



GOVERNMENT OF GIBRALTAR

GIBRALTAR RADIATION EMERGENCY RESPONSE PLAN

for an incident from

**H M Naval Base Gibraltar
“Z” Berths**

OFF-SITE EMERGENCY ARRANGEMENTS

RADIATION EMERGENCY RESPONSE PLAN

Environmental Agency

FOREWORD

The Z berths of HM Naval Base Gibraltar are designated for the berthing of Nuclear Powered Warships (NPW). The HM Naval Base Gibraltar is owned and operated by the Ministry of Defence on behalf of Her Majesty's Government. In February 2005 the Ministry of Defence undertook a *Hazard Identification and Risk Evaluation*¹ as part of their compliance with *The Radiation (Emergency Preparedness and Public Information) Regulations 2004* (REPIR 2004)². The assessment report concluded that the operator continued to need an Operator's Emergency Plan. This plan is termed the "On-site" plan.

It follows, therefore, that an off-site emergency plan is required. This emergency response plan fulfills the requirements of *The Radiation (Emergency Preparedness and Public Information) Regulations 2004* (REPIR 2004)² and is designated as the **Radiation Emergency Response Plan (RERP)** to distinguish it from other emergency plans. The former off-site emergency arrangements were prepared by the Ministry of Defence (MoD) and known as *GIBPUBSAFE*. This plan replaces *GIBPUBSAFE* and links with the MoD HM Naval Base on-site emergency plan. This plan is designed to integrate with all other emergency response plans in Gibraltar, especially the Gibraltar Major Incident Plan and the Nuclear Accident Response Organisation (NARO) of MoD.

HM Naval Base Gibraltar has two alongside Z berths, designated as berths 49 and 50, for use by UK and foreign nuclear vessels. The combined usage of the berths, known as the Port Utilisation Factor (PUF), for Gibraltar Naval Base is low, within a limit of 109 days per year.

This Radiation Emergency Response Plan has been produced by Serco Assurance, Safety Management Systems, B150 Harwell International Business Centre, Didcot, Oxfordshire, OX11 0RA, UK under contract no: SERCO/SMS/3684 with the Environmental Agency Gibraltar.

RADIATION EMERGENCY RESPONSE PLAN

Environmental Agency

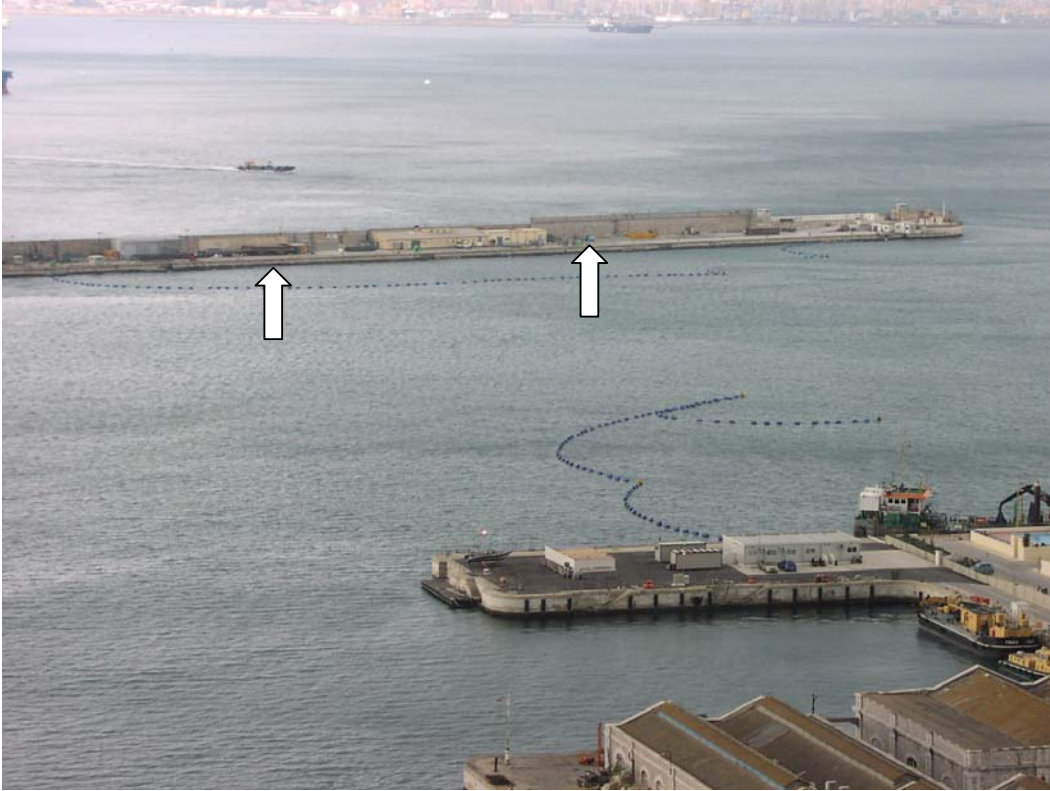
ACKNOWLEDGEMENTS

This document has been produced using the technical information contained in the *Report of Assessment of the Hazard Identification & Risk Evaluation*, Ministry of Defence ¹ produced under *The Radiation (Emergency Preparedness and Public Information) Regulations 2004 (REPPIR 2004)* ², and with the cooperation and contribution of the following

Minister for Environment
Royal Gibraltar Police
City Fire Brigade
Gibraltar Health Authority
GHA Ambulance Service
Civil Contingency Planning Advisor
Ministry of Defence
(Royal Navy and HM Naval Base Gibraltar)
Port Authority
Environmental Agency

RADIATION EMERGENCY RESPONSE PLAN

Environmental Agency



HM Naval Base Gibraltar, Z berths 49 & 50

RADIATION EMERGENCY RESPONSE PLAN

Environmental Agency

CONTENTS

FOREWORD	3
ACKNOWLEDGEMENTS	4
AUTHORISATION	5
CONTENTS	6
DISCLAIMER	6
COPYRIGHT	6
DOCUMENT CONTROL	6
AMENDMENTS	6
DISTRIBUTION LIST	6
1 INTRODUCTION	6
1.1 THE LEGISLATION	6
1.2 BACKGROUND	6
2 AIM AND OBJECTIVES	6
2.1 AIM	6
2.2 OBJECTIVES	6
2.3 PLAN CONSTRUCTION	6
3 POSSIBLE RADIATION HAZARDS	6
4 INITIAL EMERGENCY RESPONSE	6
5 COMMAND AND CONTROL ARRANGEMENTS	6
6 CATEGORISATION AND INCIDENT DEFINITION	6
6.1 STATES OF EMERGENCY	6
7 PLAN ACTIVATION AND STAND DOWN	6
7.1 ACTIVATION	6
7.2 PITs DISTRIBUTION	6
7.3 STAND-DOWN	6
7.4 ALL OTHER RESPONDERS, STAND-DOWN	6
8 ROLES AND RESPONSIBILITIES	6
8.1 ROYAL GIBRALTAR POLICE	6
8.2 CITY FIRE BRIGADE	6
8.3 AMBULANCE SERVICE	6
8.4 EMERGENCY PLANNING	6
8.5 GIBRALTAR HEALTH AUTHORITY	6
8.6 ENVIRONMENTAL AGENCY	6
8.7 GOVERNMENT OF GIBRALTAR	6

RADIATION EMERGENCY RESPONSE PLAN

Environmental Agency

8.8	MINISTRY OF DEFENCE	6
8.9	PORT DEPARTMENT	6
8.10	GIBRALTAR ELECTRICITY AUTHORITY	6
8.11	WATER, AQUAGIB Ltd	6
8.12	SEWERAGE, Technical Services Department	6
8.13	COMMUNICATIONS, Gibtelecom	6
8.14	HEALTH AND SAFETY	6
9	MEASURES TO PROTECT THE PUBLIC	6
10	INFORMING AND WARNING THE PUBLIC	6
10.1	EMERGENCY INSTRUCTIONS	6
10.2	TOURISTS	6
10.3	PUBLIC ANXIETY FOR INFORMATION	6
11	NEWS MEDIA ARRANGEMENTS	6
12	PUBLIC HEALTH ASPECTS OF A RADIOLOGICAL ACCIDENT	6
12.1	PUBLIC HEALTH RESPONSE	6
12.2	RESPONSE TO RADIATION DEPOSITION OFF-SITE	6
12.3	MONITORING	6
12.4	DECONTAMINATION	6
12.5	AIR MONITORING	6
12.6	LONG TERM SURVEILLANCE	6
13	EXTENDED RESPONSE AND RECOVERY	6
13.1	EXTENDED RESPONSE	6
13.2	RECOVERY	6
13.3	REMEDICATION	6
13.4	RELEASE OF CONTAMINATED GOODS, PROPERTY AND VEHICLES	6
14	FINANCIAL ARRANGEMENTS	6
15	ENVIRONMENTAL CONSIDERATIONS	6
15.1	IDENTIFYING MAJOR ACCIDENT HAZARDS	6
15.2	ACCIDENT SCENARIOS	6
15.3	ENVIRONMENTALLY SENSITIVE AREAS	6
16	TRAINING AND TESTING	6
17	DEBRIEFS	6
18	REVIEW AND EVALUATION	6
19	REFERENCES	6

RADIATION EMERGENCY RESPONSE PLAN
Environmental Agency

APPENDIX

6

RADIATION EMERGENCY RESPONSE PLAN

Environmental Agency

DISCLAIMER

No responsibility, whether directly or indirectly, will be accepted by the Environmental Agency Gibraltar for any errors or mistakes made in technical data or information supplied by external bodies or individuals that is included in this document. It is the responsibility of the user of this document to ensure that technical data and health and safety instructions are valid before acting on such information. In addition, any claim made by a non-prescribed recipient, or unauthorised user of this document, on any matter that might be deemed the responsibility of the Environmental Agency Gibraltar, will not be accepted.

COPYRIGHT

This document is the property of the Environmental Agency Gibraltar and, whether complete or in part, may not be reproduced, stored in a retrieval system, or transmitted in any form or by any means (electronic, mechanical, photocopying, recording or otherwise) without the prior written permission of the copyright owner. Bona fide students undertaking study or private persons may make a single copy for the purposes of personal research without recourse to the copyright owner. However, in addition, permission has been granted by other copyright owners for their information to be included in this document and is acknowledged in the appropriate places. It follows, therefore, that permission must be sought from the appropriate originating copyright owner and not from the copyright owner of this document.

DOCUMENT CONTROL

This is a controlled document and is allocated a unique reference number on the title page which is specific to a particular plan holder as indicated on the distribution list. Additional copies of this document may only be made by the Environmental Agency Gibraltar. Amendments to authorised copies will be issued as complete pages and will include the date, month and year of the amendment at the bottom left hand corner of each page. Minor amendments may be made by hand against the issue of an official change notice. All amendments are to be entered on the amendments page and include the change notice reference where appropriate.

RADIATION EMERGENCY RESPONSE PLAN

Environmental Agency

AMENDMENTS

Date	Page Number / Nature of Amendment / Change Notice Reference	Date amended	Name of person making amendment

RADIATION EMERGENCY RESPONSE PLAN

Environmental Agency

DISTRIBUTION LIST

Copy	Recipient
00	Master Copy, Environmental Agency
01	Government of Gibraltar, Chief Minister
02	Government of Gibraltar, Minister for the Environment
03	Government of Gibraltar, Minister-in-Charge of Civil Contingencies
04	Government of Gibraltar, Chief Secretary
05	Royal Gibraltar Police, Commissioner of Police
06	Gibraltar Health Authority, Chief Executive Officer
07	Gibraltar Health Authority, Director of Public Health
08	Gibraltar Health Authority Ambulance Service, Chief Executive Officer
09	Government of Gibraltar, Ministry for the Environment, Chief Technical Officer
10	City Fire Brigade, Chief Fire Officer
11	Government of Gibraltar, Director of Education
12	Government of Gibraltar, Principal Housing Officer
13	Government of Gibraltar, Media Director
14	Government of Gibraltar, Civil Contingencies Planning Advisor
15	Port Authority, Captain of Port
16	Gibtelecom, Chief Executive Officer
17	AquaGib Ltd., Managing Director
18	Gibraltar Electricity Authority, Chief Executive Officer
19	Ministry of Defence – Commander British Forces
20	Ministry of Defence – Staff Officer (Nuclear)
21	Environmental Agency
22	Environmental Agency

RADIATION EMERGENCY RESPONSE PLAN

Environmental Agency

1 INTRODUCTION

This emergency response plan is designed to stand-alone from other emergency and contingency plans applying to Gibraltar. Nevertheless, this plan, by virtue of its nature, must draw on the Gibraltar Major Incident Plan³ and the Gibraltar Nuclear Operator's Emergency Plan, HM Naval Base⁴.

1.1 THE LEGISLATION

This document has been produced under *The Radiation (Emergency Preparedness and Public Information) Regulations 2004 (REPIR 2004)*².

1.2 BACKGROUND

There has been a Royal Navy and British military presence in Gibraltar since 1704. The Ministry of Defence (MoD), which includes the armed forces, has reduced its presence and capability in Gibraltar in recent years. However, the MoD maintain a capability for receiving Nuclear Powered Warships (NPW) within the confines of HM Naval Base at two mooring points designated as "Z" berths 49 and 50 on the South Mole. Nuclear Powered Warships have been visiting Gibraltar for over 30 years. Such visits require emergency response plans to be in place specifically for a nuclear accident involving the nuclear power plant of a vessel. The local berth and port plan (on-site) and external effects plan (off-site) have been produced in the past by the MoD in Gibraltar. The recent REPIR 2004 regulations require the Environmental Agency to produce the off-site incident emergency response plan. The current MoD off-site plan, referred to as GIBPUBSAFE plan, is replaced by this document, the *Radiation Emergency Response Plan*.

It follows, therefore, that this "Off-site" Radiation Emergency Response Plan will take into account the MoD's "On-site" plan. It should be noted that the risk of releasing radioactive fission products from a NPW in a reactor incident is deemed remote, principally due to the design and operation. However, it is also recognised that no process involving hazardous components can be entirely safe so the MoD have established the Nuclear Accident Response Organisation (NARO). The NARO is maintained at one hour's notice in Gibraltar throughout all NPW visits, with additional specialist back-up support and technical advisory groups on standby in the UK ready to respond in the event of an incident.

It has been agreed with the MoD that any casualty that is either actually or suspected of being contaminated will be treated in the Royal Naval Hospital (RNH) and for whatever injury or illness condition. This will also include all casualties arising from within the affected area outside the HM Naval Base.

RADIATION EMERGENCY RESPONSE PLAN

Environmental Agency

2 AIM and OBJECTIVES

2.1 AIM

The aim of this plan is to safeguard the public, as far as it is practicable, in the event of an on-site incident involving the release of radioactive fission products associated with a nuclear power plant in a Nuclear Powered Warship.

2.2 OBJECTIVES

The objectives of this plan, as required under the REPPIR 2004 regulations² are to:

- minimise the effects, and to limit injury to persons, the environment and property from an on-site incident
- implement measures necessary to protect persons from the effects of a radioactive material dispersion and in particular the transfer of radioactive substances to individuals from the environment
- communicate the necessary information to the public in a threatened area through the emergency services and Government of Gibraltar
- provide for the long-term surveillance and medical care of persons exposed to radioactive material
- provide for the restoration and clean-up of the environment following a radioactive material deposition

It should be noted that in meeting these objectives the prevention or minimisation of deposition of radioactive material from the incident site is not within the control of this plan, and consequently the environment may be contaminated to a greater extent than the population.

2.2.1 To meet the requirements of an off-site emergency plan as specified in the REPPIR 2004 regulations², Part 2, Sections 9, 10, 13, 16 and 17.

2.2.2 To make provision for the evacuation of people from a non-radiological incident, which might take place at the same time, to a place of safety.

2.2.3 To make available sufficient information to prevent the emergency services and other organisations from exposing themselves unnecessarily to the hazards of radioactive contamination.

2.2.4 To provide a link into the Gibraltar Major Incident Plan³ and other incident plans that may be implemented.

2.2.5 To integrate this plan with the existing procedures already followed by the emergency services and others when dealing with emergencies involving the

RADIATION EMERGENCY RESPONSE PLAN

Environmental Agency

release of radioactive material into the environment of Gibraltar. These other documents and link plans include:

Gibraltar Nuclear Operator's Emergency Plan, HM Naval Base Gibraltar.

HM Naval Base Gibraltar, Major Incident Plan (BFGIB SOP Part III Section 2)

Government of Gibraltar, Gibraltar Major or Emergency Advisory Booklet⁵

Gibraltar Health Authority Major Incident Plan

Port Emergency Plans

Airport Emergency Plans

2.3 PLAN CONSTRUCTION

This plan is constructed to take into account the following aspects which are specific to radiation emergency response plans and as advised by the International Atomic Energy Agency ⁶. However, in this particular case it is recognised that the off-site effects and response will be substantially less with respects to radiation injuries when compared with the site of an incident. This off-site plan has no influence on the on-site emergency response.

- 2.3.1 To maintain control of the situation outside of HM Naval Base;
- 2.3.2 To assist in prevention or mitigation of consequences at the scene, if requested by the MoD;
- 2.3.3 To prevent the occurrence of deterministic health effects in workers and the public;
- 2.3.4 To manage the treatment of radiation injuries that may occur, if required, and provide first aid should it be required, although this is most unlikely;
- 2.3.5 To prevent, to the extent practicable, the occurrence of stochastic health effects in the population;
- 2.3.6 To prevent, to the extent practicable, the occurrence of non-radiological effects on individuals and among the population;
- 2.3.7 To protect, to the extent practicable, property and the environment;
- 2.3.8 To prepare, to the extent practicable, for the resumption of normal social and economic activity.

RADIATION EMERGENCY RESPONSE PLAN

Environmental Agency

3 POSSIBLE RADIATION HAZARDS

The science of radiation and properties of radioactive substances unavoidably contains technical words, terms and abbreviations which can be intimidating to non-scientific persons. To assist the user of this plan Appendix 1, Terminology and Abbreviations, provides explanations and descriptions.

The table below lists the main radionuclides (radioactive substances) that could be released from a nuclear power plant in a warship. There are 22 other radionuclides that would also be released but they are insignificant compared to those shown in the list. All of the radionuclides listed present a hazard by inhalation or entering the body through an injury to the skin, for example, an open wound. The primary radiation hazard is shown which may be different where the external gamma radiation hazard is not significant. See Appendix 4, Technical Details, and Appendix 5, Contamination and Radiation Dose Intervention Levels.

