Guidance on Public Health response: Involvement of PHE Food Water and Environmental Microbiology laboratory staff in the investigation of outbreaks of food or waterborne disease

National Infection Service
Food Water and Environmental Microbiology
Standard Method

FNES18 (Q4)
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Methods Working Group

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Status of National Infection Service, Food, Water and Environmental Microbiology Methods

These methods are well referenced and represent a good minimum standard for food, water and environmental microbiology. However, in using Standard Methods, laboratories should take account of local requirements and it may be necessary to undertake additional investigations.

The performance of a standard method depends on the quality of reagents, equipment, commercial and in-house test procedures. Laboratories should ensure that these have been validated and shown to be fit for purpose. Internal and external quality assurance procedures should also be in place.

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<th>FNES18 (Q4)</th>
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<td>Updated document footer and format of amendments history to reflect changed national document template FNEW10. Microbiology Services replace with National Infection Service.</td>
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<td>Bullet point added describing the role of prompt forwarding of isolates/samples for further testing, revised wording in lessons learned bullet point and addition of expert witness activities.</td>
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<td>4.0 Communication and liaison with other agencies and staff</td>
<td>Paragraph added to include OCT’s and other information routes of communication. Bullet point added to include food not yet on the market. External reporting section updated to update link and include reference to RASFF.</td>
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<td>6.0 Forwarding of Samples and cultures</td>
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<td>8.0 Additional Sources of information</td>
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<tr>
<td>19</td>
<td>Appendix 4</td>
<td>Updated</td>
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<tr>
<td>20</td>
<td>Appendix 5</td>
<td>Updated</td>
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</tbody>
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1.0 Introduction and purpose

Assistance in investigating incidents of infection for public health purposes, including outbreaks, is a core Public Health England function. The purpose of this document is to provide PHE FW&E Microbiology Service staff with guidance on best practice for public health responses during the investigation of incidents or outbreaks of food, environment and water-borne disease.

The actions to be taken will include one or more of the following:

- ensuring that all relevant information is properly collected and assessed
- providing assistance in the proper and appropriate collection and transport of samples including those which comply with requirements for the handling of Formal Samples. This will also include forwarding samples to other laboratories performing other specialist and reference tests
- providing assistance with visits to premises to co-ordinate sampling of the product at appropriate stages of production and the food production environment, provide environmental or water sampling or assisting where specialist sampling equipment or expertise is required
- ensuring prompt processing of all samples and confirmation of the identity of any relevant organism isolated
- ensure prompt forwarding of samples/isolates for additional testing
- ensuring prompt communication of results of testing to those who need to know
- providing expert and authoritative best practice advice and interpretation of test results best practice and control options
- provide an expert member of staff (normally a Food Examiner) to assist outbreak control teams where appropriate
- to assist regulatory and enforcement authorities (Local Authorities, Port Health Authorities, Food Standards Agency (FSA), Drinking Water Inspectorate (DWI), Health & Safety Executive (HSE)) prepare reports, certificates and witness statements as necessary
- provide information for food safety lessons learnt for example for outbreak control team reports, peer reviewed publications and for contamination incidents even when there are no cases of infection detected
- act as an expert witness in a court of law
2.0 Detection of incidents

Public health incidents may be recognised in a variety of ways, including:

- analysis of data within a PHE Food Water and Environmental Microbiology Laboratory such as unacceptable or trends in borderline results (e.g., low level *Listeria monocytogenes*, *Staphylococcus aureus* or *Clostridium perfringens* contamination in a ready-to-eat food from the same manufacturing environment, or persistent phosphatase failures from a single dairy)
- notification of reports from a Public Health England laboratory from testing of clinical specimens or food, water and/or environmental samples
- notification of reports from a non-Public Health England laboratory from testing of clinical specimens or food, water and/or environmental samples
- intelligence from a Local Authority (usually via Environmental Health Officers) following contact from people who are ill or from the proprietor of a premise who has received a customer complaint or as part of an inspection
- intelligence from a General Practitioner following an increase in patients visiting the surgery
- Intelligence from colleagues within Health Protection Teams (e.g., Consultants in Communicable Disease Control (CCDC)/Consultant in Health Protection (CHP)/Health Protection Nurse) as a result of local contact or notification, for example from an acute trust or infectious disease ward
- intelligence from a Regional Epidemiologist/Microbiologist as a result of notifications
- intelligence from a Reference Laboratory during epidemiological typing or referral of isolates
- by analysis of local or national surveillance or monitoring data within PHE including recognition of an exceedance in, an unusual cluster or unusual case
- intelligence from international reporting of incidents including from devolved administrations within the UK
- intelligence from another publically funded organisation such as the FSA, Department for the Environment and Rural Affairs (Defra), Environment Agency (EA), Drinking Water Inspectorate (DWI), Department of Health (DH), European Centre for Disease Prevention and Control (ECDC), European Food Safety Authority (EFSA), European Union (EU) etc.

