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Radiological Habits Survey: Hartlepool, 2002

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Radiological Habits Survey: Hartlepool, 2002

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FIGURES

TABLES

ANNEXES

SUMMARY

This report presents the results of a survey conducted in 2002 into the habits and consumption patterns of people living and working in the vicinity of Hartlepool Nuclear Power Station. Hartlepool Power Station is owned by British Energy Generation Ltd and has twin Advanced Gas-cooled Reactors. The company is licensed to operate the site under the Nuclear Installations Act, 1965. Under the Radioactive Substances Act, 1993 the company is authorised to discharge gaseous radioactive wastes to the atmosphere and liquid radioactive wastes into the Tees Bay area of the North Sea.

Potential exposure pathways related to site include:

- consumption of locally sourced terrestrial and marine foods
- occupancy of buildings and the surrounding areas relating to direct radiation
- occupancy of intertidal areas
- handling commercial fishing gear and sediment

The survey investigated all of these pathways. Individuals from the local population were interviewed and the data obtained are presented and discussed. Gamma dose rate measurements were taken to supplement those made in routine surveillance programmes.

High consumption rates were found in the following groups of locally produced foods: fish, crustaceans, molluscs, green vegetables, root vegetables and honey. Other local foods consumed were local marine plants and algae, wildfowl, other vegetables, potatoes, domestic fruit, sheep meat, poultry, eggs, wild/free foods, rabbits/hares and wild fungi.

Occupancy habits included those related to residential, work and recreational activities. In the marine environment, the main activities included angling, bait digging and dog walking. Within 1 km of the site perimeter, occupancy was limited almost exclusively to employment.

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. The information recorded during interviews was processed in 2 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 previous surveys.

Recommendations 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 of Hartlepool Power Station either 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 members of the public carry out 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) and by legislation implementing the European Union (EU) Basic Safety Standards (BSS) Directive 96/29/Euratom (CEC, 1996). 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 diet. The Food Standards Agency also ensures that public radiation exposure via the diet 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.

Operation of nuclear sites anywhere in the UK can only take place if they are licensed under the Nuclear Installations Act 1965 (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 (IRR99) (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. The dose standards are embodied in national policy (UK Parliament, 1995b) and in guidance from the International Atomic Energy Agency (IAEA), in the Basic Safety Standards for Radiation Protection (IAEA, 1996). 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.

Legislative dose standards are contained in the EU BSS Directive 96/29/Euratom and subsequently incorporated into UK law in IRR 99. In order to implement the Directive in England and Wales, the Environment Agency were issued 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

Hartlepool Power Station is owned by British Energy Generation Ltd (BEGL) and has twin Advanced Gas-cooled Reactors (AGR's). It is located on the mouth of the Tees Estuary, approximately 6 km south of the town of Hartlepool (see Figure 1). The company is licensed to operate the site under NIA 65. Under RSA 93 the company is authorised to discharge gaseous radioactive wastes to the atmosphere and liquid radioactive wastes into the Tees Bay area of the North Sea. Details of the amounts of radioactive waste discharged in 2001 can be found in the Environment Agency publication, EA, 2002. Hartlepool Power Station began producing electricity in 1983 and has a capacity of 1210 MW (www.british-energy.co.uk). Both reactors were running at maximum capacity whilst the work for the survey was being carried out. One reactor shut down for a routine refuelling outage on the day we travelled back from the survey. Hartlepool Power Station is expected to run until 2014, after which it will be decommissioned.

2.2 Survey objectives

The Centre for Environment, Fisheries and Aquaculture Science (CEFAS) undertook the survey in 2002 on behalf of the Environment Agency, the Food Standards Agency, and the Health and Safety Executive. The aim of the survey was to review habits related to public radiation exposure from Hartlepool Power Station via aquatic, terrestrial and direct radiation pathways.

The last aquatic and terrestrial habits surveys conducted by CEFAS in the Hartlepool area were in 1998. The data from these survey are currently being used for dose assessments for the Hartlepool area (e.g. FSA and SEPA, 2002). A direct radiation survey was conducted by CEFAS in 1996.

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:

- External exposure activities, including angling, commercial fishing (netting and potting), bait digging and mollusc collection along the intertidal shoreline
- The production, use and destination of local produce
- The types, seasonality of and extent of consumption of wild foods in the area
- The extent of occupancy within 1 km of the site perimeter
- The consumption rates of aquatic and terrestrial foods from within the survey areas
- The extent of any unusual practices, which may be relevant

The survey team also investigated the possible use of seaweed as a fertiliser or soil conditioner and the transfer of contamination by wildlife. In addition, some information was collected that might be relevant to pathways such as the inhalation of re-suspended radioactivity in sea spray, the inadvertent ingestion of contaminated seawater, or contact with or inadvertent ingestion of contaminated sediments.

2.3 Survey areas

Three main survey areas were defined to encompass the dominant activities expected for aquatic, terrestrial and direct radiation pathways respectively.

Earlier aquatic surveys of the Hartlepool area used hydrographic survey information to define a survey area covering the coastline from Hartlepool in the north to Saltburn-by-the-Sea in the south. This area also extends from the coastline, up to 3 km out to sea. The aquatic survey area is the same as used in 1998 and is shown in Figure 1.

The terrestrial survey area, shown in Figure 2, was defined as the circle to a radius of 5 km from the site centre (NGR 529 269), to encompass the main areas of potential deposition from gaseous discharges. The same area was surveyed in the 1998 survey.

For direct radiation, the survey area (also shown in Figure 2) was defined as the area within 1 km of the site perimeter. The 1996 survey covered the same area.

2.4 Conduct of the survey

The fieldwork component of the survey was carried out during the period 9th July to 19th July 2002, by a survey team of 4 people, according to techniques as 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. A pre-survey discussion between one of the survey team, BEGL, the Environment Agency, the Food Standards Agency and the Health and Safety Executive was held via e-mail and telephone prior to the start of the fieldwork. 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 10th July a meeting was held between the survey team and BEGL at Hartlepool Power Station. 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 as these 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 area were contacted for information on any aspects relevant to the different exposure pathways. These included the Local Sea Fisheries Committee Officer, the Environment Agency, English Nature (EN), commercial fishermen, a sea fishing club representative, wildfowling club representatives, seafood retailers, the local Defra fisheries and field officers, local councils, allotment secretaries and the Tourist Information Centre.

Individuals who were identified as having the potential to be exposed to radioactivity from the site were contacted and interviewed. The survey did not involve the whole population in the vicinity of Hartlepool, but targeted a subset of it. Interviews were used to establish individuals' consumption rates of locally grown terrestrial foods and locally caught seafoods, their handling times of intertidal sediments and commercial fishing gear and their occupancy times relevant to external exposure and direct radiation. 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 boat owners, anglers, mollusc collectors, bait-diggers, allotment holders, beekeepers, farmers and individuals working close to the site.

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 a lot of terrestrial foodstuffs. However, where possible, every interviewee was asked about pathways in each of the 3 areas. During interviews with representatives from companies based within the direct radiation survey area 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 indoor and outdoor occupancy within 1 km of the site perimeter, provided by the managers. Such individuals have only data for indoor and outdoor occupancy in Annex 1.

Approximately 36 person-days were spent interviewing and observations for about 910 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

The data collected during the field work 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. 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 tomato 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 1.

All consumption and occupancy data in the text of this report are rounded to 2 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 1 decimal place. The exception is for consumption rates less than 0.05 kg/y, which are presented to 2 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 reports, 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.

- Interviewees were contacted again to confirm the results of the initial interview if, when final consumption rates were calculated, observations were found to be high in relation to our experience of other surveys, taking into account local factors.

- Data were stored in a database in order to minimise transcription and other errors.

- Draft reports and data tables were formally reviewed by senior CEFAS staff.

- 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 mollusc species, for example, are grouped as 'molluscs'. For external exposure over intertidal 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); 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.

3.2 Data analysis

The main output of the study is the statement of individuals' consumption, handling and occupancy rates given in Annexes 1 and 2. These can be used by those undertaking radiological assessments of the effects of the operation of Hartlepool Power Station – 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, handling 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 MAFF and FSA (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 3 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 1 member of the high rate group. In this case, judgement is used as to whether to include other individuals within the group.

In previous aquatic surveys a factor of 1.5, instead of 3, was used to define the cut-off value for intertidal occupancy and handling. However, it is now considered appropriate that the same factor as for consumption is used.

For ingestion pathways, high rates for children have been calculated from the survey data. However because few child consumers were identified 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 3 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.

4 AQUATIC RADIATION PATHWAYS

4.1 Aquatic survey area

The aquatic survey area covered all intertidal areas between Hartlepool and Saltburn-by-the-Sea. Seafood caught at sea up to 3 km from the shoreline were included in the survey.

The Headland to Victoria Harbour

The Headland is a peninsula of land to the north of the town of Hartlepool. The Headland and Victoria Harbour were of significant importance to the survey as many activities relating to the fishing industry, such as angling, commercial fishing, hobby fishing, bait digging and hooking for crab and lobster took place there.

There were rocks to the north and east of the peninsula, where local people caught lobster *(Homarus gammarus*) and edible crab (*Cancer pagurus*) by one of 2 methods – either by setting lobster pots or by hooking them out from amongst the rocks using a pole with a hook on the end. This was carried out during Spring tides because at these times the water brings the shellfish further inshore. Recreational crabbing, winkle picking and angling also took place from these rocks.

The Heugh Breakwater proved a popular location for anglers, whose main catch was mackerel (*Scomber scombrus*) in the summer and cod (*Gadus morhua*) and whiting (*Merlangius merlangus*) in the winter. Peeler crab (*Carcinus maenas*) were collected for bait from rocks next to the breakwater.

The beach to the south of the peninsula, known locally as Fish Sands, had a substrate of sand and mud interspersed with small rocks. On some occasions dozens of bait diggers, collecting rag-worm (*Nereis diversicolor*) and lug-worm (*Arenicola marina*) could be found there. Winkles (*Littorina littorea*) were collected from the rocks on this beach.

Victoria Harbour to Middleton Sands

Further round the coast on the sheltered side of the Headland peninsula is the Victoria Harbour, home to the majority of Hartlepool fishing boats. There were 2 busy pontoons, Kafiga Landings and Reece Landings, where a mixture of chartered angling boats, commercial fishing boats and non-commercial boats were moored, as well as Hartlepool Fish Co, a docking area suitable for larger commercial boats. Victoria Harbour had a facility for landing and selling fish and a fish auction took place 5 days a week. There were 3 wholesalers who bought the fish as well as a few smaller local retailers.

An RNLI lifeboat station which conducted organised tours for groups of visitors was situated on the south east corner of the Victoria Harbour.

Middleton Sands to Carr House Sands

Middleton Sands is a sandy beach, tucked away in a highly industrialised area of Hartlepool. Little activity was observed on this beach during the survey although walking, sea coal collection, cockle collection, winkle picking and bait digging were reported to occur there.

Middleton Beach is separated from Hartlepool Marina by the North Pier. The marina is a thriving, modern area of Hartlepool. There were a number of restaurants, shops and tourist attractions at the marina so it was always a busy place. There were approximately 300 boats moored at the marina, of which 10 were commercial fishing boats.

There were 2 watersports clubs based at Hartlepool Marina – a yacht club and an outdoor pursuits club for groups of children. The outdoor pursuits included canoeing, kayaking and raft building and took place inside the marina, in Hartlepool Bay and down the coast past Hartlepool Power Station into Greatham Creek.

To the south of Hartlepool Marina is the Old Town Basin - a sheltered area with a sand and mud substrate, covered in places by a layer of sea coal. The 2 activities observed there were sea coal collecting and bait digging for worm and peeler crab.

Carr House Sands to North Gare

Carr House Sands and Seaton Sands combine to form a 5 km long stretch of sandy beach. The beach is easily accessible by road from Hartlepool and the seaside resort of Seaton Carew making it popular with tourists. There were a couple of small rocky outcrops – Long Scar and Little Scar, on the beach where recreational crabbing took place. Other leisure activities recorded there included playing, walking, dog walking and metal detecting.

The aquatic discharges from Hartlepool Power Station travel north from the site through a pipe, which eventually discharges into the Tees Bay at a location just off the beach at Seaton Sands, approximately half a kilometre north of the North Gare Breakwater.

North Gare to Seal Sands

The North Gare Breakwater is a concrete pier at the southern end of Seaton Sands, which was used by anglers. South of the breakwater is North Gare Sands - another 2 km long sandy beach, where activities similar to the ones at Seaton Sands and Carr House Sands occurred.

North Gare Sands and Seal Sands are Sites of Special Scientific Interest and form the Teesmouth National Nature Reserve (NNR) managed by EN. Hartlepool Power Station is located between the 2 parts of the NNR on the north bank of the Seaton-on-Tees Channel. The Teesmouth Field Centre provided environmental education for school parties and other interested visitors to learn about these intertidal areas and visits usually included spending some time on the beaches.

Seal Sands is a vast expanse of mud at low tide but is covered by water at high tide. Little human activity occurred there as there is no public access onto the mud and the site is a protected nature reserve. One group of people had permission from English Nature to catch peeler crab for bait on Seal Sands. The method used is to lay car tyres on the mud or to stick short sections of gutter pipe horizontally into the mud for the crab to crawl into at high tide. When the tide goes out, the crab are left in the tyres or tubes and can be collected.

The stretch of Greatham Creek between Seal Sands and the Greatham Creek Bridge, and the strip of land directly south of the power station have a muddy substrate. Approximately 15-20 men use these areas to set tyres or guttering to catch peeler crab.

As mentioned previously, the Seaton-on-Tees Channel is used at high tide for water sports by groups of canoeists and kayakers from Hartlepool.

Seal Sands to Bran Sands

Seal Sands and Bran Sands are on the north and south banks of the River Tees Estuary, respectively. The River Tees is tidal from the river mouth, back to the tidal barrage about 16 km upstream. Both banks of the river are heavily industrialised and evidence of human activity was scarce. However 1 salmon angler was observed fishing on some sandy ground just 200 m downstream from the barrage and evidence of people collecting peeler crabs was seen on a muddy bank near High Clarence.

Bran Sands to Coatham Sands

South Gare and the South Gare Breakwater were very important in terms of the variety of survey activities observed there and the number of people involved.

South Gare is accessed via a private road from Coatham. A small marina, a yacht club, a diving club and a coastguard station were based on the breakwater. Yachts were moored in

the marina area and non-commercial fishing boats were moored at Paddy's Hole – an area which is covered with water at high tide but which is mud at low tide. Most fishing boats were used for rod and line fishing but some were used for setting set lobster pots and/or nets. Angling from the end of the breakwater was very popular.

There are rocks immediately to both sides of the breakwater with sand and mud interspersed with rocks and mussel beds further out. South Gare is frequented by winkle pickers, bait diggers, peeler crab collectors and mussel collectors due to the variety of substrates in a concentrated area. The worm, peeler crab and mussels *(Mytilus edulis*) were all used as bait for boat and shore angling

Coatham Sands to Saltburn-by-the-Sea

The coastline from Coatham Sands to Saltburn-by-the-Sea is an unbroken 12 km stretch of sandy beach, which has good access by road and on foot. The villages of Redcar, Marske-by-the–Sea and Saltburn-by-the-Sea are situated next to the beaches. The beach was used by people walking, dog walking, metal detecting and beach combing. The northern most part of the beach, Coatham Sands was popular at weekends with people doing land yachting, kite surfing and other similar sports as the beach is sufficiently wide at this point.

There are 2 large outcrops of rocks on Redcar Sands - Coatham Rocks and Redcar Rocks. Winkle picking was a popular activity here, as was recreational crabbing, again using sticks with hooks on the end. Both activities took place primarily during Spring tides.

Redcar has slipways, which commercial and non-commercial fishermen use to get their boats onto the beach before towing them to the sea using tractors. The commercial fisherman sold some of their catch directly from the beach as soon as they landed, whilst the rest was sold to wholesalers.

From Marske-by-the-Sea to Saltburn-by-the-Sea, the beach is backed by rocky slopes, which develop into cliffs at Saltburn. Saltburn had a small concrete area near the beach where approximately a dozen hobby fishermen's boats were kept. One commercial fisherman worked his crab and lobster potting boat from the beach at Saltburn.

4.2 Commercial fisheries

Approximately 100 registered fishing boats were licensed to fish from the survey area. Of these, 60 were based in Hartlepool, of which roughly three quarters regularly used their license, and 40 were based in Redcar or South Gare, of which roughly half regularly used their license. A wide variety of fishing methods was employed by the fishermen and they tended to do different types of fishing at different times of the year. Not all the fish landed at ports within the survey area was caught in the survey area as some fishermen spent all or part of their time further than 3 km out to sea or further north or south than the boundaries of this survey.

The largest boats were based in Hartlepool at Victoria Harbour. Four or 5 boats over 14m in length docked at the Hartlepool Fish Co but they were all trawlers who fished further than 3 km out to sea. The majority of the smaller otter trawlers fished for *Nephrops* (*Nephrops norvegicus*) during the winter and white fish during the summer, and this was also further than 3 km from the shore. Three fishermen from the Victoria Harbour used their salmon licenses, and fished for salmon with drift nets during the summer salmonid season. At Kafiga Landings and Reece Landings, the 2 principal main methods of fishing were potting for crab and lobster and/or setting static nets for white fish such as cod and whiting. Potting was possible all year round from Hartlepool, although it was still more common, especially with the larger potting boats, during the summer months. A rise in numbers of velvet swimming crabs (*Portunus puber*) being caught in the pots was reported, however nobody concentrated on these crabs as their main catch.

Boats moored in Hartlepool Marina were used for *Nephrops* trawling in winter, setting lobster pots predominately in the summer and gill netting for white fish all year.

There was 1 commercial salmon fisherman at Redcar who also used gill nets for white fish during the winter. The 2 other commercial fishermen at Redcar set lobster pots all year. At Saltburn, the commercial fisherman set lobster pots in the summer and used gill nets in winter.

A commercial mussel fishery was being experimented with in Hartlepool Marina. Ropes were hung beneath the pontoons – some with mussels on and some without. The seeds from the established mussels attached themselves to the other ropes to provide stock for the coming year. No mussels had been sold from this fishery as they were still being tested for compliance with health and safety regulations.

One commercial bait digger was interviewed during the survey. He was collecting worm and peeler crab from around Hartlepool. One shop selling locally-collected live bait was also contacted but it could not be established whether the interviewed bait digger supplied the shop, or whether there were 2 bait diggers working in the survey area.

4.3 Angling and hobby fishing

The coastline was well suited for shore angling due to the ample sandy beaches, numerous rocky outcrops and 6 piers/breakwaters. Chartered angling trips were available from Hartlepool on a number of boats. Hundreds of people had their own private boats moored at 1 of the harbours or marinas, which they used for rod and line fishing. Mackerel was the main species caught in summer and cod and whiting were common in the winter. Some flat fish and the occasional bass (*Dicentrarchus labrax*) were also caught.

One angler was seen on the River Tees near the tidal barrage fishing for salmon (*Salmo salar*).

Local bylaws, made for the North Eastern Sea Fisheries District under the Sea Fisheries Regulation Act 1966 (North Eastern Sea Fisheries District, 2001) state that a non-commercial fisherman may use a boat to set up to 10 lobster pots to catch a maximum of 2 lobster, 10 crab and 30 whelk per day as long as it is for personal consumption only. Many local people, especially those living near The Headland, made use of this opportunity to set pots during Spring tides. Under the same bylaw, the maximum length of net allowed for catching fish is 100 metres.

One individual used push nets from the beach at Seaton Carew to catch common shrimps (*Crangon crangon*) for himself and his friends.

4.4 Seafood wholesalers and retailers

Seafood wholesalers and retailers were interviewed to ascertain whether the seafood sold locally was caught in the survey area. The main place for the wholesalers to purchase local fish was through the fish market at Victoria Harbour. There were 5 wholesalers - 3 based in Hartlepool, 1 in Redcar and 1 outside the survey area in Sunderland. The wholesalers bought the majority of the white fish (including haddock (*Melanogrammus aeglefinus*), cod and whiting), flat fish (including plaice (*Pleuronectus platessa*), Dover sole (*Solea solea*) and lemon sole (*Microstomus kitt*)), salmon and edible crabs and sold it to a variety of people. The 3 Hartlepool based wholesalers had their own wet fish outlets both around Hartlepool and further afield in other towns, for example Darlington, and they sold some to other fishmongers or to fish and chip shops both locally and further afield. One wholesaler re-auctioned the fish in other auctions depending on where the demand was greatest.

One fisherman owned a family-run fishmongers so approximately 30% of his catch was sold directly through his shop. At the smaller docking areas such as Reece Landings and Redcar Sands some catch was sold directly to the public as soon as it was landed.

The lobster and velvet crabs were sold to an international company who exported them to Europe. About 500 kg of velvet crab and 400 kg lobster were exported weekly, 80% of which was from fishermen inside the survey area. Ninety percent was sold to Spain and the other 10% to France and Portugal. This company also exported molluscs including cockles (*Cerastoderma edule*) and winkles but these were from outside the survey area.

Nephrops, although not from the survey area, were landed at Hartlepool and then sold to 1 of the local wholesalers or to wholesalers based in Scotland or the Newcastle area.

No commercial mollusc collection was identified in the survey area.

4.5 Wildfowl

No wildfowling occurred on the tide-washed area along the coastline within the survey area. Two wildfowling clubs existed, shooting on Saltholme and Cowpen Marshes, but these marshes are no longer naturally tide washed. The drainage was altered in the 1950's to prevent pollutants from the ICI waste tip leaching out over the marshland. However, as the wildfowl could have spent time on local tidewashed areas, the consumption rates for members of the 2 clubs have been included in this report.

The clubs had a combined total of 70 members and shot over 1700 acres of land. The main species shot were Graylag geese (*Anser anser*), Canada geese (*Branta canadensis)*, mallard (*Anas platyrhynchos*), teal (*Anas crecca*) and widgeon (*Anas penelope*).

4.6 Other food pathways

One consumer was identified, who consumed small quantities of boiled seaweed, referred to by the interviewee as 'kelp', from the Old Town Basin area in Hartlepool.

4.7 Internal exposure

Consumption data for locally caught aquatic foodstuffs are presented in Tables 2 to 6 for adults and Tables 7 to 9 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 10 for adults, and Tables 11 to 13 for children (15 year olds, 10 year olds and 5 year olds respectively). No children in the 3 month old or 1 year old age groups were noted to be consuming locally caught seafood. No child consumers of marine plants and algae or wildfowl were observed. The summary tables also include mean rates and 97.5 percentile rates based on national data (referred to as 'generic' data in this report)

Adult consumption rates

The people consuming the greatest quantities of food affected by aquatic pathways in the Hartlepool area were boat and shore anglers, commercial fishermen and wildfowlers.

It should be noted that in cases where fishermen were consuming some fish caught whilst trawling inside the survey area and some whilst trawling outside the area, it has been assumed that all the fish they consumed came from inside the area in order to provide a conservative estimate. Where people were consuming *Nephrops*, or fish caught as a by-catch of *Nephrop* trawling, this has been excluded from the report as it invariably comes from outside the survey area.

The predominant species of fish consumed by adults were cod, haddock, whiting and mackerel along with smaller quantities of bass, common ling (*Molva molva*), lemon sole, saithe (*Pollachius virens*), flounder (*Platichthys flesus*), dab (*Limanda limanda*), salmon and plaice. A critical group of 77 individuals was identified with a maximum consumption rate of 56 kg/y and a mean of 32 kg/y. The observed 97.5 percentile rate based on 191 observations was 47 kg/y. This compares with the adult generic mean and 97.5 percentile consumption

rates for fish of 15 kg/y and 40 kg/y respectively. The percentage breakdown of species eaten by the critical group was 55% cod, 15% haddock, 10% whiting and 20% mixed fish and other species as shown in Table 2. These percentages, rounded to the nearest 5%, are based on the total amount of fish consumed by this group.

The predominant species of crustaceans consumed by adults were edible crab and lobster with smaller quantities of common shrimp and velvet swimming crab. A critical group of 26 individuals was identified with a maximum consumption rate of 27 kg/y and a mean of 15 kg/y. The observed 97.5 percentile rate based on 165 observations was 22 kg/y. This compares with the adult generic mean and 97.5 percentile consumption rates for crustaceans of 3.5 kg/y and 10 kg/y respectively. The percentage breakdown of species eaten by the critical group, rounded to the nearest 5%, was 75% edible crab and 25% lobster.

