

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE
(Amended in It's Entirety)

NO: LA612D111S

DATE: **January 11, 2011**

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DEVICE TYPE: Radiographic Exposure Device

MODEL: SPEC 150

MANUFACTURER/DISTRIBUTOR: Source Production & Equipment Company
113 Teal Street
St. Rose, LA 70087-9691

SEALED SOURCE MODEL DESIGNATION: SPEC G-60

ISOTOPE:

MAXIMUM ACTIVITY:

Iridium -192

5550 GBq
(150 Curies)

Selenium-75

**5550 GBq
(150 Curies)**

Ytterbium-169

**5550 GBq
(150 Curies)**

Depleted Uranium
(Shielding)

17kg
(37 lbs)

LEAK TEST FREQUENCY: N/A

PRINCIPAL USE CODES: A - Industrial Radiography

CUSTOM DEVICE: ___ YES XX NO

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DESCRIPTION:

The model SPEC 150 exposure device is a portable ANSI N432-1980 Type 1 radiography exposure device designed for industrial radiography applications. It is used with associated equipment consisting of a source assembly, a remote control assembly, various guide tubes, and various collimators. The remote control assembly and guide tubes are essentially identical to those manufactured and distributed by Source Production and Equipment Company (SPEC) for many years.

In normal use, the control assembly and guide tube are attached to the device, the device is unlocked, and the source assembly is unlocked (2 separate actions). The source is then released from the automatic securing mechanism (ASM) by depressing the release plunger at the top of the device. The remote control assembly is then used to move the source assembly out of the device and into the working position at the end of the guide tube. After taking the radiograph, the remote control is used to retract the source. When the source assembly is retracted into the fully shielded position, it is automatically secured by the ASM.

The exposure device contains a depleted uranium shield inside a welded titanium housing. The rectangular housing measures approximately 14.1 cm (5.6 inches) high, 13.6 cm (5.4 inches) wide, and 36.8 cm (14.5 inches) long. The depleted uranium shield, which has a maximum mass of 17 kg (37.25 lbs) and a minimum shielding thickness of 4.6 cm (1.8 inches), contains a zircaloy or titanium S-tube through which the source assembly travels. **The S-tube is positioned between the automatic securing mechanism/lock module and outlet port.** Please see Attachments 1 and 2.

The SPEC -150 has three on-off mechanisms. The exposure device lock is operated with a key which is marked with an indication that points to the "Lock" or "Unlock" positions that are permanently marked on both sides of the lock endplate. The source assembly lock control assembly operating lever points to the same "Unlock" marking on the end plate when the source assembly lock is disengaged. Finally, the ASM release plunger is in the depressed (down) position when the source assembly is in the unsecured state.

The lock module contains the exposure device lock, source assembly lock, and the automatic securing mechanism. This module is a sealed unit and requires no maintenance or lubrication by the user. The ASM can be easily removed but only with special tools. The individual removing the ASM must be specifically authorized by the licensing authority. Only SPEC is authorized to perform maintenance or repair of the ASM/lock module. As a safety feature, it is necessary for the source assembly to be moved from the device to a C-1 source changer before the ASM/lock module can be removed. The locking ball at the end of the source is larger than the slot in the ASM housing, preventing the source from being unintentionally retracted from the lock end of the camera.

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The exposure device lock is located at the bottom center of the ASM/lock module and the device lock end plate. The lock is manually operated by a metal circular key. (There is no readily available substitute for this key.) According to the manufacturer, the device cannot be locked when the source assembly is not in the fully secured position. When the device is unlocked, the key cannot be removed. The key also serves as a dust cover for the lock when the camera is in use. The key must be removed before the control assembly can be disconnected from the source and device.