Radionuclide (isotope)	Symbol	Radioactive Half-Life	Primary Radiation Hazard	State
Iodine 131	¹³¹ I	8.04 d	G	vapour / particle
Strontium 90	⁹⁰ Sr	29.12 y	B	particle
Caesium 137	¹³⁷ Cs	30 y	G	particle
Plutonium 239	²³⁹ Pu	2.41 x 10 ⁴ y	A	particle
Plutonium 241	²⁴¹ Pu	13.2 y	B	particle
Cobalt 60	⁶⁰ Co	5.27 y	G	particle
Zirconium 95	⁹⁵ Zr	63.98 d	G	particle
Niobium 95	⁹⁵ Nb	35.15 d	G	particle
Ruthenium 106	¹⁰⁶ Ru	368.2 d	B (s)	particle
Cerium 144	¹⁴⁴ Ce	284.3 d	B (s)	particle
Americium 241	²⁴¹ Am	432.2 y	A, G	particle
Tritium	³ H	12.26 y	B	water vapour

Half-Life: d = days, y = years

Radiation: A = alpha, B = beta, B (s) = beta (skin), G = gamma

RADIATION EMERGENCY RESPONSE PLAN

Environmental Agency

4 INITIAL EMERGENCY RESPONSE

The initial emergency response will be activated by an alert from HM Naval Base. This will be a telephone call to the Royal Gibraltar Police Operations Room. The alert will state the nature of the incident, which may be categorised as follows.

Category 1	An engineering hazard on board and no radioactive hazard. On board situation reported to Naval Base Emergency Organisation, who alerts MoD NARO, RGP Operations Room, and City Fire Brigade Control.	Activate Emergency Plan, Silver Command. Bronze level responders called to 'Stand-by'. Consider deploying essential services to place of safety. Gold commanders advised. Undertake planning to distribute PITS and alert Royal Gibraltar Regiment (RGR).
Category 2	Radiation monitoring equipment on board and / or on jetty detect an increase in radiation levels restricted to HMNB. Reported to Naval Base Emergency Organisation, who alerts MoD NARO, RGP Operations Room And City Fire Brigade Control.	Activate Emergency Plan with Gold and Silver Commands. Deploy Bronze level responders to predefined locations. PITS will be issued by RGR. Public advised to shelter.
Category 3	Highest alert state. Radioactive material released from outside area of HMNB. Naval Base Emergency Organisation alert MoD NARO, RGP Operations Room and City Fire Brigade Control.	Activate Emergency Plan with Gold and Silver Commands. Deploy Bronze level responders to predefined locations. PITS to be issued by RGR and public advised to shelter.

RADIATION EMERGENCY RESPONSE PLAN

Environmental Agency

5 COMMAND AND CONTROL ARRANGEMENTS

5.1 The Government of Gibraltar, Royal Gibraltar Police, City Fire Brigade and other responders to emergency incidents have adopted the UK concept of Strategic, Tactical and Operational command and control for all civil emergency incidents. This is often referred to as the "Gold, Silver and Bronze" system and in Gibraltar is operated as follows:

Strategic (Gold) where strategy and policy is determined. Normally at a Control Centre away from the scene. Meetings will normally be co-ordinated by the Chief Minister, Chairman of C3.

Tactical (Silver) where the strategy set by Gold is implemented by the issue of tactical instructions and the allocation of resources.

Operational (Bronze) where resources are deployed and operational tasks performed in accordance with Silvers' tactical instructions.

5.2 It is widely recognised that the Police have the responsibility for the overall command and control of any major incident scene. However, in the case of an incident at a Z berth in HM Naval Base Gibraltar, the on-site scene is entirely under the control of the Ministry of Defence. Should a nuclear incident within the Naval Base result in effects outside, then the emergency response arrangements for outside the Naval Base come under the control of the Royal Gibraltar Police and they have primacy of control on behalf of the Government. The other responding organisations will carry out their specialist duties in accordance with their own roles and responsibilities.

5.3 The command and control structure encourages all responders to the incident to adopt a multi-agency approach and to work together and co-ordinate their activities. It is only by adopting this approach that effective management can be achieved.

5.4 The Government of Gibraltar is responsible for the overall co-ordination of the personnel and resources of all Government departments, units and contractor organisations, through the Civil Contingencies Committee (C3). The Government of Gibraltar can be represented at any or all of the emergency response command levels of Gold, Silver and Bronze. This structure enables the response to be quickly extended should the situation escalate. An incident involving the release of radioactive material from a nuclear reactor, or indeed any other significant source, will be deemed to be a Major Incident and affect all sections of the population and business community of Gibraltar.

5.5 The strategic level of command will usually be sited at the Strategic Co-ordinating Centre at No. 6 Convent Place. From here the incident will be managed. However, it is likely that due to the nature of a radiation emergency there is an urgent

RADIATION EMERGENCY RESPONSE PLAN

Environmental Agency

requirement for all Senior Officials and advisers to communicate closely and continuously in parallel with MoD Gold level centres.

5.7 The success of all mitigating actions taken at this level will largely depend on the efficiency of the communication and co-operation between the individual departments and the Gold Command established at No. 6 Convent Place.

5.8 Silver command (Tactical) will initially be located at Police Operations, New Mole House but may require relocating.

5.9 Due to the nature of a potential wide area radiation incident it is unlikely that there will be any Bronze level (Operational) command points except at rendezvous points for deployed services. This may include the Airport or Royal Gibraltar Police checkpoint at the border with Spain.

RADIATION EMERGENCY RESPONSE PLAN

Environmental Agency

6 CATEGORISATION AND INCIDENT DEFINITION

It is necessary to categorise radiation incidents so that a clear understanding of the level of response required is understood quickly and easily. In this plan consideration has been given to potential radiation emergencies emanating from HM Naval Base but this could be equally adapted for other radiation incidents.

6.1 STATES OF EMERGENCY

Incidents in HM Naval Base, Definitions

The following definitions apply to the different emergency states described within HM Naval Base Emergency Plan:

Category 1

An engineering hazard on board a NPW requiring investigation with no radiation hazard. The ship management will investigate the likely cause and implement onboard emergency procedures to bring reactor to a safe state. The onboard situation is reported to the Naval Base Emergency Organisation who will alert NARO, the Royal Gibraltar Police, Operations Room and City Fire Brigade. It will result in alerting / mustering of the key staff of the Gibraltar Major Incident Silver command in readiness for radioactive material passing the HM Naval Base boundary.

Category 2

A radiation hazard exists external to the reactor. Radiation monitoring equipment on board and / or on jetty detect an increase in radiation levels restricted to HMNB. Under these conditions the ship may be evacuated of non-essential personnel if radiation levels rise. The Naval Base Emergency Organisation who will alert NARO, the Royal Gibraltar Police, Operations Room and City Fire Brigade. This will result in Gold command alerting / mustering of the key staff of the Gibraltar Major Incident Silver command in readiness for the incident escalating. Bronze level responders will be deployed to predefined locations and PITs issued.

Category 3

This is the most serious condition where radioactive material has escaped from the ship and has moved to or may be beyond the limits of HM Naval Base. This may be detected by Health Physics monitoring teams downwind of the ship. This will be termed an off-site release.

RADIATION EMERGENCY RESPONSE PLAN

Environmental Agency

7 PLAN ACTIVATION AND STAND DOWN

7.1 ACTIVATION

The Radiation Emergency Response Plan will be fully activated when the alert by HM Naval Base has been raised to Category 1 or above.

The emergency response activation will follow the schematic diagram figure 1, shown below; this is similar to the Major Incident Plan.

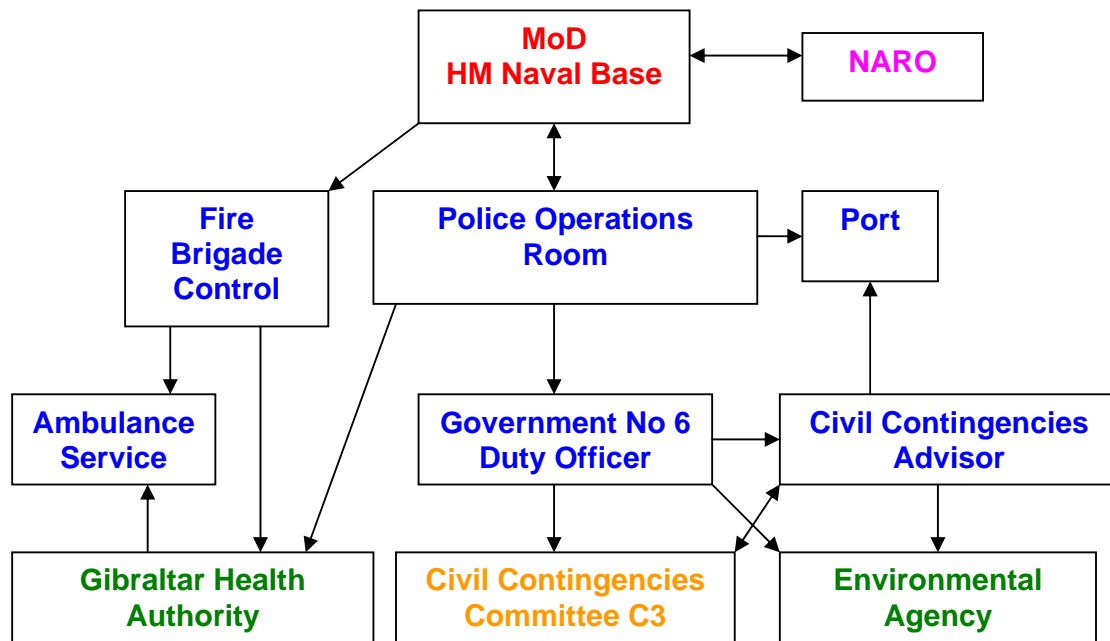


Figure 1: Activation of Emergency Plan

7.2 PITs DISTRIBUTION

The C3 on the advice of the Director of Public Health will decide on the distribution of PITs (Potassium Iodate Tablets). It is recognised that the distribution process will be manpower intensive and as such the Royal Gibraltar Regiment (RGR) are designated to distribute PITs (see Section 8.8.3(g)). Stocks of tablets are held by the RGR on behalf of the Chief Environment Health Officer. Further supplies are available from MoD if required.

Emergency services, namely, police, fire and ambulance hold sufficient stock of PITs to cater for their own personnel and would be issued following a C3 decision.

Distribution of PITs to the public will normally be on a 'house-to-house' basis undertaken by the RGR. However particular circumstances at the time may dictate that public Distribution Centres are set up to distribute the PITs tablets to the public. A combination of both distribution methods may be used. The PITs Distribution Plan

RADIATION EMERGENCY RESPONSE PLAN

Environmental Agency

is held by the Environmental Agency and RGR. Distribution will only take place as a result of a Category 2 event. No person will be expected to distribute PITs in areas affected by radioactive deposition unless the environment is declared safe enough for the operation.

The location of Distribution Centres will be advised by C3 at the time by radio or other public address systems. The manning of the Distribution Centres will be by members of the Royal Gibraltar Regiment.

The C3 and RGR will need the wind direction before implementing PITs distribution, as deposition or anticipated deposition areas will need to be avoided by distribution personnel.

7.3 STAND-DOWN

7.3.1 A prescriptive stand down procedure is just as important as the activation. The Government of Gibraltar (C3) will make the decision to stand down, acting on advice from the Royal Gibraltar Police, from an emergency by either authorising a staged reduction in response resources or a complete incident end. The decision will be taken in consultation with other key responding organisations. The timely reduction or end will have a profound effect on the population, businesses and the financial status for Gibraltar, where Category 3 has been activated.

7.3.2 Where a release of radioactive substances has resulted in deposition of radioactive substances outside the HM Naval Base, an area may be cordoned and controlled access established until remediation of the contaminated area can be completed. Under these circumstances the emergency stand down may be issued by the Royal Gibraltar Police with the affected area remaining under the control of the Government of Gibraltar for long term recovery where severe contamination has occurred.

7.4 ALL OTHER RESPONDERS, STAND-DOWN

7.4.1 The decision to stand down the initial response organisations will be taken by the Government of Gibraltar acting in consultation with the Royal Gibraltar Police and Gibraltar Health Authority.

7.4.2 Arrangements will be put in place to co-ordinate any on-going activities such as investigations, recovery operations, health surveillance, repairs and reinstatements.

7.4.3 Each organisation will be responsible for notifying their own staff of the stand down arrangements.

RADIATION EMERGENCY RESPONSE PLAN

Environmental Agency

8 ROLES AND RESPONSIBILITIES

In this section the roles and responsibilities of all key responders, both first and second tier, are described. In addition, where appropriate Standard Operating Procedures / instructions are included in the Appendix 8 for certain key individuals, functions and organisations.

- 8.1 Royal Gibraltar Police
- 8.2 City Fire Brigade
- 8.3 Ambulance Service
- 8.4 Emergency Planning
- 8.5 Gibraltar Health Authority
- 8.6 Environmental Agency
- 8.7 Government of Gibraltar (including ministry departments)
- 8.8 Ministry of Defence, including MACP / MACA
- 8.9 Port Department
- 8.10 Electricity, Gibraltar Electricity Authority
- 8.11 Water, AquaGib Ltd
- 8.12 Sewerage, Technical Services Department
- 8.13 Telecommunications, Gibtelecom
- 8.14 Gibraltar Health and Safety

RADIATION EMERGENCY RESPONSE PLAN

Environmental Agency

8.1 ROYAL GIBRALTAR POLICE

8.1.1 Introduction

In an emergency situation, the police have clearly defined objectives and, in association with those objectives, undertake specific functions within the framework of their normal statutory obligations and the overall police role. It is assumed that the only criminal functions of the police will be confined to their normal daily role and not the incident unless called on by the MoD.

8.1.2 Objectives

- Protection of life and property
- Maintenance of public order
- Detection of crime and preservation of evidence
- Management of the threat zone or radiation contaminated area

8.1.3 Functions

- a) Co-ordination of operations. The senior police officer present will identify any Forward Incident Control Posts (ICP) and Rendezvous Points (RVP) for vehicles, where appropriate, in liaison with the other Emergency Services and co-ordinate the operations of participating organisations. In addition, the police will be responsible for the setting up of a cordon to secure the threatened or affected area where this does not affect the majority of territory.
- b) Establishment of a major incident control room. The major incident control room will normally be established at Police HQ in the first instance and set up by the Emergency Control Centre Co-ordinator.
- c) Traffic control. This will present a severe problem if the majority of the populated area is likely to be affected. If a rendezvous point or points are to be set up for emergency vehicles and resources, the Police HQ Operations Room will arrange for personnel and vehicles to be despatched to control the point or points. They will nominate routes for access to and from the rendezvous point or points and will ensure that such routes are kept clear and suitably sign posted. They will notify external agencies of the effects of traffic regulation around Gibraltar.
- d) Establishment of a casualty bureau. The casualty bureau will be established by the officer in charge of the casualty bureau after notification from the Emergency Control Centre Co-ordinator. It is located at the Central Police Station, Irish Town.
- e) Information to the public. This will be managed by the Government of Gibraltar Media Officer who will arrange as necessary for information to be released to the public via the media.
- f) Mortuary duties. The Police as Coroner's Officers will be responsible for work in connection with identification of bodies and furnishing of necessary

RADIATION EMERGENCY RESPONSE PLAN

Environmental Agency

information to Coroner. It is not anticipated that there will be any fatalities directly as a result of a radiation incident.

- g) Security of Property. The Police will be responsible for all aspects of recording and storage of property recovered from casualties sustained outside of HM Naval base. This duty will also include premises and vehicles.
- h) Press Liaison. Initial public advice will be made by the Police Media Spokesperson or nominated police officer in consultation with the Government Media Director. As soon as practicable after an incident the Government Media Director will be responsible for issuing and coordinating all news media information, and will establish a media briefing point and, if necessary, make arrangements to provide media facilities at a nearby Media Centre. It is essential for other organisations to liaise closely to ensure that information for press releases is co-ordinated. See Section 10, Informing and Warning the Public and Section 11, News Media arrangements.
- i) Record of incident. The Police will maintain an operational log as a record of the incident as far as it affects the civil community of Gibraltar.

8.1.4 Mobilisation and Deployment

The Police, as an initial action, will deploy sufficient resources to isolate the contaminated or threat zone and the surrounding area, where it is practical to do so.

8.1.5 Police HQ Operations Room

- a) When alerted by the MoD Incident Control that a Category 1 or higher category accident has occurred, the Police HQ Operations Room will immediately open a log of events and ascertain the following:
 - Confirm the location of the incident
 - A description of the incident and the current situation
 - The radioactive material released, and any other hazardous substances
 - The wind direction and speed
 - The likely threatened area
 - Safe access routes and Rendezvous Point(s)
 - Any special contact numbers in use
 - Who else has been informed
- b) Contact the Government No. 6 Duty Officer and alert him/her of the incident.
- c) Contact other organisations as are appropriate to the incident (see Figure 1, page 18).
- d) Despatch Police Unit(s) to the pre-identified traffic control points via a safe route. The first Senior Police Officer at the Command Centre should consult with the Senior Fire Brigade Officer to identify the threatened areas, which should have been notified by the MoD.

RADIATION EMERGENCY RESPONSE PLAN

Environmental Agency

- e) Establish an Incident Control Command at the Central Police Station or an agreeable alternative location as advised by the MoD.
- f) Deploy other responders to Gold, Silver and Bronze, as necessary.

RADIATION EMERGENCY RESPONSE PLAN

Environmental Agency

8.2 CITY FIRE BRIGADE

8.2.1 Introduction

The Fire Brigade has clearly defined objectives and therefore undertakes specific functions within the framework of their normal duties and statutory obligations.

8.2.2 Objectives

To save life and property, render humanitarian services and restore of normality.

8.2.3 Functions

The role of the Fire Service is derived from its long experience in fire-fighting and rescue operations of all types and includes:

- a) Deploy responders to Gold, Silver and Bronze, as necessary.
- b) Contact Ambulance Service and Gibraltar Health Authority and alert them to the incident.
- c) Rescue of trapped casualties.
- d) Preventing further escalation of the effects of the incident by extinguishing fires, dealing with released chemicals and other hazardous situations and decontamination of persons, both potential and confirmed.
- e) Assist in information gathering and hazard assessment to give advice to the Police to enable them to advise the public.
- f) Liaison with the Police regarding the provision of a cordon around the threat zone or contaminated area outside the HM Naval Base to enable the City Fire Brigade to exercise control (except at terrorist related incidents).
- g) Liaison with the Ambulance Service Incident Officer and the Medical Incident Officer (if there is one present) with regard to providing assistance at casualty handling at Ambulance Loading Points and the priority evacuation of injured persons.
- h) The management of health and safety of all personnel within exclusion / threat zone, where protected persons are permitted.
- i) Consideration of the effect the incident may have on the environment and the action to be taken to minimise this.
- j) Assisting the Police with recovery of the dead, if required to do so, as in the Gibraltar Major Incident Plan.
- k) Participating in investigations as appropriate and preparing reports and evidence for inquiries.
- l) Standby during non-emergency recovery phase to ensure continued safety at, and surrounding, the contaminated area if necessary.

