Chemical Contaminant Sampling and Analysis of Shellfish from Classified Harvesting Areas (2016)

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Contents

Glossary of Main Terms

Term or Acronym	General Meaning Of Term
EU	European Union
EC	European Commission
FSS	Food Standards Scotland
FSA	Food Standards Agency
WHO	World Health Organisation
PAHs	Polycyclic aromatic hydrocarbons
PAH 4	Sum of 4 PAHs (benzo[*a*]pyrene, benz[a]anthracene, benzo[b]fluoranthene, chrysene)
PCB	Polychlorinated biphenyl
Ortho-PCB	Ortho-substituted PCB (non planar)
Non-ortho-PCB	Non-ortho-substituted PCB (co-planar)
PCDD/F	Polychlorinated dibenzo-*p*-dioxin/ polychlorinated dibenzofuran (dioxins)
TEF	Toxic Equivalency Factor – toxicity expressed for each dioxin-like compound as a fraction of 2,3,7,8-TCDD (2,3,7,8-TCDD = 1).
TEQ	Toxic Equivalence – product of the congener concentration and the TEF
Total TEQ	Total of the Sum of all the Toxic Equivalences (TEQs) for each group of compounds
Sum of ICES 6	Sum of PCB28, PCB52, PCB101, PCB138, PCB153 and PCB180
fat weight	Values relevant to the assessed fat content of the sample
whole weight	Values based on the sample as received 'whole' or wet
WHO-TEQ 2005	World Health Organisation - TEQ based on values as set in 2005
LOD	Limit of Detection
LOQ	Limit of Quantification
Lower bound	assumes values at less than the limit of detection are zero (e.g.<0.01=0)
Upper bound	assumes values at less than the limit of detection are equal to the limit of detection (e.g. <0.07=0.07)
Trace Element	An element in a sample that has an average concentration of less than 100 parts per million (less than 100 mg/kg)
Heavy Metals	A loosely defined subset of elements that exhibit metallic properties (some are toxic, some are a nutritional requirement in small amounts), (This survey includes, Cr, Mn, Co, Ni, Cu, Zn, As, Se, Ag, Cd, Hg & Pb, (Chromium, manganese, cobalt, nickel, copper, zinc, arsenic, selenium, silver, cadmium, mercury and lead)
ng/kg	Nanogram per kilogram (x10^{-9}/ part per trillion)
µg/kg	Microgram per kilogram (x 10^{-6}/ part per billion)
mg/kg	Milligram per kilogram (x 10^{-3}/ part per million)
ICP-MS	Inductively coupled plasma-mass spectrometry
HRGC-HRMS	High resolution gas chromatography - high resolution mass spectrometry
HRGC-LRMS	High resolution gas chromatography – unit resolution mass spectrometry
LIMS	Laboratory Information Management System

Executive Summary

This study on chemical contaminants in shellfish from Scottish classified shellfish production areas, fulfils part of the requirements of EU member states (EU Regulations (EC) No.1881/2006 and (EC) No. 854/2004) to adopt appropriate monitoring measures and carry out compliance checks on shellfish produced for human consumption. In comparison to earlier years, the scope of this study was widened to include production areas that had not been tested before. Marine shellfish bio-accumulate environmental contaminants because of their inability to metabolise these during feeding. The study determines concentrations of regulated environmental contaminants in the flesh of edible species with a view to determine current levels of occurrence and to allow estimation of consumer exposure.

The study analysed twenty eight composite samples of shellfish including common mussels, Pacific oysters, common cockles, carpet clams and razor clams for polychlorinated dibenzo-p-dioxins and dibenzofurans (PCDD/Fs, dioxins), polychlorinated biphenyls (PCBs) and heavy metals. There were thirty samples tested for polycyclic aromatic hydrocarbons (PAHs) that included the aforementioned species. The methodologies used for the analyses were UKAS accredited to the ISO 17025 standard and follow EU commission regulations for data quality criteria.

The highest levels of the currently regulated PAHs were observed in two separate samples showing concentrations of benzo[a]pyrene (BaP) at 3.06 µg/kg, and PAH 4 at 18.67 µg/kg, below the maximum permitted level (MPL) of 5 µg/kg and 30 µg/kg respectively (Regulation (EC) No. 835/2011). These concentrations were significantly lower than the highest levels reported in the 2015 study. In the case of PCDD/Fs and PCBs in particular, contaminant concentrations were all below the regulatory maximum levels (Regulation (EU) No. 1259/2011). Concentrations of the regulated heavy metals, mercury, cadmium and lead were all below the set maximum limits (Regulation (EC) No. 1881/2006 as amended). Contaminant profiles from the current study are similar to the previous year's data.

1. Background to Study

Marine shellfish are an excellent source of protein, are high in essential minerals, and low in calories and fat. In many parts of the UK and in Scotland in particular, the shellfish industry makes a significant contribution to the local economy. Shellfish have a recognised potential for bio-accumulating contaminants and some bivalve species such as mussels, are commonly used as early indicators of local pollution. Bivalves feed by filtering plankton from the surrounding water that washes through their habitat. This feeding mechanism leads to the bio-accumulation of pollutants of biogenic and anthropogenic origin such as polychlorinated dibenzo-p-dioxins (PCDDs), polychlorinated dibenzofurans (PCDFs), polychlorinated biphenyls (PCBs), heavy metals (trace elements) and polycyclic aromatic hydrocarbons (PAHs), from the surrounding waters. The bio-accumulation potential of the shellfish species used for food is particularly relevant in the case of environmental contaminants with long half-lives such as chlorinated PCDD/Fs and PCBs. These contaminants have been the subject of a number of studies (Garraud et al 2007, Lee et al 2007, Fernandes et al 2009, Fernandes et al 2012) relating to the occurrence and bio-accumulation in marine species and the resulting potential for human exposure arising from the consumption of the edible species.

In recognising the requirements of food safety the EU has, for a number of years, defined limits for the control of these contaminants in a range of foods including shellfish. (Commission Regulation (EC) No 1881/2006, Commission Regulation (EC) No 1259/2011, Commission Regulation (EU) No 835/2011). Some of the regulations specify new requirements on the controls expected by the competent authority (Food Standards Scotland) with respect to classified shellfish production areas. EU member states are required to adopt appropriate monitoring measures and carry out compliance checks with regard to the occurrence of these contaminants in shellfish produced for human consumption.

PCDD/Fs and PCBs are recognised environmental and food contaminants that are known to bio-accumulate in fish and shellfish. The extent of this accumulation is evident by the levels of these contaminants detected in various studies. In the UK, Total Diet Studies (TDS) (FSA 2003) carried out over the last two decades; fish (including shellfish) has consistently been one of the highest dioxin and PCB containing food groups. Human dietary exposure can therefore be significantly influenced by the fish and shellfish component of the diet, particularly in high level consumers and low body-weight individuals.

Although metabolised in many fish species, PAHs persist in shellfish as filter feeding species appear unable to affect bio-transformation of these contaminants. Other than this bio-accumulation pathway, PAHs can also arise in fish and shellfish through some food preparation and processing methods – e.g. smoked fish are known to contain elevated levels of PAHs. Some PAH compounds have been shown to be genotoxic and carcinogenic, the most studied of which (benzo[a]pyrene, or B[a]P) is regulated in a range of foods including shellfish, within the EU (SCF Opinion 2002, Commission Regulation (EC) No. 208/2005). However, more recent evaluation by EFSA's CONTAM panel, concluded that a set of 4 compounds, namely benzo[a]pyrene, chrysene, benz[a]anthracene and benzo[b]fluoranthene (collectively referred to as PAH4) were more suitable indicators of PAH toxicity in food (EFSA, 2008). These four compounds were subsequently included in the updated Commission Regulation (EC) No. 835/2011, which came into force from September 2012. In a study on bivalve molluscs including mussels, oysters and scallops, the FSA reported positive detection of most PAH compounds in samples taken in England and Wales (FSA 2005). In comparison to a study carried out about a decade earlier, reported levels were significantly lower and no sample showed levels above the 5 µg/kg EU limit for BaP in shellfish.

Some trace elements and in particular, heavy metals are established toxic contaminants. Some elements, such as copper, chromium, selenium and zinc are essential to health but may be toxic at high levels of exposure. Metals and other elements may enter marine and aquatic environments and bio-accumulate in species at any point during growth and harvesting. Some potentially toxic elements occur naturally as part of the local geology, but others may also be found in the location of certain industries, as a result of unauthorised discharge, or as a result of other anthropogenic activity.

As part of its monitoring requirements in support of EU regulations, Food Standards Scotland (FSS) has overseen the collection of shellfish each year, from classified shellfish production sites within relevant local authority areas. The production sites are required to monitor shellfish samples, with the edible tissues analysed for the contaminants described above, as specified in Commission Regulation (EU) No. 252/2012. Sampling officers from Scotland were required to obtain suitable shellfish samples from designated sampling points within classified shellfish production areas, as defined by the FSS. The collection of shellfish and transport logistics were co-ordinated by Cefas. Samples were taken and live shellfish sent to Fera, with the edible tissues analysed for the contaminants described above, as specified in Commission Regulation (EU) No. 252/2012. The analysis is carried out at Fera in York.

Fera has generated environmental contaminant data on shellfish collected from new and existing shellfish sites in Scotland since 2007. This report collates the results of the individual analyses for dioxins, PAHs and heavy metals in samples of shellfish collected from Scottish sites in the first quarter of 2016.

2. Method

2.1 Sample Collection and Preparation

Thirty samples of shellfish, including species such as common mussels, Pacific oysters, common cockles, carpet clams, and razor clams were collected during January to March 2016. The sampling period was timed to coincide with the period of optimal contaminant concentrations in the shellfish.

Details on the locations, with descriptions of the samples and identification are given in Table 1.

On receipt at the laboratory each sample was given a unique laboratory reference number and the sample details were logged into a database using LIMS. The samples were stored frozen prior to analysis. Sample preparation consisted of shelling followed by thorough homogenisation and aliquots taken for PAH and heavy metal analysis, prior to freeze-drying. Freeze-dried sample powders were re-homogenised and aliquots used for dioxin and PCB analysis.

2.2 Contaminants measured – Specific Analytes

The following analytes were determined: Regulated contaminants are highlighted in **bold.**

Dioxins - all 17, 2378-Cl substituted PCDDs and PCDFs.

Dioxin-like PCBs - IUPAC no. 77, 81, 105, 114, 118, 123, 126, 156, 157, 167, 169 and 189.

Non Dioxin-like PCBs - IUPAC numbers 18, **28**, 31, 47, 49, 51, **52**, 99, **101**, 128, **138**, **153** and **180**.

PAHs -

acenaphthene, acenaphthylene, fluorene, phenanthrene, anthracene, fluoranthene, benzo[c]fluorene, pyrene, benzo[e]pyrene, benzo[b]naptho[2,1-d]thiophene, anthanthrene, coronene, benzo[ghi]fluoranthene, **benz[a]anthracene**, **chrysene**, **benzo[b]fluoranthene**, benzo[j]fluoranthene, benzo[k)fluoranthene, **benzo[a]pyrene**, cyclopenta[c,d]pyrene, indeno[123cd]pyrene, dibenzo[ah]anthracene, benzo[ghi]perylene, dibenzo[al]pyrene, dibenzo[ae]pyrene, dibenzo[ai]pyrene, dibenzo[ah]pyrene and the substituted PAH, 5-methylchrysene.

Heavy Metals – Chromium (Cr), Manganese (Mn), Cobalt (Co), Nickel (Ni), Copper (Cu), Zinc (Zn), Arsenic (As), Selenium (Se), Silver (Ag), **Cadmium** (**Cd), Mercury (Hg), Lead (Pb)**

2.3 PCDD/F and PCB - Analytical Methodology

(FERA (UK NRL) SOPs FSG 401-414)

The method used for the preparation, extraction and analysis of samples has been reported previously (Fernandes et al 2004) and is part of the CEN EN16215:2012 standard. In brief, samples were fortified with ^{13}C-labelled analogues of target compounds and exhaustively extracted using mixed organic solvents. Ortho substituted PCBs were separated from non-ortho substituted PCBs and PCDD/Fs by fractionation on activated carbon. The two fractions were further purified using adsorption chromatography on alumina. Analytical measurement was carried out using high resolution gas chromatography-high resolution mass spectrometry (HRGC-HRMS) for the seventeen, 2,3,7,8-Cl substituted PCDD/F congeners and non-ortho substituted PCBs. HRGC-unit resolution mass spectrometry (HRGC-LRMS) was used for the measurement of the ortho substituted PCBs.

All analyses were UKAS accredited to ISO 17025 standards, with the inclusion of reference material and method blanks which were evaluated prior to reporting. Further quality assurance measures included the successful participation in international inter-comparison exercises such as Dioxins in Food-2013 and Dioxins in Food-2014, on dioxins and dioxin-like PCBs. Quality control evaluation for the accompanying data follows the criteria specified for chlorinated dioxins and PCBs (Commission Regulation (EU) No 252/2012). In addition, as NRL for chemical contaminants, FERA participates in PT exercises and other inter-laboratory exercises as organised by the EU-RL, and achieves consistently good results.