The source assembly lock is located at the center of the ASM/lock module and the device lock end plate. It is manually operated by using the operating lever on the control panel of the remote control assembly. The control assembly must be properly attached to the exposure device to operate the source assembly lock. The control assembly can be attached to the exposure device only after the drive cable connector has been attached to the source assembly connector. The source assembly lock cannot be unlocked unless the exposure device has been unlocked. When the source assembly lock is in the locked position, the release plunger cannot be latched. This ensures that the source assembly cannot be inadvertently unsecured from the ASM. The source assembly lock cannot be locked unless the source assembly has been retracted into the fully secured position.

The automatic securing mechanism secures the source assembly when it is fully retracted into the device. The ASM can neither be intentionally defeated by mechanical means nor easily bypassed by intentionally refraining from completely retracting the source. The source assembly is released from the ASM by depressing (and latching) the release plunger located at the top (external housing) of the device. The release plunger latches in the engaged (down) position. When the source assembly is cranked forward, the release plunger unlatches and returns to its original (up) position and cannot be re-latched until the source assembly has been returned to the fully retracted position. It is necessary for the user to operate the release plunger at the device before each source crank-out.

The lock cap is an oblong metal assembly that is manually attached to the control attachment boss (located at the top center of the lock end-plate). The cap prevents ingress of foreign material when the device is not being used.

The safety plug is a metal assembly that is used to prevent ingress of foreign material in the outlet port, to shield scattered radiation from the S-tube, and to help secure the source assembly when the device is not in use.

The materials used in the SPEC - 150 are depleted uranium, titanium, stainless steel, zircaloy, bronze, aluminum, tungsten, epoxy potting compound (Devcon), felt seals, foam fill and Buna rubber seals (neoprene).

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The housing, structural system, subassemblies and components are primarily welded. The ASM/lock module and outlet panel assembly are the only items which may be replaced by the licensee's authorized personnel. These parts are connected by threaded mechanical fasteners and require special tools to remove. **Additionally, the safety plug and lock cap can be replaced by the licensee's authorized personnel (using SPEC replacement parts).**

LABELING:

Exposure Device Nameplate:

The SPEC 150's nameplate is marked with Source Production and Equipment Company's name, address, device model, serial number, Curie (GBq) capacity, mass of depleted uranium shielding, and device weight in accordance with ANSI N432-1980, Section 4.2 (**the radionuclide is also marked on the device**). This label is made of permanently marked stainless steel. The size is approximately 89.0 cm (3.5 inches) x 19.0 cm (7.5 inches). The colors are black lettering on a yellow background with a magenta trefoil. It is attached to the device side with **stainless steel rivets**. See Attachment 3.

Exposure Device Caution Label:

The SPEC 150 caution label states, "Caution-Radioactive Material-Do Not Handle-Notify Civil Authorities if Found." It is made of permanently marked stainless steel. The label is yellow with a magenta trefoil and black lettering. The size is 10.8 cm (4.25 inches) x 8.9 cm (3.5 inches) and is attached to the device side with **stainless steel rivets**. It meets the requirements of ANSI N43.6-2007 and 10 CFR 20.203. See Attachment 4.

Exposure Device Warning Label:

The SPEC-150 warning labeling consists of two separate labels located on the top of the device on both sides of the carrying handle. The labels are made of stainless steel and are permanently marked with red lettering. The labels are approximately 3.2 cm (1.25 inches) x 13.3 cm (5.25 inches) and are attached with **stainless steel rivets**. Together, the labels state:

WARNING-DANGER

Radiation may cause radiation burns, sickness, cancer, genetic defects, and death. This device may be used only by authorized and monitored individuals who have been formally trained in the use of this device, the proper use of survey instruments, and radiation safety.

This device must be used in strict compliance with operating and emergency procedures and applicable regulations. It must be used with a calibrated survey instrument at all

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times. Trainees, helpers, and assistants must work under the direct surveillance of a radiographer.

Source Identification Tag:

The SPEC 150 has provision for the attachment of a source tag meeting the requirements of 10 CFR 34.20 (b) (1) and ANSI N432-1980 section 4.2. The source tag identifies the isotope, source model, serial number, activity, manufacturer, and date of manufacture. It measures approximately 6.7 cm (2.625 inches) long x 1.9 cm (0.75 inches) wide, It is attached to the top of the device by stainless steel screws. A new source tag is provided with each source.

