



# Certificate

## for Radiation Device

<b>Certificate Number</b> R-061-0001-12-2036	<b>Date of Issue</b> July 21, 2022	<b>Date of Expiry</b> August 31, 2036
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The radiation device identified below is certified by the Canadian Nuclear Safety Commission pursuant to paragraph 21(1)(h) of the *Nuclear Safety and Control Act* and section 12 of the *Nuclear Substances and Radiation Devices Regulations*.

**Manufacturer:** QSA Global, Inc.

**Make and Model:** QSA Global Models 880 Delta, 880 Sigma and 880 Elite

**Prev. Mfr. Name:** AEA Technology

**Device Type:** EXPOSURE DEVICE, CABLE

**Description:** The QSA Global Model 880 Delta, 880 Elite and 880 Sigma radiation devices consist of a cylindrical stainless steel shell enclosing depleted uranium shielding and a titanium "S" tube which houses the source. The gap between the depleted uranium shield and the shell is filled with polyurethane foam. Associated accessories such as guide tubes and controls are connected to this radiation device.

The radiation devices can also be equipped with an optional polyethylene jacket for ease of transport or an "IRSS Pipeliner" jacket to facilitate its use as an industrial radiography exposure device or Version 3 jacket incorporating a persistent monitoring tag assembly used for unit tracking purposes.

The IRSS PipeLiner System consists of an 880 exposure device, a plastic jacket, a collimating guide tube and a removable pipe shoe and swing arm assembly.

When using the IRSS PipeLiner System, only QSA Global remote controls and source assemblies, except for the Yb-169, can be used.

Refer to the Summary Evaluation for additional information (CNSC Document Number 6835015). Reference CNSC Application Number 62521.

The radiation device may contain any of the following nuclear substances in a quantity not exceeding the corresponding quantity indicated:

Nuclear Substance	Maximum Quantity
Cobalt 60	925 MBq
	2,405 MBq
Cesium 137	14 GBq
Depleted Uranium (used as shielding)	11.4 kg
	15.6 kg
Iridium 192	1,850 GBq
	4,810 GBq
	5,550 GBq
Selenium 75	5,550 GBq
Ytterbium 169	740 GBq

Designated Officer pursuant to paragraph 37(2)(a) of the *Nuclear Safety and Control Act*





# Summary Evaluation

## For certificate number R-061-0001-12-2036

### 1. Identification of Radiation Device

<b>Manufacturer:</b>	QSA Global, Inc.
<b>Prev. Manufacturer:</b>	AEA Technology
<b>Model(s):</b>	880 Delta, 880 Sigma, and 880 Elite
<b>Type:</b>	Exposure Device

### 2. Description

The QSA Global 880 Delta, 880 Elite and 880 Sigma radiation devices consist of a cylindrical stainless-steel shell enclosing depleted uranium shielding and a titanium "S" tube which houses the source. The gap between the depleted uranium shield and the shell is filled with polyurethane foam. Associated accessories such as guide tubes and controls are connected to this radiation device.

The radiation device can also be equipped with an optional polyethylene jacket for ease of transport or an "Industrial Radiography Supplies and Services (IRSS) Pipeliner" jacket to facilitate use as an industrial radiography exposure device or Version 3 jacket incorporating a persistent monitoring tag assembly used for unit tracking purposes.

The IRSS PipeLiner System consists of an 880-exposure device, a plastic jacket, a collimating guide tube and a removable pipe shoe and swing arm assembly. When using the IRSS PipeLiner System, only QSA Global remote controls and source assemblies except for the Yb-169 can be used. The maximum weight of the IRSS PipeLiner system is approximately 31.8 kg.

The dimensions of the radiation devices with the optional transport jacket are 191 mm wide x 229 mm high x 338 mm long. Total mass including the optional transport jacket of Models 880 Delta and 880 Sigma is 24 kg and for Model 880 Elite is 19 kg. The height of the radiation devices with the optional Version 3 jacket is 254 mm and the total mass of 880 Delta and 880 Sigma is 25 kg and the total mass of Model Elite is 21 kg. The dimensions of the radiation device with the optional "IRSS PipeLiner" jacket are 152 mm wide x 288 mm high x 343 mm long and the total mass of Models 880 Delta and 880 Sigma is approximately 25 kg, and the total mass of Model 880 Elite is approximately 20 kg.