8.2.4 Mobilisation

On initiation of the Plan, Fire Brigade Control will mobilise the Fire Brigade's predetermined response and if appropriate deploy to advised rendezvous points.

RADIATION EMERGENCY RESPONSE PLAN

Environmental Agency

8.3 AMBULANCE SERVICE

8.3.1 Introduction

In an emergency the Ambulance Service has specific functions to achieve their objectives which are an extension of their normal statutory obligations and role. The ambulance service in Gibraltar is operated by the Gibraltar Health Authority.

8.3.2 Objectives

The saving of life and mitigation of injury.

8.3.3 Functions

- a) First aid for casualties and triage. The Ambulance Service, on notification of a suspected or real radiation incident, will check casualties for radioactive contamination. Any casualties found to be contaminated will be the responsibility of the Royal Naval Hospital. The Ambulance Incident Officer will assess and triage casualties outside the threat zone. Any casualties within a radioactive contamination zone will be the responsibility of special Ministry of Defence Medical Teams.
- b) Decontamination. The Ambulance Service is unlikely to be involved in any decontamination operation except in assistance to the City Fire Brigade. Any contaminated, both confirmed or suspected, civilian casualties will be conveyed to the Royal Naval Hospital (RNH) by whatever vehicle is available for decontamination and treatment which shall be provided and serviced by the MOD.
- c) Conveyance to hospital. The Ambulance Service will be totally responsible for all matters relating to the collection and conveyance of casualties or sick persons which are not affected by radioactive contamination from outside the radioactive contaminated area. Where there is no radiological deposition but a threat zone has been identified, the Senior Ambulance Officer will make a judgement as to whether to commit ambulance personnel to collect casualties or sick persons.
- d) Alerting of hospital services. The Fire Brigade control will be responsible for alerting the Ambulance Service. The Ambulance Incident Officer (AIO) and a Medical Officer from either GHA or RNH will make the Health Service initial reconnaissance either jointly or separately, where this is necessary. Casualties with life threatening conditions are most likely to occur from incidents, such as road traffic accidents, rather than from the direct effects from the radiological events of the HM Naval Base. It is the responsibility of the AIO to co-ordinate the assessment, stabilisation and despatch of patients to hospital. If patients are known or suspected to be contaminated with radioactive material then they will transported to the RNH by whatever vehicle is available which shall be provided and serviced by the MOD.
- e) The Ambulance Service has no responsibility for dealing with those casualties pronounced dead in the threat zone or contaminated area. This is a Police matter as directed by Coroner.

RADIATION EMERGENCY RESPONSE PLAN

Environmental Agency

8.4 EMERGENCY PLANNING

Emergency planning is the responsibility of the Government of Gibraltar's Civil Contingencies Committee commonly known as C3.

C3 is a committee of senior Government officials which bring together all of the Government's technical and professional expertise and responsible post holders under the political leadership of the Chief Minister and Minister for Health (who is responsible for Civil Contingency planning). The composition of C3 varies from time to time and is dependant on the emergency to be managed.

C3 is charged with drawing up response plans in relation to different threats that could be foreseen to occur in Gibraltar and with rehearsing these plans and overseeing the implementation of these in the event of need.

To assist the Chief Minister and Minister of Health to carry out their obligations for civil contingencies, emergency planning and support to C3, the Government of Gibraltar has appointed a Civil Contingencies Adviser (CCA). The CCA provides all technical advice on civil contingencies matters and specific emergency plans, which includes the periodic review of all such plans, training of Government personnel in emergency response, exercising of plans and liaison with organisations outside of Government, such as Ministry of Defence and private commercial businesses. In addition, the CCA is responsible for the maintaining of the Government's command and control centres, certain emergency stores and the Emergency Contacts Directory.

In times of an emergency the CCA and his staff undertake an advisory role and ensure that the C3 committee have all necessary resources at their disposal to permit the efficient management of the emergency. The CCA is part of the C3 working at all levels of command and control but principally at Gold level, depending on the nature of the incident. The CCA and his staff are available on-call 24 hours per day.

RADIATION EMERGENCY RESPONSE PLAN

Environmental Agency

8.5 GIBRALTAR HEALTH AUTHORITY

8.5.1 Introduction

In an emergency the Gibraltar Health Authority (GHA) has specific functions to achieve their objectives which are an extension of their normal statutory obligations and role. In the case of a release of radioactive and toxic substances, the Health Authority has the additional objective of long-term health surveillance of the affected population. In situations that involve long-term health implications on the population the C3 Committee will set up a Joint Health Advisory Group (JHAG), which will be chaired by the Director of Public Health. The composition of JHAG will be determined at the time of an incident by the C3 Committee.

It has been agreed with the MoD that any casualty that is either actually or suspected of being contaminated will be treated in the Royal Naval Hospital (RNH) and for whatever injury or illness condition. This will also include all casualties arising from within the affected area outside the HM Naval Base.

8.5.2 Objectives

The key objectives are: Saving life, mitigation of injury, the promotion of recovery, and the long-term health surveillance of the population from effects of exposure to any radioactive release. It is considered most unlikely that there will be any immediate loss of life directly attributable to a radiation incident from the Naval Base.

8.5.3 Functions

- a) The assembly of all information relating to the nature, size and likely effects of an incident.
- b) The design and implementation of an action plan for investigation and control of the effects of a radiological release. Consideration should be given to the psychological trauma that may have been inflicted on the population, whether or not a radiological release has taken place.
- c) The maintenance of records of exposed public and remediation workers to assist in both short term and long term planning for monitoring and care. Such records may be used for epidemiological studies where appropriate.
- d) Provide liaison with, and advice to, appropriate agencies involved in an incident, particularly with respect of exposure of workers to any radioactive material.

8.5.4 Procedures

- a) Alerting Procedure. Once a report of a release or potential release of radioactive material is received the Gibraltar Health Authority will institute their Standard Operating Procedures for the emergency.
- b) Monitoring will be necessary at the entrances of the Accident and Emergency Unit of St Bernard's Hospital to avoid inadvertent contamination spread from self-referral casualties.

RADIATION EMERGENCY RESPONSE PLAN

Environmental Agency

- c) If a casualty is found to be contaminated the person responsible for triage will decide whether the casualty should be sent to RNH. Casualties are likely to present as general accident trauma and not conditions due to the effects of radiation. General trauma accidents are possible due to accidents from rapid evacuation, e.g. road traffic accidents.
- d) If a casualty is suspected or confirmed by monitoring of being contaminated with radioactive substances the Ambulance Incident Officer (AIO) will decide on whether to send the casualty to RNH or decontaminate at the casualty assembly point, if possible.

8.5.5 Co-ordination

Co-ordination with other organisations will be through the Civil Contingencies Committee (C3).

8.5.6 Mobilisation

The Chief Executive Officer (CEO), or Deputy CEO, acting on advice and in consultation with the Director of Public Health (DPH), will be responsible for the mobilising of all health services as they determine. This will also include the reduction in response as the impact diminishes or incident ends. St Bernard's Hospital is a critical resource for Gibraltar and the CEO will consider what measures will be necessary to protect the facility, staff and patients. The mobilisation will need to take this into account when considering deploying staff.

RADIATION EMERGENCY RESPONSE PLAN

Environmental Agency

8.6 ENVIRONMENTAL AGENCY

8.6.1 Introduction

The Environmental Agency Gibraltar is a separate organisation to the Government of Gibraltar to which it is wholly contracted to undertake the tasks of Environmental Health. These duties include:

- a) the monitoring of the safety of water supplies,
- b) the inspection and sampling of food,
- c) the inspection of food premises,
- d) waste management.

8.6.2 Objectives

- a) ensuring the safety of water supplies,
- b) ensuring that food is free from radioactive fission products and safe to eat,
- c) ensuring that contaminated waste is shipped and disposed of properly.

8.6.3 Functions

- a) advising AquaGib on any preventative and any remedial action required concerning water supplies and the operation of desalination plants,
- b) organising as required for the sampling of water supplies,
- c) organising for the distribution of Potassium Iodate Tablets (PITs) by the Royal Gibraltar Regiment once this has been authorised by C3,
- d) the monitoring of the distribution of Potassium Iodate Tablets,
- e) advising proprietors of food premises and the general public on food safety and how to protect food from risk of contamination from radioactive fission products,
- f) ensuring the safe disposal of contaminated waste arising from remediation works,
- g) to prepare and maintain off-site emergency plans as defined under the REPPIR 2004 Regulations².

RADIATION EMERGENCY RESPONSE PLAN

Environmental Agency

8.7 GOVERNMENT OF GIBRALTAR

8.7.1 Introduction

The different departments of the Government of Gibraltar have an important role to play in a wide range of emergency situations. This role will vary with the nature and phase of the emergency. Potentially any Government service could be required, either for front line delivery to the public or in a supporting role to the Emergency Services or other agencies. It is essential that all of the Government of Gibraltar services be prepared to meet their potential requirements.

The nominated lead Departmental Minister, and the Civil Contingencies Committee (C3) has the responsibility of co-ordinating the Government of Gibraltar's response at corporate level in accordance with the Gibraltar Major Incident Plan. Their activities will be supported by Departmental Support Teams as appropriate. Each Minister involved in the incident will also have an administrative support team who will co-ordinate the activities of that particular service delivery in accordance with Ministry or Departmental Procedures.

8.7.2 Objectives

- a) The support of the emergency services and others engaged in the response.
- b) The provision of a wide range of support services for the community.
- c) The recovery and return to normality of the community including areas that may have suffered from radioactive material deposition.
- d) Maintain the Government's normal service at an appropriate level.

8.7.3 Functions

The nature of any emergency invariably requires the involvement of a number of Government department services in partnership with other agencies. Their integration is essential to the effectiveness of the overall response and crucial to the care of those involved.

- a) The provision of services covering the following functional areas will provide the basis for a co-ordinated Government response to any emergency situation:
 - Transport
 - Care and Welfare
 - Emergency Accommodation
 - Emergency Feeding
 - Schools and Public Places
 - Construction and Technical Support
 - Information to the Public
 - Support to Businesses and Industry, including Tourism
- b) There are also two important elements common to all of the functional areas:
 - i. Financial support and record keeping.
 - ii. Legal advice and administrative support.

RADIATION EMERGENCY RESPONSE PLAN

Environmental Agency

- c) Every Department of the Government of Gibraltar will have a contribution to make towards the overall response to an emergency. The roles and responsibilities of the departments are set out below.
- d) Information to the public and media. The Government Media Director will be responsible for providing information to the public and establishing a media briefing point in Gibraltar, including information to the Gibraltar Tourist Board. If necessary, arrangements will be made to provide media facilities at a nearby Media Centre. See Section 10, Informing and Warning the Public and Section 11, News Media arrangements. Appendix 6 contains the public information messages which could form the basis of information releases to both the public and the media.
- e) Ensure that the C3 Committee has independent technical advice available on matters of health physics and radiation monitoring.
- f) Ensure that sufficient expertise and resources are available for monitoring and remediation under this plan.

8.7.4 Chief Minister or nominated lead Minister

The Chief Minister, or nominated lead Minister, is responsible for the overall co-ordination of the personnel and resources of the Government of Gibraltar, which would be used when dealing with major disruptions caused by peacetime disasters. The Chief Minister will also be responsible for liaising with the Governor for any assistance required from HM Government.

8.7.5 Welfare, Social Services and Housing

The appropriate departments of the Government of Gibraltar will need to work closely together on matters of public welfare. This will involve social services for the support of families and those with special needs. In addition matters of housing may arise especially where re-housing or temporary accommodation may be required until the emergency situation and recovery stage is fully resolved.

8.7.6 Public Transport

A Government company owns buses that operate the normal daily bus routes and private tour operators own buses that cover additional routes, notably those serving the tourist trade. In an emergency these services may be commandeered by the Government of Gibraltar to provide an integrated managed public transport system for the controlled movement of the population.

8.7.7 Education

The initial alert should be provided by the Government No. 6 Convent Place Duty Officer.

The Department of Education will be responsible, when advised to do so by the C3 committee, for alerting all schools and other educational establishments during term time to ensure that all pupils and students are sheltered in doors and that all external doors and windows are closed. The same arrangements for informing private

RADIATION EMERGENCY RESPONSE PLAN

Environmental Agency

householders will be applied, except initial calls will be made by telephone as a matter of priority. See Section 10, Informing and Warning the Public.

In addition it will be necessary to ensure that each school / educational establishment has adequate means of communication either as an emergency priority maintained telephone and / or radio. Normal daily school drinking water should be adequate but alternative stocks of bottled water should be considered for up to 4 hours. Beyond this time the C3 committee will need to consider actions to either maintain children in the schools or transport to their homes.

8.7.8 Building and Technical Services

Normal operations of the Building and Technical Services sections may need to be temporarily suspended in support the immediate emergency phase. This may require the deployment of resources to safe locations.

During the recovery stage (see Section 13.3) remedial works may be required, either using direct Government of Gibraltar personnel or hiring and supervising contractors. Technical advisers to the C3 Committee will advise on permissible radiation doses where this appropriate. The UK Government Decontamination Service (GDS) will provide guidance on the decontamination processes available and suitable consultants / advisors. The UK GDS contact details are:

UK Government Decontamination Service
MoD Stafford, Beaconside, Stafford ST18 0AQ
Tel: +44 (0) 8458 501323
Email: gds@defra.gsi.gov.uk

8.7.9 Finance

This is an important issue for any major emergency, and particularly for a radiation emergency emanating from the HM Naval Base, whether or not an actual release of radioactive material has taken place. The Financial and Development Secretary will have overall control of all financial matters. This is outlined Section 14, Financial Arrangements.

8.7.10 Legal Services

The Attorney General will be responsible for all legal matters relating to the Government.

RADIATION EMERGENCY RESPONSE PLAN

Environmental Agency

8.8 MINISTRY OF DEFENCE

8.8.1 Introduction

The HM Naval Base is able to accept up to two Nuclear Powered Warships (NPW) at the designated Z berths. The Ministry of Defence (MoD) is responsible for the operations at the HM Naval Base. An emergency involving a release of radioactive material (real or potential) requires emergency arrangements to be in place, including an alert procedure to the civil power and civil emergency services.

In February 2005 the Ministry of Defence undertook a *Hazard Identification and Risk Evaluation* ¹ as part of their compliance with *The Radiation (Emergency Preparedness and Public Information) Regulations 2004* (REPIR 2004) ². The supporting analysis for the NPW accident conditions was provided by Rolls Royce Naval Marine (RRNM), Derby, who is also the delegated nuclear plant design authority. The assessment report concluded that the operator continued to need an Operator's Emergency Plan. This plan is termed the "On-site" plan.

In the event of an accident leading to a nuclear emergency, both the HM Naval Base and Ministry of Defence have accident and emergency arrangements in place to effectively manage the subsequent accident situation. These arrangements provide maximum protection for all key groups of individuals within the Gibraltar Naval Base.

A continual cycle of exercises and audits has demonstrated that these emergency arrangements work well. In the unlikely event of a reactor accident, decisions on actions such as evacuation, sheltering and the taking of Potassium Iodate Tablets (PITs) by persons within the Naval Base are based on information and data supplied from the NPW and supporting Nuclear Accident Response Organisation (NARO). Specialist technical cells aid the interpretation of the accident scenario and the appropriate accident mitigation measures. In addition, a Reactor Accident Monitoring System and mobile monitoring units will supply further information.

8.8.2 Objectives

To carry out operations on the HM Naval Base in an efficient and safe manner.

8.8.3 Functions

- a) To immediately alert the Royal Gibraltar Police and City Fire Brigade of any incident, which is, or may develop into, an off-site radiological incident.
- b) To sound the ACMZ evacuation alarm as soon as a Category 1 or higher incident has occurred.
- c) To provide immediate technical advice and support to the Royal Gibraltar Police, City Fire Brigade and Gibraltar Health Authority on off-site effects.
- e) To provide a technical liaison person to attend the Civil Contingencies Committee (C3).
- f) To prepare and maintain on-site emergency plans as defined under the REPIR 2004 Regulations².
- g) To provide manpower to distribute PITS as directed by the Environmental Agency, refer to Section 7.2.

RADIATION EMERGENCY RESPONSE PLAN

Environmental Agency

- h) To provide and service appropriate vehicles for the conveyance of any contaminated, both confirmed or suspected, civilian casualties to the Royal Naval Hospital (RNH) for decontamination and treatment.

8.9 PORT DEPARTMENT

8.9.1 Introduction

The Port of Gibraltar has special duties to be carried out in the event of an emergency arising at HM Naval Base berths and seaways. These functions are an extension of their normal operations and are consistent with maintaining safety at sea of vessels traversing the Port seaway, berthed and operations on shore associated with the Port.

There are special considerations for a radiation emergency associated with the Royal Naval Z berths 49 and 50 on the South Mole.

Note: Any radioactive incident involving Z berths 49 and 50 on the South Mole is unlikely to have any significant impact on the Port area with respect to radioactive contamination given that the prevailing winds are mostly West to South-Westerly. However a Southerly wind would have an effect. Wind direction is quoted from where the wind blows from and not to. Therefore, a South-West wind will come from 225° and blow towards the North-East at 45°.

8.9.2 Objectives

- a) preserve health, safety and welfare of all persons employed or using the Port,
- b) provide advice to users of the Port on hazards that may arise within the Port area or external hazards that could impinge on port activities.

8.9.3 Functions

- a) maintain Port activities and business as reasonably achievable during an emergency involving HM Naval Base unless access is restricted,
- b) restrict access and egress to the Port facilities as advised by the C3 committee or Ministry of Defence,
- c) provide a Port representative to the C3 Committee, as required, and advise on the status of Port throughout the emergency,
- d) assist in the decontamination of Port facilities and vessels caught up in the incident where deposition of radioactive material may have occurred,
- e) provide a certificate of clearance for vessels to leave the Port and for cargo landed to be shipped onward by land, as appropriate.

8.9.4 Initial Response

In the event of a Category 1 event, the Captain of the Port will close the Port to entry of all vessels. This may also include restricting access by road. If the alert is of a Category 2 event or worse, then the Captain of the Port will, in addition to closing the Port for entry, may decide to advise vessels to leave if no radioactive material has escaped from HM Naval Base.

RADIATION EMERGENCY RESPONSE PLAN

Environmental Agency

8.9.5 Visiting passenger cruise liners

This may cause a problem for passengers ashore who may not be able to return to the ship due to road access restrictions or the ship sailing. The Captain of the Port may order a ship to sail to protect it from becoming contaminated should the risk be advised by the C3 Committee or MoD.

8.9.6 Vessels embarking

Ships that are berthed and could possibly be subject to radioactive contamination, however remote, should be monitored before they leave the Port. Consideration should be given to providing the master of an embarking vessel a certificate indicating that the vessel has been monitored and cleared to leave. See Section 13, Extended Response and Recovery.