All incidents where there is a possibility of transmission by food, water or environmental sources must be followed up, even if this is only to investigate if any samples submitted have been associated with the incident and ensure that appropriate communication has taken place with other parts of PHE.
Information note: Appendix 1 gives details of the incubation periods, symptoms and duration of common food or waterborne disease to assist staff if the aetiology of illness is unknown.

3.0 Assessment of information

At the start of any public health investigation and/or where there is evidence for the presence of pathogens, the following may be helpful as a list of options to be considered. This is not an exhaustive list and other questions or actions may be relevant depending on the individual circumstances under review:

- if sampling is considered, provide appropriate information and support for the timely collection and transport of samples
- ensure that, if sampling has taken place, that the sampling procedures used were appropriate, that the sample details are correct and that all relevant information is recorded and collated as far as possible
- review laboratory procedures, including the Public Health England Standard Methods, and risk assessments to ensure that appropriately trained and competent staff are available to perform testing using appropriate properly maintained equipment including those for suspect containment level 3 organisms and the receipt of formal samples
- review laboratory procedures to ensure relevant SOPs are fit for purpose and adhered to
- ensure that due consideration of the prevention of cross-contamination in the laboratory are made, including ensuring separation maintained from other tests which may have included the pathogen eg raw foods/waters and internal Quality Control and external Quality Assurance tests
- ensure that all appropriate tests have been carried out and the isolate and samples have been retained for future reference and testing
- ensure that samples are referred for secondary and specialised tests in a timely manner where appropriate
- ensure that isolates have been sent without delay to the appropriate reference laboratory for further identification and typing as defined in the standard method and in Appendix 2 and 3
- review the full microbiological profile of the sample in the light of the history and characteristics of the product to determine the microbiological plausibility of the results eg presence of indicator organisms
- if necessary and appropriate (this should be discussed with the senior colleagues and submitting authority as there may be legal implications), re-sample the product. This is often part of the fuller investigative process
and must not hold up any of the actions needed for the initial confirmation of pathogen detection

- ensure that the laboratory has sufficient resources available, human and technical, including laboratory consumables, to ensure that it can deal with any further sampling or examination that might be required for later investigation of the incident
- consider the need for mutual help from other PHE FW&E Microbiology Laboratories

A testing algorithm is shown in Appendix 4 that will assist in test selection and advice. However, a Food Examiner or other senior member of staff must always be consulted during any public health response.

4.0 Communication and liaison with other agencies and staff

When outbreaks/incidents are identified or suspected, it is essential that each PHE FW&E Microbiology laboratory has clear procedures in place for receiving and passing on information. All staff must be made aware of these procedures. In all circumstances the need to protect public health shall be paramount. All actions should default to the safest option and advice should be sought at any stage in the process.

When cases of disease are detected this is usually through an Outbreak Control Team (OCT); however, other less formal routes are often used. Communication and liaison may take place through the following:

- HPT and PHE Centres – CCDCs/CHPs and Regional Epidemiologists (this is often initially via a clinical duty team)
- Local Authority – Environmental Health Officers (EHOs), Port Health Authorities and/or the Director of Public Health (DHP)
- Primary Care - General Practitioners (GPs)
- Local Acute Trusts - (Consultant Microbiologist)
- Infection Control Doctor or Nurse (nosocomial outbreaks)
- Regional Microbiologists and Consultant Medical Microbiologists
- Reference Laboratory Microbiologists
- PHE Epidemiologists
- HSE
- FSA
During outbreaks of zoonotic disease:

- Veterinary Investigation Centre - Local Veterinary Investigation Officer
- Animal and Plant Health Agency (APHA)
- Defra

During outbreaks of waterborne disease:

- Local Water Provider - Public Health Specialist
- DWI

Each laboratory must ensure it has an up to date list of addresses and contact numbers, including appropriate means of out of hours contact.

When a pathogen are present at potentially injurious levels in a ready-to-eat food or hygiene problem (eg persistent indicator organisms suggesting poor cleaning or phosphatase failures in dairy products) has been detected and there are clear public health implications both the relevant HPT and Local Authority, as well as central PHE Health Protection Services (HPS) epidemiologists must be informed.

For ready-to-eat foods, the laboratory must also ensure that the FSA Incidents Branch has been informed and is aware of the incidence (0207 276 8448 or foodincidents@foodstandards.gsi.gov.uk): this is done by the Local Authority. Please ensure that the Lead FW&E Public Health Microbiologist and HPS epidemiologists are informed who also have a system to ensure that the FSA is aware of incidents at an early stage. Reports should be made as soon as a high level of presumption has been achieved: ie PCR or phenotype confirmed in the FW&E Laboratory.