The predominant species of mollusc consumed by adults were winkle, whelk, cockle and mussel. A critical group of 14 individuals was identified with a maximum consumption rate of 19 kg/y and a mean of 12 kg/y. The observed 97.5 percentile rate based on 82 observations was 15 kg/y. This compares with the adult generic mean and 97.5 percentile consumption rates for molluscs of 3.5 kg/y and 10 kg/y respectively. The percentage breakdown of species eaten by the critical group, rounded to the nearest 5%, was 70% winkles and 30% whelk (*Buccinum undatum*).

One individual eating 0.2 kg/y of seaweed was observed. No generic data are available for this food group.

The species of wildfowl consumed by adults were duck and goose. A critical group of 36 individuals was identified with a maximum consumption of 13 kg/y and a mean of 6.4 kg/y. The observed 97.5 percentile rate based on 37 observations was 10 kg/y. No generic data are available for this food group. The percentage breakdown of species eaten by the critical group, rounded to the nearest 5%, was 60% geese and 40% duck.

Children's consumption rates

15 year old age group

For fish, a critical group of 5 individuals was identified with a maximum consumption rate of 35 kg/y and a mean of 23 kg/y. The observed 97.5 percentile rate based on 14 observations was 33 kg/y. This compares with the generic mean and 97.5 percentile consumption rates for fish of 6.5 kg/y and 20 kg/y respectively.

For crustaceans, a critical group of 3 individuals was identified with a maximum consumption rate of 22 kg/y and a mean of 17 kg/y. The observed 97.5 percentile rate based on 10 observations was 21 kg/y. This compares with the generic mean and 97.5 percentile consumption rates for crustaceans of 2.5 kg/y and 6 kg/y respectively.

For molluscs, a critical group of 2 individuals was identified with a maximum consumption rate of 3.5 kg/y and a mean of 3.5 kg/y. The observed 97.5 percentile rate based on 4 observations was 3.5 kg/y. This compares with the generic mean and 97.5 percentile consumption rates for molluscs of 2.5 kg/y and 6 kg/y respectively.

10 year old age group

For fish, a critical group of 4 individuals was identified with a maximum consumption rate of 18 kg/y and a mean of 13 kg/y. The observed 97.5 percentile rate based on 11 observations was 16 kg/y. This compares with the generic mean and 97.5 percentile consumption rates for fish of 6 kg/y and 20 kg/y respectively.

For crustaceans, a critical group of 6 individuals was identified with a maximum consumption rate of 14 kg/y and a mean of 4 kg/y. The observed 97.5 percentile rate based on 6 observations was 12 kg/y. This compares with the generic mean and 97.5 percentile consumption rates for crustaceans of 2.5 kg/y and 7 kg/y respectively.

For molluscs, a critical group of 7 individuals was identified with a maximum consumption rate of 4.8 kg/y and a mean of 3.7 kg/y. The observed 97.5 percentile rate based on 10 observations was 4.8 kg/y. This compares with the generic mean and 97.5 percentile consumption rates for molluscs of 2.5 kg/y and 7 kg/y respectively.

5 year old age group

For fish, a critical group of 4 individuals was identified with a maximum consumption rate of 8.8 kg/y and a mean of 2.7 kg/y. The observed 97.5 percentile rate based on 4 observations was 8.2 kg/y. No generic consumption rates have been derived for this age group.

For crustaceans, a critical group of 4 individuals was identified with a maximum consumption rate of 9.2 kg/y and a mean of 3.9 kg/y. The observed 97.5 percentile rate based on 6 observations was 8.4 kg/y. No generic consumption rates have been derived for this age group.

For molluscs, a critical group of 3 individuals was identified with a maximum consumption rate of 9.2 kg/y and a mean of 7.8 kg/y. The observed 97.5 percentile rate based on 5 observations was 9.2 kg/y. No generic consumption rates have been derived for this age group.

4.8 External exposure

Intertidal occupancy

Table 14 shows the intertidal occupancy data recorded during the survey. The 5 types of intertidal sediment in the survey area, where public occupancy was identified, were sand, mud, rock, sand and mud and coal and sand.

The maximum occupancy time recorded over sand was 1600 h/y for an individual doing commercial sand extraction. Two other individuals (an angler and another commercial sand extractor) had occupancy times within a factor of 3 of this giving a mean time of 980 h/y.

The maximum occupancy time recorded over mud was 1300 h/y by a commercial bait digger. One other bait digger's occupancy time came within a factor of 3 of this. This gives a mean time for this group of 910 h/y.

The maximum occupancy time recorded over rock was 540 h/y for an angler. Another angler and a hobby fisherman's occupancy times came within a factor of 3 of this. This gives a mean time for this group of 350 h/y.

The maximum occupancy time recorded over sand and mud was 530 h/y for an angler. One bait digger's occupancy time came within a factor of 3 of this. This gives a mean occupancy time for this group of 390 h/y.

The maximum occupancy time recorded over coal and sand was 130 h/y for a sea coal collector. No other individuals occupancy time came within a factor of 3 of this, however, another sea coal collector was included in the critical group, giving a mean occupancy for this group of 76 h/y.

Other intertidal activities noted to be taking place in the survey area included working with fishing gear, walking, dog walking, playing and metal detecting.

Handling

Handling sediment, while bait digging or mollusc collecting, or handling commercial fishing gear, which has become entrained with fine sediment particles, can give rise to skin exposure from beta radiation. This needs consideration even though the annual dose limit for skin is a

factor of 50 times higher than that for effective dose. There is also a contribution to effective dose due to skin exposure (ICRP, 1991).

Fishing gear can also be a source of whole body gamma exposure due to occupancy in the vicinity of the gear. However this pathway is minor compared with the same exposure received during occupancy over intertidal areas and it has therefore been omitted from the report.

Table 15 shows the times spent handling fishing gear and intertidal sediment recorded during the survey.

The maximum fishing gear handling time recorded was 1700 h/y for a commercial lobster potter. Eighteen other commercial fishermen (mainly other lobster potters but also some gill netters and salmon fishermen) had gear handling times that came within a factor of 3 of this. This gives a mean handling time for this group of 1100 h/y.

The maximum sediment handling time recorded was 1600 h/y for a commercial sand extractor. Two bait diggers and another commercial sand extractor had handling times within a factor of 3 of this. This gives a mean handling time for this group of 1000 h/y.

Gamma dose rate measurements

Representative gamma dose rate measurements at 1 m above the substrate were taken at locations where high occupancy times were observed. These measurements (shown in Table 16) ranged from 0.049 to 0.058 μGy/h over sand and from 0.077 to 0.160 μGy/h over mud, and compare with natural levels of around 0.05 and 0.07 μGy/h over sand and mud respectively. Some higher measurements in Table 16 should be viewed with caution as large areas around the River Tees mouth were reclaimed using discarded slag from the steel industry. The presence of natural radionuclides in this material could increase gamma dose rates.

4.9 Water based activities

Activities taking place in or on the water can lead to ingestion of seawater and/or inhalation of sea spray. These 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. Occupancy rates for activities taking place in or on the water around Hartlepool are shown in Table 17 for adults. No children were observed to be undertaking activities in or on the water.

Activities in the water

Activities taking place in the water around Hartlepool included diving, push netting and snorkelling. Twenty-four observations were recorded and the people with the highest occupancy times in the water were 10 divers with 49 h/y.

Activities on the water

Activities taking place on the water around Hartlepool included boating to and from dives, commercial fishing and sea angling. Eighty observations for people fishing and angling were recorded and the person with the highest occupancy time on the water was a commercial fisherman, with 2100 h/y.

5 TERRESTRIAL RADIATION PATHWAYS

5.1 Terrestrial survey area

The terrestrial survey area covered all land within 5 km of the site centre (NGR 528 272) as shown in Figure 2.

The northern part of the survey area was largely urban, encompassing the village of Seaton Carew and part of Hartlepool, and the southern part of the survey area was heavily industrialised. To the west of the power station was a more open area where the farms and some marsh areas were located.

Six working farms were found in the area. All 6 of these grew arable crops and 3 also kept livestock. The arable crops grown were wheat, barley, rape, oats, linseed, beans and grass. Unlike many of the areas where habits surveys are conducted, the majority of the arable crops were sold to grain merchants, mills, distilleries, etc, rather than kept on the farm for animal feed. The grain was sold to companies outside the survey area, some as far away as Liverpool. Exposure pathways relevant to arable crops are not considered further in this report.

Of the 3 farms with livestock, 1 kept cattle and pigs, 1 kept cattle and sheep and 1 kept sheep. Meat was sold through meat markets at Darlington and Stokesley and abattoirs at Stockton-on-Tees, Darlington and Spennymoor were used. These abattoirs and meat markets are all outside the survey area.

The only consumption of locally reared meat identified in the survey area was by 1 farmer and his family, who consumed cattle meat, sheep meat and poultry from their own farm. However consumption of cattle meat occurred so rarely that rates were very difficult to establish and the results have not been considered further in this report.

Private gardens were noted in the survey area, but efforts were concentrated on the unusually large number of allotment plots since this was where the highest concentration of local fruit and vegetable producers could be found. There were 7 separate allotment sites (highlighted in Figure 2) within 5 km of the centre of the power station site: Stranton Allotments, Brierton Allotments, Waverley Terrace Allotments, Haswell Allotments and Station Lane Allotments in Hartlepool, Woodcroft Allotments in Seaton Carew and Greatham Allotments in Greatham. The total number of allotment plots found within 5 km of the site centre was approximately 300. All allotments sites were owned and run by Hartlepool Borough Council apart from the independent Woodcroft site.

Three individuals who had allotments at Stranton allotments used bladderwrack (*Fucus vesiculosus*) collected from local beaches including Fish Sands on The Headland, as part of their tomato fertiliser.

A great variety of fruit and vegetables were grown at the allotment sites. Foods were primarily grown to supply the needs of the people growing them, thus approximately 50% of the allotment plot owners and their families interviewed were virtually self-sufficient in fruit and vegetables. Any excess was given away to family and friends. Species grown included asparagus, artichoke, calabrese, spinach, chilli pepper, celery, kohl rabi and Worcesterberry.

Keeping chickens for egg production was permitted on a small scale at least 3 of the allotment sites. Chickens were kept at the Stranton, Brierton and Greatham allotments and the eggs were consumed by friends and family.

The only wild/free foods consumed from the survey area were blackberries, mushrooms and rabbit. Blackberries were prolific around the Stranton allotments and about a dozen families interviewed took advantage of this. Wild fungi were also collected from the Stranton allotment site as well as from marshy areas both on the coast and inland. One individual who shot wildfowl on Cowpen Marsh also occasionally shot rabbits for his own consumption. At the meeting with BEGL at Hartlepool Power Station we were informed that rabbits living within the

site boundary are known to spend some time off site. However, it is not thought likely that these rabbits enter the food chain as no shooting was found to take place in the vicinity of the site perimeter fence.

One beekeeper was identified living inside the survey area. He kept 6 hives in total, 4 at a farm near Greatham approximately 5 km from the power station, and 2 on an allotment plot approximately 7 km from the power station. Production of honey this year was around 14 kg, but this is lower than an average year. During years of good production any excess would normally be given to friends.

5.2 Terrestrial food wholesalers and retailers

Retailers, including greengrocers, butchers and convenience stores, in Seaton Carew, Greatham and Hartlepool were interviewed in order to find out whether they were selling produce from within the survey area. About a dozen retail outlets were visited but none sold any local produce. One retailer, who was growing and selling large amounts of local fruit and vegetables during the 1996 terrestrial survey, was no longer growing anything and his shop was now consequently selling produce from elsewhere.

5.3 Internal exposure

Consumption data for locally produced terrestrial foodstuffs are presented in Tables 18 to 29 for adults and Tables 30 to 36 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 10 for adults, and Tables 11 to 13 for children (15 year olds, 10 year olds and 5 year olds respectively). No children in the 3 month old or 1 year old age groups were noted to be consuming locally produced terrestrial foods.

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 37. Those food types shown in bold and labelled with an asterisk were sampled as part of the 2001 Food Standards Agency monitoring programme (FSA and SEPA, 2002).

Adult consumption rates

Consumption of terrestrial foods was identified in the following 12 food groups: green vegetables, other vegetables, root vegetables, potatoes, domestic fruit, sheep meat, poultry, eggs, wild/free foods, rabbits/hares, honey and wild fungi. No consumption of milk, cattle meat, pig meat, venison or 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. A further 5 critical group mean consumption rates exceeded the generic mean consumption rates. These were for green vegetables, other vegetables, eggs, honey and wild fungi. Three observed 97.5 percentile consumption rates exceeded the generic 97.5 percentile consumption rates. These were for green vegetables, other vegetables and root vegetables.

Children's consumption rates

15 year old age group

Eight children in this age group were identified to be eating locally produced terrestrial food. Consumption of terrestrial foods was identified in the following 6 food groups: green vegetables, other vegetables, root vegetables, potatoes, domestic fruit and sheep meat. No consumption was identified for the following food groups: milk, cattle meat, pig meat, poultry, eggs, wild/free foods, rabbits/hares, honey, wild fungi, venison and local cereals. No critical group mean consumption rates exceeded the generic 97.5 percentile consumption rates. The

critical mean consumption rates for green vegetables, other vegetables and root vegetables were higher than their respective generic mean consumption rates. Only for root vegetables did the observed 97.5 percentile consumption rate exceed the generic 97.5 percentile consumption rate.

10 year old age group

Five children in this age group were identified as eating locally produced food. Consumption of terrestrial foods was identified in the following 6 food groups: green vegetables, other vegetables, root vegetables, potatoes, domestic fruit and sheep meat. No consumption was identified for the following food groups: milk, cattle meat, pig meat, poultry, eggs, wild/free foods, rabbits/hares, honey, venison and local cereals. Only for root vegetables did the critical group mean consumption rate exceed the generic 97.5 percentile consumption rate. Only for 1 further food group, green vegetables, was the critical mean consumption rate higher than the generic mean consumption rate. Only for root vegetables was the observed 97.5 percentile consumption rate greater than the generic 97.5 percentile consumption rate.

5 year old age group

Three children in this age group were identified as eating locally produced food. Consumption of terrestrial foods was identified in the following 4 food groups: green vegetables, other vegetables, root vegetables, and potatoes. No consumption was identified for the following food groups: domestic fruit, milk, cattle milk, pig meat, sheep meat, poultry, eggs, wild/free foods, rabbits/hares, honey, wild fungi, venison 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 Hartlepool Power Station site perimeter fence, as shown in Figure 2. The southern part of the survey area is a large expanse of intertidal mud called Seal Sands, through which the Seaton-on-Tees Channel runs.

Immediately east of the site perimeter fence is a grassy field where horses are kept, giving way to sand dunes and North Gare Sands. Two businesses are situated to the north east of the power station on North Gare Sands.

The northern part of the survey area includes the Teesmouth Field Centre, the countryside wardens office and the Hartlepool Power Station golf course, which are all directly to the north of the power station. The countryside wardens' office is a portacabin and is the closest building to the power station. The office is shared by 2 countryside wardens who are employed by Hartlepool Borough Council, and an employee of English Nature. The golf course is bordered to the north by Zinc Works Road and the grass covered dunes to the north of this road form part of the Teesmouth National Nature Reserve. There is a footpath for public access running from north to south through the nature reserve and the survey area.

The A178 runs from the north to the west of the survey area and the land to the west of it is used predominantly for industry. An industrial estate comprising several businesses is located there. To the east of the road there is a grassy area used for hay production, and a playing field, owned and used by Hartlepool Power Station.

6.2 Residential activities

There were no places of residence in any zones of the survey area.

6.3 Leisure activities

Many people, especially school children, visited the area for leisure activities or on organised trips to the Teesmouth Field Centre. The Centre accommodates approximately 4000 day visitors per year. No data were obtained for individual visitors to the centre but it can be assumed that most visitors have occupancy times which are insignificant compared with people who work in the area. Birdwatching in the Teesmouth National Nature Reserve was popular, especially from the hide situated within the survey area directly south of the power station. The hide was also an ideal place to observe the brown and common seals swimming in and out of Greatham Creek.

The playing field to the west of the station is used by employees at the power station and by school groups for leisure activities. The golf course is open to employees of the power station and their friends.

Hartlepool Power Station Visitor Centre was closed to general visitors, although pre-booked organised groups (whether of school children or the general public) were still able to participate in guided tours of the power station.

The usual beach activities such as playing and swimming were undertaken on North Gare Sands to the north west of the power station.

Bait diggers collecting peeler crab in old car tyres or sections of guttering used the mud in-between the power station and the Seaton-on-Tees Channel.

Mushrooms were collected during the short mushroom season, from the rough grazing land where horses are kept to the east of the site.

6.4 Commercial activities

The majority of people spending time within 1 km of the site perimeter fence are employed by 1 of the companies located there, hence no child observations were obtained for Hartlepool. Interviews were conducted with representatives from 6 of these companies. The 6 companies chosen were in a direct line of sight with the power station. Three conservation organisations were based in or had representatives working within 0.25 km of the site perimeter. Employees of these organisations tended to spend a significant portion of their time in the area working outdoors.

Observations for employees of the power station itself were not investigated.

6.5 Occupancy times

Table 38 presents indoor, outdoor and total occupancy data for adults and includes distances from the site perimeter fence of where these occupancies took place. An analysis of the data by distance zones and occupancy times is shown in Table 39.

0 - 0.25 km from the site perimeter fence

Eleven individuals were identified as spending time in the 0.0 to 0.25 km zone. The majority of observations were for people at work: the exception being 1 man who regularly collected peeler crab for bait and mushrooms to eat. Two workers had the highest occupancy time of 1700 h/y.

0.25 – 0.5 km from the site perimeter fence

One hundred and twelve people were identified as spending time in the 0.25 to 0.5 km zone. All the observations were for people at work. Ninety-three workers had the highest total occupancy time of 2200 h/y.

0.5 – 1.0 km from the site perimeter fence

Seventy-three people were identified as spending time in the 0.5 to 1.0 km zone. All the observations were for people at work. Thirty-three workers had the highest total occupancy time of 2200 h/y.

6.6 Gamma dose rate measurements

Table 40 presents gamma dose rate measurements in the Hartlepool direct radiation survey area. It should be noted that the measurements have not been adjusted for natural background. Some higher measurements in Table 40 should be viewed with caution as large areas around the River Tees mouth were reclaimed using discarded slag from the steel industry. The presence of natural radionuclides in this material could increase gamma dose rates. Representative gamma dose rate measurements were taken at 8 businesses within 1 km of the site perimeter fence with outdoor measurements taken at 7 businesses and indoor measurements at 5.

The outdoor measurements, which were taken between roughly 5 and 10 metres distance from the nearest buildings, ranged from 0.059 to 0.107 µGy/h. Four outdoor measurements were taken over grass, 1 was taken over soil and stones and at 2 it was only possible to take measurements over Tarmac or concrete. Both the highest and the lowest results were over grass. The indoor measurements ranged from 0.056 to 0.086 µGy/h. Background gamma dose rate measurements at distances of 2.2 and 4.2 km from the site perimeter fence were taken over grass and these were found to be 0.069 and 0.073 µGy/h respectively.

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). The results from these could be used for comparison.

Hartlepool Power Station and the surrounding businesses are in the unusual situation of being built on a large area of reclaimed land. Waste from the steel industry was used, and it is possible that this could contain elevated levels of natural radioactivity, which could have affected some of the outdoor gamma dose rates.

Table 41 presents gamma dose rate measurements around the outside of the Hartlepool Power Station perimeter fence. Six locations were over grass, 4 were over grass and stones and 1 was over stones. The readings were taken at 1 m above the ground and within 10 metres of the fence. The measurements ranged from 0.062 (over grass) to 0.096 (over stones) µGy/h. The highest reading was found on the south west corner of the site. These readings may again be affected by the presence of natural radionuclides in the slag used to reclaim the land around the River Tees mouth.

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 42. 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.

8 CONCLUSIONS AND RECOMMENDATIONS

8.1 Survey findings

During the survey, team members interviewed the majority of commercial fishermen and numerous terrestrial food producers in the survey area. In addition anglers, bee keepers, wildfowlers, rough shooters (people shooting rabbits, pigeons etc), people collecting wild/free foods and wild fungi were identified and interviewed. All consumption rates recorded in this report include only locally produced or caught foods.

Exposure pathways were investigated for approximately 910 individuals. The survey found that pathways relating to each of the 3 potential sources of exposure from Hartlepool Power Station were present:

- Discharges of liquid radioactive waste to the Tees Bay area of the North Sea
- Discharges of gaseous radioactive waste to the atmosphere
- Direct radiation emitted from the site (sometimes called ‘station shine’)

The adult critical group rates for all local aquatic pathways (considered in isolation of the other groups) were:

- 32 kg/y for fish
- 15 kg/y for crustaceans
- 12 kg/y for molluscs
- 0.2 kg/y for marine plants and algae
- 6.4 kg/y for wildfowl

The predominant aquatic species consumed were cod, haddock, whiting, edible crabs, lobsters, winkles and whelks. The main species of wildfowl consumed were goose and duck.

The critical group occupancy times over intertidal areas (considered in isolation of the other groups) were:

- 980 h/y for sand
- 910 h/y for mud
- 350 h/y for rock
- 390 h/y for sand and mud
- 76 h/y for coal and sand

The critical group rate for handling fishing gear was 1100 h/y and for handling of sediment was 1000 h/y.

The maximum occupancy rate for time spent in water was 49 h/y for a group of 10 divers. The maximum occupancy rate for time spent on water was 2100 h/y for a commercial fisherman.

The adult critical group rates for local terrestrial pathways (considered in isolation of the other groups) were:

- 33 kg/y for green vegetables
- 36 kg/y for other vegetables
- 44 kg/y for root vegetables
- 36 kg/y for potatoes
- 12 kg/y for domestic fruit
- 4.8 kg/y for sheep meat
- 9.4 kg/y for poultry
- 14 kg/y for eggs
- 4.5 kg/y for wild/free foods
- 1.4 kg/y for rabbits/hares
- 6.8 kg/y for honey

- 4.2 kg/y for wild fungi

No consumption of milk, cattle meat, pig meat, venison or 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 by individuals, together with their external pathway exposures, are presented in bold type in Annexes 1 and 2.

For occupancy times of members of the public within 1 km of Hartlepool Power Station site perimeter, the highest rates (indoors plus outdoors) were:

- 1700 h/y for the 0 to 0.25 km zone
- 2200 h/y for the 0.25 to 0.5 km zone
- 2200 h/y for the 0.5 to 1.0 km zone

In each zone, the highest occupancy rates were due to employment.

8.2 Comparisons with previous surveys

The results from this survey can be compared with results from the last surveys undertaken at Hartlepool in each of the 3 survey areas – aquatic, terrestrial and direct radiation. The previous aquatic and terrestrial surveys were carried out concurrently in 1998 and the previous direct radiation survey was carried out in 1996.

The 2002 consumption rate data for aquatic foods from the Hartlepool area have changed in comparison to the 1998 data. The critical group consumption rate for fish has decreased from 59 kg/y to 32 kg/y. In 1998 the maximum consumption rate observed for 2 members of the same family was 110 kg/y, with the next highest observation being 68 kg/y. A total of 14 people were included in the critical group. In the 2002 survey, the maximum consumption rate for fish was 56 kg/y, causing the critical group mean consumption rate to be considerably lower. Seventy-seven people were included in the 2002 critical group.

In 1998 the main species of fish consumed were cod, whiting, mackerel and bass. In 2002 mackerel and bass have been replaced in this list by haddock.

The critical group consumption rate for crustaceans has also decreased; from 35 kg/y in 1998 to just 15 kg/y in 2002. In 1998 the maximum consumption rate observed was 63 kg/y, and 9 people were included in the critical group. In the 2002 survey, the maximum consumption rate was 27 kg/y, and 26 people were included in the critical group.

The predominant species, edible crab and lobster, have not changed since 1998, although small amounts of velvet swimming crab and common shrimp are now also being consumed.

The consumption rate for molluscs has risen slightly from 9.4 kg/y to 12 kg/y. In 1998 the maximum consumption rate observed was 18 kg/y and 7 people were included in the critical group. In the 2002 survey, the maximum consumption rate was 19 kg/y and 14 people were included in the critical group.

The main species consumed continues to be whelks and winkles, although consumption of small amounts of cockles and mussels was also noted in the 2002 survey.

Comparison of consumption rates for the marine plants and algae and wildfowl food groups can not be drawn, because in 1998 no consumption in these food groups was identified.

As in 1998, the highest intertidal occupancy rate was observed over sand. In the 1998 survey, the maximum occupancy rate over sand was 520 h/y. The critical group occupancy rate was also 520 h/y and the group included 4 people. In 2002, the maximum occupancy rate over sand was 1600 h/y. The critical group occupancy rate was 980 h/y and the group included 3 people. However, it must be noted that the methodology for determining the critical group has been altered since the 1998 survey. Using the same methodology in 2002 as was used in 1998 would have given a critical group occupancy rate over sand of 1600 h/y

for 1 person. The increase can be attributed to the high intertidal exposure of people engaged in commercial sand extraction. Although the sand extraction company was in operation at the time of the previous survey, no interviews were conducted there.