RADIATION EMERGENCY RESPONSE PLAN

Environmental Agency

8.10 GIBRALTAR ELECTRICITY AUTHORITY

In any emergency the maintenance of supply of electricity is vital. In an emergency involving the release of radioactive material into the atmosphere the electrical supply can be interfered with where supply lines cannot be maintained effectively. Areas where radioactive contamination has occurred and there are also failures in electrical supply, for whatever reason, will be particularly vulnerable to lengthy interruptions due to restrictions of entry of maintenance personnel. In addition if the generation plant is in the affected area, operational generation staff will be advised to remain under cover unless it is considered that they should be evacuated for personal safety reasons.

The Gibraltar Electricity Authority will initiate their own contingency plans to maintain appropriate electrical supplies to critical areas of Gibraltar. It is unlikely that any radioactive release incident will cause the generation plant to be out of operation for more than a few days.

8.11 WATER, AQUAGIB Ltd

Water supplies to Gibraltar are the responsibility of AquaGib Ltd. Apart from the normal use, water will also be required for decontamination of people and structures. The underground reservoirs of Gibraltar hold on average 6 weeks supply which might be less during summer peak tourist months. Water is obtained from desalination plants. These plants should not be affected by a radioactive release from the HM Naval Base.

8.12 SEWERAGE, Technical Services Department

Any radioactive deposition will almost certainly enter the sewerage system. It will be vital that the sewerage system is flushed through with water until monitoring confirms that acceptable levels of radioactivity are achieved. Acceptable levels of discharge of radioactive substances into the environment change from time to time and the latest discharge limits will be advised by the Environmental Agency. The discharge of sewerage containing radioactive material from a radiological release is considered acceptable as the level of dilution will be considerable and therefore will not cause any harm to the marine environment. Any rain fall will significantly assist the cleansing of impervious surfaces and sewers.

The monitoring of the sewerage system and marine outfalls will be undertaken by the Technical Services Department to a predefined sampling and monitoring scheme. Assistance from external contractors and Ministry of Defence may be enlisted for this task.

RADIATION EMERGENCY RESPONSE PLAN

Environmental Agency

8.13 COMMUNICATIONS, Gibtelecom

8.13.1 Introduction

Gibtelecom are the main provider of landline and mobile telephone systems in Gibraltar. The Spanish mobile telephone companies also have coverage in many parts of Gibraltar but this should not be relied on in an emergency. It should be noted that mobile telephone systems are not secure unless encrypted transmission through TETRA or a similar system is used.

It is likely that the telephone system will become overloaded in the initial phases of a radiation emergency (see 8.13.5 below).

8.13.2 Emergency Services

The Emergency Services rely on their own radio communication facilities for general communication during an incident. The Government Emergency Services use Gibtelecom's TETRA radio network.

8.13.3 Other responders

The Government of Gibraltar, and other organisations, also have mobile telephones through Gibtelecom and access to landlines.

8.13.4 Escalation and Control

If the situation escalates and necessitates control of the telephone network then the Government of Gibraltar will implement the Essential Users Telephone System. This will restrict the use of all telephones except to registered users. It may only be initiated by the Police after discussion with the Civil Contingencies Committee (C3). An operational Director of Gibtelecom will authorise the implementation of the plan by the company.

8.13.5 Emergency Contacts Directory

A directory of essential and useful telephone numbers and emergency contacts is provided as an annex to the Appendix of this plan but as a separate document. These contact details should be guarded and treated as RESTRICTED, particularly those pertaining to the Ministry of Defence, Government Ministers and ex-directory numbers. The responsibility for maintaining the Emergency Contacts Directory rests with the Government's Civil Contingencies Planning Adviser.

RADIATION EMERGENCY RESPONSE PLAN

Environmental Agency

8.14 HEALTH AND SAFETY

The Government of Gibraltar has its own Health and Safety Inspectorate, known as the Factories Inspectors and is part of the Ministry of Employment. They are responsible for all health, safety and welfare matters relating to the Government employees and legislation covering industrial and commercial businesses in Gibraltar.

They will be responsible for providing advice to Government emergency operations managers and ministers for the deployment of their personnel into both radiation deposition zones and unaffected areas where other risks may be present.

RADIATION EMERGENCY RESPONSE PLAN

Environmental Agency

9 MEASURES TO PROTECT THE PUBLIC

The protection of the public is the aim of this plan. The measures that can be taken to protect the public are dependant on whether prior warning of a release of radioactive material is available. If warning is received, two processes are likely to be conducted. Firstly, the distribution of Potassium Iodate Tablets (PITs) to those members of the public that are considered to be in the estimated plume deposition zone. Secondly, advice to the public to stay indoors. However, if an additional non-radiological emergency arises it may be necessary to evacuate a particular area, whether or not the additional emergency is within the estimated plume deposition zone. A combination of both actions is likely to be undertaken and will be dependant on the information and advice provided to the Gold and Silver Command from available experts.

9.1 NO PRIOR WARNING

An incident where there is no prior warning, although considered not credible, requires the additional actions of monitoring and decontaminating people who may have been exposed in the plume deposition zone. The distribution of Potassium Iodate Tablets (PITs) to people already exposed to a radioactive plume from a nuclear reactor accident is considered worthwhile for up to 24 hours post-event. Respiratory protection from dusts and decontamination can significantly reduce the radiation dose that an individual might receive.

9.2 WARNING RECEIVED

Considering that a warning is received, the most appropriate protection that can be advised is for people to go in and stay in doors until advised that they can leave.

9.3 INITIAL MITIGATORY ACTION

The distribution of PITs has been arranged through the Royal Gibraltar Regiment (RGR), whose members have a good geographical knowledge of the territory and populated areas. The dispensing of PITs even after exposure is considered worthwhile for up to 24 hours post-event but this will raise the issue of safe distribution by the RGR. (See also Section 7.2)

9.4 REST CENTRES / SHELTERS

Rest Centres providing temporary shelter are likely to be required for visitors and tourists. In particular this would apply to passengers ashore, stranded away from their cruise liner, which is either inaccessible in port or has sailed. The establishment of Rest Centres will be as defined in the Gibraltar Major Incident Plan.

Each Rest Centre should, at the earliest opportunity, be equipped with monitoring instruments and competent monitoring staff. A record of each person monitored and the results should be made and a copy sent to the Director of Public Health. Any person found with external radioactive contamination will require thorough supervised showering. See Section 12, Public Health Aspects of a Radiological Accident. It is

RADIATION EMERGENCY RESPONSE PLAN

Environmental Agency

the responsibility of the Competent Authority designated under the REPPIR 2004 regulations² to ensure that there is provision for adequate and suitably equipped rest centres; and the provision of competent staff and monitoring equipment at each rest centre.

It follows that ideally designated Rest Centres / Shelters should have some integral form of washing or the space allocated for a mobile decontamination facility. In general persons evacuated should not be contaminated but this cannot be ruled out. Details of the provision and location of Rest Centres will be found in the Gibraltar Major Incident Plan.

9.5 INFORMATION

An essential part of protecting the public is the provision of practical information for the public to help themselves. See Section 10, Informing and Warning the Public.

Note: the existing GIBPUBSAFE public information messages that would be issued by the MoD are included in Appendix 6.

RADIATION EMERGENCY RESPONSE PLAN

Environmental Agency

10 INFORMING AND WARNING THE PUBLIC

If an emergency within HM Naval Base is likely to escalate and cause a danger to people outside the boundary fence, the Government will issue public emergency instructions by radio, television and public broadcast vehicles.

10.1 EMERGENCY INSTRUCTIONS

The following emergency instruction will be issued.

EMERGENCY INSTRUCTIONS

- 1. Go or stay indoors.**
- 2. Close external doors and all windows, including ventilators.**
- 3. Switch off air conditioning, fans and systems providing ventilation from external air.**
- 4. Do not collect children from school. They will be properly cared for.**
- 5. Tune in to GBC radio / TV for emergency instructions.**
- 6. Do not use the telephone until the ALL CLEAR is given – ensure telephone lines are free for emergency services and if you have an emergency that is life threatening. This is particularly important for mobile phones, which may fail if the network is overloaded.**
- 7. Keep pets indoors to prevent possible contamination entering your home.**
- 8. Remain indoors until the ALL CLEAR is given or until you receive instructions from the Police.**
- 9. Follow instructions from the Police or other officials for returning to your home or usual place of work or activity.**

A pre-determined method of alerting the public to a potential hazard will be arranged between the Police, Government of Gibraltar and Ministry of Defence.

10.2 TOURISTS

Gibraltar is a popular tourist visiting place of international significance, attracting people from many different countries. Tourists enter Gibraltar by road from Spain, the airport and by cruise liners and small pleasure craft through the Port. During peak Summer periods the population of about 28,000 is significantly swelled by several thousands. This will further exacerbate the traffic congestion particularly as the border check-point with Spain is at a single point close to the airport. It is also possible that the Spanish Authorities may close the border, trapping many people within the Gibraltar territory. Tourists will need to be treated as local residents but may require special arrangements depending on their ethnic and national background. The Consular Offices Information can provide suitable assistance for

RADIATION EMERGENCY RESPONSE PLAN

Environmental Agency

languages for people injured, sick or distressed. Details of the Consular Offices can be found in the Gibraltar Major Incident Plan. It should also be considered that a cruise liner in port at the time of an emergency may put to sea either voluntarily or by order of the Port Authority without waiting to re-embark passengers ashore.

10.3 PUBLIC ANXIETY FOR INFORMATION

It is recommended that at the earliest opportunity information points are set up to provide situation reports (SITREPs) to the public. It is recognised that such an action will significantly reduce anxiety and potentially aggressive behaviour.

Another consideration is that families, including tourist groups, may become split further raising anxiety. The exchange of information between information points should be given priority to the establishing the whereabouts of people and their status.

RADIATION EMERGENCY RESPONSE PLAN

Environmental Agency

11 NEWS MEDIA ARRANGEMENTS

11.1 THE MEDIA RESPONSE

When any major incident occurs, the response by the media will be immediate. In addition, an incident involving a nuclear reactor and especially that of a warship will attract overwhelming international attention. Gathering information will be the singular focus of their attention and it is, therefore, imperative that the Government of Gibraltar, emergency services and Ministry of Defence manage jointly and are adequately prepared to meet the demands of the media.

11.2 MEDIA ROLE

The media should not be underestimated and have an important role in assisting the emergency services and Government by disseminating information to the public during a major incident. The media response at a major incident usually occurs in three stages. However, in Gibraltar there are likely to be only two stages.

11.2.1 Local media made up of local press, radio and television. These will be on scene within minutes in such a community as Gibraltar.

11.2.2 International media of over 100 people, are likely to arrive in Gibraltar within four hours of the incident where they can gain access. The Ministry of Defence will restrict access to the waters surrounding the scene and Naval Base but the designated Z berths are easily overseen from the Gibraltar heights, especially around the Cable Car Lift and all points to the summit of the Rock.

11.3 NEEDS OF MEDIA

The needs and requirements of the media have to be addressed in both manpower and equipment terms at the earliest opportunity. Accompanying the ever increasing number of media reporting personnel will be their support services and transport comprising of cars, communication vehicles and mobile satellite equipment and indeed, from the sea by boat. Border restrictions with the Spanish authorities may only delay slightly access by the press who will seek other means. Consideration should be given to coastal patrols to prevent shore landing where feasible. Press should not be permitted in evacuation centres unless evacuees give their unanimous permission.

11.4 MEDIA BRIEFING CENTRE

It is vital that a Media Briefing Centre be established as soon as possible. This establishes a focal point for the media where they can receive initial press statements and regular briefings. The need for adequate vehicle parking may need to be taken into account depending on accessibility to Gibraltar.

11.5 INITIAL MEDIA BRIEFING

RADIATION EMERGENCY RESPONSE PLAN

Environmental Agency

During the initial stages of an incident, the Government of Gibraltar Media Officer may establish a designated Media Briefing Point where all accredited members of the media must be directed.

11.6 ARRANGEMENTS FOR DEALING WITH THE MEDIA / PUBLIC

Whilst each individual agency retains the ability to issue media/public information bulletins regarding their own duties, it is advisable to superimpose over this a co-ordinating structure. Co-ordination will be conducted by the Government of Gibraltar Media Officer. Individual services Public Relation Officers (PRO's) are advised that this team is informed of any information bulletins, preferably prior to their release. The team will be located in the identified Media Briefing Centre.

The Government of Gibraltar Media Team and the Ministry of Defence Public Relations Department will issue information in liaison with each other and with the Police Media Spokesperson.

11.7 ARRANGEMENTS FOR DEALING WITH ENQUIRIES FROM FRIENDS AND RELATIVES OF CASUALTIES

The Police, if necessary, will establish a Casualty Bureau and publicise the public enquiry telephone numbers through the media. An incident involving large numbers of casualties should not arise directly from the radiation hazard itself. However, persons potentially radioactively contaminated who are under care will need to be registered through the Police Casualty Bureau system. The Bureau records must be kept cross-referenced with those of the hospitals and medical centres to enable proper enquiries from relatives and friends to be managed sympathetically and efficiently.

11.8 INFORMATION TO THE PUBLIC

Pre-prepared advice is issued by Ministry of Defence to persons within the Naval Base. Any additional advice given to the public must be agreed by all appropriate organisations prior to its release via the media or other appropriate means. Advice to the public will vary according to the circumstances prevailing at the time.

If specific messages regarding the incident are to be released they will be jointly compiled by relevant members of the response agencies and will be issued by the Government Media Director.

It is vital that Situation Reports are provided to the public so as to maintain confidence, trust and co-operation of the public. This applies equally to personnel engaged in the emergency at all levels and in particular their families.

11.9 MEDIA BRIEFING CENTRE

The only provision made for a Media Briefing Centre is the John MacIntosh Hall.

RADIATION EMERGENCY RESPONSE PLAN

Environmental Agency

12 PUBLIC HEALTH ASPECTS OF A RADIOLOGICAL ACCIDENT

12.1 PUBLIC HEALTH RESPONSE

The Director of Public Health is responsible for co-ordinating the public health aspects of the response to any emergency that impinges on the health of the population. He has a key role in maintaining the health of the public and emergency responders. In this context, visitors and tourists are also included. The health of all HM Naval Base personnel is the responsibility of the Ministry of Defence, although arrangements exist between the Ministry of Defence and the Gibraltar Health Authority to support each other where feasible and practicable to do so. The responsibility for managing all casualties, whether known to be contaminated or suspected, will be undertaken by the MoD.

12.2 RESPONSE TO RADIATION DEPOSITION OFF-SITE

Where deposition of radioactive material has been confirmed outside of the HM Naval Base by the MoD Health Physics teams, the Competent Authority appointed under the REPPiR 2004 regulations² will ensure routine monitoring is undertaken in conjunction with the MoD when it is considered safe to do so.

Areas which are shown to contain significant hazardous levels of radioactive contamination will be identified by the MoD, Competent Authority and other expert sources contracted to assist the Government of Gibraltar. The length of time that an area may be hazardous to health will be a function of the radionuclide half-lives involved and concentration of deposition.

12.3 MONITORING

Monitoring may include the measurement of radioactive material in the environment and monitoring of people for contamination. In the latter case this would be at the time of a release or in the next few days post-event. In all cases records must be made of each person monitored and results passed to the Director of Public Health for assessment and surveillance management.

Once the immediate release event has subsided it will be necessary to monitor the environment to establish the severity and extent of contamination. Again records will need to be maintained and the changing effects to be reported as determined by the Government of Gibraltar.

Monitoring will include direct radiological monitoring of surfaces and the taking of samples for laboratory analysis (most likely carried out in UK through MoD).

Samples may include sources from earth, vegetation, animals, water (especially rain run-off), and swabs from surfaces such as roofs, roads and building entrances.

The method of taking samples and the subsequent management will be the responsibility of the Competent Authority appointed under the REPPiR 2004 regulations² in keeping with their normal surveillance programmes.

RADIATION EMERGENCY RESPONSE PLAN

Environmental Agency

12.4 DECONTAMINATION

If anyone is exposed to radioactive material from deposition outside HM Naval Base they must be decontaminated without delay. The first priority will be to protect individuals' airways to prevent or at least minimise the inhalation of radioactive material. This will be particularly important before clothing is to be removed prior to decontamination washing. Generally radioactive particles are easily removed by washing with warm water and detergent, showering being the most effective means. Wherever possible families should be kept together and young children and infants allowed to be decontaminated by their parents with assistance as required. Personal modesty should be maintained at all times. There is usually no major urgency to decontaminate people from radioactive materials as compared to hazardous reactive chemicals. An exception to this will be persons with open wounds. Advice on the means of decontaminating should be verified at the time with the Ministry of Defence and Health Protection Agency (Radiological Protection) in the UK as this is under continual development and review.

12.5 AIR MONITORING

Air monitoring will be an important tool for estimating the end of deposition and continued assessment during the recovery phase where remobilisation of contaminated dusts might occur. These results will be supplied to the Health Authority on the same regular basis of monitoring or if additional monitoring is requested. Air quality monitoring will be managed by the Competent Authority appointed under the REPIR 2004 regulations².

12.6 LONG TERM SURVEILLANCE

Perhaps this will be the singular most important function of the Health Authority. It will take place for a long period of time and determined by the Director of Public Health in conjunction with advice from the UK Health Protection Agency and International Atomic Energy Agency as required. The surveillance will continue for individuals known to have been exposed, for several years post-exposure, dependant on the individual's wishes. In addition, people who are known not to have been exposed but are resident in Gibraltar may be approached to volunteer to be monitored as a control.

During the recovery phase, all workers operating in a known contaminated area will also be placed under continual health surveillance as an extension to the surveillance of the emergency responders working in the area.

RADIATION EMERGENCY RESPONSE PLAN

Environmental Agency

13 EXTENDED RESPONSE AND RECOVERY

The release of radioactive material that may deposit in the environment of Gibraltar is likely to cause a restriction on the access of the land and facilities depending on the amount and severity of radionuclides released. Short-lived radionuclides will not present a long term problem. An incident may result in an extended response period especially where there is significant contamination to facilities that have a direct affect on public services and business. The recovery from a severe release will also require significant long term management.

13.1 EXTENDED RESPONSE

The majority of the radionuclides have half-lives that will extend into several years, except radioactive iodine (^{131}I) which will have decayed completely within 3 months. Iodine is the most volatile and easily absorbed element.

The quantity of radioactive material contaminating the deposition area, depending on the conditions of release and deposition, is likely to be small and dispersed homogenously, and although measurable, could well be below international limits of exposure for most of the initially affected area.

An estimate of when an affected area can be re-entered and made liveable could be as short as 3 months or perhaps up to a year or so depending on weather conditions. Rain will cause particle material to be either washed away into the sea or absorbed deeper into the ground. Some of the material may be soluble and therefore made further safe by increased dilution due to rain.

