critical group rates for occupancy is not made for the direct radiation pathway. Such an analysis is of limited value without a detailed knowledge of the spatial extent of dose rates due to direct radiation.

For the purposes of assessing total dose integrated across all pathways, the data from the survey can be further analysed to take into account the degree of overlap of each pathway. This is discussed further in Section 7 and data to undertake a total dose assessment are provided in Annex 5. Data from Annex 3 are not included in Annex 5.

4 AQUATIC RADIATION PATHWAYS

4.1 Aquatic survey area

The aquatic survey area is shown in Figure 2. It started at Maple Lodge STW and comprised two watercourses – the GUC as far as Denham Lock and the River Colne as far as the confluence with the River Misbourne. The two watercourses from the terrestrial survey area – the Rivers Chess and Misbourne, are discussed in this section.

The Grand Union Canal

The western bank of the canal was well maintained and was easily accessible because of the towpath running alongside it, which had recently been resurfaced with gravel by British Waterways. The towpath was in constant use by cyclists, dog walkers, walkers, joggers and the occasional angler. Between Maple Lodge STW and South Harefield the eastern bank was much less accessible with only a few short stretches served by public footpaths. Between South Harefield and Denham Lock where the canal flowed through Denham Country Park, the Colne Valley Trail ran alongside the eastern bank of the canal making it more accessible. Barge traffic on the canal was fairly regular and two canoeists were also seen.

The northern most part of the survey area, where the discharge from Maple Lodge STW entered the GUC, was popular with anglers due to the slightly elevated water temperatures attracting more fish. On one occasion a barge was seen moored just south of the sewage treatment works. The occupants were interviewed and typically spent 2 months of the year in the survey area.

Coppermill Lock was the first lock downstream. Several houses were located around the lock and vehicular access was possible. Between Coppermill Lock and Coppermill Lane there was a canoe slalom owned by Broadwater Sailing Club but nobody was seen using it during the survey. To the south of Coppermill Lane were two barges, the occupants of which were

interviewed. One was permanently moored in the survey area and the other spent about 3 months per year in the survey area.

The next lock downstream was Blackjacks Lock. Just to the south of the lock were two permanently moored barges. Interviews were only conducted with one owner as the other was on the inaccessible eastern bank. Eastern European asylum seekers consuming wild foods from around the canal were reportedly seen in this area (see Section 4.5).

One more permanently moored barge was located further downstream near to Widewater Lock and the owner was interviewed. In addition, one barge which spent approximately 2 months per year in the survey area and two barges which were in the area for shorter periods of time were interviewed here. This area was also popular with anglers as access was good via Moorhall Road.

Between Widewater Lock and Denham Lock the GUC ran through the Denham Country Park which is a more picturesque, wooded area, hence this stretch of the canal was more popular with walkers and dog-walkers. Access for this 2.5 km stretch of the canal was gained either from the north at Moorhall Road or from the south at the A40. Two permanently moored barges were situated just upstream of Denham Lock. An interview was conducted with the owners of one of the barges.

The River Colne

Interchanges of water between the GUC and the River Colne were frequent in the survey area. At the northern most point of the survey area the River Colne and the GUC both flowed through the GUC channel. The first divergence occured a couple of hundred metres downstream where the river separated and ran through private land. Some of the properties with gardens bordering the River Colne had private moorings with various types of river craft moored to them. The river was generally small and inaccessible to the public from the Maple Lodge STW down to

Coppermill Lane where it flowed through the grounds of a public house. Patrons could theoretically paddle in the river here but no-one was observed doing so during the survey.

Between Coppermill Lock and Blackjacks Lock the River Colne flowed alongside the canal, joining it and diverging away again in places. At these junctions, one of which was called Horseshoe Falls, the team heard reports of children playing in the water in fine weather, though none were seen during the survey (see Annex 3).

The River Colne then meandered around a series of large, private gravel-pit lakes (which were fed by groundwater and so were not considered as part of the survey) and there was little public access to it until south of the railway bridge near Denham Green. From the railway bridge down to the confluence with the River Misbourne the river banks provided better access to walkers and anglers. Several places had been cleared by anglers for fishing although the team only saw one angler here during the survey. No other activities such as canoeing or boating were observed on the river, probably due to its small size and shallow water depth.

4.2 Commercial fisheries and food production

No commercial fishing was identified on either the GUC or the River Colne.

Small scale commercial trapping of signal crayfish was carried out by one fisherman at a lake on the River Misbourne. With the exception of the portion kept for the fisherman's personal consumption, the catch was sold to a wholesaler in Aylesbury.

Commercial production of watercress took place at a farm on the River Chess and wild watercress grew along both rivers. Consumption of farmed watercress was noted for the people working there. The watercress was sold at local markets as well as nationally to a wholesaler.

4.3 Angling

British Waterways granted one angling club the rights to fish along the stretch of the GUC in the survey area. The club had approximately 170 members, although not all the members actively fished in the survey area. The club had a scheduled match at Harefield, which took place during the habits survey so the survey team went to interview people that day. Unfortunately turnout was much lower than expected with only six people entering the match. The main catch in the GUC was bream (*Abramis brama*) and roach (*Rutilus rutilus*) but as anglers were not allowed to remove fish from the canal, no consumption was identified. Access to the entire length of the canal was good so anglers could fish throughout the survey area with the exception of the areas immediately up and downstream of the locks where fishing was banned. The point where the discharges from the Maple Lodge STW entered the canal was especially popular due to the slightly raised water temperatures attracting more fish. The stretch just upstream from Widewater Lock at South Harefield was also popular because anglers could park their cars conveniently close to the canal.

The public angling rights on the River Colne were split between five angling clubs. However, access to the river was very difficult in most places. Very little angling on the River Colne was observed although it was reported that the most popular place was in the southern part of the survey area between the railway bridge and the A40 road bridge. Evidence of angling, such as cleared areas on the river banks and in the water, was noted here. The occupant of a house situated between the canal and the river in the northern part of the survey area reported fishing in the river from his garden, which the river ran through.

One fishing club and three private fishing syndicates were identified on the River Chess or lakes fed by the River Chess. The club had a membership of approximately 100 people and the syndicates had a combined total of 19 people. Typically, fishermen ate the rainbow and brown trout they caught and shared catches shared between family and friends.

One small syndicate fished for trout on the lake on the River Misbourne.

4.4 Wholesalers and retailers

As a result of there being very little commercial fishing in the survey area, the only foods sold to wholesalers were crayfish and watercress. Neither of these wholesalers were local to the survey area.

4.5 Internal exposure

No consumption rates for fish, crustaceans, molluscs or plants from the GUC or River Colne were identified. However, although removal of fish from the GUC was not allowed, the survey team heard reports of two groups of people who might have taken fish to eat from the canal illegally (see Annex 3). One group was Eastern European immigrants. This group of people was reported to consume fish from the canal, as well as rabbits, swans and ducks from the canal area. The other group was anglers who fished on the canal and who might have kept the occasional trout they had caught, rather than releasing it back into the canal. Although nobody interviewed admitted knowing anyone who had done this, it cannot be ruled out as a possibility. Due to the sensitive nature of this issue, it was not possible to interview the people involved so no consumption rates were ascertained (see Annex 3).

Consuming fish from the River Colne was allowed. However anglers reported that most fish caught would have been coarse fish, which would not have been be consumed and that very little game fish, such as brown trout (*Salmo trutta)* or rainbow trout (*Salmo gairdneri)*, would have been caught and/or consumed.

So as not to under-estimate the amount of fish being consumed from the GUC and River Colne, a consumption rate of 1 kg/y could be assumed for assessment purposes. This nominal amount allows for fish eaten by the two groups mentioned above and is consistent with the assumed rate from the 1991 habits survey report and the amount used in Radioactivity in Food and the Environment, 2003 (RIFE 9) (EA, EHS, FSA and SEPA, 2004).

It should be noted that Hilton *et al*, (2003) used consumption rates of 2 kg/y and 20 kg/y for freshwater fish from the upper River Thames and the River Colne respectively. The rate of 2 kg/y for the upper River Thames was chosen as it was the same as that used by Burholt and Martin in their radiation dose assessment model (Hilton *et al,* 2003), and it was twice the default value used in RIFE 9. The rate of 20 kg/y applied to a 42.5 km stretch of the River Colne, and was the default value recommended by NRPB. The 42.5 km stretch included our 6 km survey area.

Consumption of freshwater fish (rainbow and brown trout), freshwater crustaceans (crayfish) and freshwater plants (water cress) from the Rivers Chess and Misbourne was identified.

4.6 External exposure

Canal and river bank occupancy

Table 3 shows the data for occupancy on the banks of the GUC and River Colne recorded during the survey. Observations for the bank of the GUC were over gravel on the towpath and observations for the banks of the River Colne were over grass. The canal towpath was about 1 metre wide and was set back from the canal by a strip of grass between half and 1 metre wide in most places. As the canal towpath has been constructed from material brought in from elsewhere and the likelihood of the canal flooding the towpath is very low, it is improbable that people using the canal towpath are exposed to radioactivity from the Amersham site.

The maximum occupancy rate recorded over the gravel of the towpath on the bank of the GUC was 920 h/y for someone who worked on the bank and went angling too. Three people carrying out canal maintenance, one house boat occupant, one dog-walker and one jogger had occupancy rates within a factor of three of this giving a mean rate of 640 h/y.

Only one person, an angler, was identified with occupancy over grass on the banks of the River Colne. His rate was 60 h/y.

Bank side occupancy for the Rivers Chess and Misbourne was investigated but is not included in the tables. Occupancy rates for anglers on lake and river banks varied greatly from 60 h/y up to several hundred h/y. Two men worked in and around the rivers as part of their jobs. One spent 60 h/y on the banks of the River Misbourne and 30 h/y on the banks of the River Chess and the other spent 72 h/y on the banks of the River Chess. Six people interviewed went walking along the banks of the River Chess, mainly between Chenies and Sarratt, and the highest occupancy recorded was 48 h/y for two people.

Handling

No observations were recorded for anyone handling commercial fishing gear or sediments from the GUC or River Colne. Handling of angling equipment was not considered to be a significant pathway. Therefore, as in previous surveys, data for this pathway were not collected.

Gamma dose rate measurements

Representative gamma dose rate measurements at 1 m above the substrate were taken. These measurements (Table 4) ranged from 0.043 µGy/h over gravel next to the GUC to 0.057 µGy/h over mud and gravel next to the River Colne. A measurement over grass was also taken. A value of 0.06 µGy/h is expected for natural substrate types.

Exposure to sewage sludge or sewage cake bio-solids

Exposure pathways relating to sewage sludge and sewage cake bio-solids at or from Maple Lodge STW were investigated as these works receive Amersham's liquid discharges. Activities, which took place in the sewer between the entry point of the liquid discharges and the sewage works were not considered.

The sewage entered the sewage works where it underwent treatment for waste water. The thicker sewage sludge sank to the bottom of treatment tanks and was transferred to a drying plant. The sludge is de-watered to a consistency similar to damp peat and was called sewage cake bio-solids. Sewage cake bio-solids were then despatched to farmers for use as a fertiliser and applied almost exclusively to arable land.

Maple Lodge STW supplied between 100 and 150 farms with the sewage cake bio-solids last year. Farms were located between 10 and 60 km away from the STW with the average being about 45 – 50 km. No farms in the survey areas were found to be using the sewage cake bio-solids and none were sold directly to the public.

Employees or contractors at the sewage treatment works spent time in close proximity (within 10 metres) to the sewage sludge or sewage cake bio-solids during processes such as servicing the machinery, cleaning and clearing pumps and pipes, clearing debris or distributing the sewage cake bio-solids. Table 5 shows the employees' occupancy rates in close proximity to the sewage sludge and sewage cake bio-solids.

The highest occupancy rate near sewage sludge was 1800 h/y for 10 employees. The highest occupancy rate near sewage cake bio-solids was 1100 h/y for three employees. No data has been collected for pathways related to other aspects of sewage disposal or treatment, such as people working in the sewers between the Amersham site and Maple Lodge STW.

4.7 Water based activities

Activities taking place in or on the water can lead to ingestion of water and/or inhalation of spray. These pathways are generally considered to be minor in comparison with other exposure pathways such as the ingestion of foods produced in the vicinity of a nuclear site. However, in order to allow for their assessment, relevant data have been collected.

Interview data were collected for people spending time in or on the GUC and the Rivers Chess and Misbourne and are shown in Table 6. There were no data for the River Colne. Table 6 indicates whether the observations are for water affected by liquid or gaseous discharges. This table includes two children. No further manipulation of the data (for example, calculating critical group rates) has been carried out.

Activities in the water

No-one was found to be spending time in water in the aquatic survey area. Activities recorded for the Rivers Chess and Misbourne included working at a watercress farm, river maintenance and paddling. The highest occupancy rate was 1900 h/y for three people working at the watercress farm.

In addition to the observations in Table 6, the survey team heard reports of, or saw people playing in the water on the River Colne at Horseshoe Falls (in the aquatic survey area) and in the River Chess at the ford in Chenies (in the terrestrial survey area). No occupancy rates for these people were gained.

Activities on the water

In the aquatic survey area, no observations were made for activities taking place on water in the River Colne. Activities taking place on the GUC included travelling or living on barges and canoeing. The person with the highest occupancy rate on water in the GUC was a houseboat occupant whose boat was permanently moored in the survey area. He was interviewed and his occupancy rate was 8000 h/y. The survey team identified a further five houseboats permanently moored in the survey area and interviews were held at three of them. As well as permanently moored barges, three barges were identified which were in the area for a few months of the year and another two were identified who spent shorter periods of time in the survey area.

Activities taking place on water in the terrestrial survey area were limited to three anglers on Misbourne Lake. Their occupancy rate was 270 h/y.

5 TERRESTRIAL RADIATION PATHWAYS

5.1 Terrestrial survey area

The terrestrial survey area covered all land and watercourses within 5 km of the site centre (NGR SU 984 975) as shown in Figure 3. It included a few large centres of population interspersed amongst sparsely populated rural areas. The largest town was Amersham, followed by the southern part of Chesham and all of Little Chalfont. Chorleywood and Chalfont St. Giles, in the south-east and south of the area respectively, were smaller towns. The River Chess flowed through the northern half of the area, entering in the north-west at Chesham and travelling towards the east. The River Misbourne flowed through the southern half of the area, entering in the east and travelling towards the south through Chalfont St. Giles.

Thirty-three working farms or smallholdings within 5 km of the site centre were visited. No one particular type of farming dominated the area – instead a diverse range of small-scale farming took place. Twenty-three farms kept livestock, of which:

- eight kept beef cattle
- five kept sheep
- two kept beef cattle and sheep
- one kept sheep and pigs
- one kept beef cattle, dairy cattle and chickens for meat
- one kept pigs, and chickens for eggs
- two kept chickens for eggs
- one kept geese for meat
- one kept goats for dairy products
- one kept beef cattle, sheep, geese and turkeys for meat and chickens and ducks for eggs

Of the 23 farms keeping livestock, 12 grew arable crops as well. Ten other farms had no livestock but just grew arable crops. Arable crops grown at farms in the area included wheat, barley, oats, corn, peas, linseed, rape and grass for silage and hay.

Beef and sheep from the survey area were most commonly sold through the Thame livestock market located in Oxfordshire, outside the survey area. Alternatively, beef was sold to a slaughterhouse/meat processors also outside the area, to other farmers around the country or directly to local customers. One farmer sold lamb through Colchester Market and another sold it to a private farmer outside the survey area. Pork was sold via farmers markets around London and the Home Counties, to a butcher outside the area and directly to local customers. Chicken and geese kept for meat were sold directly to local customers.

The cow's milk was sold to First Milk – a national company. No dairies were located within the survey area. However, two dairies located outside the area were supplied with goat's milk from within the area, and secondary products made from goat's milk such as cheese and yoghurt were sold at farmers markets around London and the Home Counties. One large-scale producer of chicken eggs sold them to a wholesaler in Wiltshire and the eggs reportedly ended up in national supermarkets. Other chicken and duck eggs were sold to a variety of local shops and directly to local customers.

Arable crops such as grass, silage, hay and occasionally wheat were usually kept on the farms or sold directly to other farmers for use as winter feed for livestock. The rest of the arable crops were sold to grain merchants or wholesalers based outside the survey area.

Six farmers or smallholders and their families consumed beef, lamb and/or pork, from their farms. Four other families interviewed bought pork or lamb directly from these local producers. The families producing cow's and goat's milk both drank milk from their animals. All four families selling chicken eggs consumed eggs from their own farms and a further nine local families interviewed bought eggs from these producers. No chicken or turkey meat from local farms was

consumed by farmers or their families. One farmer producing geese kept a small amount back for his family.

A vineyard was located in the area and although several visits were made during the survey it was shut on each occasion so no details were obtained. It looked to be a commercial vineyard but had no shop on site selling directly to the public. One Pick-Your-Own farm selling seven varieties of soft fruit was open to the public during the summer. Two nurseries within the survey area were selling vegetables. One sold a few varieties of young vegetable plants for customers to finish growing at home and one grew and sold many varieties of mature organic vegetables.

There were 12 separate allotment sites (highlighted in Figure 3) within 5 km of the site centre and the total number of allotment plots was around 320. Four sites were privately owned and seven were owned by the local council in the town or village where they were based. One site was adjacent to a railway line and used to belong to the railway company. Current ownership of this site is unknown. A great variety of fruit and vegetables were grown at the allotment sites. In addition, poultry (chickens, ducks, geese and turkeys) was also kept at one site. One tenant kept livestock (sheep and cattle) in addition to poultry at this same allotment site but he has been classed as a smallholder and included in the farms and smallholdings paragraphs above.

Consumption of foods from private gardens was noted. In addition to the usual varieties of fruit and vegetables grown, which are listed in the tables of this report, one family grew hops for beer production. Consumption rates were difficult to calculate as the hops weigh so little and are then processed meaning even less is subsequently consumed. One household kept goats in its garden on a non-commercial basis and consumed goat's milk, cheese and yoghurt, which were also given to friends and neighbours. The team heard that one person kept pigs and consumed the pork but it was not possible to interview this person. Eleven households interviewed kept chickens or ducks for eggs and any excess eggs were sometimes sold from the door to friends and local customers. Four families ate locally reared domestic poultry.

Beekeeping was very common in the terrestrial survey area. Fourteen beekeepers with hives in the area were identified, of which 12 were interviewed. Eleven of the 12 kept between two and five hives each and the other kept 15 hives. The average yield per hive was 15 kg/y. Honey was sold commercially through a couple of local outlets as well as to customers directly from the door. Excess honey was given to families and friends or in some cases sold at shows or fêtes both inside and outside the survey area.

Two private shoots took place on farmland in the survey area – one to the south-west of the site and the other to the north-east. Local farmers and residents shot pheasant, partridge, duck, wood pigeon, deer and rabbit for their own consumption. Meat from the shoots was sold directly from the farm, at farmers markets and from a butcher within the survey area. Other farmers did rough shooting for pheasant and rabbit on their own farmland.

The transfer of contamination from the Amersham site by wildlife was investigated. At the site meeting staff were asked if they were aware of wildlife that could act as vectors for the transfer of radioactivity off site. Staff were not aware of any wildlife living on site as it is a concrete site with very little natural habitat. For this reason they do not have a culling or sampling programme in place at present.

Consumption of other wild foods included blackberries, sloes, hazelnuts, elderflowers and mushrooms. Blackberries were collected from the edges of allotment sites, from hedges at the side of the roads or by farmers on their own farmland. Three families consumed wild sloes and one consumed wild hazelnuts but only in very small amounts. Mushrooms tended to grow on farmland so were mainly consumed by farmers and their families. One family collected elderflowers for making into cordial but it was impractical to calculate consumption rates due to the light weight of the flowers.

All households interviewed were on mains water and no-one drank from any private sources of water such as wells, boreholes or springs. Livestock on three farms had access to water from the Rivers Chess or Misbourne or surface water.

A mineral water bottling plant was located in Chesham. A maximum of 1000 m^3/week of water from boreholes sourced by a chalk aquifer from a depth of around 34 metres was bottled and distributed for sale all over the UK.

Exposure pathways relating to watercourses in the 5 km terrestrial area – the Rivers Chess and Misbourne – were investigated. These watercourses were small and access was restricted in most places as they ran through private land. The results for these rivers are discussed in Section 4. The following activities were identified: commercial crayfish trapping in the lake on the River Misbourne, commercial watercress production on the River Chess, angling on the River Chess and on lakes fed by both rivers, bank side occupancy for both rivers, consumption of fish and crustaceans from the lake on the River Misbourne, consumption of fish and water cress from the River Chess, occupancy in water in both rivers and occupancy on water for the lake on the River Misbourne.

5.2 Wholesalers and retailers

Retailers, including greengrocers, butchers and convenience stores, in the survey area were interviewed in order to find out whether they were selling produce from the survey area. Eleven retail outlets were visited, of which five sold no locally sourced foods. Five butchers and one delicatessen sold locally sourced foods including game birds from local shoots, trout from local lakes, eggs and honey. Market stall holders were also interviewed but the only local produce sold was watercress from the watercress farm sold by one stall holder.

5.3 Internal exposure

Consumption data for locally produced foodstuffs potentially affected by gaseous discharges are presented in Tables 7 to 25 for adults and Tables 26 to 39 for children. These tables include the mean consumption rates of the critical groups together with the observed 97.5 percentile rates calculated as described in Section 3.2. For purposes of comparison the data are summarised in

Table 40 for adults, and Tables 41 to 44 for children (15 year olds, 10 year olds, 5 year olds and 1 year olds respectively). No children in the 3 month old age group were noted to be consuming locally produced foods potentially affected by gaseous discharges.

In order to provide information relevant to surveillance and assessments studies, the consumption rate data collected during the survey were analysed to indicate which food types most commonly contributed to each food group. The data are summarised in Table 45. Those food types shown in bold and labelled with an asterisk were sampled as part of the 2003 Food Standards Agency monitoring programme (EA, EHS, FSA and SEPA, 2004).

Adult consumption rates

Consumption of locally produced foods was identified in the following 19 food groups: green vegetables, other vegetables, root vegetables, potato, domestic fruit, milk, cattle meat, pig meat, sheep meat, poultry, eggs, wild/free foods, rabbits/hares, honey, wild fungi, venison, freshwater fish, freshwater crustaceans and freshwater plants. No consumption of local cereals was identified.

When compared with the generic 97.5 percentile consumption rates, the critical group mean consumption rate was greater only for root vegetables. No generic consumption rate data exists for freshwater plants so no comparison can be made, however, the high consumption rates for this food group should be noted. A further nine critical group mean consumption rates exceeded the generic mean consumption rates. These were for green vegetables, other vegetables, potato, domestic fruit, milk, cattle meat, sheep meat, eggs and honey. One observed 97.5 percentile consumption rate, for root vegetables, exceeded the generic 97.5 percentile consumption rate. Again, no comparison can be made but the high observed 97.5 percentile for freshwater plants should be noted.

Children's consumption rates

15 year old age group

Twenty-three children in this age group were identified to be eating locally produced food. Consumption was identified in the following 14 food groups: green vegetables, other vegetables, root vegetables, potato, domestic fruit, milk, pig meat, poultry, eggs, wild/free foods, rabbits/hares, honey, wild fungi and freshwater plants. No consumption was identified for the following food groups: cattle meat, sheep meat, venison, freshwater fish, freshwater crustaceans and local cereals.

Two critical group mean consumption rates, for other vegetables and root vegetables, exceeded the generic 97.5 percentile consumption rates. (The notes on freshwater plants for adults also apply to this age group.) The critical group mean consumption rates for a further five food groups; green vegetables, domestic fruit, pig meat, eggs and honey, were higher than their respective generic mean consumption rates. The observed 97.5 percentile consumption rate exceeded the generic 97.5 percentile consumption rate for other vegetables and root vegetables.

10 year old age group

Eighteen children in this age group were identified as eating locally produced food. Consumption was identified in the following 10 food groups: green vegetables, other vegetables, root vegetables, potato, domestic fruit, poultry, eggs, wild/free foods, honey and freshwater plants. No consumption was identified for the following food groups: milk, cattle meat, pig meat, sheep meat, rabbits/hares, wild fungi, venison, freshwater fish, freshwater crustaceans and local cereals.

No critical group mean consumption rates exceeded the generic 97.5 percentile consumption rates. The critical group mean consumption rates for four food groups; other vegetables, root

vegetables, eggs and honey, were higher than the generic mean consumption rates. (The notes on freshwater plants for adults also apply to this age group.) No observed 97.5 percentile consumption rates exceeded the generic 97.5 percentile consumption rates.

5 year old age group

Nineteen children in this age group were identified as eating locally produced food. Consumption was identified in the following nine food groups: green vegetables, other vegetables, root vegetables, potato, domestic fruit, poultry, eggs, honey and freshwater plants. No consumption was identified for the following food groups: milk, cattle meat, pig meat, sheep meat, wild/free foods, rabbits/hares, wild fungi, venison, freshwater fish, freshwater crustaceans and local cereals. No generic 97.5 percentile or generic mean consumption rates have been determined for this age group so no comparisons with the corresponding observed rates are possible.

1 year old age group

Two children in this age group were identified as eating locally produced food. Consumption was identified in the following five food groups: green vegetables, other vegetables, root vegetables, potato and domestic fruit. No consumption was identified for the following food groups: milk, cattle meat, pig meat, sheep meat, poultry, eggs, wild/free foods, rabbits/hares, honey, wild fungi, venison, freshwater fish, freshwater crustaceans, freshwater plants and local cereals. No generic 97.5 percentile or generic mean consumption rates have been determined for this age group so no comparisons with the corresponding observed rates are possible.