Control Assembly Pistol Grip Marking:

The control assembly pistol grip cover plate is **clearly** marked with the words "expose" and "retract", with arrows to indicate the respective directions of cranking motion to expose or retract the source assembly, in accordance with ANSI N432-1980, section 6.1.2.

DIAGRAMS:

Please see Attachments 1 through 4.

CONDITIONS OF NORMAL USE:

The device is designed for performance of industrial radiography at field sites and permanent facilities with a broad range of environmental conditions. According to Source Production and Equipment Company, it will operate properly within a temperature range of -40 degrees F to +180 degrees F. Source Production and Equipment Company intends the device to be resistant to corrosion from typical industrial and environmental atmospheres. Vibration encountered as a result of normal use and transportation is not expected to degrade the device or its safety features. The device is not designed to be used under water.

Useful Life:

The device is designed to have a useful life of up to 50 years (depending on the conditions of usage and maintenance).

PROTOTYPE TESTING:

Prototype testing was intended to show that all requirements of ANSI N432-1980, 10 CFR part 34, LAC 33: XV. Chapter 5 (Louisiana Radiation Regulations), and other industry standards were met or exceeded. These tests included a shielding efficiency test; an endurance test; a

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horizontal shock test; a vertical shock test; accidental drop tests; a penetration test; a connector test; a guide tube and control assembly sheath crushing test; a guide tube and control assembly sheath kinking test; and an exposure head, guide tube, and control assembly sheath tensile test.

All tests, with the exception of the endurance test, penetration test and connector test were performed as specified in ANSI N432-1980. On the controls, Source Production and Equipment Company used a torque level of 6 pound-feet for the endurance test (rather than the level specified in the standard, which could not be achieved). With this exception, the device seems to be in compliance with ANSI N432-1980.

EXTERNAL RADIATION LEVELS:

The following are the maximum radiation levels expected when a 150 curie source is in the device and the safety plug and lock cap are in place:

Maximum Radiation Level With 150 Curies			
Distance From Surface	Iridium – 192	Selenium-75	Yttrbium-169
0 cm	160 mrem/hr	<0.1 mrem/hr	<0.1 mrem/hr
5 cm	71 mrem/hr	<0.1 mrem/hr	<0.1 mrem/hr
30 cm	16 mrem/hr	<0.1 mrem/hr	<0.1 mrem/hr
100 cm	1.6 mrem/hr	<0.1 mrem/hr	<0.1 mrem/hr

QUALITY ASSURANCE AND QUALITY CONTROL:

The device is manufactured under the control of the Source Production and Equipment Company Quality Assurance Program. Source Production and Equipment Company has been issued a Quality Assurance Program Approval for Radioactive Material Packages, number 0102, by the NRC. The program encompasses the design, fabrication, assembly, testing, use, repair and maintenance of radioactive material packages, exposure devices, sources and associated equipment. Reports of defects must be reported in accordance with 10 CFR Part21. **The fabrication and inspection of the SPEC -150 is performed in accordance with documented fabrication and inspection procedures.**

Each of the exposure devices is provided with a QA Final Inspection Certificate. The certificate documents the radiation profile of the device and the radiation level at the outlet port with the safety plug removed. **It certifies that the SPEC – 150 was inspected and tested and found to operate in accordance with SPEC's requirements. Inspection and test documents are maintained by SPEC.**

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LIMITATIONS:

1. The SPEC 150 shall be distributed only to those persons specifically licensed by the NRC or an Agreement State.
2. The SPEC 150 must be used in strict compliance with operating and emergency procedures and applicable regulations.
3. The maximum length guide tube which has been ANSI N432-1980 certified for use with the device is 21 feet. The control tubes used for the endurance test were 24 feet long. However Source Production and Equipment Company offers longer control cables.
4. When not in use, the safety plug and lock cap must be installed in the device.
5. The approved source assembly, SPEC G-60, shall not be subjected to environmental or other conditions of use which exceed the **ANSI N43.6-2007** classification of **07C43515**.
6. This registration sheet and the information contained within the references shall not be changed without the written consent of the State of Louisiana, Department of Environmental Quality, Radiation **Licensing Section**.