2.4 Polycyclic Aromatic Hydrocarbons (PAH) - Analytical Methodology

(FERA (UK NRL) SOP FSG 410)

The analytical methodology for the PAHs has been reported before (Rose et al, 2007) and is based on internal standardisation with GC-MS measurement. An aliquot of the homogenised sample was fortified with ^{13}C-labelled analogues of target compounds and saponified with methanolic potassium hydroxide. The extracted PAH solutions were purified in two stages with a DMF/cyclohexane partition followed by adsorption chromatography on activated silica. Purified extracts were sensitivity standardised and measured using high resolution gas chromatography-unit resolution mass spectrometry.

The analytical procedure for PAHs is UKAS accredited to the ISO 17025 standard and includes the assessment of method blanks and reference materials, (e.g. T0658, PAHs in cocoa butter) for

compliance with the accreditation criteria. The methodology also meets the criteria required for evaluating data against the maximum permitted limits for benzo[a]pyrene as specified in EU Commission Regulations. FERA regularly participates in FAPAS PT exercises for PAHs in food. In addition, as NRL for chemical contaminants, FERA participates in PT exercises and other inter-laboratory exercises as organised by the EU-RL and achieves consistently good results.

2.5 Trace Elements - Analytical Methodology

(Fera (UK NRL) SOP FSG 461 and 457)

Aliquots of the homogenised sample were weighed into allotted digestion vessels and a mixture (4:1) of nitric acid and hydrochloric acid added. The vessels were capped and the contents digested using a high pressure microwave digestion system. Reagent blanks, certified reference materials and a spiked sample were also taken through the procedure. The resulting solutions were transferred to pre-marked acid-clean plastic test tubes and diluted to 10 ml with deionised water. The digest solutions together with a set of standards covering the expected concentration range, were internally standardised with indium or rhodium in dilute nitric acid (1 %v/v). Measurements were made using an Agilent 7700x ICP-MS with collision cell.

In common with the other two sets of analyses, the analytical procedure is accredited to the ISO 17025 standard. The criteria used to assess data included checks on instrument drift, spike recovery, replicate agreement, limits of detection and certified reference material values. Regular, successful participation in FAPAS inter-comparison exercises provides further confidence in the data. In addition, as NRL for chemical contaminants, Fera participates in PT exercises and other inter-laboratory exercises as organised by the EU-RL and achieves consistently good results.

3. Results

Analyte concentrations are presented in Tables 2.1 to 2.6. Concentration units reflect current convention as required by regulation, and data were rounded to two decimal places or as appropriate. The reporting limits (quoted as "<") for dioxins, PCBs and PAHs are estimated as a dynamic parameter and therefore represent the limits of determination that prevail during the course of the measurement. For PCDD/Fs, PCBs, metals and PAHs, the reporting limits are consistent with the requirements of EU regulations. Data on the reference materials that were analysed concurrently with the samples, were within established acceptable limits, and are available if required. Measurement uncertainty (MU) was calculated and applied to data following guidelines and principals set out in Measurement Uncertainty For Persistent Organic Pollutants By Isotope-Dilution Mass Spectrometry (Epp, et al 2014). MU and reference material data can be made available if required.

In addition to the concentration of individual congeners, the dioxin-like toxicity of the samples arising from PCDD/Fs and dioxin-like PCBs has also been reported as a toxic equivalent (WHO-TEQ), which is calculated by multiplying the concentration of each congener of interest by its toxicity equivalency factor (WHO-TEF). The TEQs are presented in terms of the 2005 TEFs (van den Berg et al 2006). Additionally as per the requirements of Regulation 1259/2011, the sum of the ICES-6 PCBs is also provided. The regulations for shellfish are based on whole weight concentrations; however in keeping with previous reports to Food Standards Scotland, the results for PCDD/Fs and PCBs have also been reported on a fat weight basis.

PCDD/Fs and PCBs were detected in all samples at levels well within the regulatory limits. The combined PCDD/F + PCB TEQ (whole weight) ranged from 0.05 pg TEQ/g to 0.33 pg TEQ/g. In all but one of the samples, PCDD/Fs contributed at least half of the total TEQ. The exception was a razors sample (S16-000319) from Forth Estuary: Largo Bay where *non-ortho* PCBs contributed approximately 55% of the total TEQ.

The concentration of ICES-6 PCB ranged from 0.06 µg/kg to 2.16 µg/kg, with the highest levels found in the razors sample (S16-000319) from Forth Estuary: Largo Bay.

PAHs were detected in all thirty samples analysed. Higher molecular weight PAHs such as anthanthrene and the dibenzopyrenes were either not found above the LOQ or found at relatively low levels in all of the samples. BaP concentrations ranged from 0.09 µg/kg to 3.06 µg/kg and PAH4 concentrations ranged from 0.71 µg/kg to 18.67 µg/kg. The two highest concentrations for the regulated compounds were observed in a sample of razors (S16-001700) collected from

Fleet Bay (BaP) and a sample of mussels (S16-000301) collected from Loch Leven Upper (PAH4). All samples showed levels below MPL for BaP (set at 5 µg/kg) and PAH4 (set at 30 µg/kg).

Heavy metals were detected in all samples. The three most abundant heavy metals were zinc (Zn), manganese (Mn) and copper (Cu), with Zn present at the highest concentration. Concentrations of the regulated heavy metals mercury (Hg), cadmium (Cd) and lead (Pb) were all below the regulatory limit (Commission Regulation EC 1881/2006, as amended).

In general, the patterns and levels of the three contaminant classes were consistent with those recorded last year.

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Table 1: Overview of Samples

Local Authority	Production Area	Site name	Collection period	Sample type	GR or *NGR for sample	Fera LIMS no.
Argyll and Bute	Carradale Bay	Carradale Bay Razors	09/02/2016	Razors	NR8041536924	S16-001648
Argyll and Bute	Gallochoille Old Pier	Gallochoille Old Pier	22/02/2016	Pacific Oysters	NR 65436	S16-002246
Argyll and Bute	Ganavan Cockles	Ganavan	25/01/2016	Common Cockles	NM 85547 32406	S16-000843
Argyll and Bute	Islay	Loch Gruinart Craigens	09/02/2016	Pacific oysters	NR 30259 71160	S16-001544
Argyll and Bute	Loch Creran Cockles	Loch Creran Cockles	13/01/2016[1], 10/02/2016	Common Cockles	NM9353641009[1], NM9343141024	S16-000506[1], S16-001647
Argyll and Bute	Loch Fyne: Otter Point	Otter Point	18/01/2016	Common Cockles	NR9239384185	S16-000509
Argyll and Bute	Loch Spelve Cockles	North West Spelvie	12/01/2016	Common Cockles	NM 69363 30564	S16-000318
Argyll and Bute	North Connel Cockles	Ledaig Point Cockles	27/01/2016	Cockles	NM 8922239261	S16-000964
Argyll and Bute	West Jura	Jura	20/03/2016	Razors	NR 477778 86522	S16-014118
Comhairle nan Eilean Siar: Lewis & Harris	Loch Seaforth	East Coast Mussels	15/02/2016	Common mussels	NB 2106 1230	S16-001703
Comhairle nan Eilean Siar: Uist & Barra	Caolas Eiriosgaigh Razors	Eiriosgaigh Razors	09/02/2016	Razors	NF 7982 1245	S16-001547
Comhairle nan Eilean Siar: Uist & Barra	Garbh Lingeigh	Garbh Lingeigh	09/02/2016	Pacific Oysters	NF 7399 0328	S16-001546
Comhairle nan Eilean Siar: Uist & Barra	Oitir Mhor Razors	Rubha nan Eun	22/02/2016	Razors	NF7389 0690	S16-002261
Comhairle nan Eilean Siar: Uist & Barra	South Ford Faoileann	Faoileann	15/02/2016	Razors	NF 8591 4357	S16-001702
Comhairle nan Eilean Siar: Uist & Barra	Traigh Mhor	Traigh Mhor	07/02/2016	Common cockles	NF 7036 0497	S16-001545
Comhairle nan Eilean Siar: Uist & Barra	North Ford	Oitir Mhor	08/02/2016	Common cockles	NF 8404 5784	S16-001543
Fife	Forth Estuary: Largo Bay	Largo Bay	12/01/2016	Razors	NO 4379 0150	S16-000319

Local Authority	Production Area	Site name	Collection period	Sample type	GR or *NGR for sample	Fera LIMS no.
Dumfries and Galloway	Fleet Bay Razors	Fleet Bay Razors	14/02/2016	Razors	NX 5685 5014	S16-001700
Dumfries and Galloway	Loch Ryan Cockles	Loch Ryan Cockles	29/03/2016	Common Cockles	NX 0711 6128	S16-014232
Dumfries and Galloway	Loch Ryan Soleburn	Soleburn Cockles	Sample not submitted	Common Cockles		
Dumfries and Galloway	Luce Bay Drummore	Drummore Razors	15/03/2016	Razors	NX 1676 5418	S16-013402
Dumfries and Galloway	Wigtown Bay: Islands of Fleet	Wigtown Bay	14/02/2016	Razors	NX 4912 5012	S16-001701
Dumfries and Galloway	Luce Bay Razors	Luce Sand Razors	15/03/2016	Razors	NX 1676 5418	S16-013403
Shetland Islands	Lee Of Vollister	Whale Firth	19/01/2016	Common mussels	NO 4379 0150	S16-000505
Shetland Islands	Catfirth	Catfirth	19/01/2016	Common Mussels	HU44585357	S16-000508
Shetland Islands	Olna Firth Outer	Foula Wick	18/01/2016	Common mussels	HU37126491	S16-000503
South Ayrshire	Croy Bay	Culzean Bay	19/01/2016	Razors		S16-000501
South Ayrshire	North Bay	Barassie	19/01/2016	Razors		S16-000502
Highland Council: Lochaber	Loch Leven: Upper	Upper	11/01/2016	Common mussels	NM1477461696	S16-000301
Highland Council: Lochaber	Loch Leven: Lower	Lower	11/01/2016	Common mussels	NN07145 59071	S16-000302
Highland Council: Lochaber	Camas Garbh Clams	Sound of Sleat Clams	18/01/2016	Carpet Clams		S16-000507

Notes: (1) Unsuitable sample rejected on arrival at the laboratory

**Quality statement: Information relating to the origin of the samples (place, date of collection and GR/NGR details) is as provided by sampling staff and has not undergone verification checks by Fera/Cefas.*

Table 2.1: PCDD/Fs (dioxins) concentrations - Whole weight

Note: results maked with an “i” are indicative

Fera LIMS Sample No.	S16-001648	S16-002246	S16-000843	S16-001544	S16-001647	S16-000509	S16-000318
Sample Type	Razors	Pacific Oysters	Common Cockles	Pacific oysters	Common Cockles	Common Cockles	Common Cockles
Production area	Carradale Bay	Gallochoille Old Pier	Ganavan Cockles	Islay	Loch Creran Cockles	Loch Fyne: Otter Point	Loch Spelve Cockles
Site name	Carradale Bay Razors	Gallochoille Old Pier	Ganavan	Loch Gruinart Craigens	Loch Creran Cockles	Otter Point	North West Spelvie
Whole weight							
pg/g							
2,3,7,8-TCDD	<0.01	0.02	<0.01	0.02	<0.01	<0.01	<0.01
1,2,3,7,8-PeCDD	0.01 i	0.05	<0.01	0.06	<0.01	<0.01	<0.01 i
1,2,3,4,7,8-HxCDD	<0.01	0.01	<0.01	0.01	<0.01	<0.01	<0.01
1,2,3,6,7,8-HxCDD	0.02	0.03	<0.01	0.04	<0.01	<0.01	<0.01
1,2,3,7,8,9-HxCDD	<0.01	0.02	<0.01	0.03	<0.01	<0.01	<0.01
1,2,3,4,6,7,8-HpCDD	0.12	0.07	0.03	0.07	0.03	0.05	0.05
OCDD	0.56	0.21	0.12	0.11 i	0.13	0.20	0.22
2,3,7,8-TCDF	0.22	0.28	0.02	0.30	0.03	0.03	0.02
1,2,3,7,8-PeCDF	0.02	0.04	<0.01	0.04	<0.01	<0.01	0.01
2,3,4,7,8-PeCDF	0.07	0.11	<0.01	0.13	0.01	0.02	0.01
1,2,3,4,7,8-HxCDF	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
1,2,3,6,7,8-HxCDF	0.01	0.01	<0.01	0.02	<0.01	<0.01	<0.01
1,2,3,7,8,9-HxCDF	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
2,3,4,6,7,8-HxCDF	0.02	0.03	<0.01	0.03	<0.01	<0.01	0.01
1,2,3,4,6,7,8-HpCDF	0.05	<0.01	<0.01	0.01	0.01	0.02	0.02
1,2,3,4,7,8,9-HpCDF	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
OCDF	0.06	0.01	<0.01	0.02	<0.01	0.02	0.02
WHO-TEQ 2005 (pg/g) lower	**0.06**	**0.14**	**<0.01**	**0.16**	**0.01**	**0.01**	**0.01**
WHO-TEQ 2005 (pg/g) upper	**0.08**	**0.15**	**0.03**	**0.17**	**0.03**	**0.04**	**0.03**