Occupancy rates over coal and sand have decreased since 1998. The 1998 survey identified a critical group occupancy rate over coal and sand of 300 h/y. Seven people were included in the group and the maximum occupancy rate was also 300 h/y. In 2002, the critical group occupancy rate over coal and sand was 76 h/y (130 h/y using the same methodology as for 1998). Only 2 people were included in the group and the maximum occupancy rate identified was just 125 h/y. No large scale or commercial sea coal collecting was observed in 2002, although we were informed that it does still occur around Hartlepool, albeit less often than in previous years.

Occupancy rates over rock have increased since 1998. In 1998 the critical group occupancy rate over rock was 48 h/y for 1 winkle picker. In 2002 the critical group occupancy rate over rock was 350 h/y (540 h/y using the same methodology as in 1998). Three people were included in the group and the maximum occupancy rate was 540 h/y. The higher occupancy rates over rock were recorded for 2 anglers and a man checking his lobster pots. These activities were not noted in the 1998 survey.

Occupancies over other substrates were not identified during the 1998 survey so no comparisons with observations in the 2002 survey over mud and sand and mud can be drawn.

The 1998 survey identified a critical group handling time for commercial fishing gear of 1800 h/y for 2 fishermen. The maximum handling time was also 1800 h/y as both men had the same handling times. The 2002 survey recorded a critical group handling time of 1100 h/y for 19 people and a maximum handling time of 1700 h/y. Using the same methodology as for 1998 would have given a critical group handling time in 2002 of 1600 h/y for 5 men, similar to the rate for 1998.

The 1998 survey identified a critical group handling time for sediment of 520 h/y for 4 people with a maximum handling rate of 520 h/y as well. The 2002 survey recorded a critical group time of 1000 h/y for 4 people (1400 h/y for 2 people using the same methodology as for 1998) and a maximum handling time of 1600 h/y. The significant increase in handling times is because 3 of the 4 people in the 2002 critical group were all handling sediment in their commercial environment. There were 2 commercial sand extractors and a commercial bait digger. Again, the commercial sand extraction company was not interviewed in the previous survey.

No comparison of occupancy times in and on water can be made with previous surveys.

For terrestrial food groups, the critical group consumption rates (kg/y) in the 2002 survey are tabulated below, together with those of the 1998 survey for ease of comparison:

	1998	2002
• Green vegetable	57	33
• Other vegetables	28	36
• Root vegetables	65	44
• Potatoes	26	36
• Domestic fruit	26	12
• Pig meat	68	0
• Sheep meat	17	5
• Poultry	92	9
• Eggs	20	14
• Wild/free foods	0.57	4.5
• Rabbits/hares	2.8	1.4
• Honey	0	6.8
• Wild fungi	2.3	4.2

Consumption rates had decreased in the following food groups: green vegetables, root vegetables, domestic fruit, pig meat (nil in 2002), sheep meat, poultry, eggs and rabbits/hares. Consumption rates had increased in the following food groups: other vegetables, potatoes, wild/free foods, honey (nil in 1998) and wild fungi.

The food groups showing the greatest decrease since 1998 are poultry and pig meat. In 1998, the same individual displayed the highest consumption rates for both of these food groups. This individual used to rear his own poultry on a plot at the Stranton allotment site, but no longer does so. The most significant increase in consumption rates was seen for honey. In 1998 no honey producers were identified.

A comparison of the 1996 and 2002 direct radiation results shows that the highest occupancy rates are still recorded for people who work within 1 km of the site. However, the number of businesses in this area appears to have increased since 1996 and the number of observations has consequently increased. The same conservation organisations are still running as in 1996. Similar leisure activities are still taking place, for example: bait digging, bird watching, school parties visiting the Teesmouth Field Centre (although numbers of visitors to the centre have drastically increased) and golf playing for employees of the power station and their visitors.

In 1996 the highest recorded occupancy rate was 2900 h/y for 1 member of security staff working in the area which has now been termed the 0.25 – 0.5 km zone. In the 2002 survey, the highest occupancy time was again recorded in the 0.25 – 0.5 km zone but had decreased to 2200 h/y. Ninety-three people were recorded as having the same highest occupancy rate.

The highest occupancy rate not due to employment around Hartlepool Power Station was 800 h/y in 1996 for an ice cream vendor. This compares to 590 h/y in the 2002 survey for an individual collecting peeler crabs for bait and spending small quantities of time picking mushrooms. Ice cream vendors were not identified in the 2002 survey but peeler crab collectors in 1996 were found to have occupancy times of 420 h/y.

Eight gamma dose rate measurements from 2002 could be compared with gamma dose rate measurements taken at similar locations in 1996. Three gamma dose rate measurements taken outdoors at businesses (Businesses 1-3 in Table 40) in 2002 could be compared. At Business 1, the rate was 0.017 µGy/h higher in 2002 than in 1996, at Business 2, the rate was 0.005 µGy/h lower in 2002 than in 1996 and at Business 3, the rate was 0.013 µGy/h lower in 2002 than 1996. It should be noted that the background gamma dose measurement in 2002 was 0.002 µGy/h higher than the background measurement in 1996. Five gamma dose rate measurements taken around the site perimeter fence in 2002 could be compared and they were all very similar. The 2002 measurements were all within +/- 0.004 µGy/h of the measurements taken at the same place in 1996. Gamma dose rates measured in the direct radiation survey area in this survey ranged from 0.056 to 0.107 µGy/h.

8.3 Recommendations for environmental monitoring

The 2001 monitoring programmes operated by the Environment Agency and the Food Standards Agency included the following samples and measurements (EA, 2002 and FSA and SEPA, 2002):

Aquatic surveillance

- Plaice
- Cod
- Crabs
- Winkles
- *Fucus vesiculosus*
- Seawater
- Surface water
- Sediment from Paddy's Hole, Greatham Creek, Seaton Carew and North Gare
- Sea coal

- Gamma dose rate measurements over intertidal areas at Carr House Sands, Greatham Creek Bird Hide, Hartlepool North Sands, North Gare, Paddy's Hole, Seaton Carew and Seaton Sands

Terrestrial surveillance

- Milk
- Apples
- Cabbages
- Carrots
- Honey
- Onions
- Parsnips
- Plums
- Potatoes
- Wheat

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

- This survey identified the continued consumption of cod, but only low consumption rates of plaice. Haddock or whiting could be monitored instead of plaice, though this would end a long time-series of data for plaice
- As 3 people were found to use *Fucus vesiculosus* as part of their tomato fertiliser, it is recommended that it remains in the sampling programme
- Consumption of wildfowl was identified. One-off samples of goose and duck could be obtained for re-assurance purposes.
- Monitoring of seawater should continue as the results are relevant to the individuals who spend time on or in the water.
- Sediments from Paddy's Hole, Greatham Creek, Seaton Carew and North Gare are currently monitored. Samples from the Old Town Basin could also be taken, as individuals with high occupancy rates over 2 substrates - mud and coal and sand, were identified there.

- Sea coal is still collected, although our observations suggest that it is mainly collected from the Old Town Basin rather than Carr House Sands, North Sands and Seaton Sands, which are currently monitored.
- Gamma dose rates measurements at the Old Town Basin, at the Headlands and near the Tees Barrage could also be introduced as high rates of occupancy were noted at these locations.

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

- Monitoring of apples and plums could be extended to monitoring another fruit variety, e.g. strawberries, rhubarb or gooseberries which were much more commonly consumed
- Monitoring of carrots or parsnips could be changed to monitoring of leeks, turnip, swede or beetroot as they were eaten in greater quantities.

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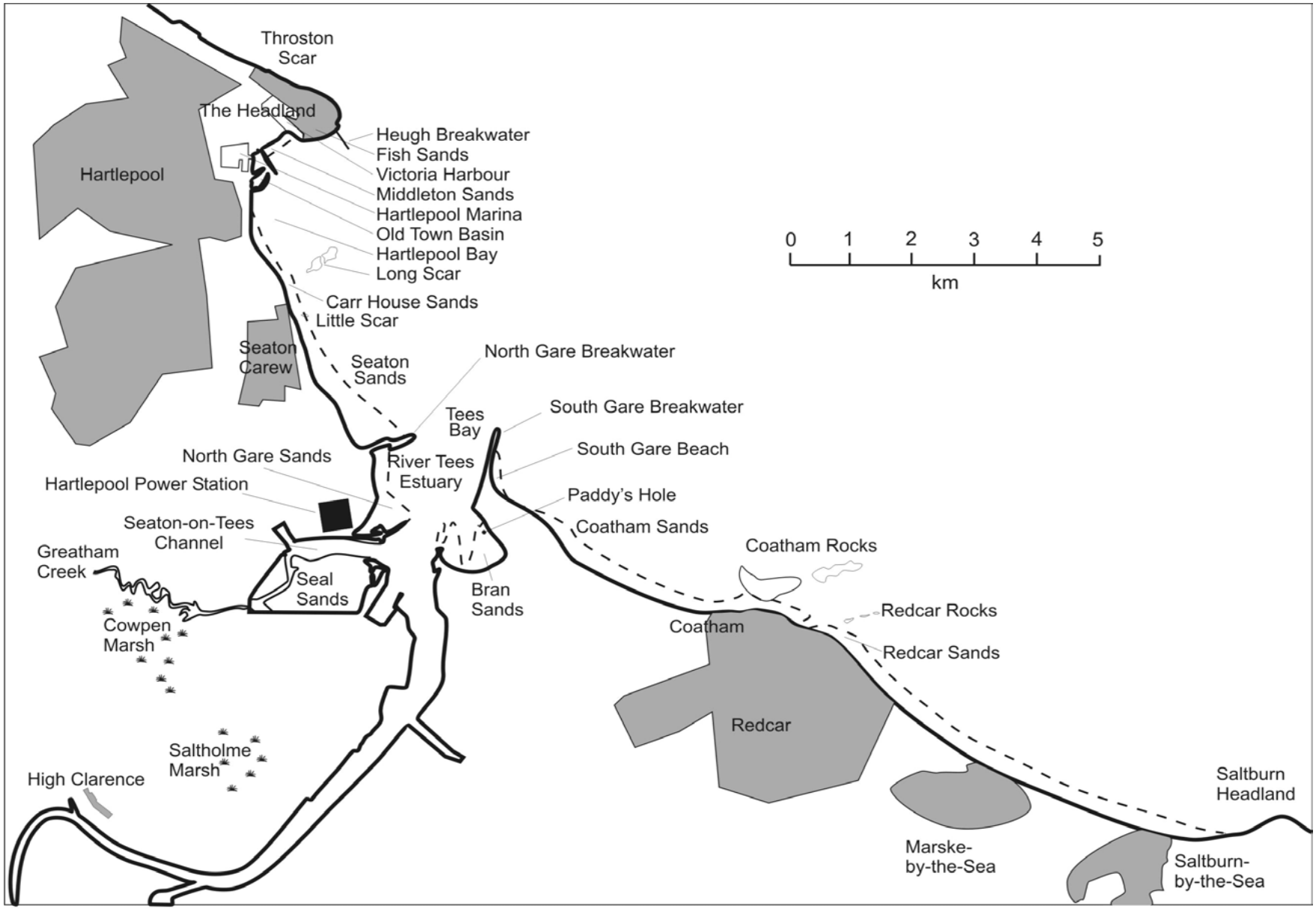

Figure 1. The Hartlepool aquatic survey area

Figure 2. The Hartlepool terrestrial (outer ring) and direct radiation (inner ring) survey areas

Key
★ = Allotment sites

Table 1. 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
Fish (fresh water)	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 2. Adult consumption rates of fish in the Hartlepool area (kg/y)

Observation number	Bass	Cod	Common ling	Dab	Flounder	Haddock	Lemon sole	Mackerel	Mixed fish	Plaice	Saithe	Salmon	Whiting	Total
121		**30.3**	**13.1**					**6.8**					**6.2**	**56.3**
119		**7.1**					**2.4**	**2.7**					**38.1**	**50.3**
501		**30.2**	**13.1**										**6.2**	**49.5**
396		**47.2**												**47.2**
399		**47.2**												**47.2**
447		**23.6**				**23.6**								**47.2**
450-462		**23.6**				**23.6**								**47.2**
402	**1.8**	**40.8**				**1.8**							**1.8**	**46.3**
55	**2.1**	**26.9**						**12.5**						**41.5**
407		**40.8**												**40.8**
768-769									**35.4**					**35.4**
793-794									**35.4**					**35.4**
837-839		**35.4**												**35.4**
153		**7.1**		**4.7**		**7.1**	**4.7**			**4.7**			**7.1**	**35.4**
173	**8.5**	**24.0**						**2.8**						**35.2**
355		**2.0**				**12.2**	**20.4**							**34.7**
709	**7.5**				**7.1**			**9.7**			**9.8**			**34.1**
703-705		**4.2**						**2.2**					**24.1**	**30.5**
430		**29.0**												**29.0**
106-108		**16.8**				**6.1**			**5.4**					**28.3**
110-111		**16.8**				**6.1**			**5.4**					**28.3**
146-149	**5.9**	**5.9**		**5.9**									**5.9**	**23.6**
379-386		**23.6**												**23.6**
782-784									**23.6**					**23.6**
791-792		**23.6**												**23.6**
836									**23.6**					**23.6**
116		**9.4**	**9.4**			**2.4**							**2.4**	**23.6**
405	**0.9**	**20.4**				**0.9**							**0.9**	**23.1**
27-38		**16.6**											**6.2**	**22.8**
869-870			**15.0**					**1.0**					**5.3**	**21.3**
57		**5.4**						**15.5**						**20.9**
47					2.4			13.8		2.4				18.7
854-855						7.1		10.8						17.9
195-196		17.7												17.7

Table 2. Adult consumption rates of fish in the Hartlepool area (kg/y)

Observation number	Bass	Cod	Common ling	Dab	Flounder	Haddock	Lemon sole	Mackerel	Mixed fish	Plaice	Saithe	Salmon	Whiting	Total
345		17.7												17.7
751-753									17.7					17.7
795-796									17.7					17.7
829-830		8.8											8.8	17.7
849-850		17.7												17.7
139							16.5							16.5
754									16.3					16.3
337		11.8						3.2						15.0
825-828		14.2												14.2
117		9.4				2.4							2.4	14.2
822-824		6.5						6.0						12.5
132-133		8.4										3.9		12.3
141-143		8.8				0.6		0.6					1.8	11.8
346-347		11.8												11.8
847-848		5.9						5.9						11.8
710-719	2.2				2.1			2.9			3.0			10.2
358		10.0												10.0
120		7.1					2.4							9.4
357		4.5				4.5								9.1
727									9.1					9.1
122		8.4												8.4
262		8.2												8.2
25-26		7.2												7.2
49		5.4						1.7						7.0
54		5.4						1.7						7.0
750		6.8												6.8
502													6.2	6.2
44-45		6.0												6.0
778-781		6.0												6.0
394-395		4.8				0.2		0.2					0.7	5.9
365-366		5.4												5.4
706		4.5												4.5
785-790								4.5						4.5
265		4.1												4.1

Table 2. Adult consumption rates of fish in the Hartlepool area (kg/y)

Observation number	Bass	Cod	Common ling	Dab	Flounder	Haddock	Lemon sole	Mackerel	Mixed fish	Plaice	Saithe	Salmon	Whiting	Total
728-731									3.4					3.4
723									3.3					3.3
809								3.3						3.3
726								2.8						2.8
263		2.7												2.7
268		2.7												2.7
393		2.7												2.7
397-398		2.7												2.7
774-776		1.0										1.6		2.6
56		2.3												2.3
58		2.3												2.3
160		2.0												2.0
258		2.0												2.0
696-698		1.8												1.8
431-436		1.3												1.3
448-449		1.3												1.3
64		1.2												1.2
66		1.2												1.2
283													1.1	1.1
286													1.1	1.1
134-135								0.9						0.9
810								0.6						0.6
21-22								0.4						0.4

Notes

Emboldened observations are the critical group consumers

The critical group consumption rate of fish based on the 77 highest adult consumers is 32.4 kg/y

The observed 97.5 percentile rate based on 191 observations is 47.2 kg/y

Table 3. Adult consumption rates of crustaceans in the Hartlepool area (kg/y)

Observation number	Common shrimp	Edible crab	Lobster	Velvet swimming crab	Total
396		**12.2**	**15.1**		**27.3**
399		**12.2**	**15.1**		**27.3**
106-108		**18.2**	**3.7**		**22.0**
110-111		**18.2**	**3.7**		**22.0**
113		**21.2**			**21.2**
355		**11.8**	**7.3**		**19.1**
132-133		**14.5**			**14.5**
720		**11.1**	**3.0**		**14.1**
119-120		**6.9**	**7.0**		**13.9**
851-852		**12.3**			**12.3**
46			**10.9**		**10.9**
116		**7.4**	**3.3**		**10.6**
721		**10.2**			**10.2**
134		**8.7**	**0.5**	**0.8**	**10.0**
837		**9.8**			**9.8**
854-855		**9.8**			**9.8**
762-763			**9.4**		**9.4**
135		**8.7**	**0.5**		**9.2**
793-794		7.4			7.4
857			6.3	0.9	7.2
416-417		5.5	1.3		6.8
139-140		4.5	2.0		6.5
409		5.8			5.8
117		2.5	3.3		5.7
706		5.1			5.1
393		4.5			4.5
397-398		4.5			4.5
754		4.5			4.5
738-739		1.9	2.5		4.4
357-358		1.7	2.5		4.2
394-395		4.2			4.2
829-830		1.1	3.0		4.1
283		3.8	0.3		4.0
841		3.8			3.8
402		3.1			3.1
86		1.8	1.2		3.0
95		1.8	1.2		3.0
744-747		2.9			2.9
728-737		1.5	1.3		2.8
849-850		2.7			2.7
755-756		2.5			2.5
195-196		2.5			2.5
825-828		1.7	0.7		2.4
63		2.3			2.3
228-229		2.3			2.3
379-386		2.3			2.3
160		2.2			2.2
258		2.2			2.2
703-704		2.1			2.1

Table 3. Adult consumption rates of crustaceans in the Hartlepool area (kg/y)

Observation number	Common shrimp	Edible crab	Lobster	Velvet swimming crab	Total
262		1.1	1.0		2.1
264-265		1.1	1.0		2.1
56		1.9			1.9
58		1.9			1.9
404		1.6			1.6
25		1.1			1.1
447		1.1			1.1
450-462		1.1			1.1
740-743		1.1			1.1
836		1.1			1.1
260-261		1.1			1.1
353-354		0.8	0.2		1.1
696		1.0			1.0
698		1.0			1.0
420		0.7	0.2		1.0
263		0.4	0.5		0.9
268		0.4	0.5		0.9
751-753		0.4	0.5		0.9
44-45		0.8			0.8
64		0.7	0.2		0.8
70-71		0.7	0.2		0.8
137		0.8			0.8
287-288		0.8			0.8
834-835			0.8		0.8
421-425		0.7			0.7
768-773	0.7				0.7
66		0.7			0.7
218-219		0.6			0.6
722		0.6			0.6
791-792		0.6			0.6
343-344		0.3			0.3
142			0.3		0.3
429		0.2			0.2
146-149		0.1	0.1		0.1

Notes

Emboldened observations are the critical group consumers

The critical group consumption rate of crustaceans based on the 26 highest adult consumers is 15.4 kg/y

The observed 97.5 percentile rate based on 165 observations is 22.0 kg/y

Table 4. Adult consumption rates of molluscs in the Hartlepool area (kg/y)

Observation number	Cockle	Mussel	Whelk	Winkle	Total
764-765				**18.5**	**18.5**
404	**1.1**		**5.4**	**8.5**	**15.1**
744-747			**11.8**		**11.8**
469-473				**11.5**	**11.5**
707-708				**6.3**	**6.3**
822		2.7		2.9	5.6
337-340		0.1		5.1	5.3
353-354				3.8	3.8
755-756	1.6			1.9	3.5
349-352				3.5	3.5
709				3.1	3.1
855				2.9	2.9
823-824				2.9	2.9
854				2.9	2.9
851-852			2.5		2.5
344				2.1	2.1
134-135	1.1			0.6	1.7
228-229				1.3	1.3
849				1.3	1.3
843-846				1.1	1.1
25		1.0			1.0
821		0.5		0.6	1.0
44-45				1.0	1.0
696				0.7	0.7
809	0.1			0.4	0.5
738-739				0.5	0.5
810-820				0.4	0.4
116				0.4	0.4
64				0.4	0.4
66				0.4	0.4
70				0.4	0.4
837				0.4	0.4
703-705				0.4	0.4
23				0.3	0.3
768-773				0.2	0.2
153-155				0.1	0.1
345				0.1	0.1

Notes

Emboldened observations are the critical group consumers

The critical group consumption rate of molluscs based on the 14 highest adult consumers is 12.1 kg/y

The observed 97.5 percentile rate based on 82 observations is 15.0 kg/y

Table 5. Adult consumption rates of marine plants and algae in the Hartlepool area (kg/y)

Observation number	Seaweed
404	**0.2**

Notes
Emboldened observations are the critical group consumers
The critical group consumption rate of marine plants and algae based on the highest adult consumer is 0.2 kg/y
The observed 97.5 percentile is not applicable for 1 observation

Table 6. Adult consumption rates of wildfowl in the Hartlepool area (kg/y)

Observation number	Duck	Goose	Total
20	**9.0**	**4.4**	**13.4**
869-870	**6.8**	**3.3**	**10.1**
21	**2.2**	**7.0**	**9.2**
871-902	**2.1**	**3.9**	**5.9**
22	0.5	1.8	2.3

Notes
Emboldened observations are the critical group consumers
The critical group consumption rate of wildfowl based on the 36 highest adult consumers is 6.4 kg/y
The observed 97.5 percentile rate based on 37 observations is 10.4 kg/y

Table 7. Children's consumption rates of fish in the Hartlepool area (kg/y)

15 year old age group

Observation number	Age	Bass	Cod	Dab	Haddock	Lemon sole	Mackerel	Mixed fish	Salmon	Whiting	Total
356	**15**		**2.0**		**12.2**	**20.4**					**34.7**
109	**15**		**16.8**		**6.1**			**5.4**			**28.3**
150	**15**	**5.9**	**5.9**	**5.9**						**5.9**	**23.6**
112	**12**		**8.4**		**3.0**			**2.7**			**14.1**
144	**13**		**8.8**		**0.6**		**0.6**			**1.8**	**11.8**
503	16									6.2	6.2
504	12									6.2	6.2
724	13							3.3			3.3
348	14		2.9								2.9
777	13		1.0						1.6		2.6
700	15		1.8								1.8
701	12		1.8								1.8
437	16		1.3								1.3
438	12		0.7								0.7

Notes

Emboldened observations are the critical group consumers

The critical group consumption rate of fish based on the 5 highest 15 year old consumers is 22.5 kg/y

The observed 97.5 percentile rate based on 14 observations is 32.6 kg/y

Table 7. Children's consumption rates of fish in the Hartlepool area (kg/y)

10 year old age group

Observation number	Age	Bass	Cod	Dab	Haddock	Lemon sole	Mackerel	Mixed fish	Salmon	Whiting	Total
797	**11**							**17.7**			**17.7**
145	**11**		**8.8**		**0.6**		**0.6**			**1.8**	**11.8**
401	**8**		**11.8**								**11.8**
406	**11**	**0.5**	**10.2**		**0.5**					**0.5**	**11.6**
725	10							3.3			3.3
699	9		1.8								1.8
439	10		0.7								0.7
440	9		0.7								0.7
441	9		0.7								0.7
442	7		0.7								0.7
443	7		0.7								0.7

Notes
Emboldened observations are the critical group consumers
The critical group consumption rate of fish based on the 4 highest 10 year old consumers is 13.2 kg/y
The observed 97.5 percentile rate based on 11 observations is 16.2 kg/y

5 year old age group

Observation number	Age	Bass	Cod	Dab	Haddock	Lemon sole	Mackerel	Mixed fish	Salmon	Whiting	Total
798	**6**							**8.8**			**8.8**
444	**6**		**0.7**								**0.7**
445	**6**		**0.7**								**0.7**
446	**4**		**0.7**								**0.7**

Notes
Emboldened observations are the critical group consumers
The critical group consumption rate of fish based on the 4 highest 5 year old consumers is 2.7 kg/y
The observed 97.5 percentile rate based on 4 observations is 8.2 kg/y

Table 8. Children's consumption rates of crustaceans in the Hartlepool area (kg/y)

