LEAFLET 20

INSTRUMENTS CONTAINING Ni-63

CONTENTS

SCOPE

1 This Leaflet covers instruments containing Nickel-63 (Ni-63). The following information describes the requirements required for keeping, using and disposing of such equipment. Summaries of the radiation risks and regulatory requirements for common MOD equipment containing Ni-63 are included in the annexes of this Leaflet. This is not a comprehensive catalogue of all equipment containing Ni-63. If equipment used by the unit or establishment is not included contact the RPA for further information. The summaries of the radiation risks satisfy the requirement for the radiological aspects of a risk assessment for normal operation and use, and form the basis of information for input into the local orders.

STATUTORY REQUIREMENTS AND PARALLEL ARRANGEMENTS

2 In addition to the general requirements of the Health and Safety at Work etc Act 1974 and the Management of Health and Safety at Work Regulations 1999, the following specific legislation applies directly or is applied indirectly through parallel arrangements designed to achieve equivalent standards:

- Ionising Radiations Regulations 1999 (IRR99) (apply directly);
- Environmental Permitting Regulations 2010 (EPR10) (England & Wales) (parallel arrangements);
- Radioactive Substances Act 1993 (RSA93) (Scotland & Northern Ireland) (parallel arrangements);
- Carriage of Dangerous Goods and Transportable Pressure Equipment Regulations 2009 (apply directly).

DUTIES

Commanding Officer and Head of Establishment (CO/HoE)

3 The CO/HoE has a duty to the Secretary of State, and a personal responsibility, to protect the environment and secure the health, safety and welfare of their staff at work. The CO/HoE is also required to protect persons not in MOD employment (e.g. members of the public) against risks to their health and safety arising from the MOD work activities. This includes radiation safety. The CO/HoE's authority (but not responsibility) for radiation safety management arrangements may be delegated to appropriate personnel, such as a Radiation Safety Officer (RSO).

Radiation Safety Officer (RSO)

4 The Radiation Safety Officer (RSO) is to ensure that:

- They are familiar with the specific radiation hazards at their unit or establishment and that an appropriate risk assessment has been carried out;
- Local orders include the requirements for keeping, using and disposing of instruments containing Ni-63 as detailed in this leaflet;
- Staff are appointed, instructed and trained in their duties relating to this Leaflet;
- The requirements stemming from this Leaflet are subject to audit.

Radiation Protection Supervisor (RPS)

5 An RPS must be appointed where an establishment has an area designated as controlled or supervised. Where an RPS is appointed, they are to ensure that work is carried out in accordance with the local orders for radiation safety which are to include the requirements of this Leaflet.

Workplace Supervisor (Radioactive Materials) (WPS) (RAM)

6 For units holding instruments containing Ni-63, but where it is unnecessary to appoint an RPS, a WPS (RAM) is to be appointed with duties to ensure that work is carried out in accordance with the local orders for radiation safety which are to include the requirements of this Leaflet.

Employees

7 It is the responsibility of all employees to ensure that they are familiar with the relevant parts of local orders to ensure that these items are handled safely and correctly. Any incidents are to be reported to the appropriate supervisor or line manager.

HAZARD

Table 1 Hazard

Radiation type		Emitted	Comments
Alpha		×	
Beta	Direct	✓	Low energy that will not penetrate the instrument casing. Undamaged equipment does not present an external hazard during routine use. A leaking Ni-63 source will cause contamination that could lead to an internal hazard if Ni-63 enters the human body.
	Bremsstrahlung	✓	Bremsstrahlung X-rays are absorbed by the casing and no significant radiation dose rates will be measured on the outside surface of the instrument
Gamma		×	
X-rays		×	
Neutrons		×	

LEGAL AND MOD MANDATORY REQUIREMENTS

Table 2 Legal and MOD mandatory requirements

Requirement	Applicable	Comments	Related Leaflet*
HSE authorisation	×		
HSE notification	✓	Keep a copy indefinitely. HSE will not provide acknowledgement of this.	3
EA notification**	✓	Only for GID-3 equipment.	3
Risk assessment	✓	See Annexes; further specific risk assessments or prior risk assessments may be required.	2
Restriction of exposure	✓	Comply with local orders – see also Leaflet 4 and 16.	4, 16
PPE	×		
Maintenance of radiation engineering controls	×		
Contingency plans	✓	See Leaflet 40.	40
Designated areas	×		
Monitoring	×		
Training for users	✓	Information and Instruction only.	15
Local orders	✓	See Leaflet 16 for guidance.	16
Appointed person	✓	WPS (RAM) required; RPS not normally required.	3
Storage	✓	In a segregated labelled secure container/ cupboard.	9