Reports must always be provided to those responsible for or commissioning the collection of samples. PHE FW&E Microbiology Laboratories must keep the relevant HPT informed of any events with public health implications; however, in some circumstances it may be difficult to identify the appropriate HPT and judgment may be needed, for example when detecting results from:

- contamination of raw foods not associated with infection (including eggs) or where foods are not or no longer on retail sale
- contamination of foods where the home authority is outside the area where the food was sampled: the relevant HPT may not be readily identifiable to the local laboratory or sampling may be taking place as a response to events taking place elsewhere
- contamination of imported foods sampled by Port Health Authorities and not associated with infection
Guidance on Public Health response: involvement of PHE Food Water and Environmental Microbiology laboratory staff in the investigation of outbreaks of food or waterborne disease

- contamination of food and water inside hospitals where the infection control team is leading in the investigation
- contamination of foods with pathogens found as a result of testing of foods by laboratories outside of PHE, some of which have resulted in national recalls by the FSA
- a persistent hygiene problem such as the presence of indicator organisms or phosphatase failures
- contamination of batches of food or other products during production and prior to placing on the market (i.e., not yet entered the food chain)

During outbreaks and incidents, FW&E laboratories must confirm with HPTs who is the ‘lead’ for the incident (usually the chair of the OCT). This will usually include a lead for the communication strategy and co-ordination of actions within PHE and outside of PHE. This will allow more rapid interpretation such as interim reporting, consolidated data, and reporting of additional data.

Information within PHE will include HP Zone reporting, alerting via PHE’s Incident reporting and Information System (IRIS) if still used, or via the weekly national teleconference held every Tuesday at 9.15 am. This weekly national tele-conference is also supported by other agencies including the FSA, Defra, the Surgeon General (British Armed Forces) and the devolved administrations.

External reporting nationally of food poisoning outbreaks for EU consideration is via the PHE EFOSS (Electronic Food Outbreak Surveillance System) as required by ECDC through the EPIS (Epidemic Intelligence Information System) (https://ecdc.europa.eu/en/publications-data/epidemic-intelligence-information-system-epis) based on Decision 1082/2013/EU. HPTs should report information through to HPS Colindale and data generated by FW&E is likely to be included in the EPIS system for food and waterborne outbreaks.

Data is also reported to the Commission by the FSA through the Rapid Alert System for Food and Feed (RASFF) system (EC Regulation No 178/2002) and this includes incidents of contamination of food (including those associated with outbreaks) which cross EU borders and includes alerts, border checks and rejections, foods on the market as well as monitoring of the market. RASFF alerts may contain data generated by FW&E and hence the importance of reporting to the FSA.

Laboratory staff must not discuss results directly with anyone outside of the public health responses (PHE, Local Authority, etc.). If contacted by anyone outside of the laboratory not known to laboratory staff, staff must verify the identity of the
caller by noting their telephone number (authenticating it if necessary) and calling back. The Unit Head, Laboratory Manager or other senior staff should then be informed and should conduct all further communications. Details of all telephone calls should be logged and recorded.

Advice on communication required for different pathogens is given in Appendix 5.

5.0 Procedure for dealing with detection of pathogens

Detection of the presence of suspect or presumptive colonies should be reported to senior staff to alert them to the potential situation. Staff should be frequently reminded of incidents where pathogens were falsely thought to be present (for example in RTE foods). Local procedures must then be followed according to Standard Methods to enable confirmation of the target organisms. Confirmation must be carried out as a matter of urgency. Molecular testing of isolates (together with other methods for rapid confirmation) should be used if appropriate to assist in the confirmation of the pathogen, provided comprehensive validation of the procedure has been undertaken to show the assay’s suitability.

Where detection of a pathogen is solely through molecular methods using a DNA extract from an enrichment broth ie no organism has been isolated, then the molecular and culture-based testing must be repeated. If no isolate can be obtained, but the molecular approach identifies a pathogen, then an aliquot of DNA extract must be sent to the relevant reference laboratory for further confirmation. Notes on interpretation of detection of non-viable or non-cultivatable pathogens are given in the FW&E Molecular Standard Methods.

Where an isolate is available, senior staff must then inform the relevant reference laboratory and submit isolates for definitive typing as a matter of urgency.

Where confirmations give rise to atypical results but the presence of a pathogen cannot be excluded (eg unusual phenotypic or genotypic reactions) then the laboratory can report the detection of a pathogen as a presumptive positive result: however this should be done with care and in full consultation with the relevant parties. In case of doubt, staff should consider delaying reporting until confirmation has been obtained from the appropriate reference laboratory. To aid more rapid reporting, multiple picks of each isolate may be submitted to the reference laboratory. A Food Examiner or senior member of staff must ensure that the Director FW&E Microbiology Laboratories, the Reference Laboratory, and senior
HPS epidemiologists at Colindale are informed when there is a high level of suspicion (PCR positive, typical phenotype etc) for the presence of a potential pathogen.