15 year old age group

Observation number	Age	Edible crab	Lobster	Total
109	**15**	**18.2**	**3.7**	**22.0**
356	**15**	**11.8**	**7.3**	**19.1**
112	**12**	**9.1**	**1.9**	**11.0**
418	13	2.8		2.8
760	14	2.5		2.5
758	12	2.5		2.5
700	15	1.0		1.0
701	12	1.0		1.0
426	14	0.7		0.7
150	15	0.1	0.1	0.1

Notes
Emboldened observations are the critical group consumers
The critical group consumption rate of crustaceans based on the
3 highest 15 year old consumers is 17.4 kg/y
The observed 97.5 percentile rate based on 10 observations is 21.3 kg/y

10 year old age group

Observation number	Age	Edible crab	Lobster	Total
401	**8**	**6.1**	**7.6**	**13.7**
759	**11**	**2.5**		**2.5**
757	**7**	**2.5**		**2.5**
411	**10**	**2.2**		**2.2**
414	**7**	**2.2**		**2.2**
699	**9**	**1.0**		**1.0**

Notes
Emboldened observations are the critical group consumers
The critical group consumption rate of crustaceans based on the
6 highest 10 year old consumers is 4.0 kg/y
The observed 97.5 percentile rate based on 6 observations is 12.3 kg/y

5 year old age group

Observation number	Age	Edible crab	Lobster	Total
136	**5**	**8.7**	**0.5**	**9.2**
419	**6**	**2.8**		**2.8**
415	**5**	**2.2**		**2.2**
99	**5**	**0.9**	**0.6**	**1.5**
427	6	0.4		0.4
428	5	0.4		0.4

Notes
Emboldened observations are the critical group consumers
The critical group consumption rate of crustaceans based on the
4 highest 5 year old consumers is 3.9 kg/y
The observed 97.5 percentile rate based on 6 observations is 8.4 kg/y

Table 9. Children's consumption rates of molluscs in the Hartlepool area (kg/y)

15 year old age group

Observation number	Age	Cockle	Mussel	Whelk	Winkle	Total
760	**14**	**1.6**			**1.9**	**3.5**
758	**12**	**1.6**			**1.9**	**3.5**
156	12				0.1	0.1
157	12				0.1	0.1

Notes
Emboldened observations are the critical group consumers
The critical group consumption rate of molluscs based on the
2 highest 15 year old consumers is 3.5 kg/y
The observed 97.5 percentile rate based on 4 observations is 3.5 kg/y

10 year old age group

Observation number	Age	Cockle	Mussel	Whelk	Winkle	Total
411	**10**	**0.6**			**4.3**	**4.8**
414	**7**	**0.6**			**4.3**	**4.8**
118	**8**				**3.8**	**3.8**
759	**11**	**1.6**			**1.9**	**3.5**
757	**7**	**1.6**			**1.9**	**3.5**
341	**8**		**0.1**		**2.6**	**2.6**
853	**7**			**2.5**		**2.5**
699	9				0.7	0.7
158	10				0.1	0.1
159	10				0.1	0.1

Notes
Emboldened observations are the critical group consumers
The critical group consumption rate of molluscs based on the
7 highest 10 year old consumers is 3.7 kg/y
The observed 97.5 percentile rate based on 10 observations is 4.8 kg/y

5 year old age group

Observation number	Age	Cockle	Mussel	Whelk	Winkle	Total
766	**5**				**9.2**	**9.2**
767	**4**				**9.2**	**9.2**
415	**5**	**0.6**			**4.3**	**4.8**
342	4		0.1		2.6	2.6
136	5				0.3	0.3

Notes
Emboldened observations are the critical group consumers
The critical group consumption rate of molluscs based on the
3 highest 5 year old consumers is 7.8 kg/y
The observed 97.5 percentile rate based on 5 observations is 9.2 kg/y

Table 10. Summary of adult's consumption rates in the Hartlepool 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	191	77	56.3	20.9	32.4	47.2	15	40
Crustaceans	165	26	27.3	9.2	15.4	22.0	3.5	10
Molluscs	82	14	18.5	6.3	12.1	15.0	3.5	10
Marine plants and algae	1	1	0.2	0.2	0.2	NA	ND	ND
Wildfowl	37	36	13.4	5.9	6.4	10.4	ND	ND
Green vegetables	266	66	59.0	20.5	32.7	48.3	15	45
Other vegetables	250	40	66.6	23.3	36.4	54.0	20	50
Root vegetables	267	72	89.9	30.0	43.8	66.5	10	40
Potatoes	209	50	73.9	26.2	35.7	63.9	50	120
Domestic fruit	169	16	20.2	7.6	11.9	18.4	20	75
Milk	NC	NC	NC	NC	NC	NC	95	240
Cattle meat	NC	NC	NC	NC	NC	NC	15	45
Pig meat	NC	NC	NC	NC	NC	NC	15	40
Sheep meat	6	6	4.8	4.8	4.8	4.8	8	25
Poultry	5	3	15.6	6.3	9.4	14.6	10	30
Eggs	53	34	20.8	8.9	14.4	20.8	8.5	25
Wild/free foods	39	5	6.8	3.0	4.5	6.8	7	25
Rabbits/hares	1	1	1.4	1.4	1.4	NA	6	15
Honey	2	2	6.8	6.8	6.8	6.8	2.5	9.5
Wild fungi	37	9	5.8	2.3	4.2	5.8	3	10
Venison	NC	NC	NC	NC	NC	NC	ND	ND

ND = not determined
NC = not consumed
NA = not applicable

Table 11. Summary of 15 year old children's consumption rates in the Hartlepool 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	14	5	34.7	11.8	22.5	32.6	6.5	20
Crustaceans	10	3	22.0	11.0	17.4	21.3	2.5	6
Molluscs	4	2	3.5	3.5	3.5	3.5	2.5	6
Green vegetables	7	6	21.3	7.7	15.2	21.3	9	25
Other vegetables	7	4	25.6	9.8	18.0	25.6	10	30
Root vegetables	7	4	32.0	12.8	19.7	30.4	7.5	20
Potatoes	5	3	21.8	15.7	19.8	21.8	60	130
Domestic fruit	1	1	1.7	1.7	1.7	NA	15	50
Milk	NC	NC	NC	NC	NC	NC	110	260
Cattle meat	NC	NC	NC	NC	NC	NC	15	35
Pig meat	NC	NC	NC	NC	NC	NC	10	30
Sheep meat	1	1	4.8	4.8	4.8	NA	5.5	15
Poultry	NC	NC	NC	NC	NC	NC	6.5	20
Eggs	NC	NC	NC	NC	NC	NC	7	25
Wild/free foods	NC	NC	NC	NC	NC	NC	3	13
Rabbits/hares	NC	NC	NC	NC	NC	NC	ND	ND
Honey	NC	NC	NC	NC	NC	NC	2	5
Wild fungi	NC	NC	NC	NC	NC	NC	2	5.5
Venison	NC	NC	NC	NC	NC	NC	ND	ND

ND = not determined
NC = not consumed
NA = not applicable

Table 12. Summary of 10 year old children's consumption rates in the Hartlepool 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	11	4	17.7	11.6	13.2	16.2	6	20
Crustaceans	6	6	13.7	1.0	4.0	12.3	2.5	7
Molluscs	10	7	4.8	2.5	3.7	4.8	2.5	7
Green vegetables	3	3	17.0	17.0	17.0	17.0	6	20
Other vegetables	3	3	4.9	4.9	4.9	4.9	8	25
Root vegetables	3	3	24.2	24.2	24.2	24.2	6	20
Potatoes	3	3	24.6	24.6	24.6	24.6	45	85
Domestic fruit	4	3	6.5	6.5	6.5	6.5	15	50
Milk	NC	NC	NC	NC	NC	NC	110	240
Cattle meat	NC	NC	NC	NC	NC	NC	15	30
Pig meat	NC	NC	NC	NC	NC	NC	8.5	25
Sheep meat	NC	NC	NC	NC	NC	NC	4	10
Poultry	NC	NC	NC	NC	NC	NC	5.5	15
Eggs	NC	NC	NC	NC	NC	NC	6.5	20
Wild/free foods	NC	NC	NC	NC	NC	NC	3	11
Rabbits/hares	NC	NC	NC	NC	NC	NC	ND	ND
Honey	NC	NC	NC	NC	NC	NC	2	7.5
Wild fungi	1	1	0.2	0.2	0.2	NA	1.5	4.5
Venison	NC	NC	NC	NC	NC	NC	ND	ND

ND = not determined
NC = not consumed
NA = not applicable

Table 13. Summary of 5 year old children's consumption rates in the Hartlepool 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	4	4	8.8	0.7	2.7	8.2	ND	ND
Crustaceans	6	4	9.2	1.5	3.9	8.4	ND	ND
Molluscs	5	3	9.2	4.8	7.8	9.2	ND	ND
Green vegetables	3	3	6.4	1.3	3.0	6.2	ND	ND
Other vegetables	3	3	6.8	0.9	2.9	6.6	ND	ND
Root vegetables	3	3	5.9	1.7	3.1	5.7	ND	ND
Potatoes	3	3	3.1	0.2	1.1	2.9	ND	ND
Domestic fruit	NC	NC	NC	NC	NC	NC	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

ND = not determined
NC = not consumed

Table 14. Intertidal occupancy in the Hartlepool area (h/y)

Observation number	Location	Activity	Sand	Mud	Rock	Sand and mud	Coal and sand
662	**North Gare Sands**	**Sand extraction**	**1584**				
696	**Various/Old Town Basin**	**Angling/Bait digging**	**780**	312			
663	**North Gare Sands**	**Sand extraction**	**560**				
173	Seaton Sands	Angling	468				
825	**Headlands Beach/Long Scar Rocks/Old Town Basin**	**Angling/Gear handling/Bait digging**	430		152	**257**	
832	South Gare Beach	Dog walking	394				
833	South Gare Beach	Dog walking	394				
345	Various/South Gare Pier	Angling/Bait digging	208	150			
831	South Gare Beach	Dog walking	183				
55	Various/South Gare Pier	Angling/Bait digging	160			4	
723	Redcar Sands	Angling	158				
793	Redcar Sands and South Gare Beach	Angling and Bait digging	142				
702	North Gare Sands	Walking	120				
343	Various/South Gare Pier	Angling/Bait digging/Shellfish collecting	104	130		8	
146	Various/Headlands Beach	Angling/Bait digging	104			104	
8	**Power station to Middleton Beaches/Old Town Basin**	**Walking/Collecting sea coal**	104				**26**
9	Power station to Middleton Beaches	Walking	104				
837	South Gare Beach	Bait digging	100				
72	Headlands Beach/Throston Scar	Walking/Playing	91		91		
73	Headlands Beach/Throston Scar	Walking/Playing	91		91		
391	Various/Greatham Creek/South Gare Pier	Angling/Bait digging	90	17		60	
709	South Gare Beach/Redcar Rocks	Bait digging/Shellfish collecting	78		104		
849	South Gare Beach	Bait digging	78				
25	Redcar and Saltburn/Redcar Rocks	Walking/Shellfish collecting	78			4	
15	North Gare Sands	Playing	78				
16	North Gare Sands	Playing	78				
17	North Gare Sands	Playing	78				
26	Redcar and Saltburn	Walking	78				
791	Redcar Sands	Angling	72				
151	Various/Headlands Beach	Angling/Bait digging	65			40	
152	Various	Angling	65				
49	Coatham Sands	Dog walking	52				
54	Coatham Sands	Dog walking	52				
57	Coatham Sands	Dog walking	52				
847	South Gare Beach/Redcar Rocks	Bait digging/Shellfish collecting	50		20		
727	Redcar and Saltburn	Angling	50				
266	Seaton Sands	Metal detecting	48				
267	Seaton Sands	Metal detecting	48				

Table 14. Intertidal occupancy in the Hartlepool area (h/y)

Observation number	Location	Activity	Sand	Mud	Rock	Sand and mud	Coal and sand
768	Long Scar Rocks	Gear handling	24				
23	Redcar Sands/Redcar Rocks	Walking/Shellfish collecting	18			8	
24	Redcar Sands	Walking	18				
10	Unknown/Old Town Basin	Walking/Collecting sea coal	12				6
11	Unknown/Old Town Basin	Walking/Collecting sea coal	12				6
18	North Gare Sands	Playing	12				
19	North Gare Sands	Playing	12				
337	South Gare Pier	Shellfish collecting/Bait digging	6	18			
116	Headlands Beach	Shellfish collecting	4				
694	**Old Town Basin**	**Collecting peeler crabs**		**1260**			
469	**Directly south of power station/North Gare Sands**	**Collecting peeler crabs/Shellfish collecting**		**561**		117	
778	Tees Estuary/Various	Bait digging/Angling		365		120	
779	Tees Estuary/Various	Bait digging/Angling		365		120	
695	Old Town Basin	Bait digging		105			
857	Seal Sands	Shellfish collecting		75			
858	Seal Sands	Shellfish collecting		75			
859	Seal Sands	Shellfish collecting		75			
703	Paddy's Hole	Bait digging		40			
402	Seal Sands/Headlands Beach	Bait digging		8		40	
407	Seal Sands/Headlands Beach	Bait digging		8		40	
774	**Tees Barrage/Various**	**Angling**			**540**	**528**	
728	**The Headland**	**Angling**			**260**		
56	**Throston Scar**	**Checking pots**			**240**		
764	Heugh Breakwater	Shellfish collecting			173		
738	The Headland	Walking			156		
762	The Headland	"Hooking" for crabs/lobsters			90		
822	Redcar Rocks	Shellfish collecting			39		
834	Redcar Rocks	"Hooking" for crabs/lobsters			36		
740	Long Scar Rocks	"Hooking" for crabs/lobsters			24		
741	Long Scar Rocks	"Hooking" for crabs/lobsters			24		
707	Redcar Rocks	Shellfish collecting			14		
708	Redcar Rocks	Shellfish collecting			14		
353	Redcar Rocks/Coatham Sands	"Hooking" for crabs/lobsters /Shellfish collecting			12	6	
821	Redcar Rocks	Shellfish collecting			10		
809	South Gare Pier	Shellfish collecting			8		
810	South Gare Pier	Shellfish collecting			8		
138	Throston Scar	Walking			6		
228	Headlands Beach	Shellfish collecting			4		

Table 14. Intertidal occupancy in the Hartlepool area (h/y)

Observation number	Location	Activity	Sand	Mud	Rock	Sand and mud	Coal and sand
336	South Gare Pier	Bait digging				145	
755	Old Town Basin	Shellfish collecting				78	
785	South Gare Beach	Bait digging				63	
270	Various	Bait digging				38	
284	Various	Bait digging				38	
285	Various	Bait digging				38	
843	Saltburn Headland	Shellfish collecting				20	
844	Saltburn Headland	Shellfish collecting				20	
134	Middleton Sands	Shellfish collecting				18	
136	Middleton Sands	Shellfish collecting				18	
141	Middleton Sands	Bait digging				16	
262	Throston Scar	Bait digging				16	
64	Throston Scar	Shellfish collecting				6	
153	Headlands Beach	Shellfish collecting				5	
44	Redcar Rocks	Shellfish collecting				3	
404	**Old Town Basin**	**Collecting sea coal**					**125**
12	Old Town Basin	Collecting sea coal					8
13	Old Town Basin	Collecting sea coal					8
14	Old Town Basin	Collecting sea coal					8

Notes

Emboldened observations are the critical group

The critical group intertidal occupancy over sand based on 3 observations is 975 h/y

The observed 97.5 percentile rate for occupancy over sand based on 47 observations is 747 h/y

The critical group intertidal occupancy over mud based on 2 observations is 911 h/y

The observed 97.5 percentile rate for occupancy over mud based on 16 observations is 998 h/y

The critical group intertidal occupancy over rock based on 3 observations is 347 h/y

The observed 97.5 percentile rate for occupancy over rock based on 23 observations is 386 h/y

The critical group intertidal occupancy over sand and mud based on 2 observations is 393 h/y

The observed 97.5 percentile rate for occupancy over sand and mud based on 30 observations is 332 h/y

The critical group intertidal occupancy over coal and sand based on 2 observations is 76 h/y

The observed 97.5 percentile rate for occupancy over coal and sand based on 7 observations is 110 h/y

Table 15. Handling of commercial fishing gear and sediment in the Hartlepool area (h/y)

Observation number	Location	Activity	Fishing gear	Sediment
720	**Off Redcar**	**Gear handling**	**1700**	
840	**Off Saltburn**	**Gear handling**	**1680**	
842	**Off Saltburn**	**Gear handling**	**1680**	
851	**Off Hartlepool**	**Gear handling**	**1540**	
721	**Off Redcar**	**Gear handling**	**1234**	
122	**Off Hartlepool**	**Gear handling**	**1102**	
262	**Off Hartlepool/Throston Scar**	**Gear handling/Bait digging**	**1100**	16
754	**Off Hartlepool**	**Gear handling**	**1100**	
744	**Off Hartlepool**	**Gear handling, Sorting catch**	**1032**	
748	**Off Hartlepool**	**Gear handling, Sorting catch**	**1032**	
749	**Off Hartlepool**	**Gear handling, Sorting catch**	**1032**	
396	**Off Hartlepool**	**Gear handling**	**975**	
106	**Off Hartlepool**	**Gear handling**	**776**	
108	**Off Hartlepool**	**Gear handling**	**776**	
109	**Off Hartlepool**	**Gear handling**	**776**	
265	**Off Hartlepool**	**Gear handling**	**740**	
44	**Off Redcar/Redcar Rocks**	**Gear handling/Shellfish collecting**	**600**	3
43	**Off Redcar**	**Gear handling**	**600**	
750	**Off Hartlepool**	**Gear handling**	**600**	
134	Off Hartlepool/Middleton Sands	Gear handling/Shellfish collecting	500	18
160	Off Hartlepool	Gear handling	500	
259	Off Hartlepool	Gear handling	500	
113	Off Hartlepool	Gear handling	455	
114	Off Hartlepool	Gear handling	455	
115	Off Hartlepool	Gear handling	455	
854	Off Hartlepool	Gear handling	420	
856	Off Hartlepool	Gear handling	420	
357	Off Hartlepool	Gear handling	416	
119	Off Hartlepool	Gear handling	400	
130	Off Hartlepool	Gear handling	250	
416	Off Hartlepool	Gear handling	250	
56	Throston Scar	Checking pots	240	
408	Off Hartlepool	Gear handling	210	
409	Off Hartlepool	Gear handling	210	
728	The Headland	Checking pots	156	
738	The Headland	Checking pots	156	
825	Long Scar Rocks, Old Town Basin	Gear handling/Bait digging	152	257
847	Off Redcar/Redcar Rocks/South Gare Beach	Gear handling/Shellfish collecting/Bait digging	100	70
116	Off Hartlepool/Headlands Beach	Gear handling/Shellfish collecting	35	4
768	Long Scar Rocks	Gear handling	24	
138	Throston Scar	Checking pots	6	
662	**North Gare Sands**	**Sand extraction**		**1584**
694	**Old Town Basin**	**Bait digging**		**1260**
469	**Directly south of power station/North Gare Sands**	**Bait digging, Shellfish collecting**		**678**
663	**North Gare Sands**	**Sand extraction**		**560**
778	Tees Estuary	Bait digging		365
779	Tees Estuary	Bait digging		365
696	Old Town Basin	Bait digging		312
709	Redcar Rocks, South Gare Beach	Shellfish collecting, Bait digging		182
764	Heugh Breakwater	Shellfish collecting		173
345	South Gare Pier	Bait digging		150
336	South Gare Pier	Bait digging		145
343	South Gare Pier	Bait digging, Shellfish collecting		138
404	Old Town Basin	Collecting sea coal		125
695	Old Town Basin	Bait digging		105
146	Headlands Beach	Bait digging		104
837	South Gare Beach	Bait digging		100
755	Old Town Basin	Shellfish collecting		78
849	South Gare Beach	Bait digging		78
391	Greatham Creek, South Gare Pier	Bait digging		77
857	Seal Sands	Shellfish collecting		75
858	Seal Sands	Shellfish collecting		75
859	Seal Sands	Shellfish collecting		75
793	South Gare Beach	Bait digging		70
785	South Gare Beach	Bait digging		63
402	Headlands Beach, Seal Sands	Bait digging		48

Table 15. Handling of commercial fishing gear and sediment in the Hartlepool area (h/y)

Observation number	Location	Activity	Fishing gear	Sediment
407	Headlands Beach, Seal Sands	Bait digging		48
151	Headlands Beach	Bait digging		40
703	Paddy's Hole	Bait digging		40
822	Redcar Rocks	Shellfish collecting		39
270	Various	Bait digging		38
284	Various	Bait digging		38
285	Various	Bait digging		38
8	Old Town Basin	Collecting sea coal		26
337	South Gare Pier	Bait digging, Shellfish collecting		24
843	Saltburn Headland	Shellfish collecting		20
844	Saltburn Headland	Shellfish collecting		20
136	Middleton Sands	Shellfish collecting		18
141	Middleton Sands	Bait digging		16
707	Redcar Rocks	Shellfish collecting		14
708	Redcar Rocks	Shellfish collecting		14
821	Redcar Rocks	Shellfish collecting		10
12	Old Town Basin	Collecting sea coal		8
13	Old Town Basin	Collecting sea coal		8
14	Old Town Basin	Collecting sea coal		8
809	South Gare Pier	Shellfish collecting		8
810	South Gare Pier	Shellfish collecting		8
23	Redcar Rocks	Shellfish collecting		8
10	Old Town Basin	Collecting sea coal		6
11	Old Town Basin	Collecting sea coal		6
64	Throston Scar	Shellfish collecting		6
353	Coatham Sands	Shellfish collecting		6
153	Headlands Beach	Shellfish collecting		5
25	Redcar Rocks	Shellfish collecting		4
55	South Gare Pier	Bait digging		4
228	Headlands Beach	Shellfish collecting		4

Notes

Emboldened observations are the critical group

The critical group fishing gear handling time based on 19 observations is 1057 h/y

The observed 97.5 percentile rate for fishing gear based on 41 observations is 1680 h/y

The critical group sediment handling time based on 4 observations is 1021 h/y

The observed 97.5 percentile rate for sediment based on 61 observations is 969 h/y

Table 16. Gamma dose rate measurements over intertidal substrates in the Hartlepool area (micro Gy/h)

Location	NGR	Substrate	Gamma dose rate at 1 metre
South Gare (Lug worm Beach)	NZ 555 266	Sand	0.049
Redcar Beach	NZ 606 253	Sand	0.052
Throston Scar	NZ 531 340	Rock	0.053
Seaton Sands	NZ 525 303	Sand	0.054
Middleton Sands	NZ 521 333	Sand	0.058
Old Town Basin	NZ 518 327	Sand and mud	0.061
Old Town Basin	NZ 518 326	Coal and sand	0.062
Redcar Rocks	NZ 612 254	Rock	0.066
River Tees bank near High Clarance	NZ 492 218	Mud	0.077
Greatham Creek	NZ 513 255	Mud	0.112
Seal Sands	NZ 519 258	Mud	0.130
South Gare (Paddy's Hole)*	NZ 555 273	Mud	0.162
South Gare (Winkle beds) *	NZ 555 276	Rock	0.230

* = This measurement should be viewed with caution as the area is known to have been reclaimed using slag from the steel industry

Table 17. Occupancy times in and on water (h/y)

Observation number	Location	Activity	In water	On water
799-808	Redcar	Diving/Boating to and from dives	49	180
722	South Gare	Diving/Boating to and from dives	42	158
860-868	South Gare	Diving/Boating to and from dives	42	158
829	Redcar	Diving/Boating to and from dives	26	61
768	Seaton Carew	Push netting	24	
857	Redcar	Diving	17	
761	Hartlepool	Snorkelling	8	
851	Hartlepool	Commercial fishing		2090
840+842	Saltburn	Commercial fishing		1680
744	Hartlepool	Commercial fishing		1615
748-749	Hartlepool	Commercial fishing		1615
837	Saltburn	Commercial fishing		1400
122	Hartlepool	Commercial fishing		1400
130	Hartlepool	Commercial fishing		1400
416	Hartlepool	Commercial fishing		1374
420	Hartlepool	Commercial fishing		1374
429	Hartlepool	Commercial fishing		1374
396	Hartlepool	Commercial fishing		1350
721	Redcar	Commercial fishing		1234
754	Hartlepool	Commercial fishing		1100
262	Hartlepool	Commercial fishing		1065
265	Hartlepool	Commercial fishing		1065
847	Redcar	Rod and line fishing and pots		1050
113-115	Hartlepool	Commercial fishing		925
854	Hartlepool	Sea angling		840
116	Hartlepool	Sea angling		832
160	Hartlepool	Commercial fishing		805
259	Hartlepool	Commercial fishing		805
43-44	Redcar	Commercial fishing		750
134	Hartlepool	Commercial fishing		750
750	Hartlepool	Commercial fishing		600
106	Hartlepool	Commercial fishing		500
108-109	Hartlepool	Commercial fishing		500
119	Hartlepool	Commercial fishing		500
408-409	Hartlepool	Commercial fishing		415
849	Hartlepool	Sea angling		351
402	Hartlepool	Sea angling		312
407	Hartlepool	Sea angling		312
836	Redcar	Sea angling		260
121	Hartlepool	Sea angling		160
501	Hartlepool	Sea angling		160
27-29	Redcar	Sea angling		153
825	Hartlepool	Sea angling		151
74	Hartlepool	Commercial fishing		120
86	Hartlepool	Commercial fishing		120
102-104	Hartlepool	Commercial fishing		120
751	Hartlepool	Sea angling		117
141	Hartlepool	Sea angling		104
77-79	Hartlepool	Commercial fishing		100
822	Redcar	Sea angling		100
394	Hartlepool	Sea angling		96
430	Hartlepool	Sea angling		84
75	Hartlepool	Commercial fishing		50