Table 3 Legal and MOD mandatory requirements (continued)

Requirement	Applicable	Comments	Related Leaflet*
Accounting	✓	Regularly mustered, recorded and retained for 2 years. Recorded on a source list and retained for 2 years. Recorded on Dstl Annual Radiation Return, copy retained for 1 year.	9
Leak testing	✓	The following equipment assigned these NSNs require leak testing: Chemical Agent Monitor (6665-99-225-3521 6665-99-225-4126 6665-99-225-3836 6665-99-252-2662 6665-99-257-7260 6665-99-051-1388 6665-99-404-9096 6665-99-705-5989) MCAD (6665-99-809-0326 6665-99-225-7832) COLPRO CAM (6665-99-609-8640 6665-99-584-1766) GID-3 (6665-99-292-4509) Otto fuel monitor (1045-99-765-5786 1045-99-870-6464 1045-99-701-4794) SIC MK10 NHA (6665-99-037-0455, 6665-99-197-1894, 6665-99-591-3031 6665-99-917-1194) Leakmeter Model 61 (6625-99-654-0124 6625-99-737-4814) Leakmeter Model 200 (6665-99-062-2276) Explosive Meter (6665-99-184-6262) The procedure for leak testing may be detailed in the operator/maintenance manual and will vary for each piece of equipment. Contact the RPA for further information. Details of the leak test undertaken and the results obtained are to be retained for 2 years.	9
Personal dosimetry	✗		
Reporting procedures	✓	See leaflet 14 for details	14
Transport	✓	Transported as an Excepted package	10 JSP 800 Vol. 4a & Vol. 4b
Sale/Transfer	✓	See Leaflet 11	11
Disposal	✓	Return to stores. Keep records for 2 years	12

*JSP 392, unless otherwise stated

**Environment Agency (EA) for England and Wales, Scottish Environment Protection Agency (SEPA) for Scotland and Environment and Heritage Service for Northern Ireland (EHSNI)

LEAFLET 20 ANNEX A

SUMMARY RADIATION RISKS AND REGULATORY REQUIREMENTS FOR CAM

Chemical Agent Monitor (CAM)	
Description	 Monitor  Marking A Nickel 63 electro-plated radioactive source is used by the Sensor Cell enclosed within the instrument. NSN 6665-99-225-3836 is the complete set with case. NSN 6665-99-051-1388 is the old version and looks identical.
Use	Chemical Agent Monitor
Supplier	Smiths Detection Ltd, Watford. UK
NSN	6665-99-225-3521 / 6665-99-225-4126
IPT details	Combat Support Equipment (CSE) IPT
Radionuclide	Nickel-63 (Ni-63)
Ionising radiation	Beta (67 keV maximum)
Half life	100.1 years
Original activity	370 MBq
Classification	This monitor contains a radioactive Class 2 source under the radioactive substances (Testing Instruments) Exemption Order 2006 of RSA93/EPR10. This has implications for the legal licensing of the holder of the source in terms of use, storage and disposal, which are briefly outlined below. The RPA is to be contacted if further information is required.
Hazard	The beta particles are of low energy and are absorbed by the casing. Bremsstrahlung X-rays are absorbed by the casing and no significant radiation dose rates will be measured on the outside surface of the instrument. Consequently, the undamaged equipment does not present an external radiation hazard during routine use.
Risk assessment	The likelihood of accidental damage to this instrument so that Ni-63 could escape is low. The following internal doses have been estimated using pessimistic assumptions: A severe incident, for example, crushing or significant internal corrosion, could possibly result in the spread of Ni-63 if the source were damaged. Maximum calculated internal dose from one damaged CAM is 16 μSv. There is no external radiation hazard presented by the open source. During an intense fire, the calculated maximum internal dose to a fire fighter is approximately 0.3 μSv per CAM. The equipment does not present an external radiation hazard if undamaged. (Ref Dstl report 13/2009).