6 DIRECT RADIATION PATHWAYS

6.1 Direct radiation survey area

The direct radiation survey area covered all land within 1 km of the Amersham site perimeter fence, as shown in Figure 3. It was a busy area, bisected from the east to the west by the A404 (White Lion Road), which ran along the northern edge of the site. Parallel to the A404 but 100m further north was a train track.

Immediately to the north of the site between the A404 and the train line was a densely populated area of housing including some four-storey flats and a church. To the north of the train line was a large saw mill/timber merchants and a school. The rest of the land to the north of the survey area was used by a farmer for growing arable crops such as wheat and barley. One working farm producing chicken eggs was found in this area.

The north-eastern sector of the survey area was taken up with the village of Little Chalfont. Roughly three quarters of the village was located within the survey area. As well as housing, this area had many local amenities such as shops and a train station.

Chilcote Lane and Finches Lane ran along the eastern edge of the site. Along these roads, 18 residential properties, a church, a pub, a rifle club building and the GE Healthcare Ltd off-site library were identified. These were among the closest properties to the site. To the south-east of the area between 0.5 and 1 km from the site was more of the village of Little Chalfont.

Two residential properties were located immediately to the south of the site. Apart from these and a few houses on the outskirts of the area, the southern and south-western sectors of the direct radiation survey area were largely agricultural land. There was one smallholding in this sector.

Six properties, including one working farm, were located on a track running along the west of the site. The farm used to have a cherry orchard, which had become too old to be commercially productive. Further out to the west and north west of the area was the south-eastern extremity of the town of Amersham. This included three schools, a large college, the Corinium Industrial Estate/Business Centre and some houses. An allotment site with two productive plots was located just under half a kilometre from the Amersham site on the eastern edge of Amersham.

6.2 Residential activities

The two main residential areas were the village of Little Chalfont to the east and the edge of Amersham to the north-west. There were also a small number of houses surrounding the site and a cluster in the extreme south west of the area. Two residential properties were also working farms and one was a smallholding. The survey focused on identifying those people likely to have the highest occupancies closest to the site perimeter.

Interviews were conducted with 35 households, most of whom were from the properties between 0 and 0.25 km of the site. People living in the houses closest to the site to the east, south and west were predominantly middle-aged couples, whereas people living along White Lion Road to the north were mainly younger families, often with children.

6.3 Leisure activities

As the 1 km survey area was fairly populated and contained most of Little Chalfont, many leisure activities were available to the public. Many school aged children had high occupancy rates because they lived, went to school and did all their after school activities inside the 1 km area. The village centre had local shops, a library and a village hall where meetings such as Women's Institute and Mother and Toddler groups were held. There was also a tennis club and several churches in Little Chalfont so people could stay in the area for these activities.

Several footpaths used by walkers and joggers ran through the open land to the north and south of the site. The nearest public footpath to the site ran less than 50 metres from the southern boundary.

6.4 Commercial and educational activities

Commercial activities within the direct radiation survey area were numerous as it was highly populated and built up. The area contained farms, shops, a saw mill, a railway station and many more amenities. The Corinium Industrial Estate had 12 units where people were employed in a wide range of jobs including furniture sales, solicitors, the food industry and the hire of machinery. Employees or contactors of GE Healthcare Ltd were not considered as part of this survey.

Five schools, one nursery and one college were located within the survey area, the closest of which was between 0.25 - 0.5 km from the site. Pupils or students, of which there was a combined total of over 4450 ranged in age from 3 to over 18. Staff numbers were approximately 450 in total. Occupancy data for these people were not collected unless they were interviewed as a result of living close to the site and being interviewed at home. For all other pupils and teachers, normal school hours could be assumed as none of the schools were boarding schools.

6.5 Occupancy rates

Table 46 presents indoor, outdoor and total occupancy data for adults and children and includes distances from the site perimeter fence where these occupancies took place. An analysis of the data by distance zones and occupancy rates is shown in Table 47.

0 - 0.25 km from the site perimeter fence

Occupancy data were collected for 98 individuals in the 0.0 to 0.25 km zone. The observations were all for residents with the exception of four people who work in the area. One resident had the highest occupancy rate of 8700 h/y. It should be noted that many other people would visit this area for shorter periods of time, for example those going to church, the pub or parish activities in the village hall. No data were collected for people undertaking these activities as their occupancy rates would have been much lower than those for people living in the area.

0.25 – 0.5 km from the site perimeter fence

Only two observations were recorded for people spending time in the 0.25 to 0.5 km zone. People in this zone were not targeted for direct radiation observations since the densely populated inner zone was prioritised due to time restrictions. The observations were for a family who lived in the area and who also had an allotment in the 5 km terrestrial survey area. One resident had the highest total occupancy rate of 8000 h/y. There were a lot of other people living in or visiting this part of the direct radiation survey area including school pupils and staff. However, the survey did not focus on them because there was a large number of people living closer to the site who were considered as being a higher priority for interview.

0.5 – 1.0 km from the site perimeter fence

Occupancy rates were recorded for nine people in the 0.5 to 1.0 km zone. People in this zone were not targeted for direct radiation observations since the densely populated inner zone was prioritised due to time restrictions. All but one of these people lived in the area and the other person worked in the area. One resident had the highest total occupancy rate of 8000 h/y.

6.6 Gamma dose rate measurements

Table 48 presents gamma dose rate measurements in the Amersham direct radiation survey area. Representative gamma dose rate measurements were taken both inside and outside a selection of residences and at outdoor background locations outside the area. It should be noted that the measurements have not been adjusted for natural background dose rates.

The outdoor measurements, which were taken approximately 5 to 10 metres from the nearest buildings, ranged from 0.067 to 0.127 µGy/h. All the outdoor measurements were taken over grass apart from two, taken over soil and stones respectively. Indoor measurements ranged from 0.054 to 0.100 µGy/h. Between 0 and 0.07 km from the site, outdoor measurements were equal to or higher than their indoor counterparts. Between 0.1 and 1 km, this trend was reversed. Background readings taken over grass between5.5 km and 6.5 km from the site ranged from 0.063 – 0.068 µGy/h.

Comprehensive studies of background radiation have been carried out on a national scale by the National Radiological Protection Board (NRPB), the most recent of these being a review conducted during 1999 (Hughes, 1999). (On 1st April 2005 the NRPB became the Radiation Protection Division of the Health Protection Agency). The results from these could be used for comparison.

7 COMBINED PATHWAYS

In determining habits data for the purposes of assessing radiological doses to the public, it may be necessary to consider a combination of pathways. Data are provided in Annexes 1 and 2 so that the full effect of combining pathways can be assessed for individual observations, given the concentrations and dose rates for a particular assessment. In some circumstances it will be possible to make simplifying assumptions, and define the consumption and external exposure rates appropriate to a series of potential critical groups. Such assumptions will depend on the assessment in question but some initial observations are provided here as a starting point for those undertaking assessments. The most extensive combinations of pathways for adult dose assessment are shown in Table 49. These are based on information in Annex 1 and are derived irrespective of the magnitude of the rate observed for each pathway.

Combinations of pathways at critical group rates may be achieved by considering the data in Annexes 1 and 2. Although critical group rates are not given in the Annexes, the rates for individuals making up the groups are shown emboldened. Possible combinations of pathways and their associated critical group rates are therefore apparent.

The National Dose Assessments Working Group (NDAWG) has considered methods for calculating total dose from consumption and occupancy data provided by habits surveys. The relevant profile for Amersham is shown in Annex 5. Further discussion of the use of these data in assessments is given in RIFE 9.

8 CONCLUSIONS AND SUGGESTIONS

8.1 Survey findings

During the survey, team members interviewed the majority of farmers in the survey area, as well as allotment holders, beekeepers, gardeners, anglers, river boat owners and GE Healthcare Ltd site neighbours. All consumption rates recorded in this report include only locally produced or caught foods.

Exposure pathways were investigated for 486 individuals. The survey found that pathways relating to each of the three potential sources of exposure from the Amersham site were present:

- Discharges of liquid radioactive waste to the sewers serving the Maple Lodge STW, which then enter the GUC and River Colne
- Discharges of gaseous radioactive waste to the atmosphere
- Direct radiation emitted from the site

No consumption of foods from waters affected by the liquid radioactive discharges was recorded for interviewees during the survey. Reports of people poaching fish from the GUC and consuming waterfowl (such as swans) from the canal area were heard but no consumption rates could be ascertained. So as not to under-estimate the amount of fish being consumed from the GUC and River Colne, a consumption rate of 1 kg/y could be assumed for assessment purposes.

The critical group occupancy rates over canal and river banks in the aquatic survey area were:

- 640 h/y for gravel on the bank of the GUC
- 60 h/y for grass on the banks of the River Colne

No handling of commercial fishing gear or canal or river sediments was noted in the aquatic survey area.

The highest time spent in close proximity to sewage sludge was 1800 h/y and the highest time spent in close proximity to the sewage cake bio-solids was 1100 h/y.

No rates for occupancy in water affected by liquid discharges were identified. The highest occupancy rate for time spent in water affected by terrestrial discharges was 1900 h/y. The highest occupancy rate for time spent on water affected by liquid discharges was 8000 h/y. The highest occupancy rate for time spent on water affected by terrestrial discharges was 270 h/y.

The adult critical group rates for the separate local consumption pathways for foods affected by gaseous discharges were:

- 32 kg/y for green vegetables
- 35 kg/y for other vegetables
- 46 kg/y for root vegetables
- 72 kg/y for potato
- 38 kg/y for domestic fruit
- 190 l/y for milk
- 21 kg/y for cattle meat
- 13 kg/y for pig meat
- 9.7 kg/y for sheep meat
- 7.1 kg/y for poultry
- 19 kg/y for eggs
- 2.0 kg/y for wild/free foods
- 2.7 kg/y for rabbits/hares
- 5.7 kg/y for honey
- 1.6 kg/y for wild fungi
- 6.7 kg/y for venison
- 8.3 kg/y for freshwater fish
- 1.3 kg/y for freshwater crustaceans
- 23 kg/y for freshwater plants

No consumption of local cereals was identified. Consumption of foodstuffs by children was also recorded. Combinations of food groups (both aquatic and terrestrial) consumed at critical group rates together with external pathway exposures, may be achieved from the data for individuals in Annexes 1 and 2. Rates for individuals making up the critical groups are presented in bold type.

No one was identified as consuming water from springs or boreholes. However, livestock at three farms had access to surface water.

For occupancy rates of members of the public within 1 km of the Amersham licensed site perimeter fence, the highest rates (indoors plus outdoors) were:

- 8700 h/y for the 0 to 0.25 km zone
- 8000 h/y for the 0.25 to 0.5 km zone
- 8000 h/y for the 0.5 to 1.0 km zone

In all three zones, the highest occupancy rates were for residents.

8.2 Comparisons with previous surveys

The results relating to aquatic and terrestrial pathways can be compared with results from the last aquatic and terrestrial habits surveys undertaken around Amersham in 1991 and 1997 respectively. No previous direct radiation surveys have been carried out around Amersham so comparisons for this exposure pathway cannot be made.

When comparing results it should be noted that the survey area considered in the 1991 aquatic survey was approximately a 1 km stretch of the GUC whereas the 2004 survey considered 6 km stretches of the GUC and the River Colne. The 1991 aquatic survey did not identify any consumption of foods from the aquatic survey area. However, in order to be prudent, a nominal figure of 1 kg/y of fish from the GUC was recommended for assessment purposes. The 2004 survey heard reports of fish from the canal being consumed by Eastern European immigrants

and by anglers who kept some of their catch rather than releasing it back into the canal. Due to the sensitive nature of this data, it was not possible to ascertain consumption rates for these pathways so a nominal figure of 1 kg/y could, again, be used for assessment purposes.

Neither survey identified consumption of any other foods affected by liquid radioactive discharges.

For external pathways it should be noted that the methodology for determining the critical group has been changed since the 1991 survey so care is needed when comparing results. In the following paragraphs, the critical group rates from the 1991 survey have been recalculated using the current method and the rates in brackets were calculated using the original method.

The 1991 and 2004 surveys both recorded occupancy rates for people on the bank of the GUC. The 1991 survey does not specify the ground type (although the gamma dose rate from the GUC was measured over grass) and in 2004 the ground type specified is gravel. The 2004 survey identified occupancy rates over grass on the banks of the River Colne but this was not included in the survey area in 1991 so no comparisons can be made.

The 1991 critical group occupancy rate on the bank of the GUC using the current methodology was 400 h/y for eight anglers (1600 h/y for one angler) with a maximum rate of 1600 h/y. Dividing 1600 h/y by 3 gives 520 h/y and judgement was used to divide the next highest observation of 450 h/y by 3 and include all observations of 150 h/y or above in the averaging. The 2004 critical group occupancy rate on the bank of the GUC was 640 h/y and included seven people – someone who worked and angled along the canal, three people working on maintaining the canal, a house boat occupant, a dog walker and a jogger. The maximum occupancy rate was 920 h/y for the worker/angler.

Neither survey identified any handling of commercial fishing gear or sediment handling from the canal or River Colne.

No comparison of occupancy rates in close proximity to the sewage sludge or the sewage cake bio-solids could be made as this was not considered in 1991.

The 1991 survey did not identify any permanent boat dwelling. The 2004 survey identified six boats that were permanently moored within 6 km of the discharge point into the GUC. However, it must be noted that most of these people were moored further downstream than Coppermill Lock, which was the cut-off point for the aquatic survey area used in 1991.

No comparison of occupancy rates in and on watercourses can be made as these were not considered in the 1991 survey.

Only a limited comparison of gamma dose rates can be made. In 1991, a gamma dose rate taken over grass at the GUC measured 0.044 µGy/h. In 2004 rates at the GUC were similar at 0.043 and 0.047 µGy/h although they were measured over gravel. A rate of 0.051 µGy/h was obtained over grass in 2004 but this was at the River Colne.

For terrestrial food groups, the critical group consumption rates (kg/y or l/y) in the 2004 survey are tabulated below, together with those of the 1997 survey for ease of comparison:

	1997	2004
• Green vegetables	72	32
• Other vegetables	51	35
• Root vegetables	80	46
• Potato	85	72
• Domestic fruit	53	38
• Milk	250	190
• Cattle meat	46	21
• Pig meat	41	13
• Sheep meat	9.1	9.7
• Poultry	40	7.1

• Eggs	20	19
• Wild/free foods	8.5	2.0
• Rabbits/hares	5.1	2.7
• Honey	4.1	5.7
• Wild fungi	3.5	1.6
• Venison	0.0	6.7
• Freshwater fish	2.1	8.3
• Freshwater crustaceans	0.0	1.3
• Freshwater plants	0.0	23
• Woodcock and snipe	4.2	*

* In 2004 this has been considered as part of the poultry group.

In 2004, consumption rates had increased in the following food groups: sheep meat, honey, venison, freshwater fish, freshwater crustaceans and freshwater plants. Consumption rates had decreased in the following food groups: green vegetables, other vegetables, root vegetables, potatoes, domestic fruit, milk, cattle meat, pig meat, poultry, eggs, wild/free foods, rabbits/hares and wild fungi.

8.3 Suggestions for environmental monitoring

The 2003 monitoring programmes operated by the Environment Agency and the Food Standards Agency included the following samples and measurements (EA, EHS, FSA and SEPA, 2004):

Aquatic surveillance

- Pike
- Flounder
- *Nuphar lutea*
- Mud and sediment from the GUC at the Maple Lodge STW outfall
- Freshwater from the GUC at Maple Cross

- Crude effluent, digested sludge and final effluent from the Maple Lodge STW
- Gamma dose rate measurements over grass, grass and mud, and grass and stones on the bank of the GUC

Terrestrial surveillance

- Milk
- Apples
- Blackberries
- Onions
- Potatoes
- Runner beans
- Spinach
- Wheat

It should be noted that the following suggestions put forward for consideration are based solely on the findings of this survey. They are not the outcome of any form of assessment.

For the aquatic monitoring programme, consideration could be given to the following:

- A sample of the sewage cake bio-solids from Maple Lodge STW could be introduced in addition to crude effluent, digested sludge and final effluent, which are already undertaken, since the sewage cake bio-solids are used as a fertiliser.

For the terrestrial monitoring programme, consideration could be given to the following:

- Replace the spinach sample with a cabbage sample in the green vegetables group as cabbage was more commonly consumed.
- A one-off sample of goat's milk could be taken to see if this is comparable with the routine cow's milk sample. The results would dictate any further monitoring.
- No meat samples are currently taken but cattle meat, pig meat, sheep meat, poultry and rabbit are all consumed by a significant amount of people. Since cattle meat and sheep

meat were consumed at critical group mean rates above the generic rates, one of these could be introduced.

- Chicken eggs are consumed by lots of people at rates above the generic mean rates. Therefore a chicken egg sample should be introduced.
- Honey was consumed by a lot of people and the observed and generic 97.5 percentile rates were similar. A sample could be introduced into the monitoring programme.
- No sample of foods from the Rivers Chess or Misbourne are currently taken. Although the levels of radionuclides in foods from these waters are likely to be minimal, it is recommended that one-off samples of rainbow trout, freshwater crayfish and watercress are taken.

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Figure 1. The Amersham aquatic, terrestrial and direct radiation survey areas shown in relation to one another (see Figures 2 and 3 for further details)

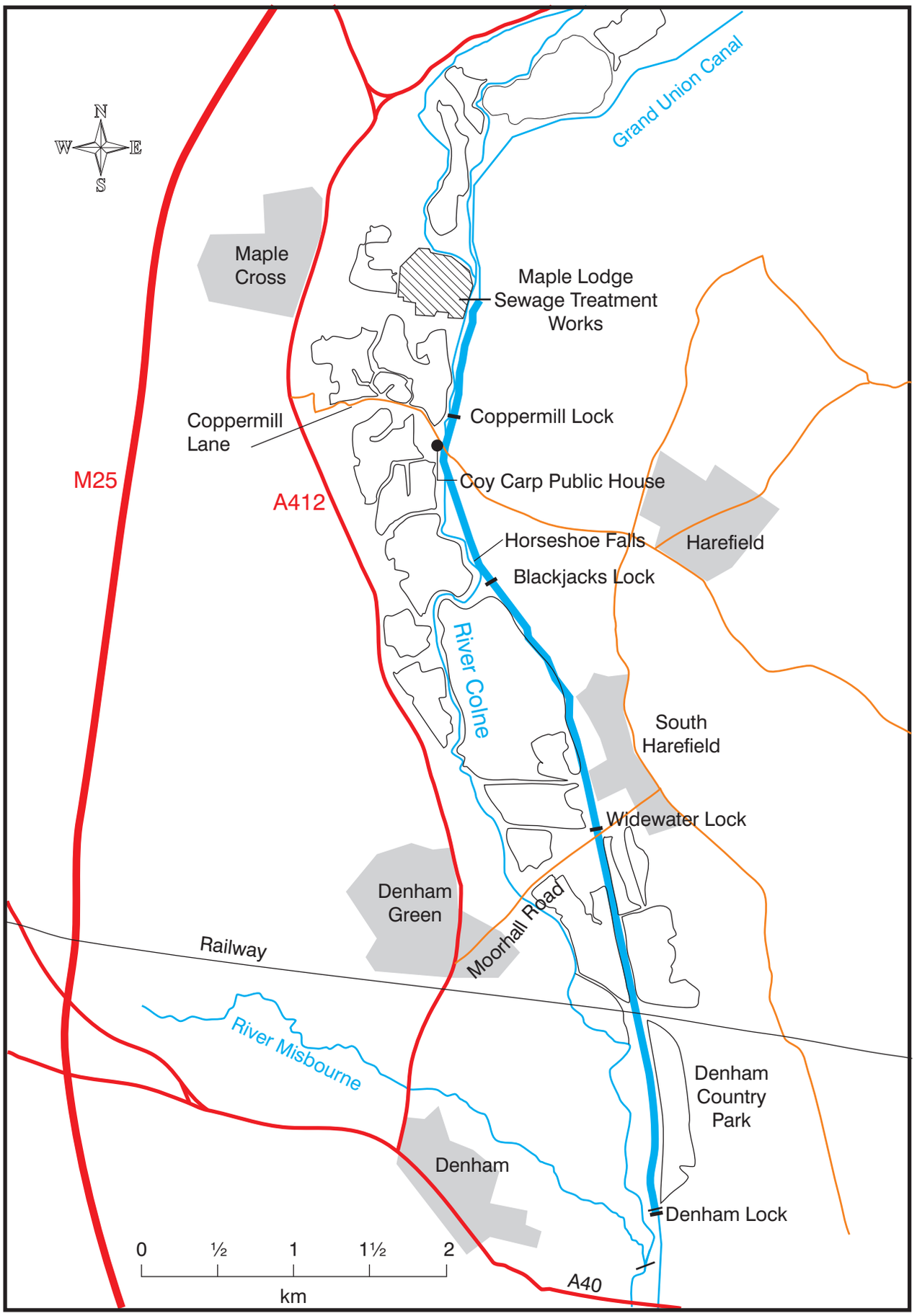

Figure 2. The Amersham aquatic survey area.

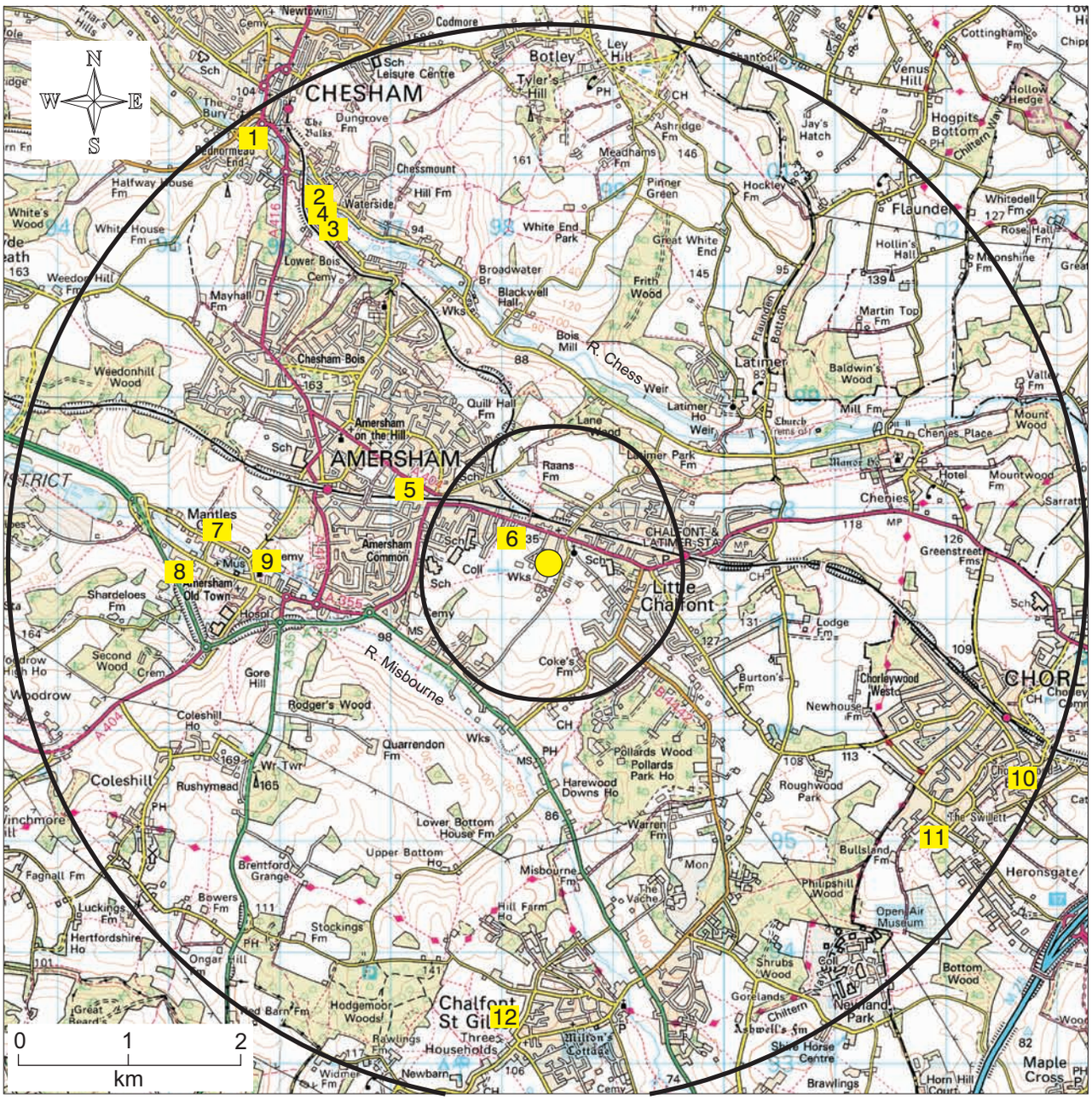

Figure 3. The Amersham terrestrial (outer ring) and direct radiation (inner ring) survey areas

1 = Germaine Street Allotments
2 = Millfields Allotments
3 = Meads Water Garden Allotments
4 = Duke of Bedford Trust Allotments
5 = Woodside Road Allotments
6 = White Lion Road Allotments
● = Amersham plc
7 = Football Allotments
8 = Little Shardloes Allotments
9 = The Pyghtle Allotments
10 = Copmans Wick Allotments
11 = The Swillett Allotments
12 = Back Lane Allotments

Table 1. Survey coverage

Group	Criteria	Estimate of complete coverage	Number for whom positive data was obtained	Coverage for positive observations	Notes
ALL PATHWAYS					
All potential people in Amersham aquatic, terrestrial and direct radiation survey areas	Number of people resident in terrestrial survey area (excluding those in the direct radiation survey area)	38600^	240^^	*	Not all people resident in the 5 km area were interviewed. The survey targeted individuals who were potentially the most exposed (Section 2.4), mostly producers of local food (farmers, small holders, allotment holders and gardeners)
	Number of people who consume food from the terrestrial survey area (excluding those who live in the terrestrial or direct radiation survey areas)	U	64	U	3 of the 64 people actually do live in the direct radiation survey area but no direct radiation data was available so they have been included in this category
	Number of people resident in the direct radiation survey area	3900	104	*	
	Number of people employed but not resident in the direct radiation survey area	U	5	U	Excluding employees and contractors of Amersham plc
	Number of people using the aquatic area	Unknown but more than 500	40^^	U	Data obtained for people living outside the 5 km area affected by aquatic discharge (excluding sewage treatment works employees)
	Number of people who work with the sewage sludge or sewage cake bio-solids from Maple Lodge Sewage Treatment Works	34	34	*****	
	Approximate total for aquatic, terrestrial and direct radiation survey areas	Unknown but more than 43000	486^^	U	The number of people for whom positive data was obtained in the above 6 categories adds up to 487 rather than 486. This is because one person fell into 2 categories and was therefore counted twice
AQUATIC PATHWAYS					
Canal and river bank users (including anglers)	Number seen in action, heard of, or spoken to during survey	U	28	U	
Canal boaters or house boat owners	Number of people seen in action, heard of or spoken to during survey	U	12	U	6 permanently moored barges were seen on the Grand Union Canal. People from 4 barges were interviewed.
Maple Lodge Sewage Treatment Works employees	Number of people who work with the sewage sludge or sewage cake bio-solids from Maple Lodge Sewage Treatment Works	34	34	*****	Interviews and correspondence with representatives from Thames Water provided generic data for 34 people.
Canoeists	Number of people canoeing in the survey area	U	1	U	

Table 1. Survey coverage

Group	Criteria	Estimate of complete coverage	Number for whom positive data was obtained	Coverage for positive observations	Notes
TERRESTRIAL PATHWAYS^^^					
Farms and smallholdings	Number of farmers and their family members consuming farm produce from the survey area	60	54	*****	Estimate of 35 farms in the area, of which 33 farmers were interviewed
Allotment holders	Number of people consuming allotment produce from the survey area	1100	165	*	Estimate of 320 allotment plots, of which 48 allotment plot holders were interviewed
Bee keepers	Number of people consuming honey from survey area	U	74	U	Estimate of 14 beekeepers in the area, of which 12 were interviewed
DIRECT RADIATION PATHWAYS					
Occupancy of area	Number with occupancies > 100 hours (excluding site employees)	Unknown but more than 3900	109	U	
Residences	Number of residents in the survey area	3900	104	*	35 households (including farms) were interviewed
Employees	Number of people predominantly based in survey area	U	25	U	Including people who live and work in the direct radiation area, excluding site employees and contractors
BREAKDOWN OF AGE GROUPS					
Adults	Individuals over 17	U	400	U	
15 year old	More than 12.0 year old to 17.0 year old	U	33	U	
10 year old	More than 7.0 year old to 12.0 year old	U	25	U	
5 year old	More than 2.0 year old to 7.0 year old	U	24	U	
1 year old	More than 1.0 year old to 2.0 year old	U	3	U	
3 months old	From 0 to 1.0 year old	U	1	U	

Notes

^ - Data from www.statistics.gov.uk were used to estimate this figure for people resident in the 5 km survey area

^^ - The number of people for whom data was obtained for each pathway listed below, will not necessarily equal the approximate total. This is because in the lower section some individuals, for example someone who lives and works in the direct radiation survey area will be counted twice, whereas others, such as people only consuming foods from their garden, will not be counted at all.

