

Radiation Protection Act 2005 – Section 17

**CERTIFICATE OF COMPLIANCE:
STANDARD FOR SEALED RADIATION SOURCE-
BENCH TOP ANALYSER**

SECTION 1: REQUIREMENTS FOR CERTIFICATES OF COMPLIANCE FOR CLASSES OF RADIATION SOURCE

SECTION 2: PARTS OF STANDARDS AND CODES OF PRACTICE ADOPTED BY THIS STANDARD

This information can also be accessed at
http://www.dhhs.tas.gov.au/peh/radiation_protection

Section I – REQUIREMENTS FOR CERTIFICATES OF COMPLIANCE FOR CLASSES OF RADIATION SOURCE.

This Standard is to be used when assessing Radiation Sources, classified by Radiation Protection Act 2005 licences as “Bench Top Analyser”, for the purpose of issuing a certificate of compliance.

In order for a certificate of compliance to be issued the Radiation Source must be shown to fully comply with the requirements in Section 2.

† Where an item was demonstrated to comply at the time of manufacture or supply, ongoing compliance for that item may be stated only if it is reasonable to assume there has been no change, modification, damage or unacceptable wear and tear to that item since the time of manufacture.

The requirements in Section 2 are taken from the following:

RPS 13	<i>Code of Practice for Safe Use of Fixed Radiation Gauges (2007).</i>
RPS 2	<i>Code of Practice for the Safe Transport of Radioactive Material (2001)</i>
RAR	<i>Regulatory Authority Requirements – Department of Health and Human Services</i>

Section 2 – PARTS OF STANDARDS AND CODES OF PRACTICE ADOPTED BY THIS STANDARD

ITEM	Requirements
Radioactive Sources	
Only appropriate sources †	Radioactive material used in a bench top analyser must be appropriate for the particular application, with regard to its activity, half-life, energy and type of radiations emitted. RPS 13 B I.1 (a)
Toxicity †	The radioactive source must not be a radioactive material of high committed effective dose per unit of intake activity (Sv Bq ⁻¹), such as those listed below, unless: (i) it is necessary for the production of neutron radiation for the particular gauging use; or (ii) a radioactive material of low committed effective dose per unit of intake activity, that produces radiation of the required type and energy for the particular gauging application, is unavailable or is otherwise impracticable for use as the source. Radioactive materials of high committed effective dose per unit of intake: 210Pb, 210Po, 226Ra, 228Ra, 227Ac, 228Th, 230Th, 231Pa, 232U, 233U, 234U, 237Np, 238Pu, 239Pu, 240Pu, 241Pu, 242Pu, 241Am, 243Am, 242Cm, 243Cm, 244Cm, 245Cm, 246Cm, 249Cf, 250Cf, 252Cf RPS 13 B I.1 (b)
Chemical and physical form †	The radioactive material must be in a chemical and physical form that, throughout the projected useful life of the bench top analyser in which it is used, will minimise: (i) corrosion and build up of internal pressure; and (ii) dispersal and solubility of the radioactive material if the source capsule is ruptured. RPS 13 B I.1 (c)
Minimum activity †	The radioactive material must not have an activity that is greater than necessary to ensure that the bench top analyser operates effectively during its projected useful life and the activity will depend on the: (i) effective radiation path length between the source and detector; and (ii) detector sensitivity and the proposed conditions of its use, where an allowance may be made for a 25% loss of detection sensitivity during the lifetime of the bench top analyser; and (iii) shielding effects of intra-beam material; and (iv) half-life of the radioactive material used. RPS 13 B I.1 (d)
Shielding with depleted uranium †	Radiation source containment that incorporates depleted uranium in its construction must be durably marked to: (a) warn of the presence of depleted uranium; and (b) indicate the quantity incorporated; and (c) provide information on the relevant physical (i.e. may spontaneously catch fire when finely divided) and radiological safety requirements. RPS 13 C I.1
Useful beam aperture †	The useful beam aperture in the shielded container for a radioactive source must be limited to a size no larger than necessary for the effective operation of the bench top analyser. RPS 13 C I.2

