REPORT

Boston Alternative Energy Facility

Appendix 14.5 Human Health Risk Assessment

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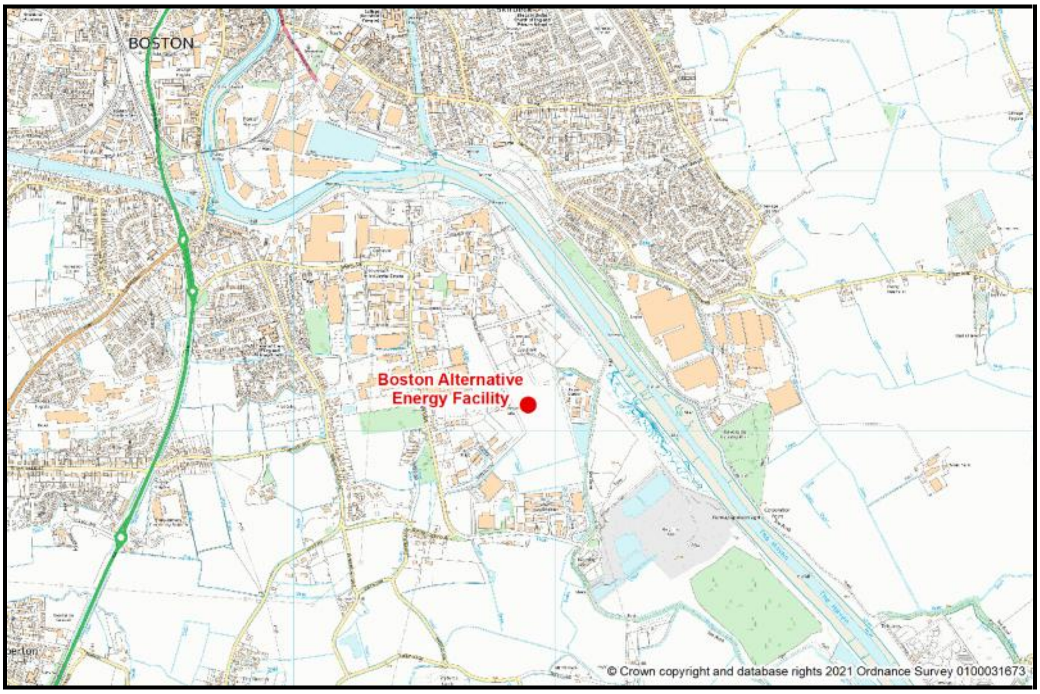
ALTERNATIVE USE BOSTON PROJECTS LTD

HUMAN HEALTH RISK ASSESSMENT:

BOSTON ALTERNATIVE ENERGY FACILITY



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Independent Air Quality & Odour Specialists

EXECUTIVE SUMMARY

INTRODUCTION

The Applicant has commissioned this assessment to consider the effects on human exposure from emissions to air from the Boston Alternative Energy Facility (the Facility). Emissions to air from the facility will be via five 80 m high stacks. These comprise three energy from waste (EfW) stacks and two lightweight aggregate (LWA) stacks. This assessment supplements the air quality assessment provided for the facility (Chapter 14 of the ES (document reference 6.2.14(1), APP-052)). This executive summary provides an overview of the assessment.

The air quality assessment provides a comparison of predicted concentrations for pollutant emissions at off-site locations with background air quality and air quality standards and guidelines for the protection of human health. The air quality assessment assumes the theoretical position that pollutants are emitted at the maximum permissible emission limit values (ELVs) during all times of operation. This position is considered unlikely to be a realistic operating scenario and represents a worst-case scenario. However, emissions from the Facility would contain a number of substances (e.g., dioxins, furans, dioxin-like polychlorinated biphenyls (PCBs) and some trace metals) that cannot be evaluated in terms of their effects on human health simply by reference to ambient air quality standards. Health effects could occur through exposure routes other than purely inhalation (e.g., via the food chain). As such, an assessment has been made of the overall human exposure to the substances by the local population and then the risk that this exposure causes. Therefore, this human health risk assessment considers other exposure pathways (e.g., ingestion of soils and locally grown foods).

Unlike substances such as nitrogen dioxide, which have short term, acute effects on the respiratory system, dioxins/furans and dioxin-like PCBs and some trace metals have the potential to cause effects through long term, cumulative exposure. Therefore, the approach seeks to quantify the hazard faced by the receptor, the exposure of the receptor to the substances identified as being a potential hazard and then to assess the risk of the exposure.

Human exposure to emissions from the Facility are assessed using the United States Environmental Protection Agency (US EPA) Human Health Risk Assessment Protocol (HHRAP) methodology. Human exposure to dioxins and furans and dioxin-like PCBs has been compared against the UK Committee on Toxicity (COT) Tolerable Daily Intake (TDI) of 2 pg/kg per day (2 picograms per kg of bodyweight per day). For the metals, the predicted exposure is compared to UK background exposure levels for the trace metals considered (arsenic, antimony, cadmium, chromium, mercury, nickel, lead and thallium).

METHODOLOGY FOR ESTIMATING EXPOSURE TO EMISSIONS (SECTION 2)

An exposure assessment for the purposes of characterising the health impact of the proposed Facility emissions requires the following steps:

(1) Measurement or estimation of emissions from the source.

(2) Modelling the fate and transport of the emitted substances through the atmosphere and through soil, water and biota following deposition onto land. Concentrations of the emitted chemicals in the environmental media are estimated at the point of exposure, which may be through inhalation or ingestion.

(3) Calculation of the uptake of the emitted chemicals into humans coming into contact with the affected media and the subsequent distribution in the body.

There are two primary exposure 'routes' where humans may come into contact with chemicals that may be of concern:

- *direct, via inhalation; or*
- *indirect, via ingestion of water, soil, vegetation and animals and animal products that become contaminated through the food chain.*

The exposures arising from ingestion are assessed with reference to the following:

- *milk from home-reared cows;*
- *eggs from home-reared chickens;*
- *home-reared beef;*
- *home-reared pork;*
- *home-reared chicken;*
- *home-grown vegetable and fruit produce;*
- *breastmilk; and*
- *soil (incidental).*

The inclusion of all food groups in the assessment conservatively assumes that both arable and pasture land are present in the vicinity of the predicted maximum annual average ground level concentration arising from emissions from the Facility. However, it should be noted that not all exposure scenarios will result in the ingestion of home-reared meat and animal products and these food products are only considered by the HHRAP for farmers and the families of farmers. Similarly, the ingestion of fish is only considered where there is a local water body that is used for fishing and where the diet of the fisher (and family) may be regularly supplemented by fish caught from these local water sources. There are no edible fish farms identified within 5 km of the proposed Facility. Therefore, the ingestion of locally caught fish has not been considered, as consumption rates are likely to be negligible.

EXPOSURE ASSESSMENT

Receptor Selection (Section 4.2)

In addition to defining specific locations for assessment, HHRAP is used to determine the location of the maximum impact over an area based on the results of the dispersion model. Residential exposure within the immediate vicinity of the Facility is limited due to the rural and industrial nature of the site. The nearest residential areas are suburban areas of Boston such as Skirbeck to the north, Skirbeck Quarter to the west, Wyberton to the west and Bladon and Fishtoft located in more rural areas. In addition, there is a small area of housing on Marsh Lane immediately to the west of the facility. Nine areas where residential exposure may occur have been defined based on residential areas around the proposed Facility. These are the nearest residential settlements. The areas to the immediate south and east of the Facility are rural and have a land use that is dominated by agricultural areas. Three areas where the potential for farming exists have been defined. These includes areas to the east, west and north. Based on the areas identified, seventeen Residential receptors and five Farmer receptors have been included in the assessment. For all receptor types, adult and child receptors have been considered.

Exposure to Dioxins, Furans and Dioxin-like PCBs (Section 4.4)

For the identified receptors, the average (lifetime) daily intake of dioxins/furans and dioxin-like PCBs are compared to COT TDI of 2 pg/kg/d.

The maximum contribution of the Facility to the COT TDI is 15.1% for the Farmer North child receptor and 10.4% for the Farmer North adult receptor. This assumes as a worst-case that these receptors produce their own home reared and home-grown food at the location of maximum impact for the area and represents an extreme worst-case. For the residential receptors, the maximum contribution of the facility to the COT TDI is 1.5% for Resident Skirbeck 1 child receptor and 0.5% for Resident Skirbeck 1 adult receptor.

The assessment also compared the Facility contribution to background intakes (i.e., intake from other sources). For adult receptors, the predicted total intake (Facility contribution plus background) was less than 42% of the COT TDI and for child receptors less than 74%. These estimates were for Farmer receptors and represent worst-case exposure estimates.

Exposure to Trace Metals (Section 4.5)

There are no exposure criteria (TDIs) in the UK for trace metals with which to compare the Facility contribution. Therefore, the impact of the Facility has been assessed by comparison of the predicted exposures with background intakes obtained from the UK Total Diet Study.

For the Farmer North receptor, predicted intakes vary between 0.0% and 153% of the lower background intake and 0.0% and 15.7% of the upper background intake. For the Resident Skirbeck 1 receptor, predicted intakes vary between 0.0% and 7.9% of the lower background intake and 0.0% and 0.8% of the upper background intake.

Predicted intakes for thallium for farmer receptors are relatively high compared to the lower background intake. However, this represents worst-case conditions with the *farmer receptor located at the point of maximum impact and consuming entirely home grown and home reared foods. Furthermore, the exposure estimate is predicted for worst-case emissions for thallium. The adoption of a more realistic emission concentration based on typical emissions for thallium would reduce the predicted exposure to between 3.2% and 31.0% of the background intake at worst.*

Cumulative Impacts (Section 4.6)

This assessment also considered the cumulative impact with the adjacent Biomass UK No. 3 Ltd facility. This considered the additional contribution from the Biomass plant at the receptors identified for the BAEF. For the Farmer North receptors, the combined impact is around 14% higher compared to the BAEF alone and total intakes (combined facility plus background) are well below the COT TDI. For trace metals, predicted combined intakes are between 10% and 26% higher than for the BAEF alone.

SUMMARY AND CONCLUSIONS

The possible impacts on human health arising from dioxins and furans and dioxin-like PCBs and trace metals emitted from the proposed Facility have been assessed under the worst-case scenario, namely that of an individual exposed for a lifetime to the effects of the highest airborne concentrations and consuming mostly locally farm produced food (e.g., grain, vegetables, dairy foods, eggs and meat). This equates to a hypothetical farmer consuming food grown entirely on the farm, situated at the closest proximity to the facility. Where there are no active farming areas in close proximity, a residential receptor is considered where it is assumed that the resident consumes locally grown vegetables.

Therefore, the methodology used in this assessment has been structured to create worst case estimates of exposure. A number of features in the methodology give rise to this degree of conservatism. Taking into account the conservative nature of the assessment, it has been demonstrated that for the maximally exposed individual, exposure to dioxins, furans and dioxin-like PCBs and trace metals is not significant.

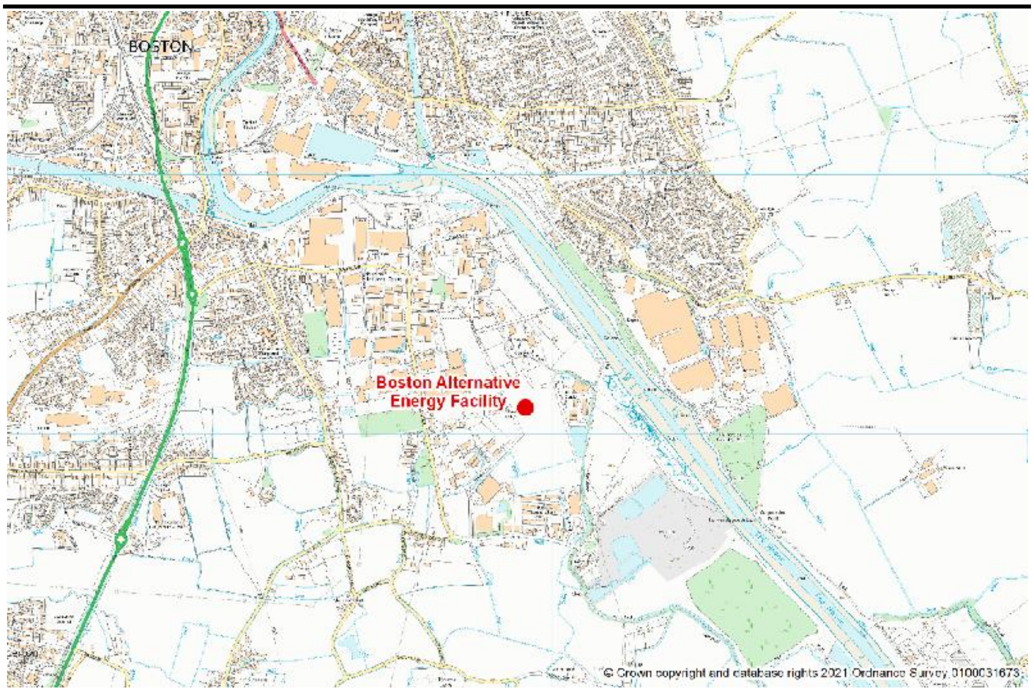
CONTENTS

1 INTRODUCTION

1.1 BACKGROUND

The Applicant has commissioned an assessment to consider the effects on human exposure from emissions to air from the Boston Alternative Energy Facility (BAEF), following receipt of Relevant Representations from Public Health England (RR-023) and discussions at an Air Quality Topic Meeting on 7th September 2021. This additional information has been provided by the Applicant to aid both the above organisation and the Examining Authority in their responses to and evaluation of the Development Consent Order (DCO) Application for the BAEF. The location of the BAEF is presented in *Figure 1.1*. The site is located within an area dominated by industrial use but with agricultural land and residential areas beyond these industrial areas.

FIGURE 1.1 LOCATION OF THE BOSTON ALTERNATIVE ENERGY FACILITY



The Application Site for the Facility covers 26.8 hectares (ha) and is split into two components: the area containing operational infrastructure for the Facility (the 'Principal Application Site'); and an area containing habitat mitigation works for wading birds (the 'Habitat Mitigation Area'). The Facility will generate power from Refuse Derived Fuel (RDF). It will have a total gross generating capacity of 102 MWe and it will deliver approximately 80 MWe to the National Grid.

The BAEF is a Nationally Significant Infrastructure Project (NSIP) under the Planning Act 2008. This is because it is a land-based power generation Facility generating more than 50 megawatts (MWe). Consent for the Facility requires a

Development Consent Order (DCO) to be submitted to the Planning Inspectorate. It will determine the application on behalf of the Secretary of State (SoS) and make recommendations to the SoS regarding the consent. The SoS will make the decision on whether to award consent. The operation of the Facility would be regulated by the Environment Agency under the Environmental Permitting Regulations.

Emissions to air from the Facility will be via five 80 m high stacks. These comprise three energy from waste (EfW) stacks and two lightweight aggregate (LWA) stacks. Emissions to air from the EfW facility will be governed by the Industrial Emissions Directive [1] (IED). In the absence of site-specific emissions monitoring data for the proposed EfW and LWA stacks, and to undertake a conservative assessment, the relevant Best Available Techniques (BAT)-Associated Emission Levels (AELs) were used for the assessment. These were obtained from the most recent BAT-conclusions document for waste incineration (European Parliament, 2019). Where the BAT-AELs were provided as a range, the upper values were used to provide a worst-case assessment. For example, the BAT-AEL for dioxins, furans and dioxin-like polychlorinated biphenyl (PCB) emissions is expressed as a daily average in the range <0.01 to 0.08 ng I-TEQ Nm^{-3} for new EfW plants. Therefore, the upper value of 0.08 ng I-TEQ Nm^{-3} was used in the assessment.

This assessment supplements the air quality assessment provided for the Facility (Chapter 14 of the ES (document reference 6.2.14(1), APP-052)). This assessment only considers emissions to air as human exposure to airborne emissions is by far the most common type of exposure experienced by members of the public [2]

The air quality assessment of emissions from the EfW and LWA stacks has been provided by the Applicant [3]. The air quality assessment provides a comparison of predicted concentrations for pollutant emissions at off-site locations with background air quality and air quality standards and guidelines for the protection of human health. The air quality assessment assumes the theoretical position that the maximum permissible emission limit values (ELVs) based on the December 2019 BAT-AELs are emitted during all times of operation. This position is considered unlikely to be a realistic operating scenario.

Given the above operating scenario, the emissions from the Facility would contain a number of substances that cannot be evaluated in terms of their effects on human health simply by reference to ambient air quality standards. Health effects could occur through exposure routes other than purely inhalation. As

1 The Industrial Emissions Directive (2010/75/EU)

2 Risk Assessment of Dioxin Releases from Municipal Waste Incineration Processes, Her Majesty's Inspectorate of Pollution (March 1996)

3 Chapter 14 Air Quality of the ES (document reference 6.2.14(1), APP-052)

such, an assessment needs to be made of the overall human *exposure* to the substances by the local population and then the *risk* that this exposure causes.

1.2 PURPOSE OF THE ASSESSMENT

This assessment has been undertaken to support the DCO application and Environmental Permit for the Facility and has been prepared in accordance with the assessor's extensive experience of the requirements of the Regulator for these types of development. In particular, this is a human health risk assessment of dioxin/furan emissions from the Facility based on the US EPA Human Health Risk Assessment Protocol (HHRAP) [4] methodology. In addition, the impact of trace metal emissions is also provided for those metals included in the HHRAP methodology (arsenic, antimony, cadmium, chromium, mercury, nickel, lead and thallium).

Human exposure to dioxins and furans has been compared against the Committee on Toxicity (COT) Tolerable Daily Intake (TDI) of 2 pg/kg per day. An assessment of exposure to dioxin-like PCBs has also been included. For the metals, the predicted exposure is compared to background exposure levels for the trace metals considered.

The HHRAP method does not contain physical properties or exposure parameters for individual dioxin-like PCBs but does provide information for two dioxin-like PCB mixtures (Aroclor 1016 and Aroclor 1254). Therefore, for these two substances typical emissions for dioxin-like PCBs have been included in the IRAP model and these have been assumed to comprise entirely of Aroclor 1016 or Aroclor 1254 depending on which substance gives rise to the highest exposure.

1.3 SCOPE OF THE ASSESSMENT

The assessment presented here considers the potential impact of substances released by the Facility on the health of the local population at the point of maximum exposure. These include substances that are 'persistent' in the environment and have several pathways from the point of release to the human receptor. Essentially, they can be described as dioxins/furans and dioxin-like polychlorinated biphenyls (PCBs) and are present in extremely small quantities and are typically measured in mass units of nanograms (ng = 10^{-9} g), picograms (pg = 10^{-12} g) and femtograms (fg = 10^{-15} g).

Unlike substances such as nitrogen dioxide, which have short term, acute effects on the respiratory system, dioxins/furans and dioxin-like PCBs have the potential to cause effects through long term, cumulative exposure. A lifetime is

4 US EPA Office of Solid Waste (September 2005) Human Health Risk Assessment Protocol for Hazardous Waste Combustion Facilities

the conventional period over which such effects are evaluated. A lifetime is taken to be 70 years, as is the default assumption of the HHRAP methodology.

The exposure scenarios used here represent highly unrealistic situations in which exposure assumptions are chosen to represent a worst case and should be treated as an extreme view of the risks to health. While individual high-end exposure estimates may represent actual exposure possibilities (albeit at very low frequency), the possibility of all high end exposure assumptions accumulating in one individual is, for practical purposes, never realised. Therefore, intakes presented here should be regarded as an extreme upper estimate of the actual exposure that would be experienced by the real population in the locality.

1.4 APPROACH TO THE ASSESSMENT

The risk assessment process is based on the application of the US EPA HHRAP.· This protocol has been assembled into a commercially available model, Industrial Risk Assessment Program (IRAP, Version 5.1.0) and marketed by Lakes Environmental of Ontario.

The approach seeks to quantify the *hazard* faced by the receptor, the *exposure* of the receptor to the substances identified as being a potential hazard and then to assess the *risk* of the exposure, as follows:

- *Quantification of the exposure*: an exposure evaluation determines the dose and intake of key indicator chemicals for an exposed person. The dose is defined as the amount of a substance contacting body boundaries (in the case of inhalation, the lungs) and intake is the amount of the substance absorbed into the body. The evaluation is based upon worst-case, scenarios, with respect to the following:
  - location of the exposed individual and duration of exposure;
  - exposure rate;
  - emission rate from the source.
- *Risk characterisation*: following the above steps, the risk is characterised by examining the toxicity of the chemicals to which the individual has been exposed, and evaluating the significance of the calculated dose by a comparison of intakes with the tolerable daily intake (TDI) for dioxins/furans and dioxin-like PCBs and background intakes for the trace metals.

2 METHODOLOGY FOR ESTIMATING EXPOSURE TO EMISSIONS

2.1 INTRODUCTION

An exposure assessment for the purposes of characterising the health impact of the proposed Facility emissions requires the following steps:

(1) Measurement or estimation of emissions from the source.

(2) Modelling the fate and transport of the emitted substances through the atmosphere and through soil, water and biota following deposition onto land. Concentrations of the emitted chemicals in the environmental media are estimated at the point of exposure, which may be through inhalation or ingestion.

(3) Calculation of the uptake of the emitted chemicals into humans coming into contact with the affected media and the subsequent distribution in the body.

With regard to Step (3), the exposure assessment considers the uptake of polychlorinated dibenzo-para-dioxins and polychlorinated dibenzofurans (PCDD/Fs, often abbreviated to 'dioxins/furans') and dioxin-like PCBs and trace metals by various categories of human receptors.

2.2 POTENTIAL EXPOSURE PATHWAYS

There are two primary exposure 'routes' where humans may come into contact with chemicals that may be of concern:

- direct, via inhalation; or
- indirect, via ingestion of water, soil, vegetation and animals and animal products that become contaminated through the food chain.

There are four other potential exposure pathways of concern following the introduction of substances into the atmosphere:

- ingestion of drinking water;
- dermal (skin) contact with soil;
- incidental ingestion of soil; and
- dermal (skin) contact with water.

2.3 EXPOSURE PATHWAYS CONSIDERED IN THE ASSESSMENT

The possible exposure pathways included in the IRAP model are shown in *Figure 2.1*. Dermal contact with soil is an insignificant exposure pathway on the basis of the infrequent and sporadic nature of the events and the very low dermal absorption factors for this exposure route, coupled with the low plausible total dose that may be experienced (when considered over the lifetime of an individual). Health risk assessments of similar emissions (Pasternach (1989) *The Risk Assessment of Environmental and Human Health Hazards*, John Wiley, New York) have concluded that dermal absorption of soil is at least one order of magnitude less efficient than lung absorption.

Similar arguments are relevant with respect to the elimination of aquatic pathways from consideration; swimming, fishing and other recreational activities are also sporadic and unlikely to lead to significant exposures or uptake of any contamination into the human body via dermal contact with water.

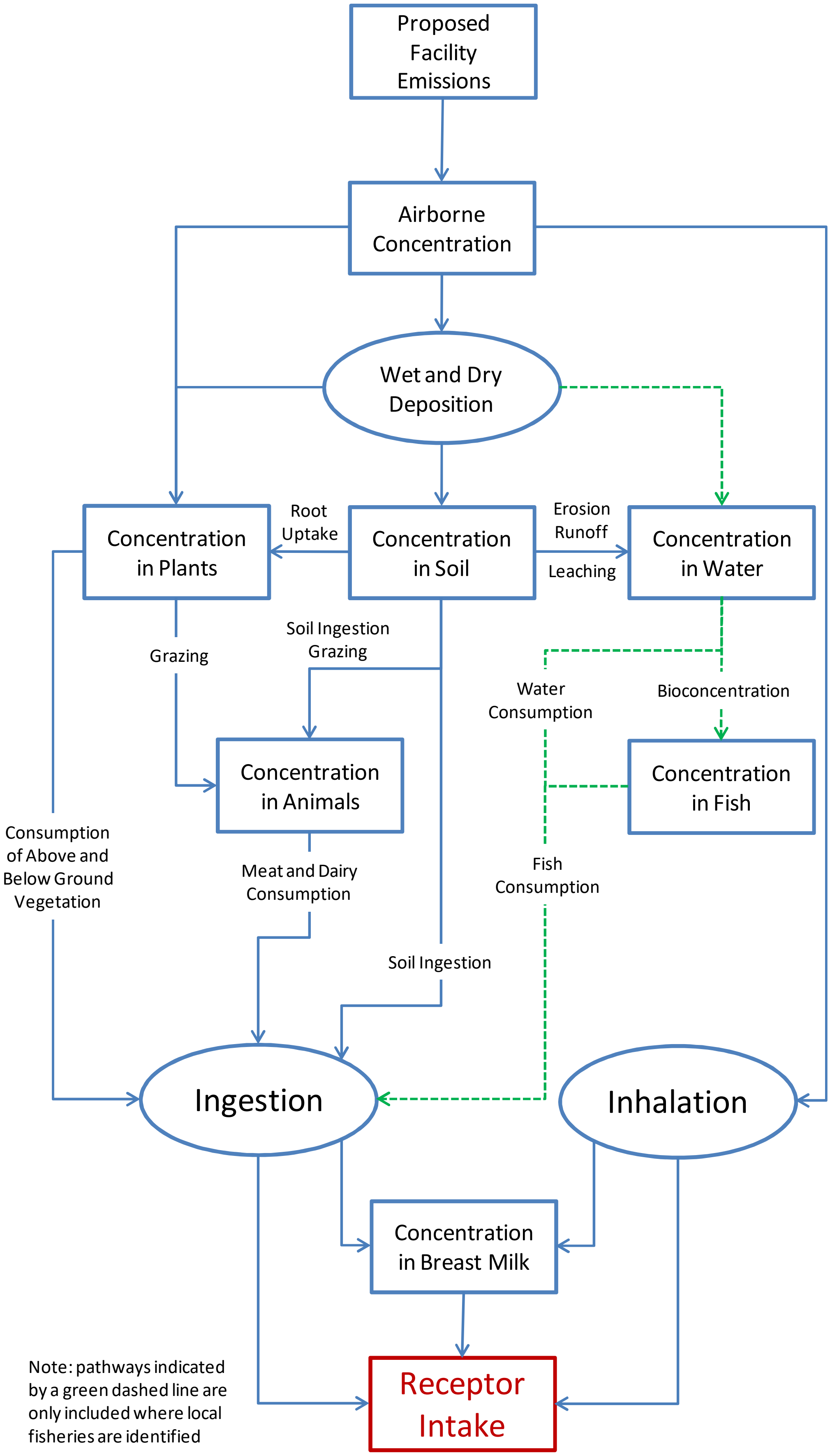
Exposure via drinking water requires contamination of surface drinking water sources local to the point of consumption. The likelihood of contamination reaching a level of concern in the local water sources and ground water supplies is extremely low, particularly where there is no large scale storage (e.g. reservoirs) or catchment areas for local water supplies within 5 km of the Facility. However, the US EPA's HHRAP does include the ingestion of drinking water from surface water sources as a potential exposure pathway where water bodies and water sheds have been defined within the exposure scenario. The ingestion of groundwater as a source of local drinking water is not considered by the HHRAP as it is considered to be an insignificant exposure pathway for combustion emissions.

The ingestion of drinking water from surface water sources is only considered a potential exposure pathway where there is a local surface water body which provides local drinking water. However, it is our experience that drinking water from a reservoir located close to this type of facility makes a very small contribution to the total exposure. Therefore, exposure via drinking water is generally only considered where there is the potential for exposure via the ingestion of fish and the presence of edible fish farms (e.g. trout or salmon farms).

On the basis of the assessment of the potential significance of the exposure pathways the key exposure pathways which are relevant to the assessment and, hence, subject to examination in detail are as follows:

- inhalation;
- ingestion of food; and
- ingestion of soil.

FIGURE 2.1 EXPOSURE PATHWAYS FOR RECEPTORS



Therefore, the exposures arising from ingestion are assessed with reference to the following:

- milk from home-reared cows;
- eggs from home-reared chickens;
- home-reared beef;
- home-reared pork;
- home-reared chicken;
- home-grown vegetable and fruit produce;
- breastmilk; and
- soil (incidental).

The inclusion of all food groups in the assessment conservatively assumes that both arable and pasture land are present in the vicinity of the predicted maximum annual average ground level concentration. This is, in reality, a highly unlikely scenario, but it has been included as a means of building a high degree of conservatism into the assessment and, hence, reducing the risk of exposures being underestimated. However, it should be noted that not all exposure scenarios will result in the ingestion of home-reared meat and animal products and these food products are only considered by the HHRAP for farmers and the families of farmers.

Similarly, the ingestion of fish is only considered where there is a local water body that is used for fishing and where the diet of the fisher (and family) may be regularly supplemented by fish caught from these local water sources. There are no edible fish farms identified within 5 km of the proposed EfW facility. Therefore, the ingestion of locally caught fish has not been considered, as consumption rates are likely to be very small.

The potential impact of the Facility on shellfish beds within the Wash was raised by the Eastern Inshore Fisheries and Conservation Authority under Section 42 of the Planning Act 2008. The Wash is located in excess of 5 km of the Facility and direct deposition rates of contaminants to the shellfish beds would be negligible. There is the potential for deposition to land and run off into rivers that feed into the Wash. However, as the Wash and parts of the river systems that feed it are tidal, there is a constant influx and efflux of water into the water body system that would result in the dispersion and dilution of contaminants. The HHRAP model can be used to determine the impact of emissions on fish and water body systems but considers a closed system where material is able to accumulate and there is minimal dilution. Therefore, it would not be appropriate to assume that the Wash acted as a closed water body system. Given the distance of the shellfish beds from the Facility and the effects of tides on dilution and dispersion it is concluded that the impact of the Facility on Shellfish would be not significant and is not considered further.

2.4 EMISSIONS AND DISPERSION MODELLING INPUT DATA

2.4.1 Compounds of Potential Concern (COPCs)

The substances which have been considered in the assessment are referred to as the Compounds of Potential Concern (COPCs) and include the seventeen PCDD/F congeners that are known to be toxic (refer *Section 2.4.4*). In addition, the IRAP model includes two dioxin-like PCBs (Aroclor 1016 and Aroclor 1254). These comprise a mixture of congeners with one to four chlorine atoms for Aroclor 1016 with a chlorine content of 41% by mass (average of three chlorine atoms). Similarly, Aroclor 1254 has between four and seven chlorine atoms and a chlorine content of 54% by mass (average of five chlorine atoms).

Emissions of arsenic, antimony, cadmium, chromium, mercury, nickel, lead and thallium have also been included in the model in order to determine the impact of metal emissions at each receptor loction. Other trace metals that have regulated emissions are not included in the IRAP model and cannot be assessed.