Table 18. Adult consumption rates of green vegetables in the Hartlepool area (kg/y)

Observation number	Asparagus	Broccoli	Brussel sprout	Cabbage	Calabrese	Cauliflower	Courgettes	Cucumber	Globe artichoke	Herbs	Kale	Lettuce	Marrow	Rocket	Spinach	Total
287-288			**11.9**	**21.3**	**6.5**	**9.8**					**5.6**	**3.8**				**59.0**
283		**5.6**	**6.1**	**7.9**	**1.9**	**27.0**	**0.2**									**48.7**
286		**5.6**	**6.1**	**7.9**	**1.9**	**27.0**	**0.2**									**48.7**
174-178			**19.1**	**12.8**		**4.5**		**3.4**	**2.2**			**4.1**	**2.2**			**48.3**
359-362			**12.5**	**20.7**		**7.0**						**1.9**				**42.1**
210-211				**26.8**		**12.4**						**1.2**				**40.4**
230-231			**17.5**	**17.5**		**3.6**										**38.6**
400			**1.4**	**23.0**		**5.4**		**4.3**				**1.6**				**35.6**
403			**1.4**	**23.0**		**5.4**		**4.3**				**1.6**				**35.6**
280-282		**10.0**	**6.1**	**8.1**		**10.0**										**34.1**
81-83		**4.5**		**20.3**		**8.7**										**33.6**
84-85		**1.7**	**11.4**	**15.2**		**1.5**						**1.5**			**1.7**	**33.0**
87		**1.7**	**11.4**	**15.2**		**1.5**						**1.5**			**1.7**	**33.0**
330-335			**7.2**	**11.4**		**11.8**						**1.6**				**32.0**
365-366				**10.4**		**15.9**						**3.8**				**30.0**
232-234			**6.6**	**15.8**		**3.6**	**0.1**					**3.8**				**30.0**
7			**10.2**			**8.4**		**8.5**							**2.6**	**29.7**
393		**0.7**	**3.0**	**13.3**		**10.9**	**0.2**			**0.2**		**1.2**				**29.4**
397-398		**0.7**	**3.0**	**13.3**		**10.9**	**0.2**			**0.2**		**1.2**				**29.4**
263			**13.7**	**9.1**								**4.5**				**27.3**
268			**13.7**	**9.1**								**4.5**				**27.3**
41-42			**8.2**	**16.4**			**0.3**									**24.9**
379-386			**1.7**	**6.9**		**5.6**		**8.0**				**2.3**				**24.4**
486-487	**0.9**	**1.5**	**16.4**	**2.9**		**2.0**						**0.3**				**24.0**
314-315			**5.1**	**9.1**		**7.0**	**0.1**					**1.7**				**23.1**
88-92			**5.9**	**13.0**		**2.4**										**21.3**
294-295			**7.1**	**4.7**		**7.0**						**1.7**				**20.5**
189-192			5.9	1.9		3.1	0.1	8.5								19.4
474-485		8.4	4.5	3.8				0.7				1.5			0.4	19.3
186-188			6.1	8.1		3.7						1.1				19.0
195-196			18.9													18.9
369-378			3.6	6.1				8.5				0.6				18.8
193-194			7.3	7.3	2.7							0.5				17.8

Table 18. Adult consumption rates of green vegetables in the Hartlepool area (kg/y)

Observation number	Asparagus	Broccoli	Brussel sprout	Cabbage	Calabrese	Cauliflower	Courgettes	Cucumber	Globe artichoke	Herbs	Kale	Lettuce	Marrow	Rocket	Spinach	Total
289-290		4.8	5.8		2.4	2.4	0.3		1.2			1.0				17.8
292-293		4.8	5.8		2.4	2.4	0.3		1.2			1.0				17.8
56			4.9	6.8	4.0	1.8	0.1									17.6
58-62			4.9	6.8	4.0	1.8	0.1									17.6
318-319				6.6	4.0	6.1						0.4				17.0
48			3.6	12.1								0.8				16.5
50-53			3.6	12.1								0.8				16.5
296-301			5.3	3.5		5.3						1.5				15.7
101		0.4	3.6	6.1		0.4		0.4				3.9				14.8
105		0.4	3.6	6.1		0.4		0.4				3.9				14.8
367-368			6.8	6.4												13.2
184-185				9.1								3.0				12.1
269			4.6	3.7		2.2						0.4	0.3		0.7	11.8
271-279			4.6	3.7		2.2						0.4	0.3		0.7	11.8
63		4.0	2.9			0.7						1.6		1.1		10.4
65		4.0	2.9			0.7						1.6		1.1		10.4
238-257			2.4	3.2	1.1	0.8		1.7				0.9				10.2
80		1.4		6.1		2.6										10.1
200-207			4.1	4.1		1.7	0.2									10.0
161-165	0.0		3.9	4.5		0.7						0.4				9.5
67-69		4.0	2.9			0.7						0.5		1.1		9.3
212-216			1.1	4.4		1.8		0.9				0.9				9.0
166-173			4.6	2.3								2.0				8.9
388-390				2.3	0.5	1.7	0.1	4.3								8.8
392				2.3	0.5	1.7	0.1	4.3								8.8
235-237				2.8				5.7								8.5
218-227			1.0	2.3	1.5	2.2						1.4				8.4
39-40			2.7	5.5			0.1									8.3
131				7.7												7.7
179-181				7.7												7.7
488-496	0.9	1.5		2.9		2.0						0.3				7.6
363-364												7.5				7.5
76			2.0	5.1												7.1

Table 18. Adult consumption rates of green vegetables in the Hartlepool area (kg/y)

Observation number	Asparagus	Broccoli	Brussel sprout	Cabbage	Calabrese	Cauliflower	Courgettes	Cucumber	Globe artichoke	Herbs	Kale	Lettuce	Marrow	Rocket	Spinach	Total
123-129			2.0	5.1												7.1
447		4.8						0.4				0.6				5.8
450-468		4.8						0.4				0.6				5.8
316-317			1.0	1.8		1.4	0.0					0.3				4.6
1-6			1.4	1.8											1.4	4.6
849-850				4.5												4.5
307-308			0.9	0.5												1.4
305-306			0.5	0.2												0.7

Notes

Emboldened observations are the critical group consumers

The critical group consumption rate of green vegetables based on the 66 highest adult consumers is 32.7 kg/y

The observed 97.5 percentile rate based on 266 observations is 48.3 kg/y

Table 19. Adult consumption rates of other vegetables in the Hartlepool area (kg/y)

Observation number	Broad bean	Chilli pepper	French bean	Mangetout	Pea	Pepper	Runner bean	Sweetcorn	Tomato	Total
287-288	**6.8**		**3.4**		**8.6**		**8.2**		**39.6**	**66.6**
7	**13.7**				**16.9**	**0.1**			**28.8**	**59.5**
84-85	**13.7**		**10.8**		**4.5**			**0.9**	**27.0**	**56.8**
87	**13.7**		**10.8**		**4.5**			**0.9**	**27.0**	**56.8**
367-368	**9.1**				**13.5**		**31.4**			**54.0**
174-178	**10.9**		**5.4**		**7.8**	**0.2**			**27.4**	**51.7**
230-231	**17.5**		**1.7**		**4.3**		**8.7**			**32.2**
81-83	**9.1**		**2.4**		**4.2**				**15.0**	**30.7**
400					**9.5**		**6.8**		**12.5**	**28.8**
403					**9.5**		**6.8**		**12.5**	**28.8**
283					**12.2**				**16.2**	**28.4**
286					**12.2**				**16.2**	**28.4**
359-362	**13.7**								**13.5**	**27.2**
235-237	**4.5**				**2.3**		**6.8**		**12.6**	**26.2**
88-92			**2.1**		**3.9**		**6.8**		**12.9**	**25.6**
195-196	**5.7**					**0.8**			**18.0**	**24.5**
388-390	**6.8**		**1.4**		**3.4**				**11.7**	**23.3**
392	**6.8**		**1.4**		**3.4**				**11.7**	**23.3**
318-319					4.9				16.2	21.1
379-386			2.7			0.2	1.9		16.2	21.0
393	4.9	0.0	4.3		1.8		2.7		7.2	20.9
397-398	4.9	0.0	4.3		1.8		2.7		7.2	20.9
193-194	13.7			3.6	3.6					20.9
232-234	4.4						3.3		12.2	19.9
212-216			0.9		1.6				14.4	16.9
186-188	8.2		3.2		5.4					16.8
474-485	1.1				1.1	0.0	5.1		9.0	16.4
314-315	3.4		2.7		5.1				5.0	16.1
269	4.6								10.8	15.4
271-279	4.6								10.8	15.4
369-378					0.9				14.4	15.3
294-295	5.7		2.3					0.5	6.3	14.7
101	2.7		0.4		0.5		1.4		9.7	14.6
105	2.7		0.4		0.5		1.4		9.7	14.6
200-207	5.1		1.6		2.0	0.1			4.8	13.7
330-335	2.4		1.9		7.1		2.0			13.4
48					1.8		10.8			12.6
50-53					1.8		10.8			12.6
63	2.9		2.0		2.6		4.9			12.4
65	2.9		2.0		2.6		4.9			12.4
67-69	2.9		2.0		2.6		4.9			12.4
296-301	4.3		1.7					0.3	4.7	11.0
447					0.8			1.2	9.0	11.0
450-468					0.8			1.2	9.0	11.0
289-290	5.8		1.2		1.4			1.4		9.8
292-293	5.8		1.2		1.4			1.4		9.8
189-192			0.6		4.1				4.9	9.5
80	2.7		0.7		1.3				4.5	9.2
363-364	9.1									9.1
166-173					1.4				7.2	8.6
1-6			3.2		2.7	0.1			2.4	8.5

Table 19. Adult consumption rates of other vegetables in the Hartlepool area (kg/y)

Observation number	Broad bean	Chilli pepper	French bean	Mangetout	Pea	Pepper	Runner bean	Sweetcorn	Tomato	Total
263			1.2		6.8					8.0
268			1.2		6.8					8.0
56					2.4		5.4			7.8
58-62					2.4		5.4			7.8
131									7.7	7.7
179-181									7.7	7.7
486-496	1.7		1.0		3.3			0.4	1.3	7.6
238-257			0.5		1.4				5.6	7.5
76					1.4		2.0		3.2	6.6
123-129					1.4		2.0		3.2	6.6
280-282					6.0					6.0
316-317	0.7		0.5		1.0				1.0	3.2
849-850							2.3			2.3
41-42					1.4			0.2		1.6
307-308	1.4									1.4
305-306	0.7									0.7
161-165					0.5					0.5
39-40					0.5			0.1		0.5

Notes

Emboldened observations are the critical group consumers

The critical group consumption rate of other vegetables based on the 40 highest adult consumers is 36.4 kg/y

The observed 97.5 percentile rate based on 250 observations is 54.0 kg/y

Table 20. Adult consumption rates of root vegetables in the Hartlepool area (kg/y)

Observation number	Beetroot	Carrot	Celery	Fennel	Garlic	Jerusalem artichoke	Kohl rabi	Leek	Onion	Parsnip	Radish	Shallot	Spring onion	Swede	Turnip	Total
287-288	**5.9**	**11.8**			**0.3**			**11.8**	**22.1**	**9.4**		**4.9**		**23.8**		**89.9**
283	**9.1**	**6.1**						**12.2**	**20.5**	**6.8**				**18.4**		**73.0**
286	**9.1**	**6.1**						**12.2**	**20.5**	**6.8**				**18.4**		**73.0**
174-178	**7.6**	**10.8**						**10.8**	**8.8**					**28.6**		**66.5**
84-85	**5.6**	**1.1**	**1.6**					**6.8**	**30.6**	**5.4**	**2.7**		**1.0**		**10.8**	**65.6**
87	**5.6**	**1.1**	**1.6**					**6.8**	**30.6**	**5.4**	**2.7**		**1.0**		**10.8**	**65.6**
230-231	**4.3**							**7.2**	**11.5**	**11.2**				**26.1**		**60.4**
210-211	**5.0**	**9.9**						**19.8**	**21.6**							**56.3**
41-42	**5.4**	**5.4**						**8.1**	**24.8**	**3.0**					**6.5**	**53.2**
400	**6.8**	**0.9**	**2.5**		**0.6**			**2.2**	**27.0**			**2.3**			**9.7**	**52.0**
403	**6.8**	**0.9**	**2.5**		**0.6**			**2.2**	**27.0**			**2.3**			**9.7**	**52.0**
359-362	**4.2**	**4.2**						**14.1**	**15.8**	**3.4**					**5.1**	**46.7**
232-234	**2.2**	**2.7**		**0.2**				**8.6**	**8.8**	**1.1**				**19.6**		**43.1**
363-364	**5.6**	**7.9**							**14.4**	**7.2**		**7.2**				**42.3**
263	**6.8**							**9.0**	**13.5**	**2.7**					**8.1**	**40.1**
268	**6.8**							**9.0**	**13.5**	**2.7**					**8.1**	**40.1**
7	**6.8**	**13.5**							**10.8**	**0.7**					**8.1**	**39.9**
184-185	**4.5**							**4.5**	**18.2**						**10.8**	**38.0**
235-237	**4.5**	**4.5**						**3.8**	**15.0**	**2.7**					**5.4**	**35.9**
56	**2.4**	**4.8**						**6.0**	**14.6**	**2.9**		**1.7**			**2.9**	**35.3**
58-62	**2.4**	**4.8**						**6.0**	**14.6**	**2.9**		**1.7**			**2.9**	**35.3**
330-335	**4.7**	**1.7**						**4.7**	**5.7**	**7.6**		**1.7**			**8.5**	**34.6**
367-368	**9.0**								**8.3**			**2.3**		**10.2**	**4.1**	**33.8**
186-188								**9.0**	**21.6**			**1.9**				**32.5**
379-386	**3.4**	**1.1**	**0.6**		**0.3**		**2.2**	**0.8**	**7.7**	**0.9**		**3.2**	**1.0**	**6.8**	**4.1**	**32.0**
289-290		**4.3**	**4.7**		**0.6**			**5.8**	**6.9**	**2.8**		**1.0**		**5.9**		**32.0**
292-293		**4.3**	**4.7**		**0.6**			**5.8**	**6.9**	**2.8**		**1.0**		**5.9**		**32.0**
193-194	**10.8**							**11.2**	**8.8**							**30.8**
388-390	**6.8**	**3.4**			**0.3**			**2.5**	**8.9**	**2.7**			**1.4**		**4.1**	**30.0**
392	**6.8**	**3.4**			**0.3**			**2.5**	**8.9**	**2.7**			**1.4**		**4.1**	**30.0**
486-487	1.6	4.1				4.5		2.3	5.0	10.8		1.2				29.5
189-192	2.3	6.1							7.7	2.7	1.4	2.4			6.1	28.6
294-295	2.4	1.4	1.1					7.0	11.6	4.5						28.0
314-315	3.4	2.5			0.2			3.4	12.8	2.7					2.0	27.1
195-196	5.6				1.3				10.8	4.5		3.2				25.4
318-319	0.8	2.4			1.4			2.4	7.8	1.9				7.3		24.2

Table 20. Adult consumption rates of root vegetables in the Hartlepool area (kg/y)

Observation number	Beetroot	Carrot	Celery	Fennel	Garlic	Jerusalem artichoke	Kohl rabi	Leek	Onion	Parsnip	Radish	Shallot	Spring onion	Swede	Turnip	Total
369-378	3.6	2.7							4.0			3.2		5.4	4.3	23.2
280-282								12.0	11.0							23.0
48	2.4	2.7						5.9	5.8					5.4		22.2
50-53	2.4	2.7						5.9	5.8					5.4		22.2
296-301	1.8	1.1	0.8					5.3	8.7	3.4						21.0
200-207	1.0		1.2					3.0	8.1	2.4					3.6	19.4
63								3.2	9.6	1.3		4.1			1.0	19.2
65								3.2	9.6	1.3		4.1			1.0	19.2
67-69								3.2	9.6	1.3		4.1			1.0	19.2
81-83	0.8	3.0	0.8						12.0						2.2	18.8
397-398	3.6	3.0						4.8	4.4	1.1			1.1			17.9
393	3.6	3.0						4.8	4.4	1.1			1.1			17.9
39-40	1.8	1.8						2.7	8.3	1.0					2.2	17.7
161-165	2.7							1.8	9.4		0.2	1.0			2.2	17.2
238-257	2.0	0.7						1.7	3.8	0.8	0.1	0.2		5.1	1.5	15.9
166-173					0.7				9.9		0.2				3.6	14.4
488-496	1.6	4.1						2.3	5.0			1.2				14.2
88-92	3.9								3.1						5.8	12.8
1-6	2.7							3.6	5.8							12.1
212-216								1.1	5.6			1.5		3.3		11.5
474-485	1.7							2.8	2.3	0.9		0.8			2.7	11.2
217	10.8															10.8
447									3.3			0.3			6.8	10.4
450-468									3.3			0.3			6.8	10.4
101	1.4	0.9			0.8			2.7	2.2	0.7		0.3				8.9
105	1.4	0.9			0.8			2.7	2.2	0.7		0.3				8.9
131														5.4	2.2	7.6
179-181														5.4	2.2	7.6
269	2.7								3.6							6.3
271-279	2.7								3.6							6.3
218-227	1.4	0.8	0.2		0.3			0.8	1.9	0.3		0.7				6.2
76	2.0	0.7									0.5	0.5	0.3		1.6	5.6
123-129	2.0	0.7									0.5	0.5	0.3		1.6	5.6
80	0.2	0.9	0.3						3.6						0.6	5.6
307-308	0.3	0.8						1.8	1.1	0.8					0.8	5.6
365-366	5.6															5.6

Table 20. Adult consumption rates of root vegetables in the Hartlepool area (kg/y)

Observation number	Beetroot	Carrot	Celery	Fennel	Garlic	Jerusalem artichoke	Kohl rabi	Leek	Onion	Parsnip	Radish	Shallot	Spring onion	Swede	Turnip	Total
316-317	0.7	0.5			0.0			0.7	2.6	0.5					0.4	5.4
305-306	0.2	0.4						0.9	0.5	0.4					0.4	2.8
849-850									2.3							2.3

Notes

Emboldened observations are the critical group consumers

The critical group consumption rate of root vegetables based on the 72 highest adult consumers is 43.8 kg/y

The observed 97.5 percentile rate based on 267 observations is 66.5 kg/y

Table 21. Adult consumption rates of potatoes in the Hartlepool area (kg/y)

Observation number	Potatoes
359-362	**73.9**
263	**68.3**
268	**68.3**
174-178	**46.4**
7	**41.0**
330-335	**33.4**
84-85	**31.9**
87	**31.9**
193-194	**29.1**
367-368	**27.3**
474-485	**27.3**
486-496	**26.5**
230-231	**26.2**
318-319	24.6
393	24.3
397-398	24.3
363-364	22.8
131	21.8
179-181	21.8
186-188	21.8
369-378	21.8
314-315	18.3
235-237	18.2
283	17.1
286	17.1
76	15.9
123-129	15.9
289-290	15.7
292-293	15.7
81-83	15.2
48	14.4
50-53	14.4
166-173	13.7
379-386	13.7
232-234	13.1
1-6	10.9
41-42	10.9
56	10.9
58-62	10.9
101	10.0
105	10.0
388-390	9.1
392	9.1
849-850	9.1
200-207	6.1
80	4.6
316-317	3.7
39-40	3.6
307-308	3.4
294-295	2.8

Table 21. Adult consumption rates of potatoes in the Hartlepool area (kg/y)

Observation number	Potatoes
218-227	2.7
212-216	2.2
296-301	2.1
400	2.0
403	2.0
161-165	1.8
305-306	1.7
238-257	1.4

Notes

Emboldened observations are the critical group consumers

The critical group consumption rate of potatoes based on the 50 highest adult consumers is 35.7 kg/y

The observed 97.5 percentile rate based on 209 observations is 63.9 kg/y

Table 22. Adult consumption rates of domestic fruit in the Hartlepool area (kg/y)

Observation number	Apple	Blackberry	Blackcurrant	Gooseberry	Grapes	Raspberry	Redcurrants	Rhubarb	Strawberry	Worcesterberry	Total
174-178			**6.8**						**8.9**	**4.5**	**20.2**
7		**1.8**						**1.2**	**8.2**		**11.1**
379-386				**6.1**				**1.7**			**7.9**
41-42								**6.9**	**0.7**		**7.6**
318-319								0.4	6.1		6.5
330-335									6.1		6.1
210-211								4.6			4.6
48								4.6			4.6
50-53								4.6			4.6
230-231			1.8	2.7							4.5
287-288			1.6	1.4			0.1	1.1			4.2
474-475		1.1				1.0		0.8	0.9		3.8
447	0.3							0.7	2.7		3.7
450-468	0.3							0.7	2.7		3.7
63		0.8						2.8			3.6
65		0.8						2.8			3.6
67-69		0.8						2.8			3.6
189-192									3.4		3.4
283			2.8								2.8
286			2.8								2.8
476-485						1.0		0.8	0.9		2.7
56			1.5	0.5					0.5		2.6
58-62			1.5	0.5					0.5		2.6
369-378						1.4			1.2		2.6
39-40								2.3	0.2		2.5
184-185				2.3							2.3
363-364				2.3							2.3
359-360				1.0				1.1			2.2
486-496								0.4	1.7		2.1
388-390									2.0		2.0
392									2.0		2.0

Table 22. Adult consumption rates of domestic fruit in the Hartlepool area (kg/y)

Observation number	Apple	Blackberry	Blackcurrant	Gooseberry	Grapes	Raspberry	Redcurrants	Rhubarb	Strawberry	Worcesterberry	Total
289-290				1.3				0.4			1.7
292-293				1.3				0.4			1.7
218-227		0.3						1.2			1.5
166-173								1.2			1.2
314-315								1.2			1.2
400	1.1										1.1
403	1.1										1.1
361-362				1.0							1.0
269			0.5		0.5						1.0
271			0.5		0.5						1.0
497-498	0.9										0.9
272-279					0.5						0.5
161-165								0.5			0.5
367-368								0.5			0.5
393								0.3			0.3
397-398								0.3			0.3
316-317								0.2			0.2

Notes

Emboldened observations are the critical group consumers

The critical group consumption rate of domestic fruit based on the 16 highest adult consumers is 11.9 kg/y

The observed 97.5 percentile rate based on 169 observations is 18.4 kg/y

Table 23. Adult consumption rates of sheep meat in the Hartlepool area (kg/y)

Observation number	Lamb meat
323	**4.8**
324	**4.8**
325	**4.8**
326	**4.8**
327	**4.8**
328	**4.8**

Notes
Emboldened observations are the critical group consumers
The critical group consumption rate of sheep meat based on the
6 highest adult consumers is 4.8 kg/y
The observed 97.5 percentile rate based on 6 observations is 4.8 kg/y

Table 24. Adult consumption rates of poultry in the Hartlepool area (kg/y)

Observation number	Chicken	Duck	Goose	Partridge	Pheasant	Pigeon	Total
20				**7.0**	**7.7**	**0.9**	**15.6**
323	**2.3**	**1.8**	**2.2**				**6.3**
324	**2.3**	**1.8**	**2.2**				**6.3**
21						1.8	1.8
22						0.7	0.7

Notes
Emboldened observations are the critical group consumers
The critical group consumption rate of poultry based on the
3 highest adult consumers is 9.4 kg/y
The observed 97.5 percentile rate based on 5 observations is 14.6 kg/y

Table 25. Adult consumption rates of eggs in the Hartlepool area (kg/y)