^^^ - 11 shops, 2 nurseries and 1 Pick-Your-Own were visited during the survey

U - Unknown

Coverage

* = >0-20% ** = 20 - 40% *** = 40 - 60% **** = 60-80% ***** =80-100%

Table 2. Typical food groups used in habits surveys

Green vegetables	Globe artichoke, asparagus, broccoli, brussel sprout, cabbage, calabrese, cauliflower, chard, courgettes, cucumber, gherkin, herbs, kale, leaf beet, lettuce, marrow, spinach
Other vegetables	Aubergine, broad bean, chilli pepper, french bean, mangetout, pea, pepper, runner bean, sweetcorn, tomato
Root vegetables	Jerusalem artichoke, beetroot, carrot, celeriac, celery, chicory, fennel, garlic, kohl rabi, leek, onion, parsnip, radish, shallot, spring onion, swede, turnip
Potato	
Domestic fruit	Apple, apricot, blackberry, blackcurrant, boysenberry, cherry, damson, fig, gooseberry, grapes, greengages, huckleberry, loganberry, melon, nectarines, peach, pear, plum, pumpkin, raspberry, redcurrants, rhubarb, rowanberry, strawberry, tayberry, whitecurrant
Milk	Milk, butter, cream, cheese, yoghurt, goats milk
Cattle meat †	
Pig meat †	
Sheep meat †	
Poultry	Chicken, duck, goose, grouse, guinea fowl, partridge, pheasant, pigeon, snipe, turkey, woodcock
Eggs	Chicken egg, duck egg, goose egg
Wild/free foods	Blackberry, blackcurrant, chestnut, crab apple, damson, dandelion root, elderberry, nettle, raspberry, rowanberry, samphire, sloe, strawberry, watercress, wild apple
Honey	
Wild Fungi	Mushrooms
Rabbits/Hare	Hare, rabbit
Venison †	
Fish (sea)	Bass, brill, cod, common ling, dab, Dover sole, flounder, gurnard, haddock, hake, herring, lemon sole, mackerel, monkfish, mullet, plaice, pollack, witch saithe, salmon, sea trout, squid*, cuttlefish*, rays, turbot, whitebait, whiting
Freshwater fish	Brown trout, rainbow trout, perch, pike, salmon (river), eels
Crustaceans	Brown crab, spider crab, crawfish, lobster, *Nephrops*, squat lobster, prawn, shrimp
Molluscs	Cockles, limpets, mussels, oysters, queen scallop, razor shell, whelks, winkles

Notes:
* Although squid and cuttlefish are molluscs, radiologically they are more akin to fish
† Including offal

Table 3. Canal and river bank occupancy rates in the Amersham aquatic survey area (h/y)

Observation number	Location (GUC = Grand Union Canal)	Activity	Towpath	Grass
113	**GUC - Several locations**	**Angling and canal maintainance**	**920**	
258	**GUC - Several locations**	**Canal maintainance**	**705**	
259	**GUC - Several locations**	**Canal maintainance**	**705**	
260	**GUC - Several locations**	**Canal maintainance**	**705**	
451	**GUC - Harefield**	**House boat occupant**	**702**	
100	**GUC - Nr Coy Carp Public House**	**Dog walking**	**365**	
271	**GUC - Maple Lodge**	**Jogging**	**365**	
270	GUC - Maple Lodge	Dog walking	275	
2	GUC - Harefield	Angling	250	
66*	GUC - Nr Coy Carp Public House	Angling	195	
67*	GUC - Nr Coy Carp Public House	Angling	195	
68*	GUC - Nr Coy Carp Public House	Angling	195	
269	GUC - Maple Lodge	Dog walking	183	
1	GUC - Maple Lodge discharge	Angling	150	
110	GUC - Several locations	Angling	144	
3	GUC - Harefield	Walking and cycling	90	
89	GUC - Nr Coy Carp Public House	Walking	52	
90	GUC - Nr Coy Carp Public House	Walking	52	
98	GUC - Nr Coy Carp Public House	Walking	52	
99	GUC - Nr Coy Carp Public House	Walking	52	
272	GUC - Maple Lodge	Cycling	52	
273	GUC - Maple Lodge	Cycling	52	
124	GUC - Several locations	Angling	50	
112	GUC - Several locations	Angling	48	
120	GUC - Several locations	Angling	48	
121	GUC - Several locations	Angling	48	
122	GUC - Several locations	Angling	48	
408	GUC - Several locations	Walking	2	
409	GUC - Several locations	Walking	2	
262	**River Colne - Nr A40 road bridge**	**Angling**		**60**

Notes

Emboldened observations are the critical group members

The critical group bankside occupancy rates over the towpath based on 7 observations is 638 h/y

The observed 97.5 percentile rate based on 29 observations for the towpath is 770 h/y

The critical group bankside occupancy rates over grass based on 1 observation is 60 h/y

The observed 97.5 percentile is not applicable for 1 observation over grass

* = Observation 66 is a 15 year old boy and observations 67 and 68 are 14 year old boys

Table 4. Gamma dose rate measurements over canal and river banks in the Amersham area (micro Gy/h)

Location	NGR	Substrate	Gamma dose rate at 1 metre
Grand Union Canal - Maple Lodge	TQ 041 920	Gravel	0.043
Grand Union Canal - South Harefield	TQ 050 886	Gravel	0.047
River Colne - Coy Carp Public House	TQ 039 911	Grass	0.051
River Colne - A40 road bridge	TQ 053 857	Mud and gravel	0.057

Table 5. Occupancy rates in close proximity to sewage sludge or sewage cake bio-solids (h/y)

Observation number	Activity	Occupancy in close proximity (<10m) to the sewage sludge	Occupancy in close proximity (<10m) to the sewage cake bio-solids
452-461	Maintaining pumps	1840	
462-470	Debris removal, cleaning filters, unblocking pumps/pipes, sampling	1700	
471-477	Debris removal, cleaning filters, unblocking pumps/pipes, sampling	1140	
478	Debris removal, cleaning filters, unblocking pumps/pipes, sampling	850	
479-481	Loading, delivering and unloading sewage cake bio-solids		1104
482	Moving sewage cake bio-solids on site		613
483-485*	Loading, delivering and unloading sewage cake bio-solids		276

Notes

* In addition to these employees, there could be up to another 32 employees doing this work for a small fraction of their working year.

No data have been collected for pathways related to other aspects of sewage disposal or treatment, such as people working in the sewers between the Amersham site and Maple Lodge STW.

Table 6. Occupancy rates in and on water in the Amersham area (h/y)

Observation number	Location (GUC = Grand Union Canal)	Activity	In water	On water
5	*River Chess*	*Working at watercress farm*	*1920*	
6	*River Chess*	*Working at watercress farm*	*1920*	
7	*River Chess*	*Working at watercress farm*	*1920*	
344	*Rivers Chess + Misbourne*	*River maintainance*	*216*	
21	*River Chess*	*River maintainance*	*72*	
316	*River Chess*	*Paddling*	*12*	
317	*River Chess*	*Paddling*	*12*	
303	*River Chess*	*Paddling*	*5*	
*304**	*River Chess*	*Paddling*	*5*	
*305**	*River Chess*	*Paddling*	*5*	
47	GUC	House boat occupant - moored in area all year		8030
451	GUC	House boat occupant - moored in area all year		7522
261	GUC	House boat occupant - moored in area all year		7460
96	GUC	House boat occupant - moored in area all year		5640
101	GUC	House boat occupant - in area approx. 3 m/y		2832
102	GUC	House boat occupant - in area approx. 3 m/y		2832
92	GUC	House boat occupant - in area approx. 2 m/y		1332
91	GUC	House boat occupant - in area approx. 2 m/y		1200
62	GUC	House boat occupant - in area approx. 2 m/y		1080
63	GUC	Canal boating - in area on holiday		336
263	*Misbourne Lake*	*Angling*		*273*
265	*Misbourne Lake*	*Angling*		*273*
266	*Misbourne Lake*	*Angling*		*273*
103	GUC - Maple Cross	Canoeing		132
64	GUC - Widewater Lock	Canal boating - passing through area		24
65	GUC - Widewater Lock	Canal boating - passing through area		24

Notes

* = Observations 304 and 305 are a 12 year old boy and an 8 year old girl respectively

Observations in italics are for water affected by gaseous discharges rather than aquatic discharges.

Table 7. Adults' consumption rates of green vegetables in the Amersham area (kg/y)

Observation number	Artichoke	Asparagus	Broccoli	Brussel sprout	Cabbage	Cala-brese	Cauli-flower	Chard	Cour-gette	Cucumber	Herbs	Kale	Lettuce	Marrow	Rocket	Spinach	Total
14-15			**20.2**	**4.1**		**7.5**	**6.1**	**8.2**	**2.0**				**1.8**	**2.0**		**2.6**	**54.5**
310-311			**4.5**	**12.1**	**11.3**		**9.1**		**2.7**	**1.1**				**12.7**			**53.6**
314-315	**5.4**	**1.2**	**5.4**		**8.8**		**2.7**		**4.4**	**4.1**			**6.5**			**3.7**	**42.1**
420-421		**0.7**		**2.7**	**4.3**		**2.0**		**3.6**	**8.5**			**11.6**	**1.8**	**0.2**	**5.9**	**41.3**
343					**10.6**				**6.8**				**18.1**	**5.4**			**41.0**
357-358			**5.7**	**11.4**	**10.6**		**5.7**		**5.5**	**1.7**							**40.6**
70-71					**24.7**				**3.3**		**1.8**		**4.9**			**5.5**	**40.1**
359-360			**6.1**	**8.2**	**7.7**		**6.1**						**6.5**			**1.8**	**36.4**
376-377	**1.4**	**1.8**		**5.6**	**7.5**	**6.2**	**3.1**		**4.1**				**2.5**			**2.8**	**35.0**
188-189			**11.2**	**9.6**				**4.8**		**1.7**				**7.2**			**34.5**
207-208				**9.8**	**11.2**		**4.1**		**3.3**			**3.3**				**1.6**	**33.3**
330-331			**7.7**	**2.5**	**6.7**		**2.1**	**1.3**	**12.9**								**33.1**
201-202					**8.2**				**3.3**	**9.2**		**4.3**	**2.0**			**4.6**	**31.6**
199-200	**2.9**		**6.6**						**8.8**				**4.0**	**8.6**			**31.0**
281-282			**8.8**	**6.4**	**12.8**				**1.4**				**1.2**				**30.5**
328-329	**1.4**			**5.0**	**6.7**			**3.5**					**6.6**			**3.7**	**26.9**
197-198			**3.8**		**6.2**				**4.4**			**6.5**	**1.5**	**1.1**			**23.6**
344-345			**3.4**	**4.6**	**4.3**		**3.4**			**2.1**			**3.8**	**1.4**			**22.8**
312-313			**2.3**	**6.1**	**5.7**				**1.4**	**0.1**				**6.4**			**21.8**
361-362			**4.4**		**14.9**								**0.7**			**1.0**	**21.0**
107			**5.2**	**3.2**	**4.3**						**1.7**	**4.5**	**2.1**				**20.9**
37, 39						**0.5**	**4.1**		**12.5**				**1.2**			**2.6**	**20.8**
127, 129				**6.1**	**5.7**				**5.0**				**1.4**			**1.5**	**19.7**
72-73				**3.4**	**4.6**	**5.6**	**2.8**							**1.8**		**1.3**	**19.5**
51-52				**2.3**	**3.0**				**5.5**			**3.2**	**1.5**			**3.4**	**18.9**
80-81				10.2					7.4								17.6
216-217			2.4	9.1			3.4						2.4				17.3
88, 93			2.5	4.9	5.5		1.2				0.3		1.0			1.1	16.6
195-196		2.5	2.0						1.8				10.0				16.4
125-126									14.7				0.8			0.9	16.3
392-393													13.6	0.2		1.7	15.5
159-161				10.6							0.8		2.3			1.5	15.2

Table 7. Adults' consumption rates of green vegetables in the Amersham area (kg/y)

Observation number	Artichoke	Asparagus	Broccoli	Brussel sprout	Cabbage	Cala-brese	Cauli-flower	Chard	Cour-gette	Cucumber	Herbs	Kale	Lettuce	Marrow	Rocket	Spinach	Total
339-340				2.7	2.6				2.7	1.2			1.2	3.2		1.4	15.0
82-83			1.5	6.1	4.6				1.1	1.5							14.9
307-309	12.1												2.7				14.7
332-333			3.4	1.1	2.9		0.9	0.6	5.7								14.5
369-370			1.5	2.0	7.7		3.1										14.3
61, 69									11.0				1.5			0.9	13.4
218-219										12.8							12.8
155-156			3.4	4.6	4.3												12.2
130-131			3.4	1.0	2.7	3.4			1.7								12.2
49-50			3.7	2.3							0.3					5.1	11.4
180-183			0.9	1.7						1.4			5.0	2.4			11.3
111					3.4					3.4				3.6			10.4
114-116					3.4					3.4				3.6			10.4
209-210				3.3	3.7				1.1			1.1				0.5	9.8
77				1.7	2.3	2.8	1.4							0.9		0.6	9.7
336-337			1.7	0.6	1.5		0.5	0.3	2.9								7.5
97													6.3			1.1	7.4
104-106													6.3			1.1	7.4
136, 139								2.4	1.8		0.7		2.3				7.2
16			2.2	0.5		0.7	0.7	0.9	0.2				0.2	0.2		0.3	6.0
213-215					1.5				4.4								5.9
346-351			0.8	1.1	1.0		0.8			0.5			0.9	0.3			5.4
84-85	1.7								3.5								5.1
341-342				0.9	0.9				0.9	0.4			0.4	1.1		0.5	5.0
75-76				0.9	1.1	1.4	0.7							0.5		0.3	4.9
408-409													3.0			1.8	4.8
424-425									1.8				3.0				4.8
108-109			0.9	0.8	1.0						0.4	1.1	0.5				4.7
363-366			1.0		3.3								0.2			0.2	4.7
316-327	0.6		0.6		1.0		0.3		0.5	0.5			0.7			0.4	4.5
203-204				4.1													4.1
46, 48									2.3		0.5		0.6				3.4

Table 7. Adults' consumption rates of green vegetables in the Amersham area (kg/y)

Observation number	Artichoke	Asparagus	Broccoli	Brussel sprout	Cabbage	Cala-brese	Cauli-flower	Chard	Cour-gette	Cucumber	Herbs	Kale	Lettuce	Marrow	Rocket	Spinach	Total
119, 123														3.2			3.2
128									2.8								2.8
134-135									2.8								2.8
40									0.4							2.0	2.4
221-223													2.4				2.4
78-79														1.8			1.8
53-54					0.5								1.3				1.8
232-233									1.5								1.5
276-277				0.7					0.5								1.2
422																0.8	0.8
371-372			0.1	0.2	0.3		0.1										0.7
388-391																0.1	0.1

Notes

Emboldened observations are the critical group consumers

The critical group consumption rate of green vegetables based on the 48 highest adult consumers is 31.8 kg/y

The observed 97.5 percentile rate based on 169 observations is 42.1 kg/y

Table 8. Adults' consumption rates of other vegetables in the Amersham area (kg/y)

Observation number	Aubergine	Broad bean	French bean	Mange-tout	Pea	Pepper	Runner bean	Squash	Sweet-corn	Tomato	Total
70-71	**8.2**		**4.4**		**18.2**		**22.0**		**2.5**	**10.2**	**65.5**
155-156		**4.6**			**2.3**		**6.8**		**2.9**	**36.0**	**52.5**
107		**6.4**	**18.9**		**6.3**		**19.0**	**0.5**		**1.3**	**52.4**
80-81		**20.5**			**6.8**		**20.4**	**0.5**			**48.1**
51-52			**16.2**				**27.2**		**3.5**		**46.9**
201-202			**2.4**				**36.7**				**39.2**
188-189		**6.8**	**2.7**				**24.5**			**3.6**	**37.6**
205-206							**36.7**				**36.7**
314-315		**4.9**			**6.5**	**2.4**	**9.8**	**0.3**		**8.2**	**32.0**
420-421		**1.4**	**4.5**			**0.5**	**6.8**		**0.7**	**17.7**	**31.6**
376-377	**5.4**	**11.3**		**3.7**			**3.4**	**0.5**	**2.2**	**4.1**	**30.5**
218-219						**2.0**				**27.0**	**29.0**
281-282						**2.9**	**20.4**			**5.4**	**28.7**
207-208		**2.2**	**1.7**		**2.2**		**9.8**		**3.5**	**6.5**	**25.8**
213-215			**1.3**		**2.0**		**19.6**		**1.7**		**24.6**
119, 123		**6.1**					**18.4**				**24.5**
357-358							**14.3**			**8.1**	**22.4**
417-419							**5.4**			**16.8**	**22.2**
361-362		2.3					15.9			2.7	20.9
310-311			0.8		9.0		1.5			9.5	20.8
61, 69		2.3	2.7		2.3		6.8		2.1	4.5	20.6
14-15		3.6	3.6			2.2	3.6	2.0	5.2		20.1
37, 39		4.3	1.7					0.1	6.3	6.8	19.2
343							18.1				18.1
339-340		2.7	1.4				8.2			5.4	17.7
359-360		2.7					14.7	0.3			17.7
216-217							12.2		4.1		16.4
46, 48		4.5					11.3				15.9
221-223							10.9			4.8	15.7
203-204							15.3				15.3
88, 93			3.6				10.2		1.2		15.1
344-345		1.1			1.1	0.7	5.1			6.8	14.9
130-131			1.8				6.1		0.8	5.7	14.4
53-54							1.3	0.5		12.5	14.3
72-73			4.1				10.2				14.3
82-83			4.9		1.4		6.1	0.1	1.7		14.1
312-313		3.0	0.4		4.5		0.8			4.8	13.4
197-198			0.6		4.6		1.6		1.7	4.9	13.4
392-393			2.7				10.2				12.9
108-109		1.5	4.6		1.5		4.6	0.1		0.3	12.7
84-85			3.0		1.3		7.7		0.4		12.4
330-331					1.7		10.2				11.9
111			1.8				5.4		4.6		11.8
114-116			1.8				5.4		4.6		11.8
49-50			0.6				5.1			6.1	11.8
180-183		1.5			0.9		4.5			4.8	11.7
199-200		8.7						0.7	1.5	0.7	11.7
159-161		0.6			3.0		7.6				11.2
408-409							3.4			6.8	10.2
78-79							10.2				10.2
422				1.8	1.1		3.3			3.6	9.8
127, 129					2.0		6.1		1.0		9.2

Table 8. Adults' consumption rates of other vegetables in the Amersham area (kg/y)

Observation number	Aubergine	Broad bean	French bean	Mange-tout	Pea	Pepper	Runner bean	Squash	Sweet-corn	Tomato	Total
424-425		4.5					4.5				9.1
40		1.4	1.6				4.1			1.9	9.0
209-210		0.7	0.6		0.7		3.3		1.2	2.2	8.6
97		1.7			0.8		5.1		0.3		7.8
104-106		1.7			0.8		5.1		0.3		7.8
125-126		1.1	1.4				3.4			1.8	7.7
77			2.0				5.1				7.1
341-342		0.9	0.5				2.7			1.8	5.9
388-391			1.2							4.1	5.3
332-333					0.7		4.5				5.2
300-302										4.8	4.8
363-366		0.5					3.5			0.6	4.6
195-196										4.5	4.5
136, 139									3.7		3.7
128										3.6	3.6
134-135										3.6	3.6
75-76			1.0				2.6				3.6
316-327		0.5			0.7	0.3	1.1	0.03		0.9	3.6
5-8							3.5				3.5
346-351		0.3			0.3	0.1	1.2		0.1	1.6	3.5
38, 41							3.4				3.4
21-22			2.3				1.1				3.4
276							2.0			0.9	2.9
369-370			1.1						1.7		2.7
336-337					0.4		2.3				2.7
16		0.4	0.4			0.2	0.4	0.2	0.6		2.2
277							0.9			0.9	1.8
404-405			0.9							0.6	1.5
328-329									1.3		1.3
307-309					0.4		0.4				0.8
371-372			0.05						0.1		0.1

Notes

Emboldened observations are the critical group consumers

The critical group consumption rate of other vegetables based on the 37 highest adult consumers is 35.0 kg/y

The observed 97.5 percentile rate based on 185 observations is 49.8 kg/y

Table 9. Adults' consumption rates of root vegetables in the Amersham area (kg/y)

Observation number	Beetroot	Carrot	Celeriac	Celery	Chicory root	Fennel	Garlic	Jerusalem artichoke	Leek	Onion	Parsnip	Radish	Salsify	Shallot	Spring onion	Swede	Turnip	Total
70-71	**10.9**	**18.2**		**13.2**		**6.3**	**2.1**		**14.6**	**14.6**	**8.7**			**5.2**				**93.9**
107	**3.2**	**9.5**							**15.8**	**7.6**	**2.5**		**1.3**			**9.5**	**3.8**	**53.0**
376-377	**1.9**	**3.0**	**2.6**			**0.3**	**1.1**		**4.4**	**20.8**	**4.5**	**1.5**		**2.6**	**1.7**	**5.6**	**2.2**	**52.0**
314-315	**8.1**	**8.1**					**1.0**		**9.7**	**13.0**	**1.3**	**5.2**		**4.6**				**50.9**
330-331		**9.9**					**0.7**		**17.3**	**19.8**	**0.7**							**48.5**
188-189	**9.8**	**5.4**							**18.2**	**14.9**								**48.3**
37, 39									**18.0**	**10.0**	**18.0**							**46.0**
201-202	**11.1**	**6.1**							**6.1**	**2.4**	**2.4**			**6.5**		**9.2**		**43.7**
216-217	**8.2**	**4.5**							**5.0**		**3.6**	**1.3**		**3.0**	**0.7**	**9.5**		**35.8**
207-208	**7.9**	**5.4**		**2.5**					**4.3**	**3.2**	**3.5**			**2.3**		**3.3**	**2.6**	**34.8**
205-206	**7.4**	**6.1**							**8.1**	**9.7**				**2.9**				**34.2**
359-360	**4.9**	**4.9**							**13.0**	**1.4**	**1.9**			**0.7**		**7.3**		**34.0**
357-358	**7.5**								**2.4**	**3.3**	**4.5**					**15.9**		**33.6**
88, 93		**6.1**							**3.2**	**10.5**	**4.1**	**0.2**		**1.4**	**0.5**	**3.1**	**2.4**	**31.4**
344-345	2.8	5.6							2.5	2.8	2.3			0.9		11.4		28.3
197-198	8.4	4.6							4.6					3.3		6.9		27.7
155-156	2.3	5.6							4.5	7.2				6.4	1.5			27.5
420-421	0.8	0.1		0.7					1.1	23.6	0.5	0.2					0.5	27.4
111	3.6	2.7							9.6	4.4		0.4		6.0				26.7
114-116	3.6	2.7							9.6	4.4		0.4		6.0				26.7
80-81	3.4	3.4					2.0		13.5		2.7				1.5			26.4
136	6.8	13.5							4.5									24.8
139	6.8	13.5							4.5									24.8
328-329	9.9	5.0	1.8							7.9								24.5
203-204	4.6	5.1								9.7	2.0			2.9				24.3
119		12.2								4.9	4.9							21.9
123		12.2								4.9	4.9							21.9
332-333		4.4					0.3		7.6	8.7	0.3							21.3
281-282		9.1							12.0			0.2						21.3
339-340	6.1						0.7		2.7	8.2	2.7	0.4						20.8
72-73	1.7	5.1			0.5				6.8	5.4				1.2				20.6
195-196									16.2						3.6			19.8
61	4.5	1.1	0.8	1.4		0.2				10.8	0.9							19.6

