Control # 583473

Date: 5/7/2014

To: Mr. Dennis Lawyer

45-23722-01

Fax #: 610-337-5269

Phone #: 610-337-5366

03030662

# of Pages: 9

From: Clancy K. McDonald FBI/RSO

Phone #: 703-581-8807

Fax #: ~~703-691-7331~~ 703-985-1719

Subject: License Renewal (Exposure Device Info)

583473

NMSS/RGN1 MATERIALS-002

Russell Underwood Program Manager

Russell Underwood Jr.

REC'D IN LAT 5-7-14

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE
(AMENDED IN ITS ENTIRETY)

NO.: NR-392-D-101-S DATE: FEB 2 8 '03 PAGE 1 OF 7

DEVICE TYPE: Depleted Uranium Collimator

MODELS: **Model A (Drawing # T79580)**
Model B (Drawing # P0009614)

DISTRIBUTOR: Federal Bureau of Investigation
Engineering Research Facility
Building 27958A
Quantico, VA 22135

MANUFACTURER: **Model A:** Sandia National Lab
1515 Eubank, SE
Albuquerque, NM 87185
Model B: Science Applications International Corp.
16701 West Bernardo Drive
San Diego, CA 92127

SEALED SOURCE MODEL DESIGNATION:

Amersham **Product Code** CDCQ8081 and
CDCQ8082 **(Model A)**
Amersham Product Code CDCB4127 (Model B)

ISOTOPE:	MAXIMUM ACTIVITY:
Cesium-137	300 millicuries (11.1 GBq)
Depleted Uranium as shielding	1.630 kg (3.59 pounds) **in Model A**
	1.640 kg (3.60 pounds) in Model B

LEAK TEST FREQUENCY: Six months

PRINCIPAL USE: (T) Other

CUSTOM DEVICE: __X__ YES _____ NO

CUSTOM USER: Federal Bureau of Investigation
Engineering Research Facility
Building 27958A
Quantico, VA 22135

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE
(AMENDED IN ITS ENTIRETY)

NO.: NR-392-D-101-S DATE: FEB 2 6 1999

DEVICE TYPE: Depleted Uranium Collimator

DESCRIPTION:

The device is designed to emit a small beam of radiation from a cesium-137 source while protecting the user from exposure to radiation. The primary shielding material consists of depleted uranium, selected to minimize volume. The length of the device is 157 mm **(6.8 in.)**, with a maximum diameter of 57.2 mm **(2.25 in.)**. **In Model A,** the total amount of depleted uranium is 1.630 kg **(3.59 pound)**. All uranium pieces are surrounded by brass, which protects the uranium from oxidation. **Model A** is shown in Attachment 1; details of all parts are shown in Attachment 2. **The source used in Model A is shown in Attachment 3.**

In Model B, the total amount of depleted uranium is 1.640 kg (3.60 pound). All uranium pieces are nickel plated and surrounded by brass, which protects the uranium from oxidation. Model B is shown in Attachment 4; details of all parts and the source are shown in Attachments 5 and 6 respectively.

The center of the device contains either a 0.15 Ci **(5.55 GBq)** or a 0.30 Ci **(11.1 GBq)** Cs-137 encapsulated source. The cesium is in the form of glass beads in a welded double wall stainless steel container. Voids between the beads and the bore are filled with inert material to prevent source movement. Surrounding the source are five individually machined pieces of depleted uranium. Surrounding this housing are two individually machined pieces of brass, which screw together to form the body of the device. Two socket set cup point screws are used to keep this body from accidentally coming unscrewed.

In Model A, a collimated beam is formed by drilling holes in the depleted uranium pieces which run through the center along the length of the device. This final collimator is held in place by two pieces of brass to form a snout. The snout is screwed to the collimator body and restrained by two set screws. **In Model B, an additional step device constructed from fansteel, machinable tungsten, may also be used to focus the radiation beam. Model B can be used with or without an extended collimator. This longer piece duplicates the shielding properties provided by the depleted uranium in the short configuration. For shipping and**

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE
(AMENDED IN ITS ENTIRETY)

NO.: NR-392-D-101-S DATE: FEB 26 1999

DEVICE TYPE: Depleted Uranium Collimator

DESCRIPTION (cont'd):

storing, Model B utilizes a plug manufactured from fansteel and brass.