Fera LIMS Sample No.	S16-000964	S16-014118	S16-001703	S16-001547	S16-001546	S16-002261	S16-001702	S16-001545
Sample Type	Cockles	Razors	Common mussels	Razors	Pacific Oysters	Razors	Razors	Common cockles
Production area	North Connel Cockles	West Jura	Loch Seaforth	Caolas Eiriosgaigh Razors	Garbh Lingeigh	Oitir Mhor Razors	South Ford Faoileann	Traigh Mhor
Site name	Ledaig Point Cockles	Jura	East Coast Mussels	Eiriosgaigh Razors	Garbh Lingeigh	Rubha nan Eun	Faoileann	Traigh Mhor
Whole weight								
pg/g								
2,3,7,8-TCDD	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01
1,2,3,7,8-PeCDD	<0.01	0.01	0.03	<0.01	0.05	0.02	0.01	<0.01
1,2,3,4,7,8-HxCDD	<0.01	<0.01	0.03	<0.01	0.01	<0.01	<0.01	<0.01
1,2,3,6,7,8-HxCDD	<0.01	0.02	0.04	0.01	0.04	0.02	0.01	<0.01
1,2,3,7,8,9-HxCDD	<0.01	0.01	0.03	0.01	0.03	0.01	<0.01	<0.01
1,2,3,4,6,7,8-HpCDD	0.04	0.13	0.26	0.08	0.07	0.10	0.07	0.02
OCDD	0.09 i	0.79	1.52	0.27	0.23	0.39	0.49	0.12
2,3,7,8-TCDF	0.02	0.19	0.15	0.10	0.27	0.11	0.10	0.02
1,2,3,7,8-PeCDF	<0.01	0.01	0.03	0.01	0.03	0.01	0.01	<0.01
2,3,4,7,8-PeCDF	0.01	0.05	0.07	0.04	0.11	0.05	0.03	<0.01 i
1,2,3,4,7,8-HxCDF	<0.01	0.02	0.02	<0.01	<0.01	0.01	0.01	<0.01
1,2,3,6,7,8-HxCDF	<0.01	0.01	<0.01	<0.01	0.02	<0.01	<0.01	<0.01
1,2,3,7,8,9-HxCDF	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
2,3,4,6,7,8-HxCDF	<0.01	0.01	0.02	0.01	0.03	0.02	0.01	<0.01
1,2,3,4,6,7,8-HpCDF	0.02	0.05	0.03	0.02	0.01	0.04	0.03	0.01
1,2,3,4,7,8,9-HpCDF	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
OCDF	0.01	0.05	0.06	0.03	0.01	0.03	0.02	<0.01
WHO-TEQ 2005 (pg/g) lower	**0.01**	**0.05**	**0.08**	**0.03**	**0.13**	**0.05**	**0.03**	**<0.01**
WHO-TEQ 2005 (pg/g) upper	**0.03**	**0.07**	**0.10**	**0.05**	**0.14**	**0.07**	**0.05**	**0.03**

Fera LIMS Sample No.	S16-001543	S16-001700	S16-014232	S16-013402	S16-001701	S16-013403	S16-000319	S16-000505
Sample Type	Common cockles	Razors	Common Cockles	Razors	Razors	Razors	Razors	Common mussels
Production area	North Ford	Fleet Bay Razors	Loch Ryan Cockles	Luce Bay Drummore	Wigtown Bay: Islands of Fleet	Luce Bay Razors	Forth Estuary: Largo Bay	Lee Of Vollister
Site name	Oitir Mhor	Fleet Bay Razors	Loch Ryan Cockles	Drummore Razors	Wigtown Bay	Luce Sand Razors	Largo Bay	Whale Firth
Whole weight								
pg/g								
2,3,7,8-TCDD	<0.01	0.02	<0.01	<0.01	0.02	<0.01	0.02	<0.01
1,2,3,7,8-PeCDD	<0.01	0.03	<0.01	0.02	0.02 i	0.01	0.03	0.02
1,2,3,4,7,8-HxCDD	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	0.01	<0.01
1,2,3,6,7,8-HxCDD	<0.01	0.05	0.01	0.02	0.03	0.01	0.06	0.02 i
1,2,3,7,8,9-HxCDD	<0.01	0.05	0.01	0.01	0.01	0.01	0.02	<0.01
1,2,3,4,6,7,8-HpCDD	0.05	0.18	0.14	0.14	0.18	0.14	0.30	0.06
OCDD	0.15 i	0.98	0.74	0.58	1.05	0.60	1.12	0.11
2,3,7,8-TCDF	0.02	0.43	0.04	0.19	0.44	0.15	0.37	0.11
1,2,3,7,8-PeCDF	<0.01	0.04	0.01	0.02	0.03	0.02	0.01	0.02
2,3,4,7,8-PeCDF	<0.01	0.13	0.02	0.05	0.13	0.05	0.09	0.05
1,2,3,4,7,8-HxCDF	<0.01	0.06	0.02	0.02	0.05	0.02	0.02	<0.01
1,2,3,6,7,8-HxCDF	<0.01	0.03	<0.01	0.01	0.02	0.01	<0.01	<0.01
1,2,3,7,8,9-HxCDF	<0.01 i	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
2,3,4,6,7,8-HxCDF	<0.01	0.04	0.01	0.02	0.02	0.01	0.02	0.02
1,2,3,4,6,7,8-HpCDF	0.02	0.11	0.04	0.05	0.09	0.05	0.07	0.01
1,2,3,4,7,8,9-HpCDF	<0.01	0.03	<0.01	<0.01	0.01	<0.01	<0.01	<0.01
OCDF	0.01	0.16	0.03	0.05	0.13	0.04	0.12	0.01
WHO-TEQ 2005 (pg/g) lower	**<0.01**	**0.16**	**0.02**	**0.06**	**0.14**	**0.05**	**0.13**	**0.05**
WHO-TEQ 2005 (pg/g) upper	**0.03**	**0.16**	**0.04**	**0.08**	**0.14**	**0.06**	**0.13**	**0.07**

Fera LIMS Sample No.	S16-000508	S16-000503	S16-000501	S16-000502	S16-000507
Sample Type	Common Mussels	Common mussels	Razors & Sand Gapers	Razors	Carpet Clams
Production area	Catfirth	Olna Firth	Croy Bay	North Bay	Camas
Site name	Catfirth	Outer Foula Wick	Culzean Bay	Barassie	Garbh Clams Sound of Sleat Clams
Whole weight					
pg/g					
2,3,7,8-TCDD	<0.01	0.01	0.01	<0.01	<0.01
1,2,3,7,8-PeCDD	<0.01 i	0.02 i	0.02	0.02	<0.01 i
1,2,3,4,7,8-HxCDD	<0.01	0.01	<0.01	<0.01 i	<0.01
1,2,3,6,7,8-HxCDD	0.01	0.03	0.02	0.01	<0.01
1,2,3,7,8,9-HxCDD	<0.01	0.02	<0.01	<0.01	<0.01 i
1,2,3,4,6,7,8-HpCDD	0.05	0.10	0.10	0.07	0.03
OCDD	0.09	0.19	0.74	0.37	0.10
2,3,7,8-TCDF	0.07	0.20	0.24	0.21	0.04
1,2,3,7,8-PeCDF	0.01	0.04	0.01	0.01	<0.01
2,3,4,7,8-PeCDF	0.04	0.12	0.07	0.05	0.01
1,2,3,4,7,8-HxCDF	<0.01	0.02	0.02	0.01	<0.01
1,2,3,6,7,8-HxCDF	<0.01	0.01 i	<0.01	<0.01	<0.01
1,2,3,7,8,9-HxCDF	<0.01	<0.01	<0.01	<0.01	<0.01
2,3,4,6,7,8-HxCDF	0.01	0.03	0.01	0.01	<0.01
1,2,3,4,6,7,8-HpCDF	<0.01	0.02	0.04	0.03	0.01
1,2,3,4,7,8,9-HpCDF	<0.01	<0.01	<0.01	<0.01	<0.01
OCDF	0.01	0.02	0.05	0.03	<0.01
WHO-TEQ 2005 (pg/g) lower	**0.02**	**0.10**	**0.08**	**0.06**	**0.01**
WHO-TEQ 2005 (pg/g) upper	**0.05**	**0.10**	**0.09**	**0.07**	**0.03**

Table 2.1: PCDD/Fs (dioxins) concentrations - Lipid weight

Fera LIMS Sample No.	S16-001648	S16-002246	S16-000843	S16-001544	S16-001647	S16-000509	S16-000318
Sample Type	Razors	Pacific Oysters	Common Cockles	Pacific oysters	Common Cockles	Common Cockles	Common Cockles
Production area	Carradale Bay	Gallochoille Old Pier	Ganavan Cockles	Islay	Loch Creran Cockles	Loch Fyne: Otter Point	Loch Spelve Cockles
Site name	Carradale Bay Razors	Gallochoille Old Pier	Ganavan	Loch Gruinart Craigens	Loch Creran Cockles	Otter Point	North West Spelvie
Lipid weight							
pg/g							
2,3,7,8-TCDD	0.82	2.76	0.60	1.12	0.20	0.36	<0.42
1,2,3,7,8-PeCDD	1.22 i	8.47	1.20	3.27	0.89	1.25	1.72 i
1,2,3,4,7,8-HxCDD	0.62	2.21	0.75	0.75	0.55	1.35	1.25
1,2,3,6,7,8-HxCDD	1.87	4.93	1.75	2.26	1.15	1.97	2.66
1,2,3,7,8,9-HxCDD	0.91	3.56	1.40	1.52	0.60	1.71	1.72
1,2,3,4,6,7,8-HpCDD	10.81	11.23	10.99	4.33	4.52	16.26	14.54
OCDD	51.90	33.01	44.20	6.21 i	16.39	67.32	64.52
2,3,7,8-TCDF	20.97	43.27	7.64	17.87	3.36	9.82	6.57
1,2,3,7,8-PeCDF	1.87	5.51	2.45	2.64	1.14	3.32	3.07
2,3,4,7,8-PeCDF	6.70	17.00	2.80	7.77	1.71	6.23	4.22
1,2,3,4,7,8-HxCDF	1.90	<0.49	<1.8	0.30	0.69	2.49	2.45
1,2,3,6,7,8-HxCDF	1.01	1.75	1.50	1.10	1.00	2.60	2.03
1,2,3,7,8,9-HxCDF	<0.38	<0.15	<0.65	0.20	<0.13	0.83	<0.63
2,3,4,6,7,8-HxCDF	2.09	4.69	2.45	1.98	1.14	2.91	3.13
1,2,3,4,6,7,8-HpCDF	4.64	1.26	3.20	0.85	1.92	5.56	6.57
1,2,3,4,7,8,9-HpCDF	<0.29	<0.27	0.45	0.15	0.27	0.88	<0.83
OCDF	5.33	1.84	3.00	1.02	1.24	5.19	5.52
WHO-TEQ 2005 (pg/g) lower	**7.21**	**22.67**	**4.42**	**9.45**	**2.56**	**6.20**	**5.29**
WHO-TEQ 2005 (pg/g) upper	**7.26**	**22.74**	**4.67**	**9.45**	**2.57**	**6.20**	**5.78**

Fera LIMS Sample No.	S16-000964	S16-014118	S16-001703	S16-001547	S16-001546	S16-002261	S16-001702	S16-001545
Sample Type	Cockles	Razors	Common mussels	Razors	Pacific Oysters	Razors	Razors	Common cockles
Production area	North Connel Cockles	West Jura	Loch Seaforth	Caolas Eiriosgaigh Razors	Garbh Lingeigh	Oitir Mhor Razors	South Ford Faoileann	Traigh Mhor
Site name	Ledaig Point Cockles	Jura	East Coast Mussels	Eiriosgaigh Razors	Garbh Lingeigh	Rubha nan Eun	Faoileann	Traigh Mhor
Lipid weight								
pg/g								
2,3,7,8-TCDD	0.46	0.83	<0.92	<0.29	1.09	0.40	0.44	<0.58
1,2,3,7,8-PeCDD	0.89	1.57	2.31	<0.55	4.04	1.41	1.13	1.26
1,2,3,4,7,8-HxCDD	0.86	0.80	1.96	0.69	1.13	0.45	0.47	<0.63
1,2,3,6,7,8-HxCDD	2.21	1.99	3.02	1.46	2.75	1.44	1.16	0.73
1,2,3,7,8,9-HxCDD	1.82	1.24	2.07	1.12	2.03	1.08	0.85	<1.35
1,2,3,4,6,7,8-HpCDD	13.72	15.42	18.36	8.19	5.23	9.08	7.63	7.59
OCDD	28.79 i	92.97	107.76	27.45	17.57	35.95	49.78	38.87
2,3,7,8-TCDF	5.97	21.99	10.83	9.80	20.64	10.16	10.19	6.09
1,2,3,7,8-PeCDF	2.54	1.69	2.27	1.05	2.65	1.04	1.21	2.03
2,3,4,7,8-PeCDF	3.39	5.66	5.31	3.56	8.64	4.34	2.95	1.84 i
1,2,3,4,7,8-HxCDF	2.57	1.82	1.23	0.88	<0.09	1.11	1.10	1.50
1,2,3,6,7,8-HxCDF	2.00	1.38	0.60	0.55	1.23	0.80	0.50	1.21
1,2,3,7,8,9-HxCDF	0.18	<0.17	<0.25	<0.41	<0.17	0.09	<0.19	<0.24
2,3,4,6,7,8-HxCDF	2.29	1.52	1.75	1.46	2.49	1.39	1.32	1.55
1,2,3,4,6,7,8-HpCDF	4.89	5.91	2.36	2.29	0.81	3.72	3.33	3.67
1,2,3,4,7,8,9-HpCDF	0.57	0.28	0.25	<0.31	<0.15	<0.19	<0.33	<0.58
OCDF	4.11	5.91	4.07	2.58	0.96	2.71	2.26	3.29
WHO-TEQ 2005 (pg/g) lower	**4.43**	**7.47**	**6.36**	**2.81**	**10.89**	**4.93**	**4.18**	**3.11**
WHO-TEQ 2005 (pg/g) upper	**4.43**	**7.49**	**7.31**	**3.69**	**10.92**	**4.94**	**4.20**	**3.91**