Table 9. Adults' consumption rates of root vegetables in the Amersham area (kg/y)

Observation number	Beetroot	Carrot	Celeriac	Celery	Chicory root	Fennel	Garlic	Jerusalem artichoke	Leek	Onion	Parsnip	Radish	Salsify	Shallot	Spring onion	Swede	Turnip	Total
69	4.5	1.1	0.8	1.4		0.2				10.8	0.9							19.6
49	2.3	0.5								7.2	5.4				1.0			16.4
50	2.3	0.5								7.2	5.4				1.0			16.4
78-79										16.2								16.2
130-131		2.0							3.0	4.9	4.9							14.8
343	2.3								10.0			1.1			1.2			14.5
310-311		1.5						0.9		12.0								14.4
424-425	4.5									9.1								13.6
108-109	0.8	2.3							3.8	1.8	0.6		0.3			2.3	0.9	12.9
369-370		3.6								3.0	5.8							12.4
46, 48	0.8	2.8								8.8								12.4
209-210	2.6	1.9		0.8					1.4	1.1	1.2			0.8		1.1	0.9	11.7
51-52	1.1						0.7		8.0	1.8								11.6
361-362	1.5	5.6							1.8		2.3							11.2
336-337		2.3					0.2		4.0	4.5	0.2							11.1
77	1.0	2.5			0.3				3.4	2.7				0.6				10.5
53-54	1.3						1.3		2.5	5.0								10.0
84-85								1.7	1.3	5.1								8.0
312-313		0.8						0.5		6.0								7.2
82-83							0.4			4.9				1.9				7.2
341-342	2.0						0.2		0.9	2.7	0.9	0.1						6.9
97	3.0	2.5									1.2							6.8
104-106	3.0	2.5									1.2							6.8
346-351	0.7	1.3							0.6	0.6	0.5			0.2		2.7		6.6
128		3.4															2.5	5.9
134-135		3.4															2.5	5.9
127, 129	2.0	2.0									1.6							5.7
316-327	0.9	0.9					0.1		1.1	1.4	0.1	0.6		0.5				5.7
40									3.4	2.2								5.5
307-309	1.5									3.7								5.2
75-76	0.4	1.3			0.1				1.7	1.4				0.3				5.2
388-391									5.0									5.0
12-13		1.3								3.3								4.6

Table 9. Adults' consumption rates of root vegetables in the Amersham area (kg/y)

Observation number	Beetroot	Carrot	Celeriac	Celery	Chicory root	Fennel	Garlic	Jerusalem artichoke	Leek	Onion	Parsnip	Radish	Salsify	Shallot	Spring onion	Swede	Turnip	Total
180-183	1.5	0.7								1.3	0.7							4.3
14-15							2.0			1.6								3.7
408-409									2.7									2.7
363-366	0.3	1.3							0.4		0.5							2.5
159-161									2.3									2.3
221-223										2.2								2.2
199-200		2.0																2.0
392-393										0.7		0.5						1.1
125-126											0.9							0.9
371-372		0.2								0.1	0.3							0.6
276-277									0.5									0.5
16							0.2			0.2								0.4

Notes

Emboldened observations are the critical group consumers

The critical group consumption rate of root vegetables based on the 27 highest adult consumers is 45.5 kg/y

The observed 97.5 percentile rate based on 165 observations is 51.9 kg/y

Table 10. Adults' consumption rates of potato in the Amersham area (kg/y)

Observation number	Potato
155-156	**136.0**
330-331	**110.1**
70-71	**88.5**
205-206	**80.1**
188-189	**76.6**
420-421	**70.8**
14-15	**67.6**
359-360	**61.0**
310-311	**58.0**
46, 48	**54.6**
424-425	**54.6**
344-345	**50.8**
119, 123	**49.1**
332-333	**48.4**
107	44.6
61, 69	43.7
80-81	41.0
314-315	39.3
203-204	38.1
78-79	37.5
343	36.3
376-377	33.8
195-196	32.8
328-329	30.0
12-13	29.6
312-313	29.0
88, 93	28.1
221-223	27.3
336-337	25.1
369-370	22.5
111	21.8
114-116	21.8
82-83	20.5
216-217	20.5
357-358	19.1
201-202	18.4
49-52	18.2
422	18.2
199-200	17.5
207-208	17.5
130-131	16.4
339-340	15.2
37, 39	15.0
197-198	14.7
72-73	13.7
84-85	12.8
346-351	12.0
361-362	11.4
108-109	10.8
159-161	8.5
307-309	8.4
16	7.5

Table 10. Adults' consumption rates of potato in the Amersham area (kg/y)

Observation number	Potato
40	6.8
77	6.8
21-22	6.8
97	6.1
104-106	6.1
209-210	5.8
218-219	5.5
276-277	5.4
341-342	5.1
53-54	5.0
232-233	4.8
180-183	4.5
316-327	4.4
127, 129	4.1
388-391	4.0
75-76	3.4
300-302	3.4
363-366	2.5
371-372	1.0

Notes

Emboldened observations are the critical group consumers

The critical group consumption rate of potato based on the 28 highest adult consumers is 71.9 kg/y

The observed 97.5 percentile rate based on 162 observations is 88.5 kg/y

Table 11. Adults' consumption rates of domestic fruit in the Amersham area (kg/y)

Observation number	Apple	Blackberry	Black-currant	Blue-berry	Cherry	Fig	Goose-berry	Grape	Greengage	Logan-berry	Melon	Pear	Plum	Pumpkin	Rasp-berry	Red-currant	Rhubarb	Straw-berry	Tay-berry	White-currant	Total
70-71		**3.6**	**20.4**				**11.0**								**16.5**	**8.2**	**4.6**		**3.6**		**67.9**
420-421	**11.8**		**4.5**			**0.1**	**9.1**			**1.8**		**0.4**	**23.6**	**7.5**	**2.3**	**1.1**	**2.3**	**0.5**		**0.1**	**65.1**
361			**2.3**				**6.1**	**40.8**	**5.7**			**1.7**	**2.8**								**59.4**
281	**6.8**	**0.5**			**0.5**	**3.4**		**1.1**	**1.4**			**2.3**	**7.9**		**3.4**	**2.7**	**6.9**	**0.5**			**37.3**
282	**6.8**	**0.5**			**0.5**			**1.1**	**1.4**			**2.3**	**7.9**		**3.4**	**2.7**	**6.9**	**0.5**			**33.9**
330-331	**9.1**	**2.3**	**0.6**		**0.9**		**0.6**					**1.1**	**6.8**		**3.4**	**1.8**	**1.7**				**28.2**
310-311	**0.9**	**1.2**	**0.2**	**0.2**			**0.2**	**11.3**				**0.5**		**4.2**	**1.5**	**0.2**	**2.7**	**0.6**			**23.6**
314-315		**1.1**	**1.1**				**1.4**								**5.4**	**0.8**	**2.1**	**10.3**		**0.8**	**23.0**
127, 129							**5.5**			**7.2**					**3.1**	**6.1**	**1.0**				**22.9**
155-156	**13.6**	**4.0**													**5.1**						**22.7**
51-52								0.8							13.6			8.2			22.6
357-358														15.8			4.5				20.3
232-233			6.8												4.1	3.6	5.5				20.0
362			2.3				6.1		5.7			1.7	2.8								18.6
344-345	9.6	1.4	0.5				1.6						4.0		0.6						17.6
46, 48			2.3				3.5								4.5	0.3	6.8				17.5
306	9.1						0.9					4.5	1.8		0.9						17.2
392-393	1.4											0.7	3.4		10.2	1.4					17.0
422	4.5												7.0		3.3						14.8
408-409	9.1		1.1				1.1		1.1						0.7	0.7		0.9			14.7
37, 39	1.8	0.5	1.2							0.2				2.0	3.8	1.7	2.5	0.2			13.9
218-219	1.5				0.2		0.2				1.7	0.3	1.5		0.9		3.5	4.1			13.9
199-200							3.3								0.3	5.4		1.6	3.2		13.8
216-217																	3.5	10.2			13.7
312-313	0.5	0.6	0.2	0.1			0.1	5.7				0.5		2.1	1.7	0.1	1.4	0.3			13.1
332-333	4.0	1.0			0.4		0.2					0.5	3.0		1.5	0.8	0.7				12.2
388-391	11.3							0.7									0.1				12.1
195-196			3.4				4.5									1.8	2.3				12.1
201-202		1.2	1.2												9.2						11.6
125-126			5.7				4.1								1.7						11.5
78-79							4.1									4.5	1.2				9.8
38, 41	2.3		2.3												2.3	2.3					9.1
328-329	1.8	0.7	0.7				1.4								2.7		0.9	0.7			8.8
339-340		1.4	0.7				0.7					0.7			2.7	0.7	1.4				8.2
61, 69							2.0							0.2	3.4		1.2				6.8
424-425															6.8						6.8
336-337	2.1	0.5			0.2		0.1					0.3	1.6		0.8	0.4	0.4				6.3
221-223			0.3				2.7									3.0					6.1
277	0.5											0.2					4.5				5.2
53-54	1.3														0.8		2.5				4.5
14-15		0.2													0.2		4.1				4.5

Table 11. Adults' consumption rates of domestic fruit in the Amersham area (kg/y)

Observation number	Apple	Blackberry	Black-currant	Blue-berry	Cherry	Fig	Goose-berry	Grape	Greengage	Logan-berry	Melon	Pear	Plum	Pumpkin	Rasp-berry	Red-currant	Rhubarb	Straw-berry	Tay-berry	White-currant	Total
188-189			0.7				0.2										3.5				4.4
346-351	2.3	0.3	0.1				0.4						0.9		0.1						4.1
363-366			0.5				1.4		1.3			0.4	0.6								4.1
111							0.8								0.1		3.2				4.1
114-116							0.8								0.1		3.2				4.1
12-13															2.8		0.5	0.5			3.8
180-183															1.9		0.2	1.5			3.6
130-131																	0.5	2.7			3.2
303		0.9	0.5				0.5								0.5	0.5		0.5			3.2
341-342		0.5	0.2				0.2					0.2			0.9	0.2	0.5				2.7
376-377			0.2													0.2	1.7			0.2	2.4
316-327		0.1	0.1				0.2								0.6	0.1	0.05	1.1		0.1	2.4
300-302		0.8					0.8								0.8						2.3
205-206							2.0														2.0
82-83															2.0						2.0
417-419	1.7					0.3															2.0
159-161			1.0															0.5			1.4
404-405	1.4																				1.4
80-81																	1.2				1.2
21-22															1.1						1.1
136, 139																		0.7			0.7
84-85															0.6						0.6
276	0.5											0.2									0.6
207-208															0.5						0.5
16		0.02													0.02		0.5				0.5
49-50		0.5																			0.5
359-360															0.4						0.4
209-210															0.2						0.2
72-73																	0.1				0.1
77																	0.1				0.1
75-76																	0.04				0.04

Notes

Emboldened observations are the critical group consumers

The critical group consumption rate of domestic fruit based on the 17 highest adult consumers is 37.5 kg/y

The observed 97.5 percentile rate based on 157 observations is 60.0 kg/y

Table 12. Adults' consumption rates of milk in the Amersham area (l/y)

Observation number	Cow's milk	Goat's milk	Total
486	**207.4**		**207.4**
487	**207.4**		**207.4**
422		**147.8**	**147.8**
184		29.6	29.6
185		29.6	29.6
423		29.6	29.6

Notes
Emboldened observations are the critical group consumers
The critical group consumption rate of milk based on the 3 highest adult consumers is 187.5 l/y
The observed 97.5 percentile rate based on 6 observations is 207.4 l/y

Table 13. Adults' consumption rates of cattle meat in the Amersham area (kg/y)

Observation number	Beef
292	**23.7**
293	**23.7**
294	**23.7**
295	**23.7**
38	**18.9**
41	**18.9**
42	**18.9**
43	**18.9**
44	**18.9**
45	**18.9**

Notes
Emboldened observations are the critical group consumers
The critical group consumption rate of cattle meat based on the 10 highest adult consumers is 20.8 kg/y
The observed 97.5 percentile rate based on 10 observations is 23.7 kg/y

Table 14. Adults' consumption rates of pig meat in the Amersham area (kg/y)

Observation number	Pork
17-20	**12.7**
88, 93	**12.7**
155-156	**12.7**
84-85	4.1
51-52	3.0

Notes
Emboldened observations are the critical group consumers
The critical group consumption rate of pig meat based on the 8 highest adult consumers is 12.7 kg/y
The observed 97.5 percentile rate based on 12 observations is 12.7 kg/y

Table 15. Adults' consumption rates of sheep meat in the Amersham area (kg/y)

Observation number	Lamb
307-309	**17.0**
442-447	**11.3**
190-194	**6.8**
426-429	**5.7**
17-20	2.8

Notes

Emboldened observations are the critical group consumers

The critical group consumption rate of sheep meat based on the 18 highest adult consumers is 9.7 kg/y

The observed 97.5 percentile rate based on 22 observations is 17.0 kg/y

Table 16. Adults' consumption rates of poultry in the Amersham area (kg/y)

Observation number	Duck	Goose	Partridge	Pheasant	Pigeon	Total
25		**13.2**				**13.2**
26		**13.2**				**13.2**
417	**1.8**			**4.5**	**3.7**	**10.0**
418	**1.8**			**4.5**	**3.7**	**10.0**
419	**1.8**			**4.5**	**3.7**	**10.0**
17	**1.4**		**2.1**	**1.4**	**2.5**	**7.3**
18	**1.4**		**2.1**	**1.4**	**2.5**	**7.3**
19	**1.4**		**2.1**	**1.4**	**2.5**	**7.3**
20	**1.4**		**2.1**	**1.4**	**2.5**	**7.3**
4	**5.4**					**5.4**
38	**0.8**			**3.8**		**4.5**
41	**0.8**			**3.8**		**4.5**
42	**0.8**			**3.8**		**4.5**
43	**0.8**			**3.8**		**4.5**
44	**0.8**			**3.8**		**4.5**
45	**0.8**			**3.8**		**4.5**
162	**2.3**			**2.3**		**4.5**
163	**2.3**			**2.3**		**4.5**
314	1.4		0.7			2.1
315	1.4		0.7			2.1
422	1.4					1.4
344		0.6		0.7		1.2
345		0.6		0.7		1.2
404				0.2		0.2
405				0.2		0.2
346		0.1				0.1
347		0.1				0.1
348		0.1				0.1
349		0.1				0.1
350		0.1				0.1
351		0.1				0.1

Notes

Emboldened observations are the critical group consumers

The critical group consumption rate of poultry based on the 18 highest adult consumers is 7.1 kg/y

The observed 97.5 percentile rate based on 31 observations is 13.2 kg/y

Table 17. Adults' consumption rates of eggs in the Amersham area (kg/y)

Observation number	Chicken egg	Duck egg	Total
4	**17.8**	**10.3**	**28.1**
344-345	**17.8**	**6.8**	**24.6**
38	**23.7**		**23.7**
41-45	**23.7**		**23.7**
422	**5.9**	**17.6**	**23.6**
257	**20.8**		**20.8**
155	**20.7**		**20.7**
388-391		**20.6**	**20.6**
235-236	**17.8**		**17.8**
404-405	**17.8**		**17.8**
57-60	**11.9**		**11.9**
423		**11.8**	**11.8**
276-277	**9.9**		**9.9**
88	8.9		8.9
93	8.9		8.9
361-362	8.9		8.9
392-393	8.9		8.9
221-223	7.9		7.9
150	7.1		7.1
156	6.9		6.9
346-351	4.2	1.6	5.8
46	5.1		5.1
48	5.1		5.1
426-429	5.1		5.1
84-85	4.4		4.4
359-360	4.4		4.4
420-421	4.4		4.4
307-309	4.0		4.0

Notes

Emboldened observations are the critical group consumers

The critical group consumption rate of eggs based on the 27 highest adult consumers is 19.1 kg/y

The observed 97.5 percentile rate based on 59 observations is 24.6 kg/y

Table 18. Adults' consumption rates of wild/free foods in the Amersham area (kg/y)

Observation number	Blackberry	Hazel nut	Sloe	Total
107	**3.5**			**3.5**
159-160	**3.0**			**3.0**
161	**3.0**			**3.0**
422	**2.0**			**2.0**
392-393	**1.8**			**1.8**
420-421	**1.1**	**0.2**	**0.2**	**1.6**
307-309	**1.5**			**1.5**
46	**1.5**			**1.5**
48	**1.5**			**1.5**
61	**1.5**			**1.5**
69	**1.5**			**1.5**
21-22	1.1			1.1
38	1.1			1.1
41	1.1			1.1
84-85	1.1			1.1
408-409	1.1			1.1
404-405	0.9			0.9
108-109	0.8			0.8
276-277	0.5		0.2	0.7
53-54	0.5			0.5
292-293	0.5			0.5
376-377	0.5			0.5
417-419	0.5			0.5
130-131	0.4			0.4
72-73			0.3	0.3
77			0.2	0.2
88	0.1			0.1
93	0.1			0.1
75-76			0.1	0.1

Notes

Emboldened observations are the critical group consumers

The critical group consumption rate of wild/free foods based on the 16 highest adult consumers is 2.0 kg/y

The observed 97.5 percentile rate based on 48 observations is 3.0 kg/y

Table 19. Adults' consumption rates of rabbits/hares in the Amersham area (kg/y)

Observation number	Rabbit
344-345	**2.7**
17-20	0.7
404-405	0.2

Notes

Emboldened observations are the critical group consumers

The critical group consumption rate of rabbits/hares based on the 2 highest adult consumers is 2.7 kg/y

The observed 97.5 percentile rate based on 8 observations is 2.7 kg/y

Table 20. Adults' consumption rates of honey in the Amersham area (kg/y)

Observation number	Honey
439-440	**10.9**
408	**6.8**
388-393	**5.7**
434-435	**5.4**
38	**3.8**
41-45	**3.8**
394-398	3.4
410-411	2.7
413-414	2.7
281-282	2.3
296-297	2.3
424-425	2.3
430-431	1.7
436-438	1.7
420-422	1.4
190-194	0.9
283-284	0.5
288-293	0.5
409	0.2
276-277	0.1

Notes

Emboldened observations are the critical group consumers

The critical group consumption rate of honey based on the 17 highest adult consumers is 5.7 kg/y

The observed 97.5 percentile rate based on 56 observations is 9.4 kg/y

Table 21. Adults' consumption rates of wild fungi in the Amersham area (kg/y)

Observation number	Mushrooms
344-345	**2.3**
276-277	**0.9**
292-293	0.5
417-419	0.3

Notes
Emboldened observations are the critical group consumers
The critical group consumption rate of wild fungi based on the 4 highest adult consumers is 1.6 kg/y
The observed 97.5 percentile rate based on 9 observations is 2.3 kg/y

Table 22. Adults' consumption rates of venison in the Amersham area (kg/y)

Observation number	Venison
417	**6.7**
418	**6.7**
419	**6.7**

Notes
Emboldened observations are the critical group consumers
The critical group consumption rate of venison based on the 3 highest adult consumers is 6.7 kg/y
The observed 97.5 percentile rate based on 3 observations is 6.7 kg/y

Table 23. Adults' consumption rates of freshwater fish in the Amersham area (kg/y)

Observation number	Brown trout	Rainbow trout	Total
239-240		**15.3**	**15.3**
263-268		**5.9**	**5.9**
25-26		4.6	4.6
27-36		3.8	3.8
21-24	0.4		0.4

Notes
Emboldened observations are the critical group consumers
The critical group consumption rate of freshwater fish based on the 8 highest adult consumers is 8.3 kg/y
The observed 97.5 percentile rate based on 24 observations is 15.3 kg/y
All fish in this table is from the terrestrial survey area and is therefore potentially affected by gaseous discharges rather than liquid discharges

Table 24. Adults' consumption rates of freshwater crustaceans in the Amersham area (kg/y)

Observation number	Crayfish
263	**1.3**
264	**1.3**

Notes

Emboldened observations are the critical group consumers
The critical group consumption rate of freshwater crustaceans based on the
2 highest adult consumers is 1.3 kg/y
The observed 97.5 percentile rate based on 2 observations is 1.3 kg/y
All crustaceans in this table are from the terrestrial survey area and are therefore potentially affected by gaseous discharges rather than liquid discharges

Table 25. Adults' consumption rates of freshwater plants in the Amersham area (kg/y)

Observation number	Watercress
5	**49.9**
6	**13.6**
7	**13.6**
8	**13.6**

Notes

Emboldened observations are the critical group consumers
The critical group consumption rate of freshwater plants based on the 4 highest adult consumers is 22.7 kg/y
(Taking the highest consumption rate of 49.9 kg/y and dividing by 3 would give a cut-off value
for the critical group of 16.6 kg/y. However, judgement has been used and in this case the
lower values of 13.6 kg/y have been included in the critical group.)
The observed 97.5 percentile rate based on 4 observations is 47.2 kg/y
All freshwater plants in this table are from the terrestrial survey area and are therefore potentially affected by gaseous discharges rather than liquid discharges

Table 26. Children's consumption rates of green vegetables in the Amersham area (kg/y)

15 year old age group

Observation number	Age	Artichoke	Broccoli	Brussel sprout	Cabbage	Calabrese	Cauliflower	Chard	Courgette	Cucumber	Herbs	Kale	Lettuce	Marrow	Spinach	Total
74	**14**			**3.4**	**4.6**	**5.6**	**2.8**							**1.8**	**1.3**	**19.5**
95	**14**		**2.5**	**4.9**	**5.5**		**1.2**				**0.3**		**1.0**		**1.1**	**16.6**
94	**12**		**2.5**	**4.9**	**5.5**		**1.2**				**0.3**		**1.0**		**1.1**	**16.6**
157	**16**		**3.4**	**4.6**	**4.3**											**12.2**
158	**15**		**3.4**	**4.6**	**4.3**											**12.2**
132	**14**		**3.4**	**1.0**	**2.7**	**3.4**			**1.7**							**12.2**
133	**12**		**3.4**	**1.0**	**2.7**	**3.4**			**1.7**							**12.2**
86	15	1.7							3.5							5.1
87	15	1.7							3.5							5.1
55	12				0.5								1.3			1.8
278	16			0.7					0.5							1.2
279	14			0.7					0.5							1.2
280	12			0.7					0.5							1.2

Notes

Emboldened observations are the critical group consumers

The critical group consumption rate of green vegetables based on the 7 highest 15 year old consumers is 14.5 kg/y

The observed 97.5 percentile rate based on 13 observations is 18.6 kg/y

10 year old age group

Observation number	Age	Artichoke	Broccoli	Brussel sprout	Cabbage	Calabrese	Cauliflower	Chard	Courgette	Cucumber	Herbs	Kale	Lettuce	Marrow	Spinach	Total
118	**7**				**1.7**					**1.7**				**1.8**		**5.2**
353	**7**		**0.4**	**0.5**	**0.5**		**0.4**			**0.3**			**0.4**	**0.02**		**2.5**
352	**9**		**0.4**	**0.5**	**0.5**		**0.4**			**0.3**			**0.4**	**0.02**		**2.5**
367	**7**		**0.5**		**1.7**								**0.1**		**0.1**	**2.3**
56	**9**				**0.5**								**1.3**			**1.8**
373	9		0.1	0.2	0.3		0.1									0.7

Notes

Emboldened observations are the critical group consumers

The critical group consumption rate of green vegetables based on the 5 highest 10 year old consumers is 2.9 kg/y

The observed 97.5 percentile rate based on 6 observations is 4.9 kg/y

Table 26. Children's consumption rates of green vegetables in the Amersham area (kg/y)