An illustration of the radiation device is shown on QSA Global drawing number R88000 (Rev. X) and an illustration of the IRSS PipeLiner system is shown on QSA Global drawing number R88095 (Rev. A). An overview of the 880 series radiation devices is shown in figure 1 and an illustration of the radiation device with the optional mounting jacket to be used as the IRSS PipeLiner System is shown in Figure 2 below.

### 3. Intended Use

The radiation device is used for industrial applications of gamma radiography to inspect material and structure of various densities. The radiation device can be used portably or with the IRSS PipeLiner System to mount it to a pipe. The IRSS PipeLiner system has been designed for the industrial applications of gamma radiography of pipeline butt welds using double wall contact and single wall viewing techniques.

#### 4. Authorized Nuclear Substances

The radiation device models 880 Sigma, 880 Delta and 880 Elite are authorized to contain one of the following nuclear substances and corresponding maximum activity within the listed source assemblies:

Nuclear Substance	Maximum Activity			Source Assembly	Special Form certificate	Source Assembly Manufacturer
	880 Delta	880 Sigma	880 Elite			
Ir-192	5550 GBq	4810 GBq	1850 GBq	A424-9	USA/0335/S-96 USA/0392/S-96	QSA Global Inc.
Se-75	5550 GBq	5550 GBq	5550 GBq	A424-25W	USA/0335/S-96 USA/0502/S-96	QSA Global Inc.
Yb-169	740 GBq	740 GBq	740 GBq	91810	N/A	QSA Global Inc.
Cs-137	14 GBq	14 GBq	14 GBq	A424-30	USA/0335/S-96	QSA Global Inc.
Co-60	2405 MBq	925 MBq	925 MBq	A424-19	USA/0335/S-96 USA/0165/S-96	QSA Global Inc.
Ir-192	5550 GBq	4810 GBq	1850 GBq	T-5	USA/0608/S-96	SPEC
Se-75	5550 GBq	5550 GBq	5550 GBq			
Yb-169	740 GBq	740 GBq	740 GBq			
Ir-192	5550 GBq	4810 GBq	1850 GBq	T-5F	USA/0608/S-96	
Se-75	5550 GBq	5550 GBq	5550 GBq			
Yb-169	740 GBq	740 GBq	740 GBq			
DU	15.6 kg	15.6 kg	11.4 kg	N/A	N/A	N/A

When using the IRSS PipeLiner system, only QSA Global remote controls and source assemblies can be used except for the Yb-169 source which is not authorized for use with the IRSS PipeLiner system.

#### 5. Maximum Expected Radiation Dose

880 Delta Maximum expected radiation doses with maximum activity

Nuclear Substance	Activity	Dose rate ( $\mu\text{Sv/hr}$ )					
		@ Surface		@ 30 cm		@ 100 cm	
		Closed shutter	Open shutter	Closed shutter	Open shutter	Closed shutter	Open shutter
Ir-192	5550 GBq	1,900	$2.9 \times 10^8$	Not provided	$8 \times 10^6$	13	$7.2 \times 10^5$
Co-60	2405 MBq	1,900	$3.07 \times 10^6$	Not provided	$8.5 \times 10^4$	5	$7.7 \times 10^3$
Se-75	5550 GBq	< 240	$1.5 \times 10^6$	Not provided	$4.3 \times 10^4$	< 2	$3.76 \times 10^3$
Cs-137	14.1 GBq*	< 390	$4.86 \times 10^5$	Not provided	$1.35 \times 10^4$	< 0.5	$1.23 \times 10^3$
Yb-169	1110 GBq*	< 240	$7.9 \times 10^7$	Not provided	$2.21 \times 10^6$	< 2	$2.0 \times 10^5$