Fera LIMS Sample No.	S16-001543	S16-001700	S16-014232	S16-013402	S16-001701	S16-013403	S16-000319	S16-000505
Sample Type	Common cockles	Razors	Common Cockles	Razors	Razors	Razors	Razors	Common mussels
Production area	North Ford	Fleet Bay Razors	Loch Ryan Cockles	Luce Bay Drummore	Wigtown Bay: Islands of Fleet	Luce Bay Razors	Forth Estuary: Largo Bay	Lee Of Vollister
Site name	Oitir Mhor	Fleet Bay Razors	Loch Ryan Cockles	Drummore Razors	Wigtown Bay	Luce Sand Razors	Largo Bay	Whale Firth
Lipid weight								
pg/g								
2,3,7,8-TCDD	0.46	3.46	0.59	0.88	1.48	0.80	0.98	0.47
1,2,3,7,8-PeCDD	1.68	4.67	2.28	1.76	2.13 i	1.27	1.52	1.79
1,2,3,4,7,8-HxCDD	0.82	3.94	2.54	0.90	0.83	0.67	0.49	0.75
1,2,3,6,7,8-HxCDD	1.68	7.24	3.68	1.71	2.21	1.61	2.74	1.81 i
1,2,3,7,8,9-HxCDD	2.04	7.37	3.97	1.29	1.25	1.22	0.88	0.84
1,2,3,4,6,7,8-HpCDD	15.04	28.62	43.70	14.58	15.60	15.34	14.50	7.05
OCDD	45.23 i	158.09	233.79	61.42	91.60	65.42	54.84	12.98
2,3,7,8-TCDF	4.93	69.91	13.28	19.62	37.90	16.72	18.25	13.69
1,2,3,7,8-PeCDF	1.93	5.63	3.61	2.04	2.90	1.92	0.72	2.48
2,3,4,7,8-PeCDF	2.86	20.24	7.25	5.02	11.68	5.01	4.55	6.23
1,2,3,4,7,8-HxCDF	1.97	9.58	4.82	1.91	4.74	2.00	0.84	0.91
1,2,3,6,7,8-HxCDF	1.18	4.15	2.80	1.27	1.56	1.19	0.43	0.84
1,2,3,7,8,9-HxCDF	0.25 i	<1.57	0.29	0.16	<0.25	<0.1	0.13	<0.13
2,3,4,6,7,8-HxCDF	1.89	6.96	4.12	1.68	2.04	1.53	0.86	1.98
1,2,3,4,6,7,8-HpCDF	4.75	16.98	12.58	5.45	7.80	5.09	3.58	1.62
1,2,3,4,7,8,9-HpCDF	0.25	5.07	0.77	0.34	1.06	0.23	<0.12	0.26
OCDF	3.07	25.07	10.78	5.14	11.45	4.72	5.79	1.47
WHO-TEQ 2005 (pg/g) lower	**4.75**	**25.85**	**9.35**	**7.28**	**12.53**	**6.35**	**8.67**	**4.62**
WHO-TEQ 2005 (pg/g) upper	**4.75**	**26.00**	**9.35**	**7.28**	**12.55**	**6.36**	**8.67**	**4.62**

Fera LIMS Sample No.	S16-000508	S16-000503	S16-000501	S16-000502	S16-000507
Sample Type	Common Mussels	Common mussels	Razors & Sand Gapers	Razors	Carpet Clams
Production area	Catfirth	Olna Firth	Croy Bay	North Bay	Camas
Site name	Catfirth	Outer Foula Wick	Culzean Bay	Barassie	Garbh Clams Sound of Sleat Clams
Lipid weight					
pg/g					
2,3,7,8-TCDD	0.70	0.65	0.61	0.58	0.19
1,2,3,7,8-PeCDD	1.77 i	1.01 i	0.84	0.97	0.29 i
1,2,3,4,7,8-HxCDD	0.96	0.75	0.28	0.36 i	0.23
1,2,3,6,7,8-HxCDD	2.97	1.62	0.94	0.82	0.31
1,2,3,7,8,9-HxCDD	0.99	1.02	0.50	0.38	0.13 i
1,2,3,4,6,7,8-HpCDD	10.26	5.98	5.66	4.36	2.38
OCDD	18.10	11.80	41.74	23.56	7.34
2,3,7,8-TCDF	13.44	12.39	13.40	13.28	3.34
1,2,3,7,8-PeCDF	2.19	2.53	0.78	0.68	0.47
2,3,4,7,8-PeCDF	7.26	7.59	3.82	2.89	0.94
1,2,3,4,7,8-HxCDF	0.86	0.93	0.94	0.81	0.34
1,2,3,6,7,8-HxCDF	1.02	0.65 i	0.41	0.33	0.37
1,2,3,7,8,9-HxCDF	<0.26	<0.19	0.14	0.12	<0.06
2,3,4,6,7,8-HxCDF	2.11	1.93	0.83	0.75	0.41
1,2,3,4,6,7,8-HpCDF	1.61	0.92	2.25	1.89	0.91
1,2,3,4,7,8,9-HpCDF	<0.23	<0.13	0.16	0.17	<0.13
OCDF	2.47	1.19	2.90	1.89	0.65
WHO-TEQ 2005 (pg/g) lower	**7.07**	**6.01**	**4.46**	**4.19**	**1.32**
WHO-TEQ 2005 (pg/g) upper	**7.10**	**6.04**	**4.46**	**4.19**	**1.33**

Table 2.2: Non-*ortho* PCB concentrations

FERA LIMS Sample No.	S16-001648	S16-002246	S16-000843	S16-001544	S16-001647	S16-000509	S16-000318	S16-000964	S16-014118
Sample Type	Razors	Pacific Oysters	Common Cockles	Pacific oysters	Common Cockles	Common Cockles	Common Cockles	Cockles	Razors
Production area	Carradale Bay	Gallochoille Old Pier	Ganavan Cockles	Islay	Loch Creran Cockles	Loch Fyne: Otter Point	Loch Spelve Cockles	North Connel Cockles	West Jura
Site name	Carradale Bay Razors	Gallochoille Old Pier	Ganavan	Loch Gruinart Craigens	Loch Creran Cockles	Otter Point	North West Spelvie	Ledaig Point Cockles	Jura
Whole Weight									
pg/g									
PCB77	7.14	2.61	0.69	2.69	0.49	1.55	0.41	0.48	6.41
PCB81	0.28	0.14	0.03	0.13	0.03	0.05	0.02	0.03	0.28
PCB126	0.40	0.49	0.13	0.57	0.23	0.10	0.08	0.10	0.42
PCB169	0.07	0.11	0.07	0.11	0.06	0.03	0.04	0.06	0.06
WHO-TEQ 2005 (pg/g) lower	**0.04**	**0.05**	**0.02**	**0.06**	**0.02**	**0.01**	**0.01**	**0.01**	**0.04**
WHO-TEQ 2005 (pg/g) upper	**0.04**	**0.05**	**0.02**	**0.06**	**0.02**	**0.01**	**0.01**	**0.01**	**0.04**
Lipid Weight									
pg/g									
PCB77	667.32	402.84	246.07	158.78	64.07	516.72	121.85	153.91	752.07
PCB81	26.44	20.87	11.59	7.91	4.06	17.45	7.24	8.57	33.40
PCB126	37.76	75.60	45.90	33.55	29.72	33.40	22.46	33.40	49.15
PCB169	6.12	16.98	23.52	6.61	7.61	9.77	12.40	19.18	7.38
WHO-TEQ 2005 (pg/g) lower	**4.03**	**8.12**	**5.32**	**3.57**	**3.21**	**3.69**	**2.63**	**3.93**	**5.22**
WHO-TEQ 2005 (pg/g) upper	**4.03**	**8.12**	**5.32**	**3.57**	**3.21**	**3.69**	**2.63**	**3.93**	**5.22**

FERA LIMS Sample No.	S16-001703	S16-001547	S16-001546	S16-002261	S16-001702	S16-001545	S16-001543	S16-001700	S16-014232
Sample Type	Common mussels	Razors	Pacific Oysters	Razors	Razors	Common cockles	Common cockles	Razors	Common Cockles
Production area	Loch Seaforth	Caolas Eiriosgaigh Razors	Garbh Lingeigh	Oitir Mhor Razors	South Ford Faoileann	Traigh Mhor	North Ford	Fleet Bay Razors	Loch Ryan Cockles
Site name	East Coast Mussels	Eiriosgaigh Razors	Garbh Lingeigh	Rubha nan Eun	Faoileann	Traigh Mhor	Oitir Mhor	Fleet Bay Razors	Loch Ryan Cockles
Whole Weight									
pg/g									
PCB77	1.53	1.27	2.00	1.45	1.34	0.26	0.30	8.23	0.86
PCB81	0.10	0.06	0.10	0.08	0.07	0.01	0.02	0.37	0.03
PCB126	0.42	0.23	0.49	0.22	0.23	0.06	0.06	0.79	0.14
PCB169	0.13	0.05	0.11	0.05	0.05	0.02	0.03	0.16	0.05
WHO-TEQ 2005 (pg/g) lower	**0.05**	**0.02**	**0.05**	**0.02**	**0.02**	**0.01**	**0.01**	**0.08**	**0.02**
WHO-TEQ 2005 (pg/g) upper	**0.05**	**0.02**	**0.05**	**0.02**	**0.02**	**0.01**	**0.01**	**0.08**	**0.02**
Lipid Weight									
pg/g									
PCB77	108.68	128.52	155.63	133.78	136.74	84.26	89.75	1323.53	269.62
PCB81	7.17	6.36	7.78	7.10	6.75	4.83	5.18	59.81	10.71
PCB126	30.09	23.34	38.38	20.11	23.94	20.21	19.11	127.38	42.71
PCB169	9.57	5.35	8.83	4.48	5.32	7.49	9.93	24.91	16.48
WHO-TEQ 2005 (pg/g) lower	**3.31**	**2.51**	**4.12**	**2.16**	**2.57**	**2.26**	**2.22**	**13.64**	**4.80**
WHO-TEQ 2005 (pg/g) upper	**3.31**	**2.51**	**4.12**	**2.16**	**2.57**	**2.26**	**2.22**	**13.64**	**4.80**

FERA LIMS Sample No.	S16-013402	S16-001701	S16-013403	S16-000319	S16-000505	S16-000508	S16-000503	S16-000501	S16-000502	S16-000507
Sample Type	Razors	Razors	Razors	Razors	Common mussels	Common Mussels	Common mussels	Razors & Sand Gapers	Razors	Carpet Clams
Production area	Luce Bay Drummore	Wigtown Bay: Islands of Fleet	Luce Bay Razors	Forth Estuary: Largo Bay	Lee Of Vollister	Catfirth	Olna Firth Outer	Croy Bay	North Bay	Camas Garbh Clams
Site name	Drummore Razors	Wigtown Bay	Luce Sand Razors	Largo Bay	Whale Firth	Catfirth	Foula Wick	Culzean Bay	Barassie	Sound of Sleat Clams
Whole Weight										
pg/g										
PCB77	4.76	7.41	4.18	18.02	2.44	1.04	1.62	7.51	6.15	0.67
PCB81	0.21	0.36	0.2	1.69	0.11	0.06	0.11	0.31	0.25	0.04
PCB126	0.32	0.67	0.29	1.64	0.36	0.2	0.47	0.46	0.41	0.06
PCB169	0.05	0.14	0.04	0.37	0.07	0.05	0.15	0.07	0.07	0.02
WHO-TEQ 2005 (pg/g) lower	**0.03**	**0.07**	**0.03**	**0.18**	**0.04**	**0.02**	**0.05**	**0.05**	**0.04**	**0.01**
WHO-TEQ 2005 (pg/g) upper	**0.03**	**0.07**	**0.03**	**0.18**	**0.04**	**0.02**	**0.05**	**0.05**	**0.04**	**0.01**
Lipid Weight										
pg/g										
PCB77	500.71	644.99	452.65	879.83	290.78	215.75	98.42	421.5	389.29	51.23
PCB81	22	31.12	21.63	82.4	13.41	13.33	6.71	17.44	16.06	2.87
PCB126	34.02	57.99	31.18	80.13	43.44	40.65	28.57	25.79	26.01	4.75
PCB169	5.53	11.95	4.6	18.23	8.21	10.81	9.3	4.12	4.65	1.57
WHO-TEQ 2005 (pg/g) lower	**3.62**	**6.23**	**3.31**	**8.67**	**4.62**	**4.41**	**3.15**	**2.75**	**2.78**	**0.53**
WHO-TEQ 2005 (pg/g) upper	**3.62**	**6.23**	**3.31**	**8.67**	**4.62**	**4.41**	**3.15**	**2.75**	**2.78**	**0.53**

