Leaflet 21

Instrument Check Sources

CONTENTS

Scope

1 This Leaflet covers instrument check sources used to assess the functionality of radiation monitoring equipment. The following information describes the requirements required for keeping, using and disposing of such sources.

2 Summaries of the radiation risks are detailed in JSP 515 Hazardous Stores Information System (HSIS). Where equipment used by a unit or establishment is not included in JSP 515, the Equipment Sponsor and RPA are to be contacted 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.

3 For advice on the suitability of instrument check sources for use with particular radiation monitoring instruments, the RPA is to be contacted.

4 The Chemical, Biological, Radiological, Nuclear (CBRN) DT coordinate the issue of instrument check sources.

Statutory Requirements

5 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);
- The Environmental Permitting (England & Wales) Regulations 2010 (EPR10) (as amended) (parallel arrangements);
- Radioactive Substances Act 1993 (Scotland & Northern Ireland) (RSA93) (parallel arrangements);
- Carriage of Dangerous Goods and Transportable Pressure Equipment Regulations 2009 (apply directly).

Duties

Commanding Officer and Head of Establishment (CO/HoE)

6 The CO/HoE has a duty to the Secretary of State, and a personal responsibility, to protect the environment and to secure the health, safety and welfare of their staff at work. The CO/HoE is also required to protect persons not in MOD employment against risks to their health or safety arising from the MOD work activities (e.g. the general public). 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)

7 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 and using of instrument check sources containing radioactive material 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)

8 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. Further information on the requirements for appointment of an RPS is given in Table 2.

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

9 In units holding instrument check sources 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

10 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.

How to Use a Check Source

11 A check source is to be used in the pre-use functional testing of any instrument to be used in a radiation or contamination survey.

12 A record of this instrument function test is required which is to include:

12.1 Battery power check;

12.2 The source reference number used to function check the instrument;

12.3 The instrument serial number;

12.4 The expected response obtained when placing the detector at a fixed position (geometry) relative to the instrument (usually found on the calibration certificate);

12.5 The actual number of counts or dose rate observed in the same geometry, as above;

12.6 The name and signature of the individual carrying out the test;

12.7 Time and date test is undertaken.

13 If the actual reading recorded deviates by more than 30% from the expected reading the user is to inform the RSO prior to use of the instrument. Further advice may be sought from the RPA.

Hazard

14 Instrument check sources may contain a variety of radioactive materials. Most emit more than one type of radiation and may contain more than one radionuclide.

Table 1 Hazard

Radiation type	Emitted	Comments
Alpha	✓	Undamaged sources should not present a significant external hazard. A leaking source will cause contamination that could lead to an internal hazard if the radioactive material enters the human body.

Beta	Direct	✓	Undamaged sources should not present a significant external hazard during routine use, as generally the activities are low. A leaking source will cause contamination that could lead to an internal hazard if the radioactive material enters the human body.
	Bremsstrahlung	✓	Low energy x-rays may be emitted, but these do not normally present a significant external hazard during routine use.
Gamma		✓	Undamaged sources should not present a significant external hazard during routine use, as the activity is low. A leaking source will cause contamination that could lead to an internal hazard if the radioactive material enters the human body.
X-rays		✓	Some check sources produce X-rays. Undamaged sources should not present a significant external hazard.
Neutrons		✓	Undamaged sources should not present a significant external hazard during routine use, as the activity is low. A leaking source will cause contamination that could lead to an internal hazard if the radioactive material enters the human body.

Legal and MOD Mandatory Requirements

15 The information given below is generic, for specific information on any particular instrument check source refer to JSP 515.

Table 2 Legal and MOD mandatory requirements

Requirement	Applicable	Comments	Related leaflet*
HSE authorisation	×		
HSE notification	✓	Keep a copy indefinitely. HSE may not provide acknowledgement of this.	3
Notification to regulators**	× (but see comment)	Exempt from Notification, provided conditions are met i.e. specific activity limits apply - for the majority of instrument check sources, the maximum activity is 4 MBq. For sources containing Ni-63 or Fe-55 contact the RPA for further guidance.	
Risk assessment	✓	See example at annex to this Leaflet. Further specific risk assessments or prior risk assessments may be required (see Leaflet 2).	2
Restriction of exposure	✓	Comply with local orders – see Leaflet 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 Annexes of Leaflet 16 for guidance.	16
Appointed person	✓	RPS not normally required except for storage areas designated as controlled or supervised. Where an RPS is not required, a WPS (RAM) needs to be appointed in accordance with Leaflet 39.	3
Storage	✓	In a segregated secure store/container/cupboard marked with radiation trefoil warning sign and stored in accordance with Leaflet 9.	9
Accounting	✓	Recorded on a source list (retained for 2 years) and mustered in accordance with Leaflet 9. Recorded on Dstl Annual Holdings Return, copy retained for 1 year.	9
Leak testing	✓ (but see comment)	Many instrument check sources require leak testing; Leaflet 9, Annex C provides examples of such sources. The procedure for leak testing may be detailed in a separate work instruction or risk assessment and will vary for each source. Contact the RPA for details, if unsure. Details of the leak test undertaken and the results obtained are to be retained for 2 years.	9
Personal dosimetry	×		