Reviewer Notes/License conditions:

1. The only parts of the SPEC 150 which are allowed to be removed by the licensee are the ASM/lock module and the outlet panel assembly. Source Production and Equipment Company does not authorize any repair to these components by licensees. The components may only be replaced (not repaired) by the licensee. The licensee must provide clear protocol for anyone who performs replacement and other maintenance, and at what intervals.
2. The device is not intended to be near unmonitored members of the public who are not involved with the transport, storage or other authorized use of the device.
3. The user must supply their own label to satisfy the requirements of Section 34.20 (b)(1)(v), 10 CFR part 34 (or the equivalent Agreement State regulation).

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Currently, there are no qualified remote mechanical (automatic) un-securing mechanisms.

SAFETY ANALYSIS:

The following safety features are incorporated into the design:

1. The source is shielded by a depleted uranium shield. The uranium provides at least 4.57 cm (1.8 inches) of shielding in all directions.
2. The ASM/lock module can not be easily removed without special tools. It is a sealed unit which should not be lubricated. Users are not authorized to disassemble or repair the unit. Before the module can be removed, the source must be moved from the device to a C-1 source changer.
3. The exposure device lock is operated by a metal circular key for which there is no readily available substitute. When the device is unlocked, the key cannot be removed. The key serves as a dust cover for the lock when the device is in use. The key must be removed to disconnect the control assembly from the exposure device.
4. The source assembly lock cannot be operated until the control assembly has been properly connected to the source assembly and device. The lock cannot be disengaged unless the exposure device has been unlocked. The lock is linked to the release plunger. The release plunger will not latch while the source assembly lock is locked. (The release plunger must latch to release the source.)
5. The automatic securing mechanism secures the source assembly whenever the source is fully retracted into the device.
6. The source assembly cannot exit the back of the control attachment boss because the locking ball is larger than the slot in the ASM housing.

Based on the above information, the Radiation Protection Division, of the Louisiana Department of Environmental Quality, believes that the device will perform as intended under all likely conditions of use and any reasonably foreseeable abnormal conditions.

REFERENCES:

This Certificate of Registration is based on information and test data contained in the following support documents, which are hereby incorporated by reference and made a part of this registry document:

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APPLICATION for RADIATION SAFETY EVALUATION and DEVICE REGISTRATION, Revision No. (0), MODEL SPEC-150 RADIOGRAPHY EXPOSURE DEVICE and ASSOCIATED EQUIPMENT, dated September 14, 1994.

SPEC 150 Industrial Radiography Exposure Device Component and Assembly Drawings (Control # 22)

APPLICATION for RADIATION SAFETY EVALUATION and DEVICE REGISTRATION, Revision No. (0), MODEL SPEC-150 RADIOGRAPHY EXPOSURE DEVICE and ASSOCIATED EQUIPMENT, 3.8 RADIOLOGICAL SAFETY INSTRUCTIONS, Supplement 1, Revision (0), dated October 14, 1994.

APPLICATION for RADIATION SAFETY EVALUATION and DEVICE REGISTRATION, Revision No. (0), MODEL SPEC-150 RADIOGRAPHY EXPOSURE DEVICE and ASSOCIATED EQUIPMENT, RADIATION PROFILE, Supplement 2, Revision (0), dated October 13, 1994.

APPLICATION for RADIATION SAFETY EVALUATION and DEVICE REGISTRATION, Revision No. (0), MODEL SPEC-150 RADIOGRAPHY EXPOSURE DEVICE and ASSOCIATED EQUIPMENT, CONTROL ASSEMBLY COMPONENT DRAWINGS NON-PROPRIETARY, Supplement 3, Revision (0), dated October 13, 1994.