Table 2.3: *Ortho* PCB concentrations – Whole weight

FERA LIMS Sample No.	S16-001648	S16-002246	S16-000843	S16-001544	S16-001647	S16-000509	S16-000318	S16-000964	S16-014118
Sample type	Razors	Pacific Oysters	Common Cockles	Pacific oysters	Common Cockles	Common Cockles	Common Cockles	Cockles	Razors
Production area	Carradale Bay	Gallochoille Old Pier	Ganavan Cockles	Islay	Loch Creran Cockles	Loch Fyne: Otter Point	Loch Spelve Cockles	North Connel Cockles	West Jura
Site name	Carradale Bay Razors	Gallochoille Old Pier	Ganavan	Loch Gruinart Craigens	Loch Creran Cockles	Otter Point	North West Spelvie	Ledaig Point Cockles	Jura
Whole weight									
µg/kg									
PCB18	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCB28	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01 i	<0.01	0.02
PCB31	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01
PCB47	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01
PCB49	0.03	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.02
PCB51	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCB52	0.05	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	0.04
PCB99	0.07	0.02	<0.01	0.04	<0.01	<0.01	<0.01	<0.01	0.06
PCB101	0.12	0.04	<0.01	0.06	<0.01	0.01	<0.01	<0.01	0.12
PCB105	0.04	0.01	<0.01	0.03	<0.01	<0.01	<0.01	<0.01	0.04
PCB114	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCB118	0.11	0.04	<0.01	0.10	0.01	0.02	<0.01	<0.01	0.11
PCB123	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCB128	0.03	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	0.03
PCB138	0.21	0.09	0.01	0.13	0.02	0.03	0.01	0.01	0.20
PCB153	0.25	0.15	0.01	0.19	0.02	0.04	0.02	0.01	0.22
PCB156	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCB157	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCB167	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCB180	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCB189	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
SUM of ICES 6(µg/kg) lower	**0.65**	**0.28**	**0.02**	**0.40**	**0.04**	**0.08**	**0.03**	**0.02**	**0.60**
SUM of ICES 6(µg/kg) upper	**0.66**	**0.31**	**0.06**	**0.41**	**0.08**	**0.11**	**0.07**	**0.06**	**0.61**
WHO-TEQ 2005 (pg/g) lower	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**
WHO-TEQ 2005 (pg/g) upper	**0.01**	**<0.01**	**<0.01**	**0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**0.01**

FERA LIMS Sample No.	S16-001703	S16-001547	S16-001546	S16-002261	S16-001702	S16-001545	S16-001543	S16-001700	S16-014232
Sample type	Common mussels	Razors	Pacific Oysters	Razors	Razors	Common cockles	Common cockles	Razors	Common Cockles
Production area	Loch Seaforth	Caolas Eiriosgaigh Razors	Garbh Lingeigh	Oitir Mhor Razors	South Ford Faoileann	Traigh Mhor	North Ford	Fleet Bay Razors	Loch Ryan Cockles
Site name	East Coast Mussels	Eiriosgaigh Razors	Garbh Lingeigh	Rubha nan Eun	Faoileann	Traigh Mhor	Oitir Mhor	Fleet Bay Razors	Loch Ryan Cockles
Whole weight									
µg/kg									
PCB18	<0.01	<0.01	<0.01	<0.01 i	<0.01	<0.01	<0.01	<0.01	<0.01
PCB28	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01 i	<0.01	0.02	<0.01
PCB31	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01
PCB47	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01
PCB49	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.02	<0.01
PCB51	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCB52	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.03	<0.01
PCB99	0.02	<0.01	0.02	0.01	<0.01	<0.01	<0.01	0.06	0.02
PCB101	0.04	0.01	0.04	0.02	0.02	<0.01	<0.01	0.12	0.03
PCB105	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.03	<0.01
PCB114	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCB118	0.03	0.02	0.04	0.02	0.02	<0.01	<0.01	0.12	0.03
PCB123	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCB128	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.03	<0.01
PCB138	0.10	0.04	0.08	0.05	0.03	<0.01	<0.01	0.19	0.06
PCB153	0.14	0.03	0.16	0.06	0.04	<0.01	0.01	0.24	0.06
PCB156	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCB157	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCB167	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCB180	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01
PCB189	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
SUM of ICES 6(µg/kg) lower	**0.29**	**0.08**	**0.28**	**0.13**	**0.09**	**<0.01**	**0.01**	**0.60**	**0.16**
SUM of ICES 6(µg/kg) upper	**0.31**	**0.11**	**0.31**	**0.16**	**0.12**	**0.06**	**0.06**	**0.61**	**0.18**
WHO-TEQ 2005 (pg/g) lower	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**
WHO-TEQ 2005 (pg/g) upper	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**

FERA LIMS Sample No.	S16-013402	S16-001701	S16-013403	S16-000319	S16-000505	S16-000508	S16-000503	S16-000501	S16-000502	S16-000507
Sample type	Razors	Razors	Razors	Razors	Common mussels	Common Mussels	Common mussels	Razors	Razors	Carpet Clams
Production area	Luce Bay Drummore	Wigtown Bay: Islands of Fleet	Luce Bay Razors	Forth Estuary: Largo Bay	Lee Of Vollister	Catfirth	Olna Firth Outer	Croy Bay	North Bay	Camas Garbh
Site name	Drummore Razors	Wigtown Bay	Luce Sand Razors	Largo Bay	Whale Firth	Catfirth	Foula Wick	Culzean Bay	Barassie	Clams Sound of Sleat
Whole weight										
µg/kg										
PCB18	<0.01	<0.01	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCB28	0.02	0.02	0.01	0.11	<0.01 i	<0.01 i	<0.01 i	0.03	0.02	<0.01 i
PCB31	0.01	0.02	0.01	0.08	<0.01 i	<0.01	<0.01	0.02	0.01	<0.01
PCB47	0.01	0.01	0.01	0.07	0.01	<0.01	<0.01	0.02	0.02	<0.01
PCB49	0.02	0.02	0.02	0.11	0.02	<0.01	0.01	0.03	0.03	<0.01
PCB51	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCB52	0.03	0.04	0.03	0.18	0.03	<0.01	0.02	0.05	0.04	<0.01
PCB99	0.05	0.06	0.04	0.19	0.06	<0.01	0.03	0.07	0.06	<0.01
PCB101	0.10	0.11	0.08	0.46	0.10	0.02	0.06	0.13	0.11	0.01
PCB105	0.03	0.03	0.03	0.11	0.02	<0.01	0.02	0.04	0.03	<0.01
PCB114	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCB118	0.09	0.10	0.08	0.29	0.10	0.02	0.06	0.12	0.10	<0.01
PCB123	<0.01	<0.01	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCB128	0.02	0.03	0.02	0.08	0.02	<0.01	0.01	0.03	0.02	<0.01
PCB138	0.16	0.18	0.14	0.62	0.14	0.05	0.13	0.21	0.17	0.02
PCB153	0.18	0.22	0.16	0.77	0.16	0.08	0.17	0.24	0.19	0.03
PCB156	<0.01	<0.01	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCB157	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCB167	<0.01	<0.01	<0.01	0.03	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCB180	<0.01	<0.01	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCB189	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
SUM of ICES 6(µg/kg) lower	**0.49**	**0.57**	**0.42**	**2.16**	**0.43**	**0.15**	**0.38**	**0.66**	**0.53**	**0.06**
SUM of ICES 6(µg/kg) upper	**0.50**	**0.58**	**0.43**	**2.16**	**0.45**	**0.18**	**0.40**	**0.67**	**0.54**	**0.09**
WHO-TEQ 2005 (pg/g) lower	**<0.01**	**<0.01**	**<0.01**	**0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**
WHO-TEQ 2005 (pg/g) upper	**0.01**	**0.01**	**0.01**	**0.02**	**0.01**	**<0.01**	**<0.01**	**0.01**	**0.01**	**<0.01**

Table 2.3: *Ortho* PCB concentrations – Lipid weight

FERA LIMS Sample No.	S16-001648	S16-002246	S16-000843	S16-001544	S16-001647	S16-000509	S16-000318	S16-000964	S16-014118
Sample type	Razors	Pacific Oysters	Common Cockles	Pacific oysters	Common Cockles	Common Cockles	Common Cockles	Cockles	Razors
Production area	Carradale Bay	Gallochoille Old Pier	Ganavan Cockles	Islay	Loch Creran Cockles	Loch Fyne: Otter Point	Loch Spelve Cockles	North Connel Cockles	West Jura
Site name	Carradale Bay Razors	Gallochoille Old Pier	Ganavan	Loch Gruinart Craigens	Loch Creran Cockles	Otter Point	North West Spelvie	Ledaig Point Cockles	Jura
Lipid weight									
µg/kg									
PCB18	0.40	0.21	0.25	0.06	0.10	0.32	<0.64	0.21	0.45
PCB28	1.80	0.78	0.59	0.25	<0.34	1.05	0.79	0.53	1.90
PCB31	1.25	0.56	0.67	0.23	0.19	0.87	<1	0.60	1.56
PCB47	1.86	0.64	0.40	0.35	0.21	0.93	1.34	0.31	1.75
PCB49	2.90	0.84	0.50	0.38	0.19	1.23	0.46	0.40	2.77
PCB51	0.23	0.08	<0.16	0.44	<0.04	<0.17	0.50	<0.11	0.24
PCB52	4.23	1.46	0.84	0.63	0.31	1.78	0.73	0.66	4.58
PCB99	6.24	3.48	0.90	2.61	0.58	3.05	0.85	0.73	7.41
PCB101	11.13	6.06	1.37	3.56	1.07	4.84	1.36	1.19	14.31
PCB105	3.56	1.83	0.61	1.64	0.44	1.93	0.47	0.49	4.24
PCB114	0.12	0.08	<0.05	0.08	0.03	0.09	<0.02	<0.04	0.15
PCB118	9.94	6.57	2.05	5.66	1.37	5.49	1.63	1.65	12.98
PCB123	0.19	0.19	<0.03	0.09	0.02	0.18	<0.07	0.03	0.22
PCB128	2.69	1.23	0.50	0.83	0.28	1.39	0.46	0.44	3.16
PCB138	19.44	13.61	4.06	7.38	2.05	11.66	3.75	3.30	22.91
PCB153	23.81	23.71	4.10	10.93	2.13	12.06	4.49	3.58	25.52
PCB156	0.50	0.34	0.22	0.30	0.15	0.55	0.14	0.21	0.70
PCB157	0.21	0.29	0.11	0.18	0.06	0.20	<0.15	0.09	0.28
PCB167	0.36	0.60	0.24	0.39	0.10	0.36	0.14	0.19	0.45
PCB180	0.51	1.42	1.03	0.76	0.39	3.20	<0.48	0.96	0.94
PCB189	0.04	<0.03	<0.03	<0.01	0.04	<0.08	<0.58	<0.04	0.04
SUM of ICES 6(µg/kg) lower	**60.92**	**47.04**	**11.99**	**23.51**	**5.95**	**34.59**	**11.12**	**10.22**	**70.16**
SUM of ICES 6(µg/kg) upper	**60.92**	**47.04**	**11.99**	**23.51**	**6.29**	**34.59**	**11.60**	**10.22**	**70.16**
WHO-TEQ 2005 (pg/g) lower	**0.45**	**0.30**	**0.10**	**0.25**	**0.07**	**0.26**	**0.07**	**0.08**	**0.57**
WHO-TEQ 2005 (pg/g) upper	**0.45**	**0.30**	**0.10**	**0.25**	**0.07**	**0.27**	**0.10**	**0.08**	**0.57**