2.4.2 Emission Parameters

Emissions from the Facility will be via five separate stacks. Emission parameters assumed for the assessment are consistent with those used for the air quality assessment as summarised in *Table 2.1*.

TABLE 2.1 SUMMARY OF THE EMISSION PARAMETERS FOR DISPERSION MODELLING

Parameter	EfW Streams	LWA Stack 1	LWA Stack 2
Number of sources	3	1	1
Stack location grid reference	533942, 342000 533970, 342008 533998, 342016	534166, 342219	534110, 342229
Stack height (m)	80	80	80
Temperature of emission (^oC)	142	110	55
Actual flow rate ($m^3\ s^{-1}$)	119	169	84.5
Emission velocity at stack exit ($m\ s^{-1}$)	16.8	17.6	17.2
Normalised flow rate ($Nm^3\ s^{-1}$) (a)	73.2	110	55
Flue/effective stack diameter (m)	3	3.5	2.5

(a) Reference conditions of 273K, 1 atmosphere, dry and 11% oxygen

2.4.3 Emission Concentrations

Within the IED and for the BAT-AELs, emissions of metals are divided into three groups. The total emissions of metals within each group is not permitted to exceed the prescribed emission limit set for the group. For the purposes of the modelling, it would be unreasonable to assume that each metal emits at the group limit. Therefore, an alternative approach would be to assume each metal is emitted as an equal proportion of the group limit (e.g. $1/9^{th}$ for the Group 3 metals and 50% for the Group 1 metals). On this basis, mercury emissions would be 0.02 mg Nm^{-3}, cadmium and thallium 0.01 mg m^{-3} and the nine Group 3 metals 0.033 mg Nm^{-3}.

In addition, Environment Agency guidance [5], provides less conservative assumptions, whereby Group 3 metals are assessed based on maximum emissions of these metals derived from data from other operational facilities. Information is provided as a proportion of the IED emission limits and are presented in *Table 2.2*. For the Group 3 metals, the maximum emission for the operational facilities is presented.

The Environment Agency do not provide comparable emission concentrations for the Group 1 and Group 2 metals or for PCDD/Fs. However, annual reports on UK Energy from Waste Statistics are provided by Tolvik Consulting with the most recent report published for 2020 [6]. This report includes information on compliance with ELVs for 54 operational EfW facilities in the UK. Typical emission concentrations for cadmium, thallium and PCDD/fs have been obtained from this report and are also provided in *Table 2.2*.

TABLE 2.2 SUMMARY OF TYPICAL PCDD/F AND METAL EMISSIONS FROM WASTE COMBUSTION FACILITIES

Metal Species	IED Limit (mg Nm^{-3})	Maximum Emission as %age of the IED Limit	Typical Emission (mg Nm^{-3})
PCDD/Fs	0.1 ng Nm^{-3}	11.4%(a)	0.011 ng Nm^{-3}
Antimony	0.5	2.3%(b)	0.012
Arsenic	0.5	5.0%(b)	0.025
Cadmium	0.05	4.0%(c)	0.0020
Chromium	0.5	18.4%(b)	0.092
Lead	0.5	10.1%(b)	0.051
Mercury	0.05	5.9%(a)	0.0030
Nickel	0.5	11.0%(b)(d)	0.055
Thallium	0.05	4.0%(c)	0.0020

(a) Tolvik Consulting UK Energy from Waste Statistics (2020)
(b) Environment Agency guidance for Group 3 metals, maximum of data
(c) Tolvik Consulting UK Energy from Waste Statistics (2020) gives cadmium and thallium combined emissions at 4.0%
(d) Third highest concentrations as highest two measurements are outliers

5 Environment Agency (June 2016) Guidance on Assessing Group 3 Metal Stack Emissions from Incinerators (Version 4)
6 UK Energy from Waste Statistics – 2020, Tolvik Consulting (May 2021)

To represent worst-case conditions the following emission concentrations are assumed for the assessment.

- PCDD/Fs – BAT-AEL of 0.08 ng Nm^{-3};
- Cadmium and thallium – 50% of the BAT-AEL at 0.01 mg Nm^{-3};
- Mercury – 100% of the BAT-AEL of 0.02 mg Nm^{-3};
- Antimony and arsenic – 0.033 mg Nm^{-3} (1/9th of the BAT-AEL);
- Chromium – 0.092 mg Nm^{-3} (maximum Environment Agency data);
- Lead – 0.051 mg Nm^{-3} (maximum Environment Agency data); and
- Nickel – 0.055 mg Nm^{-3} (maximum Environment Agency data).

A summary of the emission concentrations and emission rates assumed for the assessment is provided in *Table 2.3*.

TABLE 2.3 SUMMARY OF THE EMISSION CONCENTRATIONS AND EMISSION RATES FOR DISPERSION MODELLING

Pollutant	Daily Emission Concentration (mg Nm^{-3}) (a)(b)	Total Emission Rate (g s^{-1}) Each EFW Stack	Total Emission Rate (g s^{-1}) LWA Stack 1	Total Emission Rate (g s^{-1}) LWA Stack 2
PCDD/Fs	0.08	5.9×10^{-9}	8.8×10^{-9}	4.4×10^{-9}
Cadmium	0.01 (c)	0.00073	0.0011	0.00055
Thallium	0.01 (c)	0.00073	0.0011	0.00055
Mercury	0.02 (d)	0.0015	0.0022	0.0011
Antimony	0.033 (e)	0.0024	0.0037	0.0018
Arsenic	0.033 (e)	0.0024	0.0037	0.0018
Chromium	0.092 (f)	0.0067	0.010	0.0051
Lead	0.051 (f)	0.0037	0.0056	0.0028
Nickel	0.055 (f)	0.0040	0.0061	0.0030

(a) Reference conditions of 273K, 1 atmosphere, dry and 11% oxygen
(b) Emission concentrations expressed as mg Nm^{-3} (at reference conditions) except for PCDD/Fs which are in ng Nm^{-3} (at reference conditions)
(c) Assumed to be 50% of the Group 1 limit of 0.02 mg Nm^{-3}
(d) Assumed to be 100% of the Group 2 limit of 0.02 mg Nm^{-3}
(e) Assumed to be 1/9th of the Group 3 limit of 0.3 mg Nm^{-3}
(f) Maximum measured (Environment Agency)

2.4.4 Emission Concentrations for the Individual PCDD/F Congeners

The general term dioxins denotes a family of compounds, with each compound composed of two benzene rings interconnected with two oxygen atoms. There are 75 individual dioxins, with each distinguished by the position of chlorine or other halogen atoms positioned on the benzene rings. Furans are similar in structure to dioxins, but have a carbon bond instead of one of the two oxygen atoms connecting the two benzene rings. There are 135 individual furan compounds. Each individual furan or dioxin compound is referred to as a congener and each has a different toxicity and physical properties with regard to its atmospheric behaviour. It is important, therefore, that the exposure methodology determines the fate and transport of PCDD/Fs on a congener specific basis. It does this by accounting for the varying volatility of the congeners and their different toxicities. Consequently, information regarding the PCDD/F annual mean ground level concentrations on a congener specific basis is required. For the purposes of the exposure assessment, the congener profile for the proposed Facility is presented in *Table 2.4*, which is a standard profile for municipal waste incinerators derived by Her Majesty's Inspectorate of Pollution (HMIP), one of the predecessors of the Environment Agency. The international toxic equivalency factors are given and used to derive the toxic equivalent emission (I-TEQ).

TABLE 2.4 PCDD/F CONGENER PROFILE FOR THE PROPOSED FACILITY

Congener	Annual Mean Emission Concentration (ng Nm^{-3}) (a)	I-TEF toxic equivalent factors)	Annual Mean Emission Concentration (ng I-TEQ Nm^{-3})
2,3,7,8-TCDD	0.0025	1.0	0.0025
1,2,3,7,8-PeCDD	0.020	0.5	0.0098
1,2,3,4,7,8-HxCDD	0.023	0.1	0.0023
1,2,3,7,8,9-HxCDD	0.017	0.1	0.0017
1,2,3,6,7,8-HxCDD	0.021	0.1	0.0021
1,2,3,4,6,7,8-HpCDD	0.14	0.01	0.0014
OCDD	0.32	0.001	0.00032
2,3,7,8-TCDF	0.022	0.1	0.0022
2,3,4,7,8-PeCDF	0.043	0.5	0.021
1,2,3,7,8-PeCDF	0.022	0.05	0.0011
1,2,3,4,7,8-HxCDF	0.17	0.1	0.017
1,2,3,7,8,9-HxCDF	0.0032	0.1	0.00032
1,2,3,6,7,8-HxCDF	0.065	0.1	0.0065
2,3,4,6,7,8-HxCDF	0.070	0.1	0.0070
1,2,3,4,6,7,8-HpCDF	0.35	0.01	0.0035
1,2,3,4,7,8,9-HpCDF	0.032	0.01	0.00032
OCDF	0.32	0.001	0.00032
Total (ng I-TEQ m^{-3})			**0.08**
(a) Congener profile from Table 7.2a DOE (1996) Risk Assessment of Dioxin Releases from Municipal Waste Incineration Processes Contract No. HMIP/CPR2/41/1/181			

Information on PCB emissions has been obtained from the Defra report WR 0608 [7]. Based on the information provided, a maximum emission concentration of 3.6 x 10^{-9} mg m^{-3} is assumed. It is not stated whether this is total PCBs or dioxin-like PCBs. Therefore, as a worst-case it is assumed to comprise entirely

7 WR 0608 Emissions from Waste Management Facilities, ERM Report on Behalf of Defra (July 2011)

of dioxin-like PCBs. Furthermore, it is assumed that this is the total PCB emission and that these data are presented as the toxic equivalent concentration (i.e. 3.6 x 10^{-9} mg TEQ Nm^{-3}). For the dioxin-like PCBs, a toxic equivalent factor (TEF) of 0.1 has been used to provide an actual emission concentration (i.e. 3.6 x 10^{-8} mg Nm^{-3}). The same equivalence factor has been used to convert the total actual dose back to the total toxic equivalent dose.

The emission rates for each substance as input to the IRAP model are provided in *Table 2.5.*

TABLE 2.5 PCDD/F EMISSION RATES USED IN THE IRAP MODEL

Congener	Emission Rate for Each EFW (g s^{-1})	Emission Rate LWA Stack 1 (g s^{-1})	Emission Rate LWA Stack 2 (g s^{-1})
2,3,7,8-TCDD	1.8 x 10^{-10}	2.7 x 10^{-10}	1.4 x 10^{-10}
1,2,3,7,8-PeCDD	1.4 x 10^{-9}	2.2 x 10^{-9}	1.1 x 10^{-9}
1,2,3,4,7,8-HxCDD	1.7 x 10^{-9}	2.6 x 10^{-9}	1.3 x 10^{-9}
1,2,3,7,8,9-HxCDD	1.2 x 10^{-9}	1.8 x 10^{-9}	9.2 x 10^{-10}
1,2,3,6,7,8-HxCDD	1.5 x 10^{-9}	2.3 x 10^{-9}	1.1 x 10^{-9}
1,2,3,4,6,7,8-HpCDD	1.0 x 10^{-8}	1.5 x 10^{-8}	7.5 x 10^{-9}
OCDD	2.3 x 10^{-8}	3.5 x 10^{-8}	1.8 x 10^{-8}
2,3,7,8-TCDF	1.6 x 10^{-9}	2.5 x 10^{-9}	1.2 x 10^{-9}
2,3,4,7,8-PeCDF	3.1 x 10^{-9}	4.7 x 10^{-9}	2.4 x 10^{-9}
1,2,3,7,8-PeCDF	1.6 x 10^{-9}	2.5 x 10^{-9}	1.2 x 10^{-9}
1,2,3,4,7,8-HxCDF	1.3 x 10^{-8}	1.9 x 10^{-8}	9.6 x 10^{-9}
1,2,3,7,8,9-HxCDF	2.3 x 10^{-10}	3.5 x 10^{-10}	1.8 x 10^{-10}
1,2,3,6,7,8-HxCDF	4.7 x 10^{-9}	7.1 x 10^{-9}	3.6 x 10^{-9}
2,3,4,6,7,8-HxCDF	5.1 x 10^{-9}	7.7 x 10^{-9}	3.8 x 10^{-9}
1,2,3,4,6,7,8-HpCDF	2.6 x 10^{-8}	3.9 x 10^{-8}	1.9 x 10^{-8}
1,2,3,4,7,8,9-HpCDF	2.3 x 10^{-9}	3.5 x 10^{-9}	1.8 x 10^{-9}
OCDF	2.3 x 10^{-8}	3.5 x 10^{-8}	1.8 x 10^{-8}
Aroclor 1016/1254	2.6 x 10^{-9}	4.0 x 10^{-9}	2.0 x 10^{-9}

2.5 DISPERSION MODELLING ASSUMPTIONS

The air quality assessment has relied upon the use of ADMS to estimate ground level concentrations of pollutants. The HHRA model has been designed to accept output files from the US EPA ISC or AERMOD dispersion models, reflecting its North American origins and its need to follow the US EPA risk assessment protocol. The use of ADMS is consistent with the air quality assessment (Chapter 14 of the ES (document reference 6.2.14(1), APP-052)) undertaken for the Facility and the emissions data and model set up are identical to that carried out for the air quality assessment [3]. Therefore, to maintain consistency with the air quality assessment, it has been possible to use output from the ADMS model with IRAP using the following procedure:

- generation of ISC input files and output files for the study area;
- generation of ADMS output data using the approach outlined in the US EPA risk assessment protocol; and
- inserting the ADMS results into the ISC output files.

For the modelling, all emission properties, building heights, and other relevant factors were retained from the air quality assessment provided for the Facility (Chapter 14 of the ES (document reference 6.2.14(1), APP-052)). As the health risk assessment requires information on the deposition of substances to surfaces as well as airborne concentrations of substances, the ADMS dispersion model has also been used to predict the following:

- the airborne concentration of vapour, particle and particle bound substances emitted;
- the wet deposition rate of particle and particle bound substances; and
- the dry deposition rate of vapour, particle and particle bound substances.

For dry deposition of particles and particle bound contaminants a fixed deposition velocity of 0.01 m s^{1} has been used. The Facility will be equipped with fabric filters for the removal of fine particles and the emitted particles are likely to be predominantly in the lower size range of 1 - 2 µm in diameter. For particles of this size, deposition velocities are likely to be of the order of 0.001 to 0.01 m s^{1}. Therefore, as a worst-case, for the ADMS modelling a value of 0.01 m s^{1} has been adopted. A gas dry deposition velocity of 0.005 m s^{1} is used for the gas phase. For wet deposition, the following washout coefficients are used:

- Gas phase – washout coefficient A at 0.00016 and washout coefficient B of 0.64;
- Particle phase – washout coefficient A at 0.00028 and washout coefficient B of 0.64; and
- Particle bound phase – washout coefficient A at 0.00010 and washout coefficient B of 0.64.

2.6 DISPERSION MODELLING RESULTS

A summary of the key results from the ADMS dispersion model is presented in *Table 2.6*. These have been predicted using the 2015 Coningsby meteorological data set. This year was selected, as out of the five years considered, it was the year that provided highest predicted annual mean concentrations and deposition rates.

TABLE 2.6 MAXIMUM ANNUAL AVERAGE PARTICLE PHASE CONCENTRATIONS AND PARTICLE PHASE DEPOSITION RATES ESTIMATED BY ADMS

Pollutant	Max Annual Average Concentration (a)	Max Annual Average Deposition Rate (b)
PCDD/Fs	**(fg m^{-3})**	**(ng m^{-2} $year^{-1}$)**
2,3,7,8-TCDD	0.13	0.12
1,2,3,7,8-PeCDD	1.1	0.9
1,2,3,4,7,8-HxCDD	1.2	1.1
1,2,3,7,8,9-HxCDD	0.90	0.80
1,2,3,6,7,8-HxCDD	1.1	0.99
1,2,3,4,6,7,8-HpCDD	7.3	6.5
OCDD	17.2	15.2
2,3,7,8-TCDF	1.2	1.1
2,3,4,7,8-PeCDF	2.3	2.0
1,2,3,7,8-PeCDF	1.2	1.1
1,2,3,4,7,8-HxCDF	9.4	8.3
1,2,3,7,8,9-HxCDF	0.17	0.15
1,2,3,6,7,8-HxCDF	3.5	3.1
2,3,4,6,7,8-HxCDF	3.7	3.3
1,2,3,4,6,7,8-HpCDF	18.9	16.7
1,2,3,4,7,8,9-HpCDF	1.7	1.5
OCDF	17.2	15.2
Aroclor 1016/1254	1.9	1.7
Metals	**(ng m^{-3})**	**(mg m^{-2} a^{-1})**
Antimony	1.8	1.6
Arsenic	1.8	1.6
Cadmium	0.54	0.48
Chromium	4.9	4.4
Lead	2.7	2.4
Mercury	1.1	0.95
Nickel	3.0	2.6
Thallium	0.54	0.48

(a) Where 1 fg m^{-3} is equal to 1 x 10^{-15} g m^{-3}

(b) Where 1 ng m^{-2} $year^{-1}$ is equal to 1 x 10^{-9} g m^{-2} $year^{-1}$

Predicted maximum concentrations presented in *Table 2.6* are approximately 20% higher than presented in the air quality assessment (Chapter 14 of the ES (document reference 6.2.14(1), APP-052)) since they represent the maximum predicted anywhere within the model domain and are representative of worst-case conditions. Results presented in the air quality assessment (Chapter 14 of the ES (document reference 6.2.14(1), APP-052)) are representative of the maximum receptor concentration.

2.7 ESTIMATION OF BACKGROUND EXPOSURES

2.7.1 PCDD/Fs

The latest assessment of dietary exposure to PCCD/Fs was documented in 2003 based on the 2001 Total Diet Study (TDS) [8]. This estimated that the average intake for adults decreased from 1.8 pg TEQ kg^{-1} d^{-1} (1997) to 0.9 pg TEQ kg^{-1} d^{-1} in 2001. For younger children, the average exposure decreased from 4.0 pg TEQ kg^{-1} d^{-1} to 1.8 pg TEQ kg^{-1} d^{-1}. These reductions were likely due to the significant reduction in emissions during the 1990s from waste incineration facilities.

The 2001 TDS is twenty years old and there have been further reductions in emission since this study was published. This is evidenced by PCCD/F emissions data obtained from the UK National Atmospheric Emissions Inventory which indicates that total PCDD/F emissions in the UK decreased from 523 g TEQ a^{-1} in 1997 to 335 g TEQ a^{-1} in 2001 and further to 181 g TEQ a^{-1} in 2019.

An updated TDS was undertaken in 2012 [9] but this study did not consider dietary exposure to PCDD/Fs. The report provides the concentration of PCDD/Fs and dioxin-like PCBs in a range of food products. Using dietary intake data from the National Diet and Nutrition Survey [10] (NDNS) an estimate of the dietary exposure to PCDD/Fs has been calculated as follows.

- For each food group the ng TEQ kg^{-1} fat basis has been obtained from the 2001 and 2012 TDS for adults and children (4 to 10 years).
- The fat intake (%) for each receptor type (adults and children) has been obtained form the NDNS. Data for Years 5 to 6 were used corresponding with 2012. Data were normalised to 100%.
- The average daily fat intake was calculated based on a total fat intake of 67.8 g d^{-1} for an adult and 54.4 g d^{-1} for a child.
- The intake was calculated by multiplying the PCDD/F concentrations in food (ng TEQ kg^{-1}) by the intake g d^{-1} and then converting to units of pg TEQ kg^{-1} d^{-1}.

8 Dioxins and dioxin-like PCBs in the UK Diet: 2001 Total Diet Study Samples, Food Survey Information Sheet 38/03 (July 2003)
9 Organic Environmental Contaminants in the 2012 Total Diet Study Samples, Report to the Food Standards Agency, The Food and Environment Research Agency (December 2012)
10 https://www.gov.uk/government/statistics/ndns-results-from-years-7-and-8-combined

The results of this analysis are presented in *Annex C*. The analysis was also applied to the 2001 TDS to provide a comparison with published intakes. A summary of the results is presented in *Table 2.7*.

TABLE 2.7 COMPARISON OF PUBLISHED AND ESTIMATED INTAKES OF PCDD/FS AND DIOXIN-LIKE PCBS FOR 2001 AND 2012

Scenario	Adult (pg TEQ kg^{-1} d^{-1})	Child (pg TEQ kg^{-1} d^{-1})
2001 TDS Published	0.9	1.8
2001 Estimated Intake	0.68	1.70
2012 Estimated Intake	0.47	1.11
2012 Estimate normalised to 2001	**0.62**	**1.17**

The 2001 estimates are slightly lower than the published estimates, particularly for the adult. Therefore, the 2012 estimates have been normalised based on the difference between the published and estimated 2001 data. This results in 2012 daily intakes of 0.62 and 1.17 pg TEQ kg^{-1} d^{-1} for the adult and child, respectively.

2.7.2 Trace Metals

The concentration of trace metals in food for the 2014 TDS has been published by The Food & Environment Research Agency [11]. This presents concentrations in foods in mg kg^{-1} as prepared. The results of the study are also presented as an Excel spreadsheet [12] which provides exposure levels for, 1.5 to 3 year olds, 4 to 10 year olds, 11 to 18 year olds and adults. For some food groups results are presented as a range as for some metals the measured concentration of the metal in the food group is below the detection limit of the analysis. The lower estimate of intake assumes the concentration is 0 mg kg^{-1} and the upper estimate assumes the metal concentrations is equal to the detection limit. In reality, the exposure estimate is likely to be between the range of values presented. A summary of the lower and upper intakes for each of the metals considered is presented in *Table 2.8*.

11 Total Diet Study of Metals and Other Elements in Food, Report for the UK Food Standards Agency (FS102081), The Food & Environment Research Agency (March 2015)

12 https://www.food.gov.uk/research/research-projects/total-diet-study-metals-and-other-elements

TABLE 2.8 UPPER AND LOWER INTAKE OF TRACE METALS FROM THE 2014 TDS

Metal	Lower Intake ($\mu g\ kg^{-1}\ d^{-1}$)	Upper Intake ($\mu g\ kg^{-1}\ d^{-1}$)
Antimony	0.016	0.029
Arsenic	0.95	1.23
Cadmium	0.12	0.19
Chromium	0.42	1.1
Lead	0.062	0.11
Mercury	0.022	0.041
Nickel	1.7	1.9
Thallium	0.0084	0.082

3 INPUT PARAMETERS FOR THE IRAP MODEL

3.1 INTRODUCTION

Exposure of an individual to a chemical may occur either by inhalation or ingestion (including food, water and soil). Of interest is the total dose of the chemical received by the individual through the combination of possible routes, and the IRAP model has been developed to estimate the dose received by the human body, often referred to as the external dose.

Exposure to COPCs is a function of the estimated concentration of the substance in the environmental media with which individuals may come into contact (i.e. exposure point concentrations) and the duration of contact. The concentration at the point of contact is itself a function of the transfer through air, soil, water, plants and animals that form part of the overall pathway. Exposure equations have been developed which combine exposure factors (e.g. exposure duration, frequency and medium intake rate) and exposure point concentrations. The dose equations therefore facilitate estimation of the received dose and account for the properties of the route of exposure, i.e. ingestion and inhalation.

For those substances that bio-accumulate, i.e. become more concentrated higher up the food chain, especially in body fats, the exposure to meats and milk is of particular significance.

The IRAP model user has the facility to adjust some of the key exposure factors. An example is the diet of the receptor and the proportion of which is local produce, which may be contaminated. Obviously, if a nearby resident eats no food grown locally, then that person’s diet cannot be contaminated by the emissions from the source, in this case the proposed Facility. It is conventional to investigate two types of receptor, a farmer and a resident. It is assumed that a farmer eats proportionately more locally grown food than a resident. Where the potential exists for the consumption of locally caught fish a fisher receptor may also be considered.

The receptor types can also be divided into adults and children. Children are important receptors because they tend to ingest soil and dusts directly and have lower body weights, so that the effect of the same dose is greater in the child than in the adult.

The IRAP model is designed to accept output files of airborne concentrations and deposition rates. From these, it proceeds to calculate the concentrations of the pollutants of concern in the environmental media, foodstuffs and the human receptor. The dose experienced by the human receptor can be compared to the tolerable daily intake (TDI) provided by the Committee on Toxicity for dioxins and dioxin like PCBs of 2 pg kg^{-1} d^{-1}. For trace metals, the impact is compared to background exposures from dietary sources.

The model requires a wide range of input parameters to be defined, these include:

- physical and chemical properties of the COPCs;
- site information, including site specific data; and
- receptor information – for each receptor type (e.g. adult or child, resident or farmer or fisher).

The HHRAP default values, which are incorporated into the IRAP model, have been used for the majority of these input values. These data are provided in the following sections.

3.2 INPUT PARAMETERS FOR THE COPCS

The IRAP model contains a database of physical and chemical parameters for each of the 206 COPCs. This database is based on default values provided by the HHRAP and all default values have been used for this assessment.

These parameters are used to determine how each of the COPCs behave in the environment and their presence and accumulation in various food products (meat, fish, animal products, vegetation, soil and water). For 2,3,7,8-TCDD (the most toxic of the PCDD/Fs), the default parameters are provided in *Table 3.1*.

TABLE 3.1 IRAP INPUT PARAMETERS FOR 2, 3, 7, 8-TCDD

Parameter Description	Symbol	Units	2,3,7,8-TCDD
Chemical abstract service number	CAS No.	-	1746-01-6
Molecular weight	MW	g $mole^{-1}$	322.0
Melting point of chemical	T_m	K	578.7
Vapour pressure	V_p	atm	1.97×10^{-12}
Aqueous solubility	S	mg L^{-1}	1.93×10^{-5}
Henry's Law constant	H	atm-m^3 mol^{-1}	3.29×10^{-5}
Diffusivity of COPC in air	D_a	cm^2 s^{-1}	0.104
Diffusivity of COPC in water	Dw	cm^2 s^{-1}	5.6×10^{-6}
Octanol-water partition coefficient	K_ow	-	6,309,573
Organic carbon-water partition coefficient	K_oc	mL g^{-1}	3,890,451
Soil-water partition coefficient	Kd_s	mL g^{-1}	38,904
Suspended sediments/surface water partition coefficient	Kd_sw	L kg^{-1}	291,784
Bed sediment/sediment pore water partition coefficient	Kd_bs	mL g^{-1}	155,618
COPC loss constant due to biotic and abiotic degradation	K_sg	a^{-1}	0.03
Fraction of COPC air concentration in vapour phase	f_v		0.664
Root concentration factor	RCF	mL g^{-1}	39,999

TABLE 3.1 IRAP INPUT PARAMETERS FOR 2, 3, 7, 8-TCDD

Parameter Description	Symbol	Units	2,3,7,8-TCDD
Plant-soil bioconcentration factor for below ground produce	br_root_veg	-	1.03
Plant-soil bioconcentration factor for leafy vegetables	br_leafy_veg	-	0.00455
Plant-soil bioconcentration factor for forage	br_forage	-	0.00455
COPC air-to-plant biotransfer factor for leafy vegetables	bv_leafy_veg	-	65,500
COPC air-to-plant biotransfer factor for forage	bv_forage	-	65,500
COPC biotransfer factor for milk	ba_milk	day kg^{-1}	0.0055
COPC biotransfer factor for beef	ba_beef	day kg^{-1}	0.026
COPC biotransfer factor for pork	ba_pork	day kg^{-1}	0.032
Bioconcentration factor for COPC in eggs	Bcf_egg	-	0.060
Bioconcentration factor for COPC in chicken	Bcf_chicken	-	3.32
Fish bioconcentration factor	BCF_fish	L kg^{-1}	34,400
Fish bioaccumulation factor	BAF_fish	L kg^{-1}	0
Biota-sediment accumulation factor	BSAF_fish	-	0.09
Plant-soil bioconcentration factor for grain	br_grain	-	0.00455
Plant-soil bioconcentration factor for eggs	br_egg	-	0.011
COPC biotransfer factor for chicken	ba_chicken	day kg^{-1}	0.019

3.3 SITE AND SITE SPECIFIC PARAMETERS

The IRAP health risk assessment model requires information relating to the location and its surroundings. The parameters required include the following.

- The fraction of animal feed (grain, silage and forage) grown on contaminated soils and quantity of animal feed and soil consumed by the various animal species considered.
- The interception fraction for above ground vegetation, forage and silage and length of vegetation exposure to deposition. The yield/standing crop biomass is also required.
- Input data for assessing the risks associated with exposure to breast milk, including:
  - body weight of infant;
  - exposure duration;
  - proportion of ingested COPC stored in fat;
  - proportion of mother’s weight that is fat;

- fraction of fat in breast milk;
- fraction of ingested contaminant that is absorbed; and
- half-life of dioxins in adults and ingestion rate of breast milk.

- Other physical parameters (e.g. soil dry bulk density, density of air, soil mixing zone depth).

For all of these parameters the IRAP/EPA HHRAP default values have been used and these are presented in *Annex A*. Other site specific parameters are also required which are not provided by the IRAP model. These parameters were based on observed meteorological conditions for the proposed Facility as follows:

- Annual average evapotranspiration rate of 29.9 cm a^{-1} (assumed to be 70% of total precipitation);
- Annual average precipitation of 42.7 cm a^{-1} (based on the average for the five year data set for the 2014 to 2018 meteorological data);
- Annual average irrigation of 0 cm a^{-1};
- Annual average runoff of 4.3 cm a^{-1} (assumed to be 10% of total precipitation);
- An annual average wind velocity of 4.5 m s^{-1} (average for the five years); and
- A time period over which deposition occurs of 30 years.

3.4 RECEPTOR INFORMATION

Within the IRAP model there are three receptor types; Resident, Farmer and Fisher. Information relating to each receptor type (adult and/or child) is required by the model where these receptor types are used. The information required includes the following:

- Food (meat, dairy products, fish and vegetables), water and soil consumption rates for each receptor type. However, only Fishers are assumed to consume fish and only Farmers are assumed to consume locally reared animals and animal products.
- Fraction of contaminated food, water and soil which is consumed by each receptor type.
- Input data for the inhalation exposure including: inhalation exposure duration, inhalation exposure frequency, inhalation exposure time; and inhalation rate.
- Input data for the ingestion exposure including: exposure duration, exposure frequency, exposure time; and body weight of receptor.

For the purposes of this assessment the default IRAP/HHRAP parameters have been used mainly to define the characteristics of the receptors. The input data used are presented in *Annex B*. The only variation to this is the assumed body weight of a child receptor. The IRAP/HHRAP default value is 15 kg whereas in the UK a value of 20 kg is typically used. Therefore, a value of 20 kg has been used.