FAX of October 17, 1994, from Kenneth N. Barrington (SPEC) to Cliff Russell (DEQ-RPD) c/o USNRC.

FAXes (3) of October 21, 1994, from Kenneth N. Carrington (SPEC) to Cliff Russell (DEQ-RPD) c/o USNRC. FAX of November 7, 1994, from Kenneth N. Barrington (SPEC) to Cliff Russell (DEQ-RPD).

Letter dated November 04, 2010, from Kelley Richardt (SPEC) to James Pate, M.S. (DEQ).

Diagrams emailed December 15, 2010, from Kelley Richardt (SPEC) to Jabari Robinson, M.S. (DEQ).

E-mail December 27, 2010, from Kelley Richardt (SPEC) to Jabari Robinson, M.S. (DEQ).

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ISSUING AGENCY:

State of Louisiana, Department of Environmental Quality, Office of Environmental Services,
Assessment Division, Radiation Licensing Section

Date: 1/18/2011

Reviewed By: Jabari Robinson
Jabari Robinson, M.S.

Date: 1/18/2011

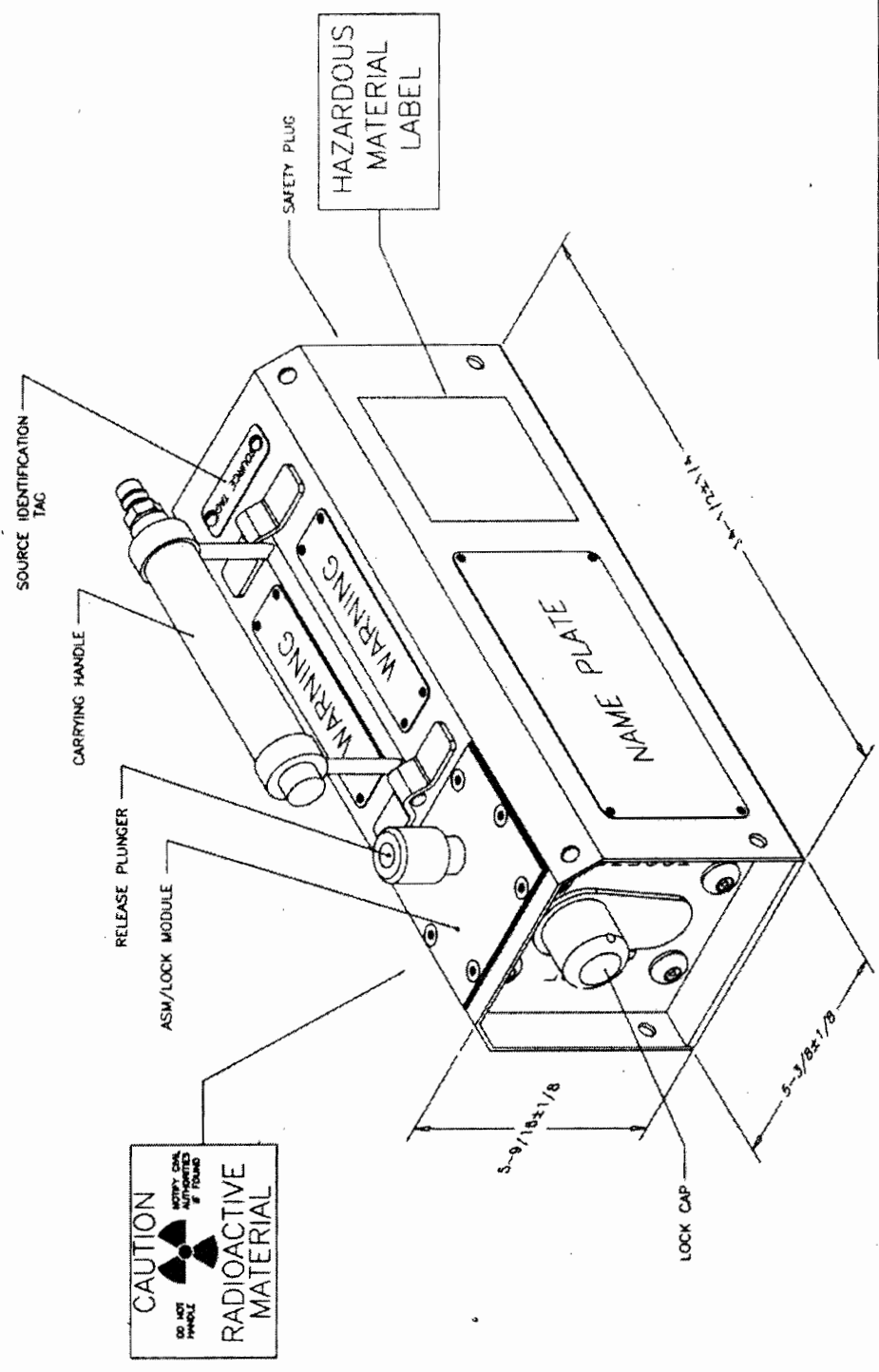
Concurrence: James M. Pate
James M. Pate, M.S.