FERA LIMS Sample No.	S16-001703	S16-001547	S16-001546	S16-002261	S16-001702	S16-001545	S16-001543	S16-001700	S16-014232
Sample type	Common mussels	Razors	Pacific Oysters	Razors	Razors	Common cockles	Common cockles	Razors	Common Cockles
Production area	Loch Seaforth	Caolas Eiriosgaigh Razors	Garbh Lingeigh	Oitir Mhor Razors	South Ford Faoileann	Traigh Mhor	North Ford	Fleet Bay Razors	Loch Ryan Cockles
Site name	East Coast Mussels	Eiriosgaigh Razors	Garbh Lingeigh	Rubha nan Eun	Faoileann	Traigh Mhor	Oitir Mhor	Fleet Bay Razors	Loch Ryan Cockles
Lipid weight									
µg/kg									
PCB18	0.14	0.16	0.12	0.38	0.17	<0.23	0.32	0.71	0.46
PCB28	0.36	0.75	0.41	0.65	<0.56	<0.98	0.64	3.81	0.86
PCB31	0.28	0.40	0.28	0.87	0.39	0.35	0.63	2.39	0.93
PCB47	0.32	0.38	0.32	0.36	0.31	0.34	0.36	2.04	0.85
PCB49	0.44	0.38	0.37	0.47	0.42	0.30	0.38	3.51	1.10
PCB51	<0.03	0.05	0.04	0.06	<0.06	<0.11	0.42	0.18	0.16
PCB52	0.79	0.62	0.67	0.83	0.73	0.53	0.64	5.56	1.99
PCB99	1.54	0.78	1.61	1.24	0.81	0.57	0.64	9.82	5.19
PCB101	2.53	1.36 i	2.78	1.66	1.80 i	1.04	0.84	18.84	9.37
PCB105	0.70	0.70	0.77	0.71	0.63	0.32	0.37	5.48	2.63
PCB114	0.04	<0.02	0.03	<0.02	0.02	<0.03	<0.03	0.19	0.13
PCB118	2.47	1.78	3.02	2.26	1.77	0.99	1.28	18.61	8.59
PCB123	0.06	0.03	0.08	0.04	0.03	0.02	<0.03	0.34	0.15
PCB128	0.76	0.61	0.52	0.63	0.61	0.27	0.31	5.20	2.89
PCB138	6.74	3.62	6.29	4.74	3.50	2.35	2.61	31.18	18.38
PCB153	9.86	3.52	12.49	5.91	3.69	2.73	3.11	38.96	20.11
PCB156	0.24	0.16	0.15	0.18	0.15	<0.1	0.14	0.79	0.99
PCB157	0.11	0.09	0.13	0.08	0.07	<0.1	<0.1	0.43	0.45
PCB167	0.24	0.10	0.29	0.13	0.10	0.09	0.13	0.73	0.77
PCB180	0.40	0.17	0.68	0.26	0.14	0.67	0.87	0.33	3.62
PCB189	0.04	<0.05	<0.02	<0.08	<0.02	<0.09	<0.14	0.06	0.13
SUM of ICES 6(µg/kg) lower	**20.68**	**10.04**	**23.32**	**14.05**	**9.86**	**7.32**	**8.71**	**98.68**	**54.33**
SUM of ICES 6(µg/kg) upper	**20.68**	**10.04**	**23.32**	**14.05**	**10.42**	**8.30**	**8.71**	**98.68**	**54.33**
WHO-TEQ 2005 (pg/g) lower	**0.12**	**0.09**	**0.13**	**0.10**	**0.08**	**0.04**	**0.06**	**0.80**	**0.42**
WHO-TEQ 2005 (pg/g) upper	**0.12**	**0.09**	**0.13**	**0.11**	**0.08**	**0.05**	**0.07**	**0.80**	**0.42**

FERA LIMS Sample No.	S16-013402	S16-001701	S16-013403	S16-000319	S16-000505	S16-000508	S16-000503	S16-000501	S16-000502	S16-000507
Sample type	Razors	Razors	Razors	Razors	Common mussels	Common Mussels	Common mussels	Razors	Razors	Carpet Clams
Production area	Luce Bay Drummore	Wigtown Bay: Islands of Fleet	Luce Bay Razors	Forth Estuary: Largo Bay	Lee Of Vollister	Catfirth	Olna Firth Outer	Croy Bay	North Bay	Camas Garbh Clams
Site name	Drummore Razors	Wigtown Bay	Luce Sand Razors	Largo Bay	Whale Firth	Catfirth	Foula Wick	Culzean Bay	Barassie	Sound of Sleat Clams
Lipid weight										
µg/kg										
PCB18	0.38	0.34	0.24	0.91	0.23	<0.41	<0.3	0.35	0.27	<0.23
PCB28	1.69	2.10	1.33	5.53	1.17	1.40	<0.59	1.51	1.26	0.47
PCB31	1.30	1.40	1.14	3.87	0.64	<1.93	<0.79	1.10	0.90	0.65
PCB47	1.26	1.13	1.10	3.36	1.23	0.53	0.44	1.30	1.05	0.30
PCB49	1.96	1.93	1.78	5.47	2.01	0.85	0.61	1.80	1.62	0.35
PCB51	0.18	0.11	0.16	0.38	<0.07	<0.01	<0.03	0.16	0.12	<0.03
PCB52	3.14	3.08	2.95	8.56	3.18	1.37	1.19	2.89	2.69	0.44
PCB99	5.24	4.95	4.71	9.30	6.62	2.04	2.06	4.09	3.70	0.54
PCB101	10.20	9.39	9.05	22.48	12.32	4.50	3.93	7.40	6.73	0.84
PCB105	3.02	2.63	2.79	5.20	2.93	1.11	0.98	2.33	2.15	0.23
PCB114	0.11	0.10	0.11	0.36	0.10	0.05	<0.05	0.07	0.07	<0.01
PCB118	9.16	8.98	8.22	14.04	11.76	4.38	3.50	6.84	6.48	0.63
PCB123	0.19	0.18	0.15	0.75	0.24	0.08	0.07	0.16	0.19	<0.01
PCB128	2.26	2.54	2.12	4.04	2.16	1.16	0.87	1.64	1.47	0.17
PCB138	16.94	15.29	15.23	30.16	16.27	10.99	7.60	11.96	11.07	1.58
PCB153	18.80	19.45	17.27	37.74	19.52	16.21	10.14	13.51	12.15	2.31
PCB156	0.51	0.40	0.51	0.89	0.77	0.36	0.26	0.27	0.24	0.08
PCB157	0.21	0.21	0.19	0.62	0.31	0.19	0.13	0.12	0.11	<0.02
PCB167	0.34	0.39	0.32	1.27	0.67	0.52	0.27	0.22	0.19	0.05
PCB180	0.67	0.24	0.71	1.15	0.83	0.93	0.61	0.18	0.11	0.60
PCB189	0.04	0.03	0.06	0.11	0.11	<0.21	<0.05	0.04	0.02	<0.08
SUM of ICES 6(µg/kg) lower	**51.44**	**49.55**	**46.54**	**105.62**	**53.29**	**35.40**	**23.47**	**37.45**	**34.01**	**6.24**
SUM of ICES 6(µg/kg) upper	**51.44**	**49.55**	**46.54**	**105.62**	**53.29**	**35.40**	**24.06**	**37.45**	**34.01**	**6.24**
WHO-TEQ 2005 (pg/g) lower	**0.41**	**0.39**	**0.37**	**0.70**	**0.51**	**0.20**	**0.16**	**0.30**	**0.28**	**0.03**
WHO-TEQ 2005 (pg/g) upper	**0.41**	**0.39**	**0.37**	**0.70**	**0.51**	**0.21**	**0.16**	**0.30**	**0.28**	**0.03**

Table 2.4: Summary of PCDD/F and PCB WHO-TEQ, and ICES-6 concentrations

FERA LIMS Sample No.	S16-001648	S16-002246	S16-000843	S16-001544	S16-001647	S16-000509	S16-000318	S16-000964	S16-014118
Sample Details:	Razors	Pacific Oysters	Common Cockles	Pacific oysters	Common Cockles	Common Cockles	Common Cockles	Cockles	Razors
Production area	Carradale Bay	Gallochoille Old Pier	Ganavan Cockles	Islay	Loch Creran Cockles	Loch Fyne: Otter Point	Loch Spelve Cockles	North Connel Cockles	West Jura
Site name	Carradale Bay Razors	Gallochoille Old Pier	Ganavan	Loch Gruinart Craigens	Loch Creran Cockles	Otter Point	North West Spelvie	Ledaig Point Cockles	Jura
Fat content (% whole)	1.07	0.65	0.28	0.91	0.77	0.30	0.34	0.31	0.85
WHO TEQ 2005 pg/g whole									
Dioxin	0.08	0.15	0.03	0.17	0.03	0.04	0.03	0.03	0.07
non ortho-PCB	0.04	0.05	0.02	0.06	0.02	0.01	0.01	0.01	0.04
ortho-PCB	0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	0.01
Sum of WHO TEQs (upper)	**0.13**	**0.21**	**0.06**	**0.24**	**0.06**	**0.06**	**0.05**	**0.05**	**0.12**
WHO TEQ 2005 pg/g Fat									
Dioxin	7.26	22.74	4.67	9.45	2.57	6.20	5.78	4.43	7.49
non ortho-PCB	4.03	8.12	5.32	3.57	3.21	3.69	2.63	3.93	5.22
ortho-PCB	0.45	0.30	0.10	0.25	0.07	0.27	0.10	0.08	0.57
Sum of WHO TEQs (upper)	**11.74**	**31.16**	**10.09**	**13.27**	**5.85**	**10.16**	**8.51**	**8.44**	**13.28**
SUM of ICES 6 µg/kg whole (upper)	**0.66**	**0.31**	**0.06**	**0.41**	**0.08**	**0.11**	**0.07**	**0.06**	**0.61**
SUM of ICES 6 µg/kg fat (upper)	**60.92**	**47.04**	**11.99**	**23.51**	**6.29**	**34.59**	**11.60**	**10.22**	**70.16**

FERA LIMS Sample No.	S16-001703	S16-001547	S16-001546	S16-002261	S16-001702	S16-001545	S16-001543	S16-001700	S16-014232
Sample Details:	Common mussels	Razors	Pacific Oysters	Razors	Razors	Common cockles	Common cockles	Razors	Common Cockles
Production area	Loch Seaforth	Caolas Eiriosgaigh Razors	Garbh Lingeigh	Oitir Mhor Razors	South Ford Faoileann	Traigh Mhor	North Ford	Fleet Bay Razors	Loch Ryan Cockles
Site name	East Coast Mussels	Eiriosgaigh Razors	Garbh Lingeigh	Rubha nan Eun	Faoileann	Traigh Mhor	Oitir Mhor	Fleet Bay Razors	Loch Ryan Cockles
Fat content (% whole)	1.41	0.98	1.29	1.09	0.98	0.30	0.33	0.62	0.32
WHO TEQ 2005 pg/g whole									
Dioxin	0.10	0.05	0.14	0.07	0.05	0.03	0.03	0.16	0.04
non ortho-PCB	0.05	0.02	0.05	0.02	0.02	0.01	0.01	0.08	0.02
ortho-PCB	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Sum of WHO TEQs (upper)	**0.16**	**0.08**	**0.20**	**0.10**	**0.08**	**0.05**	**0.05**	**0.25**	**0.07**
WHO TEQ 2005 pg/g Fat									
Dioxin	7.31	3.69	10.92	4.94	4.20	3.91	4.75	26.00	9.35
non ortho-PCB	3.31	2.51	4.12	2.16	2.57	2.26	2.22	13.64	4.80
ortho-PCB	0.12	0.09	0.13	0.11	0.08	0.05	0.07	0.80	0.42
Sum of WHO TEQs (upper)	**10.74**	**6.29**	**15.17**	**7.21**	**6.85**	**6.22**	**7.04**	**40.44**	**14.57**
SUM of ICES 6 µg/kg whole (upper)	**0.31**	**0.11**	**0.31**	**0.16**	**0.12**	**0.06**	**0.06**	**0.61**	**0.18**
SUM of ICES 6 µg/kg fat (upper)	**20.68**	**10.04**	**23.32**	**14.05**	**10.42**	**8.30**	**8.71**	**98.68**	**54.33**