4 EXPOSURE ASSESSMENT

4.1 EXPOSURE CRITERIA

The World Health Organization (WHO) recommends a tolerable daily intake (TDI) for dioxins/furans of 1 to 4 pg I-TEQ kg-BW^{-1} d^{-1} (picogrammes as the International Toxic Equivalent per kilogram bodyweight per day) [13]. The TDI represents the tolerable daily intake for lifetime exposure and short-term excursions above the TDI would have no consequence provided that the average intake over long periods is not exceeded. The UK Committee on Toxicity (COT) also provides a TDI for dioxins and dioxin-like PCBs of 2 pg I-TEQ kg-BW^{-1} d^{-1}.

4.2 SELECTION OF RECEPTORS

In addition to defining specific locations for assessment, IRAP can be used to determine the location of the maximum impact over an area based on the results of the dispersion model. For each defined land-use area, IRAP selects the locations which represent the maximum predicted concentrations or deposition rates for the area selected. The locations of these various maxima are often co-located resulting in the selection of one to nine receptor locations per defined area. This approach is adopted by IRAP since the maximum receptor impact may occur at any one of the maximum concentration or deposition locations identified.

Residential exposure within the immediate vicinity of the Facility is limited due to the rural and industrial nature of the site. The nearest residential areas are suburban areas of Boston such as Skirbeck to the north, Skirbeck Quarter to the west, Wyberton to the west and Bladon and Fishtoft located in more rural areas. In addition, there is a small area of housing on Marsh Lane immediately to the west of the Facility. Nine areas where residential exposure may occur have been defined based on residential areas around the proposed Facility. These are the nearest residential settlements.

The areas to the immediate south and east of the Facility are rural and have a land use that is dominated by agricultural areas. Three areas where the potential for farming exists have been defined. These includes areas to the east, west and north.

For each type of receptor up to nine locations are selected based on the maximum predicted airborne concentration, maximum predicted wet deposition rate and maximum dry deposition rate for the gas phase, particle phase and particle bound phase. For the assessment, seventeen Residential

13 Assessment of the Health Risk of Dioxins: Re-evaluation of the Tolerable Daily Intake (TD), WHO Consultation, May 25-29 1998, Geneva, Switzerland

receptors and five Farmer receptors have been assessed. It is considered that the likelihood of locally caught fish being consumed is low and fisher receptors have not been included in the assessment. For all of the receptor types, adult and child receptors have been considered. The locations of the Resident and Farmer receptors are described in *Table 4.1* and presented in *Figure 4.1*.

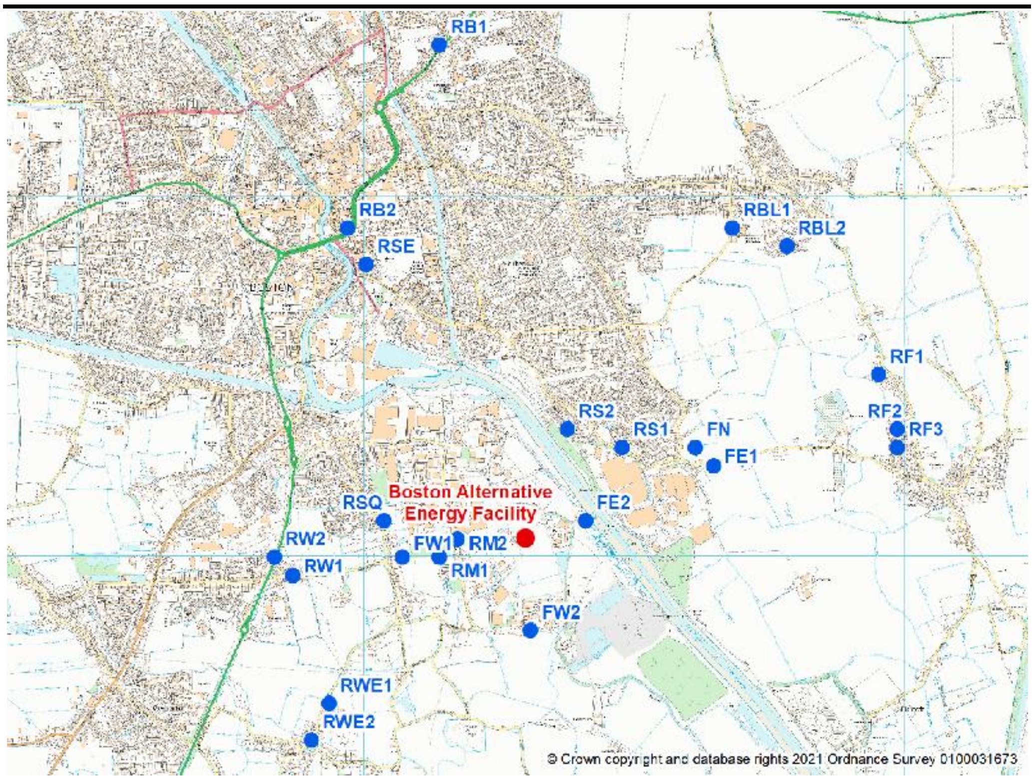
TABLE 4.1 DESCRIPTION OF RESIDENT AND FARMER RECEPTORS

Ref.	Name	Type	Easting	Northing
FE1	Farmer East 1	Farmer	534944	342501
FE2	Farmer East 2	Farmer	534233	342197
FN	Farmer North	Farmer	534843	342603
FW1	Farmer West 1	Farmer	533218	341993
FW2	Farmer West 2	Farmer	533928	341587
RBL1	Residential Bladon 1	Resident	535046	343822
RBL2	Residential Bladon 2	Resident	535350	343720
RB1	Residential Boston 1	Resident	533421	344837
RB2	Residential Boston 2	Resident	532913	343822
RF1	Residential Fishtoft 1	Resident	535858	343009
RF2	Residential Fishtoft 2	Resident	535960	342704
RF3	Residential Fishtoft 3	Resident	535960	342603
RM1	Residential Marsh Lane 1	Resident	533421	341993
RM2	Residential Marsh Lane 2	Resident	533522	342095
RS1	Residential Skirbeck 1	Resident	534436	342603
RS2	Residential Skirbeck 2	Resident	534132	342704
RSQ	Residential Skirbeck Quarter	Resident	533116	342197
RSE	Residential South End	Resident	533014	343618
RW1	Residential Wyberton 1	Resident	532608	341892
RW2	Residential Wyberton 2	Resident	532507	341993
RWE1	Residential Wyberton East 1	Resident	532811	341181
RWE2	Residential Wyberton East 2	Resident	532710	340978

At other locations not specifically included in the assessment, the predicted intakes will be lower than predicted for the discrete receptors considered.

It is assumed for the farmer receptors that land at the maximum predicted impact is used for both arable and pastureland and is considered to be representative of a worst-case.

FIGURE 4.1 LOCATION OF THE RESIDENT AND FARMER RECEPTORS



4.3 ASSESSMENT OF INTAKE

4.3.1 Ingestion Dose

The ingestion intake is calculated as the Average Daily Dose (ADD) from all ingestion exposure routes (e.g. soil, above ground vegetables, meat and dairy products) where for example:

$$ADD_{Ing,\,TCDD} = \frac{I_{Ing,\,TCDD} \times ED \times EF}{AT \times 365}$$

Where: $ADD_{Ing,\ TCDD}$ = total ingestion dose for TCDD; ED is the exposure duration (dependent on the receptor type); EF is the exposure frequency (350 days per year); and AT is the averaging time, and for determining the TDI, is assumed to be equal to the ED. The total dose is the sum of the dose for each of the individual congeners.

4.3.2 Inhalation Dose

For inhalation, the ADD from inhalation exposure is calculated as follows:

$$ADD_{Inh,\,TCDD} = \frac{C_a \times IR \times ED \times EF}{AT \times 365}$$

Where: $ADD_{Inh,\ TCDD}$ is the total inhalation does for TCDD, C_a is the concentration of TCDD in air and IR is the daily inhalation rate. The total dose is the sum of the dose for each of the individual congeners.

4.4 EXPOSURE TO DIOXINS AND FURANS

4.4.1 Comparison of Dioxin/Furan Exposure with WHO and UK COT Guidance

Facility Contribution to Intake

The average (lifetime) daily intake of dioxins/furans for the receptors considered is presented in *Table 4.2*. These are compared to the Committee on Toxicity (COT) TDI for dioxins and dioxin-like PCBs of 2 pg I-TEQ kg-BW^{-1} d^{-1}.

TABLE 4.2 COMPARISON OF AVERAGE DAILY INTAKES WITH THE UK COT AND WHO'S TDI FOR DIOXINS/FURANS (pg I-TEQ kg-BW^{-1} d^{-1})

Receptor Name	Adult	Child
Farmer East 1	0.19	0.28
Farmer East 2	0.14	0.20
Farmer North	0.21	0.30
Farmer West 1	0.065	0.095
Farmer West 2	0.047	0.068
Residential Bladon 1	0.0033	0.0092
Residential Bladon 2	0.0030	0.0085
Residential Boston 1	0.0011	0.0031
Residential Boston 2	0.00098	0.0028
Residential Fishtoft 1	0.0031	0.0087
Residential Fishtoft 2	0.0030	0.0086
Residential Fishtoft 3	0.0030	0.0085
Residential Marsh Lane 1	0.0024	0.0068
Residential Marsh Lane 2	0.0024	0.0068
Residential Skirbeck 1	0.011	0.031
Residential Skirbeck 2	0.0081	0.023
Residential Skirbeck Quarter	0.0023	0.0066
Residential South End	0.0011	0.0031
Residential Wyberton 1	0.0017	0.0049
Residential Wyberton 2	0.0017	0.0047
Residential Wyberton East 1	0.0011	0.0029
Residential Wyberton East 2	0.00092	0.0026
WHO TDI	*1 to 4 pg I-TEQ kg-BW^{-1} d^{-1}*	
Committee on Toxicity (COT) TDI	*2 pg I-TEQ kg-BW^{-1} d^{-1}*	

The maximum contribution of the Facility to the COT TDI is 15.1% for the Farmer North child receptor and 10.4% for the Farmer North adult receptor. This assumes as a worst-case that these receptors produce their own home reared and home-grown food at the location of maximum impact for the area and represents an extreme worst-case.

For the residential receptors, the maximum contribution of the Facility to the COT TDI is 1.5% for Resident Skirbeck 1 child receptor and 0.5% for Resident Skirbeck 1 adult receptor.

Total Intake

The contribution of the Facility to total intake is provided as follows:

- predicted incremental intake due to emissions from the Facility;
- average daily background intake (i.e. that arising from other sources), referred to as the mean daily intake (MDI);
- the total intake (i.e. the sum of the predicted incremental intake and the MDI);
- a comparison of the total intake with the TDI for dioxin/furans.

For the key receptors (i.e. those which represent the predicted highest exposure for the receptor types considered) the results are presented in *Table 4.3*. Results are presented for both adult and child receptors. The derivation of average background intakes is provided in *Section 2.7.1*.

A comparison of predicted intakes with the MDI and TDI is presented in *Table 4.3*. Results are presented for Farmer North and Resident Skirbeck 1 receptors where highest farmer and resident exposures are predicted.

TABLE 4.3 COMPARISON OF TOTAL INTAKE WITH THE COT TDI

Receptor	**Total Intake from the Facility (pg I-TEQ kg^{-1} d^{-1})**	**Total Intake Facility + MDI (pg I-TEQ kg^{-1} d^{-1})**	**Facility as %age of TDI**	**Total Intake as %age of TDI**
Farmer North Adult	0.21	0.83	10.4%	41.4%
Farmer North Child	0.30	1.47	15.1%	73.6%
Resident Skirbeck 1 Adult	0.011	0.63	0.5%	31.5%
Resident Skirbeck 1 Child	0.031	1.20	1.5%	60.0%
COT TDI	2	2	-	-

For inhalation and oral intake of PCDD/Fs for adults, total intake is well below the TDI. Background exposure represents approximately 31% of total exposure.

At worst, the Facility contributes 10.4% to the TDI for adults. Therefore, the total combined intake is 41.4% for the farmer receptor.

For inhalation and oral intake of PCDD/Fs for children, the background intake is 58.5% of the TDI. At worst, the additional contribution from the Facility for a child is 0.30 pg TEQ kg^{-1} d^{-1} (15% of the COT TDI). Combined with the background exposure for a 20 kg child (1.17 pg TEQ kg^{-1} d^{-1}) the total intake would be well below the TDI (73.6%). Furthermore, it should be noted that the TDI for PCCD/Fs is set for the purposes of assessing lifetime exposure and these elevated background exposures for children are therefore not representative of long-term exposure. For the resident child, the exposure from the Facility is substantially lower and the total intake represents 60.0% of the TDI for the highest residential receptor intake.

4.4.2 Infant Breast Milk Exposure to Dioxins and Furans

Another exposure pathway of interest is infant exposure to dioxins and furans via the ingestion of their mother's breast milk. This is because the potential for contamination of breast milk is particularly high for dioxin-like compounds such as these, as they are extremely lipophilic (fat soluble) and hence likely to accumulate in breast milk. Further, the infant body weight is smaller and it could be argued that the effect is therefore proportionately greater than in an adult.

This exposure is measured by the Average Daily Dose (ADD) on the basis of an averaging time of one year. In the US, a threshold value of 50 pg kg^{-1} d^{-1} of 2,3,7,8-TCDD TEQ is cited as being potentially harmful. The IRAP model calculates the ADD that would result from an adult receptor breast feeding an infant. It should be noted that the ADD calculated by IRAP does not consider dioxin-like PCBs. A summary of the ADD for each of the infants of adult receptors considered for the assessment is presented in *Table 4.4.*

The highest ADDs are calculated for the infants of farmer receptors and represent at worst less than 4.8% of the US EPA criterion of 50 pg kg^{-1} d^{-1} of 2,3,7,8-TCDD. The calculated ADDs for residential receptors are lower compared to the farmer since the most significant exposure to dioxins/furans is via the food chain, particularly animals and animal products. The farmer receptors are assumed to consume contaminated meat and dairy products. However, residential receptors are only assumed to consume vegetable products which are less significant with regard to exposure to dioxins/furans. For residential receptors, the highest exposure occurs for infants of the Resident Skirbeck 1 adult and are 0.2% of the US EPA criterion.

TABLE 4.4 ASSESSMENT OF THE AVERAGE DAILY DOSE FOR A BREAST-FED INFANT OF AN ADULT RECEPTOR

Receptor Name	**Average Daily Dose from Breast Feeding (pg kg^{-1} d^{-1} of 2,3,7,8-TCDD)**
Farmer East 1	2.2
Farmer East 2	1.4
Farmer North	2.4
Farmer West 1	0.76
Farmer West 2	0.52
Residential Bladon 1	0.031
Residential Bladon 2	0.029
Residential Boston 1	0.010
Residential Boston 2	0.0093
Residential Fishtoft 1	0.029
Residential Fishtoft 2	0.029
Residential Fishtoft 3	0.029
Residential Marsh Lane 1	0.023
Residential Marsh Lane 2	0.023
Residential Skirbeck 1	0.10
Residential Skirbeck 2	0.077
Residential Skirbeck Quarter	0.022
Residential South End	0.010
Residential Wyberton 1	0.017
Residential Wyberton 2	0.016
Residential Wyberton East 1	0.010
Residential Wyberton East 2	0.0088
US EPA Criterion	*50*
WHO criterion	*1 to 4*
UK criterion (COT)	*2*

As a worst case, the ADD for the highest exposure for the infants of farmers (Farmer North) is 120% of the COT TDI. For these receptors it is assumed, as a worst-case, that all of the adults food produce is reared and grown locally at the location of maximum impact in their area. However, as discussed previously, this is an extreme worst-case. Furthermore, the duration of exposure is short and the average daily intake over the lifetime of the individual would be substantially less.

The WHO recognises that breast-fed infants will be exposed to higher intakes for a short duration, but also that breast feeding itself provides associated benefits.

4.5 EXPOSURE TO TRACE METALS

The average daily intake of trace metals for the farmer and resident receptors with the highest intake (Farmer North and Resident Skirbeck 1) are presented in *Table 4.5* for the adult receptors and *Table 4.6* for the child receptors. Results for all receptors are provided in *Annex D*. Estimated background intakes for trace metals are provided in *Section 2.7.2.*

TABLE 4.5 COMPARISON OF METAL INTAKE WITH BACKGROUND INTAKES – FARMER NORTH AND SKIRBECK 1 ADULT RECEPTORS

Receptor/Metal	Facility Intake (μg kg^{-1} d^{-1})	Percentage of Lower Background Intake	Percentage of Upper Background Intake
Farmer North			
Antimony	2.1×10^{-7}	0.0%	0.0%
Arsenic	3.0×10^{-3}	0.3%	0.2%
Cadmium	5.1×10^{-4}	0.4%	0.3%
Chromium	4.6×10^{-2}	11.0%	4.2%
Lead	5.5×10^{-3}	8.9%	5.0%
Total mercury	1.4×10^{-3}	6.7%	3.6%
Nickel	1.9×10^{-2}	1.1%	1.0%
Thallium	1.3×10^{-2}	152.8%	15.7%
Resident Skirbeck 1			
Antimony	1.9×10^{-7}	0.0%	0.0%
Arsenic	1.6×10^{-3}	0.2%	0.1%
Cadmium	4.8×10^{-4}	0.4%	0.3%
Chromium	5.8×10^{-3}	1.4%	0.5%
Lead	2.4×10^{-3}	3.9%	2.2%
Total mercury	5.4×10^{-4}	2.6%	1.4%
Nickel	2.6×10^{-3}	0.2%	0.1%
Thallium	6.6×10^{-4}	7.9%	0.8%

For the Farmer North adult receptor, predicted intakes vary between 0.0% and 153% of the lower background intake and 0.0% and 15.7% of the upper background intake. For the Resident Skirbeck 1 adult receptor, predicted intakes vary between 0.0% and 7.9% of the lower background intake and 0.0% and 0.8% of the upper background intake.

TABLE 4.6 COMPARISON OF METAL INTAKE WITH BACKGROUND INTAKES – FARMER NORTH AND SKIRBECK 1 CHILD RECEPTORS

Receptor/Metal	Facility Intake ($\mu g\ kg^{-1}\ d^{-1}$)	Percentage of Lower Background Intake	Percentage of Upper Background Intake
Farmer North			
Antimony	4.7×10^{-7}	0.0%	0.0%
Arsenic	5.2×10^{-3}	0.4%	0.3%
Cadmium	1.2×10^{-3}	0.4%	0.3%
Chromium	7.4×10^{-2}	5.7%	3.2%
Lead	1.1×10^{-3}	8.9%	5.4%
Total mercury	2.6×10^{-3}	8.2%	4.0%
Nickel	3.0×10^{-2}	0.8%	0.7%
Thallium	1.5×10^{-2}	67.8%	9.3%
Resident Skirbeck 1			
Antimony	4.9×10^{-7}	0.0%	0.0%
Arsenic	3.8×10^{-3}	0.3%	0.2%
Cadmium	1.1×10^{-3}	0.4%	0.3%
Chromium	1.5×10^{-3}	1.2%	0.7%
Lead	5.8×10^{-3}	4.8%	2.9%
Total mercury	1.4×10^{-3}	4.4%	2.2%
Nickel	6.3×10^{-3}	0.2%	0.2%
Thallium	2.1×10^{-3}	9.6%	1.3%

For the Farmer North child receptor, predicted intakes vary between 0.0% and 67.8% of the lower background intake and 0.0% and 9.3% of the upper background intake. For the Resident Skirbeck 1 child receptor, predicted intakes vary between 0.0% and 9.6% of the lower background intake and 0.0% and 1.3% of the upper background intake.

Predicted intakes for thallium for farmer receptors are relatively high compared to the lower background intake. However, this represents worst-case conditions with the farmer receptor located at the point of maximum impact and consuming entirely home grown and home reared foods. Furthermore, this is for worst-case emissions for thallium which are assumed to be 50% of the Group 1 limit of 0.02 mg Nm^{-3}. As discussed in *Section 2.4.3*, information provided in the Tolvic report suggests that combined cadmium and thallium are 4% of the IED limit of 0.05 mg Nm^{-3}. Therefore, if this comprised entirely of thallium, an emission concentration of 0.002 mg Nm^{-3} would be more appropriate (a factor of five lower than assumed). For this more typical emission concentration, the intake of metals would be reduced to the following:

- 0.0026 $\mu g\ kg^{-1}\ d^{-1}$ for the Farmer North adult (31.0% of the lower intake and 3.2% of the upper background intake; and

- 0.0030 µg kg^{-1} d^{-1} for the Farmer North child (13.6% of the lower intake and 1.9% of the upper background intake.

4.6 CUMULATIVE IMPACTS

4.6.1 Introduction

A cumulative assessment of the impact of combined emissions from the Facility with the Biomass UK No. 3 Ltd adjacent to the site has been undertaken. The Biomass plant is located to the immediate east of the BAEF. Dispersion modelling of emissions and a subsequent human health risk assessment for PCDD/Fs and dioxin-like PCBs and trace metals has been carried out. Emission parameters for the Biomass plant are assumed to be as follows.

- Stack height of 44 m;
- stack diameter of 1.6 m;
- emission velocity of 17.8 m s^{-1};
- actual flow rate of 35.7 Am^3 s^{-1};
- normalised flow rate of 21.6 Nm^3 s^{-1}; and
- emission temperature of 146 °C.

The decision document for the permit application for Biomass UK No. 3 indicates that emissions would be in accordance with the IED as follows:

- 0.1 ng Nm^{-3} for dioxins/furans;
- 0.05 mg Nm^{-3} for Group 1 metals;
- 0.05 mg Nm^{-3} for Group 2 metals; and
- 0.5 mg Nm^{-3} for Group 3 metals.

4.6.2 Comparison of Dioxin/Furan Exposure with WHO and UK COT Guidance

Combined Contribution to Intake

The average (lifetime) daily intakes of dioxins/furans for the combined emissions from the BAEF and Biomass plant are presented in *Table 4.7* and *Table 4.8* for adult and child receptors, respectively. These are also compared to the Committee on Toxicity (COT) TDI for dioxins and dioxin-like PCBs of 2 pg I-TEQ kg-BW^{-1} d^{-1}.

TABLE 4.7 CUMULATIVE IMPACT OF THE BAEF AND BIOMASS PLANT ON AVERAGE DAILY INTAKES FOR DIOXINS/FURANS (pg I-TEQ kg-BW^{-1} d^{-1}) - ADULTS

Receptor Name	BAEF Adult	Biomass Plant Adult	Combined Adult
Farmer East 1	0.19	0.028	0.22
Farmer East 2	0.14	0.012	0.15
Farmer North	0.21	0.028	0.24
Farmer West 1	0.065	0.012	0.077
Farmer West 2	0.047	0.0099	0.057
Residential Bladon 1	0.0033	0.00040	0.0037
Residential Bladon 2	0.0030	0.00037	0.0034
Residential Boston 1	0.0011	0.00012	0.0012
Residential Boston 2	0.00098	0.00011	0.0011
Residential Fishtoft 1	0.0031	0.00037	0.0035
Residential Fishtoft 2	0.0030	0.00040	0.0034
Residential Fishtoft 3	0.0030	0.00039	0.0034
Residential Marsh Lane 1	0.0024	0.00054	0.0029
Residential Marsh Lane 2	0.0024	0.00055	0.0029
Residential Skirbeck 1	0.011	0.0015	0.012
Residential Skirbeck 2	0.0081	0.0010	0.0092
Residential Skirbeck Quarter	0.0023	0.00032	0.0026
Residential South End	0.0011	0.00012	0.0012
Residential Wyberton 1	0.0017	0.00024	0.0020
Residential Wyberton 2	0.0017	0.00022	0.0019
Residential Wyberton East 1	0.0011	0.00014	0.0012
Residential Wyberton East 2	0.00092	0.00012	0.0010
WHO TDI	*1 to 4 pg I-TEQ kg-BW^{-1} d^{-1}*		
Committee on Toxicity (COT) TDI	*2 pg I-TEQ kg-BW^{-1} d^{-1}*		

For the Farmer North adult receptor, the combined impact is 14% higher compared to the BAEF alone. The intake for this receptor is 12.0% of the TDI. For Skirbeck 1 adult, the combined predicted intake is 0.6% of the TDI compared to 0.5% for the BAEF alone.

For the Farmer North child receptor, the combined impact is 13% higher compared to the BAEF alone. The intake for this receptor is 17.0% of the TDI. For Skirbeck 1 child, the combined predicted intake is 1.8% of the TDI compared to 1.5% for the BAEF alone.

TABLE 4.8 **CUMULATIVE IMPACT OF THE BAEF AND BIOMASS PLANT ON AVERAGE DAILY INTAKES FOR DIOXINS/FURANS (pg I-TEQ kg-BW^{-1} d^{-1}) - CHILDREN**

Receptor Name	BAEF Child	Biomass Plant Child	Combined Child
Farmer East 1	0.28	0.040	0.32
Farmer East 2	0.20	0.018	0.22
Farmer North	0.30	0.041	0.34
Farmer West 1	0.095	0.017	0.11
Farmer West 2	0.068	0.014	0.082
Residential Bladon 1	0.0092	0.0011	0.010
Residential Bladon 2	0.0085	0.0010	0.0095
Residential Boston 1	0.0031	0.00035	0.0034
Residential Boston 2	0.0028	0.00032	0.0031
Residential Fishtoft 1	0.0087	0.0010	0.0097
Residential Fishtoft 2	0.0086	0.0011	0.0097
Residential Fishtoft 3	0.0085	0.0011	0.0096
Residential Marsh Lane 1	0.0068	0.0015	0.0083
Residential Marsh Lane 2	0.0068	0.0015	0.0084
Residential Skirbeck 1	0.031	0.0043	0.035
Residential Skirbeck 2	0.023	0.0029	0.026
Residential Skirbeck Quarter	0.0066	0.00089	0.0075
Residential South End	0.0031	0.00035	0.0034
Residential Wyberton 1	0.0049	0.00067	0.0056
Residential Wyberton 2	0.0047	0.00062	0.0053
Residential Wyberton East 1	0.0029	0.00039	0.0033
Residential Wyberton East 2	0.0026	0.00033	0.0029
WHO TDI	*1 to 4 pg I-TEQ kg-BW^{-1} d^{-1}*		
Committee on Toxicity (COT) TDI	*2 pg I-TEQ kg-BW^{-1} d^{-1}*		

Total Intake

A comparison of predicted intakes with the MDI and TDI is presented in *Table 4.9*. Results are presented for Farmer North and Resident Skirbeck 1 where highest farmer and resident exposures are predicted.

TABLE 4.9 COMPARISON OF TOTAL INTAKE WITH THE COT TDI – COMBINED BAEF AND BIOMASS PLANT EMISSIONS

Receptor	Intake from the BAEF + Biomass (pg I-TEQ kg^{-1} d^{-1})	Total Intake BAEF + Biomass + MDI (pg I-TEQ kg^{-1} d^{-1})	BAEF + Biomass as %age of TDI	Total Intake as %age of TDI
Farmer North Adult	0.24	0.86	11.8%	42.8%
Farmer North Child	0.34	1.51	17.2%	75.7%
Resident Skirbeck 1 Adult	0.012	0.63	0.62%	31.6%
Resident Skirbeck 1 Child	0.035	1.20	1.7%	60.2%
COT TDI	2	2	-	-

For inhalation and oral intake of PCDD/Fs for adults, the total combined intake is well below the TDI. At worst, the BAEF and Biomass plant contribute 11.8% to the TDI for adults. Therefore, the total combined impact is 42.8% for the farmer receptor.

For inhalation and oral intake of PCDD/Fs for children, the background intake is 58.5% of the TDI. At worst, the additional contribution from the BAEF and Biomass plant combined for a child is 0.34 pg TEQ kg^{-1} d^{-1} (17.2% of the COT TDI). Combined with the background exposure for a 20 kg child (1.17 pg TEQ kg^{-1} d^{-1}) the total intake would be well below the TDI (75.7%). Furthermore, it should be noted that the TDI for PCCD/Fs is set for the purposes of assessing lifetime exposure and these elevated background exposures for children are therefore not representative of long-term exposure. For the resident child, the combined exposure from the BAEF and Biomass plant is substantially lower and the total intake represents 60.2% of the TDI for the highest residential receptor intake.

4.6.3 Cumulative Exposure to Trace Metals

The average (lifetime) daily intake of trace metals for the farmer and resident receptors with the highest intake (Farmer North and Resident Skirbeck 1) are presented in *Table 4.10* for the adult receptors and *Table 4.11* for the child receptors. Results for all receptors are provided in *Annex D*. Estimated background intakes for trace metals are provided in *Section 2.7.2.*

For the BAEF, emission concentrations for the trace metals are as provided in *Section 2.4.3*. Emissions for the Biomass plant are based on the IED emission limit values. Therefore, the following have been assumed.

- Cadmium and thallium 50% of the group ELV of 0.05 mg Nm^{-3};
- Mercury 100% of the group ELV of 0.05 mg Nm^{-3};

- Group 3 metals assumed to be 1/9th of the ELV of 0.5 mg Nm^{-3} except for chromium which is assumed to be 18.4% of the ELV.

TABLE 4.10 COMPARISON OF METAL INTAKE WITH BACKGROUND INTAKES – FARMER NORTH AND SKIRBECK 1 ADULT RECEPTORS – CUMULATIVE IMPACT

Receptor/Metal	BAEF + Biomass Intake (μg kg^{-1} d^{-1})	Percentage of Lower Background Intake	Percentage of Upper Background Intake
Farmer North			
Antimony	2.4×10^{-7}	0.0%	0.0%
Arsenic	3.5×10^{-3}	0.4%	0.3%
Cadmium	6.5×10^{-4}	0.5%	0.3%
Chromium	5.1×10^{-2}	12.1%	4.6%
Lead	6.1×10^{-3}	9.9%	5.6%
Total mercury	1.8×10^{-3}	8.5%	4.6%
Nickel	2.2×10^{-2}	1.3%	1.1%
Thallium	1.6×10^{-2}	192.4%	19.7%
Resident Skirbeck 1			
Antimony	2.2×10^{-7}	0.0%	0.0%
Arsenic	1.9×10^{-3}	0.2%	0.2%
Cadmium	6.1×10^{-4}	0.5%	0.3%
Chromium	6.5×10^{-3}	1.5%	0.6%
Lead	2.7×10^{-3}	4.4%	2.5%
Total mercury	7.0×10^{-4}	3.4%	1.8%
Nickel	2.9×10^{-3}	0.2%	0.2%
Thallium	8.5×10^{-4}	10.1%	1.0%

For the Farmer North adult receptor, predicted combined intakes vary between 0.0% and 192% of the lower background intake and 0.0% and 19.7% of the upper background intake. For the Resident Skirbeck 1 adult receptor, predicted intakes vary between 0.0% and 10.1% of the lower background intake and 0.0% and 1.0% of the upper background intake.