During use, the device will be positioned by hand into a holder where it will be held in place by a magnetic holder, while measurements of density are taken. A detector, separate from the device, will be used in conjunction with the device **for taking the measurements.**

LABELING:

The Collimator will be labeled in accordance with the requirements of 10 CFR 20.1904, including also the amount of depleted uranium. A warning label will be attached by adhesive on the outside brass body frame, which cautions against removal of the set screws. The warning label will state, "WARNING - DO NOT REMOVE THESE SET SCREWS, RADIOACTIVE Cs-137 INSIDE".

DIAGRAM:

See Attachments 1, 2, 3, **4, 5, and 6.**

CONDITIONS OF NORMAL USE:

The source shall not be exposed to a corrosive atmosphere or excessive vibration. During use, the device is held in place by magnets in a holder for approximately 20 minutes of exposure time in a standard laboratory/office environment (23°C/73°F, 50% relative humidity). When not in use, the device will be stored inside a sealed lead/steel pig, which will be subjected to normal extremes of temperature. The lead/steel pig has a minimum wall thickness of 3/4 inch. The recommended working life of the source is 15 years. **A shield plug must be installed in Model B during times of non-use or when the device is in storage.**

PROTOTYPE TESTING:

Two prototypes **of Model A** were built by DOE contractors. The testing included assembly, operation tests, radiation dose rate

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE
(AMENDED IN ITS ENTIRETY)

NO.: NR-392-D-101-S DATE: FEB 2 6 1999 PAGE 4 OF 7

DEVICE TYPE: Depleted Uranium Collimator

PROTOTYPE TESTING (cont'd):

measurements, and a drop test. As the most likely accident scenario, the collimator was dropped from a height of approximately 3.5 feet (1.1 m) onto a concrete floor, landing on its nose-piece. The external threads of detail B-B in Attachment 2 were deformed such that part B-B required replacing; however, there was no additional radiation exposure and no loss of radioactive material. Prototypes have undergone successful performance in the field for 4 years, with no problems experienced in any aspect of the device. The **Model A** sealed source capsule has been tested by the source manufacturer and achieved an ANSI designation of 77C64344. **The Model B source achieved an ANSI designation of 77C64444.**

The manufacturer reported that Model A has performed as specified in the field for ten years without experiencing any problems.

EXTERNAL RADIATION LEVELS:

For Model A, the following dose rates were obtained with a 0.15 curie **(5.55 GBq)** source:

Location	Dose	
	Rem/hr	mSv/hr
Surface	0.270	**2.7**
Beam	0.250	**2.5**
6 in. **(0.15 m)** from surface	0.044	**0.44**
3/4 in. **(19.0 mm)** thick pig	0.025	**0.25**

For a 0.30 curie **(11.1 GBq)** source, the dose rates would be approximately doubled. These measurements were made using a Bicron Instrument Surveyor 2000 portable survey meter.

For Model B, the following dose rates were obtained with the 0.30 Ci (11.1 GBq) source using a Victoreen Model 450 ion chamber meter:

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE
(AMENDED IN ITS ENTIRETY)

NO.: NR-392-D-101-S DATE: FEB 26 1998

DEVICE TYPE: Depleted Uranium Collimator

LIMITATIONS AND/OR OTHER CONSIDERATIONS OF USE (cont'd):

- Reviewer Note: The operator will need to physically handle the device. Although limited use is expected, a surface dose of 540 mR/hr **(5400 μSv) in Model A** for a 300 mCi **(11.1 GBq)** source could provide unnecessary hand exposure if proper remote handling is not performed. We suggest the applicant be required to wear ring badges and whole body badges, with a monthly exchange frequency. **For Model B, the manufacturer estimated that the surface dose rate of 220 mR/hr (2200 μSv) could result in unnecessary extremity exposure during handling and transportation from storage to place of operation. Therefore, handling and transportation time should be kept to the absolute minimum.**

- **Reviewer Note: in case the device has been dropped from a height of more than 3 ft (0.9 m), its integrity and proper operation must be verified before further use.**

- When the source is no longer deemed usable, the user will transfer the material back to the DOE contractor or a specific licensee for disposal.

- This registration sheet and the information contained within the references shall not be changed without the written consent of the NRC.

SAFETY ANALYSIS SUMMARY:

The device consists of a doubly-encapsulated Cs-137 source and depleted uranium. The depleted uranium is shielded from human exposure by brass on all sides. The brass also protects the depleted uranium from corrosion due to oxidation.