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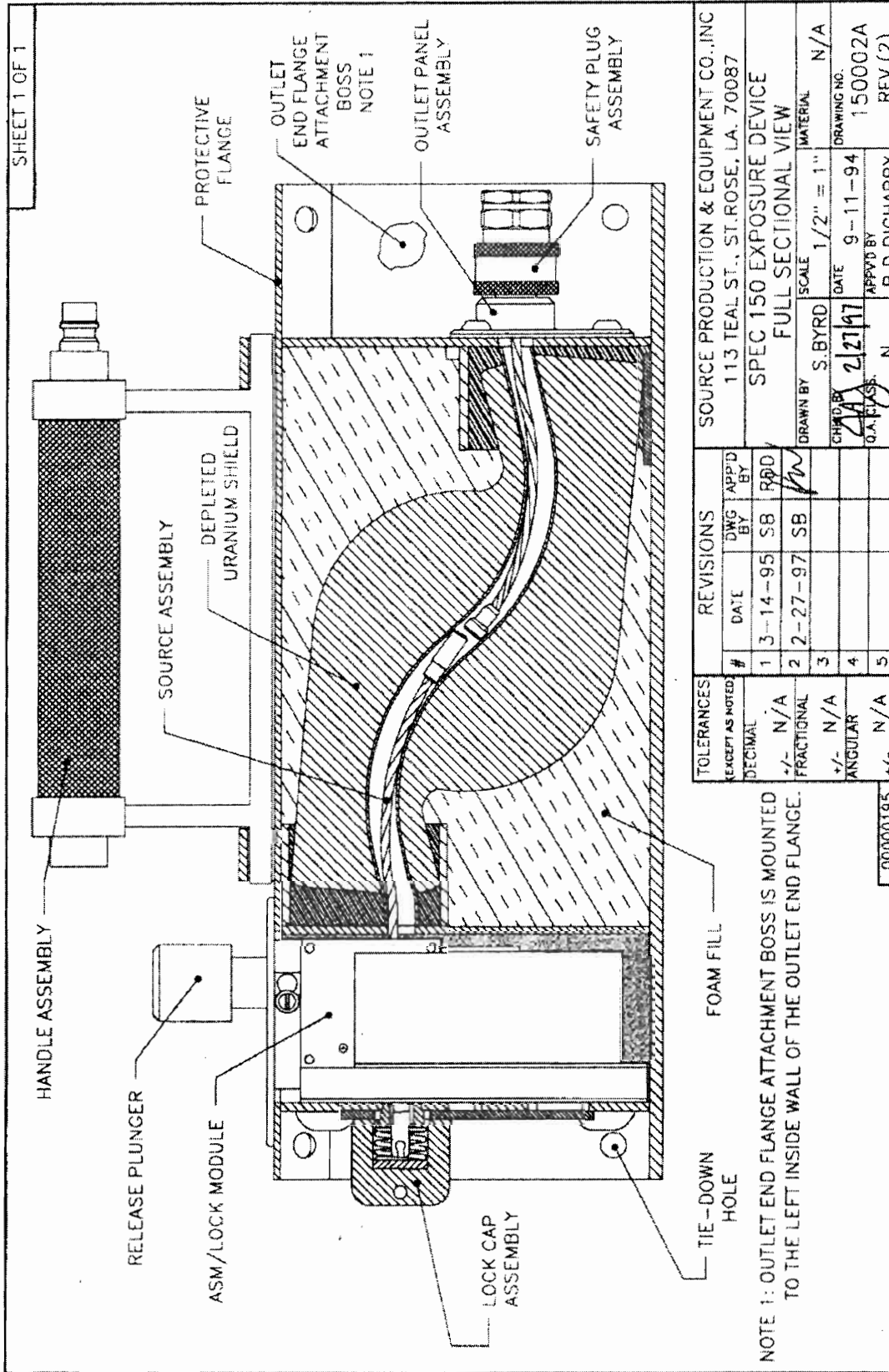
CONTROLLED COPY NO		
REV	DESCRIPTION	DATE
		APPROVED