FERA LIMS Sample No.	S16-013402	S16-001701	S16-013403	S16-000319	S16-000505	S16-000508	S16-000503	S16-000501	S16-000502	S16-000507
Sample Details:	Razors	Razors	Razors	Razors	Common mussels	Common Mussels	Common mussels	Razors	Razors	Carpet Clams
Production area	Luce Bay Drummore	Wigtown Bay: Islands of Fleet	Luce Bay Razors	Forth Estuary: Largo Bay	Lee Of Vollister	Catfirth	Olna Firth Outer	Croy Bay	North Bay	Camas Garbh Clams
Site name	Drummore Razors	Wigtown Bay	Luce Sand Razors	Largo Bay	Whale Firth	Catfirth	Foula Wick	Culzean Bay	Barassie	Sound of Sleat Clams
Fat content (% whole)	0.95	4.69	0.92	2.05	0.84	0.48	1.65	1.78	1.58	1.31
WHO TEQ 2005 pg/g whole										
Dioxin	0.08	0.14	0.06	0.13	0.07	0.05	0.10	0.09	0.07	0.03
non ortho-PCB	0.03	0.07	0.03	0.18	0.04	0.02	0.05	0.05	0.04	0.01
ortho-PCB	0.01	0.01	0.01	0.02	0.01	<0.01	<0.01	0.01	0.01	<0.01
Sum of WHO TEQs (upper)	**0.12**	**0.22**	**0.10**	**0.33**	**0.12**	**0.08**	**0.16**	**0.15**	**0.12**	**0.05**
WHO TEQ 2005 pg/g Fat										
Dioxin	7.28	12.55	6.36	8.67	4.62	7.10	6.04	4.46	4.19	1.33
non ortho-PCB	3.62	6.23	3.31	8.67	4.62	4.41	3.15	2.75	2.78	0.53
ortho-PCB	0.41	0.39	0.37	0.70	0.51	0.21	0.16	0.30	0.28	0.03
Sum of WHO TEQs (upper)	**11.31**	**19.17**	**10.04**	**18.04**	**9.75**	**11.72**	**9.35**	**7.51**	**7.25**	**1.89**
SUM of ICES 6 µg/kg whole (upper)	**0.50**	**0.58**	**0.43**	**2.16**	**0.45**	**0.18**	**0.40**	**0.67**	**0.54**	**0.09**
SUM of ICES 6 µg/kg fat (upper)	**51.44**	**49.55**	**46.54**	**105.62**	**53.29**	**35.40**	**24.06**	**37.45**	**34.01**	**6.24**

Table 2.5: PAH concentrations (µg/kg whole weight)

FERA LIMS No.	S16-001648	S16-002246	S16-000843	S16-001544	S16-001647
Description	Razors	Pacific Oysters	Common Cockles	Pacific oysters	Common Cockles
Production area	Carradale Bay	Gallochoille Old Pier	Ganavan Cockles	Islay	Loch Creran Cockles
Site name	Carradale Bay Razors	Gallochoille Old Pier	Ganavan	Loch Gruinart Craigens	Loch Creran Cockles
µg/kg whole weight					
acenaphthylene	0.07	<0.14	<0.11	<0.17	<0.05
acenaphthene	<0.31	<0.34	<0.34	<0.36	<0.31
fluorene	0.56	<0.43	<0.45	<0.48	<0.34
phenanthrene	2.62	1.16	<0.83	1.31	<0.51
anthracene	0.31	0.08	<0.06	<0.06	<0.04
fluoranthene	7.46	3.36	0.73	3.83	0.88
benzo[c]fluorene	0.38	0.22	0.04	0.21	0.05
pyrene	6.34i	2.39i	0.51i	2.65i	0.63i
benzo[ghi]fluoranthene	1.86	0.97	0.24	1.15	0.31
benz (a) anthracene	**3.14**	**0.90**	**0.28**	**0.81**	**0.37**
benzo[b]naphtho[2,1-d]thiophene	0.20	0.08	0.04	0.10	0.04
cyclopenta[c,d]pyrene	0.13	0.08	0.01	0.07	0.08
chrysene	**3.24**	**1.36**	**0.44**	**1.59**	**0.65**
5-methylchrysene	<0.02	<0.01	<0.01	<0.02	<0.01
benzo[b]fluoranthene	**4.28**	**2.24**	**0.57**	**2.52**	**0.72**
benzo[j]fluoranthene	2.02	0.67	0.30	0.68	0.41
benzo[k]fluoranthene	2.19	0.96	0.35	1.04	0.44
benzo[e]pyrene	4.73	1.72	0.63	2.05	0.78
benzo[a]pyrene	**2.49**	**0.42**	**0.25**	**0.43**	**0.34**
indeno[1,2,3-cd]pyrene	1.42	0.44	0.38	0.44	0.47
dibenz[ah]anthracene	0.26	<0.12	<0.08	<0.13	<0.1
benzo-[g,h,i]perylene	1.69	0.50	0.40	0.52	0.47
anthanthrene	0.10	<0.1	<0.1	<0.1	<0.1
dibenzo[a,l]pyrene	<0.1	<0.1	<0.1	<0.1	<0.1
dibenzo[a,e]pyrene	0.19i	<0.13	<0.12	<0.1	<0.11
dibenzo[a,i]pyrene	<0.1	<0.1	<0.1	<0.1	<0.1
dibenzo[a,h]pyrene	<0.1	<0.1	<0.1	<0.1	<0.1
coronene	0.38	0.10	0.16	0.11	0.19
PAH 4 Sum Lower µg/kg	**13.15**	**4.92**	**1.54**	**5.35**	**2.08**
PAH 4 Sum Upper µg/kg	**13.15**	**4.92**	**1.54**	**5.35**	**2.08**

FERA LIMS No.	S16-000509	S16-000318	S16-000964	S16-014118	S16-001703
Description	Common Cockles	Common Cockles	Cockles	Razors	Common mussels
Production area	Loch Fyne: Otter Point	Loch Spelve Cockles	North Connel Cockles	West Jura	Loch Seaforth
Site name	Otter Point	North West Spelvie	Ledaig Point Cockles	Jura	East Coast Mussels
µg/kg whole weight					
acenaphthylene	<0.07	<0.11	<0.17	<0.23	<0.05
acenaphthene	<0.28	<0.26	<0.36	<0.3	<0.31
fluorene	<0.41	<0.32	<0.48	<0.54	0.46
phenanthrene	<1.44	<0.52	<0.89	1.28	1.46
anthracene	<0.04	<0.03	<0.06	0.08	0.06
fluoranthene	1.44	0.74	1.06	4.17i	1.85
benzo[c]fluorene	0.09	0.04	0.06	0.43	0.09
pyrene	1.41	0.47i	0.86	3.18i	1.34
benzo[ghi]fluoranthene	0.54	0.26	0.34	1.29	0.63
benz (a) anthracene	**0.75**	**0.29**	**0.44**	**1.86**	**0.44**
benzo[b]naphtho[2,1-d]thiophene	0.07	0.03	0.06	0.15	0.05
cyclopenta[c,d]pyrene	0.02	0.02	0.03	0.08	0.09
chrysene	**1.15**	**0.50**	**0.81**	**2.29**	**0.79**
5-methylchrysene	<0.02	<0.01	<0.01	<0.03	<0.01
benzo[b]fluoranthene	**1.17**	**0.75**	**0.83**	**2.02**	**1.55**
benzo[j]fluoranthene	0.70	0.44	0.45	0.91	0.58
benzo[k]fluoranthene	0.71	0.42	0.46	1.15	0.54
benzo[e]pyrene	1.26	0.70	0.77	2.59	1.66
benzo[a]pyrene	**0.67**	**0.34**	**0.36**	**1.00**	**0.23**
indeno[1,2,3-cd]pyrene	0.72	0.51	0.54	0.77	0.49
dibenz[ah]anthracene	0.14	0.09	0.10	0.12	<0.09
benzo-[g,h,i]perylene	0.72	0.51	0.55	0.86	0.85
anthanthrene	<0.1	<0.1	<0.1	<0.1	<0.1
dibenzo[a,l]pyrene	<0.1	<0.1	<0.1	0.13	<0.1
dibenzo[a,e]pyrene	0.12i	<0.1	<0.1	0.15i	<0.11
dibenzo[a,i]pyrene	<0.1	<0.1	<0.1	<0.1	<0.1
dibenzo[a,h]pyrene	<0.1	<0.1	<0.1	<0.1	<0.1
coronene	0.23	0.22	0.21	0.30	0.27
PAH 4 Sum Lower µg/kg	**3.74**	**1.88**	**2.44**	**7.17**	**3.01**
PAH 4 Sum Upper µg/kg	**3.74**	**1.88**	**2.44**	**7.17**	**3.01**

FERA LIMS No.	S16-001547	S16-001546	S16-002261	S16-001702	S16-001545
Description	Razors	Pacific Oysters	Razors	Razors	Common cockles
Production area	Caolas Eiriosgaigh Razors	Garbh Lingeigh	Oitir Mhor Razors	South Ford Faoileann	Traigh Mhor
Site name	Eiriosgaigh Razors	Garbh Lingeigh	Rubha nan Eun	Faoileann	Traigh Mhor
µg/kg whole weight					
acenaphthylene	<0.17	<0.17	<0.14	<0.11	<0.17
acenaphthene	<0.36	<0.36	<0.34	<0.34	<0.36
fluorene	<0.48	0.50	<0.44	0.46	<0.48
phenanthrene	<0.9	1.78	0.87	1.34	<0.89
anthracene	<0.06	0.08	<0.07	0.06	<0.06
fluoranthene	1.06	4.19	2.04	1.41	0.54
benzo[c]fluorene	0.08	0.20	0.13	0.12	0.03
pyrene	0.76i	2.10i	0.95	0.95	0.37i
benzo[ghi]fluoranthene	0.17	1.26	0.17i	0.22	0.18
benz (a) anthracene	**0.44**	**0.91**	**0.48**	**0.53**	**0.16**
benzo[b]naphtho[2,1-d]thiophene	0.05	0.11	0.05	0.06	0.02
cyclopenta[c,d]pyrene	<0.01	0.15	0.05	<0.01	<0.02
chrysene	**0.89**	**1.87**	**0.89**	**1.10**	**0.33**
5-methylchrysene	<0.01	0.01	<0.01	<0.01	<0.01
benzo[b]fluoranthene	**0.86**	**3.70**	**1.18**	**1.00**	**0.33**
benzo[j]fluoranthene	0.37	1.08	0.50	0.43	0.22
benzo[k]fluoranthene	0.45	1.43	0.50	0.54	0.20
benzo[e]pyrene	0.45	2.91	0.85	0.52	0.36
benzo[a]pyrene	**0.24**	**0.47**	**0.29**	**0.28**	**0.13**
indeno[1,2,3-cd]pyrene	0.32	0.86	0.43	0.35	0.25
dibenz[ah]anthracene	<0.07	0.18	<0.08	<0.07	<0.05
benzo-[g,h,i]perylene	0.29	1.01	0.39	0.32	0.23
anthanthrene	<0.1	<0.1	<0.1	<0.1	<0.1
dibenzo[a,l]pyrene	<0.1	<0.1	<0.1	<0.1	<0.1
dibenzo[a,e]pyrene	<0.1	0.11i	<0.13	<0.12	<0.1
dibenzo[a,i]pyrene	<0.1	<0.1	<0.1	<0.1	<0.1
dibenzo[a,h]pyrene	<0.1	<0.1	<0.1	<0.1	<0.1
coronene	0.12	0.27	0.14	0.13	<0.1
PAH 4 Sum Lower µg/kg	**2.43**	**6.95**	**2.84**	**2.91**	**0.95**
PAH 4 Sum Upper µg/kg	**2.43**	**6.95**	**2.84**	**2.91**	**0.95**

FERA LIMS No.	S16-001543	S16-001700	S16-014232	S16-013402	S16-001701
Description	Common cockles	Razors	Common Cockles	Razors	Razors
Production area	North Ford	Fleet Bay Razors	Loch Ryan Cockles	Luce Bay Drummore	Wigtown Bay: Islands of Fleet
Site name	Oitir Mhor	Fleet Bay Razors	Loch Ryan Cockles	Drummore Razors	Wigtown Bay
µg/kg whole weight					
acenaphthylene	<0.17	0.20	<0.23	<0.23	<0.23
acenaphthene	<0.36	<0.31	<0.3	<0.3	<0.29
fluorene	<0.48	0.72	<0.54	<0.54	0.66
phenanthrene	<0.91	3.69	0.68	1.18	3.44
anthracene	<0.06	0.45	<0.05	0.08	0.29
fluoranthene	0.87	9.47i	0.51	3.58	9.68i
benzo[c]fluorene	0.05	0.50	0.04	0.24	0.70
pyrene	0.54i	7.41i	0.59i	2.56i	6.01i
benzo[ghi]fluoranthene	0.20	2.09	0.16	1.18	1.85
benz (a) anthracene	**0.25**	**3.83**	**0.22**	**1.72**	**3.32**
benzo[b]naphtho[2,1-d]thiophene	0.03	0.28	0.03	0.14	0.25
cyclopenta[c,d]pyrene	0.01	0.08	<0.01	0.03	0.07
chrysene	**0.51**	**3.68**	**0.34**	**2.30**	**3.01**
5-methylchrysene	<0.02	0.03	<0.01	<0.02	<0.04
benzo[b]fluoranthene	**0.51**	**4.93**	**0.47**	**2.02i**	**4.45**
benzo[j]fluoranthene	0.26	2.35	0.24	0.95	2.04
benzo[k]fluoranthene	0.27	2.51	0.26	1.11	2.32
benzo[e]pyrene	0.41	5.64	0.46	2.47	4.70
benzo[a]pyrene	**0.25**	**3.06**	**0.22**	**0.86**	**2.39**
indeno[1,2,3-cd]pyrene	0.42	1.82	0.37	0.72	1.42
dibenz[ah]anthracene	<0.08	0.36	<0.07	0.12	0.27
benzo-[g,h,i]perylene	0.37	1.99	0.36	0.78	1.56
anthanthrene	<0.1	0.20	<0.1	<0.1	<0.1
dibenzo[a,l]pyrene	<0.1	0.12i	<0.1	0.12	0.23
dibenzo[a,e]pyrene	<0.1	0.35i	<0.1	0.12i	0.27i
dibenzo[a,i]pyrene	<0.1	0.10i	<0.1	<0.1	<0.1
dibenzo[a,h]pyrene	<0.1	<0.1	<0.1	<0.1	<0.1
coronene	0.15	0.49	0.16	0.25	0.43
PAH 4 Sum Lower µg/kg	**1.52**	**15.50**	**1.25**	**6.90**	**13.17**
PAH 4 Sum Upper µg/kg	**1.52**	**15.50**	**1.25**	**6.90**	**13.17**

