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Executive Office of Health and Human Services
Department of Public Health
Radiation Control Program
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January 31, 2001

Paul H. Lohaus, Director
Office of State and Tribal Programs
Nuclear Regulatory Commission
One White Flint North
11555 Rockville Pike, 3rd Floor
Rockville, MD 20852

RE: Response to Draft Letter Received on January 17, 2001

Dear Paul:

This letter is in response to your draft letter received by our Agency on January 17, 2001. We have reviewed your recommendations regarding Registration Certificate MA-0628-D-137-S, and have produced and enclosed a draft copy of the certificate dated January 31, 2001, which includes all of the NRC recommended changes. The sole purpose of this draft is to more clearly demonstrate the points that we will make regarding your recommendations, not to represent what we intend to issue as a final document. Our comments will correspond to the numbering used in your itemized letter.

We recognize that the existing document is confusing since it deals with so many variations of the four different models and the nomenclature has not been consistent throughout. For example, in the last paragraph of the section titled, "Prototype Testing," we refer to the "Models 680 and 741" when in fact we mean the Models 680A/B and 741A/B. We will correct this in our final version so that confusion is minimized.

Listed below are the recommendations from your draft letter along with our comments regarding each recommendation:

A. Recommendation 1: "Page 6, Prototype Testing, at the end of the third paragraph add:

'The model 676 and 684 devices may only be used for the storage of radiographic sources because they do not have an automatic securing mechanism required by §34.20 or CMR 120.315'."

MA Response: We feel the entire substance of this recommendation should not be incorporated for the following reasons:

a) it refers to only two of the four devices covered by the registration certificate. If any of the four models lack the A or B designation, it does not incorporate the automatic locking mechanism. Mentioning only two devices would confuse readers. [*we made the same error on page 8, and should correct this too*];

b) this issue, covering all four of the device models, is already discussed at the bottom of page 2;

c) we do not believe it is appropriate to tell licensees that the non-approved devices can only be used to store sources. It is more accurate to simply say that they may *not* be used for industrial radiography.

B. Recommendation 2: "Page 6, Prototype Testing, add a sentence to the last paragraph: However, AEA has not demonstrated that the model 680B or 741B devices, without the overpack, meet the 30-foot (9 m) drop test requirement of ANSI N432, as required by 10 CFR 34.20 or 105 CMR 120.315";

MA Response: We agree with the content of this sentence, except it only identifies the B versions of the 680 and 741 devices. Our end product will mention both the A and B models in this context. Also, we feel that the discussion of the failed 30 foot drop and the successful 4 foot drop would be better incorporated into the third paragraph rather than appearing at the end.

C. Recommendation 3: "Limitations And/or Other Conditions of Use: Delete the first paragraph, and substitute: Outside the protective box, the model 680 and 741 devices do not meet the 30-foot (9 m) drop test requirement of ANSI N432-1980, and therefore, do not meet the requirements of 10 CFR 34.20 or 105 CMR 120.315.

Licensees may request a specific regulatory authorization (or

exemption from the requirements of §34.20 or CMR 120.315) to use the Model Series 680 and 741 devices outside the protective box (OP), to overcome constraints imposed by the temporary job-site working space and/or weight of the device. If a special authorization is considered for the use of the Model Series 680 and 741 devices outside the protection box it is recommended that restrictions should, as a minimum, include a limitation that the device should not be lifted or used more than 4 feet (1.2 m) above a sound working surface (i.e. capable of withstanding the assembled device drop from a height of four feet)."

MA Response: The idea contained in the first sentence relates more to Prototype Testing than Limitations and/or Other Considerations of Use, and since this statement will already be expressed in the Prototype Testing section (see our response to 2, above), it is redundant. We suggest to incorporate your last paragraph in place of our existing first paragraph.

Again, we have provided you with a draft version of the amended certificate incorporating your recommendations for consideration of the above arguments. Our final draft will be completed once these issues are addressed.

It is apparent that we are in agreement with the basic issues, including the restrictions on the use of the Models 680A/B and 741A/B radiography cameras. We wish to conclude our review upon receipt of your positive response to this letter.

Thank you for your input into this important matter.

Sincerely,

Bob

Robert M. Hallisey, Director

RMH/kot

Enclosure: (1)

c: Salifu Dakubu
Bob Walker
Ken Traegde

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE

NO: **MA-1059-D-137-S** DATE: **January 31, 2001**
(Supercedes NR-0628-D-101-S) **(Amended in its Entirety)**

DEVICE TYPE: Radiographic Exposure Device

MODEL: 676, 676E, 676A, 676AE, 676B, 676BE
680, 680E, 680A, 680AE, 680B, 680BE, 680-OP
684, 684E, 684A, 684AE, 684B, 684BE
741, 741E, 741A, 741AE, 741B, 741BE, 741-OP

MANUFACTURER/DISTRIBUTOR: AEA Technologies, QSA Inc.
(formerly Amersham Corporation)
40 North Avenue
Burlington, MA 01803