880 Sigma Maximum expected radiation doses with maximum activity

Nuclear Substance	Activity	Dose rate ( $\mu\text{Sv/hr}$ )					
		@ Surface		@ 30 cm		@ 100 cm	
		Closed shutter	Open shutter	Closed shutter	Open shutter	Closed shutter	Open shutter
Ir-192	4810 GBq	1810	$2.5 \times 10^8$	Not provided	$6.93 \times 10^6$	15	$6.24 \times 10^5$
Co-60	925 MBq	< 1720	$1.18 \times 10^6$	Not provided	$3.3 \times 10^4$	< 10	$3 \times 10^3$
Se-75	5550 GBq	< 240	$1.5 \times 10^6$	Not provided	$43 \times 10^4$	< 2	$3.76 \times 10^3$
Cs-137	14.1 GBq*	< 390	$4.86 \times 10^5$	Not provided	$1.35 \times 10^4$	< 0.5	$1.23 \times 10^3$
Yb-169	1110 GBq*	< 240	$7.9 \times 10^7$	Not provided	$2.21 \times 10^6$	< 2	$2.0 \times 10^5$

## 880 Elite Maximum expected radiation doses with maximum activity

Nuclear Substance	Activity	Dose rate ( $\mu\text{Sv/hr}$ )					
		@ Surface		@ 30 cm		@ 100 cm	
		Closed shutter	Open shutter	Closed shutter	Open shutter	Closed shutter	Open shutter
Ir-192	1850 GBq	1680	$9.6 \times 10^7$	Not provided	$2.67 \times 10^6$	5	$2.4 \times 10^5$
Co-60	925 MBq	1720	$1.18 \times 10^6$	Not provided	$3.3 \times 10^4$	10	$3 \times 10^3$
Se-75	5550 GBq	240	$1.5 \times 10^6$	Not provided	$43 \times 10^4$	< 2	$3.76 \times 10^3$
Cs-137	14.1 GBq*	390	$4.86 \times 10^5$	Not provided	$1.35 \times 10^4$	< 0.5	$1.23 \times 10^3$
Yb-169	1110 GBq*	240	$7.9 \times 10^7$	Not provided	$2.21 \times 10^6$	< 2	$2.0 \times 10^5$

\*Maximum authorized activity for Cs-137 is 14 GBq and 740 GBq for Yb-169; however, the radiation level reported are for 14.1 GBq of Cs-137 and 1110 GBq for Yb-169.

## 6. Conditions of Use and Storage

The radiation device is designed to operate or stored in the temperature range of  $-40^\circ\text{C}$  to  $149^\circ\text{C}$ . Humidity is not expected to affect the radiation device.

## 7. Leak Tests

The leak test is to be conducted in accordance with QSA Global, Inc. document *SENTINEL 880 Series Gamma-Ray Source Projector & Transport Container Operations and Maintenance Manual, MAN-027* and in accordance with the *Nuclear Substances and Radiation Devices Regulations*.

## 8. Emergency and Accident Response

Emergency and accident response are to be dealt with in accordance with QSA Global, Inc. document *SENTINEL 880 Series Gamma-Ray Source Projector & Transport Container Operations and Maintenance Manual, MAN-027* and in accordance with the *Nuclear Substances and Radiation Devices Regulations*.

## 9. Quality Assurance

The design, testing and manufacture of the exposure device are made in accordance with *QSA Global Quality System Manual, QSM-1*, which complies with ISO 9001:2015 requirements. The exposure device has been demonstrated to meet ANSI N432-1980 and ISO 3999:2004 (E) standards.

## 10. Inspection, Maintenance and Servicing

The radiation device is to be inspected and maintained in accordance with the instructions provided by QSA Global, Inc. in the document *SENTINEL 880 Series Gamma-Ray Source Projector & Transport Container Operations and Maintenance Manual, MAN-027, Pipeliner Operations and Maintenance Manual* when using the IRSS PipeLiner system and in accordance with the *Nuclear Substances and Radiation Devices Regulations*. QSA Global, Inc. accepts the radiation device for disposal.

## 11. Packaging and Transport

The radiation device is transported as a Type B package which is certified under CDN/E199/-96. The source is secured in the locked position during transport. The radiation device is to be transported in accordance with the *Packaging and Transport of Nuclear Substances Regulations, 2015*.