5 year old age group

Observation number	Age	Artichoke	Broccoli	Brussel sprout	Cabbage	Calabrese	Cauliflower	Chard	Courgette	Cucumber	Herbs	Kale	Lettuce	Marrow	Spinach	Total
335	**3**		**1.7**	**0.6**	**1.5**		**0.5**	**0.3**	**2.8**							**7.3**
334	**4**		**1.7**	**0.6**	**1.5**		**0.5**	**0.3**	**2.8**							**7.3**
117	**6**				**1.7**					**1.7**				**1.8**		**5.2**
212	**5**			**1.6**	**1.9**				**0.6**			**0.5**			**0.3**	**4.9**
211	**2**			**1.6**	**1.9**				**0.6**			**0.5**			**0.3**	**4.8**
338	**4**		**0.9**	**0.3**	**0.8**		**0.2**	**0.1**	**1.5**							**3.8**
355	**4**		**0.4**	**0.5**	**0.5**		**0.4**			**0.3**			**0.4**	**0.02**		**2.5**
354	**5**		**0.4**	**0.5**	**0.5**		**0.4**			**0.3**			**0.4**	**0.02**		**2.5**
356	**4**		**0.4**	**0.5**	**0.5**		**0.4**			**0.3**			**0.4**	**0.02**		**2.5**
137	3								1.4							1.4
374	6		0.1	0.2	0.3		0.1									0.7
375	3		0.1	0.2	0.3		0.1									0.7

Notes

Emboldened observations are the critical group consumers

The critical group consumption rate of green vegetables based on the 9 highest 5 year old consumers is 4.5 kg/y

The observed 97.5 percentile rate based on 12 observations is 7.3 kg/y

1 year old age group

Observation number	Age	Artichoke	Broccoli	Brussel sprout	Cabbage	Calabrese	Cauliflower	Chard	Courgette	Cucumber	Herbs	Kale	Lettuce	Marrow	Spinach	Total
368	**1**		**0.5**		**1.7**								**0.1**		**0.1**	**2.3**
138	**1**								**1.4**							**1.4**

Notes

Emboldened observations are the critical group consumers

The critical group consumption rate of green vegetables based on the 2 highest 1 year old consumers is 1.9 kg/y

The observed 97.5 percentile rate based on 2 observations is 2.3 kg/y

Table 27. Children's consumption rates of other vegetables in the Amersham area (kg/y)

15 year old age group

Observation number	Age	Broad bean	French bean	Pea	Pepper	Runner bean	Squash	Sweetcorn	Tomato	Total
157	**16**	**4.6**		**2.3**		**6.8**		**2.9**	**36.0**	**52.5**
158	**15**	**4.6**		**2.3**		**6.8**		**2.9**	**36.0**	**52.5**
95	14		3.6			10.2		1.2		15.1
94	12		3.6			10.2		1.2		15.1
132	14		1.8			6.1		0.8	5.7	14.4
133	12		1.8			6.1		0.8	5.7	14.4
74	14		4.1			10.2				14.3
55	12					1.3	0.5		12.5	14.3
86	15		3.0	1.3		7.7		0.4		12.4
87	15		3.0	1.3		7.7		0.4		12.4
9	14					3.5				3.5
278	16					0.9			0.9	1.8
279	14					0.9			0.9	1.8
280	12					0.9			0.9	1.8
407	15		0.9						0.6	1.5
406	14		0.9						0.6	1.5

Notes
Emboldened observations are the critical group consumers
The critical group consumption rate of other vegetables based on
the 2 highest 15 year old consumers is 52.5 kg/y
The observed 97.5 percentile rate based on 16 observations is 52.5 kg/y

10 year old age group

Observation number	Age	Broad bean	French bean	Pea	Pepper	Runner bean	Squash	Sweetcorn	Tomato	Total
56	**9**					**1.3**	**0.5**		**12.5**	**14.3**
118	**7**	**0.9**				**2.7**		**2.3**		**5.9**
367	7	0.3				3.5			0.3	4.1
10	8					3.5				3.5
352	9	0.1		0.1	0.04	0.6		0.03	0.8	1.7
353	7	0.1		0.1	0.04	0.6		0.03	0.8	1.7
373	9		0.05					0.1		0.1

Notes
Emboldened observations are the critical group consumers
The critical group consumption rate of other vegetables based on
the 2 highest 10 year old consumers is 10.1 kg/y
The observed 97.5 percentile rate based on 7 observations is 13.0 kg/y

Table 27. Children's consumption rates of other vegetables in the Amersham area (kg/y)

5 year old age group

Observation number	Age	Broad bean	French bean	Pea	Pepper	Runner bean	Squash	Sweetcorn	Tomato	Total
117	**6**		**0.9**			**2.7**		**2.3**		**5.9**
212	**5**	**0.4**	**0.3**	**0.4**		**1.6**		**0.6**	**1.1**	**4.3**
211	**2**	**0.4**	**0.3**	**0.4**		**1.6**		**0.6**	**1.1**	**4.3**
334	**4**			**0.4**		**2.2**				**2.6**
335	**3**			**0.4**		**2.2**				**2.6**
137	3								1.8	1.8
11	5					1.7				1.7
356	4	0.1		0.1	0.04	0.6		0.03	0.8	1.7
354	5	0.1		0.1	0.04	0.6		0.03	0.8	1.7
355	4	0.1		0.1	0.04	0.6		0.03	0.8	1.7
338	4			0.2		1.2				1.4
374	6		0.05					0.1		0.1
375	3		0.05					0.1		0.1

Notes
Emboldened observations are the critical group consumers
The critical group consumption rate of other vegetables based on
the 5 highest 5 year old consumers is 4.0 kg/y
The observed 97.5 percentile rate based on 13 observations is 5.4 kg/y

1 year old age group

Observation number	Age	Broad bean	French bean	Pea	Pepper	Runner bean	Squash	Sweetcorn	Tomato	Total
368	**1**	**0.3**				**1.8**			**0.3**	**2.3**
138	**1**								**1.8**	**1.8**

Notes
Emboldened observations are the critical group consumers
The critical group consumption rate of other vegetables based on
the 2 highest 1 year old consumers is 2.1 kg/y
The observed 97.5 percentile rate based on 2 observations is 2.3 kg/y

Table 28. Children's consumption rates of root vegetables in the Amersham area (kg/y)

15 year old age group

Observation number	Age	Beetroot	Carrot	Celery	Chicory root	Garlic	Jerusalem artichoke	Leek	Onion	Parsnip	Radish	Shallot	Spring onion	Swede	Turnip	Total
95	**14**		**6.1**					**3.2**	**10.5**	**4.1**	**0.2**	**1.4**	**0.5**	**3.1**	**2.4**	**31.4**
94	**12**		**6.1**					**3.2**	**10.5**	**4.1**	**0.2**	**1.4**	**0.5**	**3.1**	**2.4**	**31.4**
157	**16**	**2.3**	**5.6**					**4.5**	**7.2**			**6.4**	**1.5**			**27.5**
158	**15**	**2.3**	**5.6**					**4.5**	**7.2**			**6.4**	**1.5**			**27.5**
74	**14**	**1.7**	**5.1**		**0.5**			**6.8**	**5.4**			**1.2**				**20.6**
132	**14**		**2.0**					**3.0**	**4.9**	**4.9**						**14.8**
133	**12**		**2.0**					**3.0**	**4.9**	**4.9**						**14.8**
55	12	1.3				1.3		2.5	5.0							10.0
86	15						1.7	1.3	5.1							8.0
87	15						1.7	1.3	5.1							8.0
278	16							0.5								0.5
279	14							0.5								0.5
280	12							0.5								0.5

Notes

Emboldened observations are the critical group consumers

The critical group consumption rate of root vegetables based on the 7 highest 15 year old consumers is 24.0 kg/y

The observed 97.5 percentile rate based on 13 observations is 31.4 kg/y

10 year old age group

Observation number	Age	Beetroot	Carrot	Celery	Chicory root	Garlic	Jerusalem artichoke	Leek	Onion	Parsnip	Radish	Shallot	Spring onion	Swede	Turnip	Total
118	**7**	**1.8**	**1.4**					**4.8**	**2.2**		**0.2**	**3.0**				**13.3**
56	**9**	**1.3**				**1.3**		**2.5**	**5.0**							**10.0**
353	7	0.3	0.7					0.7	0.3	0.3		0.1		1.3		3.7
352	9	0.3	0.7					0.7	0.3	0.3		0.1		1.3		3.7
367	7	0.2	0.6					0.2		0.3						1.2
373	9		0.2						0.1	0.3						0.6

Notes

Emboldened observations are the critical group consumers

The critical group consumption rate of root vegetables based on the 2 highest 10 year old consumers is 11.7 kg/y

The observed 97.5 percentile rate based on 6 observations is 12.9 kg/y

Table 28. Children's consumption rates of root vegetables in the Amersham area (kg/y)

5 year old age group

Observation number	Age	Beetroot	Carrot	Celery	Chicory root	Garlic	Jerusalem artichoke	Leek	Onion	Parsnip	Radish	Shallot	Spring onion	Swede	Turnip	Total
117	**6**	**1.8**	**1.4**					**4.8**	**2.2**		**0.2**	**3.0**				**13.3**
335	**3**		**2.2**			**0.2**		**3.8**	**4.4**	**0.2**						**10.7**
334	**4**		**2.2**			**0.2**		**3.8**	**4.4**	**0.2**						**10.7**
211	**2**	**1.3**	**1.0**	**0.4**				**0.7**	**0.5**	**0.6**		**0.4**		**0.5**	**0.4**	**5.9**
212	**5**	**1.3**	**1.0**	**0.4**				**0.7**	**0.5**	**0.6**		**0.4**		**0.5**	**0.4**	**5.9**
338	**4**		**1.1**			**0.1**		**2.0**	**2.3**	**0.1**						**5.5**
354	5	0.3	0.7					0.7	0.3	0.3		0.1		1.3		3.7
356	4	0.3	0.7					0.7	0.3	0.3		0.1		1.3		3.7
355	4	0.3	0.7					0.7	0.3	0.3		0.1		1.3		3.7
137	3		1.7												1.3	3.0
374	6		0.2						0.1	0.3						0.6
375	3		0.2						0.1	0.3						0.6

Notes

Emboldened observations are the critical group consumers

The critical group consumption rate of root vegetables based on the 6 highest 5 year old consumers is 8.7 kg/y

The observed 97.5 percentile rate based on 12 observations is 12.6 kg/y

1 year old age group

Observation number	Age	Beetroot	Carrot	Celery	Chicory root	Garlic	Jerusalem artichoke	Leek	Onion	Parsnip	Radish	Shallot	Spring onion	Swede	Turnip	Total
138	**1**		**1.7**												**1.3**	**3.0**
368	**1**	**0.2**	**0.6**					**0.2**		**0.3**						**1.2**

Notes

Emboldened observations are the critical group consumers

The critical group consumption rate of root vegetables based on the 2 highest 1 year old consumers is 2.1 kg/y

The observed 97.5 percentile rate based on 2 observations is 2.9 kg/y

Table 29. Children's consumption rates of potato in the Amersham area (kg/y)

15 year old age group

Observation number	Age	Potato
157	**16**	**68.0**
158	**15**	**68.0**
95	**14**	**28.1**
94	**12**	**28.1**
132	14	16.4
133	12	16.4
74	14	13.7
86	15	12.8
87	15	12.8
278	16	5.4
279	14	5.4
280	12	5.4
55	12	5.0

Notes
Emboldened observations are the critical group consumers
The critical group consumption rate of potato based on
the 4 highest 15 year old consumers is 48.0 kg/y
The observed 97.5 percentile rate based on 13 observations is 68.0 kg/y

10 year old age group

Observation number	Age	Potato
118	**7**	**10.9**
352	**9**	**6.0**
353	**7**	**6.0**
56	**9**	**5.0**
367	7	1.3
373	9	1.0

Notes
Emboldened observations are the critical group consumers
The critical group consumption rate of potato based on
the 4 highest 10 year old consumers is 7.0 kg/y
The observed 97.5 percentile rate based on 6 observations is 10.3 kg/y

Table 29. Children's consumption rates of potato in the Amersham area (kg/y)

5 year old age group

Observation number	Age	Potato
334	**4**	**24.2**
335	**3**	**24.2**
338	**4**	**12.6**
117	**6**	**10.9**
354	5	6.0
355	4	6.0
356	4	6.0
212	5	2.9
211	2	2.9
374	6	1.0
375	3	1.0

Notes
Emboldened observations are the critical group consumers
The critical group consumption rate of potato based on
the 4 highest 5 year old consumers is 18.0 kg/y
The observed 97.5 percentile rate based on 11 observations is 24.2 kg/y

1 year old age group

Observation number	Age	Potato
368	**1**	**1.3**

Notes
Emboldened observations are the critical group consumers
The critical group consumption rate of potato based on
the only 1 year old consumer is 1.3 kg/y
The observed 97.5 percentile rate is not applicable for 1 observation

Table 30. Children's consumption rates of domestic fruit in the Amersham area (kg/y)

15 year old age group

Observation number	Age	Apple	Blackberry	Blackcurrant	Cherry	Gooseberry	Greengage	Pear	Plum	Raspberry	Redcurrant	Rhubarb	Strawberry	Total
157	**16**	**13.6**	**4.0**							**5.1**				**22.7**
158	**15**	**13.6**	**4.0**							**5.1**				**22.7**
55	12	1.3								0.8		2.5		4.5
132	14											0.5	2.7	3.2
133	12											0.5	2.7	3.2
304	12		0.9	0.5		0.5				0.5	0.5		0.5	3.2
407	15	1.4												1.4
406	14	1.4												1.4
86	15									0.6				0.6
87	15									0.6				0.6
278	16	0.5						0.2						0.6
279	14	0.5						0.2						0.6
280	12	0.5						0.2						0.6
74	14											0.1		0.1

Notes

Emboldened observations are the critical group consumers

The critical group consumption rate of domestic fruit based on the 2 highest 15 year old consumers is 22.7 kg/y

The observed 97.5 percentile rate based on 14 observations is 22.7 kg/y

10 year old age group

Observation number	Age	Apple	Blackberry	Blackcurrant	Cherry	Gooseberry	Greengage	Pear	Plum	Raspberry	Redcurrant	Rhubarb	Strawberry	Total
56	**9**	**1.3**								**0.8**		**2.5**		**4.5**
305	**8**		**0.9**	**0.5**		**0.5**				**0.5**	**0.5**		**0.5**	**3.2**
353	**7**	**1.1**	**0.2**	**0.1**		**0.4**			**0.5**	**0.1**				**2.3**
352	**9**	**1.1**	**0.2**	**0.1**		**0.4**			**0.5**	**0.1**				**2.3**
367	**7**			**0.3**		**0.7**	**0.6**	**0.2**	**0.3**					**2.1**
118	**7**					**0.4**				**0.1**		**1.6**		**2.1**

Notes

Emboldened observations are the critical group consumers

The critical group consumption rate of domestic fruit based on the 6 highest 10 year old consumers is 2.7 kg/y

The observed 97.5 percentile rate based on 6 observations is 4.3 kg/y

Table 30. Children's consumption rates of domestic fruit in the Amersham area (kg/y)

5 year old age group

Observation number	Age	Apple	Blackberry	Blackcurrant	Cherry	Gooseberry	Greengage	Pear	Plum	Raspberry	Redcurrant	Rhubarb	Strawberry	Total
334	**4**	**2.0**	**0.2**	**0.1**	**0.2**	**0.1**		**0.2**	**1.5**	**0.7**	**0.4**	**0.4**		**5.9**
335	**3**	**2.0**	**0.2**	**0.1**	**0.2**	**0.1**		**0.2**	**1.5**	**0.7**	**0.4**	**0.4**		**5.9**
338	**4**	**1.0**	**0.3**	**0.1**	**0.1**	**0.1**		**0.1**	**0.8**	**0.4**	**0.2**	**0.2**		**3.2**
354	**5**	**1.1**	**0.2**	**0.1**		**0.4**			**0.5**	**0.1**				**2.3**
355	**4**	**1.1**	**0.2**	**0.1**		**0.4**			**0.5**	**0.1**				**2.3**
356	**4**	**1.1**	**0.2**	**0.1**		**0.4**			**0.5**	**0.1**				**2.3**
117	**6**					**0.4**				**0.1**		**1.6**		**2.1**
212	5									0.1				0.1
211	2									0.1				0.1

Notes

Emboldened observations are the critical group consumers

The critical group consumption rate of domestic fruit based on the 7 highest 5 year old consumers is 3.4 kg/y

The observed 97.5 percentile rate based on 9 observations is 5.9 kg/y

1 year old age group

Observation number	Age	Apple	Blackberry	Blackcurrant	Cherry	Gooseberry	Greengage	Pear	Plum	Raspberry	Redcurrant	Rhubarb	Strawberry	Total
368	**1**			**0.3**		**0.7**	**0.6**	**0.2**	**0.3**					**2.1**

Notes

Emboldened observations are the critical group consumers

The critical group consumption rate of domestic fruit based on the only 1 year old consumer is 2.1 kg/y

The observed 97.5 percentile rate is not applicable for 1 observation

Table 31. Children's consumption rates of milk in the Amersham area (l/y)

15 year old age group

Observation number	Age	Goat's milk
186	**15**	**29.6**
187	**12**	**29.6**

Notes
Emboldened observations are the critical group consumers
The critical group consumption rate of milk based on the 2 highest 15 year old consumers is 29.6 l/y
The observed 97.5 percentile rate based on 2 observations is 29.6 l/y

Table 32. Children's consumption rates of pig meat in the Amersham area (kg/y)

15 year old age group

Observation number	Age	Pork
157	**16**	**12.7**
158	**15**	**12.7**
95	**14**	**12.7**
94	**12**	**12.7**
86	15	4.1
87	15	4.1

Notes
Emboldened observations are the critical group consumers
The critical group consumption rate of pig meat based on the 4 highest 15 year old consumers is 12.7 kg/y
The observed 97.5 percentile rate based on 6 observations is 12.7 kg/y

Table 33. Children's consumption rates of poultry in the Amersham area (kg/y)

15 year old age group

Observation number	Age	Goose	Pheasant	Total
407	**15**		**0.2**	**0.2**
406	**14**		**0.2**	**0.2**

Notes
Emboldened observations are the critical group consumers
The critical group consumption rate of poultry based on the 2 highest 15 year old consumers is 0.2 kg/y
The observed 97.5 percentile rate based on 2 observations is 0.2 kg/y

10 year old age group

Observation number	Age	Goose	Pheasant	Total
352	**9**	**0.1**		**0.1**
353	**7**	**0.1**		**0.1**

Notes
Emboldened observations are the critical group consumers
The critical group consumption rate of poultry based on the 2 highest 10 year old consumers is 0.1 kg/y
The observed 97.5 percentile rate based on 2 observations is 0.1 kg/y

5 year old age group

Observation number	Age	Goose	Pheasant	Total
354	**5**	**0.1**		**0.1**
355	**4**	**0.1**		**0.1**
356	**4**	**0.1**		**0.1**

Notes
Emboldened observations are the critical group consumers
The critical group consumption rate of poultry based on the 3 highest 5 year old consumers is 0.1 kg/y
The observed 97.5 percentile rate based on 3 observations is 0.1 kg/y

Table 34. Children's consumption rates of eggs in the Amersham area (kg/y)

15 year old age group

Observation number	Age	Chicken egg	Duck egg	Total
407	**15**	**17.8**		**17.8**
406	**14**	**17.8**		**17.8**
278	**16**	**9.9**		**9.9**
279	**14**	**9.9**		**9.9**
280	**12**	**9.9**		**9.9**
95	**14**	**8.9**		**8.9**
94	**12**	**8.9**		**8.9**
157	**16**	**6.9**		**6.9**
158	**15**	**6.9**		**6.9**
86	15	4.4		4.4
87	15	4.4		4.4

Notes
Emboldened observations are the critical group consumers
The critical group consumption rate of eggs based on
the 9 highest 15 year old consumers is 10.8 kg/y
The observed 97.5 percentile rate based on 11 observations is 17.8 kg/y

10 year old age group

Observation number	Age	Chicken egg	Duck egg	Total
238	**10**	**17.8**		**17.8**
237	**8**	**17.8**		**17.8**
152	**11**	**7.1**		**7.1**
153	**10**	**7.1**		**7.1**
154	**7**	**7.1**		**7.1**
352	9	2.1	0.8	2.9
353	7	2.1	0.8	2.9

Notes
Emboldened observations are the critical group consumers
The critical group consumption rate of eggs based on
the 5 highest 10 year old consumers is 11.4 kg/y
The observed 97.5 percentile rate based on 7 observations is 17.8 kg/y

5 year old age group

Observation number	Age	Chicken egg	Duck egg	Total
354	**5**	**2.1**	**0.8**	**2.9**
355	**4**	**2.1**	**0.8**	**2.9**
356	**4**	**2.1**	**0.8**	**2.9**

Notes
Emboldened observations are the critical group consumers
The critical group consumption rate of eggs based on
the 3 highest 5 year old consumers is 2.9 kg/y
The observed 97.5 percentile rate based on 3 observations is 2.9 kg/y

Table 35. Children's consumption rates of wild/free foods in the Amersham area (kg/y)

15 year old age group

Observation number	Age	Blackberry	Sloe	Total
86	**15**	**1.1**		**1.1**
87	**15**	**1.1**		**1.1**
407	**15**	**0.9**		**0.9**
406	**14**	**0.9**		**0.9**
55	**12**	**0.5**		**0.5**
278	**16**	**0.5**		**0.5**
279	**14**	**0.5**		**0.5**
280	**12**	**0.5**		**0.5**
132	**14**	**0.4**		**0.4**
133	**12**	**0.4**		**0.4**
74	14		0.3	0.3
95	14	0.1		0.1
94	12	0.1		0.1

Notes
Emboldened observations are the critical group consumers
The critical group consumption rate of wild/free foods based on
the 10 highest 15 year old consumers is 0.7 kg/y
The observed 97.5 percentile rate based on 13 observations is 1.1 kg/y

10 year old age group

Observation number	Age	Blackberry	Sloe	Total
56	**9**	**0.5**		**0.5**

Notes
Emboldened observations are the critical group consumers
The critical group consumption rate of wild/free foods based on
the only 10 year old consumer is 0.5 kg/y
The observed 97.5 percentile rate is not applicable for 1 observation

Table 36. Children's consumption rates of rabbits/hares in the Amersham area (kg/y)

15 year old age group

Observation number	Age	Rabbit
407	**15**	**0.2**
406	**14**	**0.2**

Notes
Emboldened observations are the critical group consumers
The critical group consumption rate of rabbits/hares based on
the 2 highest 15 year old consumers is 0.2 kg/y
The observed 97.5 percentile rate based on 2 observations is 0.2 kg/y

Table 37. Children's consumption rates of honey in the Amersham area (kg/y)

15 year old age group

Observation number	Age	Honey
399	**12**	**3.4**
298	**16**	**2.3**
432	**15**	**1.7**
433	**13**	**1.7**
278	16	0.1
279	14	0.1
280	12	0.1

Notes
Emboldened observations are the critical group consumers
The critical group consumption rate of honey based on
the 4 highest 15 year old age group consumers is 2.3 kg/y
The observed 97.5 percentile rate based on 7 observations is 3.2 kg/y

10 year old age group

Observation number	Age	Honey
400	**10**	**3.4**
401	**8**	**3.4**
402	**8**	**3.4**
415	**8**	**2.7**
441	**7**	**1.8**

Notes
Emboldened observations are the critical group consumers
The critical group consumption rate of honey based on
the 5 highest 10 year old consumers is 2.9 kg/y
The observed 97.5 percentile rate based on 5 observations is 3.4 kg/y

5 year old age group

Observation number	Age	Honey
403	**6**	**3.4**
412	**4**	**2.7**
416	**2**	**2.7**
285	5	0.5
286	3	0.5
287	2	0.5

Notes
Emboldened observations are the critical group consumers
The critical group consumption rate of honey based on
the 3 highest 5 year old consumers is 2.9 kg/y
The observed 97.5 percentile rate based on 6 observations is 3.3 kg/y

Table 38. Children's consumption rates of wild fungi in the Amersham area (kg/y)

15 year old age group

Observation number	Age	Mushrooms
278	**16**	**0.9**
279	**14**	**0.9**
280	**12**	**0.9**

Notes

Emboldened observations are the critical group consumers
The critical group consumption rate of wild fungi based on
the 3 highest 15 year old consumers is 0.9 kg/y
The observed 97.5 percentile rate based on 3 observations is 0.9 kg/y

Table 39. Children's consumption rates of freshwater plants in the Amersham area (kg/y)

15 year old age group

Observation number	Age	Watercress
9	**14**	**13.6**

Notes
Emboldened observations are the critical group consumers
The critical group consumption rate of freshwater plants based on
the only 15 year old consumer is 13.6 kg/y
The observed 97.5 percentile rate is not applicable for 1 observation
All freshwater plants in this table are from the terrestrial survey area and are therefore
potentially affected by gaseous discharges rather than liquid discharges

10 year old age group

Observation number	Age	Watercress
10	**8**	**13.6**

Notes
Emboldened observations are the critical group consumers
The critical group consumption rate of freshwater plants based on
the only 10 year old consumer is 13.6 kg/y
The observed 97.5 percentile rate is not applicable for 1 observation
All freshwater plants in this table are from the terrestrial survey area and are therefore
potentially affected by gaseous discharges rather than liquid discharges

5 year old age group

Observation number	Age	Watercress
11	**5**	**6.8**

Notes
Emboldened observations are the critical group consumers
The critical group consumption rate of freshwater plants based on
the only 5 year old consumer is 6.8 kg/y
The observed 97.5 percentile rate is not applicable for 1 observation
All freshwater plants in this table are from the terrestrial survey area and are therefore
potentially affected by gaseous discharges rather than liquid discharges

Table 40. Summary of adults' consumption rates in the Amersham area (kg/y or l/y)