Under ordinary conditions of handling, storage, and use, it is unlikely that the byproduct material contained within the device will not be released or inadvertently removed from the shielding. To obtain access to the source, one must first remove the two set screws which keep the brass body parts from being accidentally turned. Next, one must unscrew the two brass body parts and separate the depleted uranium pieces. Appropriate warnings are affixed to deter this.

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE
(AMENDED IN ITS ENTIRETY)

NO.: NR-392-D-101-S DATE: FEB 26 1999

DEVICE TYPE: Depleted Uranium Collimator

SAFETY ANALYSIS SUMMARY (cont'd):

The device will be remotely handled in all cases, except for positioning of the device in the holder, in which case, if one assumes it to be handheld for a length of time of approximately 5 seconds, 4 times daily. This would result in a hand exposure of 200 mrem (2 mSv) per quarter for a 300 millicurie (11.1 GBq) device and is within the limits set by 10 CFR Part 20.

When not in use, the device will be stored in a fire-proof lead/steel pig which will be kept in an insulated safe.

Based on the above and on our review of the information and test data cited below, we continue to conclude that the Depleted Uranium Collimator is acceptable for licensing purposes. Furthermore, we continue to conclude that this device would be expected to maintain its containment integrity for normal conditions of use and accidental conditions which might occur during uses specified in this certificate.

REFERENCES:

The following supporting documents for the Depleted Uranium Collimator are hereby incorporated by reference and are made a part of this registry document.

- U.S. Department of Justice letters dated June 22, 1988, August 25, 1988, and September 29, 1988, with enclosures.
- **Science Applications International Corporation letter dated August 7, 1998, with enclosures thereto.**

ISSUING AGENCY:

U.S. Nuclear Regulatory Commission

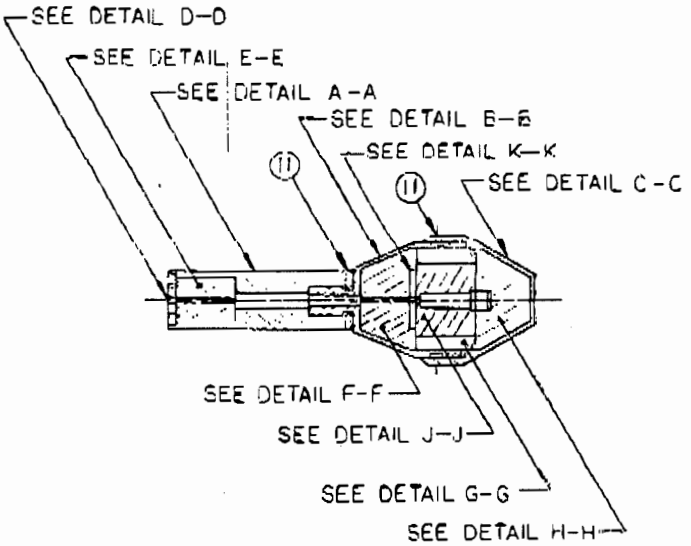
Date: FEB 26 1999 Reviewer: John P. Jankovich

Date: FEB 26 1999 Concurrence: Seung J. Lee

NOTES

1. ITEMS 5 THRU 10 WILL BE SUPPLIED BY DIV. 1311, SANDIA LABS.

DESIGN ACTION PART NO.	ZONE	LTR	DESCRIPTION	APPROVED BY	DATE
1 799580-000		A	HOWARD SELTZER 1243		5/5/71



30°0'+0°0' -0°30'

CONCENTRIC

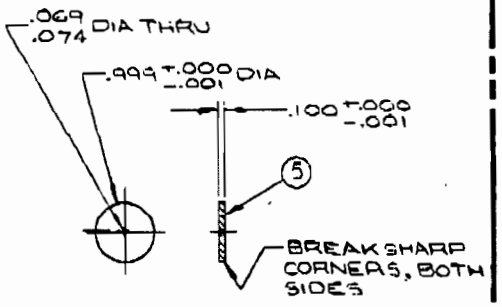
WITHIN .002

23° 0'+0°0' -0°30'

1.749 +.000 -.001

1.000 +.001 -.000 DIA

TO BE O.D.