13.2 RECOVERY

The Recovery Management Team would need to consider the following when devising a recovery programme. The remediation and recovery would need to be set against the overall benefits obtained.

Advantages	Disadvantages
Improved public perception	remediation workers receive radiation doses
Return to normality (need to be defined)	waste generation and associated issue of volumes, activities, transport, storage, disposal
Public reassurance	Social disruption
Public dose savings	Environmental damage
Consideration of and protection for wildlife	Loss of earnings / livelihood
Limiting damage to people's livelihood	Monetary costs / claims for compensation
	Reduction in flexibility to apply subsequent remediation options

Source: Nuclear Emergency Planning Liaison Group: *Civil Nuclear Emergency Planning - Consolidated Guidance*, Handbook Chapter 17, DTI, UK, 2003.

RADIATION EMERGENCY RESPONSE PLAN

Environmental Agency

Advice on methods of decontamination and removal of contaminated material can be obtained from the UK Government Decontamination Service, MoD and DTI (NEPLG - Recovery working Group). They will also advise which contractors may be suitable. Contact details of the UK Decontamination Service will be found in Section 8.7.8.

13.3 REMEDIATION

Following an accident involving a release of radioactive material, the residual hazard would come from the long-lived contamination which may remain on the ground for many years. A number of techniques, including washing, chemical cleaning, vegetation removal, turning of land and building demolition could be used to decontaminate areas after the accident. There are no UK national criteria, at present (2006), for decontamination after an accident and any decisions would be taken in light of the particular circumstances of the accident. Timescales would allow all necessary local and national authorities to be included in these considerations.

The UK Health Protection Agency (Radiological Protect Division) has issued guidance in this area in their document *Intervention for Recovery After Accident* (NRPB 1998) and this guidance is summarised here for information. It is based on separating potential recovery countermeasures into three categories as shown in the table below.

Recovery Countermeasures: Categories

Category	Description	Examples
A	Moderately dose effective, relatively low resource / disruption, prompt implementation, completed within about one month.	Ploughing of large areas of grass. Extended evacuation / short-term relocation (short-lived radionuclides). Vacuum sweeping / fire hosing all metal surfaces. Grass cutting.
B	Dose effective, relatively high resource / disruption, long duration / lasting impact.	Turf / soil removal and replacement. Double digging all soil / grass areas. Road planning. Prolonged or permanent relocation.
C	Either poorly dose effective or: moderately dose effective, high resource / disruption etc.	Fire hosing buildings. Sandblasting walls. Roof replacement. Cleaning indoor surfaces.

13.2.1 Measures in Category A could generally be completed within the first month following the accident and, once completed, would incur no further disruption. Combinations of such measures can also be highly dose effective. They therefore clearly meet the aim of facilitating prompt return to normal living. Since the costs of these countermeasures (in the widest sense of the word) are relatively small, it is proposed that consideration should always be given to whether it is appropriate to implement remediation countermeasures in this Category even for very low levels of exposure. Prompt implementation of appropriate measures in this Category should ensure that doses are reduced

RADIATION EMERGENCY RESPONSE PLAN

Environmental Agency

to low levels (at most a few mSv in the year following the accident) following all but the most severe accidents.

- 13.2.2 More disruptive countermeasures (i.e. those in Category B) are difficult to complete within the first month, or continue to cause disruption after they are completed, or require substantial resources. They are less effective therefore in facilitating a prompt return to normal living. Also potential costs are likely to be high, and it is proposed that measures in this Category are unlikely to be justified in circumstances where the annual projected dose is less than 10 mSv. At projected doses of around 10 mSv in the first year it is likely that only the least disruptive of these measures would be justified.
- 13.2.3 Measures in Category C would not in general be justified on radiological grounds. However, they might be included in a recovery strategy, either because the circumstances of the accident prevent other, more effective countermeasures being implemented, or for reasons other than dose reduction. For example, the cleaning of indoor surfaces would not normally be expected to avert significant dose, but may well provide a high degree of reassurance for people in their homes and workplaces. This guidance is summarised in table below.

Summary of Guidance of Intervention for Recovery

Circumstances	Countermeasures	
	To consider	Unlikely to be justified
Any off-site contamination	Category A	Category B, Category C [note 1]
Dose >10 mSv y-1	Category A, Category B [note 2]	Category C [note 3]
Lifetime dose >1 Sv	All	None

Note 1: May be justified in support of other measures

Note 2: Need to offset increasing resource / disruption with increasing dose averted

Note 3: May be justified in support of other measures, or if Category B measures impractical

13.4 RELEASE OF CONTAMINATED GOODS, PROPERTY AND VEHICLES

The Recovery Management Team, set up by the C3 Committee or Competent Authority, will advise on the clearance and certification process for releasing property, cargo, sea-going vessels, aircraft and motor vehicles. No movable goods, property or vehicles should be allowed to leave Gibraltar until the levels of radioactive contamination, real or suspected, are at or below the limits set by the IAEA; such limits are continually under review. Expert advice should be obtained at the time as to what would be the acceptable levels.

The clearance certification should include the actual results of the monitoring and, if appropriate, the background levels of natural radiation. It is important to differentiate between the presence of natural radiation and that which might have resulted from an incident.

RADIATION EMERGENCY RESPONSE PLAN

Environmental Agency

14 FINANCIAL ARRANGEMENTS

A major emergency incident involving a release or potential release of radioactivity from HM Naval Base will necessarily incur expenditure by the Government of Gibraltar and the emergency services above that normally encountered in their daily operations. Under these circumstances the Ministry of Defence will be liable for reimbursing all necessary expenditure. This will require adequate control of finance and the establishment of procedures that can be brought into effect quickly to assist the emergency management team. In the case of a radiological incident such financial arrangements must be robust as the effects of any radioactive contamination and the subsequent recovery would most likely continue for a considerable length of time.

The financial arrangements that would be applied in a major incident would be implemented. In addition, consideration would need to be given by the C3 Committee to the location of Government services and in particular the finance section. Apart from the financial arrangements for managing an incident and the subsequent recovery, the daily financial service would need to be maintained.

The Recovery Management Team would require finance personnel dedicated to the recovery operation unless it was considered that the additional burden could be sustained within the existing Finance section. The normal arrangements for obtaining receipts and control of invoices would apply but consideration would need to be given to obtaining additional copies for the MoD.

It should be recognised that time to engage a suitable contractor for a particular operation may over-ride the necessity to obtain competitive quotations.

Where assistance is required that is not directly applicable to an incident emanating from HM Naval Base, then the normal guidance applied in the UK to requesting and engaging assistance from the MoD will apply under the Military Aid to the Civil Authority (MACA). This is described in the MoD Interim Joint Doctrine Publication (IJDP-02).

RADIATION EMERGENCY RESPONSE PLAN

Environmental Agency

15 ENVIRONMENTAL CONSIDERATIONS

15.1 IDENTIFYING MAJOR ACCIDENT HAZARDS

Major radiation accident hazards to the environment will be those where events have the potential to:

- to affect normal day-to-day activities;
- pose knock-on threats to human health by contamination of food or drinking water;
- affect large areas of land designated for conservation, amenity or planning purposes;
- be long term or persistent and / or inhibit natural processes of regeneration;
- be severe by causing significant permanent or long-term damage to the ecosystem (direct, indirect or knock-on), such as reduced breeding success of protected species, or reduced biodiversity of protected habitats, or destruction / reduction in quality of a significant proportion of the area of a rare habitat.

15.2 ACCIDENT SCENARIOS

A nuclear accident at the HM Naval Base will be a unique event due to several variables, i.e. the range of radionuclides, the concentrations and quantities involved, the receiving environment, available pathways for dispersion, prevailing meteorological conditions, etc. This individuality of incidents may mean that it is generally not possible to predict precisely the impact, or duration of effects, suffered by the local environment. To this end, the following accident scenarios are offered for consideration.

15.2.1 Fire in primary containment. This can pose a substantial threat to the environment because this may release radionuclides into the air that may disperse over a wide area more easily than any other radiological event. However, a fire in the primary containment can only present a radiological hazard if both the primary and secondary containments are breached. Fires tend to cause products of combustion, vaporous material and fine dust debris to be carried high into the atmosphere that will then redeposit over a wide area. This would pose a significant hazard to the environment except perhaps the sea water and harbour sea bed muds.

15.2.2 Explosion breaching containment. This will also pose a substantial threat to the environment because an explosion may release material from the confines of the warship. Again, both the primary and secondary containments will need to be breached for a radiological hazard to occur. An explosion not accompanied by a fire may release toxic material but is unlikely to be expelled to any significant height when compared to a fire. The release of radioactive material could pose a particular threat under stable air conditions.

15.3 ENVIRONMENTALLY SENSITIVE AREAS

The Upper Rock is a protected nature reserve.

RADIATION EMERGENCY RESPONSE PLAN

Environmental Agency

16 TRAINING AND TESTING

The objective of testing the radiation emergency plan is to give confidence in the following constituents of the plan:

- the completeness, consistency and accuracy of the emergency plan and other documentation used by organisations responding to an emergency
- the adequacy of the equipment and facilities
- the competence of staff to carry out the duties identified for them in the plan and their use of the equipment and facilities

16.1 ASPECTS OF PLAN TO BE TESTED

The overall testing regime for the off-site emergency plan will be similar to the Gibraltar Major Incident Plan but will have a greater emphasis on activation, alerting the emergency services, public warnings, and mobilising HM Naval Base personnel who may assist the Government of Gibraltar and civil emergency services in the event of an emergency.

All other aspects are common to the Gibraltar major Incident Plan.

Regular liaison with the MoD, HM Naval base, to programme exercises to fit in with their onsite exercises would be of benefit to both the civil emergency responders, MoD and Government of Gibraltar.

16.2 METHODS OF TRAINING AND TESTING

Exercises to test the on-site and off-site emergency plans should be viewed as part of the on-going training of key personnel in preparation for dealing with an emergency. There are a number of forms that such exercises can take and these include: drills, seminar exercises, walk-through exercises, table-top exercises, control post exercises, and live exercises.

All of these are common to the Gibraltar major Incident Plan and other emergency response plans. Seminar and table-top exercises would be appropriate and cost-effective means of exercising the plan.

16.3 TIMETABLE FOR TESTING

Emergency plans have to be reviewed, revised and tested periodically and not exceeding three years. The testing of emergency plans should be based on an accident scenarios identified in the safety report as being reasonably foreseeable.

Aspects of this plan may be tested in combination with other plans such as the Gibraltar Major Incident Plan, and in particular the activation of command and control.

The timetable for testing all emergency response plans is vested with the Civil Contingencies Planning Adviser.

RADIATION EMERGENCY RESPONSE PLAN

Environmental Agency

17 DEBRIEFS

It is essential that all staff involved in an incident be debriefed if lessons are to be learnt and improvements to future incident response be achieved. These should be conducted at all levels from front line staff up to senior management.

Internally, each agency will conduct its own debriefs using local line management. On an inter agency level, the C3 Committee may request the Police to co-ordinate a multi-agency debrief, if it considers it appropriate. Similarly, departmental and corporate debriefings can also be convened following any scale of emergency.

An important benefit of debriefing personnel involved is that it can assist in the psychological recovery of individuals who may have been traumatised by the event. This may go a long way to reducing post traumatic stress syndrome.

17.1 ORGANISATION

In order to maximise the benefits, a number of points should be observed to enable debrief meetings to proceed effectively.

17.1.1 Convened at the appropriate time

Local Team debriefings	in the first "shift" immediately following the stand-down of the incident.
Departmental debriefings	not later than 5 working days after the emergency services have stood down.
Corporate debriefings	not later than 7 working days after the emergency services have stood down.
Inter-Agency debriefings	not later than 14 working days after the emergency services have stood down. (Can be extended to 28 working days if necessary for a major protracted event).

The time periods shown above are a guide; the longer the time after the event or particular episode the less value the debriefing will be.

17.1.3 Held at an appropriate venue

The venue must be able to accommodate all those who are likely to attend. It must also be able to provide for any special needs such as the use of audio-visual equipment which could be used as an aid to the debriefing.

17.1.4 Chaired by an appropriate authority

In the event of a radiological emergency or major incident, it has been agreed that the Government of Gibraltar will appoint a suitable Government person or organisation to convene and chair inter-agency debriefings.

Organisation specific team debriefs should be conducted by the local line management of the organisation and include contractors where appropriate. For

RADIATION EMERGENCY RESPONSE PLAN

Environmental Agency

example, involvement of voluntary organisations, business and tourism may be incorporated with the appropriate Government ministry or department.

17.1.5 Chaired by an appropriate person

Multi-agency debriefings should be chaired by a Police Officer of rank not less than that of a superintendent in the event of a major disaster or that of a Senior Officer for debriefings. Such a person should be skilled and experienced in conducting meetings and must be able to call on the support of officers from their legal departments to advise as appropriate. The chairperson should also ensure that a record of proceedings is taken by a suitably experienced officer.

17.1.6 Constructive

The aim of every debriefing session should be to evaluate what has occurred and if necessary to introduce positive changes which will ensure a continued effective response to emergencies in the future. It is acknowledged that emergency preparedness is a dynamic and ongoing process and debriefings are an essential element of effective planning. It should not be seen as an opportunity to apportion blame or to single out a "scapegoat" which can only be counter-productive.

17.1.7 A forum to exchange information

It may not always be clear how different authorities and agencies responded to an emergency. Debriefings can provide an excellent opportunity for all concerned to gain an appreciation of the difficulties and responses of each organisation. Such enhanced understanding should foster a more informed response for future emergencies.

17.1.8 Conclusions / recommendations

Managers and officers of organisations attending debriefs will decide whether they should produce minutes or a report of the proceedings. It should be borne in mind that all information, conclusions and recommendations will be public information. Matters involving UK national security would be advised by the Ministry of Defence and should be excluded from debriefs. The release of radioactive material from HM Naval Base Gibraltar in an incident and the subsequent alert to the civil authority should not involve any security classified aspects. Those organising the debrief will also determine who should receive copies of such documents.

17.2 INQUIRIES / INVESTIGATIONS

It should always be borne in mind that the discussions, minutes or reports of debriefings could be used in inquiries or investigations by or against the Government of Gibraltar, as the civil authority, including the emergency services. Representatives from legal departments will be able to advise on this issue during the debriefing.

An incident investigation conducted by the UK Government or Ministry of Defence, may also request records for their own enquiries.

It follows, therefore, that all records in whatever form must be preserved and controlled. In addition, such records will be available to the public under the Freedom of Information Act (UK 2005) and Gibraltar equivalent, except those

RADIATION EMERGENCY RESPONSE PLAN

Environmental Agency

documents that are exempt under security considerations, pertaining to criminal proceedings, or commercial activities not covered by the Act. The exemption sections that could apply are Sections 23, 24 and 26. The Legislation Support Unit of the Government of Gibraltar can advise on all aspects of the Freedom of Information Act (UK 2005) and Gibraltar equivalent.

RADIATION EMERGENCY RESPONSE PLAN

Environmental Agency

18 REVIEW AND EVALUATION

All emergency plans require periodic review and evaluation to ensure that they remain valid. The review process should take into account changes in legislative requirements, changes of infrastructure of key responding organisations, including roles and responsibilities. In addition, improvements in communication and technological advances should also be incorporated to ensure that plan users are in a position to respond more effectively. This may include the means of disseminating plans and their ease of accessibility.

Emergency plans are usually evaluated against a schedule of exercises designed to test particular plan aspects or procedures. Multi-agency exercises have the added advantage of also enabling plans to be reviewed with respect to the involvement of individual responding organisations which otherwise could be over-looked during internal organisation changes.

Formal plan and procedures review should include an examination of training requirements both for existing personnel and in particular new staff. All organisations that may be called on to respond to a radiological emergency should include in their staff induction programmes the basic aspects of emergency planning and response.

The periodic review of this plan should be carried in conjunction with a review of other emergency plans and operational procedures so as ensure that there is no conflict or omissions between plans.

The custodian of this plan will undertake the periodic review, which shall not exceed three years as required under Section 10(1) of the REPPPIR 2004 regulations².

RADIATION EMERGENCY RESPONSE PLAN

Environmental Agency

19 References

- 1 Ministry of Defence: *Gibraltar 'Z' berths, Report of Assessment of the Hazard Identification & Risk Evaluation*, February 2005.
- 2 *The Radiation (Emergency Preparedness and Public Information) Regulations 2004*; (these are known as REPPIR 2004 regulations for Gibraltar), Gibraltar Gazette, Legal Notice No. 87 of 2004.
- 3 Government of Gibraltar, *Major Incident Plan*.
- 4 Ministry of Defence, *Gibraltar Nuclear Operator's Emergency Plan*, HM Naval Base Gibraltar.
- 5 Government of Gibraltar: *Gibraltar Major Incident or Emergency Advisory Booklet*, Publications Office, 2005.
- 6 International Atomic Energy Agency: *Preparedness and Response for a Nuclear or Radiological Emergency*, IAEA Safety Standard GS-R-2, Vienna, 2002.

General sources referenced during construction of plan.

United Kingdom Government: *Civil Contingencies Act*, Civil Contingencies Secretariat, Home Office, London, 2004.

Dealing with Disaster, Civil Contingencies Secretariat, Cabinet Office, HM Government, UK, 3rd ed, 2003.

The Exercise Planners Guide, Home Office, HM Government, UK, Millennium issue, 2000.

Ministry of Defence: *Operations in the UK: The Defence Contribution to Resilience*, Interim Joint Doctrine Publication 02 (IJDPO2), Joint Doctrine & Concepts Centre, MOD Shrivenham, UK, December 2004.

International Atomic Energy Agency: *Arrangements for Preparedness for a Nuclear or Radiological Emergency*, IAEA Safety Standard DS105, Vienna, final draft version 8 sent for approval 7 October 2005. (note: should be used with IAEA GS-R-2, ref 7)

International Atomic Energy Agency: *Emergency Notification and Assistance, TOM*, IAEA EPR-ENATOM (2004) and *Joint Radiation Emergency Management Plan*, IAEA EPR-JPLAN (2004), Vienna, 2004.

International Atomic Energy Agency: *Preparation, Conduct and Evaluation of Exercises to Test Preparedness for a Nuclear or Radiological Emergency*, IAEA EPR-EXERCISE (2005), Vienna 2005.