Observation number	Chicken egg
263	**20.8**
268	**20.8**
486-487	**20.8**
323-324	**17.8**
474-475	**17.8**
238-257	**14.0**
186-187	**8.9**
193-194	**8.9**
388-389	**8.9**
195-199	5.9
367-368	5.9
63	2.5
65	2.5
67-69	2.5
81-83	1.5
161-163	1.4
80	0.4

Notes
Emboldened observations are the critical group consumers
The critical group consumption rate of eggs based on the
34 highest adult consumers is 14.4 kg/y
The observed 97.5 percentile rate based on 53 observations is 20.8 kg/y

Table 26. Adult consumption rates of wild/free foods in the Hartlepool area (kg/y)

Observation number	Blackberry
263	**6.8**
268	**6.8**
393	**3.0**
397	**3.0**
398	**3.0**
768	1.4
769	1.4
388	0.9
389	0.9
400	0.9
403	0.9
76	0.5
123-129	0.5
447	0.5
450-468	0.5

Notes
Emboldened observations are the critical group consumers
The critical group consumption rate of wild/free foods based on the
5 highest adult consumers is 4.5 kg/y
The observed 97.5 percentile rate based on 39 observations is 6.8 kg/y

Table 27. Adult consumption rates of rabbits/hares in the Hartlepool area (kg/y)

Observation number	Rabbit
20	**1.4**

Notes
Emboldened observations are the critical group consumers
The critical group consumption rate of rabbits/hares based on the highest adult consumer is 1.4 kg/y
The observed 97.5 percentile is not applicable for 1 observation

Table 28. Adult consumption rates of honey in the Hartlepool area (kg/y)

Observation number	Honey
903	**6.8**
904	**6.8**

Notes
Emboldened observations are the critical group consumers
The critical group consumption rate of honey based on the 2 highest adult consumers is 6.8 kg/y
The observed 97.5 percentile rate based on 2 observations is 6.8 kg/y

Table 29. Adult consumption rates of wild fungi in the Hartlepool area (kg/y)

Observation number	Mushrooms
469-473	**5.8**
486	**2.3**
487	**2.3**
869	**2.3**
870	**2.3**
768	1.6
769	1.6
263	0.6
268	0.6
447	0.5
450-468	0.5
402	0.4
405	0.4
21	0.1
22	0.1

Notes
Emboldened observations are the critical group consumers
The critical group consumption rate of wild fungi based on the 9 highest adult consumers is 4.2 kg/y
The observed 97.5 percentile rate based on 37 observations is 5.8 kg/y

Table 30. Children's consumption rates of green vegetables in the Hartlepool area (kg/y)

15 year old age group

Observation number	Age	Broccoli	Brussel sprout	Cabbage	Calabrese	Cauliflower	Courgettes	Globe artichoke	Lettuce	Total
93	**16**		**5.9**	**13.0**		**2.4**				**21.3**
94	**13**		**5.9**	**13.0**		**2.4**				**21.3**
291	**15**	**4.8**	**5.8**		**2.4**	**2.4**	**0.3**	**1.2**	**1.0**	**17.8**
304	**13**		**5.3**	**3.5**		**5.3**			**1.5**	**15.7**
182	**14**			**7.7**						**7.7**
183	**12**			**7.7**						**7.7**
208	12		2.1	3.4		0.9	0.1			6.4

Notes

Emboldened observations are the critical group consumers

The critical group consumption rate of green vegetables based on the 6 highest 15 year old consumers is 15.2 kg/y

The observed 97.5 percentile rate based on 7 observations is 21.3 kg/y

10 year old age group

Observation number	Age	Broccoli	Brussel sprout	Cabbage	Calabrese	Cauliflower	Courgettes	Globe artichoke	Lettuce	Total
320	**11**			**6.6**	**4.0**	**6.1**			**0.4**	**17.0**
321	**9**			**6.6**	**4.0**	**6.1**			**0.4**	**17.0**
322	**7**			**6.6**	**4.0**	**6.1**			**0.4**	**17.0**

Notes

Emboldened observations are the critical group consumers

The critical group consumption rate of green vegetables based on the 3 highest 10 year old consumers is 17.0 kg/y

The observed 97.5 percentile rate based on 3 observations is 17.0 kg/y

Table 30. Children's consumption rates of green vegetables in the Hartlepool area (kg/y)

5 year old age group

Observation number	Age	Broccoli	Brussel sprout	Cabbage	Calabrese	Cauliflower	Courgettes	Globe artichoke	Lettuce	Total
209	**6**		**2.1**	**3.4**		**0.9**	**0.1**			**6.4**
303	**2**		**0.4**	**0.3**		**0.4**			**0.1**	**1.3**
302	**4**		**0.4**	**0.3**		**0.4**			**0.1**	**1.3**

Notes

Emboldened observations are the critical group consumers

The critical group consumption rate of green vegetables based on the 3 highest 5 year old consumers is 3.0 kg/y

The observed 97.5 percentile rate based on 3 observations is 6.2 kg/y

Table 31. Children's consumption rates of other vegetables in the Hartlepool area (kg/y)

15 year old age group

Observation number	Age	Broad bean	French bean	Pea	Pepper	Runner bean	Sweetcorn	Tomato	Total
93	**16**		**2.1**	**3.9**		**6.8**		**12.9**	**25.6**
94	**13**		**2.1**	**3.9**		**6.8**		**12.9**	**25.6**
304	**13**	**4.3**	**1.7**				**0.3**	**4.7**	**11.0**
291	**15**	**5.8**	**1.2**	**1.4**			**1.4**		**9.8**
182	14							7.7	7.7
183	12							7.7	7.7
208	12	2.6	0.8	1.0	0.1			2.4	6.9

Notes
Emboldened observations are the critical group consumers
The critical group consumption rate of other vegetables based on the
4 highest 15 year old consumers is 18.0 kg/y
The observed 97.5 percentile rate based on 7 observations is 25.6 kg/y

10 year old age group

Observation number	Age	Broad bean	French bean	Pea	Pepper	Runner bean	Sweetcorn	Tomato	Total
320	**11**			**4.9**					**4.9**
321	**9**			**4.9**					**4.9**
322	**7**			**4.9**					**4.9**

Notes
Emboldened observations are the critical group consumers
The critical group consumption rate of other vegetables based on the
3 highest 10 year old consumers is 4.9 kg/y
The observed 97.5 percentile rate based on 3 observations is 4.9 kg/y

5 year old age group

Observation number	Age	Broad bean	French bean	Pea	Pepper	Runner bean	Sweetcorn	Tomato	Total
209	**6**	**2.6**	**0.8**	**1.0**	**0.1**			**2.4**	**6.9**
302	**4**	**0.3**	**0.1**				**0.0**	**0.4**	**0.9**
303	**2**	**0.3**	**0.1**				**0.0**	**0.4**	**0.9**

Notes
Emboldened observations are the critical group consumers
The critical group consumption rate of other vegetables 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 6.6 kg/y

Table 32. Children's consumption rates of root vegetables in the Hartlepool area (kg/y)

15 year old age group

Observation number	Age	Beetroot	Carrot	Celery	Garlic	Leek	Onion	Parsnip	Shallot	Swede	Turnip	Total
291	**15**		**4.3**	**4.7**	**0.6**	**5.8**	**6.9**	**2.8**	**1.0**	**5.9**		**32.0**
304	**13**	**1.8**	**1.1**	**0.8**		**5.3**	**8.7**	**3.4**				**21.0**
93	**16**	**3.9**					**3.1**				**5.8**	**12.8**
94	**13**	**3.9**					**3.1**				**5.8**	**12.8**
208	12	0.5		0.6		1.5	4.1	1.2			1.8	9.8
182	14									5.4	2.2	7.6
183	12									5.4	2.2	7.6

Notes

Emboldened observations are the critical group consumers

The critical group consumption rate of root vegetables based on the 4 highest 15 year old consumers is 19.7 kg/y

The observed 97.5 percentile rate based on 7 observations is 30.4 kg/y

10 year old age group

Observation number	Age	Beetroot	Carrot	Celery	Garlic	Leek	Onion	Parsnip	Shallot	Swede	Turnip	Total
321	**9**	**0.8**	**2.4**		**1.4**	**2.4**	**7.8**	**1.9**		**7.3**		**24.2**
320	**11**	**0.8**	**2.4**		**1.4**	**2.4**	**7.8**	**1.9**		**7.3**		**24.2**
322	**7**	**0.8**	**2.4**		**1.4**	**2.4**	**7.8**	**1.9**		**7.3**		**24.2**

Notes

Emboldened observations are the critical group consumers

The critical group consumption rate of root vegetables based on the 3 highest 10 year old consumers is 24.2 kg/y

The observed 97.5 percentile rate based on 3 observations is 24.2 kg/y

Table 32. Children's consumption rates of root vegetables in the Hartlepool area (kg/y)

5 year old age group

Observation number	Age	Beetroot	Carrot	Celery	Garlic	Leek	Onion	Parsnip	Shallot	Swede	Turnip	Total
209	**6**						**4.1**				**1.8**	**5.9**
302	**4**	**0.1**	**0.1**	**0.1**		**0.4**	**0.7**	**0.3**				**1.7**
303	**2**	**0.1**	**0.1**	**0.1**		**0.4**	**0.7**	**0.3**				**1.7**

Notes

Emboldened observations are the critical group consumers

The critical group consumption rate of root vegetables based on the 3 highest 5 year old consumers is 3.1 kg/y

The observed 97.5 percentile rate based on 3 observations is 5.7 kg/y

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

15 year old age group

Observation number	Age	Potatoes
182	**14**	**21.8**
183	**12**	**21.8**
291	**15**	**15.7**
208	12	3.1
304	13	2.1

Notes
Emboldened observations are the critical group consumers
The critical group consumption rate of potatoes based on the
3 highest 15 year old consumers is 19.8 kg/y
The observed 97.5 percentile rate based on 5 observations is 21.8 kg/y

10 year old age group

Observation number	Age	Potatoes
320	**11**	**24.6**
321	**9**	**24.6**
322	**7**	**24.6**

Notes
Emboldened observations are the critical group consumers
The critical group consumption rate of potatoes based on the
3 highest 10 year old consumers is 24.6 kg/y
The observed 97.5 percentile rate based on 3 observations is 24.6 kg/y

5 year old age group

Observation number	Age	Potatoes
209	**6**	**3.1**
302	**4**	**0.2**
303	**2**	**0.2**

Notes
Emboldened observations are the critical group consumers
The critical group consumption rate of potatoes based on the
3 highest 5 year old consumers is 1.1 kg/y
The observed 97.5 percentile rate based on 3 observations is 2.9 kg/y

Table 34. Children's consumption rates of domestic fruit in the Hartlepool area (kg/y)

15 year old age group

Observation number	Age	Apple	Gooseberry	Rhubarb	Strawberry	Total
291	**15**		**1.3**	**0.4**		**1.7**

Notes
Emboldened observations are the critical group consumers
The critical group consumption rate of domestic fruit based on the highest 15 year old consumer is 1.7 kg/y
The observed 97.5 percentile is not applicable for 1 observation

10 year old age group

Observation number	Age	Apple	Gooseberry	Rhubarb	Strawberry	Total
320	**11**			**0.4**	**6.1**	**6.5**
321	**9**			**0.4**	**6.1**	**6.5**
322	**7**			**0.4**	**6.1**	**6.5**
499	11	0.9				0.9

Notes
Emboldened observations are the critical group consumers
The critical group consumption rate of domestic fruit based on the 3 highest 10 year old consumers is 6.5 kg/y
The observed 97.5 percentile rate based on 4 observations is 6.5 kg/y

Table 35. Children's consumption rates of sheep meat in the Hartlepool area (kg/y)

15 year old age group

Observation number	Age	Lamb meat
329	**13**	**4.8**

Notes
Emboldened observations are the critical group consumers
The critical group consumption rate of sheep meat based on the highest 15 year old consumer is 4.8 kg/y
The observed 97.5 percentile is not applicable for 1 observation

Table 36. Children's consumption rates of wild fungi in the Hartlepool area (kg/y)

10 year old age group

Observation number	Age	Mushrooms
406	**11**	**0.2**

Notes
Emboldened observations are the critical group consumers
The critical group consumption rate of wild fungi based on the highest 10 year old consumer is 0.2 kg/y
The observed 97.5 percentile is not applicable for 1 observation

Table 37. Percentage contribution each food type makes to its terrestrial food group for adults

Green vegetables	
***Cabbage**	35.7 %
Brussel sprout	24.1 %
Cauliflower	15.6 %
Broccoli	7.2 %
Cucumber	7.0 %
Lettuce	6.1 %
Calabrese	2.4 %
Other (8 varieties)	2.1 %

Other vegetables	
Tomato	49.6 %
Broad bean	16.7 %
Pea	15.1 %
Runner bean	10.7 %
French bean	6.5 %
Sweetcorn	1.0 %
Other (3 varieties)	0.4 %

Root vegetables	
***Onion**	32.5 %
Leek	13.5 %
Turnip	11.5 %
Swede	11.3 %
Beetroot	11.3 %
***Carrot**	7.7 %
***Parsnip**	6.1 %
Shallot	3.6 %
Other (7 varieties)	2.6 %

Domestic fruit	
Strawberry	39.0 %
Rhubarb	24.5 %
Gooseberry	13.7 %
Blackcurrant	9.8 %
Raspberry	4.5 %
Worcesterberry	3.9 %
Blackberry	2.0 %
***Apple**	1.6 %
Other (2 varieties)	1.0 %

Poultry	
Pheasant	25.8 %
Partridge	23.4 %
Chicken	15.1 %
Goose	14.7 %
Duck	12.0 %
Pigeon	9.4 %

Eggs	
Chicken egg	100.0 %

Wild/free foods	
Blackberry	100.0 %

Rabbits/hares	
Rabbit	100.0 %

NOTES

Food types asterisked and emboldened were monitored by FSA in 2001 (FSA and SEPA, 2002)
Other foods monitored were milk, honey, plums, potatoes and wheat
Percentages are based on the consumption of all adults in the survey consuming that particular food group

Table 38. Occupancy times in the Hartlepool direct radiation survey area for adults (h/y)

Observation number	Sex (U if unknown)	Age (in years) (U if unknown)	Distance from site perimeter fence (km)	Indoor occupancy	Outdoor occupancy	Total occupancy
0 to 0.25 km zone						
905	M	56	0.01	909	743	1652
906	F	33	0.01	1239	413	1652
657	F	48	0.05	310	930	1240
658	F	25	0.05	310	930	1240
616	M	U	0.25		1040	1040
650	M	U	0.25		1040	1040
469	M	U	0.05		585	585
659	M	52	0.05	140	420	560
907	M	38	0.01	235	235	470
660	F	30	0.05	13	38	50
661	F	86	0.05	13	38	50
0.25 to 0.5 km zone						
506-587	M	U	0.33	1987	221	2208
588-598	F	U	0.33	1987	221	2208
662	M	38	0.50		2160	2160
607-609	M	U	0.33	420	1260	1680
663	M	49	0.50		560	560
599-603	F	U	0.33	510		510
614-615	M	U	0.33	22	50	72
604	M	U	0.33	26	26	52
610-613	M	U	0.33		4	4
605-606	M	U	0.33	0.2	1.8	2
0.5 to 1.0 km zone						
617	M	31	0.70	1080	1080	2160
618	M	24	0.70	1080	1080	2160
619	M	50	0.70	1080	1080	2160
620	M	47	0.70	1080	1080	2160
621	M	27	0.70	1080	1080	2160
622	M	31	0.70	1080	1080	2160
623	M	51	0.70	1080	1080	2160
624	M	61	0.70	1080	1080	2160
625	M	23	0.70	1080	1080	2160
626	M	57	0.70	1080	1080	2160
627	M	53	0.70	1080	1080	2160
628	M	57	0.70	1080	1080	2160
629	M	47	0.70	1080	1080	2160
630	M	49	0.70	1080	1080	2160
631	M	55	0.70	1080	1080	2160
632	M	50	0.70	1080	1080	2160
633	M	47	0.70	1080	1080	2160
634	M	53	0.70	1080	1080	2160
635	M	40	0.70	1080	1080	2160
636	M	30	0.70	1080	1080	2160
637	M	55	0.70	1080	1080	2160
638	M	38	0.70	1080	1080	2160
639	M	52	0.70	1080	1080	2160
640	M	49	0.70	1080	1080	2160
641	M	18	0.70	1080	1080	2160

Table 38. Occupancy times in the Hartlepool direct radiation survey area for adults (h/y)

Observation number	Sex (U if unknown)	Age (in years) (U if unknown)	Distance from site perimeter fence (km)	Indoor occupancy	Outdoor occupancy	Total occupancy
642	M	43	0.70	1080	1080	2160
643	M	29	0.70	1080	1080	2160
644	M	32	0.70	1080	1080	2160
645	M	40	0.70	1080	1080	2160
646	M	54	0.70	1080	1080	2160
647	M	51	0.70	1080	1080	2160
648	M	52	0.70	1080	1080	2160
649	M	52	0.70	1080	1080	2160
664-689	M	U	0.90	2094	21	2115
690-693	F	U	0.90	2094	21	2115
309	M	40	1.00	1840		1840
310	M	40	1.00	1840		1840
311	M	40	1.00	1840		1840
312	F	25	1.00	1840		1840
651-653	M	U	1.00	1482	262	1744
654-656	F	U	1.00	1482	262	1744

Table 39. Analysis of occupancy times in the Hartlepool direct radiation survey area

0 to 0.25 km zone	
Number of hours per year	Number of observations
8000 to 8760	0
7000 to 8000	0
6000 to 7000	0
5000 to 6000	0
4000 to 5000	0
3000 to 4000	0
2000 to 3000	0
1000 to 2000	6
0 to 1000	5

0.25 to 0.5 km zone	
Number of hours per year	Number of observations
8000 to 8760	0
7000 to 8000	0
6000 to 7000	0
5000 to 6000	0
4000 to 5000	0
3000 to 4000	0
2000 to 3000	94
1000 to 2000	3
0 to 1000	15

0.5 to 1.0 km zone	
Number of hours per year	Number of observations
8000 to 8760	0
7000 to 8000	0
6000 to 7000	0
5000 to 6000	0
4000 to 5000	0
3000 to 4000	0
2000 to 3000	63
1000 to 2000	10
0 to 1000	0

Table 40. Gamma dose rate measurements in the Hartlepool direct radiation survey area (micro Gy/h)

Location	Distance (km)	NGR	Ground type	Gamma dose rate at 1 metre
Business 1	0.05	NZ 526 272	Grass	0.083
Business 1	0.05	NZ 526 272	Indoors	0.072
Business 2	0.33	NZ 534 272	Concrete	0.061
Business 2	0.33	NZ 534 273	Indoors	0.056
Business 3	0.50	NZ 535 273	Grass	0.059
Business 4	0.70	NZ 518 270	Soil and stones	0.083
Business 4	0.70	NZ 518 270	Indoors	0.062
Business 5	0.90	NZ 517 271	Tarmac	0.067
Business 5	0.90	NZ 517 271	Indoors	0.086
Business 6	0.90	NZ 518 274	Grass	0.107
Business 7	1.00	NZ 518 266	Grass	0.069
Business 7	1.00	NZ 517 266	Indoors	0.069
Business 8	1.00	NZ 519 278	Indoors	0.085
Background 1 (Seaton Carew Golf Course)	2.20	NZ 527 294	Grass	0.069
Background 2 (South Hartlepool, nr A178)	4.20	NZ 219 311	Grass	0.073

Table 41. Gamma dose rate measurements around the Hartlepool site perimeter fence (micro Gy/h)

Location	NGR	Substrate	Gamma dose rate at 1 metre
South eastern corner	NZ 532 267	Grass	0.080
Approx 300 m south of north eastern corner	NZ 532 268	Grass	0.078
Approx 200 m south of north eastern corner	NZ 532 269	Grass	0.068
Approx 100 m south of north eastern corner	NZ 531 270	Grass	0.070
North eastern corner	NZ 531 271	Grass	0.074
Approx 50 m west of north eastern corner	NZ 530 271	Grass and stones	0.074
Approx 100 m west of north eastern corner (where discharge pipe crosses perimeter fence)	NZ 530 271	Grass and stones	0.077
Approx 150 m west of north eastern corner	NZ 529 271	Grass and stones	0.070
Approx 5 m east of main entrance	NZ 529 271	Grass	0.062
Approx 150 m north of south western corner	NZ 527 268	Grass and stones	0.089
South western corner	NZ 528 267	Stones	0.096

Table 42. Examples of food group combinations eaten and external exposure by adults for consideration for dose assessment purposes

Combination number	Fish	Crustaceans	Molluscs	Marine plants and algae	Wildfowl	Green vegetables	Other vegetables	Root vegetables	Potatoes	Domestic fruit	Sheep meat	Poultry	Eggs	Wild/free foods	Rabbits/hares	Honey	Wild fungi	Intertidal occupancy over sand	Intertidal occupancy over mud	Intertidal occupancy over rock	Intertidal occupancy over sand and mud	Intertidal occupancy over coal and sand	Handling fishing gear	Handling sediment	Occupancy in water	Occupancy on water	Indoors occupancy	Outdoors occupancy
1	*	*				*	*	*	*	*										*			*					
2																		*				*		*				
3					*							*			*													
4	*				*							*					*											
5	*	*	*															*			*			*				
6	*	*	*																		*		*	*		*		
7		*				*	*	*		*			*															
8	*		*															*		*				*				
9	*	*				*	*	*	*				*	*			*											
10						*	*	*	*	*			*	*															
11	*	*	*															*					*	*		*		
12	*					*	*	*	*	*								*										
13		*	*																	*	*			*				
14																											*	*
15											*	*	*															
16	*	*	*															*	*					*				
17		*																*	*		*			*				
18	*	*				*	*	*	*	*				*														
19	*	*															*		*		*			*		*		
20		*	*	*																		*		*				
21	*	*				*	*	*		*				*			*											
22			*														*		*		*			*				*
23						*	*	*	*	*			*				*											
24																		*						*				*
25	*	*																							*	*		
26		*	*																	*			*					
27	*	*	*											*			*	*					*		*			
28	*	*																*		*	*		*	*				
29	*		*																	*				*		*		
30	*																	*		*			*	*		*		
31	*	*	*			*	*	*	*									*						*		*		
32		*																	*					*	*			
33																*												

Annex 1. Adult's consumption rates (kg/y or l/y) and occupancy times (h/y) in the Hartlepool area

Observation number	Sex (U if unknown)	Age in years (U if unknown)	Distance from Hartlepool Power Station (km) (U if unknown)	Fish	Crustaceans	Molluscs	Marine plants and algae	Wildfowl	Green vegetables	Other vegetables	Root vegetables	Potatoes	Domestic fruit	Sheep meat	Poultry	Eggs	Wild/free foods	Rabbits/hares	Honey	Wild fungi	Intertidal occupancy over sand	Intertidal occupancy over mud	Intertidal occupancy over rock	Intertidal occupancy over sand and mud	Intertidal occupancy over coal and sand	Handling fishing gear	Handling sediment	Occupancy in water	Occupancy on water	Indoors occupancy	Outdoors occupancy
1	F	50	2.8						4.6	8.5	12.1	10.9																			
2	M	50	2.8						4.6	8.5	12.1	10.9																			
3	M	30	U						4.6	8.5	12.1	10.9																			
4	M	32	U						4.6	8.5	12.1	10.9																			
5	F	33	U						4.6	8.5	12.1	10.9																			
6	F	29	U						4.6	8.5	12.1	10.9																			
7	M	62	2.8						**29.7**	**59.5**	**39.9**	**41.0**	**11.1**																		
8	M	78	80.0																		104				**26**		26				
9	F	78	80.0																		104										
10	M	48	U																		12				6		6				
11	F	48	U																		12				6		6				
12	M	50	10+																						8		8				
13	M	40	10+																						8		8				
14	M	66	10+																						8		8				
15	M	35	3.0																		78										
20	M	48	8.0					**13.4**							**15.6**			**1.4**													
21	M	73	10+	0.4				**9.2**							1.8					0.1											
22	F	70	10+	0.4				2.3							0.7					0.1											
23	M	51	12.0			0.3															18			8			8				
24	F	52	12.0																		18										
25	M	74	8.0	7.2	1.1	1.0															78			4			4				
26	F	65	8.0	7.2																	78										
27	M	U	10+	**22.8**																									153		
28	M	U	10+	**22.8**																									153		
29	M	U	10+	**22.8**																									153		
30	F	U	10+	**22.8**																											
31	F	U	10+	**22.8**																											
32	F	U	10+	**22.8**																											
33-38	U	U	10+	**22.8**																											