DETAIL K-K

ITEM	QTY	PART NUMBER	DESCRIPTION	MATERIAL
16				
15				
14				
13				
12				
11	4		SET SCREW, 4-40 UNC x 3/16 LONG	
10	1		DEPLETED URANIUM	
9	1		DEPLETED URANIUM	
8	1		DEPLETED URANIUM	
7	1		DEPLETED URANIUM	
6	1		DEPLETED URAIUM	
5	1		DEPLETED URAIUM	
4	1		BRASS	
3	1		BRASS	
2	1		BRASS	
1	1		BRASS	
	NA	9900000	GEN. MFG. REQUIREMENTS	

LIST OF MATERIAL

AGENCY APPROVALS			SHEET	1
ORG	DATE	APPROVALS	ISSUE	A

SHEET INDEX

ANY CLASSIFICATION: UNCLASSIFIED

DWG CLASSIFICATION LEVEL: UNCLASSIFIED

TITLE: COLLIMATOR

SIZE	DESIGN AGENT. NO.	DWG. NUMBER
E	10213	1 799580

SCALE 1/1 SHEET 1 OF 1

1 799580 E

4 3 2 1

Date: 5/8/2014

45-23722-01
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# of Pages:

From: Clancy K. McDonald

Phone #: 703-581-8807

Fax #: [redacted] 703-985-1719

Subject: License Renewal (Appendix B Check List)

583473
NMSS/RGN1 MATERIALS-002

PROGRAM MANAGER
Russell Underwood Jr.
Russell Underwood Jr.

REC'D IN LAT 5-8-14

ITEMS 5 AND 6: MATERIALS TO BE POSSESSED AND PROPOSED USES

Yes	No	Radioisotope	Manufacturer or Distributor, Model No.	Quantity	Use As Listed on SSD Certificate	Specify Other Uses Not Listed on SSD Certificate
✓		Cesium-137	Sealed source manufacturer or distributor and model number: Sandia National Labs Device manufacturer or distributor and model number: QSA Inc.	Not to exceed either the maximum activity per source or maximum activity per device as specified in Sealed Source and Device Registration Certificate up to 4 with some for Total 120	Yes ☑ Specific description of the gauge use: Used for the measurement of the liquid properties of materials	☑ Not applicable ☐ Uses are: (Submit safety analysis supporting safe use)
		Americium-241	Sealed source manufacturer or distributor and model number: Device manufacturer or distributor and model number:	Not to exceed either the maximum activity per source or maximum activity per device as specified in Sealed Source and Device Registration Certificate	Yes ☐ Specific description of the gauge use:	☐ Not applicable ☐ Uses are: (Submit safety analysis supporting safe use)

APPENDIX B

Yes	No	Radioisotope	Manufacturer or Distributor Model No.	Quantity	Use As Listed on SSD Certificate	Specify Other Uses Not Listed on SSD Certificate
		Californium-252	Sealed source manufacturer or distributor and model number: _____ Device manufacturer or distributor and model number: _____	Not to exceed either the maximum activity per source or maximum activity per device as specified in Sealed Source and Device Registration Certificate	Yes ☐ Specific description of the gauge use: _____ _____ _____ _____ _____ _____ _____	☐ Not applicable _____ ☐ Uses are: _____ (Submit safety analysis supporting safe use)
		Other Isotope (Specify):	Sealed source manufacturer or distributor and model number: _____ Device manufacturer or distributor and model number: _____	Not to exceed either the maximum activity per source or maximum activity per device as specified in Sealed Source and Device Registration Certificate	Yes ☐ Specific description of the gauge use: _____	☐ Not applicable _____ ☐ Uses are: _____ (Submit safety analysis supporting safe use)
		Financial Assurance Required and Evidence of Financial Assurance Provided				

