



INTRODUCTION

Incidents involving biological agents can lead to outbreaks of infection and contamination of the environment. These incidents can occur naturally, accidentally or through intentional release. The associated contamination may cause restrictions and access controls to the site (ie farm, school, hospital or water supply) until the contamination is dealt with and the remediated environment declared safe to use or re-enter.

Previous incidents have shown that there are a variety of ways in which contaminated areas can be remediated, but these processes can be lengthy and costly and may not necessarily be the most appropriate recovery options for the environment in question.

Public Health England has developed the UK Recovery Handbook for Biological Incidents as a resource of information and technical guidance for local authorities and others involved in remediation and recovery phase following an incident with a biological agent. This handbook can be used for incidents that occur naturally or by accidental/intentional release.

This project completes the CBRN recovery handbook compendium and employs modified tools and methodologies within the UK Recovery Handbook for Radiation Incidents (v4, 2015)¹ and the UK Recovery Handbook for Chemical Incidents (v1, 2012)².

METHODS

Detailed literature reviews have been completed investigating the environmental persistence of the prioritised biological agents and their resistance to chemical and physical decontamination techniques.

An online retrospective study and literature search of previous incidents has been carried out to determine appropriate recovery options. The information gathered has been used to inform the effectiveness and constraints of the recovery options when used.

Stakeholder workshops and focus group meetings have been used to evaluate and review the practicability of the handbook's recovery options and the steps in the decision-aiding framework.

More details on the handbook are available from the recovery, remediation and environmental decontamination webpage at <https://www.gov.uk/government/collections/recovery-remediation-and-environmental-decontamination>



THE HANDBOOK

The handbook is divided into three sections, each dealing with a separate environment: **food production systems**, **inhabited areas** and **water environments**.

A selection of biological agents has been chosen by the stakeholder groups. These prioritised agents represent the most likely causes of biological incidents where the handbook would be used to develop a recovery strategy.

Data on the environmental persistence of the prioritised agents considered within the handbook has been collated into a simple, easy to interpret database.

The database has been split into three sections: **food production systems**, **inhabited areas** and **water environments** and includes data on the resistance/susceptibility of the biological agents to various decontamination techniques. This data is incorporated into the corresponding recovery options.

Data sheets have been produced for each recovery option in the handbook. These data sheets provide the user with detailed information about the recovery option that is needed to form a recovery strategy. The factors considered include cost, waste, effectiveness, time of application and social implications, among others.

What is a recovery option?

Recovery options are defined in the handbook as *"an action intended to reduce or avert the exposure of people to biological contamination"* Recovery options are classified as **protection**, **restoration** or **waste disposal**.

Protection options include:

- **product recall; precautionary (food safety) advice**
- **restrict public access; medical intervention**
- **isolate/ contain water supply; restrict water use (DND/DNU notice)**

Restoration options include:

- **removal of topsoil; decontamination of food premises**
- **reactive liquids; HEPA vacuum cleaning**
- **water treatment at the point of use (tap); flush distribution system**

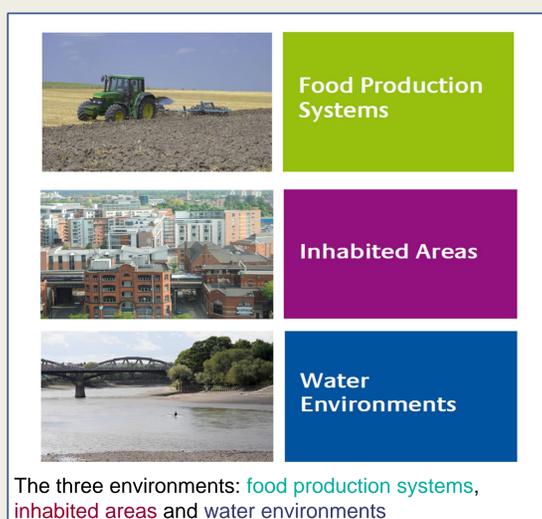
Waste disposal options include:

- **disposal of foodstuffs**
- **incineration**
- **drain to temporary storage**

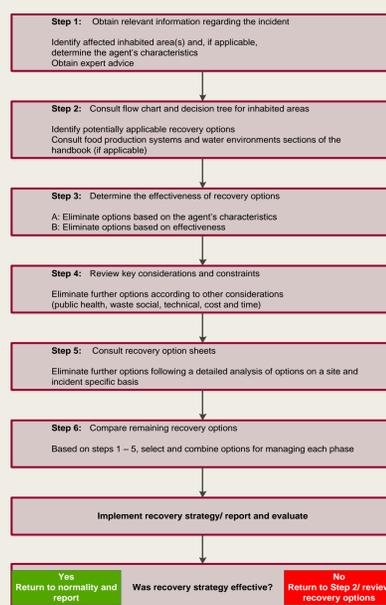
Users will be able to follow the six-step process and decision trees for each environment within the handbook, that will lead the user through the process of identifying and evaluating relevant recovery options that may be appropriate to remediate the contaminated environment.

Recovery options will need to be reviewed by users for their applicability to the specific incident. Tables, such as the one below (taken from the inhabited areas section), will assist users in evaluating the recovery options based on the surface type contaminated and the contaminating agent, and thereby inform the recovery strategy for remediating the affecting area or environment.

Key: Effectiveness	Up to 100% effective		Potentially effective		Limited effectiveness	
	Robust	Sensitive	Free	Absorbed	Inaccessible	
Protection options						
(1) Restrict public access	N/A	N/A				
(2) Controlled workforce access	N/A	N/A				
(3) Impose restrictions on transport	N/A	N/A				
(4) Temporary relocation from residential areas	N/A	N/A				
(5) Medical intervention	N/A	N/A				
(6) Pest control	N/A	N/A				
Remediation options						
(7) Removal/treatment of contamination source	N/A	N/A				
(8) Reactive gases and vapours						
(9) Gaseous decontamination of objects						
(10) Reactive liquids						
(11) Energy decontamination techniques						
(12) Steam cleaning						
(13) HEPA vacuum cleaning						
(14) Modify operation/cleaning of ventilation systems						
(15) Storage, covering, gentle cleaning of precious objects						
(16) Natural inactivation						
(17) Soil and vegetation removal	N/A	N/A				
(18) Barriers to seal land contamination						



The three environments: **food production systems**, **inhabited areas** and **water environments**



DISCUSSION

The aim of the handbook is to provide a decision-aiding framework that will guide users to develop the most suitable recovery strategy for the biological agent and contaminated environment. Users are guided through a number of considerations that will help to remove recovery options that are inappropriate. The handbook provides a facility to record the decisions made, which can then be written into the recovery report that can then be used as part of the auditing process. Recovery options are developed for each individual environment: **food production systems**, **inhabited areas** and **water environments**, and are separated into areas of key importance when designing a recovery strategy. It can also be used to promote constructive dialogue between all parties concerned to identify potential problems that may arise during recovery.

The handbook can be used for planning and preparation activities prior to an incident and for training purposes. The project team has the ability to run through desk-based exercises, helping to train those who will be potentially using the handbook in future responses.

CONCLUSIONS

The UK Recovery Handbook for Biological Incidents will help decision makers to identify and develop recovery strategies following a biological incident, by providing scientific advice and guidance in a simple to use decision-aiding framework format, and will also enable the decisions made during the recovery process to be documented.

The handbook will be openly available as a linked document when released on gov.uk in November 2015.

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