Annex 1. Adult's consumption rates (kg/y or l/y) and occupancy times (h/y) in the Hartlepool area

Observation number	Sex (U if unknown)	Age in years (U if unknown)	Distance from Hartlepool Power Station (km) (U if unknown)	Fish	Crustaceans	Molluscs	Marine plants and algae	Wildfowl	Green vegetables	Other vegetables	Root vegetables	Potatoes	Domestic fruit	Sheep meat	Poultry	Eggs	Wild/free foods	Rabbits/hares	Honey	Wild fungi	Intertidal occupancy over sand	Intertidal occupancy over mud	Intertidal occupancy over rock	Intertidal occupancy over sand and mud	Intertidal occupancy over coal and sand	Handling fishing gear	Handling sediment	Occupancy in water	Occupancy on water	Indoors occupancy	Outdoors occupancy
39	M	55	U						8.3	0.5	17.7	3.6	2.5																		
40	F	53	U						8.3	0.5	17.7	3.6	2.5																		
41	M	50	U						**24.9**	1.6	**53.2**	10.9	**7.6**																		
42	F	51	U						**24.9**	1.6	**53.2**	10.9	**7.6**																		
43	M	U	10+																							**600**			750		
44	M	57	10+	6.0	0.8	1.0																		3		**600**	3		750		
45	U	60	10+	6.0	0.8	1.0																									
46	M	57	10+		**10.9**																										
47	M	42	U	18.7																											
48	M	50	U						16.5	12.6	22.2	14.4	4.6																		
49	M	63	U	7.0																	52										
50	F	48	U						16.5	12.6	22.2	14.4	4.6																		
51	F	22	U						16.5	12.6	22.2	14.4	4.6																		
52	M	49	U						16.5	12.6	22.2	14.4	4.6																		
53	F	47	U						16.5	12.6	22.2	14.4	4.6																		
54	F	59	U	7.0																	52										
55	M	29	U	**41.5**																	160			4			4				
56	M	65	U	2.3	1.9				17.6	7.8	**35.3**	10.9	2.6										**240**			240					
57	M	57	U	**20.9**																	52										
58	F	60	U	2.3	1.9				17.6	7.8	**35.3**	10.9	2.6																		
59	M	26	U						17.6	7.8	**35.3**	10.9	2.6																		
60	M	61	U						17.6	7.8	**35.3**	10.9	2.6																		
61	F	59	U						17.6	7.8	**35.3**	10.9	2.6																		
62	M	30	U						17.6	7.8	**35.3**	10.9	2.6																		
63	M	52	U		2.3				10.4	12.4	19.2		3.6			2.5															
64	M	42	U	1.2	0.8	0.4																		6			6				
65	F	51	U						10.4	12.4	19.2		3.6			2.5															
66	F	40	U	1.2	0.7	0.4																									
67	F	26	U						9.3	12.4	19.2		3.6			2.5															

Annex 1. Adult's consumption rates (kg/y or l/y) and occupancy times (h/y) in the Hartlepool area

Observation number	Sex (U if unknown)	Age in years (U if unknown)	Distance from Hartlepool Power Station (km) (U if unknown)	Fish	Crustaceans	Molluscs	Marine plants and algae	Wildfowl	Green vegetables	Other vegetables	Root vegetables	Potatoes	Domestic fruit	Sheep meat	Poultry	Eggs	Wild/free foods	Rabbits/hares	Honey	Wild fungi	Intertidal occupancy over sand	Intertidal occupancy over mud	Intertidal occupancy over rock	Intertidal occupancy over sand and mud	Intertidal occupancy over coal and sand	Handling fishing gear	Handling sediment	Occupancy in water	Occupancy on water	Indoors occupancy	Outdoors occupancy
68	M	25	U						9.3	12.4	19.2		3.6			2.5															
69	M	27	U						9.3	12.4	19.2		3.6			2.5															
70	M	22	U		0.8	0.4																									
71	F	18	U		0.8																										
72	M	51	10.0																		91		91								
74	M	33	40.0																										120		
75	M	39	10+																										50		
76	M	U	U						7.1	6.6	5.6	15.9					0.5														
77	M	34	10+																										100		
78	M	31	10+																										100		
79	M	25	10+																										100		
80	M	42	U						10.1	9.2	5.6	4.6				0.4															
81	M	41	U						**33.6**	**30.7**	18.8	15.2				1.5															
82	F	37	U						**33.6**	**30.7**	18.8	15.2				1.5															
83	M	40	U						**33.6**	**30.7**	18.8	15.2				1.5															
84	M	57	U						**33.0**	**56.8**	**65.6**	**31.9**																			
85	F	57	U						**33.0**	**56.8**	**65.6**	**31.9**																			
86	M	31	U		3.0																								120		
87	F	21	U						**33.0**	**56.8**	**65.6**	**31.9**																			
88	M	64	U						**21.3**	**25.6**	12.8																				
89	F	62	U						**21.3**	**25.6**	12.8																				
90	M	38	U						**21.3**	**25.6**	12.8																				
91	F	40	U						**21.3**	**25.6**	12.8																				
92	F	33	U						**21.3**	**25.6**	12.8																				
95	F	U	U		3.0																										
101	M	71	U						14.8	14.6	8.9	10.0																			
102	M	28	7.0																										120		
103	M	26	7.0																										120		
104	M	18	6.0																										120		

Annex 1. Adult's consumption rates (kg/y or l/y) and occupancy times (h/y) in the Hartlepool area

Observation number	Sex (U if unknown)	Age in years (U if unknown)	Distance from Hartlepool Power Station (km) (U if unknown)	Fish	Crustaceans	Molluscs	Marine plants and algae	Wildfowl	Green vegetables	Other vegetables	Root vegetables	Potatoes	Domestic fruit	Sheep meat	Poultry	Eggs	Wild/free foods	Rabbits/hares	Honey	Wild fungi	Intertidal occupancy over sand	Intertidal occupancy over mud	Intertidal occupancy over rock	Intertidal occupancy over sand and mud	Intertidal occupancy over coal and sand	Handling fishing gear	Handling sediment	Occupancy in water	Occupancy on water	Indoors occupancy	Outdoors occupancy
105	F	62	U						14.8	14.6	8.9	10.0																			
106	M	44	77.0	**28.3**	**22.0**																					**776**			500		
107	F	44	7.0	**28.3**	**22.0**																										
108	M	17	7.0	**28.3**	**22.0**																					**776**			500		
110	F	24	7.0	**28.3**	**22.0**																										
111	F	19	7.0	**28.3**	**22.0**																										
113	M	U	3.0		**21.2**																					455			925		
114	M	U	U																							455			925		
115	M	U	U																							455			925		
116	M	54	7.0	**23.6**	**10.6**	0.4															4					35	4		832		
117	F	46	7.0	14.2	5.7																										
119	M	U	U	**50.3**	**13.9**																					400			500		
120	F	U	U	9.4	**13.9**																										
121	M	U	U	**56.3**																									160		
122	M	56	7.0	8.4																						**1102**			1400		
123-129	U	U	U						7.1	6.6	5.6	15.9					0.5														
130	M	46	7.0																							250			1400		
131	U	U	U						7.7	7.7	7.6	21.8																			
132	M	29	7.0	12.3	**14.5**																										
133	M	26	7.0	12.3	**14.5**																										
134	M	U	U	0.9	**10.0**	1.7																		18		500	18		750		
135	F	U	U	0.9	**9.2**	1.7																									
137	M	62	7.0		0.8																										
138	M	64	7.0																				6			6					
139	F	64	7.0	16.5	6.5																										
140	F	38	7.0		6.5																										
141	M	50	9.0	11.8																				16			16		104		
142	F	43	9.0	11.8	0.3																										
143	M	19	9.0	11.8																											

Annex 1. Adult's consumption rates (kg/y or l/y) and occupancy times (h/y) in the Hartlepool area

Observation number	Sex (U if unknown)	Age in years (U if unknown)	Distance from Hartlepool Power Station (km) (U if unknown)	Fish	Crustaceans	Molluscs	Marine plants and algae	Wildfowl	Green vegetables	Other vegetables	Root vegetables	Potatoes	Domestic fruit	Sheep meat	Poultry	Eggs	Wild/free foods	Rabbits/hares	Honey	Wild fungi	Intertidal occupancy over sand	Intertidal occupancy over mud	Intertidal occupancy over rock	Intertidal occupancy over sand and mud	Intertidal occupancy over coal and sand	Handling fishing gear	Handling sediment	Occupancy in water	Occupancy on water	Indoors occupancy	Outdoors occupancy
146	M	52	9.0	**23.6**	0.1																104			104			104				
147	F	47	9.0	**23.6**	0.1																										
148	F	20	9.0	**23.6**	0.1																										
149	M	18	9.0	**23.6**	0.1																										
151	M	29	U																		65			40			40				
153	M	58	7.0	**35.4**		0.1																		5			5				
154	M	37	7.0			0.1																									
155	M	33	7.0			0.1																									
160	M	50	U	2.0	2.2																					500			805		
161	M	64	U						9.5	0.5	17.2	1.8	0.5			1.4															
162	M	92	U						9.5	0.5	17.2	1.8	0.5			1.4															
163	M	56	U						9.5	0.5	17.2	1.8	0.5			1.4															
164	M	58	U						9.5	0.5	17.2	1.8	0.5																		
165	M	83	U						9.5	0.5	17.2	1.8	0.5																		
166	M	55	U						8.9	8.6	14.4	13.7	1.2																		
167	F	50	U						8.9	8.6	14.4	13.7	1.2																		
168	M	20	U						8.9	8.6	14.4	13.7	1.2																		
169	F	22	U						8.9	8.6	14.4	13.7	1.2																		
170	M	45	U						8.9	8.6	14.4	13.7	1.2																		
171	F	45	U						8.9	8.6	14.4	13.7	1.2																		
172	M	75	U						8.9	8.6	14.4	13.7	1.2																		
173	F	70	U	**35.2**					8.9	8.6	14.4	13.7	1.2								468										
174	M	63	U						**48.3**	**51.7**	**66.5**	**46.4**	**20.2**																		
175	M	65	U						**48.3**	**51.7**	**66.5**	**46.4**	**20.2**																		
176	M	62	U						**48.3**	**51.7**	**66.5**	**46.4**	**20.2**																		
177	M	58	U						**48.3**	**51.7**	**66.5**	**46.4**	**20.2**																		
178	F	60	U						**48.3**	**51.7**	**66.5**	**46.4**	**20.2**																		
179	U	U	U						7.7	7.7	7.6	21.8																			
180	U	U	U						7.7	7.7	7.6	21.8																			

Annex 1. Adult's consumption rates (kg/y or l/y) and occupancy times (h/y) in the Hartlepool area

Observation number	Sex (U if unknown)	Age in years (U if unknown)	Distance from Hartlepool Power Station (km) (U if unknown)	Fish	Crustaceans	Molluscs	Marine plants and algae	Wildfowl	Green vegetables	Other vegetables	Root vegetables	Potatoes	Domestic fruit	Sheep meat	Poultry	Eggs	Wild/free foods	Rabbits/hares	Honey	Wild fungi	Intertidal occupancy over sand	Intertidal occupancy over mud	Intertidal occupancy over rock	Intertidal occupancy over sand and mud	Intertidal occupancy over coal and sand	Handling fishing gear	Handling sediment	Occupancy in water	Occupancy on water	Indoors occupancy	Outdoors occupancy
181	U	U	U						7.7	7.7	7.6	21.8																			
184	U	U	U						12.1		**38.0**		2.3																		
185	F	U	U						12.1		**38.0**		2.3																		
186	M	U	U						19.0	16.8	**32.5**	21.8				**8.9**															
187	F	U	U						19.0	16.8	**32.5**	21.8				**8.9**															
188	U	U	U						19.0	16.8	**32.5**	21.8																			
189	U	U	U						19.4	9.5	28.6		3.4																		
190	U	U	U						19.4	9.5	28.6		3.4																		
191	U	U	U						19.4	9.5	28.6		3.4																		
192	U	U	U						19.4	9.5	28.6		3.4																		
193	U	U	U						17.8	20.9	**30.8**	**29.1**				**8.9**															
194	U	U	U						17.8	20.9	**30.8**	**29.1**				**8.9**															
195	U	U	U	17.7	2.5				18.9	**24.5**	25.4					5.9															
196	U	U	U	17.7	2.5				18.9	**24.5**	25.4					5.9															
197	U	U	U													5.9															
198	U	U	U													5.9															
199	U	U	U													5.9															
200-207	U	U	U						10.0	13.7	19.4	6.1																			
210	M	65	U						**40.4**		**56.3**		4.6																		
211	F	62	U						**40.4**		**56.3**		4.6																		
212	F	72	U						9.0	16.9	11.5	2.2																			
213	F	45	U						9.0	16.9	11.5	2.2																			
214	F	40	U						9.0	16.9	11.5	2.2																			
215	F	44	U						9.0	16.9	11.5	2.2																			
216	F	52	U						9.0	16.9	11.5	2.2																			
217	M	90	U								10.8																				
218	M	52	U		0.6				8.4		6.2	2.7	1.5																		
219	F	50	U		0.6				8.4		6.2	2.7	1.5																		
220	M	50	U						8.4		6.2	2.7	1.5																		

Annex 1. Adult's consumption rates (kg/y or l/y) and occupancy times (h/y) in the Hartlepool area

Observation number	Sex (U if unknown)	Age in years (U if unknown)	Distance from Hartlepool Power Station (km) (U if unknown)	Fish	Crustaceans	Molluscs	Marine plants and algae	Wildfowl	Green vegetables	Other vegetables	Root vegetables	Potatoes	Domestic fruit	Sheep meat	Poultry	Eggs	Wild/free foods	Rabbits/hares	Honey	Wild fungi	Intertidal occupancy over sand	Intertidal occupancy over mud	Intertidal occupancy over rock	Intertidal occupancy over sand and mud	Intertidal occupancy over coal and sand	Handling fishing gear	Handling sediment	Occupancy in water	Occupancy on water	Indoors occupancy	Outdoors occupancy
221	F	50	U						8.4		6.2	2.7	1.5																		
222	M	50	U						8.4		6.2	2.7	1.5																		
223	F	50	U						8.4		6.2	2.7	1.5																		
224	M	50	U						8.4		6.2	2.7	1.5																		
225	F	50	U						8.4		6.2	2.7	1.5																		
226	M	50	U						8.4		6.2	2.7	1.5																		
227	F	50	U						8.4		6.2	2.7	1.5																		
228	M	67	U		2.3	1.3																	4				4				
229	M	28	U		2.3	1.3																									
230	M	69	U						**38.6**	**32.2**	**60.4**	**26.2**	4.5																		
231	F	69	U						**38.6**	**32.2**	**60.4**	**26.2**	4.5																		
232	M	72	U						**30.0**	19.9	**43.1**	13.1																			
233	F	74	U						**30.0**	19.9	**43.1**	13.1																			
234	M	48	U						**30.0**	19.9	**43.1**	13.1																			
235	M	67	U						8.5	**26.2**	**35.9**	18.2																			
236	F	78	U						8.5	**26.2**	**35.9**	18.2																			
237	M	75	U						8.5	**26.2**	**35.9**	18.2																			
238-247	M	U	U						10.2	7.5	15.9	1.4				**14.0**															
248-257	F	U	U						10.2	7.5	15.9	1.4				**14.0**															
258	F	40	U	2.0	2.2																										
259	M	56	U																							500			805		
260	M	60	U		1.1																										
261	F	51	U		1.1																										
262	M	61	U	8.2	2.1																			16		**1100**	16		1065		
263	M	U	U	2.7	0.9				**27.3**	8.0	**40.1**	**68.3**				**20.8**	**6.8**			0.6											
264	F	60	U		2.1																										
265	M	86	U	4.1	2.1																					**740**			1065		
266	M	U	U																		48										
267	M	U	U																		48										

Annex 1. Adult's consumption rates (kg/y or l/y) and occupancy times (h/y) in the Hartlepool area

Observation number	Sex (U if unknown)	Age in years (U if unknown)	Distance from Hartlepool Power Station (km) (U if unknown)	Fish	Crustaceans	Molluscs	Marine plants and algae	Wildfowl	Green vegetables	Other vegetables	Root vegetables	Potatoes	Domestic fruit	Sheep meat	Poultry	Eggs	Wild/free foods	Rabbits/hares	Honey	Wild fungi	Intertidal occupancy over sand	Intertidal occupancy over mud	Intertidal occupancy over rock	Intertidal occupancy over sand and mud	Intertidal occupancy over coal and sand	Handling fishing gear	Handling sediment	Occupancy in water	Occupancy on water	Indoors occupancy	Outdoors occupancy
268	U	U	U	2.7	0.9				**27.3**	8.0	**40.1**	**68.3**				**20.8**	**6.8**			0.6											
269	U	U	U						11.8	15.4	6.3		1.0																		
270	M	U	25.0																					38			38				
271	U	U	U						11.8	15.4	6.3		1.0																		
272-279	U	U	U						11.8	15.4	6.3		0.5																		
280	U	U	U						**34.1**	6.0	23.0																				
281	U	U	U						**34.1**	6.0	23.0																				
282	U	U	U						**34.1**	6.0	23.0																				
283	M	76	U	1.1	4.0				**48.7**	**28.4**	**73.0**	17.1	2.8																		
284	M	U	25.0																					38			38				
285	M	U	25.0																					38			38				
286	F	78	U	1.1					**48.7**	**28.4**	**73.0**	17.1	2.8																		
287	M	63	U		0.8				**59.0**	**66.6**	**89.9**		4.2																		
288	F	57	U		0.8				**59.0**	**66.6**	**89.9**		4.2																		
289	M	42	U						17.8	9.8	**32.0**	15.7	1.7																		
290	F	41	U						17.8	9.8	**32.0**	15.7	1.7																		
292	M	68	U						17.8	9.8	**32.0**	15.7	1.7																		
293	F	65	U						17.8	9.8	**32.0**	15.7	1.7																		
294	M	54	U						**20.5**	14.7	28.0	2.8																			
295	F	52	U						**20.5**	14.7	28.0	2.8																			
296	M	40	U						15.7	11.0	21.0	2.1																			
297	M	40	U						15.7	11.0	21.0	2.1																			
298	M	40	U						15.7	11.0	21.0	2.1																			
299	F	40	U						15.7	11.0	21.0	2.1																			
300	F	40	U						15.7	11.0	21.0	2.1																			
301	F	40	U						15.7	11.0	21.0	2.1																			
305	M	69	U						0.7	0.7	2.8	1.7																			
306	F	65	U						0.7	0.7	2.8	1.7																			
307	M	44	U						1.4	1.4	5.6	3.4																			

Annex 1. Adult's consumption rates (kg/y or l/y) and occupancy times (h/y) in the Hartlepool area

Observation number	Sex (U if unknown)	Age in years (U if unknown)	Distance from Hartlepool Power Station (km) (U if unknown)	Fish	Crustaceans	Molluscs	Marine plants and algae	Wildfowl	Green vegetables	Other vegetables	Root vegetables	Potatoes	Domestic fruit	Sheep meat	Poultry	Eggs	Wild/free foods	Rabbits/hares	Honey	Wild fungi	Intertidal occupancy over sand	Intertidal occupancy over mud	Intertidal occupancy over rock	Intertidal occupancy over sand and mud	Intertidal occupancy over coal and sand	Handling fishing gear	Handling sediment	Occupancy in water	Occupancy on water	Indoors occupancy	Outdoors occupancy
308	F	40	U						1.4	1.4	5.6	3.4																			
309	M	40	U																											1840	
310	M	40	U																											1840	
311	M	40	U																											1840	
312	F	25	U																											1840	
314	M	53	U						**23.1**	16.1	27.1	18.3	1.2																		
315	F	53	U						**23.1**	16.1	27.1	18.3	1.2																		
316	M	79	U						4.6	3.2	5.4	3.7	0.2																		
317	F	78	U						4.6	3.2	5.4	3.7	0.2																		
318	M	41	U						17.0	21.1	24.2	24.6	6.5																		
319	F	38	U						17.0	21.1	24.2	24.6	6.5																		
323	M	57	3.9											**4.8**	**6.3**	**17.8**															
324	F	56	3.9											**4.8**	**6.3**	**17.8**															
325	M	45	U											**4.8**																	
326	M	45	U											**4.8**																	
327	F	45	U											**4.8**																	
328	F	45	U											**4.8**																	
330	M	76	U						**32.0**	13.4	**34.6**	**33.4**	6.1																		
331	F	66	U						**32.0**	13.4	**34.6**	**33.4**	6.1																		
332	M	50	U						**32.0**	13.4	**34.6**	**33.4**	6.1																		
333	F	40	U						**32.0**	13.4	**34.6**	**33.4**	6.1																		
334	F	40	U						**32.0**	13.4	**34.6**	**33.4**	6.1																		
335	F	70	U						**32.0**	13.4	**34.6**	**33.4**	6.1																		
336	M	U	U																					145			145				
337	M	27	U	15.0		5.3															6	18					24				
338	M	U	U			5.3																									
339	F	U	U			5.3																									
340	F	U	U			5.3																									
343	M	54	U		0.3																104	130		8			138				

Annex 1. Adult's consumption rates (kg/y or l/y) and occupancy times (h/y) in the Hartlepool area

Observation number	Sex (U if unknown)	Age in years (U if unknown)	Distance from Hartlepool Power Station (km) (U if unknown)	Fish	Crustaceans	Molluscs	Marine plants and algae	Wildfowl	Green vegetables	Other vegetables	Root vegetables	Potatoes	Domestic fruit	Sheep meat	Poultry	Eggs	Wild/free foods	Rabbits/hares	Honey	Wild fungi	Intertidal occupancy over sand	Intertidal occupancy over mud	Intertidal occupancy over rock	Intertidal occupancy over sand and mud	Intertidal occupancy over coal and sand	Handling fishing gear	Handling sediment	Occupancy in water	Occupancy on water	Indoors occupancy	Outdoors occupancy
344	F	54	U		0.3	2.1																									
345	M	46	U	17.7		0.1															208	150					150				
346	F	46	U	11.8																											
347	F	20	U	11.8																											
349	M	U	U			3.5																									
350	M	U	U			3.5																									
351	M	U	U			3.5																									
352	M	U	U			3.5																									
353	M	23	10+		1.1	3.8																	12	6			6				
354	M	55	10+		1.1	3.8																									
355	M	58	U	**34.7**	**19.1**																										
357	M	U	U	9.1	4.2																					416					
358	F	40	U	10.0	4.2																										
359	U	U	U						**42.1**	**27.2**	**46.7**	**73.9**	2.2																		
360	U	U	U						**42.1**	**27.2**	**46.7**	**73.9**	2.2																		
361	U	U	U						**42.1**	**27.2**	**46.7**	**73.9**	1.0																		
362	U	U	U						**42.1**	**27.2**	**46.7**	**73.9**	1.0																		
363	U	U	U						7.5	9.1	**42.3**	22.8	2.3																		
364	U	U	U						7.5	9.1	**42.3**	22.8	2.3																		
365	U	U	4.8	5.4					**30.0**		5.6																				
366	U	U	4.8	5.4					**30.0**		5.6																				
367	U	U	U						13.2	**54.0**	**33.8**	**27.3**	0.5			5.9															
368	U	U	U						13.2	**54.0**	**33.8**	**27.3**	0.5			5.9															
369-378	U	U	U						18.8	15.3	23.2	21.8	2.6																		
379-386	U	U	U	**23.6**	2.3				**24.4**	21.0	**32.0**	13.7	**7.9**																		
388	U	U	U						8.8	**23.3**	**30.0**	9.1	2.0			**8.9**	0.9														
389	U	U	U						8.8	**23.3**	**30.0**	9.1	2.0			**8.9**	0.9														
390	U	U	U						8.8	**23.3**	**30.0**	9.1	2.0																		
391	M	U	U																		90	17		60			77				

Annex 1. Adult's consumption rates (kg/y or l/y) and occupancy times (h/y) in the Hartlepool area