Food group	Number of observations	No. higher rate consumers	Observed maximum critical group consumption rate	Observed minimum critical group consumption rate	Observed mean critical group consumption rate	Observed 97.5 %ile consumption rate	Generic mean consumption rate	Generic 97.5 %ile consumption rate
Fish[A]	NC	NC	NC	NC	NC	NC	15.0	40.0
Crustaceans[A]	NC	NC	NC	NC	NC	NC	3.5	10.0
Molluscs[A]	NC	NC	NC	NC	NC	NC	3.5	10.0
Green vegetables	169	48	54.5	18.9	31.8	42.1	15.0	45.0
Other vegetables	185	37	65.5	22.2	35.0	49.8	20.0	50.0
Root vegetables	165	27	93.9	31.4	45.5	51.9	10.0	40.0
Potato	162	28	136.0	48.4	71.9	88.5	50.0	120.0
Domestic fruit	157	17	67.9	22.7	37.5	60.0	20.0	75.0
Milk	6	3	207.4	147.8	187.5	207.4	95.0	240.0
Cattle meat	10	10	23.7	18.9	20.8	23.7	15.0	45.0
Pig meat	12	8	12.7	12.7	12.7	12.7	15.0	40.0
Sheep meat	22	18	17.0	5.7	9.7	17.0	8.0	25.0
Poultry	31	18	13.2	4.5	7.1	13.2	10.0	30.0
Eggs	59	27	28.1	9.9	19.1	24.6	8.5	25.0
Wild/free foods	48	16	3.5	1.5	2.0	3.0	7.0	25.0
Rabbits/hares	8	2	2.7	2.7	2.7	2.7	6.0	15.0
Honey	56	17	10.9	3.8	5.7	9.4	2.5	9.5
Wild fungi	9	4	2.3	0.9	1.6	2.3	3.0	10.0
Venison	3	3	6.7	6.7	6.7	6.7	ND	ND
Fish[G]	24	8	15.3	5.9	8.3	15.3	15.0	40.0
Crustaceans[G]	2	2	1.3	1.3	1.3	1.3	3.5	10.0
Freshwater plants[G]	4	4	49.9	13.6	22.7	47.2	ND	ND

Notes

ND = not determined

NC = not consumed

[A] = relating to aquatic discharges

[G] = relating to gaseous discharges

Table 41. Summary of 15 year old children's consumption rates in the Amersham area (kg/y or l/y)

Food group	Number of observations	No. higher rate consumers	Observed maximum critical group consumption rate	Observed minimum critical group consumption rate	Observed mean critical group consumption rate	Observed 97.5 %ile consumption rate	Generic mean consumption rate	Generic 97.5 %ile consumption rate
Fish[A]	NC	NC	NC	NC	NC	NC	6.5	20.0
Crustaceans[A]	NC	NC	NC	NC	NC	NC	2.5	6.0
Molluscs[A]	NC	NC	NC	NC	NC	NC	2.5	6.0
Green vegetables	13	7	19.5	12.2	14.5	18.6	9.0	25.0
Other vegetables	16	2	52.5	52.5	52.5	52.5	10.0	30.0
Root vegetables	13	7	31.4	14.8	24.0	31.4	7.5	20.0
Potato	13	4	68.0	28.1	48.0	68.0	60.0	130.0
Domestic fruit	14	2	22.7	22.7	22.7	22.7	15.0	50.0
Milk	2	2	29.6	29.6	29.6	29.6	110.0	260.0
Cattle meat	NC	NC	NC	NC	NC	NC	15.0	35.0
Pig meat	6	4	12.7	12.7	12.7	12.7	10.0	30.0
Sheep meat	NC	NC	NC	NC	NC	NC	5.5	15.0
Poultry	2	2	0.2	0.2	0.2	0.2	6.5	20.0
Eggs	11	9	17.8	6.9	10.8	17.8	7.0	25.0
Wild/free foods	13	10	1.1	0.4	0.7	1.1	3.0	13.0
Rabbits/hares	2	2	0.2	0.2	0.2	0.2	ND	ND
Honey	7	4	3.4	1.7	2.3	3.2	2.0	5.0
Wild fungi	3	3	0.9	0.9	0.9	0.9	2.0	5.5
Venison	NC	NC	NC	NC	NC	NC	ND	ND
Fish[G]	NC	NC	NC	NC	NC	NC	6.5	20.0
Crustaceans[G]	NC	NC	NC	NC	NC	NC	2.5	6.0
Freshwater plants[G]	1	1	13.6	13.6	13.6	NA	ND	ND

Notes

ND = not determined

NC = not consumed

NA = not applicable

[A] = relating to aquatic discharges

[G] = relating to gaseous discharges

Table 42. Summary of 10 year old children's consumption rates in the Amersham area (kg/y or l/y)

Food group	Number of observations	No. higher rate consumers	Observed maximum critical group consumption rate	Observed minimum critical group consumption rate	Observed mean critical group consumption rate	Observed 97.5 %ile consumption rate	Generic mean consumption rate	Generic 97.5 %ile consumption rate
Fish[A]	NC	NC	NC	NC	NC	NC	6.0	20.0
Crustaceans[A]	NC	NC	NC	NC	NC	NC	2.5	7.0
Molluscs[A]	NC	NC	NC	NC	NC	NC	2.5	7.0
Green vegetables	6	5	5.2	1.8	2.9	4.9	6.0	20.0
Other vegetables	7	2	14.3	5.9	10.1	13.0	8.0	25.0
Root vegetables	6	2	13.3	10.0	11.7	12.9	6.0	20.0
Potato	6	4	10.9	5.0	7.0	10.3	45.0	85.0
Domestic fruit	6	6	4.5	2.1	2.7	4.3	15.0	50.0
Milk	NC	NC	NC	NC	NC	NC	110.0	240.0
Cattle meat	NC	NC	NC	NC	NC	NC	15.0	30.0
Pig meat	NC	NC	NC	NC	NC	NC	8.5	25.0
Sheep meat	NC	NC	NC	NC	NC	NC	4.0	10.0
Poultry	2	2	0.1	0.1	0.1	0.1	5.5	15.0
Eggs	7	5	17.8	7.1	11.4	17.8	6.5	20.0
Wild/free foods	1	1	0.5	0.5	0.5	NA	3.0	11.0
Rabbits/hares	NC	NC	NC	NC	NC	NC	ND	ND
Honey	5	5	3.4	1.8	2.9	3.4	2.0	7.5
Wild fungi	NC	NC	NC	NC	NC	NC	1.5	4.5
Venison	NC	NC	NC	NC	NC	NC	ND	ND
Fish[G]	NC	NC	NC	NC	NC	NC	6.0	20.0
Crustaceans[G]	NC	NC	NC	NC	NC	NC	2.5	7.0
Freshwater plants[G]	1	1	13.6	13.6	13.6	NA	ND	ND

Notes

ND = not determined

NC = not consumed

NA = not applicable

[A] = relating to aquatic discharges

[G] = relating to gaseous discharges

Table 43. Summary of 5 year old children's consumption rates in the Amersham area (kg/y or l/y)

Food group	Number of observations	No. higher rate consumers	Observed maximum critical group consumption rate	Observed minimum critical group consumption rate	Observed mean critical group consumption rate	Observed 97.5 %ile consumption rate	Generic mean consumption rate	Generic 97.5 %ile consumption rate
Fish[A]	NC	NC	NC	NC	NC	NC	ND	ND
Crustaceans[A]	NC	NC	NC	NC	NC	NC	ND	ND
Molluscs[A]	NC	NC	NC	NC	NC	NC	ND	ND
Green vegetables	12	9	7.3	2.5	4.5	7.3	ND	ND
Other vegetables	13	5	5.9	2.6	4.0	5.4	ND	ND
Root vegetables	12	6	13.3	5.5	8.7	12.6	ND	ND
Potato	11	4	24.2	10.9	18.0	24.2	ND	ND
Domestic fruit	9	7	5.9	2.1	3.4	5.9	ND	ND
Milk	NC	NC	NC	NC	NC	NC	ND	ND
Cattle meat	NC	NC	NC	NC	NC	NC	ND	ND
Pig meat	NC	NC	NC	NC	NC	NC	ND	ND
Sheep meat	NC	NC	NC	NC	NC	NC	ND	ND
Poultry	3	3	0.1	0.1	0.1	0.1	ND	ND
Eggs	3	3	2.9	2.9	2.9	2.9	ND	ND
Wild/free foods	NC	NC	NC	NC	NC	NC	ND	ND
Rabbits/hares	NC	NC	NC	NC	NC	NC	ND	ND
Honey	6	3	3.4	2.7	2.9	3.3	ND	ND
Wild fungi	NC	NC	NC	NC	NC	NC	ND	ND
Venison	NC	NC	NC	NC	NC	NC	ND	ND
Fish[G]	NC	NC	NC	NC	NC	NC	ND	ND
Crustaceans[G]	NC	NC	NC	NC	NC	NC	ND	ND
Freshwater plants[G]	1	1	6.8	6.8	6.8	NA	ND	ND

Notes

ND = not determined

NC = not consumed

NA = not applicable

[A] = relating to aquatic discharges

[G] = relating to gaseous discharges

Table 44. Summary of 1 year old children's consumption rates in the Amersham area (kg/y or l/y)

Food group	Number of observations	No. higher rate consumers	Observed maximum critical group consumption rate	Observed minimum critical group consumption rate	Observed mean critical group consumption rate	Observed 97.5 %ile consumption rate	Generic mean consumption rate	Generic 97.5 %ile consumption rate
Fish[A]	NC	NC	NC	NC	NC	NC	ND	ND
Crustaceans[A]	NC	NC	NC	NC	NC	NC	ND	ND
Molluscs[A]	NC	NC	NC	NC	NC	NC	ND	ND
Green vegetables	2	2	2.3	1.4	1.9	2.3	ND	ND
Other vegetables	2	2	2.3	1.8	2.1	2.3	ND	ND
Root vegetables	2	2	3.0	1.2	2.1	2.9	ND	ND
Potato	1	1	1.3	1.3	1.3	NA	ND	ND
Domestic fruit	1	1	2.1	2.1	2.1	NA	ND	ND
Milk	NC	NC	NC	NC	NC	NC	ND	ND
Cattle meat	NC	NC	NC	NC	NC	NC	ND	ND
Pig meat	NC	NC	NC	NC	NC	NC	ND	ND
Sheep meat	NC	NC	NC	NC	NC	NC	ND	ND
Poultry	NC	NC	NC	NC	NC	NC	ND	ND
Eggs	NC	NC	NC	NC	NC	NC	ND	ND
Wild/free foods	NC	NC	NC	NC	NC	NC	ND	ND
Rabbits/hares	NC	NC	NC	NC	NC	NC	ND	ND
Honey	NC	NC	NC	NC	NC	NC	ND	ND
Wild fungi	NC	NC	NC	NC	NC	NC	ND	ND
Venison	NC	NC	NC	NC	NC	NC	ND	ND
Fish[G]	NC	NC	NC	NC	NC	NC	ND	ND
Crustaceans[G]	NC	NC	NC	NC	NC	NC	ND	ND
Freshwater plants[G]	NC	NC	NC	NC	NC	NC	ND	ND

Notes

ND = not determined

NC = not consumed

NA = not applicable

[A] = relating to aquatic discharges

[G] = relating to gaseous discharges

Table 45. Percentage contribution each food type makes to its terrestrial food group for adults

Green vegetables	
Cabbage	19.2 %
Brussel sprout	14.6 %
Courgettes	13.3 %
Lettuce	12.1 %
Broccoli	10.5 %
Marrow	5.6 %
Cauliflower	5.4 %
***Spinach**	5.3 %
Cucumber	4.7 %
Artichoke	2.8 %
Calabrese	2.1 %
Kale	1.8 %
Chard	1.7 %
Other (3 varieties)	0.9 %
Other vegetables	
***Runner bean**	47.2 %
Tomato	22.3 %
Broad bean	9.0 %
French bean	7.3 %
Pea	6.7 %
Sweetcorn	4.7 %
Aubergine	1.0 %
Pepper	1.0 %
Other (2 varieties)	0.8 %
Root vegetables	
***Onion**	25.5 %
Leek	21.0 %
Carrot	15.8 %
Beetroot	12.9 %
Parsnip	7.4 %
Swede	6.4 %
Shallot	4.6 %
Celery	1.4 %
Turnip	1.1 %
Radish	1.0 %
Garlic	1.0 %
Other (6 varieties)	1.9 %
Rabbits/hares	
Rabbit	100.0 %
Milk	
***Cow's milk**	63.7 %
Goat's milk	36.3 %

Domestic fruit	
Raspberry	17.1 %
***Apple**	15.2 %
Rhubarb	10.4 %
Gooseberry	9.7 %
Plum	8.1 %
Blackcurrant	7.8 %
Strawberry	6.8 %
Redcurrants	6.5 %
Grapes	5.2 %
Pumpkin	4.1 %
Blackberry	3.1 %
Pear	1.6 %
Greengages	1.4 %
Loganberry	1.2 %
Other (6 varieites)	1.8 %
Poultry	
Pheasant	35.1 %
Duck	21.5 %
Goose	20.8 %
Pigeon	15.5 %
Partridge	7.2 %
Eggs	
Chicken egg	79.6 %
Duck egg	20.4 %
Fish (freshwater)	
Rainbow trout	98.5 %
Brown trout	1.5 %
Crustaceans (freshwater)	
Crayfish	100.0 %
Freshwater plants	
Watercress	100.0 %
Wild/free foods	
***Blackberry**	95.4 %
Sloe	3.7 %
Hazel nuts	0.9 %

Food types astrisked and emboldened were monitored by FSA in 2003 (EA, EHS, FSA and SEPA, 2004)
Other foods sampled were potatoes and wheat
Percentages are based on the consumption of all adults in the survey consuming that particular food group

Table 46. Occupancy rates in the Amersham direct radiation survey area for adults and children (h/y)

Observation Number	Age (in years) (U if unknown)	Distance from site perimeter fence (km)	Indoor occupancy	Outdoor occupancy	Total occupancy
0 to 0.25 km zone					
134	55	0.05	8016	640	8656
135	29	0.05	7602	820	8422
137	3	0.05	7782	640	8422
138	1	0.05	7782	640	8422
152	11	0.10	8012	324	8336
153	10	0.10	8012	324	8336
154	7	0.10	8012	324	8336
241	40	0.05	6864	1456	8320
378	34	0.04	7433	821	8254
292	79	0.02	6004	2190	8194
227	20	0.05	8088		8088
381	9	0.04	6798	1218	8016
151	33	0.10	7650	324	7974
386	1	0.04	7808	156	7964
299	54	0.04	7885	52	7937
167	37	0.10	7836	100	7936
169	12	0.10	7604	300	7904
170	8	0.10	7604	300	7904
256	61	0.05	7419	455	7874
418	61	0.01	7248	624	7872
380	10	0.04	6614	1218	7832
245	44	0.05	6522	1150	7672
246	3	0.05	6522	1150	7672
247	3	0.05	6522	1150	7672
253	37	0.05	6268	1344	7612
254	2	0.05	6268	1344	7612
384	13	0.04	7060	520	7580
385	10	0.04	7060	520	7580
221	62	0.05	7284	260	7544
229	80	0.05	6478	1036	7514
233	73	0.10	7136	376	7512
172	42	0.05	7239	255	7494
225	46	0.05	7322	100	7422
248	39	0.05	6670	728	7398
140	58	0.10	6935	460	7395
232	72	0.10	6916	468	7384
144	54	0.10	7248	96	7344
171	42	0.05	5600	1664	7264
150	45	0.10	6876	324	7200
417	58	0.01	6763	416	7179
303	33	0.05	6812	286	7098
174	9	0.05	6140	893	7032
178	5	0.05	6273	689	6962
304	12	0.05	6314	622	6936
305	8	0.05	6314	622	6936
128	U	0.05	6280	640	6920
168	40	0.10	6816	100	6916
404	59	0.02	4868	2008	6876
177	12	0.05	6175	689	6864
242	7	0.05	6024	840	6864
243	5	0.05	6024	840	6864
141	55	0.10	6359	460	6819
176	35	0.05	6125	689	6814

Table 46. Occupancy rates in the Amersham direct radiation survey area for adults and children (h/y)

Observation Number	Age (in years) (U if unknown)	Distance from site perimeter fence (km)	Indoor occupancy	Outdoor occupancy	Total occupancy
0 to 0.25 km zone					
383	27	0.04	6567	182	6749
143	82	0.10	6557	192	6749
218	32	0.05	4696	2016	6712
220	1	0.05	4696	2016	6712
222	71	0.05	6448	260	6708
249	47	0.05	5980	728	6708
382	31	0.04	6438	182	6620
255	11	0.05	5880	672	6552
224	52	0.05	6179	325	6504
379	13	0.04	5210	1218	6428
179	19	0.05	5552	802	6354
145	55	0.10	6120	184	6304
293	60	0.02	5766	520	6286
252	37	0.05	5544	728	6272
244	47	0.05	5312	930	6242
226	13	0.05	5908	311	6219
405	65	0.02	5649	546	6195
149	31	0.10	5814	354	6168
449	28	0.03	5785	338	6123
300	50	0.05	5531	561	6092
230	47	0.05	5710	301	6010
406	14	0.02	5643	365	6008
148	73	0.10	5690	222	5912
274	38	0.05	5901		5901
223	43	0.05	5608	104	5712
175	39	0.05	5092	572	5664
275	32	0.05	5548		5548
302	18	0.05	5264	208	5472
146	58	0.10	5246	118	5364
147	57	0.10	5158	118	5276
448	29	0.03	4675	338	5013
219	39	0.05	4817	175	4992
228	18	0.05	4640	244	4884
173	15	0.05	4839		4839
251	22	0.05	4216	208	4424
250	23	0.05	3616	208	3824
387	44	0.04	3176	104	3280
419	31	0.01	3036	92	3128
142	19	0.10	2362	50	2412
231	42	0.05	1502		1502
234	60	0.00	1200		1200
164	19	0.10	1190	10	1200
166	21	0.10	1190	10	1200
407	15	0.02	798	210	1008
165	16	0.10	854	10	864
0.25 to 0.5 km zone					
358	41	0.50	6664	1300	7964
357	68	0.50	4944	520	5464
0.5 to 1 km zone					
235	44	0.70	5236	2800	8036
236	39	0.70	6762	356	7118
306	57	0.66	5714	1278	6992

Table 46. Occupancy rates in the Amersham direct radiation survey area for adults and children (h/y)

Observation Number	Age (in years) (U if unknown)	Distance from site perimeter fence (km)	Indoor occupancy	Outdoor occupancy	Total occupancy
0.5 to 1 km zone					
237	8	0.70	6004	667	6671
238	10	0.70	6004	667	6671
307	65	0.80	5211	1369	6580
308	62	0.80	5284	104	5388
309	26	0.80	3564	156	3720
315	62	0.70	1920		1920

Table 47. Analysis of occupancy rates in the Amersham direct radiation survey area

0 to 0.25 km zone	
Number of hours per year	Number of observations
8000 to 8760	12
7000 to 8000	30
6000 to 7000	33
5000 to 6000	9
4000 to 5000	4
3000 to 4000	3
2000 to 3000	1
1000 to 2000	5
0 to 1000	1

0.25 to 0.5 km zone	
Number of hours per year	Number of observations
8000 to 8760	0
7000 to 8000	1
6000 to 7000	0
5000 to 6000	1
4000 to 5000	0
3000 to 4000	0
2000 to 3000	0
1000 to 2000	0
0 to 1000	0

0.5 to 1 km zone	
Number of hours per year	Number of observations
8000 to 8760	1
7000 to 8000	1
6000 to 7000	4
5000 to 6000	1
4000 to 5000	0
3000 to 4000	1
2000 to 3000	0
1000 to 2000	1
0 to 1000	0

Table 48. Gamma dose rate measurements for the Amersham direct radiation survey (micro Gy/h)

Location	NGR	Distance (km)	Substrate - outdoors	Gamma dose rate at 1 metre - outdoors	Substrate - indoors	Gamma dose rate at 1 metre - indoors
Business 1	SU 983 975	0.01			U	0.089
Finch Lane - House 1	SU 985 974	0.02	Grass	0.077	U	0.070
Finch Lane - House 2	SU 985 975	0.02	Grass	0.079	Concrete	0.068
Chilcote Lane - House 1	SU 985 976	0.02	Grass	0.086	Concrete	0.083
Farm 1	SU 983 975	0.02	Grass	0.127	Wood	0.072
Bendrose - House 1	SU 982 974	0.03	Grass	0.077		
Chiltern Heights	SU 984 978	0.05	Soil	0.067		
Chiltern Heights - House 1	SU 984 978	0.05	Grass	0.068	U	0.068
Chiltern Heights - House 2	SU 984 978	0.05	Grass	0.070	U	0.059
Chiltern Heights - House 3	SU 984 978	0.05	Grass	0.072	U	0.054
Finch Lane - House 3	SU 986 975	0.05	Grass	0.077	Wood	0.074
Bendrose - House 2	SU 983 976	0.05	Grass	0.088	U	0.084
Finch Lane - House 4	SU 984 972	0.07	Stone	0.087	U	0.081
Church	SU 985 976	0.10	Grass	0.072	Concrete	0.098
Bendrose - House 3	SU 981 974	0.10	Grass	0.072		
White Lion Road - House 1	SU 986 977	0.15	Grass	0.080	Concrete	0.085
White Lion Road - House 2	SU 987 976	0.25	Grass	0.079	Wood	0.100
Little Chalfont - House 1	SU 987 966	0.65	Grass	0.071	U	0.089
Farm 2	SU 978 965	0.80	Grass	0.068	U	0.079

Background 1 - Bovingdon	TL 011 022	6	Grass	0.067
Background 2 - Sarratt	TQ 039 998	5.5	Grass	0.068
Background 3 - Little Missenden	SU 934 985	5	Grass	0.063
Background 4 - Seer Green/Beaconsfield	SU 950 914	6.5	Grass	0.066

Notes
U = Unknown

Table 49. Examples of food groups eaten and external exposure combinations by adults for consideration for dose assessments purposes

Combination number	Green vegetables	Other vegetables	Root vegetables	Potato	Domestic fruit	Milk	Cattle meat	Pig meat	Sheep meat	Poultry	Eggs	Wild/free foods	Rabbits/hares	Honey	Wild fungi	Venison	Fish (freshwater)	Crustaceans (freshwater)	Freshwater plants	Canal bank occupancy over towpath	River bank occupancy over grass	Occupancy in water	Occupancy on water	Occupancy in close proximity to sewage sludge	Occupancy in close proximity to sewage cake bio-solids	Indoor occupancy within 1 km of site perimeter fence	Outdoor occupancy within 1 km of site perimeter fence
1		*			*		*			*	*	*		*													
2		*																	*			*					
3	*	*	*	*	*			*			*	*															
4								*	*	*			*														
5		*		*	*							*					*					*					
6										*							*										
7																	*	*					*				
8	*	*	*	*	*						*															*	*
9	*	*		*	*	*				*	*	*		*													
10									*					*													
11																					*						
12	*	*	*	*	*						*	*		*	*												
13							*					*		*	*											*	*
14					*																	*				*	*
15	*	*	*	*					*		*	*														*	*
16	*	*	*	*	*					*																*	
17	*	*	*	*	*					*	*		*		*							*					
18		*			*					*	*	*	*													*	*
19	*	*	*		*							*		*						*							
20		*			*					*		*			*	*										*	*
21																				*			*				
22																								*			
23																									*		

Annex 1. Adults' consumption rates (kg/y or l/y) and occupancy rates (h/y) in the Amersham area

Observation number	Sex	Age in years (U if unknown)	Distance of residence from Amersham site (km) (U if unknown)	Green vegetables	Other vegetables	Root vegetables	Potato	Domestic fruit	Milk	Cattle meat	Pig meat	Sheep meat	Poultry	Eggs	Wild/free foods	Rabbits/hares	Honey	Wild fungi	Venison	Fish (freshwater)	Crustaceans (freshwater)	Freshwater plants	Canal bank occupancy over towpath	River bank occupancy over grass	Occupancy in water *	Occupancy on water *	Occupancy in close proximity to sewage sludge	Occupancy in close proximity to sewage cake bio-solids	Indoor occupancy within 1 km of site perimeter fence	Outdoor occupancy within 1 km of site perimeter fence
1	M	26	U																				150							
2	M	66	U																				250							
3	M	45	U																				90							
4	M	70	2.9										**5.4**	**28.1**																
5	M	65	3.5		3.5																	**49.9**			*1920*					
6	F	57	3.5		3.5																	**13.6**			*1920*					
7	M	25	3.5		3.5																	**13.6**			*1920*					
8	F	25	3.5		3.5																	**13.6**								
12	M	29	2.3			4.6	29.6	3.8																						
13	F	28	2.3			4.6	29.6	3.8																						
14	M	58	1.8	**54.5**	20.1	3.7	**67.6**	4.5																						
15	F	56	1.8	**54.5**	20.1	3.7	**67.6**	4.5																						
16	F	79	U	6.0	2.2	0.4	7.5	0.5																						
17	M	54	3.8								**12.7**	2.8	**7.3**			0.7														
18	F	46	3.8								**12.7**	2.8	**7.3**			0.7														
19	F	23	3.8								**12.7**	2.8	**7.3**			0.7														
20	M	20	3.8								**12.7**	2.8	**7.3**			0.7														
21	M	55	3.4		3.4		6.8	1.1							1.1					0.4					*72*					
22	F	54	3.4		3.4		6.8	1.1							1.1					0.4										
23	M	28	U																	0.4										
24	F	26	U																	0.4										
25	M	60	1.5										**13.2**							4.6										
26	F	60	1.5										**13.2**							4.6										
27	M	U	U																	3.8										
28	F	U	U																	3.8										
29	M	U	U																	3.8										
30	F	U	U																	3.8										
31	F	U	U																	3.8										

Annex 1. Adults' consumption rates (kg/y or l/y) and occupancy rates (h/y) in the Amersham area