FERA LIMS No.	S16-013403	S16-000319	S16-000505	S16-000508	S16-000503
Description	Razors	Razors	Common mussels	Common Mussels	Common mussels
Production area	Luce Bay Razors	Forth Estuary: Largo Bay	Lee Of Vollister	Catfirth	Olna Firth Outer
Site name	Luce Sand Razors	Largo Bay	Whale Firth	Catfirth	Foula Wick
µg/kg whole weight					
acenaphthylene	<0.23	<0.11	0.13	<0.07	0.14
acenaphthene	<0.3	<0.26	<0.28	<0.28	<0.28
fluorene	<0.54	0.64	<0.41	<0.4	<0.41
phenanthrene	1.37	2.60	<1.45	<1.43	1.47
anthracene	0.11	0.12	0.04	<0.04	0.13
fluoranthene	3.60	4.70	0.99	0.96	1.91
benzo[c]fluorene	0.26	0.25	0.08	0.07	0.16
pyrene	2.71i	3.44i	0.96	0.93	2.02
benzo[ghi]fluoranthene	1.17	0.94	0.50	0.32	0.89
benz (a) anthracene	**1.64**	**1.54**	**0.42**	**0.41**	**0.68**
benzo[b]naphtho[2,1-d]thiophene	0.14	0.11	0.02	0.04	0.04
cyclopenta[c,d]pyrene	0.04	0.03	0.06	0.04	0.09
chrysene	**2.19**	**1.62**	**0.73**	**0.67**	**1.07**
5-methylchrysene	<0.03	<0.04	<0.01	<0.02	<0.01
benzo[b]fluoranthene	**2.06**	**1.99**	**1.06**	**0.72**	**1.56**
benzo[j]fluoranthene	0.97	0.94	0.48	0.35	0.71
benzo[k]fluoranthene	1.10	0.99	0.41	0.30	0.61
benzo[e]pyrene	2.47	2.09	0.94	0.48	1.78
benzo[a]pyrene	**0.90**	**0.98**	**0.27**	**0.20**	**0.35**
indeno[1,2,3-cd]pyrene	0.78	0.74	0.41	0.26	0.54
dibenz[ah]anthracene	0.12	0.13	<0.07	<0.05	<0.08
benzo-[g,h,i]perylene	0.87	0.84	0.59	0.30	0.89
anthanthrene	<0.1	<0.1	<0.1	<0.1	<0.1
dibenzo[a,l]pyrene	0.13	<0.1	<0.1	<0.1	<0.1
dibenzo[a,e]pyrene	0.13i	0.14i	<0.11	<0.1	<0.1
dibenzo[a,i]pyrene	<0.1	<0.1	<0.1	<0.1	<0.1
dibenzo[a,h]pyrene	<0.1	<0.1	<0.1	<0.1	<0.1
coronene	0.27	0.20	0.22	<0.1	0.27
PAH 4 Sum Lower µg/kg	**6.79**	**6.13**	**2.48**	**2.00**	**3.66**
PAH 4 Sum Upper µg/kg	**6.79**	**6.13**	**2.48**	**2.00**	**3.66**

FERA LIMS No.	S16-000501	S16-000502	S16-000301	S16-000302	S16-000507
Description	Razors	Razors	Common mussels	Common mussels	Carpet Clams
Production area	Croy Bay	North Bay	Loch Leven: Upper	Loch Leven: Lower	Camas Garbh Clams
Site name	Culzean Bay	Barassie	Upper	Lower	Sound of Sleat Clams
µg/kg whole weight					
acenaphthylene	0.11	0.38	<0.11	0.18	0.12i
acenaphthene	<0.26	0.34	<0.26	<0.26	<0.26
fluorene	0.76	1.21	<0.32	0.63	0.60
phenanthrene	2.77	3.78	1.06	1.81	1.75
anthracene	0.32	0.67	0.14	0.18	0.10
fluoranthene	5.86	9.36i	2.15	3.01	1.31
benzo[c]fluorene	0.35	0.75	0.22	0.23	0.06
pyrene	4.69i	9.23i	2.74i	2.77i	0.72
benzo[ghi]fluoranthene	1.26	2.26	0.97	1.06	0.24
benz (a) anthracene	**1.99**	**4.09**	**1.44**	**1.29**	**0.15**
benzo[b]naphtho[2,1-d]thiophene	0.15	0.25	0.15	0.12	0.01
cyclopenta[c,d]pyrene	0.03	0.06	0.10	0.09	0.01
chrysene	**2.08**	**3.42**	**2.33**	**2.06**	**0.20**
5-methylchrysene	<0.01	<0.04	<0.04	<0.03	<0.01
benzo[b]fluoranthene	**2.75**	**4.43**	**12.14**	**6.60**	**0.27**
benzo[j]fluoranthene	1.31	2.11	3.29	2.12	0.10
benzo[k]fluoranthene	1.39	2.24	4.68	2.44	0.09
benzo[e]pyrene	2.60	4.89	7.88	5.59	0.38
benzo[a]pyrene	**1.43**	**2.47**	**2.76**	**1.48**	**0.09**
indeno[1,2,3-cd]pyrene	1.00	1.38	3.15	1.80	<0.09
dibenz[ah]anthracene	0.20	0.29	0.71	0.35	<0.05
benzo-[g,h,i]perylene	1.15	1.89	5.40	3.25	0.22
anthanthrene	<0.1	<0.1	<0.1	<0.1	<0.1
dibenzo[a,l]pyrene	<0.1	<0.1	<0.1	<0.1	<0.1
dibenzo[a,e]pyrene	0.18i	0.25i	0.57i	0.31i	<0.1
dibenzo[a,i]pyrene	<0.1	<0.1	<0.1	<0.1	<0.1
dibenzo[a,h]pyrene	<0.1	<0.1	<0.1	<0.1	<0.1
coronene	0.25	0.53	1.02	0.53	<0.1
PAH 4 Sum Lower µg/kg	**8.25**	**14.41**	**18.67**	**11.43**	**0.71**
PAH 4 Sum Upper µg/kg	**8.25**	**14.41**	**18.67**	**11.43**	**0.71**

Table 2.6: Heavy metal concentrations (mg/kg whole weight)

Fera LIMS Sample No.	S16-000964	S16-000318	S16-000509	S16-000843	S16-001647	S16-001544	S16-002246	S16-001648	S16-014118
Sample type	Cockles	Common Cockles	Common Cockles	Common Cockles	Common Cockles	Pacific oysters	Pacific Oysters	Razors	Razors
Production area	North Connel Cockles	Loch Spelve Cockles	Loch Fyne: Otter Point	Ganavan Cockles	Loch Creran Cockles	Islay	Gallochoille Old Pier	Carradale Bay	West Jura
Site name	Ledaig Point Cockles	North West Spelvie	Otter Point	Ganavan	Loch Creran Cockles	Loch Gruinart Craigens	Gallochoille Old Pier	Carradale Bay Razors	Jura
Cr	0.14	0.13	0.12	0.25	0.17	0.15	~0.08	0.27	0.38
Mn	1.62	1.75	3.31	2.49	1.46	6.34	1.68	2.59	2.51
Co	0.124	0.157	0.191	0.204	0.143	0.036	0.030	0.084	0.083
Ni	2.65	2.29	2.24	3.22	2.45	~0.08	~0.08	~0.09	0.13
Cu	0.30	0.28	0.35	0.31	0.34	5.39	18.1	1.14	1.04
Zn	6.28	6.34	6.81	6.07	6.65	128	214	19.1	16.6
As	1.097	1.129	1.326	1.297	1.022	2.180	2.408	2.356	2.021
Se	0.177	0.212	0.259	0.204	0.196	0.245	0.223	0.301	0.300
Ag	0.019	~0.004	~0.010	~0.007	~0.004	0.299	0.767	0.292	0.222
Cd	0.026	0.033	0.043	0.037	0.034	0.121	0.191	0.044	0.022
Hg	0.010	0.007	0.007	0.009	0.011	0.016	0.022	0.015	0.017
Pb	0.053	0.049	0.047	0.084	0.067	0.068	0.131	0.065	0.084

' ~ ' indicates the measured value was above LoD but below LoQ

Fera LIMS Sample No.	S16-001703	S16-001543	S16-001545	S16-001546	S16-001547	S16-001702	S16-002261	S16-014232	S16-001700	S16-001701
Sample type	Common mussels	Common cockles	Common cockles	Pacific Oysters	Razors	Razors	Razors	Common Cockles	Razors	Razors
Production area	Loch Seaforth	North Ford	Traigh Mhor	Garbh Lingeigh	Caolas Eiriosgaigh Razors	South Ford Faoileann	Oitir Mhor Razors	Loch Ryan Cockles	Fleet Bay Razors	Wigtown Bay: Islands of Fleet
Site name	East Coast Mussels	Oitir Mhor	Traigh Mhor	Garbh Lingeigh	Eiriosgaigh Razors	Faoileann	Rubha nan Eun	Loch Ryan Cockles	Fleet Bay Razors	Wigtown Bay
Cr	0.11	0.48	0.20	0.13	0.24	0.22	0.16	0.32	0.17	0.23
Mn	2.47	2.82	1.06	2.13	0.66	0.87	1.05	1.75	1.94	2.23
Co	0.034	0.137	0.070	0.039	0.088	0.090	0.032	0.166	0.076	0.092
Ni	~0.10	2.63	1.52	~0.10	~0.09	~0.10	~0.06	2.62	~0.09	~0.08
Cu	0.84	0.49	0.29	9.51	0.87	0.98	0.98	0.53	0.99	1.00
Zn	14.6	5.65	6.66	223	15.5	16.3	13.9	7.21	14.3	16.3
As	2.163	2.34	1.07	2.58	2.39	2.70	1.88	1.19	1.54	1.68
Se	0.431	0.206	0.166	0.295	0.356	0.340	0.268	0.263	0.268	0.330
Ag	~0.007	0.049	0.027	0.680	0.049	0.089	0.091	~0.004	0.252	0.337
Cd	0.115	0.034	0.063	0.309	0.156	0.146	0.048	0.039	0.036	0.032
Hg	0.011	0.012	~0.006	0.026	0.038	0.043	0.020	0.010	0.024	0.031
Pb	0.086	0.077	0.040	0.143	0.030	0.035	0.054	0.067	0.125	0.121

' ~ ' indicates the measured value was above LoD but below LoQ

Fera LIMS Sample No.	S16-013402	S16-013403	S16-000319	S16-000507	S16-000503	S16-000505	S16-000508	S16-000502	S16-000501
Sample type	Razors	Razors	Razors	Carpet Clams	Common mussels	Common mussels	Common Mussels	Razors	Razors
Production area	Luce Bay Drummore	Luce Bay Razors	Forth Estuary: Largo Bay	Camas Garbh Clams	Olna Firth Outer	Lee Of Vollister	Catfirth	North Bay	Croy Bay
Site name	Drummore Razors	Luce Sand Razors	Largo Bay	Sound of Sleat Clams	Foula Wick	Whale Firth	Catfirth	Barassie	Culzean Bay
Cr	0.45	0.36	0.24	0.21	0.12	0.10	~0.09	0.74	0.83
Mn	2.58	3.02	1.59	3.88	0.91	0.69	1.40	1.49	1.72
Co	0.098	0.100	0.087	0.409	0.029	0.019	0.020	0.064	0.063
Ni	0.26	0.30	~0.09	1.70	0.11	~0.10	~0.08	0.11	0.10
Cu	1.18	1.37	1.30	1.74	0.99	0.74	0.56	1.30	1.78
Zn	17.7	17.9	15.5	8.77	21.4	12.6	20.2	15.3	18.4
As	1.96	1.83	1.39	6.36	1.92	1.38	1.23	1.79	2.11
Se	0.306	0.297	0.440	0.880	0.341	0.276	0.206	0.309	0.324
Ag	0.181	0.175	0.447	1.874	~0.004	~0.005	~0.003	0.194	0.337
Cd	0.025	0.021	0.027	0.740	0.128	0.061	0.086	0.030	0.035
Hg	0.016	0.015	0.029	0.028	0.008	~0.006	~0.006	0.014	0.016
Pb	0.093	0.091	0.148	0.123	0.145	0.113	0.121	0.071	0.087

' ~ ' indicates the measured value was above LoD but below LoQ

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