TABLE 4.11 COMPARISON OF METAL INTAKE WITH BACKGROUND INTAKES – FARMER NORTH AND SKIRBECK 1 CHILD RECEPTORS – CUMULATIVE IMPACT

Receptor/Metal	Facility Intake ($\mu g\ kg^{-1}\ d^{-1}$)	Percentage of Lower Background Intake	Percentage of Upper Background Intake
Farmer North			
Antimony	5.4×10^{-7}	0.0%	0.0%
Arsenic	6.1×10^{-3}	0.4%	0.3%
Cadmium	1.5×10^{-3}	0.5%	0.4%
Chromium	8.2×10^{-2}	6.3%	3.5%
Lead	1.2×10^{-3}	10.0%	6.0%
Total mercury	3.3×10^{-3}	10.3%	5.1%
Nickel	3.3×10^{-2}	0.9%	0.8%
Thallium	1.9×10^{-2}	85.4%	11.7%
Resident Skirbeck 1			
Antimony	5.7×10^{-7}	0.0%	0.0%
Arsenic	4.6×10^{-3}	0.3%	0.2%
Cadmium	1.5×10^{-3}	0.5%	0.4%
Chromium	1.7×10^{-3}	1.3%	0.7%
Lead	6.6×10^{-3}	5.5%	3.3%
Total mercury	1.8×10^{-3}	5.7%	2.8%
Nickel	7.0×10^{-3}	0.2%	0.2%
Thallium	2.7×10^{-3}	12.3%	1.7%

For the Farmer North child receptor, predicted intakes vary between 0.0% and 85.4% of the lower background intake and 0.0% and 11.7% of the upper background intake. For the Resident Skirbeck 1 child receptor, predicted intakes vary between 0.0% and 12.3% of the lower background intake and 0.0% and 1.7% of the upper background intake.

As discussed in *Section 4.5*, predicted intakes for thallium for farmer receptors are relatively high compared to the lower background intake. However, this represents worst-case conditions with the farmer receptor located at the point of maximum impact and consuming entirely home grown and home reared foods. Furthermore, this is for worst-case emissions for thallium which are assumed to be 50% of the Group 1 limit of 0.02 mg Nm^{-3} for the BAEF and 50% of the Group 1 limit of 0.05 mg Nm^{-3} for the Biomass plant. As discussed in *Section 2.4.3*, information provided in the Tolvic report suggest that combined cadmium and thallium are 4% of the IED limit of 0.05 mg Nm^{-3}. Therefore, if this comprised entirely of thallium, an emission concentration of 0.002 mg Nm^{-3}

would be more appropriate. For this more typical emission concentration, the combined intake of metals would be reduced to the following:

- 0.0028 µg kg^{-1} d^{-1} for the Farmer North adult (33.7% of the lower intake and 3.5% of the upper background intake; and
- 0.0033 µg kg^{-1} d^{-1} for the Farmer North child (15.0% of the lower intake and 2.1% of the upper background intake.

5 SUMMARY AND CONCLUSIONS

5.1 SUMMARY

The possible impacts on human health arising from dioxins and furans (PCDD/F) and dioxin-like PCBs and trace metals emitted from the proposed Boston Alternative Energy Facility (BAEF) to the south of Boston have been assessed under the worst-case scenario, namely that of an individual exposed for a lifetime to the effects of the highest airborne concentrations and consuming mostly locally farm produced food (e.g. grain, vegetables, dairy foods, eggs and meat). This equates to a hypothetical farmer consuming food grown on the farm, situated at the closest proximity to the Facility. Where there are no active farming areas in close proximity, a residential receptor is considered where it is assumed that the resident consumes locally grown vegetables.

The assessment has identified and considered the most plausible pathways of exposure for the individuals considered (farmer and resident). Deposition and subsequent uptake of the compounds of potential concern (COPCs) into the food chain is likely to be the more numerically significant pathway over direct inhalation.

For PCDD/Fs and dioxin-like PCBs, the maximum contribution of the Facility to the COT TDI is 15.1% for the farmer receptors and 1.5% for the residential receptors. For the farmer this assumes as a worst-case that these receptors are located at the closest farming area to the Facility and all of their food is reared and grown at this location and represents an extreme worst-case. Combined with the background intake of PCDD/Fs and dioxin-like PCBs (i.e. from other sources), the total intake (BAEF plus background) is well below the COT TDI. Therefore, the impact of PCCD/F emissions on local sensitive receptors is considered to be not significant.

For trace metals, predicted intakes vary between 0.0% and 153% of the lower background intake and 0.0% and 15.7% of the upper background intake for the worst-case farmer receptor. For the worst-case resident, predicted intakes vary between 0.0% and 7.9% of the lower background intake and 0.0% and 0.8% of the upper background intake. The predicted intakes for child receptors are lower than for adult receptors. Highest intakes are predicted for thallium for farmer receptors. However, the predicted intakes represent worst-case conditions with the farmer receptor located at the point of maximum impact and consuming entirely home grown and home reared foods. Furthermore, predicted intakes are for worst-case emissions for thallium which are assumed to be 50% of the Group 1 limit of 0.02 mg Nm^{-3}. Actual emissions are likely to be substantially less than this as published in the 2020 annual report on UK Energy from Waste Statistics provided by Tolvik Consulting. Therefore, taking into consideration the conservative assumptions adopted, the impact of trace metal emissions on local sensitive receptors is considered to be not significant.

This assessment also considered the cumulative impact with the adjacent Biomass UK No. 3 Ltd facility. This considered the additional contribution from the Biomass plant at the receptors identified for the BAEF. For the Farmer North receptors, the combined impact is around 14% higher compared to the BAEF alone and total intakes (combined developments plus background) are well below the COT TDI. For trace metals, predicted combined intakes are between 10% and 26% higher than for the BAEF alone.

5.2 CONCLUSIONS

The risk assessment methodology used in this assessment has been structured so as to create worst case estimates of risk. A number of features in the methodology give rise to this degree of conservatism. Taking into account the conservative nature of the assessment, it has been demonstrated that for the maximally exposed individual, exposure to dioxins, furans and dioxin-like PCBs and trace metals is not significant.

ANNEX A

SITE PARAMETERS

Annex A: Site Parameters Defined for the Health Risk Assessment

Parameter	Parameter Value	IRAP Symbol	Units
Soil dry bulk density	1.5	bd	g cm^{-3}
Forage fraction grown on contam. soil eaten by CATTLE	1.0	beef_fi_forage	--
Grain fraction grown on contam. soil eaten by CATTLE	1.0	beef_fi_grain	--
Silage fraction grown on contam. eaten by CATTLE	1.0	beef_fi_silage	--
Qty of forage eaten by CATTLE each day	8.8	beef_qp_forage	kg DW d^{-1}
Qty of grain eaten by CATTLE each day	0.47	beef_qp_grain	kg DW d^{-1}
Qty of silage eaten by CATTLE each day	2.5	beef_qp_silage	kg DW d^{-1}
Grain fraction grown on contam. soil eaten by CHICKEN	1.0	chick_fi_grain	--
Qty of grain eaten by CHICKEN each day	0.2	chick_qp_grain	kg DW d^{-1}
Fish lipid content	0.07	f_lipid	--
Fraction of CHICKEN's diet that is soil	0.1	fd_chicken	--
Universal gas constant	8.205e-5	gas_r	atm-m^3 mol^{-1} K^{-1}
Plant surface loss coefficient	18	kp	a^{-1}
Fraction of mercury emissions NOT lost to the global cycle	0.48	merc_q_corr	--
Fraction of mercury speciated into methyl mercury in produce	0.22	mercmethyl_ag	--
Fraction of mercury speciated into methyl mercury in soil	0.02	mercmethyl_sc	--
Forage fraction grown contam. soil, eaten by MILK CATTLE	1.0	milk_fi_forage	--
Grain fraction grown contam. soil, eaten by MILK CATTLE	1.0	milk_fi_grain	--
Silage fraction grown contam. soil, eaten by MILK CATTLE	1.0	milk_fi_silage	--
Qty of forage eaten by MILK CATTLE each day	13.2	milk_qp_forage	kg DW d^{-1}
Qty of grain eaten by MILK CATTLE each day	3.0	milk_qp_grain	kg DW d^{-1}
Qty of silage eaten by MILK CATTLE each day	4.1	milk_qp_silage	kg DW d^{-1}
Averaging time	1	milkfat_at	a
Body weight of infant	9.4	milfat_bw_infant	kg
Exposure duration of infant to breast milk	1	milkfat_ed	a
Proportion of ingested dioxin that is stored in fat	0.9	milkfat_f1	--
Proportion of mothers weight that is fat	0.3	milkfat_f2	--
Fraction of fat in breast milk	0.04	milkfat_f3	--
Fraction of ingested contaminant that is absorbed	0.9	milkfat_f4	--
Half-life of dioxin in adults	2555	milkfat_h	d
Ingestion rate of breast milk	0.688	milkfat_ir_milk	kg d^{-1}
Viscosity of air corresponding to air temp.	1.81e-04	mu_a	g cm^{-1} s^{-1}
Fraction of grain grown on contam. soil eaten by PIGS	1.0	pork_fi_grain	--
Fraction of silage grown on contam. soil and eaten by PIGS	1.0	pork_fi_silage	--
Qty of grain eaten by PIGS each day	3.3	pork_qp_grain	kg DW d^{-1}
Qty of silage eaten by PIGS each day	1.4	pork_qp_silage	kg DW d^{-1}
Qty of soil eaten by CATTLE	0.5	qs_beef	kg d^{-1}
Qty of soil eaten by CHICKEN	0.022	qs_chick	kg d^{-1}
Qty of soil eaten by DAIRY CATTLE	0.4	qs_milk	kg d^{-1}
Qty of soil eaten by PIGS	0.37	qs_pork	kg d^{-1}
Density of air	1.2e-3	rho_a	g cm^{-3}
Solids particle density	2.7	rho_s	g cm^{-3}
Interception fraction - edible portion ABOVEGROUND	0.39	rp	--
Interception fraction - edible portion FORAGE	0.5	rp_forage	--
Interception fraction - edible portion SILAGE	0.46	rp_silage	--
Ambient air temperature	298	t	K
Temperature correction factor	1.026	theta	--
Soil volumetric water content	0.2	theta_s	mL cm^{-3}
Length of plant expos. to depos. - ABOVEGROUND	0.16	tp	a
Length of plant expos. to depos. - FORAGE	0.12	tp_forage	a
Length of plant expos. to depos. - SILAGE	0.16	tp_silage	a
Average annual wind speed	3.9	u	m s^{-1}
Dry deposition velocity	0.5	vdv	cm s^{-1}
Dry deposition velocity for mercury	2.9	vdv_hg	cm s^{-1}
Wind velocity	3.9	w	m s^{-1}
Yield/standing crop biomass - edible portion ABOVEGROUND	2.24	yp	kg DW m^{-2}
Yield/standing crop biomass - edible portion FORAGE	0.24	yp_forage	kg DW m^{-2}
Yield/standing crop biomass - edible portion SILAGE	0.8	yp_silage	kg DW m^{-2}
Soil mixing zone depth	2.0	z	cm

ANNEX B

SCENARIO PARAMETERS

Annex B: Exposure Scenario Parameters

Parameter Description	Adult Resident	Child Resident	Adult Farmer	Child Farmer	Adult Fisher	Child Fisher	Units
Averaging time for carcinogens	70	70	70	70	70	70	a
Averaging time for noncarcinogens	30	6	40	6	30	6	a
Consumption rate of BEEF	0.0	0.0	0.00122	0.00075	0.0	0.0	kg kg^{-1} FW d^{-1}
Body weight	70	15	70	15	70	15	kg
Consumption rate of POULTRY	0.0	0.0	0.00066	0.00045	0.0	0.0	kg kg^{-1} FW d^{-1}
Consumption rate of ABOVEGROUND PRODUCE	0.00032	0.00077	0.00047	0.00113	0.00032	0.00077	kg kg^{-1} DW d^{-1}
Consumption rate of BELOWGROUND PRODUCE	0.00014	0.00023	0.00017	0.00028	0.00014	0.00023	kg kg^{-1} DW d^{-1}
Consumption rate of DRINKING WATER	1.4	0.67	1.4	0.67	1.4	0.67	L d^{-1}
Consumption rate of PROTECTED ABOVEGROUND PRODUCE	0.00061	0.0015	0.00064	0.00157	0.00061	0.0015	kg kg^{-1} DW d^{-1}
Consumption rate of SOIL	0.0001	0.0002	0.0001	0.0002	0.0001	0.0002	kg d^{-1}
Exposure duration	30	6	40	6	30	6	yr
Exposure frequency	350	350	350	350	350	350	d a^{-1}
Consumption rate of EGGS	0.0	0.0	0.00075	0.00054	0.0	0.0	kg kg^{-1} FW d^{-1}
Fraction of contaminated ABOVEGROUND PRODUCE	1.0	1.0	1.0	1.0	1.0	1.0	--
Fraction of contaminated DRINKING WATER	1.0	1.0	1.0	1.0	1.0	1.0	--
Fraction contaminated SOIL	1.0	1.0	1.0	1.0	1.0	1.0	--
Consumption rate of FISH	0.0	0.0	0.0	0.0	0.00125	0.00088	kg kg^{-1} FW d^{-1}
Fraction of contaminated FISH	1.0	1.0	1.0	1.0	1.0	1.0	--
Inhalation exposure duration	30	6	40	6	30	6	a
Inhalation exposure frequency	350	350	350	350	350	350	d a^{-1}
Inhalation exposure time	24	24	24	24	24	24	h d^{-1}
Fraction of contaminated BEEF	1	1	1	1	1	1	--
Fraction of contaminated POULTRY	1	1	1	1	1	1	--
Fraction of contaminated EGGS	1	1	1	1	1	1	--
Fraction of contaminated MILK	1	1	1	1	1	1	--
Fraction of contaminated PORK	1	1	1	1	1	1	--
Inhalation rate	0.83	0.30	0.83	0.30	0.83	0.30	m^{3} h^{-1}
Consumption rate of MILK	0.0	0.0	0.01367	0.02268	0.0	0.0	kg kg^{-1} FW d^{-1}
Consumption rate of PORK	0.0	0.0	0.00055	0.00042	0.0	0.0	kg kg^{-1} FW d^{-1}
Time period at the beginning of combustion	0	0	0	0	0	0	a
Length of exposure duration	30	6	40	6	30	6	a

ANNEX C

ESTIMATION OF 2012 BACKGROUND PCDD/F INTAKES

Calculation of Dietary Intake of PCDD/Fs and Dioxin-like PCBs

Adult - 70 kg

Foodstuff	**ng/kg WHO TEQ/kg fat basis 2001**	**ng/kg fat WHO TEQ upper 2012**	**NDNS Years 5-6 Total Fat Intake %**	**NDNS Years 5-6 Total Fat Intake % Normalised**	**Average Daily Fat Intake (g/d)**	**Intake pgTEQ/kgBW/d 2001 but 2012 Diet**	**Intake pgTEQ/kgBW/d 2012**	**Intake Normalised for 2001 Discrepancy 2012**
Bread	0.35	0.277	4.2	4.6	3.1	0.0155	0.0123	0.016
Cereals	0.26	0.134	17.1	18.6	12.6	0.0469	0.0241	0.032
Carcass Meat	0.73	0.534	6.3	6.9	4.6	0.0485	0.0355	0.047
Offal	7.32	1.925	0.2	0.2	0.1	0.0154	0.0041	0.005
Meat Products	0.42	0.203	9.7	10.6	7.2	0.0429	0.0208	0.027
Poultry	0.71	0.148	6.1	6.6	4.5	0.0456	0.0095	0.013
Fish	4.63	3.499	4.6	5.0	3.4	0.2245	0.1696	0.224
fats & Oils	0.19	0.124	9.7	10.6	7.2	0.0194	0.0127	0.017
Eggs	0.44	0.463	4.3	4.7	3.2	0.0199	0.0210	0.028
Sugar	0.45	0.919	3.8	4.1	2.8	0.0180	0.0368	0.049
Green Vegetables	0.84	1.577	0.5	0.5	0.4	0.0044	0.0083	0.011
Potatoes	0.4	0.186	5.2	5.7	3.8	0.0219	0.0102	0.013
Other vegetables	0.37	0.965	1.65	1.8	1.2	0.0064	0.0168	0.022
Canned vegetables	0.45	0.392	1.65	1.8	1.2	0.0078	0.0068	0.009
Fresh Fruit	0.95	1.535	0.45	0.5	0.3	0.0045	0.0073	0.010
Fruit Products	1.26	1.778	0.45	0.5	0.3	0.0060	0.0084	0.011
Milk	0.9	0.421	5	5.4	3.7	0.0474	0.0222	0.029
Milk& Dairy Products	0.89	0.452	8.7	9.5	6.4	0.0816	0.0414	0.055
Nuts	0.2	0.045	2.3	2.5	1.7	0.0048	0.0011	0.001
			91.9	100	67.8	0.68	0.47	0.62

Child - 20 kg, 4 to 10 years

Foodstuff	**ng/kg WHO TEQ/kg fat basis 2001**	**ng/kg fat WHO TEQ upper 2012**	**NDNS Years 5-6 Total Fat Intake %**	**NDNS Years 5-6 Total Fat Intake % Normalised**	**Average Daily Fat Intake (g/d)**	**Intake pgTEQ/kgBW/d 2001 but 2012 Diet**	**Intake pgTEQ/kgBW/d 2012**	**Intake Normalised for 2001 Discrepancy 2012**
Bread	0.35	0.277	4.0	4.3	2.4	0.0413	0.0327	0.034
Cereals	0.26	0.134	21.0	22.8	12.4	0.1609	0.0829	0.088
Carcass Meat	0.73	0.534	3.6	3.9	2.1	0.0774	0.0567	0.060
Offal	7.32	1.925	0.1	0.1	0.1	0.0216	0.0057	0.006
Meat Products	0.42	0.203	9.5	10.3	5.6	0.1176	0.0568	0.060
Poultry	0.71	0.148	5.3	5.7	3.1	0.1109	0.0231	0.024
Fish	4.63	3.499	2.7	2.9	1.6	0.3684	0.2784	0.294
fats & Oils	0.19	0.124	8.9	9.6	5.2	0.0498	0.0325	0.034
Eggs	0.44	0.463	2.1	2.3	1.2	0.0272	0.0287	0.030
Sugar	0.45	0.919	4.9	5.3	2.9	0.0650	0.1327	0.140
Green Vegetables	0.84	1.577	0.4	0.4	0.2	0.0099	0.0186	0.020
Potatoes	0.4	0.186	5.8	6.3	3.4	0.0684	0.0318	0.034
Other vegetables	0.37	0.965	0.9	1.0	0.5	0.0098	0.0256	0.027
Canned vegetables	0.45	0.392	0.9	1.0	0.5	0.0119	0.0104	0.011
Fresh Fruit	0.95	1.535	0.3	0.3	0.2	0.0084	0.0136	0.014
Fruit Products	1.26	1.778	0.3	0.3	0.2	0.0111	0.0157	0.017
Milk	0.9	0.421	10.6	11.5	6.2	0.2811	0.1315	0.139
Milk& Dairy Products	0.89	0.452	9.8	10.6	5.8	0.2570	0.1305	0.138
Nuts	0.2	0.045	1.2	1.3	0.7	0.0071	0.0016	0.002
			92.3	100	54.4	1.70	1.11	1.17

ANNEX D

PREDICTED TRACE METAL INTAKES

Metal Intake for the Boston Alternative Energy Facility

Receptor	Receptor Type	Source	COPC	EFW Intake ug/kgBW/d	Lower Background ug/kgBW/d	%age	Upper Background ug/kg/d	%age
Farm East 1	farmer_adult	EFW	Antimony	2.0E-07	0.016	0.0%	0.029	0.0%
Farm East 1	farmer_adult	EFW	Arsenic	2.7E-03	0.95	0.3%	1.23	0.2%
Farm East 1	farmer_adult	EFW	Cadmium	4.7E-04	0.12	0.4%	0.19	0.2%
Farm East 1	farmer_adult	EFW	Chromium	4.2E-02	0.42	10.0%	1.1	3.8%
Farm East 1	farmer_adult	EFW	Lead	5.0E-03	0.062	8.1%	0.11	4.5%
Farm East 1	farmer_adult	EFW	Total mercury	1.3E-03	0.022	6.2%	0.041	3.3%
Farm East 1	farmer_adult	EFW	Nickel	1.8E-02	1.7	1.0%	1.9	0.9%
Farm East 1	farmer_adult	EFW	Thallium	1.2E-02	0.0084	140.2%	0.082	14.4%
Farm East 1	farmer_child	EFW	Antimony	4.5E-07	0.028	0.0%	0.055	0.0%
Farm East 1	farmer_child	EFW	Arsenic	4.7E-03	1.5	0.3%	2.1	0.2%
Farm East 1	farmer_child	EFW	Cadmium	1.1E-03	0.28	0.4%	0.41	0.3%
Farm East 1	farmer_child	EFW	Chromium	6.8E-02	1.3	5.2%	2.3	2.9%
Farm East 1	farmer_child	EFW	Lead	9.8E-03	0.12	8.1%	0.20	4.9%
Farm East 1	farmer_child	EFW	Total mercury	2.4E-03	0.033	7.5%	0.067	3.7%
Farm East 1	farmer_child	EFW	Nickel	2.7E-02	3.6	0.8%	4.1	0.7%
Farm East 1	farmer_child	EFW	Thallium	1.4E-02	0.022	62.2%	0.16	8.6%
Farm East 2	farmer_adult	EFW	Antimony	4.7E-07	0.016	0.0%	0.029	0.0%
Farm East 2	farmer_adult	EFW	Arsenic	2.0E-03	0.95	0.2%	1.23	0.2%
Farm East 2	farmer_adult	EFW	Cadmium	3.4E-04	0.12	0.3%	0.19	0.2%
Farm East 2	farmer_adult	EFW	Chromium	3.6E-02	0.42	8.6%	1.1	3.3%
Farm East 2	farmer_adult	EFW	Lead	3.7E-03	0.062	5.9%	0.11	3.3%
Farm East 2	farmer_adult	EFW	Total mercury	1.2E-03	0.022	5.8%	0.041	3.1%
Farm East 2	farmer_adult	EFW	Nickel	1.3E-02	1.7	0.8%	1.9	0.7%
Farm East 2	farmer_adult	EFW	Thallium	1.2E-02	0.0084	145.5%	0.082	14.9%
Farm East 2	farmer_child	EFW	Antimony	1.1E-06	0.028	0.0%	0.055	0.0%
Farm East 2	farmer_child	EFW	Arsenic	3.4E-03	1.5	0.2%	2.1	0.2%
Farm East 2	farmer_child	EFW	Cadmium	7.9E-04	0.28	0.3%	0.41	0.2%
Farm East 2	farmer_child	EFW	Chromium	6.0E-02	1.3	4.6%	2.3	2.6%
Farm East 2	farmer_child	EFW	Lead	7.1E-03	0.12	5.9%	0.20	3.6%
Farm East 2	farmer_child	EFW	Total mercury	2.3E-03	0.033	7.2%	0.067	3.6%
Farm East 2	farmer_child	EFW	Nickel	2.0E-02	3.6	0.5%	4.1	0.5%
Farm East 2	farmer_child	EFW	Thallium	1.4E-02	0.022	65.1%	0.16	9.0%
Farm North	farmer_adult	EFW	Antimony	2.1E-07	0.016	0.0%	0.029	0.0%
Farm North	farmer_adult	EFW	Arsenic	3.0E-03	0.95	0.3%	1.23	0.2%
Farm North	farmer_adult	EFW	Cadmium	5.1E-04	0.12	0.4%	0.19	0.3%
Farm North	farmer_adult	EFW	Chromium	4.6E-02	0.42	11.0%	1.1	4.2%
Farm North	farmer_adult	EFW	Lead	5.5E-03	0.062	8.9%	0.11	5.0%
Farm North	farmer_adult	EFW	Total mercury	1.4E-03	0.022	6.7%	0.041	3.6%
Farm North	farmer_adult	EFW	Nickel	1.9E-02	1.7	1.1%	1.9	1.0%
Farm North	farmer_adult	EFW	Thallium	1.3E-02	0.0084	152.8%	0.082	15.7%
Farm North	farmer_child	EFW	Antimony	4.7E-07	0.028	0.0%	0.055	0.0%
Farm North	farmer_child	EFW	Arsenic	5.2E-03	1.5	0.4%	2.1	0.3%
Farm North	farmer_child	EFW	Cadmium	1.2E-03	0.28	0.4%	0.41	0.3%
Farm North	farmer_child	EFW	Chromium	7.4E-02	1.3	5.7%	2.3	3.2%
Farm North	farmer_child	EFW	Lead	1.1E-02	0.12	8.9%	0.20	5.4%
Farm North	farmer_child	EFW	Total mercury	2.6E-03	0.033	8.2%	0.067	4.0%
Farm North	farmer_child	EFW	Nickel	3.0E-02	3.6	0.8%	4.1	0.7%
Farm North	farmer_child	EFW	Thallium	1.5E-02	0.022	67.8%	0.16	9.3%
Farm West 1	farmer_adult	EFW	Antimony	7.7E-08	0.016	0.0%	0.029	0.0%
Farm West 1	farmer_adult	EFW	Arsenic	9.2E-04	0.95	0.1%	1.23	0.1%
Farm West 1	farmer_adult	EFW	Cadmium	1.6E-04	0.12	0.1%	0.19	0.1%
Farm West 1	farmer_adult	EFW	Chromium	1.5E-02	0.42	3.5%	1.1	1.3%
Farm West 1	farmer_adult	EFW	Lead	1.7E-03	0.062	2.8%	0.11	1.6%
Farm West 1	farmer_adult	EFW	Total mercury	4.6E-04	0.022	2.2%	0.041	1.2%
Farm West 1	farmer_adult	EFW	Nickel	6.1E-03	1.7	0.4%	1.9	0.3%
Farm West 1	farmer_adult	EFW	Thallium	4.2E-03	0.0084	49.6%	0.082	5.1%
Farm West 1	farmer_child	EFW	Antimony	1.8E-07	0.028	0.0%	0.055	0.0%
Farm West 1	farmer_child	EFW	Arsenic	1.6E-03	1.5	0.1%	2.1	0.1%
Farm West 1	farmer_child	EFW	Cadmium	3.7E-04	0.28	0.1%	0.41	0.1%
Farm West 1	farmer_child	EFW	Chromium	2.4E-02	1.3	1.8%	2.3	1.0%
Farm West 1	farmer_child	EFW	Lead	3.4E-03	0.12	2.8%	0.20	1.7%
Farm West 1	farmer_child	EFW	Total mercury	8.3E-04	0.033	2.6%	0.067	1.3%
Farm West 1	farmer_child	EFW	Nickel	9.3E-03	3.6	0.3%	4.1	0.2%
Farm West 1	farmer_child	EFW	Thallium	4.8E-03	0.022	22.0%	0.16	3.0%
Farm West 2	farmer_adult	EFW	Antimony	9.9E-08	0.016	0.0%	0.029	0.0%
Farm West 2	farmer_adult	EFW	Arsenic	6.6E-04	0.95	0.1%	1.23	0.1%
Farm West 2	farmer_adult	EFW	Cadmium	1.1E-04	0.12	0.1%	0.19	0.1%
Farm West 2	farmer_adult	EFW	Chromium	1.1E-02	0.42	2.7%	1.1	1.0%
Farm West 2	farmer_adult	EFW	Lead	1.2E-03	0.062	2.0%	0.11	1.1%