ITEMS 7 THROUGH 11: TRAINING AND EXPERIENCE, FACILITIES AND EQUIPMENT, RADIATION SAFETY PROGRAM, AND WASTE DISPOSAL

Item No. And Title	Suggested Response	Yes	Alternative Procedures Attached
7. INDIVIDUAL(S) RESPONSIBLE FOR RADIATION SAFETY PROGRAM AND THEIR TRAINING AND EXPERIENCE – RADIATION SAFETY OFFICER Name: Charles L. Wagner IV	Before obtaining licensed materials, the proposed RSO will have successfully completed one of the training courses described in Criteria in the section entitled "Individual(s) Responsible for Radiation Safety Program and Their Training and Experience – Radiation Safety Officer" in NUREG-1556, Vol. 1, Rev. 1, dated November 2001.	☑	☐
8. TRAINING FOR INDIVIDUALS WORKING IN OR FREQUENTING RESTRICTED AREAS	Before using licensed materials, authorized users will have successfully completed one of the training course described in Criteria in the section entitled "Training for Individuals Working In or Frequenting Restricted Areas" in NUREG-1556, Vol. 1, Rev 1, dated November 2001.	☑	☐
9. FACILITIES AND EQUIPMENT	No information needs to be submitted in response to this item; key issues are addressed under "Radiation Safety Program – Public Dose" and "Radiation Safety Program – Operating and Emergency Procedures."	Separate Item 9 Response Need Not Be Submitted With Application	
10. RADIATION SAFETY PROGRAM – AUDIT PROGRAM	The applicant is *not* required to, and should not, submit its audit program to NRC for review during the licensing phase.	Need Not Be Submitted With Application	
10. RADIATION SAFETY PROGRAM – TERMINATION OF ACTIVITIES	The applicant is *not* required to submit a response to the termination of activities section during the initial application. However, when the license expires or when the licensee ceases operation, NRC Form 314 must be submitted.	Need Not Be Submitted With Application	
10. RADIATION SAFETY PROGRAM – SURVEY INSTRUMENTS	We will either possess and use, or have access to and use, a radiation survey meter that meets the Criteria in the section entitled "Radiation Safety Program – Instruments" in NUREG-1556, Vol. 1, Rev. 1, dated November 2001.	☑	☐

Item No. And Title	Suggested Response	Yes	Alternative Procedures Attached
10. RADIATION SAFETY PROGRAM – MATERIAL RECEIPT AND ACCOUNTABILITY	Physical inventories will be conducted at intervals not to exceed 6 months, to account for all sealed sources and devices received and possessed under the license.	☑	☐
10. RADIATION SAFETY PROGRAM – OCCUPATIONAL DOSIMETRY	Either we will maintain, for inspection by NRC, documentation demonstrating that unmonitored individuals are not likely to receive a radiation dose in excess of 10 percent of the allowable limits in 10 CFR Part 20, or we will provide dosimetry processed and evaluated by an NVLAP-approved processor that is exchanged at a frequency recommended by the processor.	☑	☐
10. RADIATION SAFETY PROGRAM – PUBLIC DOSE	The applicant is *not* required to submit a response to the public dose section during the licensing phase. This matter will be examined during an inspection.	**Need Not Be Submitted With Application**	
10. RADIATION SAFETY PROGRAM – OPERATING AND EMERGENCY PROCEDURES	We will implement and maintain the operating and emergency procedures in Appendix H of NUREG-1556, Vol. 1, Rev. 1, dated November 2001, and provide copies of these procedures to all gauge users and at each job site. **OR** Operating and emergency procedures will be developed, implemented, and maintained and will meet the criteria in the section entitled "Radiation Safety Program – Operating and Emergency Procedures" in NUREG-1556, Vol. 1, Rev. 1, dated November 2001.	☐ ☑	☐
10. RADIATION SAFETY PROGRAM – LEAK TEST	Leak tests will be performed at intervals approved by NRC or an Agreement State and specified in the Sealed Source and Device Registration Sheet. Leak tests will be performed by an organization authorized by NRC or an Agreement State to provide leak testing services for other licensees or using a leak test kit supplied by an organization authorized by NRC or an Agreement State to provide leak test kits to other licensees and according to the kit supplier's instructions.	☑	☐ **The information in Appendix J supporting a request to perform leak testing and sample analysis is attached.**

Item No. And Title	Suggested Response	Yes	Alternative Procedures Attached
10. RADIATION SAFETY PROGRAM – MAINTENANCE	*Routine Cleaning and Lubrication* We will implement and maintain procedures for routine maintenance of our gauges according to each manufacturer's recommendations and instructions. *Non-Routine Maintenance* We will send the gauge to the manufacturer or other person authorized by NRC or an Agreement State to perform non-routine maintenance or repair operations that require the removal of the source or source rod from the gauge.	☑ ☑	☐ ☐ The information listed in Appendix G supporting a request to perform non-routine maintenance in-house is attached.
10.RADIATION SAFETY PROGRAM – TRANSPORTATION	The applicant is *not* required to submit its response to transportation during the licensing process. However, this issue will be reviewed during inspection.	Need Not Be Submitted With Application	
11. WASTE MANAGEMENT – GAUGE DISPOSAL AND TRANSFER	The applicant is not required to submit a response to waste management during the licensing process. However, the licensee should develop, implement, and maintain gauge transfer and disposal procedures in its radiation protection program.	Need Not Be Submitted With Application	