Nuclear Emergency Planning Liaison Group: *Civil Nuclear Emergency Planning - Consolidated Guidance*, Handbook, Department of Trade & Industry, United Kingdom, April 2003

RADIATION EMERGENCY RESPONSE PLAN

Environmental Agency

APPENDIX

Appendix

- 1 Terminology and Abbreviations
- 2 Location of Site
- 3 Plume Dispersion / Deposition Diagrams – Gibraltar
- 4 Technical Data, Nuclear Reactor Fission Products
- 5 Contamination and Radiation Dose Intervention Levels
- 6 Initial Public Information Statements
- 7 Basic Awareness of Radiation and Radiation Protection
- 8 Standard Operating Procedures

RADIATION EMERGENCY RESPONSE PLAN

Environmental Agency

APPENDIX 1

TERMINOLOGY AND ABBREVIATIONS

Note: Wherever possible SI units have been used and their equivalent common usage units provided for clarity. Names of chemical substances are shown to the standards of the International Union of Pure and Applied Chemistry (IUPAC) with common or colloquial names included for ease of understanding.

Alpha Particle	Fast moving helium nucleus ^4He . Stopped by few millimetres of air or surface of skin but harmful if taken inside the human body.
Atom	Smallest unit of an element, having all the characteristics of that element and consisting of a dense, central, positively charged nucleus surrounded by a system of electrons. Cannot be divided in a chemical reaction except for limited removal, transfer, or exchange of certain electrons.
Atomic Mass	Atomic weight including protons and neutrons.
Atomic Number	Number of protons in an atom.
Becquerel (Bq)	The SI derived unit of radioactivity. "Radioactivity" is caused when atoms disintegrate, ejecting energetic particles or electromagnetic radiation. One becquerel is the radiation caused by one disintegration per second.
Beta Particle	Electron, negatively charged particle but can be positively charged (positron). Wide range of energy levels. Stopped by a few metres of air. Depending on energy can be stopped by thick fabric, thin metal sheet, concrete and water. Harmful if taken inside the human body but less harm than alpha particles.
Danger Areas	Area having been contaminated from radioactive fall-out.
Fission Products	Stable and unstable nuclides from atomic fission process.
Gamma Radiation	Electromagnetic radiation emitted from the nucleus of an atom; sometimes called gamma rays. Absorbed by thick metal and concrete but may travel several metres in air. Risk is from external irradiation of human body.
Gray (Gy)	The SI unit of radiation dose. Radiation carries energy, and when it is absorbed by matter the matter receives this energy. The dose is the amount of energy deposited per unit of mass. One gray is defined to be the dose of one joule of energy absorbed per kilogram of matter.
Ionising Radiation	Radiation that causes ionisation in recipient living cells.
Isotope	Nuclides of same element, same atomic number but different atomic mass.
Nuclide	Distinct nuclear species (synonymous with isotope).

RADIATION EMERGENCY RESPONSE PLAN

Environmental Agency

Radiation Dose	Energy imparted from radioactive substances to living and inanimate matter from energetic particles or electromagnetic radiation.
Radioactive Contamination	Radioactive material deposited in the environment potentially causing a hazard to health especially when taken inside the human body.
Radioactive Decay	Gradual decrease in radioactivity of a radioactive substance.
Radioactive Deposition	Radioactive particles deposited into the environment from atmospheric dispersed radioactive material, including irradiated debris and radioactive particles bound to debris.
Radioactive Half-Life	Time taken for the radioactivity to be reduced to half.
Radioisotope	Radioactive isotope.
Radionuclide	Radioactive nuclides.
Risk	A function of the probability (or likelihood) of harm actually occurring and the severity of its consequences.
Risk Assessment	The identification of the hazards present and an estimate of the extent of the risks involved, taking into account any precautions that may have been taken or other mitigation measures. Sometimes known as Hazard Analysis.
Sievert (Sv)	An SI unit used for measuring the effective (or equivalent) dose of radiation received by a human or some other living organism. Different forms of radiation have different effects on living tissue, therefore a simple measurement of dose as energy received, stated in grays, does not give a clear indication of the possible effects of the radiation. The equivalent dose, in sieverts, is equal to the actual dose, in grays, multiplied by a "quality factor" which is larger for more hazardous forms of radiation. An effective dose of one sievert requires 1 gray of beta or gamma radiation but only 0.05 gray of alpha radiation or 0.1 gray of neutron radiation. The sievert is a large unit, therefore radiation doses are usually measured in millisieverts (mSv).
Stable isotope	Element (nuclide) not exhibiting radioactive decay.
Threat Zone	Area potentially at risk from radioactive deposition.
Unstable	Element (nuclide) undergoing radioactive decay.
X-Ray Radiation	Electromagnetic radiation from an atom due to loss of charged particles, e.g. loss of electrons. Longer wavelength than gamma but shorter than ultra-violet. Effects are similar to but less than gamma radiation.

RADIATION EMERGENCY RESPONSE PLAN

Environmental Agency

ABBREVIATIONS

ACMZ	Automatic Counter Measure Zone (site operator)
AIO	Ambulance Incident Officer
C3	Civil Contingencies Committee (Government of Gibraltar)
ECC	Emergency Control Centre
GIBPUBSAFE	Gibraltar Public Safety Scheme for nuclear accidents
HPA	Health Protection Agency (UK)
HSE	Health and Safety Executive (UK)
IAEA	International Atomic Energy Agency
IUPAC	International Union of Pure and Applied Chemistry
MACA	Military Aid to Civil Authorities (MoD)
MACP	Military Aid to Civil Power (MoD)
MoD	Ministry of Defence (UK)
NARO	Nuclear Accident Response Organisation (MoD, UK)
NPW	Nuclear Powered Warship
PITs	Potassium Iodate Tablets (also potassium iodide is used)
PTSS / PTSD	Post Traumatic Stress Syndrome / Disorder
REPPIR	Radiation (Emergency Preparedness and Public Information) Regulations, Gibraltar, 2004
RGP	Royal Gibraltar Police
RGR	Royal Gibraltar Regiment

RADIATION EMERGENCY RESPONSE PLAN

Environmental Agency

APPENDIX 2

HM NAVAL BASE GIBRALTAR



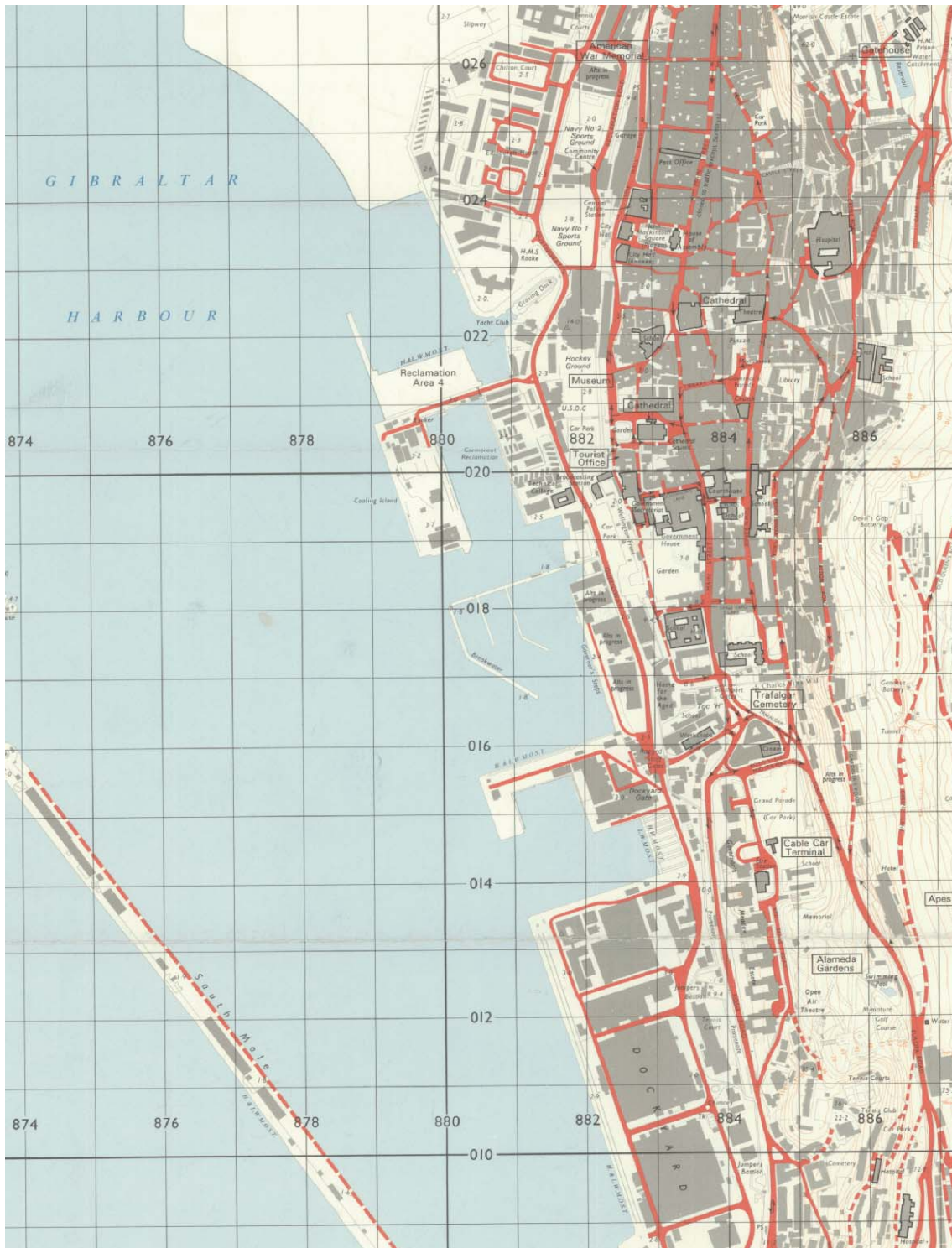
Source: Directorate General Military Survey, Ministry of Defence, London, 1971.

Z berths located on South Mole between Easting 874-876 and Northing 014-016
Scale 1:5000 Grid 100m

RADIATION EMERGENCY RESPONSE PLAN

Environmental Agency

HM Naval Base and Gibraltar City / Harbour



Source: Directorate General Military Survey, Ministry of Defence, London, 1971.

RADIATION EMERGENCY RESPONSE PLAN

Environmental Agency

Scale 1:5000 Grid 100m

RADIATION EMERGENCY RESPONSE PLAN

Environmental Agency

APPENDIX 3

PLUME DISPERSION / DEPOSITION DIAGRAMS

The three plume dispersion and deposition diagrams included in this Appendix are for general information only and should not be used for real emergency response, although may be used for exercise and training purposes. In a real emergency the MoD will supply a plume dispersion with anticipated doses and deposition.

The example plume dispersion and deposition diagrams have been calculated against a general weather condition where the prevailing wind is from the South-West, under Pasquill stability weather category D3, using the PUMA dispersion model. Pasquill category D3 represents neutral weather conditions with average wind speeds at about 5 m s^{-1} . The main isotope plotted is Iodine-131.

Scientific number notation has been used on the diagrams. The following examples are provided for a better understanding.

Unit	Scientific notation	SI units			
Sievert (Sv)	5.00E-02	5.00×10^{-2}	0.050 Sv	50 mSv	50,000 μSv
Sievert (Sv)	3.50E-02	3.50×10^{-2}	0.035 Sv	35 mSv	35,000 μSv
Sievert (Sv)	1.00E-02	1.0×10^{-2}	0.01 Sv	10 mSv	
Becquerel (Bq)	1.00E+07	1.0×10^7	10,000,000 Bq	10 MBq	

Sievert is the unit of absorbed dose of radiation. (See Appendix 1)

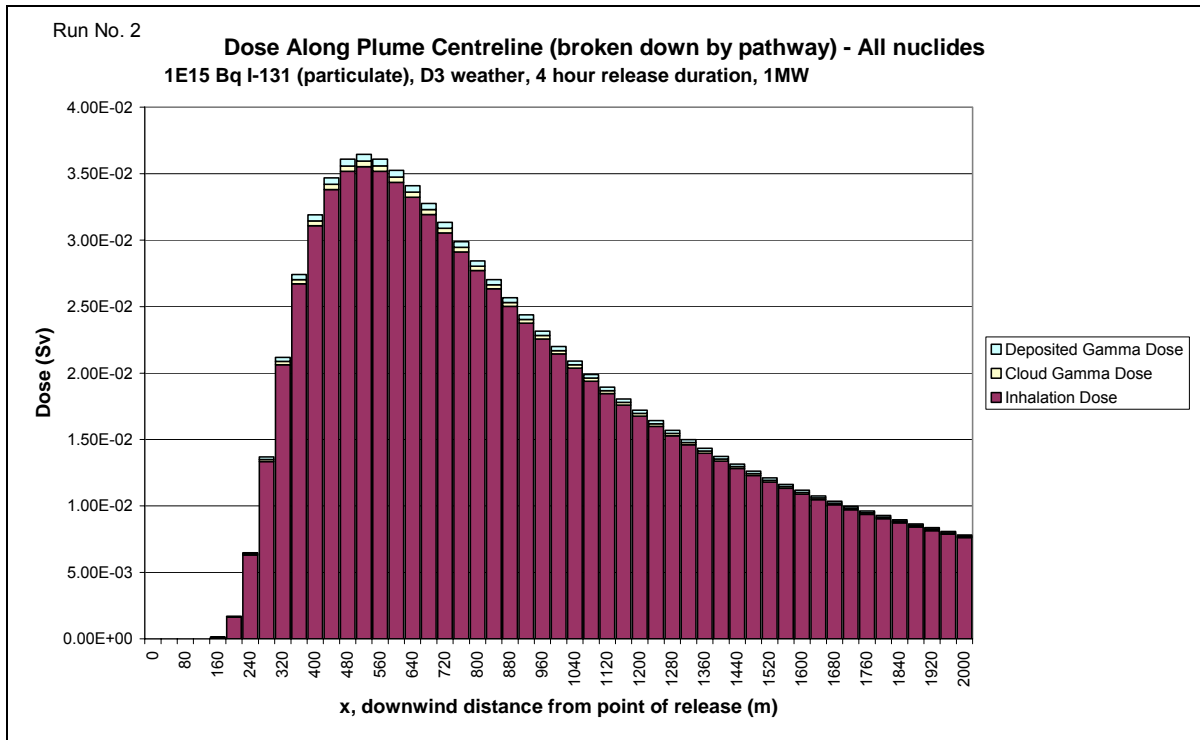
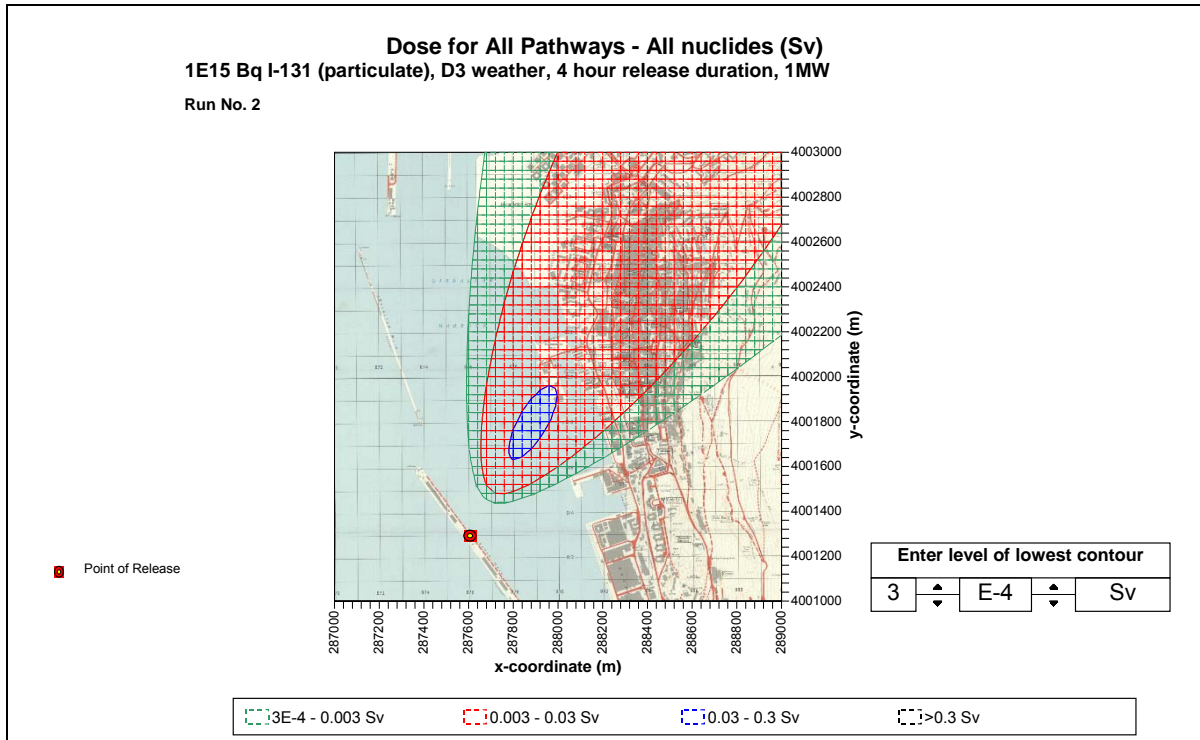
Becquerel is the SI unit of radioactivity. (See Appendix 1)

The radiation doses and activity deposition are based on a worst case where most of the contents of a 1 MegaWatt (MW) nuclear reactor on board a ship is released to atmosphere over a period of 4 hours.