Metal Intake for the Boston Alternative Energy Facility

Receptor	Receptor Type	Source	COPC	EFW Intake ug/kgBW/d	Lower Background ug/kgBW/d	%age	Upper Background ug/kg/d	%age
Farm West 2	farmer_adult	EFW	Total mercury	3.6E-04	0.022	1.7%	0.041	0.9%
Farm West 2	farmer_adult	EFW	Nickel	4.4E-03	1.7	0.3%	1.9	0.2%
Farm West 2	farmer_adult	EFW	Thallium	3.5E-03	0.0084	41.1%	0.082	4.2%
Farm West 2	farmer_child	EFW	Antimony	2.3E-07	0.028	0.0%	0.055	0.0%
Farm West 2	farmer_child	EFW	Arsenic	1.2E-03	1.5	0.1%	2.1	0.1%
Farm West 2	farmer_child	EFW	Cadmium	2.7E-04	0.28	0.1%	0.41	0.1%
Farm West 2	farmer_child	EFW	Chromium	1.8E-02	1.3	1.4%	2.3	0.8%
Farm West 2	farmer_child	EFW	Lead	2.4E-03	0.12	2.0%	0.20	1.2%
Farm West 2	farmer_child	EFW	Total mercury	6.7E-04	0.033	2.1%	0.067	1.0%
Farm West 2	farmer_child	EFW	Nickel	6.7E-03	3.6	0.2%	4.1	0.2%
Farm West 2	farmer_child	EFW	Thallium	4.0E-03	0.022	18.3%	0.16	2.5%
Res Bladon 1	resident_adult	EFW	Antimony	5.6E-08	0.016	0.0%	0.029	0.0%
Res Bladon 1	resident_adult	EFW	Arsenic	4.8E-04	0.95	0.1%	1.23	0.0%
Res Bladon 1	resident_adult	EFW	Cadmium	1.4E-04	0.12	0.1%	0.19	0.1%
Res Bladon 1	resident_adult	EFW	Chromium	1.7E-03	0.42	0.4%	1.1	0.2%
Res Bladon 1	resident_adult	EFW	Lead	7.3E-04	0.062	1.2%	0.11	0.7%
Res Bladon 1	resident_adult	EFW	Total mercury	1.6E-04	0.022	0.8%	0.041	0.4%
Res Bladon 1	resident_adult	EFW	Nickel	7.9E-04	1.7	0.0%	1.9	0.0%
Res Bladon 1	resident_adult	EFW	Thallium	2.0E-04	0.0084	2.4%	0.082	0.2%
Res Bladon 1	resident_child	EFW	Antimony	1.4E-07	0.028	0.0%	0.055	0.0%
Res Bladon 1	resident_child	EFW	Arsenic	1.2E-03	1.5	0.1%	2.1	0.1%
Res Bladon 1	resident_child	EFW	Cadmium	3.5E-04	0.28	0.1%	0.41	0.1%
Res Bladon 1	resident_child	EFW	Chromium	4.6E-03	1.3	0.4%	2.3	0.2%
Res Bladon 1	resident_child	EFW	Lead	1.8E-03	0.12	1.5%	0.20	0.9%
Res Bladon 1	resident_child	EFW	Total mercury	4.2E-04	0.033	1.3%	0.067	0.7%
Res Bladon 1	resident_child	EFW	Nickel	1.9E-03	3.6	0.1%	4.1	0.0%
Res Bladon 1	resident_child	EFW	Thallium	6.3E-04	0.022	2.9%	0.16	0.4%
Res Bladon 2	resident_adult	EFW	Antimony	5.3E-08	0.016	0.0%	0.029	0.0%
Res Bladon 2	resident_adult	EFW	Arsenic	4.4E-04	0.95	0.0%	1.23	0.0%
Res Bladon 2	resident_adult	EFW	Cadmium	1.3E-04	0.12	0.1%	0.19	0.1%
Res Bladon 2	resident_adult	EFW	Chromium	1.6E-03	0.42	0.4%	1.1	0.1%
Res Bladon 2	resident_adult	EFW	Lead	6.7E-04	0.062	1.1%	0.11	0.6%
Res Bladon 2	resident_adult	EFW	Total mercury	1.5E-04	0.022	0.7%	0.041	0.4%
Res Bladon 2	resident_adult	EFW	Nickel	7.3E-04	1.7	0.0%	1.9	0.0%
Res Bladon 2	resident_adult	EFW	Thallium	1.8E-04	0.0084	2.2%	0.082	0.2%
Res Bladon 2	resident_child	EFW	Antimony	1.4E-07	0.028	0.0%	0.055	0.0%
Res Bladon 2	resident_child	EFW	Arsenic	1.1E-03	1.5	0.1%	2.1	0.1%
Res Bladon 2	resident_child	EFW	Cadmium	3.2E-04	0.28	0.1%	0.41	0.1%
Res Bladon 2	resident_child	EFW	Chromium	4.3E-03	1.3	0.3%	2.3	0.2%
Res Bladon 2	resident_child	EFW	Lead	1.6E-03	0.12	1.3%	0.20	0.8%
Res Bladon 2	resident_child	EFW	Total mercury	3.8E-04	0.033	1.2%	0.067	0.6%
Res Bladon 2	resident_child	EFW	Nickel	1.7E-03	3.6	0.0%	4.1	0.0%
Res Bladon 2	resident_child	EFW	Thallium	5.8E-04	0.022	2.7%	0.16	0.4%
Res Boston 1	resident_adult	EFW	Antimony	2.4E-08	0.016	0.0%	0.029	0.0%
Res Boston 1	resident_adult	EFW	Arsenic	1.5E-04	0.95	0.0%	1.23	0.0%
Res Boston 1	resident_adult	EFW	Cadmium	4.4E-05	0.12	0.0%	0.19	0.0%
Res Boston 1	resident_adult	EFW	Chromium	5.8E-04	0.42	0.1%	1.1	0.1%
Res Boston 1	resident_adult	EFW	Lead	2.2E-04	0.062	0.4%	0.11	0.2%
Res Boston 1	resident_adult	EFW	Total mercury	5.4E-05	0.022	0.3%	0.041	0.1%
Res Boston 1	resident_adult	EFW	Nickel	2.4E-04	1.7	0.0%	1.9	0.0%
Res Boston 1	resident_adult	EFW	Thallium	6.6E-05	0.0084	0.8%	0.082	0.1%
Res Boston 1	resident_child	EFW	Antimony	6.2E-08	0.028	0.0%	0.055	0.0%
Res Boston 1	resident_child	EFW	Arsenic	3.5E-04	1.5	0.0%	2.1	0.0%
Res Boston 1	resident_child	EFW	Cadmium	1.1E-04	0.28	0.0%	0.41	0.0%
Res Boston 1	resident_child	EFW	Chromium	1.6E-03	1.3	0.1%	2.3	0.1%
Res Boston 1	resident_child	EFW	Lead	5.3E-04	0.12	0.4%	0.20	0.3%
Res Boston 1	resident_child	EFW	Total mercury	1.4E-04	0.033	0.4%	0.067	0.2%
Res Boston 1	resident_child	EFW	Nickel	5.8E-04	3.6	0.0%	4.1	0.0%
Res Boston 1	resident_child	EFW	Thallium	2.2E-04	0.022	1.0%	0.16	0.1%
Res Boston 2	resident_adult	EFW	Antimony	2.4E-08	0.016	0.0%	0.029	0.0%
Res Boston 2	resident_adult	EFW	Arsenic	1.3E-04	0.95	0.0%	1.23	0.0%
Res Boston 2	resident_adult	EFW	Cadmium	3.8E-05	0.12	0.0%	0.19	0.0%
Res Boston 2	resident_adult	EFW	Chromium	5.2E-04	0.42	0.1%	1.1	0.0%
Res Boston 2	resident_adult	EFW	Lead	1.9E-04	0.062	0.3%	0.11	0.2%
Res Boston 2	resident_adult	EFW	Total mercury	4.9E-05	0.022	0.2%	0.041	0.1%
Res Boston 2	resident_adult	EFW	Nickel	2.1E-04	1.7	0.0%	1.9	0.0%
Res Boston 2	resident_adult	EFW	Thallium	6.0E-05	0.0084	0.7%	0.082	0.1%
Res Boston 2	resident_child	EFW	Antimony	6.1E-08	0.028	0.0%	0.055	0.0%
Res Boston 2	resident_child	EFW	Arsenic	3.1E-04	1.5	0.0%	2.1	0.0%

Metal Intake for the Boston Alternative Energy Facility

Receptor	Receptor Type	Source	COPC	EFW Intake ug/kgBW/d	Lower Background ug/kgBW/d	%age	Upper Background ug/kg/d	%age
Res Boston 2	resident_child	EFW	Cadmium	9.2E-05	0.28	0.0%	0.41	0.0%
Res Boston 2	resident_child	EFW	Chromium	1.4E-03	1.3	0.1%	2.3	0.1%
Res Boston 2	resident_child	EFW	Lead	4.7E-04	0.12	0.4%	0.20	0.2%
Res Boston 2	resident_child	EFW	Total mercury	1.2E-04	0.033	0.4%	0.067	0.2%
Res Boston 2	resident_child	EFW	Nickel	5.0E-04	3.6	0.0%	4.1	0.0%
Res Boston 2	resident_child	EFW	Thallium	2.1E-04	0.022	0.9%	0.16	0.1%
Res Fishtoft 1	resident_adult	EFW	Antimony	6.0E-08	0.016	0.0%	0.029	0.0%
Res Fishtoft 1	resident_adult	EFW	Arsenic	4.4E-04	0.95	0.0%	1.23	0.0%
Res Fishtoft 1	resident_adult	EFW	Cadmium	1.3E-04	0.12	0.1%	0.19	0.1%
Res Fishtoft 1	resident_adult	EFW	Chromium	1.6E-03	0.42	0.4%	1.1	0.1%
Res Fishtoft 1	resident_adult	EFW	Lead	6.6E-04	0.062	1.1%	0.11	0.6%
Res Fishtoft 1	resident_adult	EFW	Total mercury	1.5E-04	0.022	0.7%	0.041	0.4%
Res Fishtoft 1	resident_adult	EFW	Nickel	7.2E-04	1.7	0.0%	1.9	0.0%
Res Fishtoft 1	resident_adult	EFW	Thallium	1.9E-04	0.0084	2.2%	0.082	0.2%
Res Fishtoft 1	resident_child	EFW	Antimony	1.5E-07	0.028	0.0%	0.055	0.0%
Res Fishtoft 1	resident_child	EFW	Arsenic	1.0E-03	1.5	0.1%	2.1	0.1%
Res Fishtoft 1	resident_child	EFW	Cadmium	3.1E-04	0.28	0.1%	0.41	0.1%
Res Fishtoft 1	resident_child	EFW	Chromium	4.4E-03	1.3	0.3%	2.3	0.2%
Res Fishtoft 1	resident_child	EFW	Lead	1.6E-03	0.12	1.3%	0.20	0.8%
Res Fishtoft 1	resident_child	EFW	Total mercury	3.9E-04	0.033	1.2%	0.067	0.6%
Res Fishtoft 1	resident_child	EFW	Nickel	1.7E-03	3.6	0.0%	4.1	0.0%
Res Fishtoft 1	resident_child	EFW	Thallium	6.1E-04	0.022	2.8%	0.16	0.4%
Res Fishtoft 2	resident_adult	EFW	Antimony	6.2E-08	0.016	0.0%	0.029	0.0%
Res Fishtoft 2	resident_adult	EFW	Arsenic	4.3E-04	0.95	0.0%	1.23	0.0%
Res Fishtoft 2	resident_adult	EFW	Cadmium	1.3E-04	0.12	0.1%	0.19	0.1%
Res Fishtoft 2	resident_adult	EFW	Chromium	1.6E-03	0.42	0.4%	1.1	0.1%
Res Fishtoft 2	resident_adult	EFW	Lead	6.5E-04	0.062	1.0%	0.11	0.6%
Res Fishtoft 2	resident_adult	EFW	Total mercury	1.5E-04	0.022	0.7%	0.041	0.4%
Res Fishtoft 2	resident_adult	EFW	Nickel	7.0E-04	1.7	0.0%	1.9	0.0%
Res Fishtoft 2	resident_adult	EFW	Thallium	1.8E-04	0.0084	2.2%	0.082	0.2%
Res Fishtoft 2	resident_child	EFW	Antimony	1.6E-07	0.028	0.0%	0.055	0.0%
Res Fishtoft 2	resident_child	EFW	Arsenic	1.0E-03	1.5	0.1%	2.1	0.0%
Res Fishtoft 2	resident_child	EFW	Cadmium	3.1E-04	0.28	0.1%	0.41	0.1%
Res Fishtoft 2	resident_child	EFW	Chromium	4.3E-03	1.3	0.3%	2.3	0.2%
Res Fishtoft 2	resident_child	EFW	Lead	1.6E-03	0.12	1.3%	0.20	0.8%
Res Fishtoft 2	resident_child	EFW	Total mercury	3.8E-04	0.033	1.2%	0.067	0.6%
Res Fishtoft 2	resident_child	EFW	Nickel	1.7E-03	3.6	0.0%	4.1	0.0%
Res Fishtoft 2	resident_child	EFW	Thallium	6.1E-04	0.022	2.8%	0.16	0.4%
Res Fishtoft 3	resident_adult	EFW	Antimony	6.1E-08	0.016	0.0%	0.029	0.0%
Res Fishtoft 3	resident_adult	EFW	Arsenic	4.2E-04	0.95	0.0%	1.23	0.0%
Res Fishtoft 3	resident_adult	EFW	Cadmium	1.3E-04	0.12	0.1%	0.19	0.1%
Res Fishtoft 3	resident_adult	EFW	Chromium	1.6E-03	0.42	0.4%	1.1	0.1%
Res Fishtoft 3	resident_adult	EFW	Lead	6.4E-04	0.062	1.0%	0.11	0.6%
Res Fishtoft 3	resident_adult	EFW	Total mercury	1.5E-04	0.022	0.7%	0.041	0.4%
Res Fishtoft 3	resident_adult	EFW	Nickel	6.9E-04	1.7	0.0%	1.9	0.0%
Res Fishtoft 3	resident_adult	EFW	Thallium	1.8E-04	0.0084	2.2%	0.082	0.2%
Res Fishtoft 3	resident_child	EFW	Antimony	1.5E-07	0.028	0.0%	0.055	0.0%
Res Fishtoft 3	resident_child	EFW	Arsenic	1.0E-03	1.5	0.1%	2.1	0.0%
Res Fishtoft 3	resident_child	EFW	Cadmium	3.0E-04	0.28	0.1%	0.41	0.1%
Res Fishtoft 3	resident_child	EFW	Chromium	4.3E-03	1.3	0.3%	2.3	0.2%
Res Fishtoft 3	resident_child	EFW	Lead	1.5E-03	0.12	1.3%	0.20	0.8%
Res Fishtoft 3	resident_child	EFW	Total mercury	3.8E-04	0.033	1.2%	0.067	0.6%
Res Fishtoft 3	resident_child	EFW	Nickel	1.7E-03	3.6	0.0%	4.1	0.0%
Res Fishtoft 3	resident_child	EFW	Thallium	6.0E-04	0.022	2.7%	0.16	0.4%
Res Marsh Lane 1	resident_adult	EFW	Antimony	5.7E-08	0.016	0.0%	0.029	0.0%
Res Marsh Lane 1	resident_adult	EFW	Arsenic	3.2E-04	0.95	0.0%	1.23	0.0%
Res Marsh Lane 1	resident_adult	EFW	Cadmium	9.4E-05	0.12	0.1%	0.19	0.0%
Res Marsh Lane 1	resident_adult	EFW	Chromium	1.3E-03	0.42	0.3%	1.1	0.1%
Res Marsh Lane 1	resident_adult	EFW	Lead	4.8E-04	0.062	0.8%	0.11	0.4%
Res Marsh Lane 1	resident_adult	EFW	Total mercury	1.2E-04	0.022	0.6%	0.041	0.3%
Res Marsh Lane 1	resident_adult	EFW	Nickel	5.2E-04	1.7	0.0%	1.9	0.0%
Res Marsh Lane 1	resident_adult	EFW	Thallium	1.5E-04	0.0084	1.8%	0.082	0.2%
Res Marsh Lane 1	resident_child	EFW	Antimony	1.4E-07	0.028	0.0%	0.055	0.0%
Res Marsh Lane 1	resident_child	EFW	Arsenic	7.6E-04	1.5	0.1%	2.1	0.0%
Res Marsh Lane 1	resident_child	EFW	Cadmium	2.3E-04	0.28	0.1%	0.41	0.1%
Res Marsh Lane 1	resident_child	EFW	Chromium	3.5E-03	1.3	0.3%	2.3	0.2%
Res Marsh Lane 1	resident_child	EFW	Lead	1.2E-03	0.12	1.0%	0.20	0.6%
Res Marsh Lane 1	resident_child	EFW	Total mercury	3.0E-04	0.033	1.0%	0.067	0.5%
Res Marsh Lane 1	resident_child	EFW	Nickel	1.2E-03	3.6	0.0%	4.1	0.0%

Metal Intake for the Boston Alternative Energy Facility

Receptor	Receptor Type	Source	COPC	EFW Intake ug/kgBW/d	Lower Background ug/kgBW/d	%age	Upper Background ug/kg/d	%age
Res Marsh Lane 1	resident_child	EFW	Thallium	5.1E-04	0.022	2.3%	0.16	0.3%
Res Marsh Lane 2	resident_adult	EFW	Antimony	6.3E-08	0.016	0.0%	0.029	0.0%
Res Marsh Lane 2	resident_adult	EFW	Arsenic	3.0E-04	0.95	0.0%	1.23	0.0%
Res Marsh Lane 2	resident_adult	EFW	Cadmium	9.1E-05	0.12	0.1%	0.19	0.0%
Res Marsh Lane 2	resident_adult	EFW	Chromium	1.3E-03	0.42	0.3%	1.1	0.1%
Res Marsh Lane 2	resident_adult	EFW	Lead	4.6E-04	0.062	0.7%	0.11	0.4%
Res Marsh Lane 2	resident_adult	EFW	Total mercury	1.2E-04	0.022	0.6%	0.041	0.3%
Res Marsh Lane 2	resident_adult	EFW	Nickel	5.0E-04	1.7	0.0%	1.9	0.0%
Res Marsh Lane 2	resident_adult	EFW	Thallium	1.5E-04	0.0084	1.8%	0.082	0.2%
Res Marsh Lane 2	resident_child	EFW	Antimony	1.6E-07	0.028	0.0%	0.055	0.0%
Res Marsh Lane 2	resident_child	EFW	Arsenic	7.3E-04	1.5	0.0%	2.1	0.0%
Res Marsh Lane 2	resident_child	EFW	Cadmium	2.2E-04	0.28	0.1%	0.41	0.1%
Res Marsh Lane 2	resident_child	EFW	Chromium	3.5E-03	1.3	0.3%	2.3	0.2%
Res Marsh Lane 2	resident_child	EFW	Lead	1.1E-03	0.12	0.9%	0.20	0.6%
Res Marsh Lane 2	resident_child	EFW	Total mercury	3.0E-04	0.033	1.0%	0.067	0.5%
Res Marsh Lane 2	resident_child	EFW	Nickel	1.2E-03	3.6	0.0%	4.1	0.0%
Res Marsh Lane 2	resident_child	EFW	Thallium	5.2E-04	0.022	2.4%	0.16	0.3%
Res Skirbeck 1	resident_adult	EFW	Antimony	1.9E-07	0.016	0.0%	0.029	0.0%
Res Skirbeck 1	resident_adult	EFW	Arsenic	1.6E-03	0.95	0.2%	1.23	0.1%
Res Skirbeck 1	resident_adult	EFW	Cadmium	4.8E-04	0.12	0.4%	0.19	0.3%
Res Skirbeck 1	resident_adult	EFW	Chromium	5.8E-03	0.42	1.4%	1.1	0.5%
Res Skirbeck 1	resident_adult	EFW	Lead	2.4E-03	0.062	3.9%	0.11	2.2%
Res Skirbeck 1	resident_adult	EFW	Total mercury	5.4E-04	0.022	2.6%	0.041	1.4%
Res Skirbeck 1	resident_adult	EFW	Nickel	2.6E-03	1.7	0.2%	1.9	0.1%
Res Skirbeck 1	resident_adult	EFW	Thallium	6.6E-04	0.0084	7.9%	0.082	0.8%
Res Skirbeck 1	resident_child	EFW	Antimony	4.9E-07	0.028	0.0%	0.055	0.0%
Res Skirbeck 1	resident_child	EFW	Arsenic	3.8E-03	1.5	0.3%	2.1	0.2%
Res Skirbeck 1	resident_child	EFW	Cadmium	1.1E-03	0.28	0.4%	0.41	0.3%
Res Skirbeck 1	resident_child	EFW	Chromium	1.5E-02	1.3	1.2%	2.3	0.7%
Res Skirbeck 1	resident_child	EFW	Lead	5.8E-03	0.12	4.8%	0.20	2.9%
Res Skirbeck 1	resident_child	EFW	Total mercury	1.4E-03	0.033	4.4%	0.067	2.2%
Res Skirbeck 1	resident_child	EFW	Nickel	6.3E-03	3.6	0.2%	4.1	0.2%
Res Skirbeck 1	resident_child	EFW	Thallium	2.1E-03	0.022	9.6%	0.16	1.3%
Res Skirbeck 2	resident_adult	EFW	Antimony	1.6E-07	0.016	0.0%	0.029	0.0%
Res Skirbeck 2	resident_adult	EFW	Arsenic	1.2E-03	0.95	0.1%	1.23	0.1%
Res Skirbeck 2	resident_adult	EFW	Cadmium	3.4E-04	0.12	0.3%	0.19	0.2%
Res Skirbeck 2	resident_adult	EFW	Chromium	4.4E-03	0.42	1.0%	1.1	0.4%
Res Skirbeck 2	resident_adult	EFW	Lead	1.7E-03	0.062	2.8%	0.11	1.6%
Res Skirbeck 2	resident_adult	EFW	Total mercury	4.0E-04	0.022	2.0%	0.041	1.0%
Res Skirbeck 2	resident_adult	EFW	Nickel	1.9E-03	1.7	0.1%	1.9	0.1%
Res Skirbeck 2	resident_adult	EFW	Thallium	5.0E-04	0.0084	5.9%	0.082	0.6%
Res Skirbeck 2	resident_child	EFW	Antimony	4.0E-07	0.028	0.0%	0.055	0.0%
Res Skirbeck 2	resident_child	EFW	Arsenic	2.8E-03	1.5	0.2%	2.1	0.1%
Res Skirbeck 2	resident_child	EFW	Cadmium	8.3E-04	0.28	0.3%	0.41	0.2%
Res Skirbeck 2	resident_child	EFW	Chromium	1.2E-02	1.3	0.9%	2.3	0.5%
Res Skirbeck 2	resident_child	EFW	Lead	4.2E-03	0.12	3.5%	0.20	2.1%
Res Skirbeck 2	resident_child	EFW	Total mercury	1.0E-03	0.033	3.3%	0.067	1.6%
Res Skirbeck 2	resident_child	EFW	Nickel	4.6E-03	3.6	0.1%	4.1	0.1%
Res Skirbeck 2	resident_child	EFW	Thallium	1.6E-03	0.022	7.4%	0.16	1.0%
Res Skirbeck Quarter	resident_adult	EFW	Antimony	5.0E-08	0.016	0.0%	0.029	0.0%
Res Skirbeck Quarter	resident_adult	EFW	Arsenic	3.2E-04	0.95	0.0%	1.23	0.0%
Res Skirbeck Quarter	resident_adult	EFW	Cadmium	9.6E-05	0.12	0.1%	0.19	0.1%
Res Skirbeck Quarter	resident_adult	EFW	Chromium	1.2E-03	0.42	0.3%	1.1	0.1%
Res Skirbeck Quarter	resident_adult	EFW	Lead	4.8E-04	0.062	0.8%	0.11	0.4%
Res Skirbeck Quarter	resident_adult	EFW	Total mercury	1.2E-04	0.022	0.6%	0.041	0.3%
Res Skirbeck Quarter	resident_adult	EFW	Nickel	5.3E-04	1.7	0.0%	1.9	0.0%
Res Skirbeck Quarter	resident_adult	EFW	Thallium	1.4E-04	0.0084	1.7%	0.082	0.2%
Res Skirbeck Quarter	resident_child	EFW	Antimony	1.3E-07	0.028	0.0%	0.055	0.0%
Res Skirbeck Quarter	resident_child	EFW	Arsenic	7.7E-04	1.5	0.1%	2.1	0.0%
Res Skirbeck Quarter	resident_child	EFW	Cadmium	2.3E-04	0.28	0.1%	0.41	0.1%
Res Skirbeck Quarter	resident_child	EFW	Chromium	3.3E-03	1.3	0.3%	2.3	0.1%
Res Skirbeck Quarter	resident_child	EFW	Lead	1.2E-03	0.12	1.0%	0.20	0.6%
Res Skirbeck Quarter	resident_child	EFW	Total mercury	2.9E-04	0.033	0.9%	0.067	0.5%
Res Skirbeck Quarter	resident_child	EFW	Nickel	1.3E-03	3.6	0.0%	4.1	0.0%
Res Skirbeck Quarter	resident_child	EFW	Thallium	4.8E-04	0.022	2.2%	0.16	0.3%
Res South End	resident_adult	EFW	Antimony	2.7E-08	0.016	0.0%	0.029	0.0%
Res South End	resident_adult	EFW	Arsenic	1.4E-04	0.95	0.0%	1.23	0.0%
Res South End	resident_adult	EFW	Cadmium	4.3E-05	0.12	0.0%	0.19	0.0%
Res South End	resident_adult	EFW	Chromium	5.8E-04	0.42	0.1%	1.1	0.1%

Metal Intake for the Boston Alternative Energy Facility

Receptor	Receptor Type	Source	COPC	EFW Intake ug/kgBW/d	Lower Background ug/kgBW/d	%age	Upper Background ug/kg/d	%age
Res South End	resident_adult	EFW	Lead	2.2E-04	0.062	0.3%	0.11	0.2%
Res South End	resident_adult	EFW	Total mercury	5.4E-05	0.022	0.3%	0.041	0.1%
Res South End	resident_adult	EFW	Nickel	2.3E-04	1.7	0.0%	1.9	0.0%
Res South End	resident_adult	EFW	Thallium	6.7E-05	0.0084	0.8%	0.082	0.1%
Res South End	resident_child	EFW	Antimony	6.8E-08	0.028	0.0%	0.055	0.0%
Res South End	resident_child	EFW	Arsenic	3.4E-04	1.5	0.0%	2.1	0.0%
Res South End	resident_child	EFW	Cadmium	1.0E-04	0.28	0.0%	0.41	0.0%
Res South End	resident_child	EFW	Chromium	1.6E-03	1.3	0.1%	2.3	0.1%
Res South End	resident_child	EFW	Lead	5.2E-04	0.12	0.4%	0.20	0.3%
Res South End	resident_child	EFW	Total mercury	1.4E-04	0.033	0.4%	0.067	0.2%
Res South End	resident_child	EFW	Nickel	5.6E-04	3.6	0.0%	4.1	0.0%
Res South End	resident_child	EFW	Thallium	2.3E-04	0.022	1.0%	0.16	0.1%
Res Wyberton 1	resident_adult	EFW	Antimony	3.5E-08	0.016	0.0%	0.029	0.0%
Res Wyberton 1	resident_adult	EFW	Arsenic	2.4E-04	0.95	0.0%	1.23	0.0%
Res Wyberton 1	resident_adult	EFW	Cadmium	7.3E-05	0.12	0.1%	0.19	0.0%
Res Wyberton 1	resident_adult	EFW	Chromium	9.3E-04	0.42	0.2%	1.1	0.1%
Res Wyberton 1	resident_adult	EFW	Lead	3.7E-04	0.062	0.6%	0.11	0.3%
Res Wyberton 1	resident_adult	EFW	Total mercury	8.6E-05	0.022	0.4%	0.041	0.2%
Res Wyberton 1	resident_adult	EFW	Nickel	4.0E-04	1.7	0.0%	1.9	0.0%
Res Wyberton 1	resident_adult	EFW	Thallium	1.1E-04	0.0084	1.3%	0.082	0.1%
Res Wyberton 1	resident_child	EFW	Antimony	8.9E-08	0.028	0.0%	0.055	0.0%
Res Wyberton 1	resident_child	EFW	Arsenic	5.9E-04	1.5	0.0%	2.1	0.0%
Res Wyberton 1	resident_child	EFW	Cadmium	1.8E-04	0.28	0.1%	0.41	0.0%
Res Wyberton 1	resident_child	EFW	Chromium	2.5E-03	1.3	0.2%	2.3	0.1%
Res Wyberton 1	resident_child	EFW	Lead	8.9E-04	0.12	0.7%	0.20	0.4%
Res Wyberton 1	resident_child	EFW	Total mercury	2.2E-04	0.033	0.7%	0.067	0.3%
Res Wyberton 1	resident_child	EFW	Nickel	9.6E-04	3.6	0.0%	4.1	0.0%
Res Wyberton 1	resident_child	EFW	Thallium	3.5E-04	0.022	1.6%	0.16	0.2%
Res Wyberton 2	resident_adult	EFW	Antimony	3.5E-08	0.016	0.0%	0.029	0.0%
Res Wyberton 2	resident_adult	EFW	Arsenic	2.3E-04	0.95	0.0%	1.23	0.0%
Res Wyberton 2	resident_adult	EFW	Cadmium	7.0E-05	0.12	0.1%	0.19	0.0%
Res Wyberton 2	resident_adult	EFW	Chromium	8.9E-04	0.42	0.2%	1.1	0.1%
Res Wyberton 2	resident_adult	EFW	Lead	3.5E-04	0.062	0.6%	0.11	0.3%
Res Wyberton 2	resident_adult	EFW	Total mercury	8.3E-05	0.022	0.4%	0.041	0.2%
Res Wyberton 2	resident_adult	EFW	Nickel	3.8E-04	1.7	0.0%	1.9	0.0%
Res Wyberton 2	resident_adult	EFW	Thallium	1.0E-04	0.0084	1.2%	0.082	0.1%
Res Wyberton 2	resident_child	EFW	Antimony	8.7E-08	0.028	0.0%	0.055	0.0%
Res Wyberton 2	resident_child	EFW	Arsenic	5.6E-04	1.5	0.0%	2.1	0.0%
Res Wyberton 2	resident_child	EFW	Cadmium	1.7E-04	0.28	0.1%	0.41	0.0%
Res Wyberton 2	resident_child	EFW	Chromium	2.4E-03	1.3	0.2%	2.3	0.1%
Res Wyberton 2	resident_child	EFW	Lead	8.5E-04	0.12	0.7%	0.20	0.4%
Res Wyberton 2	resident_child	EFW	Total mercury	2.1E-04	0.033	0.7%	0.067	0.3%
Res Wyberton 2	resident_child	EFW	Nickel	9.2E-04	3.6	0.0%	4.1	0.0%
Res Wyberton 2	resident_child	EFW	Thallium	3.4E-04	0.022	1.5%	0.16	0.2%
Res Wyberton East 1	resident_adult	EFW	Antimony	1.8E-08	0.016	0.0%	0.029	0.0%
Res Wyberton East 1	resident_adult	EFW	Arsenic	1.5E-04	0.95	0.0%	1.23	0.0%
Res Wyberton East 1	resident_adult	EFW	Cadmium	4.6E-05	0.12	0.0%	0.19	0.0%
Res Wyberton East 1	resident_adult	EFW	Chromium	5.6E-04	0.42	0.1%	1.1	0.1%
Res Wyberton East 1	resident_adult	EFW	Lead	2.3E-04	0.062	0.4%	0.11	0.2%
Res Wyberton East 1	resident_adult	EFW	Total mercury	5.2E-05	0.022	0.3%	0.041	0.1%
Res Wyberton East 1	resident_adult	EFW	Nickel	2.5E-04	1.7	0.0%	1.9	0.0%
Res Wyberton East 1	resident_adult	EFW	Thallium	6.3E-05	0.0084	0.8%	0.082	0.1%
Res Wyberton East 1	resident_child	EFW	Antimony	4.6E-08	0.028	0.0%	0.055	0.0%
Res Wyberton East 1	resident_child	EFW	Arsenic	3.7E-04	1.5	0.0%	2.1	0.0%
Res Wyberton East 1	resident_child	EFW	Cadmium	1.1E-04	0.28	0.0%	0.41	0.0%
Res Wyberton East 1	resident_child	EFW	Chromium	1.5E-03	1.3	0.1%	2.3	0.1%
Res Wyberton East 1	resident_child	EFW	Lead	5.6E-04	0.12	0.5%	0.20	0.3%
Res Wyberton East 1	resident_child	EFW	Total mercury	1.3E-04	0.033	0.4%	0.067	0.2%
Res Wyberton East 1	resident_child	EFW	Nickel	6.1E-04	3.6	0.0%	4.1	0.0%
Res Wyberton East 1	resident_child	EFW	Thallium	2.0E-04	0.022	0.9%	0.16	0.1%
Res Wyberton East 2	resident_adult	EFW	Antimony	1.7E-08	0.016	0.0%	0.029	0.0%
Res Wyberton East 2	resident_adult	EFW	Arsenic	1.3E-04	0.95	0.0%	1.23	0.0%
Res Wyberton East 2	resident_adult	EFW	Cadmium	4.0E-05	0.12	0.0%	0.19	0.0%
Res Wyberton East 2	resident_adult	EFW	Chromium	4.9E-04	0.42	0.1%	1.1	0.0%
Res Wyberton East 2	resident_adult	EFW	Lead	2.0E-04	0.062	0.3%	0.11	0.2%
Res Wyberton East 2	resident_adult	EFW	Total mercury	4.6E-05	0.022	0.2%	0.041	0.1%
Res Wyberton East 2	resident_adult	EFW	Nickel	2.2E-04	1.7	0.0%	1.9	0.0%
Res Wyberton East 2	resident_adult	EFW	Thallium	5.5E-05	0.0084	0.7%	0.082	0.1%
Res Wyberton East 2	resident_child	EFW	Antimony	4.2E-08	0.028	0.0%	0.055	0.0%