### 6.0 Forwarding of samples or cultures

Samples for specialist or reference testing performed in other laboratories should be forwarded as soon as possible. The samples should be risk assessed to determine whether they are high risk or not with reference to PHE RA/00939 ‘Transport of FW&E Samples’. Low risk samples do not need to be transported according to the Carriage of Dangerous Goods Act (2004). However, it is good practice to package to the Packaging Instruction 650 standard (PI650).

The packaging should consist of an inner package (watertight receptacle, watertight secondary packaging, an absorbent material in sufficient quantity to absorb the entire contents placed between the receptacle and the secondary packaging) and a rigid outer package of adequate strength for capacity, mass and intended use. The package can be transported by overnight DX, Royal Mail or City Sprint (SameDay), and should be labelled ‘To be opened in Laboratory only’.

Samples may be sent by the FW&E Cool Box Courier System where appropriate. Samples for histamine testing should be sent frozen and a large polystyrene box is a suitable secondary container for this.

A list of specialist laboratories is shown in Appendix 2, although this is not exhaustive.

Subcultures of pathogens should be forwarded to the appropriate Reference Laboratory. A list of the Laboratories and submission criteria is shown in Appendix 3. For cultures associated with clinical cases, please include a prominent note on the request form in addition to any other identifiers such as an HP Zone reporting, or if used an IRIS ILog number. Do not include patients’ names on the request form.

All samples or isolates being referred to other laboratories must be appropriately packaged and will need to be sent as either Category A or Category B. Category A infectious substances are assigned to UN 2814 and must be packaged in accordance with UN Packaging Instructions PI620. Category A transfers should be individually requested through an approved courier. The service will be a next day tracked door-to-door delivery, which must be signed for at collection and receipt. Category B samples must be packed according to PI650 as described above.
7.0 Additional considerations

Staff are reminded that primary role of the FW&E Microbiology Laboratories is for public health and public health protection and that these considerations must be seen as over-riding all other considerations. For example, results from work undertaken as part of commercial contracts should be treated in exactly the same way as any other work with respect to informing others involved with risk assessment and public health interventions as well as for the submission of cultures etc.

Finally, FW&E microbiology work can be requested by the Police or the Ministry of Defence (MoD). These requests are typically linked to situations where there may be criminal involvement (such as where there is suspect deliberate contamination of a food, water or environmental source). These situations are likely to be associated with increased sensitivity with regards to disclosing information, particularly around details of work performed in other laboratories which may impinge on national security.

However, to ensure that the PHE is delivering public health outputs and is aware of apparently unrelated events which may be occurring in different laboratories, the Lead FW&E Public Health Microbiologist, and Deputy Director of the Specialist Microbiology must be informed: both individuals have security clearance and can be informed that events are occurring. The FW&E Microbiology Laboratories may have an important contribution demonstrating the presence of conventional bacterial pathogens. All samples must be treated as Formal samples since this may be part of a prosecution and witness statements may need to be produced. All samples should be photographed on arrival and these, together with all information (including photographs) must be securely stored whilst within the laboratory such that every effort is made to prevent unauthorized disclosure of information and tampering with samples.

A risk assessment must be carried out for each sample or batch of samples to provide assurance that all hazards are adequately controlled and laboratory staff are not being exposed to un-necessary risk. The contents of the risk assessment may contain sensitive information (for example, the categorization of sample material as low risk may necessitate sensitive information on what hazards have been excluded). However, an adequate risk assessment can be carried out by senior National Infection Service staff without the need for this to be fully disclosed to all FW&E staff. An adequate risk assessment will also need to be carried out if FW&E staff are required to forward samples to other laboratories.
8.0 Additional sources of information


Examining food, water and environmental samples from healthcare environments. PHE 2013.


9.0 Acknowledgements and contacts

This Standard Method has been developed, reviewed and revised by National Infection Service, Food, Water and Environmental Microbiology Methods Working Group.

The contributions of many individuals in Food, Water and Environmental laboratories, reference laboratories and specialist organisations who have provided information and comment during the development of this document are acknowledged.

For further information please contact us at:

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Food Water & Environmental Microbiology Laboratories
Central Office
Colindale, London
NW9 5EQ

E-mail: fwelabs@phe.gov.uk
### Appendix 1: Symptoms and duration of illness for bacterial pathogens detected by the PHE FW&E microbiology laboratories