Observation number	Sex (U if unknown)	Age in years (U if unknown)	Distance from Hartlepool Power Station (km) (U if unknown)	Fish	Crustaceans	Molluscs	Marine plants and algae	Wildfowl	Green vegetables	Other vegetables	Root vegetables	Potatoes	Domestic fruit	Sheep meat	Poultry	Eggs	Wild/free foods	Rabbits/hares	Honey	Wild fungi	Intertidal occupancy over sand	Intertidal occupancy over mud	Intertidal occupancy over rock	Intertidal occupancy over sand and mud	Intertidal occupancy over coal and sand	Handling fishing gear	Handling sediment	Occupancy in water	Occupancy on water	Indoors occupancy	Outdoors occupancy
392	U	U	U						8.8	**23.3**	**30.0**	9.1	2.0																		
393	U	U	U	2.7	4.5				**29.4**	20.9	17.9	24.3	0.3				**3.0**														
394	M	53	15.0	5.9	4.2																								96		
395	F	52	15.0	5.9	4.2																										
396	M	37	U	**47.2**	**27.3**																					**975**			1350		
397	U	U	U	2.7	4.5				**29.4**	20.9	17.9	24.3	0.3				**3.0**														
398	U	U	U	2.7	4.5				**29.4**	20.9	17.9	24.3	0.3				**3.0**														
399	F	U	U	**47.2**	**27.3**																										
400	U	U	U						**35.6**	**28.8**	**52.0**	2.0	1.1				0.9														
402	M	45	7.0	**46.3**	3.1															0.4		8		40			48		312		
403	U	U	U						**35.6**	**28.8**	**52.0**	2.0	1.1				0.9														
404	M	38	U		1.6	**15.1**	**0.2**																		**125**		125				
405	F	U	7.0	**23.1**																0.4											
407	M	47	7.0	**40.8**																		8		40			48		312		
408	M	54	25.0																							210			415		
409	M	56	U		5.8																					210			415		
416	M	33	U		6.8																					250			1374		
417	F	35	U		6.8																										
420	M	36	U		1.0																								1374		
421	F	U	U		0.7																										
422	M	U	U		0.7																										
423	F	U	U		0.7																										
424	F	18	U		0.7																										
425	M	17	U		0.7																										
429	M	35	U		0.2																								1374		
430	M	U	U	**29.0**																									84		
431	M	U	U	1.3																											
432	M	U	U	1.3																											
433	M	U	U	1.3																											

Annex 1. Adult's consumption rates (kg/y or l/y) and occupancy times (h/y) in the Hartlepool area

Observation number	Sex (U if unknown)	Age in years (U if unknown)	Distance from Hartlepool Power Station (km) (U if unknown)	Fish	Crustaceans	Molluscs	Marine plants and algae	Wildfowl	Green vegetables	Other vegetables	Root vegetables	Potatoes	Domestic fruit	Sheep meat	Poultry	Eggs	Wild/free foods	Rabbits/hares	Honey	Wild fungi	Intertidal occupancy over sand	Intertidal occupancy over mud	Intertidal occupancy over rock	Intertidal occupancy over sand and mud	Intertidal occupancy over coal and sand	Handling fishing gear	Handling sediment	Occupancy in water	Occupancy on water	Indoors occupancy	Outdoors occupancy
434	F	U	U	1.3																											
435	F	U	U	1.3																											
436	F	U	U	1.3																											
447	U	U	U	**47.2**	1.1				5.8	11.0	10.4		3.7				0.5			0.5											
448	M	U	U	1.3																											
449	F	U	U	1.3																											
450-462	U	U	U	**47.2**	1.1				5.8	11.0	10.4		3.7				0.5			0.5											
463-468	U	U	U						5.8	11.0	10.4		3.7				0.5			0.5											
469	U	U	U			**11.5**														**5.8**		**561**		117			**678**				585
470	U	U	U			**11.5**														**5.8**											
471	U	U	U			**11.5**														**5.8**											
472	U	U	U			**11.5**														**5.8**											
473	U	U	U			**11.5**														**5.8**											
474	U	U	U						19.3	16.4	11.2	**27.3**	3.8			**17.8**															
475	U	U	U						19.3	16.4	11.2	**27.3**	3.8			**17.8**															
476-485	U	U	U						19.3	16.4	11.2	**27.3**	2.7																		
486	U	U	U						**24.0**	7.6	29.5	**26.5**	2.1			**20.8**				**2.3**											
487	U	U	U						**24.0**	7.6	29.5	**26.5**	2.1			**20.8**				**2.3**											
488-496	U	U	U						7.6	7.6	14.2	**26.5**	2.1																		
497	M	50	4.8										0.9																		
498	F	50	4.8										0.9																		
501	M	U	U	**49.5**																									160		
502	F	U	U	6.2																											
506-587	M	U	U																											1987	221
588-598	F	U	U																											1987	221
599-603	F	U	U																											510	
604	M	U	U																											26	26
605	M	U	U																											0	2
606	M	U	U																											0	2

Annex 1. Adult's consumption rates (kg/y or l/y) and occupancy times (h/y) in the Hartlepool area

Observation number	Sex (U if unknown)	Age in years (U if unknown)	Distance from Hartlepool Power Station (km) (U if unknown)	Fish	Crustaceans	Molluscs	Marine plants and algae	Wildfowl	Green vegetables	Other vegetables	Root vegetables	Potatoes	Domestic fruit	Sheep meat	Poultry	Eggs	Wild/free foods	Rabbits/hares	Honey	Wild fungi	Intertidal occupancy over sand	Intertidal occupancy over mud	Intertidal occupancy over rock	Intertidal occupancy over sand and mud	Intertidal occupancy over coal and sand	Handling fishing gear	Handling sediment	Occupancy in water	Occupancy on water	Indoors occupancy	Outdoors occupancy
607	M	U	U																											420	1260
608	M	U	U																											420	1260
609	M	U	U																											420	1260
610-613	M	U	U																												4
614	M	U	U																											22	50
615	M	U	U																											22	50
616	M	U	U																												1040
617	M	31	U																											1080	1080
618	M	24	U																											1080	1080
619	M	50	U																											1080	1080
620	M	47	U																											1080	1080
621	M	27	U																											1080	1080
622	M	31	U																											1080	1080
623	M	51	U																											1080	1080
624	M	61	U																											1080	1080
625	M	23	U																											1080	1080
626	M	57	U																											1080	1080
627	M	53	U																											1080	1080
628	M	57	U																											1080	1080
629	M	47	U																											1080	1080
630	M	49	U																											1080	1080
631	M	55	U																											1080	1080
632	M	50	U																											1080	1080
633	M	47	U																											1080	1080
634	M	53	U																											1080	1080
635	M	40	U																											1080	1080
636	M	30	U																											1080	1080
637	M	55	U																											1080	1080
638	M	38	U																											1080	1080

Annex 1. Adult's consumption rates (kg/y or l/y) and occupancy times (h/y) in the Hartlepool area

Observation number	Sex (U if unknown)	Age in years (U if unknown)	Distance from Hartlepool Power Station (km) (U if unknown)	Fish	Crustaceans	Molluscs	Marine plants and algae	Wildfowl	Green vegetables	Other vegetables	Root vegetables	Potatoes	Domestic fruit	Sheep meat	Poultry	Eggs	Wild/free foods	Rabbits/hares	Honey	Wild fungi	Intertidal occupancy over sand	Intertidal occupancy over mud	Intertidal occupancy over rock	Intertidal occupancy over sand and mud	Intertidal occupancy over coal and sand	Handling fishing gear	Handling sediment	Occupancy in water	Occupancy on water	Indoors occupancy	Outdoors occupancy
639	M	52	U																											1080	1080
640	M	49	U																											1080	1080
641	M	18	U																											1080	1080
642	M	43	U																											1080	1080
643	M	29	U																											1080	1080
644	M	32	U																											1080	1080
645	M	40	U																											1080	1080
646	M	54	U																											1080	1080
647	M	51	U																											1080	1080
648	M	52	U																											1080	1080
649	M	52	U																											1080	1080
650	M	U	U																												1040
651	M	U	U																											1482	262
652	M	U	U																											1482	262
653	M	U	U																											1482	262
654	F	U	U																											1482	262
655	F	U	U																											1482	262
656	F	U	U																											1482	262
657	F	48	U																											310	930
658	F	25	U																											310	930
659	M	52	U																											140	420
660	F	30	U																											13	38
661	F	86	U																											13	38
662	M	38	U																		**1584**						**1584**				2160
663	M	49	U																		**560**						**560**				560
664-689	M	U	U																											2094	21
690-693	F	U	U																											2094	21
694	M	20	U																			**1260**					**1260**				
695	M	U	U																			105					105				

Annex 1. Adult's consumption rates (kg/y or l/y) and occupancy times (h/y) in the Hartlepool area

Observation number	Sex (U if unknown)	Age in years (U if unknown)	Distance from Hartlepool Power Station (km) (U if unknown)	Fish	Crustaceans	Molluscs	Marine plants and algae	Wildfowl	Green vegetables	Other vegetables	Root vegetables	Potatoes	Domestic fruit	Sheep meat	Poultry	Eggs	Wild/free foods	Rabbits/hares	Honey	Wild fungi	Intertidal occupancy over sand	Intertidal occupancy over mud	Intertidal occupancy over rock	Intertidal occupancy over sand and mud	Intertidal occupancy over coal and sand	Handling fishing gear	Handling sediment	Occupancy in water	Occupancy on water	Indoors occupancy	Outdoors occupancy
696	M	U	6.0	1.8	1.0	0.7															**780**	312					312				
697	F	U	6.0	1.8																											
698	M	U	6.0	1.8	1.0																										
702	M	35	U																		120										
703	M	U	U	**30.5**	2.1	0.4																40					40				
704	M	U	U	**30.5**	2.1	0.4																									
705	M	U	U	**30.5**		0.4																									
706	M	U	5.0	4.5	5.1																										
707	M	U	12.0			**6.3**																	14				14				
708	M	U	12.0			**6.3**																	14				14				
709	M	U	6.5	**34.1**		3.1															78		104				182				
710	M	U	6.5	10.2																											
711	F	U	6.5	10.2																											
712	M	U	6.5	10.2																											
713	F	U	6.5	10.2																											
714	M	U	6.5	10.2																											
715	F	U	6.5	10.2																											
716	M	U	6.5	10.2																											
717	F	U	6.5	10.2																											
718	M	U	6.5	10.2																											
719	F	U	6.5	10.2																											
720	M	U	8.0		**14.1**																					**1700**					
721	M	U	8.0		**10.2**																					**1234**			1234		
722	M	U	14.0		0.6																							42	158		
723	M	U	8.0	3.3																	158										
726	M	U	U	2.8																											
727	M	U	U	9.1																	50										
728	M	45	5.0	3.4	2.8																		**260**			156					
729	F	U	5.0	3.4	2.8																										

Annex 1. Adult's consumption rates (kg/y or l/y) and occupancy times (h/y) in the Hartlepool area

Observation number	Sex (U if unknown)	Age in years (U if unknown)	Distance from Hartlepool Power Station (km) (U if unknown)	Fish	Crustaceans	Molluscs	Marine plants and algae	Wildfowl	Green vegetables	Other vegetables	Root vegetables	Potatoes	Domestic fruit	Sheep meat	Poultry	Eggs	Wild/free foods	Rabbits/hares	Honey	Wild fungi	Intertidal occupancy over sand	Intertidal occupancy over mud	Intertidal occupancy over rock	Intertidal occupancy over sand and mud	Intertidal occupancy over coal and sand	Handling fishing gear	Handling sediment	Occupancy in water	Occupancy on water	Indoors occupancy	Outdoors occupancy
730	F	U	5.0	3.4	2.8																										
731	F	U	5.0	3.4	2.8																										
732	F	U	5.0		2.8																										
733	M	U	5.0		2.8																										
734	M	U	5.0		2.8																										
735	F	U	5.0		2.8																										
736	F	U	5.0		2.8																										
737	M	U	5.0		2.8																										
738	M	U	5.0		4.4	0.5																	156			156					
739	F	U	5.0		4.4	0.5																									
740	M	U	3.0		1.1																		24								
741	M	U	3.0		1.1																		24								
742	F	U	3.0		1.1																										
743	F	U	3.0		1.1																										
744	M	U	5.0		2.9	**11.8**																				**1032**			1615		
745	F	U	5.0		2.9	**11.8**																									
746	M	U	5.0		2.9	**11.8**																									
747	F	U	5.0		2.9	**11.8**																									
748	M	U	5.0																							**1032**			1615		
749	M	U	5.0																							**1032**			1615		
750	M	65	5.0	6.8																						**600**			600		
751	M	68	U	17.7	0.9																								117		
752	F	U	U	17.7	0.9																										
753	M	U	U	17.7	0.9																										
754	M	U	U	16.3	4.5																					**1100**			1100		
755	M	60	5.5		2.5	3.5																		78			78				
756	F	U	5.5		2.5	3.5																									
761	M	35	U																									8			
762	M	30	7.0		**9.4**																		90								

Annex 1. Adult's consumption rates (kg/y or l/y) and occupancy times (h/y) in the Hartlepool area

Observation number	Sex (U if unknown)	Age in years (U if unknown)	Distance from Hartlepool Power Station (km) (U if unknown)	Fish	Crustaceans	Molluscs	Marine plants and algae	Wildfowl	Green vegetables	Other vegetables	Root vegetables	Potatoes	Domestic fruit	Sheep meat	Poultry	Eggs	Wild/free foods	Rabbits/hares	Honey	Wild fungi	Intertidal occupancy over sand	Intertidal occupancy over mud	Intertidal occupancy over rock	Intertidal occupancy over sand and mud	Intertidal occupancy over coal and sand	Handling fishing gear	Handling sediment	Occupancy in water	Occupancy on water	Indoors occupancy	Outdoors occupancy
763	F	30	7.0		**9.4**																										
764	M	28	5.0			**18.5**																	173				173				
765	F	27	5.0			**18.5**																									
768	M	U	3.0	**35.4**	0.7	0.2											1.4			1.6	24					24		24			
769	F	U	3.0	**35.4**	0.7	0.2											1.4			1.6											
770-773	M	U	3.0		0.7	0.2																									
774	M	30	15.0	2.6																			**540**	**528**							
775	F	30	15.0	2.6																											
776	M	18	15.0	2.6																											
778	M	28	5.0	6.0																		365		120			365				
779	M	29	5.0	6.0																		365		120			365				
780	F	U	5.0	6.0																											
781	F	U	5.0	6.0																											
782	M	U	5.0	**23.6**																											
783	F	U	5.0	**23.6**																											
784	F	U	5.0	**23.6**																											
785	M	40	8.0	4.5																				63			63				
786	F	40	8.0	4.5																											
787	M	U	8.0	4.5																											
788	M	U	8.0	4.5																											
789	F	U	8.0	4.5																											
790	F	U	8.0	4.5																											
791	M	U	8.0	**23.6**	0.6																72										
792	F	U	8.0	**23.6**	0.6																										
793	M	U	8.0	**35.4**	7.4																142						70				
794	F	U	8.0	**35.4**	7.4																										
795	M	U	8.0	17.7																											
796	M	U	8.0	17.7																											
799-808	M	U	U																									49	180		

Annex 1. Adult's consumption rates (kg/y or l/y) and occupancy times (h/y) in the Hartlepool area

Observation number	Sex (U if unknown)	Age in years (U if unknown)	Distance from Hartlepool Power Station (km) (U if unknown)	Fish	Crustaceans	Molluscs	Marine plants and algae	Wildfowl	Green vegetables	Other vegetables	Root vegetables	Potatoes	Domestic fruit	Sheep meat	Poultry	Eggs	Wild/free foods	Rabbits/hares	Honey	Wild fungi	Intertidal occupancy over sand	Intertidal occupancy over mud	Intertidal occupancy over rock	Intertidal occupancy over sand and mud	Intertidal occupancy over coal and sand	Handling fishing gear	Handling sediment	Occupancy in water	Occupancy on water	Indoors occupancy	Outdoors occupancy
809	M	61	6.5	3.3		0.5																	8				8				
810	M	62	6.5	0.6		0.4																	8				8				
811-815	M	U	6.5			0.4																									
816-820	F	U	6.5			0.4																									
821	M	54	8.0			1.0																	10				10				
822	M	57	8.0	12.5		5.6																	39				39		100		
823	F	U	8.0	12.5		2.9																									
824	F	U	8.0	12.5		2.9																									
825	M	U	8.0	14.2	2.4																430		152	**257**		152	257				
826	F	U	8.0	14.2	2.4																										
827	F	U	8.0	14.2	2.4																										
828	M	U	8.0	14.2	2.4																										
829	M	43	8.0	17.7	4.1																							26	61		
830	M	U	8.0	17.7	4.1																										
831	F	48	8.0																		183										
832	F	U	8.0																		394										
833	F	U	8.0																		394										
834	M	30	8.0		0.8																		36								
835	F	30	8.0		0.8																										
836	M	U	8.0	**23.6**	1.1																								260		
837	M	50	14.0	**35.4**	**9.8**	0.4															100						100		1400		
838	F	50	14.0	**35.4**																											
839	F	U	14.0	**35.4**																											
840	M	59	14.0																							**1680**			1680		
841	F	U	14.0		3.8																										
842	M	36	14.0																							**1680**			1680		
843	M	25	8.0			1.1																		20			20				
844	M	25	8.0			1.1																		20			20				
845	F	25	8.0			1.1																									

Annex 1. Adult's consumption rates (kg/y or l/y) and occupancy times (h/y) in the Hartlepool area

Observation number	Sex (U if unknown)	Age in years (U if unknown)	Distance from Hartlepool Power Station (km) (U if unknown)	Fish	Crustaceans	Molluscs	Marine plants and algae	Wildfowl	Green vegetables	Other vegetables	Root vegetables	Potatoes	Domestic fruit	Sheep meat	Poultry	Eggs	Wild/free foods	Rabbits/hares	Honey	Wild fungi	Intertidal occupancy over sand	Intertidal occupancy over mud	Intertidal occupancy over rock	Intertidal occupancy over sand and mud	Intertidal occupancy over coal and sand	Handling fishing gear	Handling sediment	Occupancy in water	Occupancy on water	Indoors occupancy	Outdoors occupancy
846	F	25	8.0			1.1																									
847	M	71	8.0	11.8																	50		20			100	70		1050		
848	F	70	8.0	11.8																											
849	M	U	5.0	17.7	2.7	1.3			4.5	2.3	2.3	9.1									78						78		351		
850	F	U	5.0	17.7	2.7				4.5	2.3	2.3	9.1																			
851	M	U	5.0		**12.3**	2.5																				**1540**			2090		
852	F	U	5.0		**12.3**	2.5																									
854	M	U	5.0	17.9	**9.8**	2.9																				420			840		
855	F	U	5.0	17.9	**9.8**	2.9																									
856	M	U	5.0																							420					
857	M	35	5.0		7.2																	75					75	17			
858	M	35	5.0																			75					75				
859	M	35	5.0																			75					75				
860-868	M	U	U																									42	158		
869	M	61	7.0	**21.3**				**10.1**												**2.3**											
870	F	57	7.0	**21.3**				**10.1**												**2.3**											
871-902	U	U	U					**5.9**																							
903	M	U	4.0																**6.8**												
904	F	U	4.0																**6.8**												
905	M	56	U																											909	743
906	F	33	U																											1239	413
907	M	38	U																											235	235

Annex 2. Children's consumption rates (kg/y or l/y) and occupancy times (h/y) in the Hartlepool area

Observation number	Sex	Age in years	Distance from Hartlepool Power Station (km) (U if unknown)	Fish	Crustaceans	Molluscs	Green vegetables	Other vegetables	Root vegetables	Potatoes	Domestic fruit	Sheep meat	Wild fungi	Intertidal occupancy over sand	Intertidal occupancy over rock	Intertidal occupancy over sand and mud	Handling fishing gear	Handling sediment	Occupancy on water
Fifteen year old age group																			
112	F	12	7	**14.1**	**11.0**														
156	F	12	7			0.1													
157	F	12	7			0.1													
183	M	12	U				**7.7**	7.7	7.6	**21.8**									
208	M	12	U				6.4	6.9	9.8	3.1									
438	F	12	U	0.7															
504	F	12	U	6.2															
701	M	12	6	1.8	1.0														
758	F	12	5.5		2.5	**3.5**													
94	F	13	U				**21.3**	**25.6**	**12.8**										
144	M	13	9	**11.8**															
304	M	13	U				**15.7**	**11.0**	**21.0**	2.1									
329	M	13	U									**4.8**							
418	F	13	U		2.8														
724	F	13	8	3.3															
777	F	13	15	2.6															
182	M	14	U				**7.7**	7.7	7.6	**21.8**									
348	M	14	U	2.9															
426	F	14	U		0.7														
760	M	14	5.5		2.5	**3.5**													
109	M	15	7	**28.3**	**22.0**												**776**		500
150	F	15	9	**23.6**	0.1														
291	F	15	U				**17.8**	**9.8**	**32.0**	**15.7**	**1.7**								
356	F	15	U	**34.7**	**19.1**														
700	M	15	6	1.8	1.0														
93	F	16	U				**21.3**	**25.6**	**12.8**										
437	M	16	U	1.3															
503	F	16	U	6.2															

Annex 2. Children's consumption rates (kg/y or l/y) and occupancy times (h/y) in the Hartlepool area

Observation number	Sex	Age in years	Distance from Hartlepool Power Station (km) (U if unknown)	Fish	Crustaceans	Molluscs	Green vegetables	Other vegetables	Root vegetables	Potatoes	Domestic fruit	Sheep meat	Wild fungi	External occupancy over sand	Intertidal occupancy over rock	Intertidal occupancy over sand and mud	Handling fishing gear	Handling sediment	Occupancy on water
Ten year old age group																			
18	F	7	3											12					
322	F	7	U				**17.0**	**4.9**	**24.2**	**24.6**	**6.5**								
414	F	7	U		**2.2**	**4.8**													
442	F	7	U	0.7															
443	M	7	U	0.7															
757	F	7	5.5		**2.5**	**3.5**													
853	F	7	5			**2.5**													
118	M	8	U			**3.8**													
152	M	8	U											65					
341	F	8	U			**2.6**													
401	M	8	U	**11.8**	**13.7**														
321	M	9	U				**17.0**	**4.9**	**24.2**	**24.6**	**6.5**								
440	F	9	U	0.7															
441	F	9	U	0.7															
699	F	9	6	1.8	**1.0**	0.7													
158	M	10	7			0.1													
159	M	10	7			0.1													
411	M	10	U		**2.2**	**4.8**													
439	M	10	U	0.7															
725	M	10	8	3.3															
145	M	11	9	**11.8**															
320	M	11	U				**17.0**	**4.9**	**24.2**	**24.6**	**6.5**								
406	M	11	7	**11.6**									**0.2**						
499	F	11	5								0.9								
759	M	11	5.5		**2.5**	**3.5**													
797	M	11	8	**17.7**															

Annex 2. Children's consumption rates (kg/y or l/y) and occupancy times (h/y) in the Hartlepool area

Observation number	Sex	Age in years	Distance from Hartlepool Power Station (km) (U if unknown)	Fish	Crustaceans	Molluscs	Green vegetables	Other vegetables	Root vegetables	Potatoes	Domestic fruit	Sheep meat	Wild fungi	Intertidal occupancy over sand	Intertidal occupancy over rock	Intertidal occupancy over sand and mu	Handling fishing gear	Handling sediment	Occupancy on water
Five year old age group																			
17	F	2	3											78					
303	F	2	U				**1.3**	**0.9**	**1.7**	**0.2**									
73	F	3	10											91	91				
302	F	4	U				**1.3**	**0.9**	**1.7**	**0.2**									
342	F	4	U			2.6													
446	M	4	U	**0.7**															
767	M	4	5			**9.2**													
16	M	5	3											78					
19	F	5	3											12					
99	F	5	U		**1.5**														
136	F	5	U		**9.2**	0.3										18		18	
415	M	5	U		**2.2**	**4.8**													
428	F	5	U		0.4														
766	F	5	5			**9.2**													
209	F	6	U				**6.4**	**6.9**	**5.9**	**3.1**									
419	F	6	U		**2.8**														
427	F	6	U		0.4														
444	F	6	U	**0.7**															
445	M	6	U	**0.7**															
798	F	6	8	**8.8**															

Annex 3. Ratios for determining consumption rates for children

Food group	Ratio child/adult		
	6 - 12 months	10 yr old	15 yr old
Fish	0.375	0.500	0.500
Crustaceans	0.525*	0.700	0.600
Molluscs	0.525*	0.700	0.600
Green vegetables	0.222	0.444	0.556
Other vegetables	0.200	0.500	0.600
Root vegetables	0.375	0.500	0.500
Potatoes	0.292	0.708	1.083
Domestic fruit	0.467	0.667	0.667
Milk	1.333	1.000	1.083
Cattle meat	0.222	0.667	0.778
Pig meat	0.138	0.625	0.750
Sheep meat	0.120	0.400	0.600
Poultry	0.183	0.500	0.667
Eggs	0.600	0.800	1.000
Wild/free foods	0.072	0.440	0.520
Rabbits/hares	ND	ND	ND
Honey	0.789	0.789	0.526
Wild fungi	0.150	0.450	0.550
Venison	ND	ND	ND

ND - No data

* No MAFF 1998 data were available for these rates. Ratios were derived by scaling the 10 year olds crustaceans and mollusc consumption data

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