Metal Intake for the Boston Alternative Energy Facility

Receptor	Receptor Type	Source	COPC	EFW Intake ug/kgBW/d	Lower Background ug/kgBW/d	%age	Upper Background ug/kg/d	%age
Res Wyberton East 2	resident_child	EFW	Arsenic	3.2E-04	1.5	0.0%	2.1	0.0%
Res Wyberton East 2	resident_child	EFW	Cadmium	9.6E-05	0.28	0.0%	0.41	0.0%
Res Wyberton East 2	resident_child	EFW	Chromium	1.3E-03	1.3	0.1%	2.3	0.1%
Res Wyberton East 2	resident_child	EFW	Lead	4.8E-04	0.12	0.4%	0.20	0.2%
Res Wyberton East 2	resident_child	EFW	Total mercury	1.2E-04	0.033	0.4%	0.067	0.2%
Res Wyberton East 2	resident_child	EFW	Nickel	5.3E-04	3.6	0.0%	4.1	0.0%
Res Wyberton East 2	resident_child	EFW	Thallium	1.8E-04	0.022	0.8%	0.16	0.1%

Metal Intake for the Biomass Plant

Receptor	Receptor Type	Source	COPC	Biomas Intake ug/kgBW/d	Lower Background ug/kgBW/d	%age	Upper Background ug/kg/d	%age
Farm East 1	farmer_adult	Biomass	Antimony	3.2E-08	0.016	0.0%	0.029	0.0%
Farm East 1	farmer_adult	Biomass	Arsenic	5.1E-04	0.95	0.1%	1.23	0.0%
Farm East 1	farmer_adult	Biomass	Cadmium	1.3E-04	0.12	0.1%	0.19	0.1%
Farm East 1	farmer_adult	Biomass	Chromium	4.7E-03	0.42	1.1%	1.1	0.4%
Farm East 1	farmer_adult	Biomass	Lead	6.3E-04	0.062	1.0%	0.11	0.6%
Farm East 1	farmer_adult	Biomass	Total mercury	3.6E-04	0.022	1.7%	0.041	0.9%
Farm East 1	farmer_adult	Biomass	Nickel	2.0E-03	1.7	0.1%	1.9	0.1%
Farm East 1	farmer_adult	Biomass	Thallium	3.3E-03	0.0084	38.9%	0.082	4.0%
Farm East 1	farmer_child	Biomass	Antimony	7.2E-08	0.028	0.0%	0.055	0.0%
Farm East 1	farmer_child	Biomass	Arsenic	8.9E-04	1.5	0.1%	2.1	0.0%
Farm East 1	farmer_child	Biomass	Cadmium	3.1E-04	0.28	0.1%	0.41	0.1%
Farm East 1	farmer_child	Biomass	Chromium	7.6E-03	1.3	0.6%	2.3	0.3%
Farm East 1	farmer_child	Biomass	Lead	1.2E-03	0.12	1.0%	0.20	0.6%
Farm East 1	farmer_child	Biomass	Total mercury	6.6E-04	0.033	2.1%	0.067	1.0%
Farm East 1	farmer_child	Biomass	Nickel	3.1E-03	3.6	0.1%	4.1	0.1%
Farm East 1	farmer_child	Biomass	Thallium	3.8E-03	0.022	17.3%	0.16	2.4%
Farm East 2	farmer_adult	Biomass	Antimony	3.8E-08	0.016	0.0%	0.029	0.0%
Farm East 2	farmer_adult	Biomass	Arsenic	2.3E-04	0.95	0.0%	1.23	0.0%
Farm East 2	farmer_adult	Biomass	Cadmium	6.0E-05	0.12	0.0%	0.19	0.0%
Farm East 2	farmer_adult	Biomass	Chromium	2.4E-03	0.42	0.6%	1.1	0.2%
Farm East 2	farmer_adult	Biomass	Lead	2.8E-04	0.062	0.5%	0.11	0.3%
Farm East 2	farmer_adult	Biomass	Total mercury	1.9E-04	0.022	0.9%	0.041	0.5%
Farm East 2	farmer_adult	Biomass	Nickel	9.2E-04	1.7	0.1%	1.9	0.0%
Farm East 2	farmer_adult	Biomass	Thallium	1.9E-03	0.0084	22.1%	0.082	2.3%
Farm East 2	farmer_child	Biomass	Antimony	8.6E-08	0.028	0.0%	0.055	0.0%
Farm East 2	farmer_child	Biomass	Arsenic	4.0E-04	1.5	0.0%	2.1	0.0%
Farm East 2	farmer_child	Biomass	Cadmium	1.4E-04	0.28	0.0%	0.41	0.0%
Farm East 2	farmer_child	Biomass	Chromium	3.9E-03	1.3	0.3%	2.3	0.2%
Farm East 2	farmer_child	Biomass	Lead	5.5E-04	0.12	0.5%	0.20	0.3%
Farm East 2	farmer_child	Biomass	Total mercury	3.6E-04	0.033	1.1%	0.067	0.6%
Farm East 2	farmer_child	Biomass	Nickel	1.4E-03	3.6	0.0%	4.1	0.0%
Farm East 2	farmer_child	Biomass	Thallium	2.2E-03	0.022	9.8%	0.16	1.4%
Farm North	farmer_adult	Biomass	Antimony	3.2E-08	0.016	0.0%	0.029	0.0%
Farm North	farmer_adult	Biomass	Arsenic	5.2E-04	0.95	0.1%	1.23	0.0%
Farm North	farmer_adult	Biomass	Cadmium	1.4E-04	0.12	0.1%	0.19	0.1%
Farm North	farmer_adult	Biomass	Chromium	4.8E-03	0.42	1.2%	1.1	0.4%
Farm North	farmer_adult	Biomass	Lead	6.4E-04	0.062	1.0%	0.11	0.6%
Farm North	farmer_adult	Biomass	Total mercury	3.7E-04	0.022	1.8%	0.041	0.9%
Farm North	farmer_adult	Biomass	Nickel	2.1E-03	1.7	0.1%	1.9	0.1%
Farm North	farmer_adult	Biomass	Thallium	3.3E-03	0.0084	39.6%	0.082	4.1%
Farm North	farmer_child	Biomass	Antimony	7.3E-08	0.028	0.0%	0.055	0.0%
Farm North	farmer_child	Biomass	Arsenic	9.1E-04	1.5	0.1%	2.1	0.0%
Farm North	farmer_child	Biomass	Cadmium	3.2E-04	0.28	0.1%	0.41	0.1%
Farm North	farmer_child	Biomass	Chromium	7.7E-03	1.3	0.6%	2.3	0.3%
Farm North	farmer_child	Biomass	Lead	1.3E-03	0.12	1.0%	0.20	0.6%
Farm North	farmer_child	Biomass	Total mercury	6.7E-04	0.033	2.1%	0.067	1.1%
Farm North	farmer_child	Biomass	Nickel	3.2E-03	3.6	0.1%	4.1	0.1%
Farm North	farmer_child	Biomass	Thallium	3.9E-03	0.022	17.6%	0.16	2.4%
Farm West 1	farmer_adult	Biomass	Antimony	1.4E-08	0.016	0.0%	0.029	0.0%
Farm West 1	farmer_adult	Biomass	Arsenic	2.2E-04	0.95	0.0%	1.23	0.0%
Farm West 1	farmer_adult	Biomass	Cadmium	5.7E-05	0.12	0.0%	0.19	0.0%
Farm West 1	farmer_adult	Biomass	Chromium	2.1E-03	0.42	0.5%	1.1	0.2%
Farm West 1	farmer_adult	Biomass	Lead	2.7E-04	0.062	0.4%	0.11	0.2%
Farm West 1	farmer_adult	Biomass	Total mercury	1.6E-04	0.022	0.7%	0.041	0.4%
Farm West 1	farmer_adult	Biomass	Nickel	8.8E-04	1.7	0.1%	1.9	0.0%
Farm West 1	farmer_adult	Biomass	Thallium	1.4E-03	0.0084	16.9%	0.082	1.7%
Farm West 1	farmer_child	Biomass	Antimony	3.2E-08	0.028	0.0%	0.055	0.0%
Farm West 1	farmer_child	Biomass	Arsenic	3.9E-04	1.5	0.0%	2.1	0.0%
Farm West 1	farmer_child	Biomass	Cadmium	1.3E-04	0.28	0.0%	0.41	0.0%
Farm West 1	farmer_child	Biomass	Chromium	3.3E-03	1.3	0.3%	2.3	0.1%
Farm West 1	farmer_child	Biomass	Lead	5.3E-04	0.12	0.4%	0.20	0.3%
Farm West 1	farmer_child	Biomass	Total mercury	2.9E-04	0.033	0.9%	0.067	0.4%
Farm West 1	farmer_child	Biomass	Nickel	1.3E-03	3.6	0.0%	4.1	0.0%
Farm West 1	farmer_child	Biomass	Thallium	1.6E-03	0.022	7.5%	0.16	1.0%
Farm West 2	farmer_adult	Biomass	Antimony	1.6E-08	0.016	0.0%	0.029	0.0%
Farm West 2	farmer_adult	Biomass	Arsenic	1.9E-04	0.95	0.0%	1.23	0.0%
Farm West 2	farmer_adult	Biomass	Cadmium	4.8E-05	0.12	0.0%	0.19	0.0%
Farm West 2	farmer_adult	Biomass	Chromium	1.8E-03	0.42	0.4%	1.1	0.2%
Farm West 2	farmer_adult	Biomass	Lead	2.3E-04	0.062	0.4%	0.11	0.2%
Farm West 2	farmer_adult	Biomass	Total mercury	1.4E-04	0.022	0.6%	0.041	0.3%

Metal Intake for the Biomass Plant

Receptor	Receptor Type	Source	COPC	Biomas Intake ug/kgBW/d	Lower Background ug/kgBW/d	%age	Upper Background ug/kg/d	%age
Farm West 2	farmer_adult	Biomass	Nickel	7.4E-04	1.7	0.0%	1.9	0.0%
Farm West 2	farmer_adult	Biomass	Thallium	1.3E-03	0.0084	14.9%	0.082	1.5%
Farm West 2	farmer_child	Biomass	Antimony	3.6E-08	0.028	0.0%	0.055	0.0%
Farm West 2	farmer_child	Biomass	Arsenic	3.2E-04	1.5	0.0%	2.1	0.0%
Farm West 2	farmer_child	Biomass	Cadmium	1.1E-04	0.28	0.0%	0.41	0.0%
Farm West 2	farmer_child	Biomass	Chromium	2.8E-03	1.3	0.2%	2.3	0.1%
Farm West 2	farmer_child	Biomass	Lead	4.4E-04	0.12	0.4%	0.20	0.2%
Farm West 2	farmer_child	Biomass	Total mercury	2.5E-04	0.033	0.8%	0.067	0.4%
Farm West 2	farmer_child	Biomass	Nickel	1.1E-03	3.6	0.0%	4.1	0.0%
Farm West 2	farmer_child	Biomass	Thallium	1.5E-03	0.022	6.6%	0.16	0.9%
Res Bladon 1	resident_adult	Biomass	Antimony	8.6E-09	0.016	0.0%	0.029	0.0%
Res Bladon 1	resident_adult	Biomass	Arsenic	8.0E-05	0.95	0.0%	1.23	0.0%
Res Bladon 1	resident_adult	Biomass	Cadmium	3.6E-05	0.12	0.0%	0.19	0.0%
Res Bladon 1	resident_adult	Biomass	Chromium	1.7E-04	0.42	0.0%	1.1	0.0%
Res Bladon 1	resident_adult	Biomass	Lead	8.0E-05	0.062	0.1%	0.11	0.1%
Res Bladon 1	resident_adult	Biomass	Total mercury	4.0E-05	0.022	0.2%	0.041	0.1%
Res Bladon 1	resident_adult	Biomass	Nickel	7.9E-05	1.7	0.0%	1.9	0.0%
Res Bladon 1	resident_adult	Biomass	Thallium	4.8E-05	0.0084	0.6%	0.082	0.1%
Res Bladon 1	resident_child	Biomass	Antimony	2.2E-08	0.028	0.0%	0.055	0.0%
Res Bladon 1	resident_child	Biomass	Arsenic	1.9E-04	1.5	0.0%	2.1	0.0%
Res Bladon 1	resident_child	Biomass	Cadmium	8.6E-05	0.28	0.0%	0.41	0.0%
Res Bladon 1	resident_child	Biomass	Chromium	4.5E-04	1.3	0.0%	2.3	0.0%
Res Bladon 1	resident_child	Biomass	Lead	1.9E-04	0.12	0.2%	0.20	0.1%
Res Bladon 1	resident_child	Biomass	Total mercury	1.0E-04	0.033	0.3%	0.067	0.2%
Res Bladon 1	resident_child	Biomass	Nickel	1.9E-04	3.6	0.0%	4.1	0.0%
Res Bladon 1	resident_child	Biomass	Thallium	1.5E-04	0.022	0.7%	0.16	0.1%
Res Bladon 2	resident_adult	Biomass	Antimony	8.0E-09	0.016	0.0%	0.029	0.0%
Res Bladon 2	resident_adult	Biomass	Arsenic	7.3E-05	0.95	0.0%	1.23	0.0%
Res Bladon 2	resident_adult	Biomass	Cadmium	3.3E-05	0.12	0.0%	0.19	0.0%
Res Bladon 2	resident_adult	Biomass	Chromium	1.6E-04	0.42	0.0%	1.1	0.0%
Res Bladon 2	resident_adult	Biomass	Lead	7.3E-05	0.062	0.1%	0.11	0.1%
Res Bladon 2	resident_adult	Biomass	Total mercury	3.6E-05	0.022	0.2%	0.041	0.1%
Res Bladon 2	resident_adult	Biomass	Nickel	7.2E-05	1.7	0.0%	1.9	0.0%
Res Bladon 2	resident_adult	Biomass	Thallium	4.4E-05	0.0084	0.5%	0.082	0.1%
Res Bladon 2	resident_child	Biomass	Antimony	2.0E-08	0.028	0.0%	0.055	0.0%
Res Bladon 2	resident_child	Biomass	Arsenic	1.7E-04	1.5	0.0%	2.1	0.0%
Res Bladon 2	resident_child	Biomass	Cadmium	7.8E-05	0.28	0.0%	0.41	0.0%
Res Bladon 2	resident_child	Biomass	Chromium	4.1E-04	1.3	0.0%	2.3	0.0%
Res Bladon 2	resident_child	Biomass	Lead	1.7E-04	0.12	0.1%	0.20	0.1%
Res Bladon 2	resident_child	Biomass	Total mercury	9.3E-05	0.033	0.3%	0.067	0.1%
Res Bladon 2	resident_child	Biomass	Nickel	1.7E-04	3.6	0.0%	4.1	0.0%
Res Bladon 2	resident_child	Biomass	Thallium	1.4E-04	0.022	0.6%	0.16	0.1%
Res Boston 1	resident_adult	Biomass	Antimony	3.2E-09	0.016	0.0%	0.029	0.0%
Res Boston 1	resident_adult	Biomass	Arsenic	2.3E-05	0.95	0.0%	1.23	0.0%
Res Boston 1	resident_adult	Biomass	Cadmium	1.0E-05	0.12	0.0%	0.19	0.0%
Res Boston 1	resident_adult	Biomass	Chromium	5.2E-05	0.42	0.0%	1.1	0.0%
Res Boston 1	resident_adult	Biomass	Lead	2.3E-05	0.062	0.0%	0.11	0.0%
Res Boston 1	resident_adult	Biomass	Total mercury	1.2E-05	0.022	0.1%	0.041	0.0%
Res Boston 1	resident_adult	Biomass	Nickel	2.3E-05	1.7	0.0%	1.9	0.0%
Res Boston 1	resident_adult	Biomass	Thallium	1.5E-05	0.0084	0.2%	0.082	0.0%
Res Boston 1	resident_child	Biomass	Antimony	8.2E-09	0.028	0.0%	0.055	0.0%
Res Boston 1	resident_child	Biomass	Arsenic	5.6E-05	1.5	0.0%	2.1	0.0%
Res Boston 1	resident_child	Biomass	Cadmium	2.5E-05	0.28	0.0%	0.41	0.0%
Res Boston 1	resident_child	Biomass	Chromium	1.4E-04	1.3	0.0%	2.3	0.0%
Res Boston 1	resident_child	Biomass	Lead	5.6E-05	0.12	0.0%	0.20	0.0%
Res Boston 1	resident_child	Biomass	Total mercury	3.1E-05	0.033	0.1%	0.067	0.0%
Res Boston 1	resident_child	Biomass	Nickel	5.6E-05	3.6	0.0%	4.1	0.0%
Res Boston 1	resident_child	Biomass	Thallium	4.8E-05	0.022	0.2%	0.16	0.0%
Res Boston 2	resident_adult	Biomass	Antimony	3.2E-09	0.016	0.0%	0.029	0.0%
Res Boston 2	resident_adult	Biomass	Arsenic	2.0E-05	0.95	0.0%	1.23	0.0%
Res Boston 2	resident_adult	Biomass	Cadmium	9.1E-06	0.12	0.0%	0.19	0.0%
Res Boston 2	resident_adult	Biomass	Chromium	4.7E-05	0.42	0.0%	1.1	0.0%
Res Boston 2	resident_adult	Biomass	Lead	2.0E-05	0.062	0.0%	0.11	0.0%
Res Boston 2	resident_adult	Biomass	Total mercury	1.1E-05	0.022	0.1%	0.041	0.0%
Res Boston 2	resident_adult	Biomass	Nickel	2.0E-05	1.7	0.0%	1.9	0.0%
Res Boston 2	resident_adult	Biomass	Thallium	1.3E-05	0.0084	0.2%	0.082	0.0%
Res Boston 2	resident_child	Biomass	Antimony	8.1E-09	0.028	0.0%	0.055	0.0%
Res Boston 2	resident_child	Biomass	Arsenic	4.9E-05	1.5	0.0%	2.1	0.0%
Res Boston 2	resident_child	Biomass	Cadmium	2.2E-05	0.28	0.0%	0.41	0.0%
Res Boston 2	resident_child	Biomass	Chromium	1.3E-04	1.3	0.0%	2.3	0.0%

Metal Intake for the Biomass Plant

Receptor	Receptor Type	Source	COPC	Biomas Intake ug/kgBW/d	Lower Background ug/kgBW/d	%age	Upper Background ug/kg/d	%age
Res Boston 2	resident_child	Biomass	Lead	4.9E-05	0.12	0.0%	0.20	0.0%
Res Boston 2	resident_child	Biomass	Total mercury	2.8E-05	0.033	0.1%	0.067	0.0%
Res Boston 2	resident_child	Biomass	Nickel	4.9E-05	3.6	0.0%	4.1	0.0%
Res Boston 2	resident_child	Biomass	Thallium	4.4E-05	0.022	0.2%	0.16	0.0%
Res Fishtoft 1	resident_adult	Biomass	Antimony	8.8E-09	0.016	0.0%	0.029	0.0%
Res Fishtoft 1	resident_adult	Biomass	Arsenic	7.2E-05	0.95	0.0%	1.23	0.0%
Res Fishtoft 1	resident_adult	Biomass	Cadmium	3.2E-05	0.12	0.0%	0.19	0.0%
Res Fishtoft 1	resident_adult	Biomass	Chromium	1.6E-04	0.42	0.0%	1.1	0.0%
Res Fishtoft 1	resident_adult	Biomass	Lead	7.2E-05	0.062	0.1%	0.11	0.1%
Res Fishtoft 1	resident_adult	Biomass	Total mercury	3.7E-05	0.022	0.2%	0.041	0.1%
Res Fishtoft 1	resident_adult	Biomass	Nickel	7.2E-05	1.7	0.0%	1.9	0.0%
Res Fishtoft 1	resident_adult	Biomass	Thallium	4.5E-05	0.0084	0.5%	0.082	0.1%
Res Fishtoft 1	resident_child	Biomass	Antimony	2.2E-08	0.028	0.0%	0.055	0.0%
Res Fishtoft 1	resident_child	Biomass	Arsenic	1.7E-04	1.5	0.0%	2.1	0.0%
Res Fishtoft 1	resident_child	Biomass	Cadmium	7.8E-05	0.28	0.0%	0.41	0.0%
Res Fishtoft 1	resident_child	Biomass	Chromium	4.2E-04	1.3	0.0%	2.3	0.0%
Res Fishtoft 1	resident_child	Biomass	Lead	1.7E-04	0.12	0.1%	0.20	0.1%
Res Fishtoft 1	resident_child	Biomass	Total mercury	9.4E-05	0.033	0.3%	0.067	0.1%
Res Fishtoft 1	resident_child	Biomass	Nickel	1.7E-04	3.6	0.0%	4.1	0.0%
Res Fishtoft 1	resident_child	Biomass	Thallium	1.4E-04	0.022	0.6%	0.16	0.1%
Res Fishtoft 2	resident_adult	Biomass	Antimony	9.4E-09	0.016	0.0%	0.029	0.0%
Res Fishtoft 2	resident_adult	Biomass	Arsenic	7.6E-05	0.95	0.0%	1.23	0.0%
Res Fishtoft 2	resident_adult	Biomass	Cadmium	3.4E-05	0.12	0.0%	0.19	0.0%
Res Fishtoft 2	resident_adult	Biomass	Chromium	1.7E-04	0.42	0.0%	1.1	0.0%
Res Fishtoft 2	resident_adult	Biomass	Lead	7.6E-05	0.062	0.1%	0.11	0.1%
Res Fishtoft 2	resident_adult	Biomass	Total mercury	3.9E-05	0.022	0.2%	0.041	0.1%
Res Fishtoft 2	resident_adult	Biomass	Nickel	7.6E-05	1.7	0.0%	1.9	0.0%
Res Fishtoft 2	resident_adult	Biomass	Thallium	4.7E-05	0.0084	0.6%	0.082	0.1%
Res Fishtoft 2	resident_child	Biomass	Antimony	2.4E-08	0.028	0.0%	0.055	0.0%
Res Fishtoft 2	resident_child	Biomass	Arsenic	1.8E-04	1.5	0.0%	2.1	0.0%
Res Fishtoft 2	resident_child	Biomass	Cadmium	8.2E-05	0.28	0.0%	0.41	0.0%
Res Fishtoft 2	resident_child	Biomass	Chromium	4.4E-04	1.3	0.0%	2.3	0.0%
Res Fishtoft 2	resident_child	Biomass	Lead	1.8E-04	0.12	0.2%	0.20	0.1%
Res Fishtoft 2	resident_child	Biomass	Total mercury	9.9E-05	0.033	0.3%	0.067	0.2%
Res Fishtoft 2	resident_child	Biomass	Nickel	1.8E-04	3.6	0.0%	4.1	0.0%
Res Fishtoft 2	resident_child	Biomass	Thallium	1.5E-04	0.022	0.7%	0.16	0.1%
Res Fishtoft 3	resident_adult	Biomass	Antimony	9.4E-09	0.016	0.0%	0.029	0.0%
Res Fishtoft 3	resident_adult	Biomass	Arsenic	7.6E-05	0.95	0.0%	1.23	0.0%
Res Fishtoft 3	resident_adult	Biomass	Cadmium	3.4E-05	0.12	0.0%	0.19	0.0%
Res Fishtoft 3	resident_adult	Biomass	Chromium	1.7E-04	0.42	0.0%	1.1	0.0%
Res Fishtoft 3	resident_adult	Biomass	Lead	7.6E-05	0.062	0.1%	0.11	0.1%
Res Fishtoft 3	resident_adult	Biomass	Total mercury	3.9E-05	0.022	0.2%	0.041	0.1%
Res Fishtoft 3	resident_adult	Biomass	Nickel	7.6E-05	1.7	0.0%	1.9	0.0%
Res Fishtoft 3	resident_adult	Biomass	Thallium	4.7E-05	0.0084	0.6%	0.082	0.1%
Res Fishtoft 3	resident_child	Biomass	Antimony	2.4E-08	0.028	0.0%	0.055	0.0%
Res Fishtoft 3	resident_child	Biomass	Arsenic	1.8E-04	1.5	0.0%	2.1	0.0%
Res Fishtoft 3	resident_child	Biomass	Cadmium	8.2E-05	0.28	0.0%	0.41	0.0%
Res Fishtoft 3	resident_child	Biomass	Chromium	4.4E-04	1.3	0.0%	2.3	0.0%
Res Fishtoft 3	resident_child	Biomass	Lead	1.8E-04	0.12	0.2%	0.20	0.1%
Res Fishtoft 3	resident_child	Biomass	Total mercury	9.9E-05	0.033	0.3%	0.067	0.2%
Res Fishtoft 3	resident_child	Biomass	Nickel	1.8E-04	3.6	0.0%	4.1	0.0%
Res Fishtoft 3	resident_child	Biomass	Thallium	1.5E-04	0.022	0.7%	0.16	0.1%
Res Marsh Lane 1	resident_adult	Biomass	Antimony	1.3E-08	0.016	0.0%	0.029	0.0%
Res Marsh Lane 1	resident_adult	Biomass	Arsenic	1.0E-04	0.95	0.0%	1.23	0.0%
Res Marsh Lane 1	resident_adult	Biomass	Cadmium	4.7E-05	0.12	0.0%	0.19	0.0%
Res Marsh Lane 1	resident_adult	Biomass	Chromium	2.3E-04	0.42	0.1%	1.1	0.0%
Res Marsh Lane 1	resident_adult	Biomass	Lead	1.0E-04	0.062	0.2%	0.11	0.1%
Res Marsh Lane 1	resident_adult	Biomass	Total mercury	5.3E-05	0.022	0.3%	0.041	0.1%
Res Marsh Lane 1	resident_adult	Biomass	Nickel	1.0E-04	1.7	0.0%	1.9	0.0%
Res Marsh Lane 1	resident_adult	Biomass	Thallium	6.4E-05	0.0084	0.8%	0.082	0.1%
Res Marsh Lane 1	resident_child	Biomass	Antimony	3.2E-08	0.028	0.0%	0.055	0.0%
Res Marsh Lane 1	resident_child	Biomass	Arsenic	2.5E-04	1.5	0.0%	2.1	0.0%
Res Marsh Lane 1	resident_child	Biomass	Cadmium	1.1E-04	0.28	0.0%	0.41	0.0%
Res Marsh Lane 1	resident_child	Biomass	Chromium	6.0E-04	1.3	0.0%	2.3	0.0%
Res Marsh Lane 1	resident_child	Biomass	Lead	2.5E-04	0.12	0.2%	0.20	0.1%
Res Marsh Lane 1	resident_child	Biomass	Total mercury	1.4E-04	0.033	0.4%	0.067	0.2%
Res Marsh Lane 1	resident_child	Biomass	Nickel	2.5E-04	3.6	0.0%	4.1	0.0%
Res Marsh Lane 1	resident_child	Biomass	Thallium	2.1E-04	0.022	0.9%	0.16	0.1%
Res Marsh Lane 2	resident_adult	Biomass	Antimony	1.3E-08	0.016	0.0%	0.029	0.0%
Res Marsh Lane 2	resident_adult	Biomass	Arsenic	1.1E-04	0.95	0.0%	1.23	0.0%