PUMA Run no.2 Dose for all pathways, all nuclides
PUMA Run no.3 Deposited Gamma Dose, all nuclides
PUMA Run no.4 Deposited activity, all nuclides

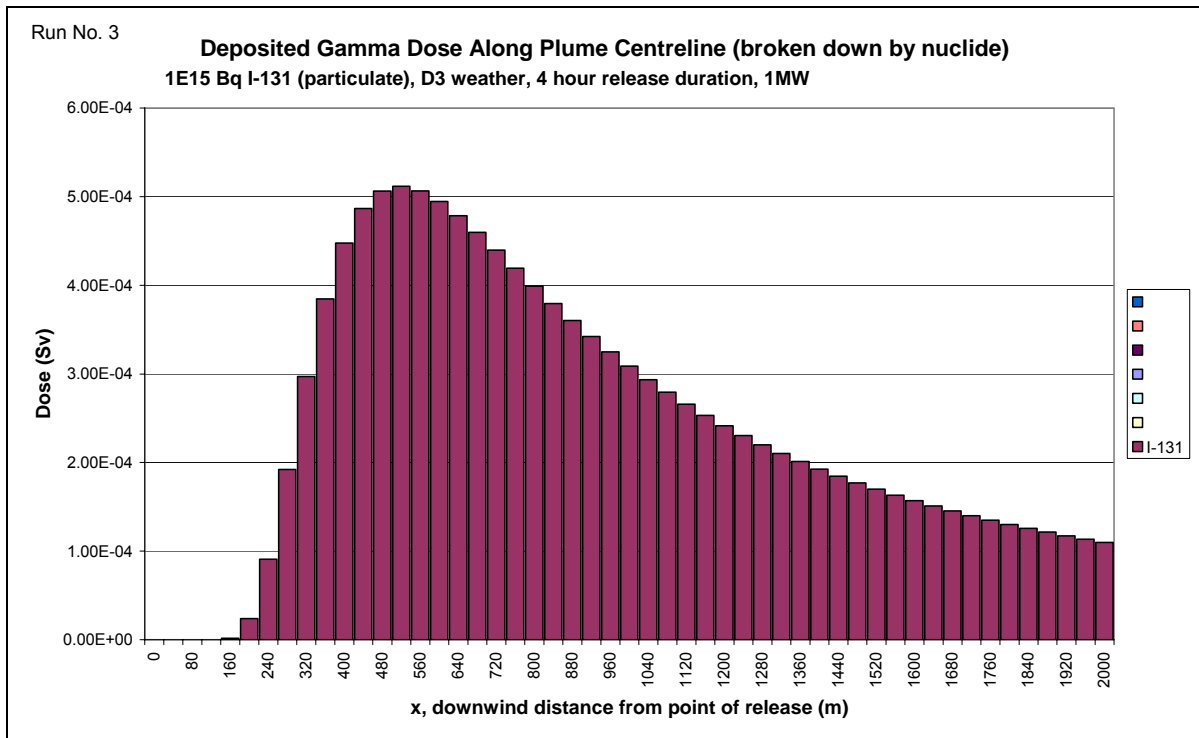
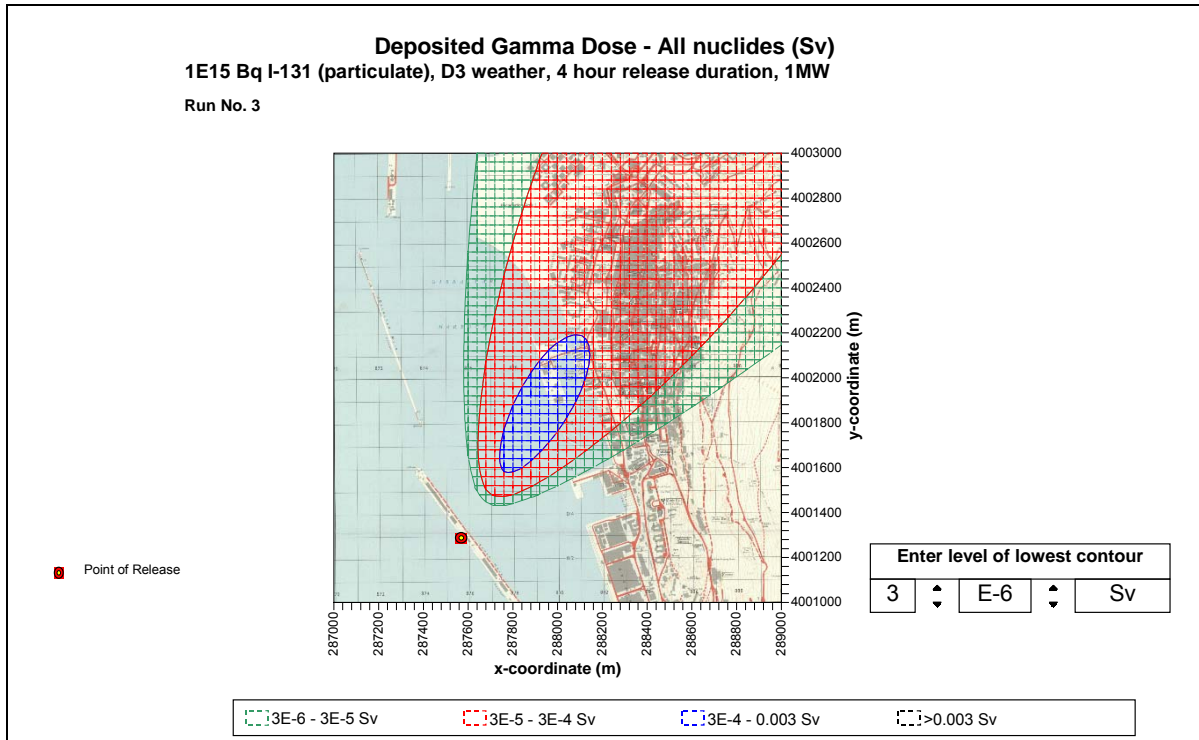
RADIATION EMERGENCY RESPONSE PLAN

Environmental Agency



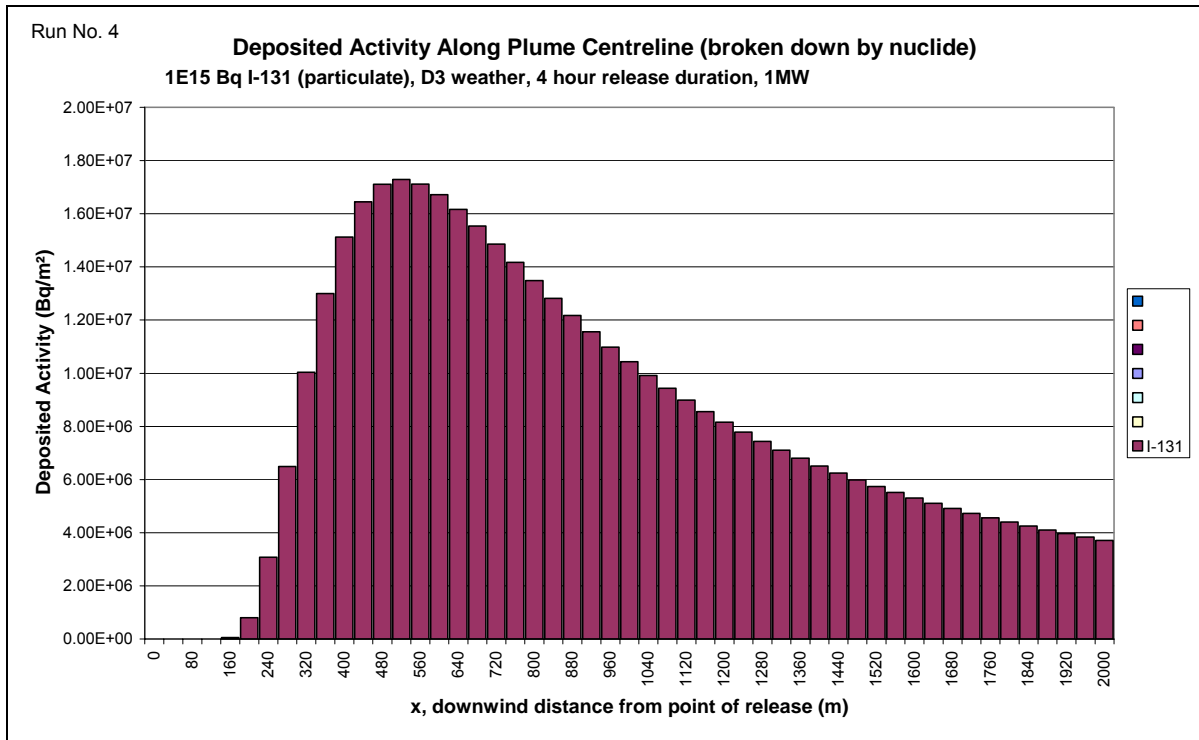
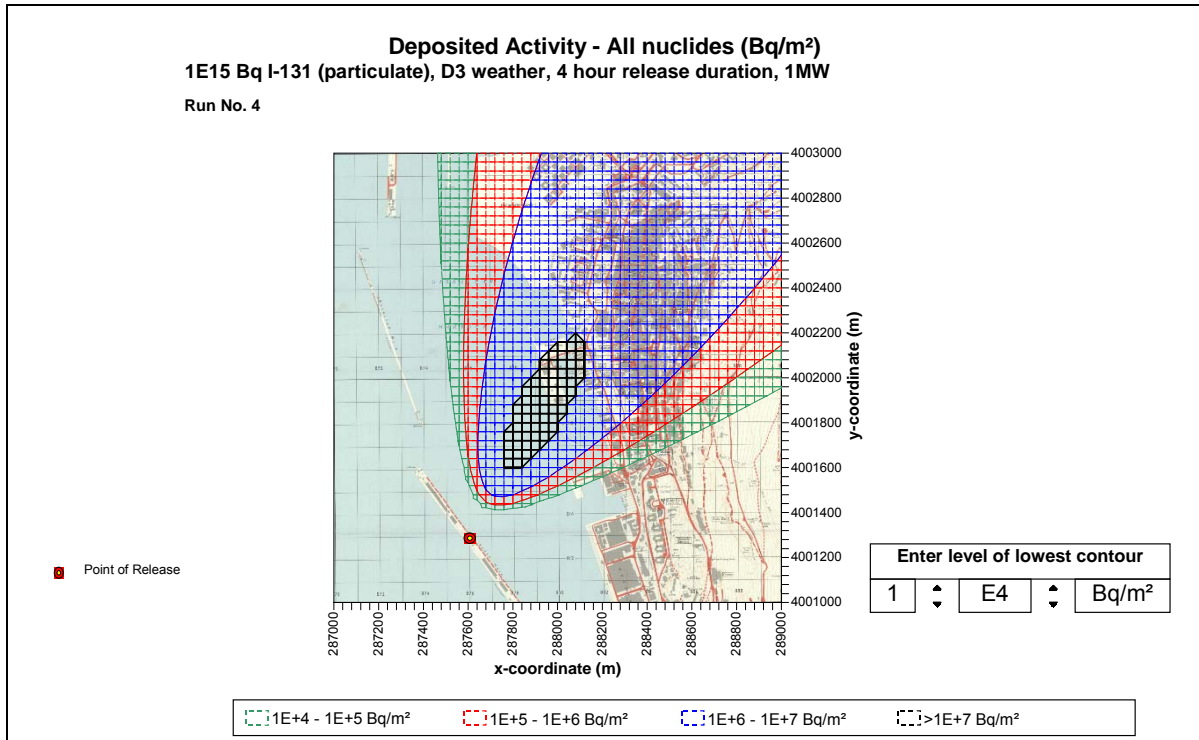
RADIATION EMERGENCY RESPONSE PLAN

Environmental Agency



RADIATION EMERGENCY RESPONSE PLAN

Environmental Agency



RADIATION EMERGENCY RESPONSE PLAN

Environmental Agency

APPENDIX 4

TECHNICAL DATA

NUCLEAR REACTOR FISSION PRODUCTS

The science of radiation and properties of radioactive substances unavoidably contains technical words, terms and abbreviations which can be intimidating to non-scientific persons. To assist the user of this plan Appendix 1, Terminology and Abbreviations, provides explanations and descriptions. Appendix 7 comprises a basic awareness of radiation and radiation protection

The table below lists the main radionuclides (radioactive substances) that could be released from a nuclear power plant. There are 22 other radionuclides that would also be released but they are insignificant compared to those shown in the list. All of the radionuclides listed present a hazard by inhalation or entering the body through an injury to the skin, for example, an open wound.

Radionuclide (isotope)	Symbol	Radioactive Half-Life	Primary Radiation Hazard	State
Iodine 131	¹³¹ I	8.04 d	G	vapour / particle
Strontium 90	⁹⁰ Sr	29.12 y	B	particle
Caesium 137	¹³⁷ Cs	30 y	G	particle
Plutonium 239	²³⁹ Pu	2.41 x 10 ⁴ y	A	particle
Plutonium 241	²⁴¹ Pu	13.2 y	B	particle
Cobalt 60	⁶⁰ Co	5.27 y	G	particle
Zirconium 95	⁹⁵ Zr	63.98 d	G	particle
Niobium 95	⁹⁵ Nb	35.15 d	G	particle
Ruthenium 106	¹⁰⁶ Ru	368.2 d	B (s)	particle
Cerium 144	¹⁴⁴ Ce	284.3 d	B (s)	particle
Americium 241	²⁴¹ Am	432.2 y	A, G	particle
Tritium	³ H	12.26 y	B	water vapour

Half-Life: d = days, y = years

Radiation: A = alpha, B = beta, B (s) = beta (skin), G = gamma

RADIATION EMERGENCY RESPONSE PLAN

Environmental Agency

APPENDIX 5

CONTAMINATION AND RADIATION DOSE INTERVENTION LEVELS

A “radiation emergency” is defined, for the purposes of the Radiation Emergency Response Plan, as being an incident involving the release of radioactive substances that will potentially give a member of the public a dose above 5 mSv. This is set by the International Atomic Energy Agency (IAEA) and the Gibraltar *Radiation (Emergency Preparedness and Public Information) Regulations, 2004*. This potential dose disregards any health protection measures to be taken during the 24 hours immediately following the first release of radioactive material.

Emergency Reference Levels

Emergency Reference Levels (ERLs) for sheltering and evacuation as recommended by the Health Protection Agency (Radiological Protection Division) are summarised in the table below. The ERLs are levels of ‘dose saved’ at which it is justifiable to introduce countermeasures. It should be noted that these values are levels at which the countermeasure should be considered for implementation, they do not necessarily represent the optimum levels for a release of radioactive fission products from an incident within the HM Naval Base. Other factors such as the reduction in anxiety of the public resulting from the implementation of a countermeasure, the disruption to individuals, the number of people involved and financial will also need to be considered.

Emergency Reference Levels for Sheltering and Evacuation

Countermeasure	Dose Equivalent (mSv)			
	Lower ERL		Upper ERL	
	Whole Body	Thyroid, lung or skin	Whole Body	Thyroid, lung or other single organ
Sheltering	3	30	30	300
Evacuation	30	300	300	3000

The ERLs are formulated into two dose levels, lower and upper, of dose saved for the public. Below the lower levels of dose saved the radiological risk may be assessed as less than the conventional risks and social disruption resulting from implementing the countermeasures, i.e. the risks of implementation are likely to outweigh the benefits. The upper levels of dose saved have been recommended as being those at which action should almost definitely be taken. At values between the upper and lower bounds of the ERL the implementation of countermeasures is desirable but not essential and must be considered in the light of the situation at the time. However, it has been decided by the Government that the countermeasure of issuing Potassium Iodate Tablets (PITs) will be carried out at Category 2 or above.

The dose levels for personnel engaged on remediation works will be advised by experts contracted to the Competent Authority when necessary. Levels of ground

RADIATION EMERGENCY RESPONSE PLAN

Environmental Agency

contamination, below which remedial action is deemed not necessary, will be similarly advised by experts when necessary.

RADIATION EMERGENCY RESPONSE PLAN

Environmental Agency

APPENDIX 6 INITIAL PUBLIC INFORMATION STATEMENTS

Note: The Initial Public Information Statements contained in this appendix are the original agreed with the Ministry of Defence under the former GIBPUBSAFE plan.

INITIAL PUBLIC INFORMATION STATEMENTS

The following statements suitably modified to suit the occasion are for use in the event of an incident, which is, or may develop into, an off-site radiological incident. Prior consultation/approval of the Government Media Director is essential before making any announcement along the following lines.

CATEGORY ONE ACCIDENT

1. A problem has occurred on board the nuclear-powered submarine..... which is berthed at.....berth in Gibraltar.
2. Although THERE IS NO RADIATION HAZARD we (are advising/have advised) people in the immediate area surrounding the submarine (define area) to leave/take shelter) as a precautionary measure while the problem is being dealt with. There is no danger whatsoever of a nuclear bomb type of explosion.
3. There is no need for people outside the above named area to take any special action. However, to assist specialist teams and emergency services responding to the problem, it is requested that individuals in the vicinity (define, by reference to local boundaries, e.g. roads, district names) stay indoors, unless advised to otherwise by the police.
4. Further statements will be made when there are any more developments. Please listen for announcements on your local TV and radio (name stations and frequencies).

RADIATION EMERGENCY RESPONSE PLAN

Environmental Agency

CATEGORY TWO ACCIDENT

1. An accident has occurred on board the nuclear-powered submarine..... which is berthed at..... berth in Gibraltar.
2. (INSERT REPORT ON CURRENT SITUATION)
3. A full investigation will be carried out into the cause of the accident.
4. There is no dangerous whatsoever of a nuclear bomb type explosion, nor has there been a release of radioactive material from the submarine. There is, however, a radiation hazard in the immediate vicinity of the submarine's hull. In accordance with the prearranged local public safety plan, and after consulting local civil emergency authorities, we:

are evacuating/have evacuated a zone within.....metres of the submarine.

in accordance with the Government of Gibraltar's policy, are advising/have advised the whole rock shelter plan to be implemented.

AND

are issuing/have issued Potassium Iodate tablets to personnel throughout Gibraltar starting in the down wind sector as a precaution against the absorption of radioactive Iodine.

Shelter Advice

Go indoors and STAY THERE.

DO NOT try to collect children at school unless told to do so. The school authorities will look after them.

Close all doors, windows and ventilators. Switch off any ventilation or air conditioning systems drawing air from outside the building.

DO NOT leave the shelter or a building unless requested to do so by the Police or other emergency service.

Keep tuned to local Radio/TV. Name stations and frequencies.

Emergency Services and Military forces are responding to the accident. You will be informed when these precautions are no longer necessary.

5. These are precautionary measures taken while naval and civilian specialists are dealing with the problem.
6. There is no need for people outside the above named area to take any special action. However to assist specialist teams and emergency services responding to the problem it is requested that individuals in the vicinity (define by reference to local boundaries, e.g. roads, district names) stay indoors, unless advised to do otherwise by the police).
7. Further statements will be made when there are any more developments. Please listen for announcement on your local TV and radio (name stations and frequencies).

RADIATION EMERGENCY RESPONSE PLAN

Environmental Agency

CATEGORY THREE ACCIDENT

1. An accident has occurred on board the nuclear-powered submarine..... which is berthed at..... berth in Gibraltar.
2. (INSERT REPORT ON CURRENT SITUATION)
3. A full investigation will be carried out into the cause of the accident.
4. There is no danger whatsoever of a nuclear bomb type of explosion. Some radioactive material has, however been released from the submarine. There is also a radiation hazard in the immediate vicinity of the submarine. In accordance with the prearranged local public safety plan, and after consulting local civil emergency authorities, we:

are evacuating/have evacuated a zone with.....metres of the submarine,

AND

in accordance with the Government of Gibraltar's policy, are advising/have advised the whole rock shelter plan to be implemented.

AND

have started/completed issue of Potassium Iodate tablets to personnel throughout Gibraltar as a precaution against the absorption of radioactive Iodine.

Shelter Advice

- Go indoors and STAY THERE.
- DO NOT eat opened or uncovered food or drink. Wash all utensils before using. Wash hands before eating or preparing food.
- DO NOT use garden produce that has been outside since....
- DO NOT try to collect children at school unless told to do so. The school authorities will look after them.
- Close all doors, windows and ventilators. Switch off any ventilation or air conditioning systems drawing air from outside the building.
- DO NOT leave the shelter or a building unless requested to do so by the Police or other emergency service.
- Keep tuned to local Radio/TV. Name stations and frequencies.
- Emergency Services and Military forces are responding to the accident. You will be informed when these precautions are no longer necessary.
5. These are precautionary measures taken while naval and civilian specialists are dealing with the problem.
 6. There is no need for people outside the above named area to take any special action. However to assist specialist teams and emergency services responding to the problem it is requested that individuals in the vicinity (define by reference to local boundaries, e.g. roads, district names) stay indoors, unless advised to do otherwise by the police).
 7. Further statements will be made when there are any more developments. Please listen for announcement on your local TV and radio (name stations and frequencies).