Chemical Agent Monitor (CAM)	
Local orders	Details of the control measures taken from this leaflet are to be included in the local orders for the use of CAM. JSP 392 - Leaflet 16 gives guidance to the content of local orders.
Control measures during use	No special precautions are required when handling this equipment.
Inspection	Annually as well as during routine maintenance. A check is to be made for signs of damage.
Leak test	There is no requirement to leak test a CAM whilst it is hermetically sealed and stored in Method II packaging. Otherwise testing is required for this component on a 24 month basis. See Table 2 of this Leaflet and JSP 392 - Leaflet 9.
Accounting	This item is to be accounted for on a Radioactive Source List. JSP 392 - Leaflet 9 refers. Mustering is to be at a frequency determined by the potential for loss. A muster and associated records are to be undertaken at least monthly. Any change of location or custodian is to be entered in the Source Movement Log.
Radioactive Substances Act 1993/Environmental Permitting Regulations 2010	This item is subject to RSA93/EPR10 and is to be included in the Annual Radiation Return to Dstl. See JSP 392 - Leaflet 3.
Storage and labelling	This item is to be stored in a dedicated area for radioactive materials. JSP 392 - Leaflet 9 refers. The equipment is to display the recognised radioactive warning trefoil label. The storage area is also to display a sign indicating the presence of radioactive material within i.e. a radiation warning trefoil including the contact name and telephone number of the RPS or WPS and stating the nature of the radiological hazard “items containing radioactive material”. No radiation hazard from intact equipment. Radioactive contamination hazard if equipment is damaged.
Contingency plans **Spills** **Loss**	If a breakage occurs the area is to be cordoned off. The broken source fragments item can be cleaned up using a breakage kit. JSP 392 - Leaflet 40 refers. Broken fragments to be disposed of as directed by the RPA. If this item is involved in any unusual occurrence, follow JSP 392 - Leaflet 14. Contact the RPA.
Transport	This item is to be transported as an Excepted Package. JSP 800 Volume 4a or Volume 4b refers.
Disposal	Units and establishments are to return this item to the Stores Organisation.

LEAFLET 20 ANNEX B

SUMMARY RADIATION RISKS AND REGULATORY REQUIREMENTS FOR COLPROCAM

Collective Protection Chemical Agent Monitor (ColProCAM)	
Description	 Monitor  Marking A portable monitor which is used to detect nerve blister and blood agents. It contains one 555 MBq Nickel-63 source, electro-plated onto stable Nickel and then onto a brass substrate. The dimensions of each of the sources are 7.5 mm x 7mm high.
Use	Chemical Agent Monitor
Supplier	Bruker Daltonics GMBH, Industriestrasse 26, CH-8117 Fallenden, Switzerland
NSN	6665-99-609-8640 / 6665-99-584-1766
IPT details	Combat Support Equipment (CSE) IPT
Radionuclide	Nickel-63 (Ni-63)
Ionising radiation	Beta (67 keV maximum)
Half life	100.1 years
Original activity	555 MBq
Classification	This monitor contains a radioactive Class 2 source under the Radioactive Substances (Testing Instruments) Exemption Order 2006 of RSA93/EPR10. This has implications for the legal licensing of the holder of the source in terms of use, storage and disposal, which are briefly outlined below. The RPA is to be contacted if further information is required.
Hazard	The beta particles are of low energy and are absorbed by the casing. Bremsstrahlung X-rays are absorbed by the casing and no significant radiation dose rates will be measured on the outside surface of the instrument. Consequently, the undamaged equipment does not present an external radiation hazard during routine use. During sieve changes and leak testing Ni-63 contamination could lead to an internal hazard if the source is leaking and contamination from hands enters the body.

Collective Protection Chemical Agent Monitor (ColProCAM)	
Risk assessment	The likelihood of accidental damage to this instrument so that Ni-63 could escape is low. The following internal doses have been estimated using pessimistic assumptions: A severe incident, for example, crushing or significant internal corrosion could possibly result in the spread of Ni-63 if the source were damaged. Maximum calculated internal dose from one damaged ColProCAM is 24μSv. There is no external radiation hazard presented by the open source. During an intense fire, the calculated maximum internal dose to a fire fighter is approximately 0.4 μSv per ColProCAM. The equipment does not present an external radiation hazard if undamaged. (Ref Dstl Report 11/2009).
Local orders	Details of the control measures taken from this leaflet are to be included in the local orders for the use of ColProCAM. JSP 392, Leaflet 16 gives guidance to the content of local orders.
Control measures during use	No special precautions are required when handling this equipment.
Inspection	Annually as well as during routine maintenance. A check is to be made for signs of damage.
Leak test	There is no requirement to leak test a ColProCAM whilst it is hermetically sealed and stored in Method II packaging. Otherwise testing is required for this component every 2 years. See Table 2 of this leaflet and JSP 392 - Leaflet 9.
Accounting	This item is to be accounted for on a Radioactive Source List. JSP 392 - Leaflet 9 refers. Mustering is to be at a frequency determined by the potential for loss. A muster and associated records are to be undertaken at least monthly. Any change of location or custodian is to be entered in the Source Movement Log.
Radioactive Substances Act 1993/Environmental Permitting Regulations 2010	This item is subject to RSA93/EPR10 and is to be included in the Annual Radiation Return to Dstl. JSP 392 - Leaflet 3.
Storage and labelling	This item is to be stored in a dedicated area for radioactive materials. JSP 392 - Leaflet 9 refers. The equipment is to display the recognised radioactive warning trefoil label. The storage area is also to display a sign indicating the presence of radioactive material within i.e. a radiation warning trefoil including the contact name and telephone number of the RPS or WPS (RAM) and stating the nature of the radiological hazard “items containing radioactive material”. No radiation hazard from intact equipment. Radioactive contamination hazard if equipment is damaged.
Contingency plans **Spills** **Loss**	If a breakage occurs the area is to be cordoned off. The broken source fragments item can be cleaned up using a breakage kit. Leaflet 40 refers. Broken fragments to be disposed of as directed by the RPA. If this item is involved in any unusual occurrence, follow JSP 392 - Leaflet 14. Contact the RPA.
Transport	This item is to be transported as an Excepted Package. JSP 800 Volume 4a or Volume 4b refers.
Disposal	Units and establishments are to return this item to the Stores Organisation.