Table 2 Legal and MOD mandatory requirements (continued)

Requirement	Applicable	Comments	Related leaflet*
Reporting procedures	✓	All losses and certain other incidents require to be reported to MOD authorities. Reporting to external regulatory authorities may also be required. See Leaflet 14 for details.	14
Transport	✓	Transported as an excepted package.	10, JSP 800 Vol. 4a & Vol. 4b
Marking	✓	Radioactive trefoil and identification marking	9
Disposal	✓	Return to stores. Keep records for 2 years.	12
Sale/transfer	✓	See Leaflet 11	11

*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).

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Leaflet 21 Annex A

Example Summary Radiation Risk Assessment

1623a Natural Uranium Check Source

1623A Natural uranium check source	
Description	 The check source is a disc of natural uranium (23.1 mm diameter, 1.12 mm thick) mounted in an aluminium container. The container lid is unscrewed to reveal the source, which is bonded to the circular aluminium base block. NOTE: These check sources have been modified with a steel ring and four screws to hold the source more securely. Please contact your RPA if your check source is not the modified version shown above.
Use	Used in the functional testing of a wide range of radiation protection instruments.
Supplier	AEA Technology QSA
NSN / part number	K107-6665-99-193-3906
DT	Chemical Biological Radiological Nuclear (CBRN)
Radionuclide	Natural uranium (Nat-U)
Ionising radiation	Alpha, beta and gamma and X-ray radiation is emitted from the source. Natural uranium contains 0.72% uranium- 235, 0.006% uranium-234 and 99.274% uranium-238.
Half life	~ 4.5×10^9 years for uranium 238
Original activity	111 kBq
Hazard	The alpha radiation of the uranium isotopes in the source, present an internal radiation hazard on ingestion or inhalation of the natural uranium. The beta radiation of some of the decay products present in the source, together with the weak gamma radiation emitted by all nuclides, present an external radiation hazard.

Risk assessment	During the functional testing on a wide range of radiation protection instruments, the radioactive source will be exposed for a short period only and will be directed away from the body. The most significant dose rate will be to the hand of the operator and will be shielded by the source housing. In this configuration the maximum dose rate to the hand is 1.5 μSv/hr. As the check source may be used on a daily basis, and a functional test is estimated to take 30 seconds, the maximum theoretical skin dose for a working year is estimated to be 5 μSv/hr. Whole body effective dose would be very much less than this value.
Local orders	Details of the control measures taken from this leaflet are to be included in the local orders for radiation safety (Leaflet 16 refers).
Control measures during use	There is no requirement to unscrew the source lid when function testing an instrument that measures gamma radiation. The unopened source container should be placed against the radiation monitoring instrument to obtain a reading. If necessary, the lid should be unscrewed for use to check the function of particular type of instrument (e.g. alpha or beta contamination probe). In this case, the radiation monitoring instrument or detector is to be placed against the outer casing or close to (but not touching) the surface of the uranium disc to obtain a reading. This item is not to be carried on the person and handling of the item is to be kept to a minimum. The spread of contamination and the likelihood of any resultant personal contamination will be minimised where practicable by wearing disposable gloves when using the source and washing hands immediately afterwards as a precautionary measure.
Leak testing	Leak testing is required at least every 24 months.
Accounting	This item is to be accounted for on a Radioactive Source List (Leaflet 9 refers) under the supervision of an RPS or WPS (RAM). 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.
EPR10/RSA93	This item is exempt from notification to the relevant environment agencies under EPR10/RSA93.
Annual Holdings Return (AHR)	This item should be included on the AHR to Dstl ESD (Leaflet 3 refers)
Storage and labelling	This item is to be stored in a dedicated area for radioactive materials (see Leaflet 9). The equipment is to have the recognised radioactive trefoil and marking on it. The storage/installed area is also to have a sign showing 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 in appropriate languages: **Items contain radioactive material. No radiation hazard from intact item. Radioactive contamination hazard if item damaged.**
Contingency plans breakage/loss/incident	If a breakage occurs the area is to be cordoned off. The RSO and the RPA are to be contacted. Reporting of loss and certain other incidents are to be carried out in accordance with the procedures described in Leaflet 14.
Transport	May be transported as an excepted package.
Disposal	Units and Establishments are to return this item, unbroken, through the Stores Organisation.

LEAFLET 21 Annex B

Example Instrument Pre-Use Functional Testing Record Sheet

Instrument Description	Serial Number	Battery Power Check	Check Source Reference Number	Instrument Response		Name of person carrying out test	Signature	Date
				Expected	Actual			

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