<table>
<thead>
<tr>
<th>ORGANISM/TOXIN</th>
<th>INCUBATION PERIOD</th>
<th>SYMPTOMS</th>
<th>DURATION</th>
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<tbody>
<tr>
<td>Bacillus species</td>
<td>Emetic 1-5 h &amp; Diarrhoeal 8-16 h</td>
<td>V, D&amp;V, AP</td>
<td>1-1.5 days</td>
</tr>
<tr>
<td>Campylobacter species</td>
<td>1-11 d</td>
<td>D, AP, O</td>
<td>2 days to 1 week</td>
</tr>
<tr>
<td>Clostridium perfringens</td>
<td>8-22 h</td>
<td>D, AP</td>
<td>1 day</td>
</tr>
<tr>
<td>Listeria monocytogenes</td>
<td>GI 1-2 d, Systemic 2-90 d</td>
<td>Septicaemia, ,meningitis, O</td>
<td>Variable with risk of death or long term sequelae</td>
</tr>
<tr>
<td>Legionella species (water)</td>
<td>2-21 d</td>
<td>D&amp;V, O</td>
<td>Short (Pontiac) 1-2 days Long (Legionnaire’s Disease) 2-20 days with risk of death</td>
</tr>
<tr>
<td>Pseudomonas aeruginosa</td>
<td>Variable</td>
<td>Septicaemia (especially young, elderly and immune-compromised), ear, skin, eye infections, folliculitis</td>
<td>variable</td>
</tr>
<tr>
<td>Salmonella species (non typhoidal)</td>
<td>12 h – 3 d</td>
<td>D&amp;V, O</td>
<td>1-4 days</td>
</tr>
<tr>
<td>Salmonella (typhoidal)</td>
<td>5-56 d</td>
<td>Fever, AP, septicaemia, constipation to severe diarrhoea,</td>
<td>10-14 days with risk of death</td>
</tr>
<tr>
<td>Shigella species</td>
<td>1-7 d</td>
<td>AP, O</td>
<td>Up to 2 weeks</td>
</tr>
<tr>
<td>Staphylococcus aureus (and occasionally other coagulase positive staphylococci)</td>
<td>1-5 h</td>
<td>V, D&amp;V, AP</td>
<td>0.5 to 2 days</td>
</tr>
<tr>
<td>Vibrio species</td>
<td>1-4 days</td>
<td>AP, D</td>
<td>Up to 1 week</td>
</tr>
<tr>
<td>VTEC O157</td>
<td>2-14 d</td>
<td>V, D&amp;V, Bloody D, AP</td>
<td>Variable with risk of death or long term sequelae</td>
</tr>
<tr>
<td>Yersinia enterocolitica</td>
<td>3-7 days</td>
<td>AP, D</td>
<td>1-3 weeks</td>
</tr>
<tr>
<td>Histamine (Scrombrotoxin)</td>
<td>10 -30 mins</td>
<td>Allergic symptoms, nausea, D</td>
<td>4 – 24 hrs</td>
</tr>
</tbody>
</table>

D = diarrhoea; D&V = diarrhoea and vomiting; AP = abdominal pain, V = vomiting; O = other;
## Appendix 2: Specialist reference services for food, water and environmental samples

<table>
<thead>
<tr>
<th>Organism/Disease</th>
<th>Reference Facilities available from:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Clostridium botulinum</strong> <em>(Food, environmental), Staphylococcal toxins (food),</em></td>
<td>Gastrointestinal Bacteria Reference Unit, PHE Colindale, 61 Colindale Avenue, London</td>
</tr>
<tr>
<td></td>
<td>Tel: 020 8327 7116</td>
</tr>
<tr>
<td></td>
<td>Fax: 020 8905 9929</td>
</tr>
<tr>
<td><strong>Bacillus anthracis</strong> <em>(food, water and environment)</em></td>
<td>The Rare and Imported Pathogens Laboratory (RIPL) at Porton, Manor Farm Road, Wiltshire</td>
</tr>
<tr>
<td></td>
<td>Tel: +44 (0) 1980 612 100 (24 hour switchboard)</td>
</tr>
<tr>
<td></td>
<td>Fax: +44 (0) 1980 610 848</td>
</tr>
<tr>
<td></td>
<td>Email: <a href="mailto:ripl@phe.gov.uk">ripl@phe.gov.uk</a></td>
</tr>
<tr>
<td><strong>Blue green algae</strong> <em>(water)</em></td>
<td>Advice available from the Environmental Agency and Local Water Companies, Analysis also available from private companies e.g. Haycock Associates Deer Park Business Centre, Eckington; Persore Worcester, WR10 3DN. Tel: 01386 750642</td>
</tr>
<tr>
<td><strong>Cryptosporidium, Giardia, Toxoplasma, Trichinella, Anisakis</strong> <em>(food)</em></td>
<td>European Union Reference Laboratory for Parasites, ISS, Viale Regina Elena 299, Rome, Italy</td>
</tr>
<tr>
<td></td>
<td>Tel: + 39 06 4990 2304/2310</td>
</tr>
<tr>
<td></td>
<td>Fax: + 39 06 4990 3561</td>
</tr>
<tr>
<td></td>
<td><a href="mailto:crl.parasites@iss.it">crl.parasites@iss.it</a></td>
</tr>
<tr>
<td><strong>Cryptosporidium, Giardia</strong> <em>(water)</em></td>
<td>UK Cryptosporidium Reference Unit</td>
</tr>
<tr>
<td></td>
<td>Public Health Wales Microbiology ABM, Singleton Hospital, Swansea, SA2 8QA</td>
</tr>
<tr>
<td></td>
<td>Tel: 01792 285341/ 01792 205666 (out of hours)</td>
</tr>
<tr>
<td></td>
<td>Fax: 01792 202320</td>
</tr>
<tr>
<td><strong>Histamine</strong> <em>(scrombotoxin)</em> analysis</td>
<td>Public Analyst Laboratories, contact address can be obtained from the Association of Public Analysts website (<a href="http://www.publicanalyst.com/about_us/the_laboratories">http://www.publicanalyst.com/about_us/the_laboratories</a> )</td>
</tr>
<tr>
<td><strong>Marine biotoxins</strong> <em>(PSP, DSP, ASP, Ciguatera)</em> Hepatitis A and E, Norovirus, Rotavirus and other foodborne viruses (food and water)</td>
<td>Centre for Environment, Fisheries &amp; Aquaculture Science, Weymouth</td>
</tr>
<tr>
<td></td>
<td>The Nothe, Barrack Road, Weymouth, Dorset DT4 8UB</td>
</tr>
<tr>
<td></td>
<td>Tel: +44 (0) 1305 206600</td>
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<td></td>
<td>Fax: +44 (0) 1305 206601</td>
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</tbody>
</table>
### Appendix 3: Submission of FW&E sample to reference laboratories