LEAFLET 20 ANNEX C

SUMMARY RADIATION RISKS AND REGULATORY REQUIREMENTS FOR MK10NHA

Mk10NHA	
Description	 Mk 10NHA unit  Ni-63 Source  Markings A Nickel-63 check source is found within the detector. It is held in place on plastic supports in the twin-drift tube sensor cell
Use	Ship Installed Chemical Agent Detector check source
Supplier	Smith Detection Ltd, Watford. UK
NSN	6665-99-037-0455 or 6665-99-591-3031
IPT details	Marine Environment Survivability & Habitability – Chemical Biological Radiological Nuclear (MESH) IPT
Radionuclide	Nickel-63 (Ni-63)
Ionising radiation	Beta (67 keV maximum)
Half life	100.1 years
Original activity	370 MBq
Classification	This detector contains a radioactive Class 2 source under the Radioactive Substances (Testing Instruments) Exemption Order 2006 of RSA93/EPR10. This has implications for the legal licensing of the holder of the source in terms of use, storage and disposal, which are briefly outlined below. The RPA is to be contacted if further information is required.
Hazard	The beta particles are of low energy and are absorbed by the casing. Bremsstrahlung X-rays are absorbed by the casing and no significant radiation dose rates will be measured on the outside surface of the instrument. Consequently, the equipment does not present an external radiation hazard during routine use.
Risk assessment	The likelihood of accidental damage to this source when installed to such a degree that Ni-63 escape is low. A more severe accident, for example, crushing, could possibly result in the spread of Ni-63 if the source were damaged. A body intake by ingestion could give an internal dose of around 0.6μSv. During an intense fire, the calculated maximum internal dose to a fire fighter is 1.9 μSv per unit. The equipment does not present an external radiation hazard if undamaged. (Dstl Report 38/2008).
Local orders	Details of the control measures taken from this leaflet are to be included in the local orders for the use of this source. JSP 392 - Leaflet 16 gives guidance to the content of local orders.
Control measures during use	During normal use no special precautions are required. During maintenance, undertaken only by recognised calibration facilities, it is recommended that the maintainer wear waterproof gloves when opening the detector.

Mk10NHA	
Inspection **Leak testing**	Annually as well as during routine maintenance. Checks are to be made for signs of damage. A leak test is required **every year**. The leak test certificate must be retained for at least 2 years. See Table 2 of this Leaflet and JSP 392 - Leaflet 9.
Accounting	The source must be accounted for on a Radioactive Source List under the care of an appointed RPS or WPS (RAM) (see JSP 392 - Leaflet 9). All radioactive material is to be mustered at least monthly. Any change of location is to be entered in the Source Movement Log together with any change in custodian.
Radioactive Substances Act 1993/Environmental Permitting Regulations 2010	This item is subject to RSA93/EPR10 and is to be included in the Annual Radiation Return to Dstl. JSP 392 - Leaflet 3 refers.
Storage and labelling	If not installed, this item is to be stored in a dedicated area for radioactive materials. JSP 392 - Leaflet 9 refers. The equipment is to have the recognised radioactive trefoil on it. The storage/installed area is also to have a sign showing radioactive material within i.e. a trefoil including the contact name and telephone number of the RPS or WPS (RAM) and stating the nature of the radiological hazard “items containing nickel-63”. No radiation hazard from intact equipment. Radioactive contamination hazard if equipment damaged.
Contingency plans **Spills** **Loss**	If a breakage occurs the area is to be cordoned off. The broken source fragments item can be cleaned up using a breakage kit. JSP 392 - Leaflet 40 refers. Broken fragments are disposed of as directed by the RPA. If this item is involved in any unusual occurrence, follow JSP 392 - Leaflet 14 refers. Contact the RPA
Transport	This item may be transported as an excepted item. JSP 800 Volume 4a or Volume 4b refers.
Disposal	Units and establishments are to return this item to the Stores Organisation.