Metal Intake for the Biomass Plant

Receptor	Receptor Type	Source	COPC	Biomas Intake ug/kgBW/d	Lower Background ug/kgBW/d	%age	Upper Background ug/kg/d	%age
Res Marsh Lane 2	resident_adult	Biomass	Cadmium	4.7E-05	0.12	0.0%	0.19	0.0%
Res Marsh Lane 2	resident_adult	Biomass	Chromium	2.3E-04	0.42	0.1%	1.1	0.0%
Res Marsh Lane 2	resident_adult	Biomass	Lead	1.1E-04	0.062	0.2%	0.11	0.1%
Res Marsh Lane 2	resident_adult	Biomass	Total mercury	5.4E-05	0.022	0.3%	0.041	0.1%
Res Marsh Lane 2	resident_adult	Biomass	Nickel	1.1E-04	1.7	0.0%	1.9	0.0%
Res Marsh Lane 2	resident_adult	Biomass	Thallium	6.6E-05	0.0084	0.8%	0.082	0.1%
Res Marsh Lane 2	resident_child	Biomass	Antimony	3.4E-08	0.028	0.0%	0.055	0.0%
Res Marsh Lane 2	resident_child	Biomass	Arsenic	2.5E-04	1.5	0.0%	2.1	0.0%
Res Marsh Lane 2	resident_child	Biomass	Cadmium	1.1E-04	0.28	0.0%	0.41	0.0%
Res Marsh Lane 2	resident_child	Biomass	Chromium	6.2E-04	1.3	0.0%	2.3	0.0%
Res Marsh Lane 2	resident_child	Biomass	Lead	2.5E-04	0.12	0.2%	0.20	0.1%
Res Marsh Lane 2	resident_child	Biomass	Total mercury	1.4E-04	0.033	0.4%	0.067	0.2%
Res Marsh Lane 2	resident_child	Biomass	Nickel	2.5E-04	3.6	0.0%	4.1	0.0%
Res Marsh Lane 2	resident_child	Biomass	Thallium	2.1E-04	0.022	1.0%	0.16	0.1%
Res Skirbeck 1	resident_adult	Biomass	Antimony	3.2E-08	0.016	0.0%	0.029	0.0%
Res Skirbeck 1	resident_adult	Biomass	Arsenic	3.1E-04	0.95	0.0%	1.23	0.0%
Res Skirbeck 1	resident_adult	Biomass	Cadmium	1.4E-04	0.12	0.1%	0.19	0.1%
Res Skirbeck 1	resident_adult	Biomass	Chromium	6.5E-04	0.42	0.2%	1.1	0.1%
Res Skirbeck 1	resident_adult	Biomass	Lead	3.1E-04	0.062	0.5%	0.11	0.3%
Res Skirbeck 1	resident_adult	Biomass	Total mercury	1.5E-04	0.022	0.7%	0.041	0.4%
Res Skirbeck 1	resident_adult	Biomass	Nickel	3.0E-04	1.7	0.0%	1.9	0.0%
Res Skirbeck 1	resident_adult	Biomass	Thallium	1.8E-04	0.0084	2.2%	0.082	0.2%
Res Skirbeck 1	resident_child	Biomass	Antimony	8.2E-08	0.028	0.0%	0.055	0.0%
Res Skirbeck 1	resident_child	Biomass	Arsenic	7.4E-04	1.5	0.0%	2.1	0.0%
Res Skirbeck 1	resident_child	Biomass	Cadmium	3.3E-04	0.28	0.1%	0.41	0.1%
Res Skirbeck 1	resident_child	Biomass	Chromium	1.7E-03	1.3	0.1%	2.3	0.1%
Res Skirbeck 1	resident_child	Biomass	Lead	7.4E-04	0.12	0.6%	0.20	0.4%
Res Skirbeck 1	resident_child	Biomass	Total mercury	3.9E-04	0.033	1.2%	0.067	0.6%
Res Skirbeck 1	resident_child	Biomass	Nickel	7.3E-04	3.6	0.0%	4.1	0.0%
Res Skirbeck 1	resident_child	Biomass	Thallium	5.8E-04	0.022	2.6%	0.16	0.4%
Res Skirbeck 2	resident_adult	Biomass	Antimony	2.4E-08	0.016	0.0%	0.029	0.0%
Res Skirbeck 2	resident_adult	Biomass	Arsenic	2.0E-04	0.95	0.0%	1.23	0.0%
Res Skirbeck 2	resident_adult	Biomass	Cadmium	9.0E-05	0.12	0.1%	0.19	0.0%
Res Skirbeck 2	resident_adult	Biomass	Chromium	4.4E-04	0.42	0.1%	1.1	0.0%
Res Skirbeck 2	resident_adult	Biomass	Lead	2.0E-04	0.062	0.3%	0.11	0.2%
Res Skirbeck 2	resident_adult	Biomass	Total mercury	1.0E-04	0.022	0.5%	0.041	0.3%
Res Skirbeck 2	resident_adult	Biomass	Nickel	2.0E-04	1.7	0.0%	1.9	0.0%
Res Skirbeck 2	resident_adult	Biomass	Thallium	1.2E-04	0.0084	1.5%	0.082	0.2%
Res Skirbeck 2	resident_child	Biomass	Antimony	6.0E-08	0.028	0.0%	0.055	0.0%
Res Skirbeck 2	resident_child	Biomass	Arsenic	4.8E-04	1.5	0.0%	2.1	0.0%
Res Skirbeck 2	resident_child	Biomass	Cadmium	2.2E-04	0.28	0.1%	0.41	0.1%
Res Skirbeck 2	resident_child	Biomass	Chromium	1.2E-03	1.3	0.1%	2.3	0.1%
Res Skirbeck 2	resident_child	Biomass	Lead	4.9E-04	0.12	0.4%	0.20	0.2%
Res Skirbeck 2	resident_child	Biomass	Total mercury	2.6E-04	0.033	0.8%	0.067	0.4%
Res Skirbeck 2	resident_child	Biomass	Nickel	4.8E-04	3.6	0.0%	4.1	0.0%
Res Skirbeck 2	resident_child	Biomass	Thallium	4.0E-04	0.022	1.8%	0.16	0.2%
Res Skirbeck Quarter	resident_adult	Biomass	Antimony	7.6E-09	0.016	0.0%	0.029	0.0%
Res Skirbeck Quarter	resident_adult	Biomass	Arsenic	6.1E-05	0.95	0.0%	1.23	0.0%
Res Skirbeck Quarter	resident_adult	Biomass	Cadmium	2.8E-05	0.12	0.0%	0.19	0.0%
Res Skirbeck Quarter	resident_adult	Biomass	Chromium	1.4E-04	0.42	0.0%	1.1	0.0%
Res Skirbeck Quarter	resident_adult	Biomass	Lead	6.1E-05	0.062	0.1%	0.11	0.1%
Res Skirbeck Quarter	resident_adult	Biomass	Total mercury	3.1E-05	0.022	0.2%	0.041	0.1%
Res Skirbeck Quarter	resident_adult	Biomass	Nickel	6.1E-05	1.7	0.0%	1.9	0.0%
Res Skirbeck Quarter	resident_adult	Biomass	Thallium	3.8E-05	0.0084	0.5%	0.082	0.0%
Res Skirbeck Quarter	resident_child	Biomass	Antimony	1.9E-08	0.028	0.0%	0.055	0.0%
Res Skirbeck Quarter	resident_child	Biomass	Arsenic	1.5E-04	1.5	0.0%	2.1	0.0%
Res Skirbeck Quarter	resident_child	Biomass	Cadmium	6.6E-05	0.28	0.0%	0.41	0.0%
Res Skirbeck Quarter	resident_child	Biomass	Chromium	3.6E-04	1.3	0.0%	2.3	0.0%
Res Skirbeck Quarter	resident_child	Biomass	Lead	1.5E-04	0.12	0.1%	0.20	0.1%
Res Skirbeck Quarter	resident_child	Biomass	Total mercury	8.0E-05	0.033	0.3%	0.067	0.1%
Res Skirbeck Quarter	resident_child	Biomass	Nickel	1.5E-04	3.6	0.0%	4.1	0.0%
Res Skirbeck Quarter	resident_child	Biomass	Thallium	1.2E-04	0.022	0.6%	0.16	0.1%
Res South End	resident_adult	Biomass	Antimony	3.5E-09	0.016	0.0%	0.029	0.0%
Res South End	resident_adult	Biomass	Arsenic	2.2E-05	0.95	0.0%	1.23	0.0%
Res South End	resident_adult	Biomass	Cadmium	1.0E-05	0.12	0.0%	0.19	0.0%
Res South End	resident_adult	Biomass	Chromium	5.2E-05	0.42	0.0%	1.1	0.0%
Res South End	resident_adult	Biomass	Lead	2.2E-05	0.062	0.0%	0.11	0.0%
Res South End	resident_adult	Biomass	Total mercury	1.2E-05	0.022	0.1%	0.041	0.0%
Res South End	resident_adult	Biomass	Nickel	2.2E-05	1.7	0.0%	1.9	0.0%
Res South End	resident_adult	Biomass	Thallium	1.5E-05	0.0084	0.2%	0.082	0.0%

Metal Intake for the Biomass Plant

Receptor	Receptor Type	Source	COPC	Biomas Intake ug/kgBW/d	Lower Background ug/kgBW/d	%age	Upper Background ug/kg/d	%age
Res South End	resident_child	Biomass	Antimony	8.9E-09	0.028	0.0%	0.055	0.0%
Res South End	resident_child	Biomass	Arsenic	5.4E-05	1.5	0.0%	2.1	0.0%
Res South End	resident_child	Biomass	Cadmium	2.4E-05	0.28	0.0%	0.41	0.0%
Res South End	resident_child	Biomass	Chromium	1.4E-04	1.3	0.0%	2.3	0.0%
Res South End	resident_child	Biomass	Lead	5.4E-05	0.12	0.0%	0.20	0.0%
Res South End	resident_child	Biomass	Total mercury	3.1E-05	0.033	0.1%	0.067	0.0%
Res South End	resident_child	Biomass	Nickel	5.4E-05	3.6	0.0%	4.1	0.0%
Res South End	resident_child	Biomass	Thallium	4.9E-05	0.022	0.2%	0.16	0.0%
Res Wyberton 1	resident_adult	Biomass	Antimony	5.6E-09	0.016	0.0%	0.029	0.0%
Res Wyberton 1	resident_adult	Biomass	Arsenic	4.6E-05	0.95	0.0%	1.23	0.0%
Res Wyberton 1	resident_adult	Biomass	Cadmium	2.1E-05	0.12	0.0%	0.19	0.0%
Res Wyberton 1	resident_adult	Biomass	Chromium	1.0E-04	0.42	0.0%	1.1	0.0%
Res Wyberton 1	resident_adult	Biomass	Lead	4.6E-05	0.062	0.1%	0.11	0.0%
Res Wyberton 1	resident_adult	Biomass	Total mercury	2.4E-05	0.022	0.1%	0.041	0.1%
Res Wyberton 1	resident_adult	Biomass	Nickel	4.6E-05	1.7	0.0%	1.9	0.0%
Res Wyberton 1	resident_adult	Biomass	Thallium	2.9E-05	0.0084	0.3%	0.082	0.0%
Res Wyberton 1	resident_child	Biomass	Antimony	1.4E-08	0.028	0.0%	0.055	0.0%
Res Wyberton 1	resident_child	Biomass	Arsenic	1.1E-04	1.5	0.0%	2.1	0.0%
Res Wyberton 1	resident_child	Biomass	Cadmium	5.0E-05	0.28	0.0%	0.41	0.0%
Res Wyberton 1	resident_child	Biomass	Chromium	2.7E-04	1.3	0.0%	2.3	0.0%
Res Wyberton 1	resident_child	Biomass	Lead	1.1E-04	0.12	0.1%	0.20	0.1%
Res Wyberton 1	resident_child	Biomass	Total mercury	6.0E-05	0.033	0.2%	0.067	0.1%
Res Wyberton 1	resident_child	Biomass	Nickel	1.1E-04	3.6	0.0%	4.1	0.0%
Res Wyberton 1	resident_child	Biomass	Thallium	9.2E-05	0.022	0.4%	0.16	0.1%
Res Wyberton 2	resident_adult	Biomass	Antimony	5.3E-09	0.016	0.0%	0.029	0.0%
Res Wyberton 2	resident_adult	Biomass	Arsenic	4.2E-05	0.95	0.0%	1.23	0.0%
Res Wyberton 2	resident_adult	Biomass	Cadmium	1.9E-05	0.12	0.0%	0.19	0.0%
Res Wyberton 2	resident_adult	Biomass	Chromium	9.3E-05	0.42	0.0%	1.1	0.0%
Res Wyberton 2	resident_adult	Biomass	Lead	4.2E-05	0.062	0.1%	0.11	0.0%
Res Wyberton 2	resident_adult	Biomass	Total mercury	2.2E-05	0.022	0.1%	0.041	0.1%
Res Wyberton 2	resident_adult	Biomass	Nickel	4.2E-05	1.7	0.0%	1.9	0.0%
Res Wyberton 2	resident_adult	Biomass	Thallium	2.6E-05	0.0084	0.3%	0.082	0.0%
Res Wyberton 2	resident_child	Biomass	Antimony	1.3E-08	0.028	0.0%	0.055	0.0%
Res Wyberton 2	resident_child	Biomass	Arsenic	1.0E-04	1.5	0.0%	2.1	0.0%
Res Wyberton 2	resident_child	Biomass	Cadmium	4.6E-05	0.28	0.0%	0.41	0.0%
Res Wyberton 2	resident_child	Biomass	Chromium	2.5E-04	1.3	0.0%	2.3	0.0%
Res Wyberton 2	resident_child	Biomass	Lead	1.0E-04	0.12	0.1%	0.20	0.1%
Res Wyberton 2	resident_child	Biomass	Total mercury	5.5E-05	0.033	0.2%	0.067	0.1%
Res Wyberton 2	resident_child	Biomass	Nickel	1.0E-04	3.6	0.0%	4.1	0.0%
Res Wyberton 2	resident_child	Biomass	Thallium	8.4E-05	0.022	0.4%	0.16	0.1%
Res Wyberton East 1	resident_adult	Biomass	Antimony	3.0E-09	0.016	0.0%	0.029	0.0%
Res Wyberton East 1	resident_adult	Biomass	Arsenic	2.8E-05	0.95	0.0%	1.23	0.0%
Res Wyberton East 1	resident_adult	Biomass	Cadmium	1.2E-05	0.12	0.0%	0.19	0.0%
Res Wyberton East 1	resident_adult	Biomass	Chromium	5.9E-05	0.42	0.0%	1.1	0.0%
Res Wyberton East 1	resident_adult	Biomass	Lead	2.8E-05	0.062	0.0%	0.11	0.0%
Res Wyberton East 1	resident_adult	Biomass	Total mercury	1.4E-05	0.022	0.1%	0.041	0.0%
Res Wyberton East 1	resident_adult	Biomass	Nickel	2.8E-05	1.7	0.0%	1.9	0.0%
Res Wyberton East 1	resident_adult	Biomass	Thallium	1.7E-05	0.0084	0.2%	0.082	0.0%
Res Wyberton East 1	resident_child	Biomass	Antimony	7.5E-09	0.028	0.0%	0.055	0.0%
Res Wyberton East 1	resident_child	Biomass	Arsenic	6.7E-05	1.5	0.0%	2.1	0.0%
Res Wyberton East 1	resident_child	Biomass	Cadmium	3.0E-05	0.28	0.0%	0.41	0.0%
Res Wyberton East 1	resident_child	Biomass	Chromium	1.5E-04	1.3	0.0%	2.3	0.0%
Res Wyberton East 1	resident_child	Biomass	Lead	6.7E-05	0.12	0.1%	0.20	0.0%
Res Wyberton East 1	resident_child	Biomass	Total mercury	3.5E-05	0.033	0.1%	0.067	0.1%
Res Wyberton East 1	resident_child	Biomass	Nickel	6.6E-05	3.6	0.0%	4.1	0.0%
Res Wyberton East 1	resident_child	Biomass	Thallium	5.2E-05	0.022	0.2%	0.16	0.0%
Res Wyberton East 2	resident_adult	Biomass	Antimony	2.5E-09	0.016	0.0%	0.029	0.0%
Res Wyberton East 2	resident_adult	Biomass	Arsenic	2.3E-05	0.95	0.0%	1.23	0.0%
Res Wyberton East 2	resident_adult	Biomass	Cadmium	1.0E-05	0.12	0.0%	0.19	0.0%
Res Wyberton East 2	resident_adult	Biomass	Chromium	4.9E-05	0.42	0.0%	1.1	0.0%
Res Wyberton East 2	resident_adult	Biomass	Lead	2.3E-05	0.062	0.0%	0.11	0.0%
Res Wyberton East 2	resident_adult	Biomass	Total mercury	1.1E-05	0.022	0.1%	0.041	0.0%
Res Wyberton East 2	resident_adult	Biomass	Nickel	2.3E-05	1.7	0.0%	1.9	0.0%
Res Wyberton East 2	resident_adult	Biomass	Thallium	1.4E-05	0.0084	0.2%	0.082	0.0%
Res Wyberton East 2	resident_child	Biomass	Antimony	6.4E-09	0.028	0.0%	0.055	0.0%
Res Wyberton East 2	resident_child	Biomass	Arsenic	5.5E-05	1.5	0.0%	2.1	0.0%
Res Wyberton East 2	resident_child	Biomass	Cadmium	2.5E-05	0.28	0.0%	0.41	0.0%
Res Wyberton East 2	resident_child	Biomass	Chromium	1.3E-04	1.3	0.0%	2.3	0.0%
Res Wyberton East 2	resident_child	Biomass	Lead	5.5E-05	0.12	0.0%	0.20	0.0%
Res Wyberton East 2	resident_child	Biomass	Total mercury	2.9E-05	0.033	0.1%	0.067	0.0%

Metal Intake for the Biomass Plant

Receptor	Receptor Type	Source	COPC	Biomas Intake ug/kgBW/d	Lower Background ug/kgBW/d	%age	Upper Background ug/kg/d	%age
Res Wyberton East 2	resident_child	Biomass	Nickel	5.5E-05	3.6	0.0%	4.1	0.0%
Res Wyberton East 2	resident_child	Biomass	Thallium	4.3E-05	0.022	0.2%	0.16	0.0%

Metal Intake for the Boston Alternative Energy Facility and Biomass Plant Combined

Receptor	Receptor Type	Source	COPC	EFW Intake ug/kgBW/d	Lower Background ug/kgBW/d	%age	Upper Background ug/kg/d	%age
Farm East 1	farmer_adult	EFW + Biomass	Antimony	2.3E-07	0.016	0.0%	0.029	0.0%
Farm East 1	farmer_adult	EFW + Biomass	Arsenic	3.2E-03	0.95	0.3%	1.23	0.3%
Farm East 1	farmer_adult	EFW + Biomass	Cadmium	6.0E-04	0.12	0.5%	0.19	0.3%
Farm East 1	farmer_adult	EFW + Biomass	Chromium	4.7E-02	0.42	11.1%	1.1	4.3%
Farm East 1	farmer_adult	EFW + Biomass	Lead	5.6E-03	0.062	9.1%	0.11	5.1%
Farm East 1	farmer_adult	EFW + Biomass	Total mercury	1.7E-03	0.022	7.9%	0.041	4.2%
Farm East 1	farmer_adult	EFW + Biomass	Nickel	2.0E-02	1.7	1.2%	1.9	1.0%
Farm East 1	farmer_adult	EFW + Biomass	Thallium	1.5E-02	0.0084	179.1%	0.082	18.3%
Farm East 1	farmer_child	EFW + Biomass	Antimony	5.2E-07	0.028	0.0%	0.055	0.0%
Farm East 1	farmer_child	EFW + Biomass	Arsenic	5.6E-03	1.5	0.4%	2.1	0.3%
Farm East 1	farmer_child	EFW + Biomass	Cadmium	1.4E-03	0.28	0.5%	0.41	0.3%
Farm East 1	farmer_child	EFW + Biomass	Chromium	7.5E-02	1.3	5.8%	2.3	3.3%
Farm East 1	farmer_child	EFW + Biomass	Lead	1.1E-02	0.12	9.2%	0.20	5.5%
Farm East 1	farmer_child	EFW + Biomass	Total mercury	3.0E-03	0.033	9.6%	0.067	4.7%
Farm East 1	farmer_child	EFW + Biomass	Nickel	3.0E-02	3.6	0.8%	4.1	0.7%
Farm East 1	farmer_child	EFW + Biomass	Thallium	1.7E-02	0.022	79.5%	0.16	10.9%
Farm East 2	farmer_adult	EFW + Biomass	Antimony	5.1E-07	0.016	0.0%	0.029	0.0%
Farm East 2	farmer_adult	EFW + Biomass	Arsenic	2.2E-03	0.95	0.2%	1.23	0.2%
Farm East 2	farmer_adult	EFW + Biomass	Cadmium	4.0E-04	0.12	0.3%	0.19	0.2%
Farm East 2	farmer_adult	EFW + Biomass	Chromium	3.8E-02	0.42	9.1%	1.1	3.5%
Farm East 2	farmer_adult	EFW + Biomass	Lead	3.9E-03	0.062	6.4%	0.11	3.6%
Farm East 2	farmer_adult	EFW + Biomass	Total mercury	1.4E-03	0.022	6.7%	0.041	3.6%
Farm East 2	farmer_adult	EFW + Biomass	Nickel	1.4E-02	1.7	0.8%	1.9	0.7%
Farm East 2	farmer_adult	EFW + Biomass	Thallium	1.4E-02	0.0084	167.5%	0.082	17.2%
Farm East 2	farmer_child	EFW + Biomass	Antimony	1.2E-06	0.028	0.0%	0.055	0.0%
Farm East 2	farmer_child	EFW + Biomass	Arsenic	3.8E-03	1.5	0.3%	2.1	0.2%
Farm East 2	farmer_child	EFW + Biomass	Cadmium	9.3E-04	0.28	0.3%	0.41	0.2%
Farm East 2	farmer_child	EFW + Biomass	Chromium	6.4E-02	1.3	4.9%	2.3	2.8%
Farm East 2	farmer_child	EFW + Biomass	Lead	7.7E-03	0.12	6.4%	0.20	3.8%
Farm East 2	farmer_child	EFW + Biomass	Total mercury	2.6E-03	0.033	8.3%	0.067	4.1%
Farm East 2	farmer_child	EFW + Biomass	Nickel	2.1E-02	3.6	0.6%	4.1	0.5%
Farm East 2	farmer_child	EFW + Biomass	Thallium	1.6E-02	0.022	75.0%	0.16	10.3%
Farm North	farmer_adult	EFW + Biomass	Antimony	2.4E-07	0.016	0.0%	0.029	0.0%
Farm North	farmer_adult	EFW + Biomass	Arsenic	3.5E-03	0.95	0.4%	1.23	0.3%
Farm North	farmer_adult	EFW + Biomass	Cadmium	6.5E-04	0.12	0.5%	0.19	0.3%
Farm North	farmer_adult	EFW + Biomass	Chromium	5.1E-02	0.42	12.1%	1.1	4.6%
Farm North	farmer_adult	EFW + Biomass	Lead	6.1E-03	0.062	9.9%	0.11	5.6%
Farm North	farmer_adult	EFW + Biomass	Total mercury	1.8E-03	0.022	8.5%	0.041	4.6%
Farm North	farmer_adult	EFW + Biomass	Nickel	2.2E-02	1.7	1.3%	1.9	1.1%
Farm North	farmer_adult	EFW + Biomass	Thallium	1.6E-02	0.0084	192.4%	0.082	19.7%
Farm North	farmer_child	EFW + Biomass	Antimony	5.4E-07	0.028	0.0%	0.055	0.0%
Farm North	farmer_child	EFW + Biomass	Arsenic	6.1E-03	1.5	0.4%	2.1	0.3%
Farm North	farmer_child	EFW + Biomass	Cadmium	1.5E-03	0.28	0.5%	0.41	0.4%
Farm North	farmer_child	EFW + Biomass	Chromium	8.2E-02	1.3	6.3%	2.3	3.5%
Farm North	farmer_child	EFW + Biomass	Lead	1.2E-02	0.12	10.0%	0.20	6.0%
Farm North	farmer_child	EFW + Biomass	Total mercury	3.3E-03	0.033	10.3%	0.067	5.1%
Farm North	farmer_child	EFW + Biomass	Nickel	3.3E-02	3.6	0.9%	4.1	0.8%
Farm North	farmer_child	EFW + Biomass	Thallium	1.9E-02	0.022	85.4%	0.16	11.7%
Farm West 1	farmer_adult	EFW + Biomass	Antimony	9.2E-08	0.016	0.0%	0.029	0.0%
Farm West 1	farmer_adult	EFW + Biomass	Arsenic	1.1E-03	0.95	0.1%	1.23	0.1%
Farm West 1	farmer_adult	EFW + Biomass	Cadmium	2.2E-04	0.12	0.2%	0.19	0.1%
Farm West 1	farmer_adult	EFW + Biomass	Chromium	1.7E-02	0.42	4.0%	1.1	1.5%
Farm West 1	farmer_adult	EFW + Biomass	Lead	2.0E-03	0.062	3.2%	0.11	1.8%
Farm West 1	farmer_adult	EFW + Biomass	Total mercury	6.1E-04	0.022	2.9%	0.041	1.6%
Farm West 1	farmer_adult	EFW + Biomass	Nickel	7.0E-03	1.7	0.4%	1.9	0.4%
Farm West 1	farmer_adult	EFW + Biomass	Thallium	5.6E-03	0.0084	66.4%	0.082	6.8%
Farm West 1	farmer_child	EFW + Biomass	Antimony	2.1E-07	0.028	0.0%	0.055	0.0%
Farm West 1	farmer_child	EFW + Biomass	Arsenic	2.0E-03	1.5	0.1%	2.1	0.1%
Farm West 1	farmer_child	EFW + Biomass	Cadmium	5.1E-04	0.28	0.2%	0.41	0.1%
Farm West 1	farmer_child	EFW + Biomass	Chromium	2.7E-02	1.3	2.1%	2.3	1.2%
Farm West 1	farmer_child	EFW + Biomass	Lead	3.9E-03	0.12	3.2%	0.20	1.9%
Farm West 1	farmer_child	EFW + Biomass	Total mercury	1.1E-03	0.033	3.5%	0.067	1.8%
Farm West 1	farmer_child	EFW + Biomass	Nickel	1.1E-02	3.6	0.3%	4.1	0.3%
Farm West 1	farmer_child	EFW + Biomass	Thallium	6.5E-03	0.022	29.5%	0.16	4.1%
Farm West 2	farmer_adult	EFW + Biomass	Antimony	1.1E-07	0.016	0.0%	0.029	0.0%
Farm West 2	farmer_adult	EFW + Biomass	Arsenic	8.5E-04	0.95	0.1%	1.23	0.1%
Farm West 2	farmer_adult	EFW + Biomass	Cadmium	1.6E-04	0.12	0.1%	0.19	0.1%
Farm West 2	farmer_adult	EFW + Biomass	Chromium	1.3E-02	0.42	3.1%	1.1	1.2%
Farm West 2	farmer_adult	EFW + Biomass	Lead	1.5E-03	0.062	2.4%	0.11	1.3%
Farm West 2	farmer_adult	EFW + Biomass	Total mercury	5.0E-04	0.022	2.4%	0.041	1.3%
Farm West 2	farmer_adult	EFW + Biomass	Nickel	5.1E-03	1.7	0.3%	1.9	0.3%
Farm West 2	farmer_adult	EFW + Biomass	Thallium	4.7E-03	0.0084	56.1%	0.082	5.7%
Farm West 2	farmer_child	EFW + Biomass	Antimony	2.6E-07	0.028	0.0%	0.055	0.0%
Farm West 2	farmer_child	EFW + Biomass	Arsenic	1.5E-03	1.5	0.1%	2.1	0.1%

Metal Intake for the Boston Alternative Energy Facility and Biomass Plant Combined

Receptor	Receptor Type	Source	COPC	EFW Intake ug/kgBW/d	Lower Background ug/kgBW/d	%age	Upper Background ug/kg/d	%age
Farm West 2	farmer_child	EFW + Biomass	Cadmium	3.8E-04	0.28	0.1%	0.41	0.1%
Farm West 2	farmer_child	EFW + Biomass	Chromium	2.1E-02	1.3	1.6%	2.3	0.9%
Farm West 2	farmer_child	EFW + Biomass	Lead	2.9E-03	0.12	2.4%	0.20	1.4%
Farm West 2	farmer_child	EFW + Biomass	Total mercury	9.2E-04	0.033	2.9%	0.067	1.4%
Farm West 2	farmer_child	EFW + Biomass	Nickel	7.8E-03	3.6	0.2%	4.1	0.2%
Farm West 2	farmer_child	EFW + Biomass	Thallium	5.5E-03	0.022	25.0%	0.16	3.4%
Res Bladon 1	resident_adult	EFW + Biomass	Antimony	6.5E-08	0.016	0.0%	0.029	0.0%
Res Bladon 1	resident_adult	EFW + Biomass	Arsenic	5.6E-04	0.95	0.1%	1.23	0.0%
Res Bladon 1	resident_adult	EFW + Biomass	Cadmium	1.8E-04	0.12	0.1%	0.19	0.1%
Res Bladon 1	resident_adult	EFW + Biomass	Chromium	1.9E-03	0.42	0.5%	1.1	0.2%
Res Bladon 1	resident_adult	EFW + Biomass	Lead	8.1E-04	0.062	1.3%	0.11	0.7%
Res Bladon 1	resident_adult	EFW + Biomass	Total mercury	2.0E-04	0.022	1.0%	0.041	0.5%
Res Bladon 1	resident_adult	EFW + Biomass	Nickel	8.7E-04	1.7	0.1%	1.9	0.0%
Res Bladon 1	resident_adult	EFW + Biomass	Thallium	2.5E-04	0.0084	2.9%	0.082	0.3%
Res Bladon 1	resident_child	EFW + Biomass	Antimony	1.6E-07	0.028	0.0%	0.055	0.0%
Res Bladon 1	resident_child	EFW + Biomass	Arsenic	1.4E-03	1.5	0.1%	2.1	0.1%
Res Bladon 1	resident_child	EFW + Biomass	Cadmium	4.3E-04	0.28	0.2%	0.41	0.1%
Res Bladon 1	resident_child	EFW + Biomass	Chromium	5.1E-03	1.3	0.4%	2.3	0.2%
Res Bladon 1	resident_child	EFW + Biomass	Lead	2.0E-03	0.12	1.6%	0.20	1.0%
Res Bladon 1	resident_child	EFW + Biomass	Total mercury	5.2E-04	0.033	1.7%	0.067	0.8%
Res Bladon 1	resident_child	EFW + Biomass	Nickel	2.1E-03	3.6	0.1%	4.1	0.1%
Res Bladon 1	resident_child	EFW + Biomass	Thallium	7.8E-04	0.022	3.5%	0.16	0.5%
Res Bladon 2	resident_adult	EFW + Biomass	Antimony	6.1E-08	0.016	0.0%	0.029	0.0%
Res Bladon 2	resident_adult	EFW + Biomass	Arsenic	5.1E-04	0.95	0.1%	1.23	0.0%
Res Bladon 2	resident_adult	EFW + Biomass	Cadmium	1.6E-04	0.12	0.1%	0.19	0.1%
Res Bladon 2	resident_adult	EFW + Biomass	Chromium	1.8E-03	0.42	0.4%	1.1	0.2%
Res Bladon 2	resident_adult	EFW + Biomass	Lead	7.4E-04	0.062	1.2%	0.11	0.7%
Res Bladon 2	resident_adult	EFW + Biomass	Total mercury	1.9E-04	0.022	0.9%	0.041	0.5%
Res Bladon 2	resident_adult	EFW + Biomass	Nickel	8.0E-04	1.7	0.0%	1.9	0.0%
Res Bladon 2	resident_adult	EFW + Biomass	Thallium	2.3E-04	0.0084	2.7%	0.082	0.3%
Res Bladon 2	resident_child	EFW + Biomass	Antimony	1.6E-07	0.028	0.0%	0.055	0.0%
Res Bladon 2	resident_child	EFW + Biomass	Arsenic	1.2E-03	1.5	0.1%	2.1	0.1%
Res Bladon 2	resident_child	EFW + Biomass	Cadmium	4.0E-04	0.28	0.1%	0.41	0.1%
Res Bladon 2	resident_child	EFW + Biomass	Chromium	4.7E-03	1.3	0.4%	2.3	0.2%
Res Bladon 2	resident_child	EFW + Biomass	Lead	1.8E-03	0.12	1.5%	0.20	0.9%
Res Bladon 2	resident_child	EFW + Biomass	Total mercury	4.8E-04	0.033	1.5%	0.067	0.8%
Res Bladon 2	resident_child	EFW + Biomass	Nickel	1.9E-03	3.6	0.1%	4.1	0.0%
Res Bladon 2	resident_child	EFW + Biomass	Thallium	7.2E-04	0.022	3.3%	0.16	0.5%
Res Boston 1	resident_adult	EFW + Biomass	Antimony	2.8E-08	0.016	0.0%	0.029	0.0%
Res Boston 1	resident_adult	EFW + Biomass	Arsenic	1.7E-04	0.95	0.0%	1.23	0.0%
Res Boston 1	resident_adult	EFW + Biomass	Cadmium	5.4E-05	0.12	0.0%	0.19	0.0%
Res Boston 1	resident_adult	EFW + Biomass	Chromium	6.3E-04	0.42	0.1%	1.1	0.1%
Res Boston 1	resident_adult	EFW + Biomass	Lead	2.5E-04	0.062	0.4%	0.11	0.2%
Res Boston 1	resident_adult	EFW + Biomass	Total mercury	6.6E-05	0.022	0.3%	0.041	0.2%
Res Boston 1	resident_adult	EFW + Biomass	Nickel	2.6E-04	1.7	0.0%	1.9	0.0%
Res Boston 1	resident_adult	EFW + Biomass	Thallium	8.1E-05	0.0084	1.0%	0.082	0.1%
Res Boston 1	resident_child	EFW + Biomass	Antimony	7.0E-08	0.028	0.0%	0.055	0.0%
Res Boston 1	resident_child	EFW + Biomass	Arsenic	4.1E-04	1.5	0.0%	2.1	0.0%
Res Boston 1	resident_child	EFW + Biomass	Cadmium	1.3E-04	0.28	0.0%	0.41	0.0%
Res Boston 1	resident_child	EFW + Biomass	Chromium	1.7E-03	1.3	0.1%	2.3	0.1%
Res Boston 1	resident_child	EFW + Biomass	Lead	5.9E-04	0.12	0.5%	0.20	0.3%
Res Boston 1	resident_child	EFW + Biomass	Total mercury	1.7E-04	0.033	0.5%	0.067	0.3%
Res Boston 1	resident_child	EFW + Biomass	Nickel	6.3E-04	3.6	0.0%	4.1	0.0%
Res Boston 1	resident_child	EFW + Biomass	Thallium	2.7E-04	0.022	1.2%	0.16	0.2%
Res Boston 2	resident_adult	EFW + Biomass	Antimony	2.7E-08	0.016	0.0%	0.029	0.0%
Res Boston 2	resident_adult	EFW + Biomass	Arsenic	1.5E-04	0.95	0.0%	1.23	0.0%
Res Boston 2	resident_adult	EFW + Biomass	Cadmium	4.7E-05	0.12	0.0%	0.19	0.0%
Res Boston 2	resident_adult	EFW + Biomass	Chromium	5.7E-04	0.42	0.1%	1.1	0.1%
Res Boston 2	resident_adult	EFW + Biomass	Lead	2.1E-04	0.062	0.3%	0.11	0.2%
Res Boston 2	resident_adult	EFW + Biomass	Total mercury	6.0E-05	0.022	0.3%	0.041	0.2%
Res Boston 2	resident_adult	EFW + Biomass	Nickel	2.3E-04	1.7	0.0%	1.9	0.0%
Res Boston 2	resident_adult	EFW + Biomass	Thallium	7.3E-05	0.0084	0.9%	0.082	0.1%
Res Boston 2	resident_child	EFW + Biomass	Antimony	6.9E-08	0.028	0.0%	0.055	0.0%
Res Boston 2	resident_child	EFW + Biomass	Arsenic	3.6E-04	1.5	0.0%	2.1	0.0%
Res Boston 2	resident_child	EFW + Biomass	Cadmium	1.1E-04	0.28	0.0%	0.41	0.0%
Res Boston 2	resident_child	EFW + Biomass	Chromium	1.5E-03	1.3	0.1%	2.3	0.1%
Res Boston 2	resident_child	EFW + Biomass	Lead	5.1E-04	0.12	0.4%	0.20	0.3%
Res Boston 2	resident_child	EFW + Biomass	Total mercury	1.5E-04	0.033	0.5%	0.067	0.2%
Res Boston 2	resident_child	EFW + Biomass	Nickel	5.5E-04	3.6	0.0%	4.1	0.0%
Res Boston 2	resident_child	EFW + Biomass	Thallium	2.5E-04	0.022	1.1%	0.16	0.2%
Res Fishtoft 1	resident_adult	EFW + Biomass	Antimony	6.9E-08	0.016	0.0%	0.029	0.0%
Res Fishtoft 1	resident_adult	EFW + Biomass	Arsenic	5.1E-04	0.95	0.1%	1.23	0.0%
Res Fishtoft 1	resident_adult	EFW + Biomass	Cadmium	1.6E-04	0.12	0.1%	0.19	0.1%
Res Fishtoft 1	resident_adult	EFW + Biomass	Chromium	1.8E-03	0.42	0.4%	1.1	0.2%