<table>
<thead>
<tr>
<th>ORGANISM</th>
<th>CRITERIA FOR SUBMISSION</th>
<th>TESTS*</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Bacillus cereus and other Bacillus species</em></td>
<td>All isolates associated with clinical cases&lt;br&gt;• All isolates from sampling with a result of &gt;10⁵ cfu/g</td>
<td>Confirmation</td>
</tr>
<tr>
<td><em>Campylobacter spp.</em> (thermotolerant)</td>
<td>All isolates associated with clinical cases</td>
<td>Confirmation and speciation</td>
</tr>
<tr>
<td><em>Clostridium perfringens</em></td>
<td>All isolates associated with clinical cases&lt;br&gt;• Isolates from sampling with a result of &gt;10⁵ cfu/g</td>
<td>Confirmation, typing</td>
</tr>
<tr>
<td><em>Salmonella spp.</em></td>
<td>All isolates</td>
<td>Confirmation and typing</td>
</tr>
<tr>
<td><em>Shigella spp.</em></td>
<td>All isolates</td>
<td>Confirmation and typing</td>
</tr>
<tr>
<td><em>Listeria monocytogenes</em></td>
<td>All isolates</td>
<td>Confirmation and typing</td>
</tr>
<tr>
<td><em>E coli O157 (or other VTEC)</em></td>
<td>All isolates</td>
<td>Confirmation and typing</td>
</tr>
<tr>
<td><em>Staphylococcus aureus and other coagulase positive staphylococci</em></td>
<td>All isolates associated with clinical cases or isolates from routine sampling with a result of &gt;10⁴ cfu/g</td>
<td>Confirmation and typing</td>
</tr>
<tr>
<td><em>Legionella pneumophila Sg1</em></td>
<td>All isolates associated with clinical cases or where there is an elevated infection risk.</td>
<td>Confirmation and typing</td>
</tr>
<tr>
<td><em>Yersinia</em></td>
<td>All isolates associated with clinical cases</td>
<td>Confirmation and typing</td>
</tr>
<tr>
<td><em>Pseudomonas aeruginosa</em></td>
<td>All isolates associated with clinical cases in hospitals</td>
<td>Confirmation and typing</td>
</tr>
<tr>
<td><em>Vibrio spp.</em></td>
<td>All isolates associated with clinical cases&lt;br&gt;• All isolates of <em>V.cholerae</em>&lt;br&gt;• All isolates of <em>V.parahaemolyticus</em></td>
<td>Confirmation, typing for <em>V.cholerae</em></td>
</tr>
</tbody>
</table>

Cultures associated with clinical cases must include a prominent note on the request form. HPZone or ILOG numbers may also be helpful. However, do not include patient names or other Patient Identifiable Information on request forms from FW&E Microbiology Laboratories.