## 12. Authorized Configurations and Accessories

The following accessories are authorized for use with this radiation device:

Equipment	Model No	Manufacturer
Control assemblies	664XX*, 692XX*, 693XX*, SAN882XX, SAN882RXX, SAN885XX, SAN885RXX, SAN886XX, SAN886RXX, SAN887XX, SAN887RXX	QSA Global, Inc.
	K125664-129 (issue D)	MDS Nordion
	256xxx**	SPEC
	Cs-QSA880-13	IRISNDT
	3740-04 SAE100R7	Acuren
Control Tubes	242825, 242835	SPEC
Guide Tubes	48906-X*, 48930-X*, 48931-X*, 95020-X*, 95021-X*, 48907-X*, 48998-X*, 48999-X*, 95073-X*, 95074-X*, 95075-X*, 95076-X*, 48912G-X, 48912GTUB-XX, 48906G-X, 95020G-X Model 489- and Model 950- style guide tubes may be used with Model TUB011-X guide tube shield assembly as an option.	QSA Global, Inc.
	224107, 224207, 224307, 228107	SPEC
Collimators	717, 827, 828, 846	QSA global, Inc.
Cable Male Connectors	550	QSA Global, Inc.
	D898, G140301-027	MDS Nordion
	244002, 244003	SPEC
Drive Connector	661	QSA Global, Inc.
Control Adaptor	141101	SPEC
Threaded End Stops	222510	SPEC
	TAN691, 8011003202	QSA Global, Inc.
PipeLiner assembly	PL1000	IRSS
Centering device	CANSPEC-045	Acuren
Rigid Tube	J-tube CANSPEC-048	Acuren
	J-tube 91500-XX	QSA Global, Inc.
	69130-XX	QSA Global, Inc.

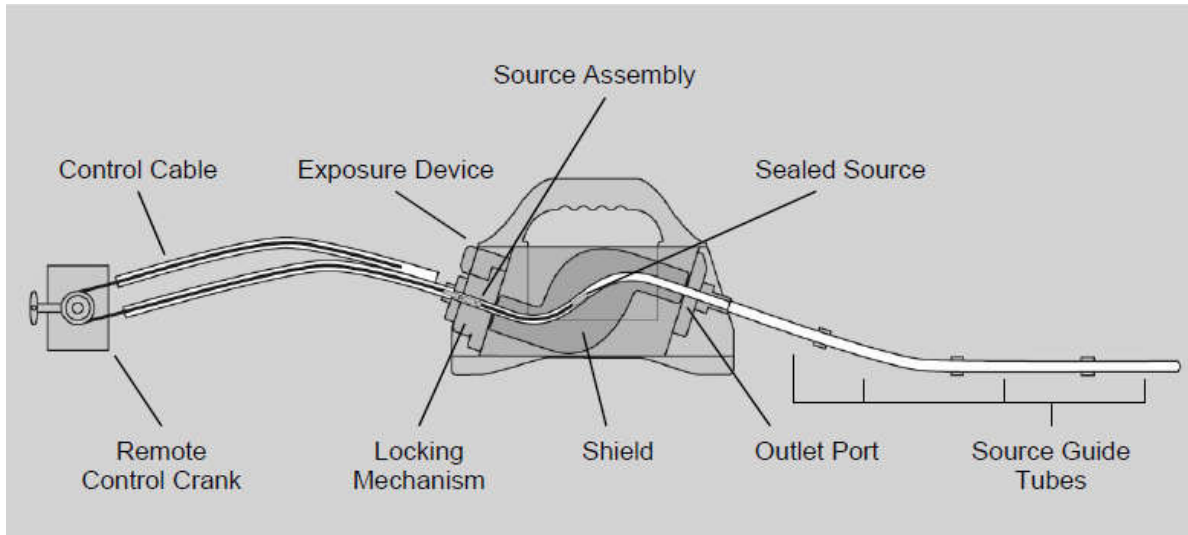
\* Where X represents the length of guide tube in ft

\*\* where xxx varies based on the specific configuration of the Sentinel style control assembly model. For example, control assemblies could include 256025, 256035, 256036, 256037, 256050, 256125

## 13. Reference Documents

No.	Description	Date	CNSC Reference No.
1	Application, for Rev. 12 certificate	2022-02-15 2022-03-31	6748033 6770090

**Figure 1: Overview of 880 Series**



**Figure 2: Illustration of the IRSS PipeLiner System**