Collimator requirements †	Where a collimator insert or diaphragm is required to limit the size of the useful beam, such a modification must: (a) only be fitted by the manufacturer or authorised service representative; and (b) not interfere with the effective operation of the bench top analyser; and (c) not reduce the shielding properties or other safety features of the containment. RPS 13 C 1.3
Means for terminating exposure ††	A bench top analyser must be fitted with: (a) a shutter; or (b) a means of moving the source to a safe position; or (c) a means of de-energising the radiation source. RPS 13 C 1.4
Radioactive source construction †	Each radioactive source used in a bench top analyzer must be: (a) a sealed source of durable design and construction; and (b) readily identifiable by use of appropriate markings and documentation. RPS 13 B 2.1 The form and working life of each source used in a bench top analyzer must be suitable for: (a) the particular application; and (b) the useful life of the bench top analyser; and (c) environmental conditions of its use. RPS 13 B2.2 The outermost capsule of a radioactive source that is used in a bench top analyzer must satisfy the American National Standard N 452.1977 (NBS Handbook 126) if the source pre dates 2000. RPS 13 B 2.4 For radioactive sources post 2000 they must satisfy ISO (International Standard) 2919-1999(E); Note: A radioactive source that complies with the 'special form' design and test requirements of the IAEA (International Atomic Energy Agency) would satisfy the ISO test requirements. RAR
Construction requirements for a source container	
Exposure rates	When the analyser is loaded with the source of greatest activity for which it is designed, the radiation level must not exceed 10 microsieverts per hour ambient dose equivalent rate at any point 5 cm from the external surface while the shutter is closed. RAR
Compatibility of materials used in constructing the source container	The source container must be constructed of materials that: (a) are physically and chemically compatible with each other and, where applicable, the materials of the radioactive sources that it is designed to contain; and (b) can withstand the effects of prolonged irradiation without significant deterioration of any physical properties necessary for the safety of the bench top analyser; and (c) are resistant to corrosion or other physical or structural damage which may occur during the use, transport and storage of the bench top analyser. RPS 13 C 1.10
Shutter	A shutter or source control mechanism must be fitted. RAR The shutter or source control mechanism and the associated mechanism for its operation, must be designed, constructed and, if necessary, protected by a rugged covering, so that its operation is not adversely affected by corrosive substances, dust, moisture, other contaminants, vibration or heat, to which it may be exposed during its projected useful life. RPS 13 C2.1

Lockable Shutter †	The shutter or source control mechanism must be: (a) provided with an effective lock so that it can be secured in the 'beam off' position; and (b) designed so that it cannot be locked in the 'beam on' position. RPS 13 C2.2 (a),(b)
Labels and markings required on the source container	Each label located on the analyser be must be made of a material that can withstand the long-term effects of corrosion and general exposure to the environment in which it is to be used. RPS 13 C 1.14
Marked with trefoil and CAUTION or WARNING	The analyser must be durably marked with a label incorporating the radiation hazard symbol (trefoil as given in the appropriate Australian Standard) and the word "CAUTION" or "WARNING" followed by words to the general form of "Contains Radioactive Source" RAR The symbol and markings on the label specified above must be black on a yellow background. RPS 13 C 1.13
Information required on the durable label	Radionuclide Activity and date measured Name and address of manufacturer RAR
Test for non fixed contamination	The analyser is to be wipe ¹ tested for the presence of non-fixed contamination. ²
	Non fixed contamination levels ¹ not to exceed those specified in ISO 9978 RAR
Preventative maintenance	All control mechanisms, including the shutter or source control mechanism must operate properly. RAR

¹ **Wipe test** is based on taking with wet or dry tissue possible radioactive contamination from source surface. The tissue may be wetted with water, diluted nitric acid or another solution inactive for capsule material but actively removing radioactive contamination. If measured activity of tissue does not exceed 185 Bq (5 nCi) the source surface proves to be non-contaminated.

² Electroplated sources (such as Ni63) should not be tested for leakage by wiping the foil directly. An indication of leakage can be obtained by checking the storage container for radioactivity or by checking the exhaust ports of items such as gas chromatography devices (ICRP 1977).