Metal Intake for the Boston Alternative Energy Facility and Biomass Plant Combined

Receptor	Receptor Type	Source	COPC	EFW Intake ug/kgBW/d	Lower Background ug/kgBW/d	%age	Upper Background ug/kg/d	%age
Res Fishtoft 1	resident_adult	EFW + Biomass	Lead	7.3E-04	0.062	1.2%	0.11	0.7%
Res Fishtoft 1	resident_adult	EFW + Biomass	Total mercury	1.9E-04	0.022	0.9%	0.041	0.5%
Res Fishtoft 1	resident_adult	EFW + Biomass	Nickel	7.9E-04	1.7	0.0%	1.9	0.0%
Res Fishtoft 1	resident_adult	EFW + Biomass	Thallium	2.3E-04	0.0084	2.7%	0.082	0.3%
Res Fishtoft 1	resident_child	EFW + Biomass	Antimony	1.7E-07	0.028	0.0%	0.055	0.0%
Res Fishtoft 1	resident_child	EFW + Biomass	Arsenic	1.2E-03	1.5	0.1%	2.1	0.1%
Res Fishtoft 1	resident_child	EFW + Biomass	Cadmium	3.9E-04	0.28	0.1%	0.41	0.1%
Res Fishtoft 1	resident_child	EFW + Biomass	Chromium	4.8E-03	1.3	0.4%	2.3	0.2%
Res Fishtoft 1	resident_child	EFW + Biomass	Lead	1.8E-03	0.12	1.5%	0.20	0.9%
Res Fishtoft 1	resident_child	EFW + Biomass	Total mercury	4.8E-04	0.033	1.5%	0.067	0.8%
Res Fishtoft 1	resident_child	EFW + Biomass	Nickel	1.9E-03	3.6	0.1%	4.1	0.0%
Res Fishtoft 1	resident_child	EFW + Biomass	Thallium	7.5E-04	0.022	3.4%	0.16	0.5%
Res Fishtoft 2	resident_adult	EFW + Biomass	Antimony	7.1E-08	0.016	0.0%	0.029	0.0%
Res Fishtoft 2	resident_adult	EFW + Biomass	Arsenic	5.0E-04	0.95	0.1%	1.23	0.0%
Res Fishtoft 2	resident_adult	EFW + Biomass	Cadmium	1.6E-04	0.12	0.1%	0.19	0.1%
Res Fishtoft 2	resident_adult	EFW + Biomass	Chromium	1.8E-03	0.42	0.4%	1.1	0.2%
Res Fishtoft 2	resident_adult	EFW + Biomass	Lead	7.2E-04	0.062	1.2%	0.11	0.7%
Res Fishtoft 2	resident_adult	EFW + Biomass	Total mercury	1.9E-04	0.022	0.9%	0.041	0.5%
Res Fishtoft 2	resident_adult	EFW + Biomass	Nickel	7.8E-04	1.7	0.0%	1.9	0.0%
Res Fishtoft 2	resident_adult	EFW + Biomass	Thallium	2.3E-04	0.0084	2.8%	0.082	0.3%
Res Fishtoft 2	resident_child	EFW + Biomass	Antimony	1.8E-07	0.028	0.0%	0.055	0.0%
Res Fishtoft 2	resident_child	EFW + Biomass	Arsenic	1.2E-03	1.5	0.1%	2.1	0.1%
Res Fishtoft 2	resident_child	EFW + Biomass	Cadmium	3.9E-04	0.28	0.1%	0.41	0.1%
Res Fishtoft 2	resident_child	EFW + Biomass	Chromium	4.8E-03	1.3	0.4%	2.3	0.2%
Res Fishtoft 2	resident_child	EFW + Biomass	Lead	1.7E-03	0.12	1.4%	0.20	0.9%
Res Fishtoft 2	resident_child	EFW + Biomass	Total mercury	4.8E-04	0.033	1.5%	0.067	0.8%
Res Fishtoft 2	resident_child	EFW + Biomass	Nickel	1.9E-03	3.6	0.1%	4.1	0.0%
Res Fishtoft 2	resident_child	EFW + Biomass	Thallium	7.6E-04	0.022	3.4%	0.16	0.5%
Res Fishtoft 3	resident_adult	EFW + Biomass	Antimony	7.0E-08	0.016	0.0%	0.029	0.0%
Res Fishtoft 3	resident_adult	EFW + Biomass	Arsenic	5.0E-04	0.95	0.1%	1.23	0.0%
Res Fishtoft 3	resident_adult	EFW + Biomass	Cadmium	1.6E-04	0.12	0.1%	0.19	0.1%
Res Fishtoft 3	resident_adult	EFW + Biomass	Chromium	1.8E-03	0.42	0.4%	1.1	0.2%
Res Fishtoft 3	resident_adult	EFW + Biomass	Lead	7.1E-04	0.062	1.1%	0.11	0.6%
Res Fishtoft 3	resident_adult	EFW + Biomass	Total mercury	1.9E-04	0.022	0.9%	0.041	0.5%
Res Fishtoft 3	resident_adult	EFW + Biomass	Nickel	7.7E-04	1.7	0.0%	1.9	0.0%
Res Fishtoft 3	resident_adult	EFW + Biomass	Thallium	2.3E-04	0.0084	2.7%	0.082	0.3%
Res Fishtoft 3	resident_child	EFW + Biomass	Antimony	1.8E-07	0.028	0.0%	0.055	0.0%
Res Fishtoft 3	resident_child	EFW + Biomass	Arsenic	1.2E-03	1.5	0.1%	2.1	0.1%
Res Fishtoft 3	resident_child	EFW + Biomass	Cadmium	3.8E-04	0.28	0.1%	0.41	0.1%
Res Fishtoft 3	resident_child	EFW + Biomass	Chromium	4.7E-03	1.3	0.4%	2.3	0.2%
Res Fishtoft 3	resident_child	EFW + Biomass	Lead	1.7E-03	0.12	1.4%	0.20	0.9%
Res Fishtoft 3	resident_child	EFW + Biomass	Total mercury	4.8E-04	0.033	1.5%	0.067	0.8%
Res Fishtoft 3	resident_child	EFW + Biomass	Nickel	1.8E-03	3.6	0.1%	4.1	0.0%
Res Fishtoft 3	resident_child	EFW + Biomass	Thallium	7.5E-04	0.022	3.4%	0.16	0.5%
Res Marsh Lane 1	resident_adult	EFW + Biomass	Antimony	7.0E-08	0.016	0.0%	0.029	0.0%
Res Marsh Lane 1	resident_adult	EFW + Biomass	Arsenic	4.2E-04	0.95	0.0%	1.23	0.0%
Res Marsh Lane 1	resident_adult	EFW + Biomass	Cadmium	1.4E-04	0.12	0.1%	0.19	0.1%
Res Marsh Lane 1	resident_adult	EFW + Biomass	Chromium	1.5E-03	0.42	0.4%	1.1	0.1%
Res Marsh Lane 1	resident_adult	EFW + Biomass	Lead	5.8E-04	0.062	0.9%	0.11	0.5%
Res Marsh Lane 1	resident_adult	EFW + Biomass	Total mercury	1.7E-04	0.022	0.8%	0.041	0.4%
Res Marsh Lane 1	resident_adult	EFW + Biomass	Nickel	6.2E-04	1.7	0.0%	1.9	0.0%
Res Marsh Lane 1	resident_adult	EFW + Biomass	Thallium	2.1E-04	0.0084	2.5%	0.082	0.3%
Res Marsh Lane 1	resident_child	EFW + Biomass	Antimony	1.8E-07	0.028	0.0%	0.055	0.0%
Res Marsh Lane 1	resident_child	EFW + Biomass	Arsenic	1.0E-03	1.5	0.1%	2.1	0.0%
Res Marsh Lane 1	resident_child	EFW + Biomass	Cadmium	3.4E-04	0.28	0.1%	0.41	0.1%
Res Marsh Lane 1	resident_child	EFW + Biomass	Chromium	4.1E-03	1.3	0.3%	2.3	0.2%
Res Marsh Lane 1	resident_child	EFW + Biomass	Lead	1.4E-03	0.12	1.2%	0.20	0.7%
Res Marsh Lane 1	resident_child	EFW + Biomass	Total mercury	4.4E-04	0.033	1.4%	0.067	0.7%
Res Marsh Lane 1	resident_child	EFW + Biomass	Nickel	1.5E-03	3.6	0.0%	4.1	0.0%
Res Marsh Lane 1	resident_child	EFW + Biomass	Thallium	7.1E-04	0.022	3.2%	0.16	0.4%
Res Marsh Lane 2	resident_adult	EFW + Biomass	Antimony	7.6E-08	0.016	0.0%	0.029	0.0%
Res Marsh Lane 2	resident_adult	EFW + Biomass	Arsenic	4.1E-04	0.95	0.0%	1.23	0.0%
Res Marsh Lane 2	resident_adult	EFW + Biomass	Cadmium	1.4E-04	0.12	0.1%	0.19	0.1%
Res Marsh Lane 2	resident_adult	EFW + Biomass	Chromium	1.5E-03	0.42	0.4%	1.1	0.1%
Res Marsh Lane 2	resident_adult	EFW + Biomass	Lead	5.7E-04	0.062	0.9%	0.11	0.5%
Res Marsh Lane 2	resident_adult	EFW + Biomass	Total mercury	1.7E-04	0.022	0.8%	0.041	0.4%
Res Marsh Lane 2	resident_adult	EFW + Biomass	Nickel	6.1E-04	1.7	0.0%	1.9	0.0%
Res Marsh Lane 2	resident_adult	EFW + Biomass	Thallium	2.1E-04	0.0084	2.6%	0.082	0.3%
Res Marsh Lane 2	resident_child	EFW + Biomass	Antimony	1.9E-07	0.028	0.0%	0.055	0.0%
Res Marsh Lane 2	resident_child	EFW + Biomass	Arsenic	9.9E-04	1.5	0.1%	2.1	0.0%
Res Marsh Lane 2	resident_child	EFW + Biomass	Cadmium	3.3E-04	0.28	0.1%	0.41	0.1%
Res Marsh Lane 2	resident_child	EFW + Biomass	Chromium	4.2E-03	1.3	0.3%	2.3	0.2%
Res Marsh Lane 2	resident_child	EFW + Biomass	Lead	1.4E-03	0.12	1.1%	0.20	0.7%
Res Marsh Lane 2	resident_child	EFW + Biomass	Total mercury	4.4E-04	0.033	1.4%	0.067	0.7%

Metal Intake for the Boston Alternative Energy Facility and Biomass Plant Combined

Receptor	Receptor Type	Source	COPC	EFW Intake ug/kgBW/d	Lower Background ug/kgBW/d	%age	Upper Background ug/kg/d	%age
Res Marsh Lane 2	resident_child	EFW + Biomass	Nickel	1.5E-03	3.6	0.0%	4.1	0.0%
Res Marsh Lane 2	resident_child	EFW + Biomass	Thallium	7.4E-04	0.022	3.3%	0.16	0.5%
Res Skirbeck 1	resident_adult	EFW + Biomass	Antimony	2.2E-07	0.016	0.0%	0.029	0.0%
Res Skirbeck 1	resident_adult	EFW + Biomass	Arsenic	1.9E-03	0.95	0.2%	1.23	0.2%
Res Skirbeck 1	resident_adult	EFW + Biomass	Cadmium	6.1E-04	0.12	0.5%	0.19	0.3%
Res Skirbeck 1	resident_adult	EFW + Biomass	Chromium	6.5E-03	0.42	1.5%	1.1	0.6%
Res Skirbeck 1	resident_adult	EFW + Biomass	Lead	2.7E-03	0.062	4.4%	0.11	2.5%
Res Skirbeck 1	resident_adult	EFW + Biomass	Total mercury	7.0E-04	0.022	3.4%	0.041	1.8%
Res Skirbeck 1	resident_adult	EFW + Biomass	Nickel	2.9E-03	1.7	0.2%	1.9	0.2%
Res Skirbeck 1	resident_adult	EFW + Biomass	Thallium	8.5E-04	0.0084	10.1%	0.082	1.0%
Res Skirbeck 1	resident_child	EFW + Biomass	Antimony	5.7E-07	0.028	0.0%	0.055	0.0%
Res Skirbeck 1	resident_child	EFW + Biomass	Arsenic	4.6E-03	1.5	0.3%	2.1	0.2%
Res Skirbeck 1	resident_child	EFW + Biomass	Cadmium	1.5E-03	0.28	0.5%	0.41	0.4%
Res Skirbeck 1	resident_child	EFW + Biomass	Chromium	1.7E-02	1.3	1.3%	2.3	0.7%
Res Skirbeck 1	resident_child	EFW + Biomass	Lead	6.6E-03	0.12	5.5%	0.20	3.3%
Res Skirbeck 1	resident_child	EFW + Biomass	Total mercury	1.8E-03	0.033	5.7%	0.067	2.8%
Res Skirbeck 1	resident_child	EFW + Biomass	Nickel	7.0E-03	3.6	0.2%	4.1	0.2%
Res Skirbeck 1	resident_child	EFW + Biomass	Thallium	2.7E-03	0.022	12.3%	0.16	1.7%
Res Skirbeck 2	resident_adult	EFW + Biomass	Antimony	1.8E-07	0.016	0.0%	0.029	0.0%
Res Skirbeck 2	resident_adult	EFW + Biomass	Arsenic	1.4E-03	0.95	0.1%	1.23	0.1%
Res Skirbeck 2	resident_adult	EFW + Biomass	Cadmium	4.4E-04	0.12	0.4%	0.19	0.2%
Res Skirbeck 2	resident_adult	EFW + Biomass	Chromium	4.8E-03	0.42	1.1%	1.1	0.4%
Res Skirbeck 2	resident_adult	EFW + Biomass	Lead	1.9E-03	0.062	3.1%	0.11	1.8%
Res Skirbeck 2	resident_adult	EFW + Biomass	Total mercury	5.1E-04	0.022	2.5%	0.041	1.3%
Res Skirbeck 2	resident_adult	EFW + Biomass	Nickel	2.1E-03	1.7	0.1%	1.9	0.1%
Res Skirbeck 2	resident_adult	EFW + Biomass	Thallium	6.2E-04	0.0084	7.4%	0.082	0.8%
Res Skirbeck 2	resident_child	EFW + Biomass	Antimony	4.6E-07	0.028	0.0%	0.055	0.0%
Res Skirbeck 2	resident_child	EFW + Biomass	Arsenic	3.3E-03	1.5	0.2%	2.1	0.2%
Res Skirbeck 2	resident_child	EFW + Biomass	Cadmium	1.0E-03	0.28	0.4%	0.41	0.3%
Res Skirbeck 2	resident_child	EFW + Biomass	Chromium	1.3E-02	1.3	1.0%	2.3	0.6%
Res Skirbeck 2	resident_child	EFW + Biomass	Lead	4.7E-03	0.12	3.9%	0.20	2.3%
Res Skirbeck 2	resident_child	EFW + Biomass	Total mercury	1.3E-03	0.033	4.1%	0.067	2.0%
Res Skirbeck 2	resident_child	EFW + Biomass	Nickel	5.0E-03	3.6	0.1%	4.1	0.1%
Res Skirbeck 2	resident_child	EFW + Biomass	Thallium	2.0E-03	0.022	9.2%	0.16	1.3%
Res Skirbeck Quarter	resident_adult	EFW + Biomass	Antimony	5.8E-08	0.016	0.0%	0.029	0.0%
Res Skirbeck Quarter	resident_adult	EFW + Biomass	Arsenic	3.8E-04	0.95	0.0%	1.23	0.0%
Res Skirbeck Quarter	resident_adult	EFW + Biomass	Cadmium	1.2E-04	0.12	0.1%	0.19	0.1%
Res Skirbeck Quarter	resident_adult	EFW + Biomass	Chromium	1.4E-03	0.42	0.3%	1.1	0.1%
Res Skirbeck Quarter	resident_adult	EFW + Biomass	Lead	5.5E-04	0.062	0.9%	0.11	0.5%
Res Skirbeck Quarter	resident_adult	EFW + Biomass	Total mercury	1.5E-04	0.022	0.7%	0.041	0.4%
Res Skirbeck Quarter	resident_adult	EFW + Biomass	Nickel	5.9E-04	1.7	0.0%	1.9	0.0%
Res Skirbeck Quarter	resident_adult	EFW + Biomass	Thallium	1.8E-04	0.0084	2.1%	0.082	0.2%
Res Skirbeck Quarter	resident_child	EFW + Biomass	Antimony	1.5E-07	0.028	0.0%	0.055	0.0%
Res Skirbeck Quarter	resident_child	EFW + Biomass	Arsenic	9.2E-04	1.5	0.1%	2.1	0.0%
Res Skirbeck Quarter	resident_child	EFW + Biomass	Cadmium	3.0E-04	0.28	0.1%	0.41	0.1%
Res Skirbeck Quarter	resident_child	EFW + Biomass	Chromium	3.7E-03	1.3	0.3%	2.3	0.2%
Res Skirbeck Quarter	resident_child	EFW + Biomass	Lead	1.3E-03	0.12	1.1%	0.20	0.7%
Res Skirbeck Quarter	resident_child	EFW + Biomass	Total mercury	3.7E-04	0.033	1.2%	0.067	0.6%
Res Skirbeck Quarter	resident_child	EFW + Biomass	Nickel	1.4E-03	3.6	0.0%	4.1	0.0%
Res Skirbeck Quarter	resident_child	EFW + Biomass	Thallium	6.0E-04	0.022	2.7%	0.16	0.4%
Res South End	resident_adult	EFW + Biomass	Antimony	3.0E-08	0.016	0.0%	0.029	0.0%
Res South End	resident_adult	EFW + Biomass	Arsenic	1.6E-04	0.95	0.0%	1.23	0.0%
Res South End	resident_adult	EFW + Biomass	Cadmium	5.3E-05	0.12	0.0%	0.19	0.0%
Res South End	resident_adult	EFW + Biomass	Chromium	6.3E-04	0.42	0.2%	1.1	0.1%
Res South End	resident_adult	EFW + Biomass	Lead	2.4E-04	0.062	0.4%	0.11	0.2%
Res South End	resident_adult	EFW + Biomass	Total mercury	6.6E-05	0.022	0.3%	0.041	0.2%
Res South End	resident_adult	EFW + Biomass	Nickel	2.6E-04	1.7	0.0%	1.9	0.0%
Res South End	resident_adult	EFW + Biomass	Thallium	8.1E-05	0.0084	1.0%	0.082	0.1%
Res South End	resident_child	EFW + Biomass	Antimony	7.7E-08	0.028	0.0%	0.055	0.0%
Res South End	resident_child	EFW + Biomass	Arsenic	4.0E-04	1.5	0.0%	2.1	0.0%
Res South End	resident_child	EFW + Biomass	Cadmium	1.3E-04	0.28	0.0%	0.41	0.0%
Res South End	resident_child	EFW + Biomass	Chromium	1.7E-03	1.3	0.1%	2.3	0.1%
Res South End	resident_child	EFW + Biomass	Lead	5.7E-04	0.12	0.5%	0.20	0.3%
Res South End	resident_child	EFW + Biomass	Total mercury	1.7E-04	0.033	0.5%	0.067	0.3%
Res South End	resident_child	EFW + Biomass	Nickel	6.2E-04	3.6	0.0%	4.1	0.0%
Res South End	resident_child	EFW + Biomass	Thallium	2.8E-04	0.022	1.3%	0.16	0.2%
Res Wyberton 1	resident_adult	EFW + Biomass	Antimony	4.1E-08	0.016	0.0%	0.029	0.0%
Res Wyberton 1	resident_adult	EFW + Biomass	Arsenic	2.9E-04	0.95	0.0%	1.23	0.0%
Res Wyberton 1	resident_adult	EFW + Biomass	Cadmium	9.4E-05	0.12	0.1%	0.19	0.0%
Res Wyberton 1	resident_adult	EFW + Biomass	Chromium	1.0E-03	0.42	0.2%	1.1	0.1%
Res Wyberton 1	resident_adult	EFW + Biomass	Lead	4.2E-04	0.062	0.7%	0.11	0.4%
Res Wyberton 1	resident_adult	EFW + Biomass	Total mercury	1.1E-04	0.022	0.5%	0.041	0.3%
Res Wyberton 1	resident_adult	EFW + Biomass	Nickel	4.5E-04	1.7	0.0%	1.9	0.0%
Res Wyberton 1	resident_adult	EFW + Biomass	Thallium	1.3E-04	0.0084	1.6%	0.082	0.2%

Metal Intake for the Boston Alternative Energy Facility and Biomass Plant Combined

Receptor	Receptor Type	Source	COPC	EFW Intake ug/kgBW/d	Lower Background ug/kgBW/d	%age	Upper Background ug/kg/d	%age
Res Wyberton 1	resident_child	EFW + Biomass	Antimony	1.0E-07	0.028	0.0%	0.055	0.0%
Res Wyberton 1	resident_child	EFW + Biomass	Arsenic	7.0E-04	1.5	0.0%	2.1	0.0%
Res Wyberton 1	resident_child	EFW + Biomass	Cadmium	2.3E-04	0.28	0.1%	0.41	0.1%
Res Wyberton 1	resident_child	EFW + Biomass	Chromium	2.7E-03	1.3	0.2%	2.3	0.1%
Res Wyberton 1	resident_child	EFW + Biomass	Lead	1.0E-03	0.12	0.8%	0.20	0.5%
Res Wyberton 1	resident_child	EFW + Biomass	Total mercury	2.8E-04	0.033	0.9%	0.067	0.4%
Res Wyberton 1	resident_child	EFW + Biomass	Nickel	1.1E-03	3.6	0.0%	4.1	0.0%
Res Wyberton 1	resident_child	EFW + Biomass	Thallium	4.4E-04	0.022	2.0%	0.16	0.3%
Res Wyberton 2	resident_adult	EFW + Biomass	Antimony	4.0E-08	0.016	0.0%	0.029	0.0%
Res Wyberton 2	resident_adult	EFW + Biomass	Arsenic	2.7E-04	0.95	0.0%	1.23	0.0%
Res Wyberton 2	resident_adult	EFW + Biomass	Cadmium	8.9E-05	0.12	0.1%	0.19	0.0%
Res Wyberton 2	resident_adult	EFW + Biomass	Chromium	9.9E-04	0.42	0.2%	1.1	0.1%
Res Wyberton 2	resident_adult	EFW + Biomass	Lead	3.9E-04	0.062	0.6%	0.11	0.4%
Res Wyberton 2	resident_adult	EFW + Biomass	Total mercury	1.0E-04	0.022	0.5%	0.041	0.3%
Res Wyberton 2	resident_adult	EFW + Biomass	Nickel	4.2E-04	1.7	0.0%	1.9	0.0%
Res Wyberton 2	resident_adult	EFW + Biomass	Thallium	1.3E-04	0.0084	1.5%	0.082	0.2%
Res Wyberton 2	resident_child	EFW + Biomass	Antimony	1.0E-07	0.028	0.0%	0.055	0.0%
Res Wyberton 2	resident_child	EFW + Biomass	Arsenic	6.6E-04	1.5	0.0%	2.1	0.0%
Res Wyberton 2	resident_child	EFW + Biomass	Cadmium	2.1E-04	0.28	0.1%	0.41	0.1%
Res Wyberton 2	resident_child	EFW + Biomass	Chromium	2.6E-03	1.3	0.2%	2.3	0.1%
Res Wyberton 2	resident_child	EFW + Biomass	Lead	9.5E-04	0.12	0.8%	0.20	0.5%
Res Wyberton 2	resident_child	EFW + Biomass	Total mercury	2.7E-04	0.033	0.9%	0.067	0.4%
Res Wyberton 2	resident_child	EFW + Biomass	Nickel	1.0E-03	3.6	0.0%	4.1	0.0%
Res Wyberton 2	resident_child	EFW + Biomass	Thallium	4.2E-04	0.022	1.9%	0.16	0.3%
Res Wyberton East 1	resident_adult	EFW + Biomass	Antimony	2.1E-08	0.016	0.0%	0.029	0.0%
Res Wyberton East 1	resident_adult	EFW + Biomass	Arsenic	1.8E-04	0.95	0.0%	1.23	0.0%
Res Wyberton East 1	resident_adult	EFW + Biomass	Cadmium	5.8E-05	0.12	0.0%	0.19	0.0%
Res Wyberton East 1	resident_adult	EFW + Biomass	Chromium	6.2E-04	0.42	0.1%	1.1	0.1%
Res Wyberton East 1	resident_adult	EFW + Biomass	Lead	2.6E-04	0.062	0.4%	0.11	0.2%
Res Wyberton East 1	resident_adult	EFW + Biomass	Total mercury	6.6E-05	0.022	0.3%	0.041	0.2%
Res Wyberton East 1	resident_adult	EFW + Biomass	Nickel	2.8E-04	1.7	0.0%	1.9	0.0%
Res Wyberton East 1	resident_adult	EFW + Biomass	Thallium	8.0E-05	0.0084	0.9%	0.082	0.1%
Res Wyberton East 1	resident_child	EFW + Biomass	Antimony	5.3E-08	0.028	0.0%	0.055	0.0%
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Res Wyberton East 1	resident_child	EFW + Biomass	Total mercury	1.7E-04	0.033	0.5%	0.067	0.3%
Res Wyberton East 1	resident_child	EFW + Biomass	Nickel	6.8E-04	3.6	0.0%	4.1	0.0%
Res Wyberton East 1	resident_child	EFW + Biomass	Thallium	2.5E-04	0.022	1.1%	0.16	0.2%
Res Wyberton East 2	resident_adult	EFW + Biomass	Antimony	1.9E-08	0.016	0.0%	0.029	0.0%
Res Wyberton East 2	resident_adult	EFW + Biomass	Arsenic	1.6E-04	0.95	0.0%	1.23	0.0%
Res Wyberton East 2	resident_adult	EFW + Biomass	Cadmium	5.0E-05	0.12	0.0%	0.19	0.0%
Res Wyberton East 2	resident_adult	EFW + Biomass	Chromium	5.4E-04	0.42	0.1%	1.1	0.0%
Res Wyberton East 2	resident_adult	EFW + Biomass	Lead	2.2E-04	0.062	0.4%	0.11	0.2%
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