RADIATION EMERGENCY RESPONSE PLAN

Environmental Agency

APPENDIX 7

RADIATION AND RADIATION PROTECTION

BASIC AWARENESS

Note: The notes contained in this appendix are not intended to give an in depth knowledge about radiation and radiation protection but a basic awareness and introduction to those persons who may be called on to use this Radiation Emergency Response Plan.

We are exposed to radiation, in its various forms, every day of our lives; it is a natural part of our environment and has been since the Earth and cosmos were born. Common sources of naturally occurring radiation include radon gas, which occurs naturally in granite bearing rocks, and the increased exposure to cosmic rays when flying at high altitudes. However, there are also sources of manmade radiation, including nuclear power plants and radioactive sources used in medical diagnostics and radiotherapy treatment.

First we will describe the different types of radiation, including its effects and how it arises, and then move on to basic radiation protection. Certain terms and abbreviations will be encountered, which are either explained where first used or are contained in Appendix 1, Terminology and Abbreviations.

The different types of ionising radiation have their own symbols as follows:

type	symbol	nature
alpha	α	particle
beta	β	particle
gamma	γ	electromagnetic wave
X-ray	X	electromagnetic wave
neutron	n	particle

Radiation is found in two fundamental forms: as electromagnetic waves (rays) or as atomic particles. Here we are concerned with ionising radiation and its potential harmful effects.

The Electromagnetic Spectrum

Electromagnetic radiation is energy travelling through space in packets (photons) with specific wavelengths and associated energies. The electromagnetic spectrum describes the whole range of electromagnetic radiation with different wavelengths. Visible light is a form of electromagnetic radiation with a wavelength of $\sim 10^{-9}\text{m}$, but the full spectrum ranges from gamma radiation with very short wavelengths of $<10^{-11}\text{m}$ to long wave radio with wavelengths $>10^3\text{m}$. Figure 1 shows the electromagnetic spectrum.

RADIATION EMERGENCY RESPONSE PLAN

Environmental Agency

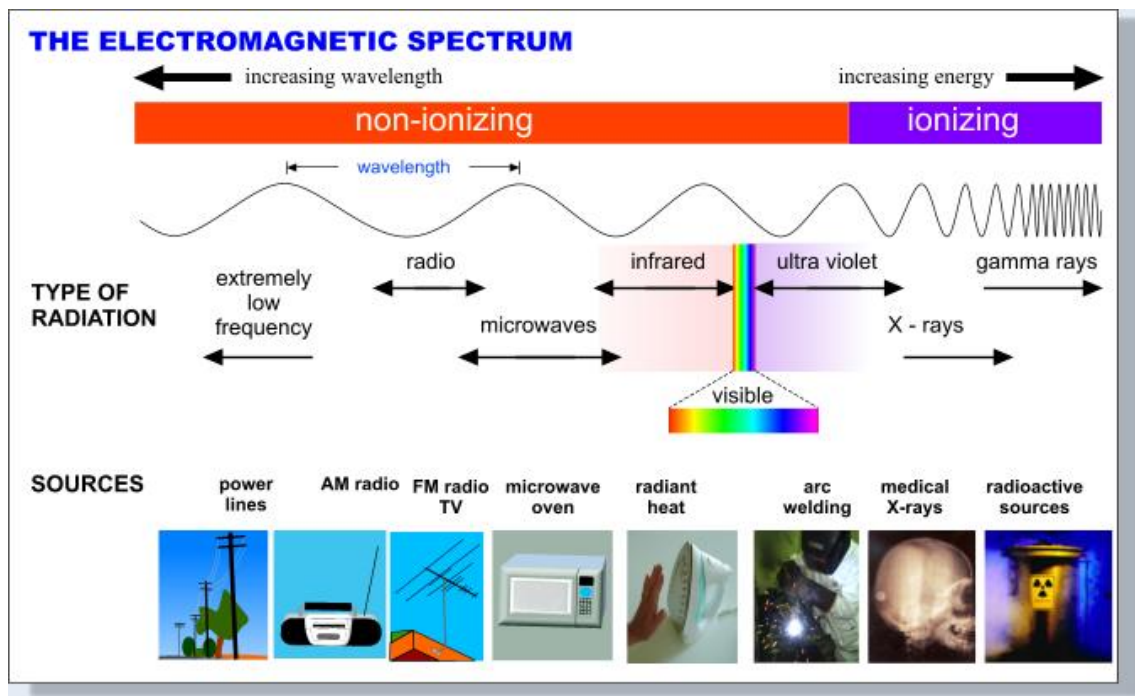


Figure 1: Electromagnetic spectrum

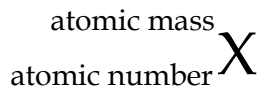
The Atom and Atomic Particles

An atom is the smallest unit of matter that cannot be divided further by chemical means. A simple model of an atom is of a central solid nucleus, with orbiting particles of energy known as electrons which travel in different orbital levels. The main constituents of the nucleus are protons and neutrons. There are other particles in an atomic nucleus but are beyond the scope of these notes.

Elements are atoms with varying numbers of protons. The number of protons characteristic of an element is its atomic number. Protons have positive charges; so to balance these, atoms have an equal number of electrons, which are negatively charged. Some electrons can be positively charged and are known as positrons, but this is beyond the scope of these notes.

How are the elements written – symbols?

The symbolic presentation of the elements including isotopes is as follows.



where X is the element symbol.

RADIATION EMERGENCY RESPONSE PLAN

Environmental Agency

Figure 2 shows a symbolic representation of a helium atom.



Figure 2: Helium atom

A short-hand form of writing radio-isotopes is to use the chemical symbol suffixed with the mass number, for example Na-24 indicates sodium with atomic mass 24.

Isotopes

Although an element is defined by its atomic number, i.e. how many protons it has, it can have variants with differing numbers of neutrons, known as isotopes or nuclides. The words isotope and nuclide are effectively synonymous. The total number of protons and neutrons in an atom is known as the atomic mass, as shown above. Therefore, isotopes of an element are variants with different atomic masses. Interestingly, the chemistry of an element is governed by the atomic number.

Hydrogen is the simplest element, with only one proton. However, it has three isotopes, with 0, 1 and 2 neutrons, as shown in Figure 3 below.

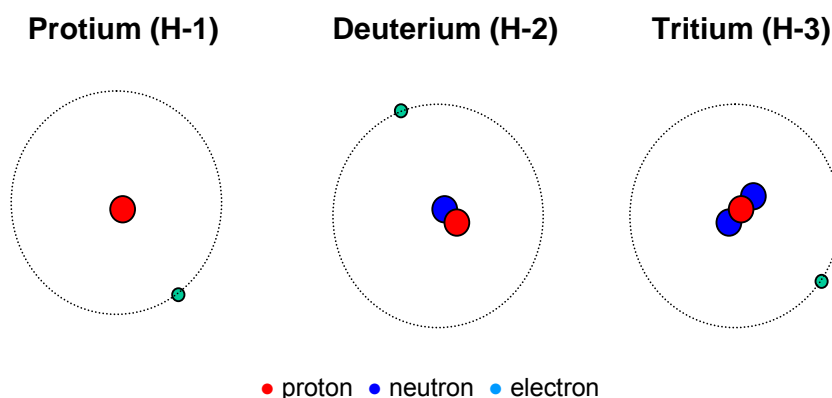


Figure 3: Hydrogen and its isotopes.

Protium is an alternative name for hydrogen isotope 1. Hydrogen Oxide (H₂O) is

RADIATION EMERGENCY RESPONSE PLAN

Environmental Agency

better known as water and Deuterium Oxide is commonly known as 'Heavy Water'.

Radioactivity

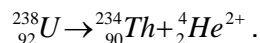
An isotope is stable if the forces within the nucleus are balanced. Most elements have at least one stable isotope, and in some cases more. For example, both Beryllium and Phosphorus only have one stable isotope, whereas Tin has ten stable isotopes.

In an unstable isotope, the forces within the nucleus are unbalanced, leading to an excess of energy. The unstable nucleus attempts to reach stability by releasing this energy in the form of neutrons, protons, or other particles or energy forms. Such unstable isotopes are described as being radioactive. The energy or particles thrown off as the isotope seeks to reach stability are known as radiation.

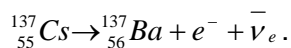
The nuclei of very unstable isotopes sometimes release energy as gamma rays (γ -rays), which can be seen in Figure 1 to be very low wavelength electromagnetic radiation.

When an unstable isotope seeks to become stable by emitting particles, this is known as disintegration. The process of isotopes releasing particles whilst changing from one element to another is known as radioactive decay.

The two key forms of radioactive decay that we are interested in here are alpha (α) and beta (β) decay. In alpha decay the nucleus of an unstable isotope of a heavy atom seeks to become stable by emitting a new nucleus made up of two protons and two neutrons (a positively charged helium nucleus - no electrons). Since the nucleus has lost two protons, the atomic number of the isotope is reduced by 2 and the atomic mass by 4, resulting in a nucleus of a new element. For example, a uranium nuclide that undergoes alpha decay results in a helium nucleus (alpha particle) and a thorium nuclide:



In the case of beta decay a neutron in the nucleus decays into proton, releasing an electron and a neutrino. The neutrino is an uncharged particle which does not interact with its surroundings, so we will not consider it further. This decay therefore results in no change in the atomic mass of the nuclide, but an increase of one in the atomic number, so forming a nuclide of a different element. For example, a Caesium nuclide that undergoes beta decay results in a barium nuclide:



Radioactive half-lives and decay chains

Different unstable isotopes undergo decay at different rates. The time period over which half of the nuclei in a material have undergone decay is known as the radioactive half-life. Half-lives range from a few microseconds to thousands of years.

In some cases a nucleus must undergo a series of decays before becoming stable, which is known as a decay chain. Each decay stage in the chain has its own half-life.

RADIATION EMERGENCY RESPONSE PLAN

Environmental Agency

For example, a ^{232}Th undergoes a decay chain with 10 stages before ending as the stable nuclide ^{208}Pb .

Ionizing and non-ionizing radiation

Non-ionizing radiation causes molecules to vibrate but does not alter their overall composition. Ionizing radiation can cause electrons to be displaced from a molecule, forming a positively charged molecule, known as an ion. Ionizing radiation may be in the form of either particles or electromagnetic energy, which behave in different ways.

Alpha (α) particles, beta (β) particles and gamma (γ) rays are all forms of ionizing radiation. The next section describes their characteristics.

Another form of ionizing radiation is X-rays, which are released when electrons surrounding a nucleus change from one orbital level to another.

Characteristics of individual types of ionizing radiation

Alpha particles are heavy particles, and are relatively easily stopped, such as by human skin or a few millimetres of air. However, if ingested or inhaled alpha particles can severely damage health.

Beta particles are essentially electrons. They can be stopped by a few centimetres thickness of a dense material, although they can travel significant distances through air. Similarly, to alpha particles, ingestion or inhalation is dangerous but not to as great an extent.

Gamma (γ) rays are very difficult to stop. It takes several metres of a dense material such as lead to stop them. They can travel several metres in air and are able to pass through the human body, potentially exposing the internal organs to radiation. Although gamma rays do not directly ionise human tissue, they can excite electrons which then go on to ionize tissue.

X-rays have similar but lesser effects to Gamma (γ) rays.

Neutrons are produced by some radioactive materials by spontaneous nucleus decay but are more often produced under artificial conditions where an alpha emitting radioactive source is brought into intimate contact with the element beryllium. They can also be produced by accelerating atoms of deuterium or tritium in a vacuum into other atoms of deuterium or tritium absorbed in into a metal such as zirconium. The penetrating power of neutrons is high in some materials (higher than gamma) but can also be absorbed by materials containing light elements such as hydrogen; hence neutron shielding usually comprises water, wax, concrete or light polymers. The presence of neutron radioactive substances may indicate fissionable material.

Detecting radiation

Part of the danger of radiation lies in the fact that it cannot be detected by the human senses, so someone can be completely unaware that they are being exposed to radiation. In all cases it must be detected using some form of specialist equipment, such as a "Geiger counter", which relies on the ionisation effects, and "scintillation

RADIATION EMERGENCY RESPONSE PLAN

Environmental Agency

counters” where the radiation produces small bursts of light in photosensitive crystalline material that can be amplified electronically and measured.

Measuring radiation

The key factor to evaluate the risk associated with exposure to radiation is the measurement of the energy imparted from the radiation to the person’s tissue, or other inanimate material. This is known as the radiation dose.

There are a number of units used for quantifying radiation and radiation protection. One Becquerel (Bq) is equivalent to a quantity of material undergoing one atom disintegration per second. This unit is extremely small and often laboratory amounts are as MBq and in the environment as kBq. Since it is the energy deposited by the radiation that is of interest; one Gray (Gy) is the dose associated with the deposition of one Joule of energy per kilogram of matter. Absorbed dose rates are measured in Grays per hour (Gyh^{-1}).

However, different forms of radiation have different effects on biological tissue. For example 1 Gy of alpha radiation is far more hazardous than 1 Gy of beta radiation. A unit which takes this into account is the Sievert (Sv). The Sievert is the product of the dose in Grays multiplied by a “quality factor” (or radiation weighting factor), which is larger for more hazardous forms of radiation. For example, an effective dose of 1 Sv requires 1 Gy of beta radiation but only 0.05 Gy of alpha radiation; hence alpha particles have a radiation weighting factor of 20. The Sievert is a large unit so radiation doses are usually measured in milliSieverts (mSv).

Radiation Effects

Ionizing radiation deposits energy in body tissue, which may cause no long-term ill effects to the cell structures. Large amounts of ionizing radiation can cause significant damage to cells, which results in the condition commonly known as “radiation sickness” or in severe cases death. Alternatively cells can remain fundamentally undamaged but may mutate, increasing the risk of the cells becoming cancerous.

There are two categories of effects of radiation exposure, stochastic and deterministic.

Stochastic effects are where the probability of the effect occurring is a function of the dose which causes the effect. The severity of effect is not related to the magnitude of initiating dose. An example is radiation induced cancers.

Deterministic effects (non-stochastic) are based on a threshold of ionising radiation exposure being achieved in a recipient before any effect is observed / detected. Such effects may be erythema (reddening of skin), where high levels of radiation dose are required over a short period of time (>3.0 Gy).

Practical Radiation Protection Principles

Radiation protection is based around three basic principles: time, distance and shielding. Where a radioactive source is unsealed, such as in the case of dispersed

RADIATION EMERGENCY RESPONSE PLAN

Environmental Agency

contamination, containment is also considered. These principles are explained as follows. The health risk increases with increasing amounts of radiation received.

Time

The amount of radiation received is directly proportional to the exposure time. In the case of external exposure this is very easily calculated, as it is the time the person is in near the source. For internal exposure, from ingestion or inhalation, the radiation source is trapped within the body. The biological half-life is then used to measure radiation exposure time, which is defined as the time the body takes to either expel or chemically break down half of the radioactive substance. Clearly, reducing exposure time is a good way of decreasing risks, although this is not easily achievable in the case of ingested or inhaled sources.

Distance

The radiation energy level from a radioactive source decreases relatively quickly with distance. In simple terms, if you move twice as far away from a source, the radiation is four times less. Conversely, if you move to be half as far away from a source, the radiation levels are four times higher. Increasing the distance from a source is therefore a useful method of reducing the risk of exposure.

Shielding

Shielding is the third key factor of radiation protection. This involves placing some material between the radioactive source and a person. In the case of alpha and beta particles we can see from above that this can be relatively easily achieved. For gamma rays several centimetres of a very dense material is required to give significant levels of shielding. Commonly thick lead blocks or plates are used to give protection from gamma rays, and lesser thicknesses of lead sheet for X-rays.

Examples of Radiation Protection

The Chernobyl accident in 1986 resulted in radioactive particles settling over large areas of Europe. These areas are monitored, and in some regions food production from the land is restricted for human consumption, albeit the limits were originally arbitrarily set and not based on any proven scientific evidence.

Following a release of radioactivity, the public may be advised to shelter in their homes or place of work with the doors and windows closed. This provides protection both in that the building itself provides shielding protection and that keeping the building reasonably sealed prevents inhalation of radioactive particles. In addition, occupying the centre ground floor area of a building applies increased distance. An alternative countermeasure is evacuation, which takes advantage of increasing the distance from the source / area of contamination; however, this can only be achieved before the radioactive material has been deposited. Evacuation is not viable after deposition but could be considered after the radioactivity has decayed sufficiently to permit controlled exposure.

RADIATION EMERGENCY RESPONSE PLAN

Environmental Agency

Hazards from Ionising Radiation put into Perspective

The hazards from being exposed to ionising radiation need to be put into perspective with our everyday normal lives. Indeed, recent studies (2006) show that the effects of radiation exposure in the population of Ukraine, as a result of the 1986 Chernobyl disaster, is much less than anticipated.

The table below provides an indication of risk of death from several causes.

Hazard	Radiation Dose (mSv)	Risk of Death
Average annual dose to people in the UK as part of normal life	2.6	1 in 10,000
Dose from a return flight from London to New York	0.14	1 in 230,000
Dose from eating a bag of brazil nuts	0.01	1 in 2.5 million
Expected dose from using a training source	<0.001	1 in a very big number
Heart Disease		1 in 200
Cancer (all)		1 in 387
Burn or Scald at Home		1 in 610
Maternal Death in Pregnancy		1 in 8,200
Road Accident		1 in 16,800
Surgical Anaesthesia		1 in 185,000
Lightning		1 in 18.7M
Rail Travel Accident		1 in 43M
Aircraft Accident		1 in 125M

Source: UK Health & Safety Executive, 2006

The information contained in these notes has been taken from several sources; a useful guide is *Living with Radiation*, UK Health Protection Agency.

RADIATION EMERGENCY RESPONSE PLAN

Environmental Agency

APPENDIX 8

STANDARD OPERATING PROCEDURES

Note: Individual organisations should place their respective SOPs in this section, using this page as the contents list.

ORGANISATION:

SOP No.	Description / Responder Function	Issue

RADIATION EMERGENCY RESPONSE PLAN

Environmental Agency

CONTACTS DIRECTORY

The Contacts Directory for this plan should be kept separate from the main body of text and ideally only include contact details vital to a radiation emergency.

Details of contacts will be found in the Gibraltar Major Incident Plan, Emergency Contacts Directory.