Observation number	Sex	Age in years (U if unknown)	Distance of residence from Amersham site (km) (U if unknown)	Green vegetables	Other vegetables	Root vegetables	Potato	Domestic fruit	Milk	Cattle meat	Pig meat	Sheep meat	Poultry	Eggs	Wild/free foods	Rabbits/hares	Honey	Wild fungi	Venison	Fish (freshwater)	Crustaceans (freshwater)	Freshwater plants	Canal bank occupancy over towpath	River bank occupancy over grass	Occupancy in water *	Occupancy on water *	Occupancy in close proximity to sewage sludge	Occupancy in close proximity to sewage cake bio-solids	Indoor occupancy within 1 km of site perimeter fence	Outdoor occupancy within 1 km of site perimeter fence
32	M	U	U																	3.8										
33	M	U	U																	3.8										
34	F	U	U																	3.8										
35	F	U	U																	3.8										
36	M	U	U																	3.8										
37	M	68	1.5	**20.8**	19.2	**46.0**	15.0	13.9																						
38	M	58	2.2		3.4			9.1		**18.9**			**4.5**	**23.7**	1.1		**3.8**													
39	F	68	1.5	**20.8**	19.2	**46.0**	15.0	13.9																						
40	M	88	U	2.4	9.0	5.5	6.8																							
41	F	56	2.2		3.4			9.1		**18.9**			**4.5**	**23.7**	1.1		**3.8**													
42	M	U	2.2							**18.9**			**4.5**	**23.7**			**3.8**													
43	F	U	2.2							**18.9**			**4.5**	**23.7**			**3.8**													
44	F	U	2.2							**18.9**			**4.5**	**23.7**			**3.8**													
45	F	U	2.2							**18.9**			**4.5**	**23.7**			**3.8**													
46	M	66	1.2	3.4	15.9	12.4	**54.6**	17.5						5.1	**1.5**															
47	M	45	U																							8030				
48	F	63	1.2	3.4	15.9	12.4	**54.6**	17.5						5.1	**1.5**															
49	M	82	2.5	11.4	11.8	16.4	18.2	0.5																						
50	F	81	2.5	11.4	11.8	16.4	18.2	0.5																						
51	M	74	2.6	**18.9**	**46.9**	11.6	18.2	22.6			3.0																			
52	F	75	2.6	**18.9**	**46.9**	11.6	18.2	22.6			3.0																			
53	M	45	2.2	1.8	14.3	10.0	5.0	4.5							0.5															
54	F	45	2.2	1.8	14.3	10.0	5.0	4.5							0.5															
57	F	57	4.5											**11.9**																
58	M	62	4.5											**11.9**																
59	M	33	4.5											**11.9**																
60	M	30	4.5											**11.9**																
61	M	65	1.3	13.4	20.6	19.6	43.7	6.8							**1.5**															

Annex 1. Adults' consumption rates (kg/y or l/y) and occupancy rates (h/y) in the Amersham area

Observation number	Sex	Age in years (U if unknown)	Distance of residence from Amersham site (km) (U if unknown)	Green vegetables	Other vegetables	Root vegetables	Potato	Domestic fruit	Milk	Cattle meat	Pig meat	Sheep meat	Poultry	Eggs	Wild/free foods	Rabbits/hares	Honey	Wild fungi	Venison	Fish (freshwater)	Crustaceans (freshwater)	Freshwater plants	Canal bank occupancy over towpath	River bank occupancy over grass	Occupancy in water *	Occupancy on water *	Occupancy in close proximity to sewage sludge	Occupancy in close proximity to sewage cake bio-solids	Indoor occupancy within 1 km of site perimeter fence	Outdoor occupancy within 1 km of site perimeter fence
62	M	39	U																							1080				
63	M	48	U																							336				
64	M	68	U																							24				
65	F	66	U																							24				
69	F	60	1.3	13.4	20.6	19.6	43.7	6.8							**1.5**															
70	M	70	1.5	**40.1**	**65.5**	**93.9**	**88.5**	**67.9**																						
71	F	65	1.5	**40.1**	**65.5**	**93.9**	**88.5**	**67.9**																						
72	M	50	1.4	**19.5**	14.3	20.6	13.7	0.1							0.3															
73	F	50	1.4	**19.5**	14.3	20.6	13.7	0.1							0.3															
75	M	22	1.4	4.9	3.6	5.2	3.4	0.04							0.1															
76	F	18	1.4	4.9	3.6	5.2	3.4	0.04							0.1															
77	F	80	U	9.7	7.1	10.5	6.8	0.1							0.2															
78	M	82	0.9	1.8	10.2	16.2	37.5	9.8																						
79	F	76	0.9	1.8	10.2	16.2	37.5	9.8																						
80	M	71	3.2	17.6	**48.1**	26.4	41.0	1.2																						
81	F	72	3.2	17.6	**48.1**	26.4	41.0	1.2																						
82	M	70	1.3	14.9	14.1	7.2	20.5	2.0																						
83	F	71	1.3	14.9	14.1	7.2	20.5	2.0																						
84	M	58	1.5	5.1	12.4	8.0	12.8	0.6			4.1			4.4	1.1															
85	F	51	1.5	5.1	12.4	8.0	12.8	0.6			4.1			4.4	1.1															
88	M	48	1.5	16.6	15.1	**31.4**	28.1				**12.7**			8.9	0.1															
89	M	44	U																				52							
90	F	43	U																				52							
91	M	40	U																							1200				
92	F	41	U																							1332				
93	F	48	1.5	16.6	15.1	**31.4**	28.1				**12.7**			8.9	0.1															
96	M	36	U																							5640				
97	M	78	1.4	7.4	7.8	6.8	6.1																							

Annex 1. Adults' consumption rates (kg/y or l/y) and occupancy rates (h/y) in the Amersham area

Observation number	Sex	Age in years (U if unknown)	Distance of residence from Amersham site (km) (U if unknown)	Green vegetables	Other vegetables	Root vegetables	Potato	Domestic fruit	Milk	Cattle meat	Pig meat	Sheep meat	Poultry	Eggs	Wild/free foods	Rabbits/hares	Honey	Wild fungi	Venison	Fish (freshwater)	Crustaceans (freshwater)	Freshwater plants	Canal bank occupancy over towpath	River bank occupancy over grass	Occupancy in water *	Occupancy on water *	Occupancy in close proximity to sewage sludge	Occupancy in close proximity to sewage cake bio-solids	Indoor occupancy within 1 km of site perimeter fence	Outdoor occupancy within 1 km of site perimeter fence
98	F	39	U																				52							
99	F	42	U																				52							
100	F	52	U																				**365**							
101	M	52	U																							2832				
102	F	49	U																							2832				
103	M	49	U																							132				
104	F	82	1.4	7.4	7.8	6.8	6.1																							
105	F	60	U	7.4	7.8	6.8	6.1																							
106	M	60	U	7.4	7.8	6.8	6.1																							
107	M	55	1.4	**20.9**	**52.4**	**53.0**	44.6								**3.5**															
108	F	53	U	4.7	12.7	12.9	10.8								0.8															
109	F	83	U	4.7	12.7	12.9	10.8								0.8															
110	M	62	U																				144							
111	M	53	1.2	10.4	11.8	26.7	21.8	4.1																						
112	M	44	U																				48							
113	M	62	U																				**920**							
114	F	51	1.2	10.4	11.8	26.7	21.8	4.1																						
115	F	26	1.2	10.4	11.8	26.7	21.8	4.1																						
116	M	28	1.2	10.4	11.8	26.7	21.8	4.1																						
119	M	69	1.2	3.2	**24.5**	21.9	**49.1**																							
120	M	30	U																				48							
121	M	64	U																				48							
122	M	32	U																				48							
123	F	67	1.2	3.2	**24.5**	21.9	**49.1**																							
124	M	68	U																				50							
125	M	64	1.3	16.3	7.7	0.9		11.5																						
126	F	57	1.3	16.3	7.7	0.9		11.5																						
127	F	71	U	**19.7**	9.2	5.7	4.1	**22.9**																						

Annex 1. Adults' consumption rates (kg/y or l/y) and occupancy rates (h/y) in the Amersham area

Observation number	Sex	Age in years (U if unknown)	Distance of residence from Amersham site (km) (U if unknown)	Green vegetables	Other vegetables	Root vegetables	Potato	Domestic fruit	Milk	Cattle meat	Pig meat	Sheep meat	Poultry	Eggs	Wild/free foods	Rabbits/hares	Honey	Wild fungi	Venison	Fish (freshwater)	Crustaceans (freshwater)	Freshwater plants	Canal bank occupancy over towpath	River bank occupancy over grass	Occupancy in water *	Occupancy on water *	Occupancy in close proximity to sewage sludge	Occupancy in close proximity to sewage cake bio-solids	Indoor occupancy within 1 km of site perimeter fence	Outdoor occupancy within 1 km of site perimeter fence
128	M	U	0.05	2.8	3.6	5.9																								6280	640
129	M	75	U	**19.7**	9.2	5.7	4.1	**22.9**																							
130	M	49	1.9	12.2	14.4	14.8	16.4	3.2							0.4																
131	F	46	1.9	12.2	14.4	14.8	16.4	3.2							0.4																
134	F	55	0.05	2.8	3.6	5.9																								8016	640
135	F	29	0.05	2.8	3.6	5.9																								7602	820
136	M	59	1.7	7.2	3.7	24.8		0.7																							
139	F	59	1.7	7.2	3.7	24.8		0.7																							
140	M	58	0.1																											6935	460
141	F	55	0.1																											6359	460
142	F	19	0.1																											2362	50
143	F	82	0.1																											6557	192
144	F	54	0.1																											7248	96
145	M	55	0.1																											6120	184
146	M	58	0.1																											5246	118
147	F	57	0.1																											5158	118
148	M	73	0.1																											5690	222
149	M	31	0.1																											5814	354
150	M	45	0.1											7.1																6876	324
151	F	33	0.1																											7650	324
155	M	70	1.9	12.2	**52.5**	27.5	**136.0**	**22.7**			**12.7**			**20.7**																
156	F	48	1.9	12.2	**52.5**	27.5	**136.0**	**22.7**			**12.7**			6.9																
159	M	70	1.8	15.2	11.2	2.3	8.5	1.4							**3.0**															
160	F	66	1.8	15.2	11.2	2.3	8.5	1.4							**3.0**															
161	M	33	1.8	15.2	11.2	2.3	8.5	1.4							**3.0**															
162	M	37	2.1										**4.5**																	
163	F	37	2.1										**4.5**																	
164	F	19	U																											1190	10

Annex 1. Adults' consumption rates (kg/y or l/y) and occupancy rates (h/y) in the Amersham area

Observation number	Sex	Age in years (U if unknown)	Distance of residence from Amersham site (km) (U if unknown)	Green vegetables	Other vegetables	Root vegetables	Potato	Domestic fruit	Milk	Cattle meat	Pig meat	Sheep meat	Poultry	Eggs	Wild/free foods	Rabbits/hares	Honey	Wild fungi	Venison	Fish (freshwater)	Crustaceans (freshwater)	Freshwater plants	Canal bank occupancy over towpath	River bank occupancy over grass	Occupancy in water *	Occupancy on water *	Occupancy in close proximity to sewage sludge	Occupancy in close proximity to sewage cake bio-solids	Indoor occupancy within 1 km of site perimeter fence	Outdoor occupancy within 1 km of site perimeter fence
166	F	21	U																											1190	10
167	M	37	0.1																											7836	100
168	F	40	0.1																											6816	100
171	M	42	0.05																											5600	1664
172	F	42	0.05																											7239	255
175	M	39	0.05																											5092	572
176	F	35	0.05																											6125	689
179	M	19	0.05																											5552	802
180	M	77	5.0	11.3	11.7	4.3	4.5	3.6																							
181	F	75	5.0	11.3	11.7	4.3	4.5	3.6																							
182	M	40	5.0	11.3	11.7	4.3	4.5	3.6																							
183	F	40	5.0	11.3	11.7	4.3	4.5	3.6																							
184	M	44	3.9						**29.6**																						
185	F	37	3.9						**29.6**																						
188	M	75	5.0	**34.5**	**37.6**	**48.3**	**76.6**	4.4																							
189	F	68	5.0	**34.5**	**37.6**	**48.3**	**76.6**	4.4																							
190	F	52	1.5									**6.8**					0.9														
191	M	58	1.5									**6.8**					0.9														
192	F	23	1.5									**6.8**					0.9														
193	F	22	1.5									**6.8**					0.9														
194	M	19	1.5									**6.8**					0.9														
195	M	43	5.0	16.4	4.5	19.8	32.8	12.1																							
196	F	43	5.0	16.4	4.5	19.8	32.8	12.1																							
197	M	72	5.0	**23.6**	13.4	27.7	14.7																								
198	F	72	5.0	**23.6**	13.4	27.7	14.7																								
199	M	27	5.0	**31.0**	11.7	2.0	17.5	13.8																							
200	F	27	5.0	**31.0**	11.7	2.0	17.5	13.8																							
201	M	76	5.0	**31.6**	**39.2**	**43.7**	18.4	11.6																							

Annex 1. Adults' consumption rates (kg/y or l/y) and occupancy rates (h/y) in the Amersham area

Observation number	Sex	Age in years (U if unknown)	Distance of residence from Amersham site (km) (U if unknown)	Green vegetables	Other vegetables	Root vegetables	Potato	Domestic fruit	Milk	Cattle meat	Pig meat	Sheep meat	Poultry	Eggs	Wild/free foods	Rabbits/hares	Honey	Wild fungi	Venison	Fish (freshwater)	Crustaceans (freshwater)	Freshwater plants	Canal bank occupancy over towpath	River bank occupancy over grass	Occupancy in water *	Occupancy on water *	Occupancy in close proximity to sewage sludge	Occupancy in close proximity to sewage cake bio-solids	Indoor occupancy within 1 km of site perimeter fence	Outdoor occupancy within 1 km of site perimeter fence
202	F	70	5.0	**31.6**	**39.2**	**43.7**	18.4	11.6																						
203	M	62	10.0	4.1	15.3	24.3	38.1																							
204	F	61	10.0	4.1	15.3	24.3	38.1																							
205	M	76	5.0		**36.7**	**34.2**	**80.1**	2.0																						
206	F	75	5.0		**36.7**	**34.2**	**80.1**	2.0																						
207	M	67	5.0	**33.3**	**25.8**	**34.8**	17.5	0.5																						
208	F	64	5.0	**33.3**	**25.8**	**34.8**	17.5	0.5																						
209	M	38	5.0	9.8	8.6	11.7	5.8	0.2																						
210	F	34	5.0	9.8	8.6	11.7	5.8	0.2																						
213	F	58	5.0	5.9	**24.6**																									
214	M	58	5.0	5.9	**24.6**																									
215	M	30	5.0	5.9	**24.6**																									
216	M	52	5.0	17.3	16.4	**35.8**	20.5	13.7																						
217	F	54	5.0	17.3	16.4	**35.8**	20.5	13.7																						
218	F	32	0.05	12.8	**29.0**		5.5	13.9																					4696	2016
219	M	39	0.05	12.8	**29.0**		5.5	13.9																					4817	175
221	F	62	0.05	2.4	15.7	2.2	27.3	6.1						7.9															7284	260
222	M	71	0.05	2.4	15.7	2.2	27.3	6.1						7.9															6448	260
223	M	43	0.05	2.4	15.7	2.2	27.3	6.1						7.9															5608	104
224	M	52	0.05																										6179	325
225	F	46	0.05																										7322	100
227	F	20	0.05																										8088	
228	M	18	0.05																										4640	244
229	F	80	0.05																										6478	1036
230	M	47	0.05																										5710	301
231	M	42	0.05																										1502	
232	M	72	0.1	1.5			4.8	20.0																					6916	468
233	F	73	0.1	1.5			4.8	20.0																					7136	376

Annex 1. Adults' consumption rates (kg/y or l/y) and occupancy rates (h/y) in the Amersham area

Observation number	Sex	Age in years (U if unknown)	Distance of residence from Amersham site (km) (U if unknown)	Green vegetables	Other vegetables	Root vegetables	Potato	Domestic fruit	Milk	Cattle meat	Pig meat	Sheep meat	Poultry	Eggs	Wild/free foods	Rabbits/hares	Honey	Wild fungi	Venison	Fish (freshwater)	Crustaceans (freshwater)	Freshwater plants	Canal bank occupancy over towpath	River bank occupancy over grass	Occupancy in water *	Occupancy on water *	Occupancy in close proximity to sewage sludge	Occupancy in close proximity to sewage cake bio-solids	Indoor occupancy within 1 km of site perimeter fence	Outdoor occupancy within 1 km of site perimeter fence
234	M	60	U																										1200	
235	M	44	0.7											**17.8**															5236	2800
236	F	39	0.7											**17.8**															6762	356
239	M	80	5.0																	**15.3**										
240	F	76	5.0																	**15.3**										
241	F	40	0.05																										6864	1456
244	M	47	0.05																										5312	930
245	F	44	0.05																										6522	1150
248	M	39	0.05																										6670	728
249	F	47	0.05																										5980	728
250	F	23	0.05																										3616	208
251	M	22	0.05																										4216	208
252	M	37	0.05																										5544	728
253	F	37	0.05																										6268	1344
256	F	61	0.05																										7419	455
257	F	35	3.4											**20.8**																
258	M	50	U																				**705**							
259	M	32	U																				**705**							
260	M	29	U																				**705**							
261	M	50	U																							7460				
262	M	58	U																					**60**						
263	M	55	U																	**5.9**	**1.3**					*273*				
264	F	55	U																	**5.9**	**1.3**									
265	M	52	U																	**5.9**						*273*				
266	M	54	U																	**5.9**						*273*				
267	F	54	U																	**5.9**										
268	F	54	U																	**5.9**										
269	F	52	U																				183							

Annex 1. Adults' consumption rates (kg/y or l/y) and occupancy rates (h/y) in the Amersham area

Observation number	Sex	Age in years (U if unknown)	Distance of residence from Amersham site (km) (U if unknown)	Green vegetables	Other vegetables	Root vegetables	Potato	Domestic fruit	Milk	Cattle meat	Pig meat	Sheep meat	Poultry	Eggs	Wild/free foods	Rabbits/hares	Honey	Wild fungi	Venison	Fish (freshwater)	Crustaceans (freshwater)	Freshwater plants	Canal bank occupancy over towpath	River bank occupancy over grass	Occupancy in water *	Occupancy on water *	Occupancy in close proximity to sewage sludge	Occupancy in close proximity to sewage cake bio-solids	Indoor occupancy within 1 km of site perimeter fence	Outdoor occupancy within 1 km of site perimeter fence
270	F	55	U																				275							
271	M	36	U																				**365**							
272	M	42	U																				52							
273	F	36	U																				52							
274	M	38	0.05																										5901	
275	F	32	0.05																										5548	
276	M	49	2.8	1.2	2.9	0.5	5.4	0.6						**9.9**	0.7		0.1	**0.9**												
277	F	46	2.8	1.2	1.8	0.5	5.4	5.2						**9.9**	0.7		0.1	**0.9**												
281	M	53	3.1	**30.5**	**28.7**	21.3		**37.3**									2.3													
282	F	48	3.1	**30.5**	**28.7**	21.3		**33.9**									2.3													
283	F	39	3.1														0.5													
284	M	40	3.1														0.5													
288	F	40	3.1														0.5													
289	F	40	3.1														0.5													
290	F	25	3.1														0.5													
291	F	26	3.1														0.5													
292	M	79	0.02							**23.7**					0.5		0.5	0.5											6004	2190
293	F	60	0.02							**23.7**					0.5		0.5	0.5											5766	520
294	F	27	U							**23.7**																				
295	M	50	U							**23.7**																				
296	M	50	6.0														2.3													
297	F	42	6.0														2.3													
299	F	54	0.04																										7885	52
300	F	50	0.05		4.8		3.4	2.3																					5531	561
301	F	18	0.05		4.8		3.4	2.3																						
302	M	18	0.05		4.8		3.4	2.3																					5264	208
303	F	33	0.05					3.2																	*5*				6812	286
306	M	57	0.7					17.2																					5714	1278

Annex 1. Adults' consumption rates (kg/y or l/y) and occupancy rates (h/y) in the Amersham area

Observation number	Sex	Age in years (U if unknown)	Distance of residence from Amersham site (km) (U if unknown)	Green vegetables	Other vegetables	Root vegetables	Potato	Domestic fruit	Milk	Cattle meat	Pig meat	Sheep meat	Poultry	Eggs	Wild/free foods	Rabbits/hares	Honey	Wild fungi	Venison	Fish (freshwater)	Crustaceans (freshwater)	Freshwater plants	Canal bank occupancy over towpath	River bank occupancy over grass	Occupancy in water *	Occupancy on water *	Occupancy in close proximity to sewage sludge	Occupancy in close proximity to sewage cake bio-solids	Indoor occupancy within 1 km of site perimeter fence	Outdoor occupancy within 1 km of site perimeter fence
307	M	65	0.8	14.7	0.8	5.2	8.4					**17.0**		4.0	**1.5**														5211	1369
308	F	62	0.8	14.7	0.8	5.2	8.4					**17.0**		4.0	**1.5**														5284	104
309	F	26	0.8	14.7	0.8	5.2	8.4					**17.0**		4.0	**1.5**														3564	156
310	M	38	4.3	**53.6**	20.8	14.4	**58.0**	**23.6**																						
311	F	40	4.3	**53.6**	20.8	14.4	**58.0**	**23.6**																						
312	M	62	6.0	**21.8**	13.4	7.2	29.0	13.1																						
313	F	59	6.0	**21.8**	13.4	7.2	29.0	13.1																						
314	M	59	4.3	**42.1**	**32.0**	**50.9**	39.3	**23.0**					2.1																	
315	F	62	4.3	**42.1**	**32.0**	**50.9**	39.3	**23.0**					2.1																1920	
316	F	26	4.3	4.5	3.6	5.7	4.4	2.4																	*12*					
317	F	24	4.3	4.5	3.6	5.7	4.4	2.4																	*12*					
318	M	93	4.3	4.5	3.6	5.7	4.4	2.4																						
319	F	83	4.3	4.5	3.6	5.7	4.4	2.4																						
320	M	U	4.3	4.5	3.6	5.7	4.4	2.4																						
321	M	U	4.3	4.5	3.6	5.7	4.4	2.4																						
322	M	U	4.3	4.5	3.6	5.7	4.4	2.4																						
323	M	U	4.3	4.5	3.6	5.7	4.4	2.4																						
324	F	U	4.3	4.5	3.6	5.7	4.4	2.4																						
325	F	U	4.3	4.5	3.6	5.7	4.4	2.4																						
326	F	U	4.3	4.5	3.6	5.7	4.4	2.4																						
327	F	U	4.3	4.5	3.6	5.7	4.4	2.4																						
328	M	71	4.3	**26.9**	1.3	24.5	30.0	8.8																						
329	F	63	4.3	**26.9**	1.3	24.5	30.0	8.8																						
330	M	66	4.3	**33.1**	11.9	**48.5**	**110.1**	**28.2**																						
331	F	61	4.3	**33.1**	11.9	**48.5**	**110.1**	**28.2**																						
332	M	33	35.0	14.5	5.2	21.3	**48.4**	12.2																						
333	F	33	35.0	14.5	5.2	21.3	**48.4**	12.2																						
336	F	31	35.0	7.5	2.7	11.1	25.1	6.3																						

Annex 1. Adults' consumption rates (kg/y or l/y) and occupancy rates (h/y) in the Amersham area

Observation number	Sex	Age in years (U if unknown)	Distance of residence from Amersham site (km) (U if unknown)	Green vegetables	Other vegetables	Root vegetables	Potato	Domestic fruit	Milk	Cattle meat	Pig meat	Sheep meat	Poultry	Eggs	Wild/free foods	Rabbits/hares	Honey	Wild fungi	Venison	Fish (freshwater)	Crustaceans (freshwater)	Freshwater plants	Canal bank occupancy over towpath	River bank occupancy over grass	Occupancy in water *	Occupancy on water *	Occupancy in close proximity to sewage sludge	Occupancy in close proximity to sewage cake bio-solids	Indoor occupancy within 1 km of site perimeter fence	Outdoor occupancy within 1 km of site perimeter fence
337	M	31	35.0	7.5	2.7	11.1	25.1	6.3																							
339	M	58	4.0	15.0	17.7	20.8	15.2	8.2																							
340	F	54	4.0	15.0	17.7	20.8	15.2	8.2																							
341	F	20	4.0	5.0	5.9	6.9	5.1	2.7																							
342	F	18	4.0	5.0	5.9	6.9	5.1	2.7																							
343	M	59	4.0	**41.0**	18.1	14.5	36.3																								
344	M	56	4.0	**22.8**	14.9	28.3	**50.8**	17.6					1.2	**24.6**		**2.7**		**2.3**								*216*					
345	F	54	4.0	**22.8**	14.9	28.3	**50.8**	17.6					1.2	**24.6**		**2.7**		**2.3**													
346	M	U	4.0	5.4	3.5	6.6	12.0	4.1					0.1	5.8																	
347	M	U	4.0	5.4	3.5	6.6	12.0	4.1					0.1	5.8																	
348	M	U	4.0	5.4	3.5	6.6	12.0	4.1					0.1	5.8																	
349	F	U	4.0	5.4	3.5	6.6	12.0	4.1					0.1	5.8																	
350	F	U	4.0	5.4	3.5	6.6	12.0	4.1					0.1	5.8																	
351	F	U	4.0	5.4	3.5	6.6	12.0	4.1					0.1	5.8																	
357	M	68	0.5	**40.6**	**22.4**	**33.6**	19.1	20.3																						4944	520
358	F	41	0.5	**40.6**	**22.4**	**33.6**	19.1	20.3																						6664	1300
359	M	75	3.8	**36.4**	17.7	**34.0**	**61.0**	0.4						4.4																	
360	F	65	3.8	**36.4**	17.7	**34.0**	**61.0**	0.4						4.4																	
361	M	60	4.0	**21.0**	20.9	11.2	11.4	**59.4**						8.9																	
362	F	56	4.0	**21.0**	20.9	11.2	11.4	18.6						8.9																	
363	M	32	4.0	4.7	4.6	2.5	2.5	4.1																							
364	M	23	4.0	4.7	4.6	2.5	2.5	4.1																							
365	F	30	4.0	4.7	4.6	2.5	2.5	4.1																							
366	F	22	4.0	4.7	4.6	2.5	2.5	4.1																							
369	M	64	4.3	14.3	2.7	12.4	22.5																								
370	F	58	4.3	14.3	2.7	12.4	22.5																								
371	F	30	4.3	0.7	0.1	0.6	1.0																								
372	F	32	4.3	0.7	0.1	0.6	1.0																								