Attachment 1

NOTE:
1. HAZARDOUS MATERIAL LABEL IS TYPICAL OF OPPOSITE SIDE OF DEVICE.



SOURCE PRODUCTION & EQUIPMENT CO., INC. 113 TEAL ST. ST. ROSE, LA. 70087	
DATE	11-20-10
APPROVALS	
DESIGNER	MP
CHECKED	MP
DESIGNED	MP
IN CHARGE	N/A
SCALE	1:1
SCALE NTS	BT5000000
SHEET	1 of 1



SOURCE PRODUCTION & EQUIPMENT CO., INC
 113 TEAL ST., ST. ROSE, LA. 70087
 SPEC 150 EXPOSURE DEVICE
 FULL SECTIONAL VIEW
 DRAWN BY S. BYRD SCALE 1/2" = 1"
 MATERIAL N/A
 CHECKED BY [Signature] DATE 9-11-94 DRAWING NO. 150002A
 O.A. CLASS. N APPROVED BY R.D. DICHARRY REV. (2)

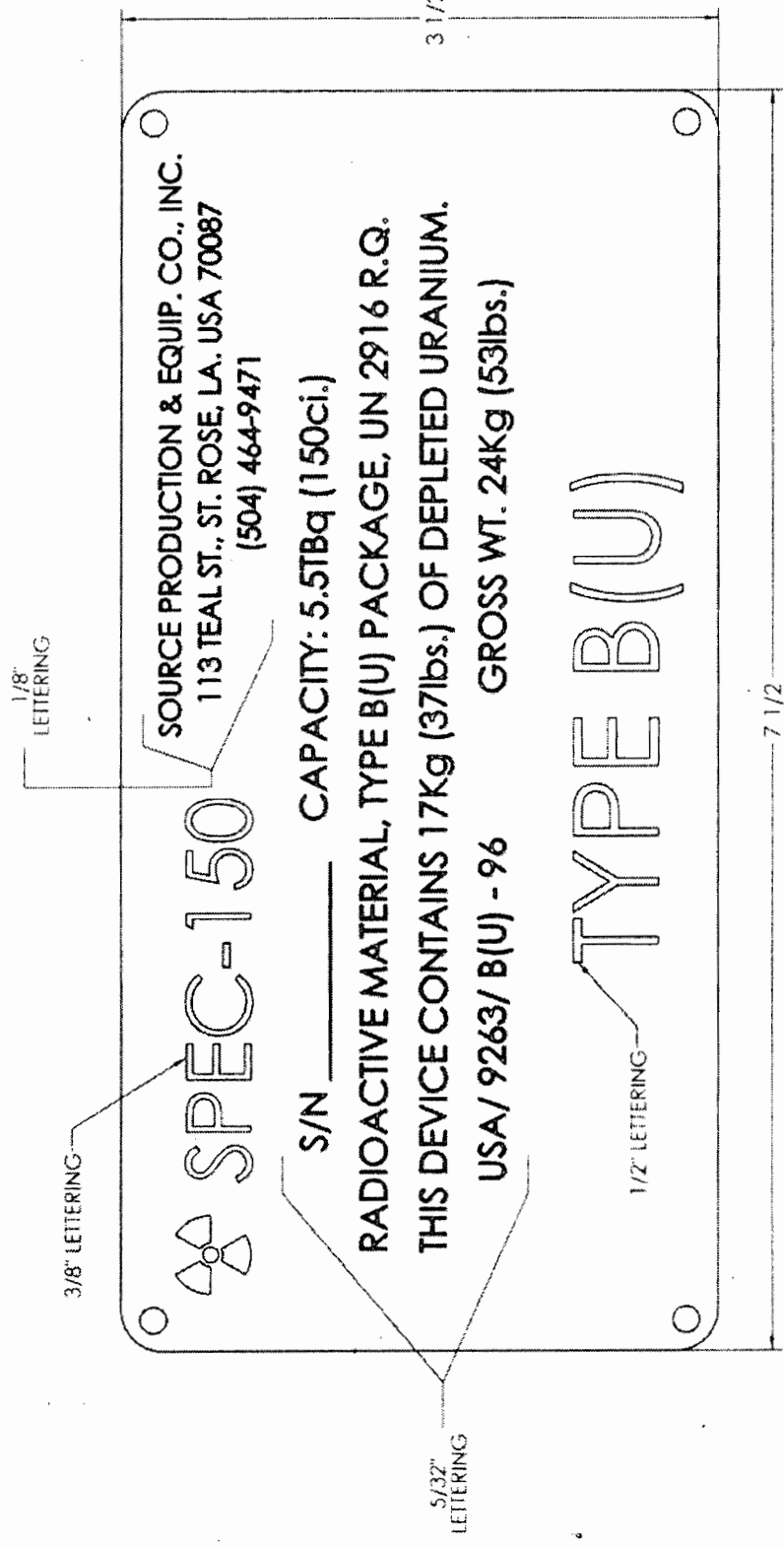
TOLERANCES		REVISIONS			
EXCEPT AS NOTED		#	DATE	DWG BY	APPRD BY
DECIMAL	+/- N/A	1	3-14-95	SB	RDD
FRACTIONAL	+/- N/A	2	2-27-97	SB	[Signature]
ANGULAR	+/- N/A	3			
		4			
		5			

NOTE 1: OUTLET END FLANGE ATTACHMENT BOSS IS MOUNTED TO THE LEFT INSIDE WALL OF THE OUTLET END FLANGE.

00000195

REVISIONS		
REV	DESCRIPTION	DATE

Attachment 3



- NOTES:
1. LETTERING TO BE PERMANENTLY MARKED.
 2. BLACK LETTERS
 3. YELLOW BACKGROUND.
 4. MAGENTA LOGO
 5. NAMEPLATE MAY INCLUDE ADDITIONAL INFORMATION SUCH AS THE ISOTOPE
 6. MATERIAL: STAINLESS STEEL

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE		APPROVALS	DATE	SOURCE PRODUCTION & EQUIPMENT CO., INC 113 TEAL ST., ST. ROSE, LA. 70087	
		DRAWN: JF	11-30-10		
		CHECKED: MGT	MGT		
		APPROVED: MGT	MGT		
TREATMENT	NONE	SIZE	DWG. NO.	REV	
FINISH	NONE		C	B1500005	0
DEFINITE SCALE DRAWING		QC CLAS.	N/A	SCALE: NTS	B150000500
					SHEET 1 OF 1