- * Typing may include toxin to toxin gene detection
- cfu = colony forming units
Appendix 4: PHE MS FW&E laboratories public health decision tree
Appendix 5: Specialist food testing, communication and liaison with other agencies and health protection services staff

<table>
<thead>
<tr>
<th>Organism/Disease</th>
<th>Reporting of Public Health Incidents by FW&amp;E Microbiology staff to HPTs</th>
<th>Additional Information</th>
</tr>
</thead>
</table>
| **Bacillus cereus** | When *B. cereus* are isolated from:  
• foods epidemiologically related to outbreaks or to other confirmed/suspected cases  
• ready-to-eat foods at unsatisfactory levels  
Ensure reporting to:  
• HPT (OCT if outbreak)  
• Local Authority and FSA  
• LPHM FW&E  
• Reference Laboratory (referral of isolates) | Rice is often implicated in cases and outbreaks, although other foods, such as meat products, soups, vegetables, puddings and sauces have been associated with disease.  
Screening/surveillance activities, including local food surveys by Environmental or Port Health Authorities may identify issues within particular food premises. These incidents will usually remain an Environmental Health issue, for local action.  
For investigation of unsatisfactory levels of contamination of ready-to-eat foods linked to large producers, this would typically involve the Food Standards Agency as well as Environmental Health and HPS nationally.  
Similar considerations apply to other *Bacillus* species associated with clinical cases |
| **Campylobacter spp.** | When *Campylobacter* are isolated from:  
• Food or water epidemiologically related to outbreaks or to other confirmed/suspected cases  
• ready-to-eat foods  
Ensure reporting to:  
• HPT (OCT if outbreak)  
• Local Authority and FSA  
• LPHM FW&E  
• DWI (if waterborne)  
• Reference Laboratory (referral of isolates) | *Campylobacter* is the commonest reported bacterial cause of infectious intestinal disease in England.  
The consumption of low numbers of *Campylobacter* in food is sufficient to cause infection.  
Environmental Health will be involved in immediate investigation of contamination of ready-to-eat foods with *Campylobacter*.  
For investigation of contamination of ready-to-eat foods linked to large producers, this would typically involve the Food Standards Agency as well as Environmental Health and HPS nationally |
Guidance on Public Health response: involvement of PHE Food Water and Environmental Microbiology laboratory staff in the investigation of outbreaks of food or waterborne disease

<table>
<thead>
<tr>
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</tr>
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</table>
| *Clostridium perfringens* | When *C.l.perfringens* are isolated from:  
- Food epidemiologically related to outbreaks or to other confirmed/suspected cases  
- ready-to-eat foods at unsatisfactory levels  
Ensure reporting to:  
- HPT (OCT if outbreak)  
- Local Authority and FSA  
- LPHM FW&E  
- Reference Laboratory (referral of isolates) | Cooked meat products subjected to poor temperature and time control during cooling and storage are most often associated with outbreaks. This bacterium is also associated with person to person and antibiotic associated diarrhoea where environmental surveillance may be requested. Not all *C.l.perfringens* have the ability to produce enterotoxin and cause gastrointestinal illness. Screening/surveillance activities, including local food surveys by Environmental Health may identify issues within particular food premises. These incidents will usually remain an Environmental Health issue, for local action. |
| *Salmonella* spp.         | When *Salmonella* are isolated from:  
- Food or water epidemiologically related to outbreaks or to other confirmed/suspected cases  
- ready-to-eat foods  
Ensure reporting to:  
- HPT (OCT if outbreak)  
- Local Authority and FSA  
- LPHM FW&E  
- DWI (if waterborne)  
- Reference Laboratory (referral of isolates)  
Rapid, robust and effective liaison within PHE is required in particular for investigation of *Salmonella* Typhi and *Salmonella* Paratyphi cases linked to foods consumed within the UK although this will occur rarely. | Exposure to high numbers of *Salmonella* species is usually required for infection; however outbreaks and incidents may be associated with food and water contaminated with low numbers especially with certain food types (high fat) and where vulnerable individuals are involved.  
Foods typically associated with *Salmonella* infection include poultry and eggs though other foods such as herbs and spices, fermented meats, cheese, nuts, seeds, melon and chocolate have been implicated.  
LA will be involved in immediate investigation of *Salmonella* contamination of ready-to-eat food.  
Screening/surveillance activities, including local food surveys by Environmental Health may identify issues within particular food premises. These incidents will usually remain an Environmental Health issue, for local action.  
For investigation of contaminated ready-to-eat foods linked to large producers, this would typically involve the Food Standards Agency as well as Environmental Health and HPS nationally. |
### Organism/Disease

#### Shigella spp.

When *Shigella* are isolated from:
- foods epidemiologically related to outbreaks or to other confirmed/suspected cases

Ensure reporting to:
- HPT (OCT if outbreak)
- Local Authority and FSA
- Director FW&E
- DWI (if waterborne)
- Reference Laboratory (referral of isolates)

Food or water related *Shigella* incidents are uncommon and person to person transmission is the more usual route of infection.

#### Listeria monocytogenes

When *L. monocytogenes* are isolated from:
- foods epidemiologically related to outbreaks or to other confirmed/suspected cases
- ready-to-eat foods at unsatisfactory levels

Ensure reporting to:
- HPT (OCT if outbreak)
- Local Authority and FSA
- LPHM FW&E
- Reference Laboratory (referral of isolates)

Screening/surveillance activities, including local food surveys by Environmental Health may identify food safety issues within particular food premises, such as low levels of *Listeria* at point of sale. These incidents will usually remain an Environmental Health issue, for local action. Escalation and liaison with HPTs may occur depending upon any public health implications identified particularly if the food items are likely to be consumed by vulnerable groups (eg Hospital inpatients).