Annex 1. Adults' consumption rates (kg/y or l/y) and occupancy rates (h/y) in the Amersham area

Observation number	Sex	Age in years (U if unknown)	Distance of residence from Amersham site (km) (U if unknown)	Green vegetables	Other vegetables	Root vegetables	Potato	Domestic fruit	Milk	Cattle meat	Pig meat	Sheep meat	Poultry	Eggs	Wild/free foods	Rabbits/hares	Honey	Wild fungi	Venison	Fish (freshwater)	Crustaceans (freshwater)	Freshwater plants	Canal bank occupancy over towpath	River bank occupancy over grass	Occupancy in water *	Occupancy on water *	Occupancy in close proximity to sewage sludge	Occupancy in close proximity to sewage cake bio-solids	Indoor occupancy within 1 km of site perimeter fence	Outdoor occupancy within 1 km of site perimeter fence
376	M	58	4.3	**35.0**	**30.5**	**52.0**	33.8	2.4							0.5															
377	F	64	4.3	**35.0**	**30.5**	**52.0**	33.8	2.4							0.5															
378	F	34	0.04																										7433	821
382	F	31	0.04																										6438	182
383	M	27	0.04																										6567	182
387	M	44	0.04																										3176	104
388	F	54	2.0	0.1	5.3	5.0	4.0	12.1						**20.6**			**5.7**													
389	M	57	2.0	0.1	5.3	5.0	4.0	12.1						**20.6**			**5.7**													
390	M	21	2.0	0.1	5.3	5.0	4.0	12.1						**20.6**			**5.7**													
391	M	23	2.0	0.1	5.3	5.0	4.0	12.1						**20.6**			**5.7**													
392	M	68	1.3	15.5	12.9	1.1		17.0						8.9	**1.8**		**5.7**													
393	F	69	1.3	15.5	12.9	1.1		17.0						8.9	**1.8**		**5.7**													
394	M	U	1.3														3.4													
395	M	U	1.3														3.4													
396	M	U	1.3														3.4													
397	F	U	1.3														3.4													
398	F	U	1.3														3.4													
404	F	59	0.02		1.5			1.4					0.2	**17.8**	0.9	0.2													4868	2008
405	M	65	0.02		1.5			1.4					0.2	**17.8**	0.9	0.2													5649	546
408	M	75	5.0	4.8	10.2	2.7		14.7							1.1		**6.8**						2							
409	F	75	5.0	4.8	10.2	2.7		14.7							1.1		0.2						2							
410	M	44	U														2.7													
411	F	38	U														2.7													
413	F	40	U														2.7													
414	M	39	U														2.7													
417	M	58	0.01		**22.2**			2.0					**10.0**		0.5			0.3	**6.7**										6763	416
418	F	61	0.01		**22.2**			2.0					**10.0**		0.5			0.3	**6.7**										7248	624
419	M	31	0.01		**22.2**			2.0					**10.0**		0.5			0.3	**6.7**										3036	92

Annex 1. Adults' consumption rates (kg/y or l/y) and occupancy rates (h/y) in the Amersham area

Observation number	Sex	Age in years (U if unknown)	Distance of residence from Amersham site (km) (U if unknown)	Green vegetables	Other vegetables	Root vegetables	Potato	Domestic fruit	Milk	Cattle meat	Pig meat	Sheep meat	Poultry	Eggs	Wild/free foods	Rabbits/hares	Honey	Wild fungi	Venison	Fish (freshwater)	Crustaceans (freshwater)	Freshwater plants	Canal bank occupancy over towpath	River bank occupancy over grass	Occupancy in water *	Occupancy on water *	Occupancy in close proximity to sewage sludge	Occupancy in close proximity to sewage cake bio-solids	Indoor occupancy within 1 km of site perimeter fence	Outdoor occupancy within 1 km of site perimeter fence
420	F	49	3.0	**41.3**	**31.6**	27.4	**70.8**	**65.1**						4.4	**1.6**		1.4													
421	M	52	3.0	**41.3**	**31.6**	27.4	**70.8**	**65.1**						4.4	**1.6**		1.4													
422	F	64	4.5	0.8	9.8		18.2	14.8	**147.8**				1.4	**23.6**	**2.0**		1.4													
423	F	27	4.5						**29.6**					**11.8**															
424	M	66	4.5	4.8	9.1	13.6	**54.6**	6.8									2.3													
425	F	60	4.5	4.8	9.1	13.6	**54.6**	6.8									2.3													
426	M	U	5.0									**5.7**		5.1																
427	M	U	5.0									**5.7**		5.1																
428	F	U	5.0									**5.7**		5.1																
429	F	U	5.0									**5.7**		5.1																
430	F	46	4.0														1.7													
431	M	52	4.0														1.7													
434	M	65	3.5														**5.4**													
435	F	62	3.5														**5.4**													
436	M	57	U														1.7													
437	F	54	U														1.7													
438	F	26	U														1.7													
439	M	51	U														**10.9**													
440	F	46	U														**10.9**													
442	M	U	5.0									**11.3**																		
443	M	U	U									**11.3**																		
444	M	U	U									**11.3**																		
445	F	U	U									**11.3**																		
446	F	U	U									**11.3**																		
447	F	U	U									**11.3**																		
448	M	29	0.03																										4675	338
449	F	28	0.03																										5785	338
451	M	46	U																				**702**			7522				

Annex 1. Adults' consumption rates (kg/y or l/y) and occupancy rates (h/y) in the Amersham area

Observation number	Sex	Age in years (U if unknown)	Distance of residence from Amersham site (km) (U if unknown)	Green vegetables	Other vegetables	Root vegetables	Potato	Domestic fruit	Milk	Cattle meat	Pig meat	Sheep meat	Poultry	Eggs	Wild/free foods	Rabbits/hares	Honey	Wild fungi	Venison	Fish (freshwater)	Crustaceans (freshwater)	Freshwater plants	Canal bank occupancy over towpath	River bank occupancy over grass	Occupancy in water *	Occupancy on water *	Occupancy in close proximity to sewage sludge	Occupancy in close proximity to sewage cake bio-solids	Indoor occupancy within 1 km of site perimeter fence	Outdoor occupancy within 1 km of site perimeter fence
452	M	U	U																								1840			
453	M	U	U																								1840			
454	M	U	U																								1840			
455	M	U	U																								1840			
456	M	U	U																								1840			
457	M	U	U																								1840			
458	M	U	U																								1840			
459	M	U	U																								1840			
460	M	U	U																								1840			
461	M	U	U																								1840			
462	M	U	U																								1700			
463	M	U	U																								1700			
464	M	U	U																								1700			
465	M	U	U																								1700			
466	M	U	U																								1700			
467	M	U	U																								1700			
468	M	U	U																								1700			
469	M	U	U																								1700			
470	M	U	U																								1700			
471	M	U	U																								1140			
472	M	U	U																								1140			
473	M	U	U																								1140			
474	M	U	U																								1140			
475	M	U	U																								1140			
476	M	U	U																								1140			
477	M	U	U																								1140			
478	M	U	U																								850			
479	M	U	U																									1100		

Annex 1. Adults' consumption rates (kg/y or l/y) and occupancy rates (h/y) in the Amersham area

Observation number	Sex	Age in years (U if unknown)	Distance of residence from Amersham site (km) (U if unknown)	Green vegetables	Other vegetables	Root vegetables	Potato	Domestic fruit	Milk	Cattle meat	Pig meat	Sheep meat	Poultry	Eggs	Wild/free foods	Rabbits/hares	Honey	Wild fungi	Venison	Fish (freshwater)	Crustaceans (freshwater)	Freshwater plants	Canal bank occupancy over towpath	River bank occupancy over grass	Occupancy in water *	Occupancy on water *	Occupancy in close proximity to sewage sludge	Occupancy in close proximity to sewage cake bio-solids	Indoor occupancy within 1 km of site perimeter fence	Outdoor occupancy within 1 km of site perimeter fence
480	M	U	U																									1100		
481	M	U	U																									1100		
482	M	U	U																									613		
483	M	U	U																									276		
484	M	U	U																									276		
485	M	U	U																									276		
486	F	U	4.0						**207.4**																					
487	M	U	4.0						**207.4**																					

* Occupancy rates in italics were for water affected by gaseous discharges rather than by liquid discharges.

Annex 2. Childrens' consumption rates (kg/y or l/y) and occupancy rates (h/y) in the Amersham area

Observation number	Sex	Age in years	Distance of residence from Amersham site (km) (U if unknown)	Green vegetables	Other vegetables	Root vegetables	Potato	Domestic fruit	Milk	Pig meat	Poultry	Eggs	Wild/free foods	Rabbits/hares	Honey	Wild fungi	Freshwater plants	Canal bank occupancy over towpath	Occupancy in water *	Indoor occupancy within 1 km of site perimeter fence	Outdoor occupancy within 1 km of site perimeter fence
15 year old age group																					
55	M	12	2.2	1.8	14.3	10.0	5.0	4.5					**0.5**								
94	F	12	1.5	**16.6**	15.1	**31.4**	**28.1**			**12.7**		**8.9**	0.1								
133	F	12	1.9	**12.2**	14.4	**14.8**	16.4	3.2					**0.4**								
169	M	12	0.10																	7604	300
177	F	12	0.05																	6175	689
187	F	12	3.9						**29.6**												
280	M	12	2.8	1.2	1.8	0.5	5.4	0.6				**9.9**	**0.5**		0.1	**0.9**					
304	M	12	0.05					3.2											*5*	6314	622
399	F	12	1.3												**3.4**						
226	M	13	0.05																	5908	311
379	M	13	0.04																	5210	1218
384	M	13	0.04																	7060	520
433	M	13	4.0												**1.7**						
9	M	14	3.5		3.5												**13.6**				
67	M	14	U															195			
68	M	14	U															195			
74	M	14	1.4	**19.5**	14.3	**20.6**	13.7	0.1					0.3								
95	M	14	1.5	**16.6**	15.1	**31.4**	**28.1**			**12.7**		**8.9**	0.1								
132	M	14	1.9	**12.2**	14.4	**14.8**	16.4	3.2					**0.4**								
279	F	14	2.8	1.2	1.8	0.5	5.4	0.6				**9.9**	**0.5**		0.1	**0.9**					
406	F	14	0.02		1.5			1.4			**0.2**	**17.8**	**0.9**	**0.2**						5643	365
66	M	15	U															195			
86	M	15	1.5	5.1	12.4	8.0	12.8	0.6		4.1		4.4	**1.1**								
87	M	15	1.5	5.1	12.4	8.0	12.8	0.6		4.1		4.4	**1.1**								
158	M	15	1.9	**12.2**	**52.5**	**27.5**	**68.0**	**22.7**		**12.7**		**6.9**									
173	M	15	0.05																	4839	
186	F	15	3.9						**29.6**												
407	F	15	0.02		1.5			1.4			**0.2**	**17.8**	**0.9**	**0.2**						798	210
432	M	15	4.0												**1.7**						
157	F	16	1.9	**12.2**	**52.5**	**27.5**	**68.0**	**22.7**		**12.7**		**6.9**									
165	M	16	U																	854	10
278	F	16	2.8	1.2	1.8	0.5	5.4	0.6				**9.9**	**0.5**		0.1	**0.9**					
298	M	16	6.0												**2.3**						

Annex 2. Childrens' consumption rates (kg/y or l/y) and occupancy rates (h/y) in the Amersham area

Observation number	Sex	Age in years	Distance of residence from Amersham site (km) (U if unknown)	Green vegetables	Other vegetables	Root vegetables	Potato	Domestic fruit	Milk	Pig meat	Poultry	Eggs	Wild/free foods	Rabbits/hares	Honey	Wild fungi	Freshwater plants	Canal bank occupancy over towpath	Occupancy in water *	Indoor occupancy within 1 km of site perimeter fence	Outdoor occupancy within 1 km of site perimeter fence
10 year old age group																					
118	F	7	1.2	**5.2**	**5.9**	**13.3**	**10.9**	**2.1**													
154	F	7	0.10									**7.1**								8012	324
242	F	7	0.05																	6024	840
353	F	7	4.0	**2.5**	1.7	3.7	**6.0**	**2.3**			**0.1**	2.9									
367	F	7	4.0	**2.3**	4.1	1.2	1.3	**2.1**													
441	M	7	U												**1.8**						
10	F	8	3.5		3.5												**13.6**				
170	M	8	0.10																	7604	300
237	M	8	0.70									**17.8**								6004	667
305	F	8	0.05					**3.2**											*5*	6314	622
401	M	8	1.3												**3.4**						
402	M	8	1.3												**3.4**						
415	M	8	U												**2.7**						
56	M	9	2.2	**1.8**	**14.3**	**10.0**	**5.0**	**4.5**					**0.5**								
174	M	9	0.05																	6140	893
352	M	9	4.0	**2.5**	1.7	3.7	**6.0**	**2.3**			**0.1**	2.9									
373	F	9	4.3	0.7	0.1	0.6	1.0														
381	M	9	0.04																	6798	1218
153	M	10	0.10									**7.1**								8012	324
238	F	10	0.70									**17.8**								6004	667
380	M	10	0.04																	6614	1218
385	M	10	0.04																	7060	520
400	F	10	1.3												**3.4**						
152	M	11	0.10									**7.1**								8012	324
255	F	11	0.05																	5880	672

Annex 2. Childrens' consumption rates (kg/y or l/y) and occupancy rates (h/y) in the Amersham area

Observation number	Sex	Age in years	Distance of residence from Amersham site (km) (U if unknown)	Green vegetables	Other vegetables	Root vegetables	Potato	Domestic fruit	Milk	Pig meat	Poultry	Eggs	Wild/free foods	Rabbits/hares	Honey	Wild fungi	Freshwater plants	Canal bank occupancy over towpath	Occupancy in water *	Indoor occupancy within 1 km of site perimeter fence	Outdoor occupancy within 1 km of site perimeter fence
5 year old age group																					
211	M	2	5.0	**4.8**	**4.3**	**5.9**	2.9	0.1													
254	F	2	0.05																	6268	1344
287	M	2	3.1												0.5						
416	M	2	U												**2.7**						
137	F	3	0.05	1.4	1.8	3.0														7782	640
246	F	3	0.05																	6522	1150
247	F	3	0.05																	6522	1150
286	M	3	3.1												0.5						
335	M	3	35.0	**7.3**	**2.6**	**10.7**	**24.2**	**5.9**													
375	M	3	4.3	0.7	0.1	0.6	1.0														
334	M	4	35.0	**7.3**	**2.6**	**10.7**	**24.2**	**5.9**													
338	M	4	6.5	**3.8**	1.4	**5.5**	**12.6**	**3.2**													
355	F	4	4.0	**2.5**	1.7	3.7	6.0	**2.3**			**0.1**	**2.9**									
356	M	4	4.0	**2.5**	1.7	3.7	6.0	**2.3**			**0.1**	**2.9**									
412	M	4	U												**2.7**						
11	M	5	3.5		1.7												**6.8**				
178	F	5	0.05																	6273	689
212	F	5	5.0	**4.9**	**4.3**	**5.9**	2.9	0.1													
243	M	5	0.05																	6024	840
285	F	5	3.1												0.5						
354	M	5	4.0	**2.5**	1.7	3.7	6.0	**2.3**			**0.1**	**2.9**									
117	M	6	1.2	**5.2**	**5.9**	**13.3**	**10.9**	**2.1**													
374	F	6	4.3	0.7	0.1	0.6	1.0														
403	M	6	1.3												**3.4**						
1 year old age group																					
138	F	1	0.05	**1.4**	**1.8**	**3.0**														7782	640
368	F	1	4.0	**2.3**	**2.3**	**1.2**	**1.3**	**2.1**													
386	M	1	0.04																	7808	156
3 month old age group																					
220	M	0.8	0.05																	4696	2016

* Occupancy rates in italics were for water affected by gaseous discharges rather than by liquid discharges.

Annex 3. Qualitative and estimated data for use in dose assessment

	Details of reported habit	Pathways involved	Estimated rate	Other pathways possibly involved
1	The team heard a report of children playing in the River Colne at Horseshoe Falls in fine weather. There were no confirmed observations of this pathway noted during the survey.	Occupancy in water affected by liquid discharges.	Insufficient data to estimate a rate.	Canal or river bank occupancy. No rates estimated.
2	The team heard a report of Eastern European immigrants poaching fish to consume from the Grand Union Canal. There were no confirmed observations of this pathway noted during the survey.	Fish consumption from water affected by liquid discharges.	1 kg/y per person. For more information see Section 4.5.	Canal or river bank occupancy. No rates estimated.
3	The team heard a report that anglers fishing on the Grand Union Canal may poach the occasional trout if they caught one. There were no confirmed observations of this pathway noted during the survey.	Fish consumption from water affected by liquid discharges.	1 kg/y per person. For more information see Section 4.5.	Canal or river bank occupancy. No rates estimated.
4	The team saw children playing in the River Chess but were unable to interview them due to the perceived sensitivity of adult males interviewing children when their parents are not there. High occupancy rates for adults were recorded but the highest confirmed rate for children was 5 h/y. there is a chance that the children we saw may have a higher occupancy rate than 5 h/y.	Occupancy in water affected by terrestrial discharges.	Insufficient data to estimate a rate.	
5	There was a vineyard in the survey area, which was shut when we visited so no consumption data for wine was obtained, although it is likely that this pathway exists.	Consumption of domestic fruit.	Insufficient data to estimate a rate.	

Annex 4. Ratios for determining consumption rates for children

Food group	Ratio child/adult[1]	
	1 yr old	10 yr old
Fish[2]	0.050	0.200
Crustaceans[2]	0.050	0.250
Molluscs[2]	0.050	0.250
Green vegetables	0.222	0.444
Other vegetables	0.200	0.500
Root vegetables	0.375	0.500
Potatoes	0.292	0.708
Domestic fruit	0.467	0.667
Milk	1.333	1.000
Cattle meat	0.222	0.667
Pig meat	0.138	0.625
Sheep meat	0.120	0.400
Poultry	0.183	0.500
Eggs	0.600	0.800
Wild/free foods[3]	0.110	0.490
Game[4]	0.140	0.500
Honey	0.789	0.789
Wild fungi	0.150	0.450
Freshwater fish[2]	0.050	0.250
Direct radiation	1.000	1.000
External exposure	0.500	0.030
Plume	1.000	1.000

Notes

1. The age groups suggested for assessment in this table are those relating to dose coefficients representing 1 to 2 yr olds (labelled 1 yr old) and 7 to 12 yr olds (labelled 10 yr old). Excepting notes 2 and 3, ratios were derived from Byrom et al., (1995) for 1yr old (6 - 12 months) and 10 yr old children (10 - 11 yrs).
2. Ratios were derived from Smith and Jones, (2003) which presented data for infants and children.
3. Ratios were derived from FSA data for wild fruit and nuts for infants and 10 yr old children.
4. Game includes rabbits/hares and venison

Annex 5. Summary of Amersham profiled habits data

Profile Name	Pathway Name	Aquatic plants - fresh	Crustacea - Fresh	Direct[3]	Eggs	Fish - Fresh	Fruit - Domestic	Fruit and nuts - Wild	Gamma ext - grass	Gamma ext - Tow path	Honey	Meat - Cow	Meat - Game[1]	Meat - Pig	Meat - Poultry	Meat - Sheep	Milk	Mushrooms	Occupancy IN water	Occupancy ON water	Plume (IN; 0-0.25km)^2	Plume (MID; 0.25-0.5km)^2	Plume (OUT; 0.5-1km)^2	Vegetables - Green	Vegetables - Other Domestic	Vegetables - Potatoes	Vegetables - Root
		kg	kg	-	kg	kg	kg	kg	h	h	kg	kg	kg	kg	kg	kg	l	kg	h	h	h	h	h	kg	kg	kg	kg
Freshwater plant consumers		22.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1440	0	0	0	0	0	3.5	0	0
Freshwater crustacean consumers		0	1.3	0	0	5.9	0	0	0	0	0	0	0	0	0	0	0	0	0	137	0	0	0	0	0	0	0
Occupants for direct radiation		0	0	1.00	1.5	0	2.4	0.1	0	0	0	0.6	0.3	0	0.4	0.7	0	0	0	0	5527	174	516	2.7	3.6	2.8	2.1
Egg consumers		0	0	0.15	19.1	0	5.5	0.3	0	0	1.7	4.2	0.2	0.5	1.4	0	6.6	0.2	8	0	484	0	561	2.3	4.7	10.5	3.9
Freshwater fish consumers		0	0.3	0	0	8.3	0	0	0	0	0	0	0	0	0	0	0	0	0	102	0	0	0	0	0	0	0
Domestic fruit consumers		0	0	0.06	2.7	0	37.5	0.2	0	0	0.4	0	0	1.5	0.2	0	0	0	0	0	0	0	113	33.3	30.9	60.3	34.7
Wild fruit and nut consumers		0	0	0.19	4.5	0	14.5	2.0	0	0	1.0	0	0	0	0.1	3.2	9.2	0	0	0	0	0	981	16.2	16.2	28.2	12.3
Occupants with exposure over grass		0	0	0	0	0	0	0	60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Occupants with exposure over tow path		0	0	0	0	0	0	0	0	638	0	0	0	0	0	0	0	0	0	1075	0	0	0	0	0	0	0
Honey consumers		0	0	0	14.3	0	6.8	0.4	0	0	5.7	6.7	0	0	1.6	0	0	0	0	0	0	0	0	2.1	3.8	1.0	1.5
Cattle meat consumers		0	0	0.20	14.2	0	1.8	0.3	0	0	2.4	20.8	0	0	2.7	0	0	0.1	0	0	1448	0	0	0	0.7	0	0
Game meat consumers		0	0	0.60	9.8	0	8.2	0.3	0	0	0	0	5.1	0	6.5	0	0	1.1	43	0	3636	0	0	9.1	19.3	20.3	11.3
Pig meat consumers		0	0	0	5.7	0	5.7	0	0	0	0	0	0.3	12.7	3.7	1.4	0	0	0	0	0	0	0	7.2	16.9	41.0	14.7
Poultry meat consumers		0	0	0.17	9.5	0.5	1.3	0.2	0	0	1.3	6.3	1.3	2.8	7.1	0.6	0	0.1	0	0	1010	0	0	0	4.1	0	0
Sheep meat consumers		0	0	0.17	1.8	0	0	0.3	0	0	0.3	0	0	0	0	9.7	0	0	0	0	0	0	872	2.5	0.1	1.4	0.9
Milk consumers		0	0	0	7.9	0	4.9	0.7	0	0	0.5	0	0	0	0.5	0	187.5	0	0	0	0	0	0	0.3	3.3	6.1	0
Mushroom consumers		0	0	0	17.2	0	10.3	0.3	0	0	0	0	1.4	0	0.6	0	0	1.6	54	0	0	0	0	12.0	8.6	28.1	14.4
Occupancy in water		25.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1920	0	0	0	0	0	3.5	0	0
Occupancy on water		0	0	0	0	0	0	0	0	117	0	0	0	0	0	0	0	0	0	5719	0	0	0	0	0	0	0
Occupants for plume pathways (inner area)		0	0	1.00	1.1	0	1.6	0.1	0	0	0	0.8	0.3	0	0.5	0	0	0	0	0	6636	0	0	0.7	3.1	1.7	0.4
Occupants for plume pathways (inner area)		0	0	1.00	0	0	20.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6714	0	40.6	22.4	19.1	33.6
Occupants for plume pathways (inner area)		0	0	1.00	7.9	0	2.9	0.8	0	0	0	0	0	0	0	8.5	0	0	0	0	0	0	6306	7.4	0.4	4.2	2.6
Green vegetable consumers		0	0	0.06	1.8	0	18.3	0.2	0	0	0.2	0	0.1	0.1	0.1	0	0	0.1	5	0	0	280	40	31.8	24.3	37.7	30.2
Other domestic vegetable consumers		0	0	0.22	1.0	0	16	0.2	0	0	0.2	0	0.5	0.8	0.9	0	0	0	0	0	808	363	52	22.3	35.0	38.7	30.0
Potato consumers		0	0	0	3.7	0	19.5	0.2	0	0	0.3	0	0.2	0.9	0.1	0	0	0.2	8	0	0	0	0	25.3	26.0	71.9	30.7
Root vegetable consumers		0	0	0.11	1.0	0	13.9	0.2	0	0	0	0	0	0.9	0.2	0	0	0	0	0	0	497	71	29.0	29.3	46.7	45.5

Notes

1. Game meat includes rabbits/hares and venison
2. Plume times are the sums of individuals' indoor and outdoor times
3. Expressed as proportion of group who are present within 1km of site

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