LEAFLET 20 ANNEX D

SUMMARY RADIATION RISKS AND REGULATORY REQUIREMENTS FOR MAN PORTABLE CHEMICAL AGENT DETECTOR

Man Portable Chemical Agent Detector	
Description	 A portable monitor which is used to detect nerve blister and blood agents. It contains two electrodeposited Nickel-63 sources of 370 and 185 MBq (Total 555 MBq). The Nickel-63 is electroplated onto stable nickel and then onto a brass substrate
Use	Chemical Agent Monitor
Supplier	Smiths Detection Ltd, Watford. UK
NSN	6665-99-809-0326
IPT details	CSE IPT
Radionuclide	Ni-63
Ionising radiation	Beta (67 keV maximum)
Half life	100.1 years
Original activity	555 MBq
Classification	This monitor contains two radioactive Class 2 sources under the radioactive substances (Testing Instruments) Exemption Order 2006 of RSA93/EPR10. This has implications for the legal licensing of the holder of the source in terms of use, storage and disposal, which are briefly outlined below. Your RPA is to be contacted if further information is required.
Hazard	The beta particles are of low energy and are absorbed by the casing. Bremsstrahlung X-rays are absorbed by the casing and no significant radiation dose rates will be measured on the outside surface of the instrument. Consequently, the undamaged equipment does not present an external radiation hazard during routine use.
Risk assessment	The likelihood of accidental damage to this instrument so that Ni-63 could escape is low. The following internal doses have been estimated using pessimistic assumptions: A severe incident, for example, crushing or significant internal corrosion, could possibly result in the spread of Ni-63 if the source were damaged. Maximum calculated internal dose from one damaged MCAD is 24 μSv. A worst case exposure during sieve pack replacement is 2.9 μSv. During an intense fire, the calculated maximum internal dose to a fire fighter is approximately 0.4 μSv per MCAD. The equipment does not present an external radiation hazard if undamaged. (Dstl Report 10/2009).
Local orders	Details of the control measures taken from this Leaflet are to be included in the local orders for the use of this source. JSP 392 - Leaflet 16 gives guidance to the content of local orders.

Man Portable Chemical Agent Detector	
Control measures during use	No special precautions are required when handling this equipment.
Inspection	Annually as well as during routine maintenance a check is to be made for signs of damage.
Leak test	There is no requirement to leak test an MCAD whilst it is hermetically sealed and stored in Method II packaging. Otherwise testing is required for this component every 2 years. See Table 2 of this Leaflet and JSP 392 - Leaflet 9.
Accounting	The source must be accounted for on a Radioactive Source List under the care of an appointed RPS or WPS (RAM) (see JSP 392 - Leaflet 9). All radioactive material is to be mustered at least monthly. Any change of location is to be entered in the Source Movement Log together with any change in custodian.
Radioactive Substances Act 1993/Environmental Permitting Regulations 2010	This item is subject to RSA93/EPR10 and is to be included in the Annual Radiation Return to Dstl. JSP 392 - Leaflet 3 refers.
Storage and labelling	This item is to be stored in a dedicated area for radioactive materials. JSP 392 - Leaflet 9 refers. The equipment is to display the recognised radioactive warning trefoil label. The storage area is also to display a sign indicating the presence of radioactive material within i.e. a radiation warning trefoil including the contact name and telephone number of the RPS and stating the nature of the radiological hazard “items containing radioactive material”. No radiation hazard from intact equipment. Radioactive contamination hazard if equipment is damaged.
Contingency plans **Spills** **Loss**	If a breakage occurs the area is to be cordoned off. The broken source fragments item can be cleaned up using a breakage kit. JSP 392 - Leaflet 40 refers. Broken fragments to be disposed of as directed by the RPA. If this item is involved in any unusual occurrence, follow JSP 392 - Leaflet 14. Contact the RPA.
Transport	This item is to be transported as an Excepted Package. JSP 800 Volume 4a or Volume 4b refers.
Disposal	Units and establishments are to return this item to the Stores Organisation.