For investigation of contamination of ready-to-eat foods linked to large producers, this would typically involve the Food Standards Agency as well as Environmental Health and HPS nationally.
<table>
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<th>Reporting of Public Health Incidents by FW&amp;E Microbiology staff to HPTs</th>
<th>Additional Information</th>
</tr>
</thead>
</table>
| **E. coli O157 (or other Shiga toxin producing *E. coli* (STEC))** | When *E. coli* O157 or other STEC is isolated from:  
- Food or water epidemiologically related to outbreaks or to other confirmed/suspected cases  
- ready-to-eat foods  
Ensure reporting to:  
- HPT (OCT if outbreak)  
- Local Authority and FSA  
- LPHM FW&E  
- DWI (if waterborne)  
- Reference Laboratory (referral of isolates)  
Early coordinated responses are required due to nature of pathogen, infective dose and potential public health impact. | Food, water, animal and environmental sources have been implicated in cases, clusters and outbreaks of O157 STEC.  
Telephone reporting of confirmed results – resulting in immediate follow-up and investigation by LA.  
Pathogen detected in water and environmental samples may be invaluable when there is an ongoing incident.  
Outbreaks can be associated with food premises as well as water and animal sources |
| **S. aureus and other coagulase positive staphylococci** | When *S. aureus* (or other coagulase positive staphylococci) are isolated from:  
- food epidemiologically related to outbreaks or to other confirmed/suspected cases  
- ready-to-eat foods at unsatisfactory levels  
Ensure reporting to:  
- HPT (OCT if outbreak)  
- Local Authority and FSA  
- LPHM FW&E  
- Reference Laboratory (referral of isolates) | Illness due to staphylococcal enterotoxins which are pre-formed in food. Not all *S. aureus* (or other coagulase producing staphylococci) carry the enterotoxin producing genes and therefore have the potential to cause illness.  
For investigation of contamination of ready-to-eat foods linked to large producers, this would typically involve the Food Standards Agency as well as Environmental Health and HPS nationally. |
<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td><strong>Legionella pneumophila</strong> (usually serogroup 1)</td>
<td><strong>When<em>L. pneumophila</em> are isolated from:</strong>&lt;br&gt;• Water systems or cooling towers that are epidemiologically related to outbreaks or to other confirmed/suspected cases&lt;br&gt;• Water systems (especially in hospitals) at unsatisfactory levels (&gt;1000/L) Ensure reporting to:&lt;br&gt;• HPT (OCT if outbreak)&lt;br&gt;• Local Authority&lt;br&gt;• LPHM FW&amp;E&lt;br&gt;• Infection Control Doctor or Nurse (nosocomial outbreaks)&lt;br&gt;• Duty Holder (hot, cold and drinking water systems in hospitals)&lt;br&gt;• Reference Laboratory (referral of isolates)</td>
<td>The duty for control of Legionella hygiene in hot, cold and drinking water systems in hospitals is identified as resting with the Duty Holder (HTML 04-01 part B). The Duty Holder may differ from those commissioning testing (often estates departments). Where &gt;100 legionella cfu/litre are detected as part of monitoring, remedial action is likely and it is important that the Duty Holder is always informed. Incidents linked to confirmed cases and settings where vulnerable people are present will be reported to Environmental Health Departments. The Health and Safety Executive may also be involved via the ICT/OCT.</td>
</tr>
<tr>
<td><strong>Pseudomonas aeruginosa</strong></td>
<td><strong>When<em>P. aeruginosa</em> are isolated from:</strong>&lt;br&gt;• Recreational water or other water sources epidemiologically related to outbreaks or to other confirmed/suspected cases (including folliculitis from swimming pools)&lt;br&gt;• Environmental sources associated with skin puncturing and confirmed/suspect cases&lt;br&gt;• Water sources in hospitals associated with skin puncturing and confirmed/suspect cases Ensure reporting to:&lt;br&gt;• HPT (OCT if outbreak)&lt;br&gt;• Local Authority&lt;br&gt;• LPHM FW&amp;E&lt;br&gt;• Infection Control Doctor or Nurse (nosocomial outbreaks)&lt;br&gt;• Reference Laboratory (referral of isolates)</td>
<td>FW&amp;E laboratory will liaise with LA on repeated high levels of <em>Pseudomonas aeruginosa</em> in recreational water incidents that may have public health implications&lt;br&gt;FW&amp;E laboratory will liaise with hospital infection control teams on repeated high levels of <em>Pseudomonas aeruginosa</em> from augmented healthcare environments.</td>
</tr>
</tbody>
</table>