SEALED SOURCE MODEL DESIGNATION: AEA Technology Models A424-9, A424-13, A424-14, A424-15, A424-18, A424-20, and 943 (See below for exposure device/source authorization)

ISOTOPE:

Exposure Device Model Number	Source Model Number(s)	Isotope	Maximum Activity
{676, 676E, 676A, 676B, 676AE, 676BE}	A424-13	Cobalt-60 Depleted U Shielding	330 curies (12.2 TBq) 193 kg (425 lb)
{680, 680E, 680A, 680B, 680AE, 680BE, 680-OP}	A424-14, 943	Cobalt-60 Depleted U Shielding	110 curies (4.1 TBq) 137 kg (302 lb)
{684, 684E, 684A, 684B, 684AE, 684BE}	A424-15 A424-20	Cobalt-60 Iridium-192 Depleted U Shielding	11 curies (407 GBq) 240 curies (8.9 TBq) 70 kg (155 lb)
{741, 741E, 741A, 741B, 741AE, 741BE, 741-OP}	A424-18 A424-9	Cobalt-60 Iridium-192 Depleted U Shielding	33 curies (1221 GBq) 240 curies (8.9 TBq) 102 kg (225 lb)

LEAK TEST FREQUENCY: 6 months

PRINCIPAL USE (A) Industrial Radiography

CUSTOM USER: ____ YES __X__ NO

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE

NO: **MA-1059-D-137-S** DATE: **January 31, 2001**
(Supercedes NR-0628-D-101-S) **(Amended in its Entirety)**

DEVICE TYPE: Radiographic Exposure Device

DESCRIPTION:

Model 676, 680, 684 and 741 **series of** radiographic exposure devices, including their A, B, E, AE and BE versions, are similar in construction methods, materials and operation. However, they differ in the size and weight of each model as shown in Table 1 below, and by the source capacity as shown on page 1 of this registration.

Table 1

Exposure Device	Height (inches)	Length (inches)	Width (inches)	Maximum Weight of Device, lb*	Maximum Weight of DU Shield, lb*	Side Plate Thickness (inches)
676 Series	13.7	23.0	16.0	625	425	1.0
680 Series	11.9	21.0	14.6	465	302	0.75
684 Series	10.3	17.1	12.9	225	155	0.63
741 Series	11.4	19.1	13.9	360	225	0.63

(Multiply the number of inches by 2.54 to get units of centimeters and the number of pounds by 0.4536 to get units of kilograms)

(* NOTE: Weights shown here are based on actual measurements of production units. Previous registration sheet showed calculated weights).

The 'A' designation identifies a model whose lock assembly has been upgraded by retrofitting an automatic securing mechanism so that the device meets regulatory requirements. The 'B' designation identifies a device manufactured with the automatic securing mechanism on the lock assembly. The 'E' designation signifies that the model has been equipped with electronic circuitry to allow use with an automatic exposure control **mechanism**.

The versions not designated with an A or B do not have the automatic securing mechanism and, **therefore,** do not meet the current requirements of 10 CFR 34.20 **and 105 CMR 120.315. These models may not be used for industrial radiography.**

DEVICE TYPE: Radiographic Exposure Device

The source assemblies are housed in an 'S'-shaped titanium or zircalloy tube. In the models 680, 684 and 741 series, the source tube has an outside diameter of 0.467 inches (1.186 cm) and an inside diameter of 0.385 inches (0.978 cm). In the model 676 series, the outside diameter is 0.625 inches (1.587 cm) and the inside diameter is 0.545 inches (1.384 cm). The source tube is surrounded by depleted uranium metal as the shielding material. The uranium shielding is cast in place around the source tube.

The uranium shield is encased in a steel housing and fixed in position by retaining bar assemblies. The void space between the shield and the shell is filled with polyurethane foam. Steel-uranium interfaces are separated with 0.01 inch (0.25 mm) thick copper separators. The housing is fabricated from a steel shell and two side plates. The shell is fabricated from 0.25 inch **(6.35 mm)** thick steel (0.18 inches **(4.6 mm)** thick for the 684 series of devices). The side frames are fabricated from steel and are secured to the shell by means of four tapped rods that extend through the shell and by four 7/16 - 20 bolts, 2 inches (5.08 cm) long. The side frames can be either of a one-piece construction or a two-piece construction. The two-piece side frame consists of a plate welded in the center of the side frame.

The devices are equipped with locking mechanisms to prevent motion of the source assembly when in the locked position. This is accomplished by the lock trapping and securing a steel ball which is swaged onto the source assembly cable. The lock mechanism also prevents the source from being inadvertently retracted through the back of the device. The unit is operated with a flexible cable which moves the source from the shielded position to the end of a source guide tube, and returns the source to the shielded position. The source is fastened to the flexible cable by the standard model 550 AEA Technology source connector.

A control cable connector and lock-selector assembly is used on all models. The control connector is located on the connector plate assembly with "operate", "lock" and "connect" positions for connection to the control device. The connector plate assembly is secured to the device by means of four ¼ - 20 tamper-proof bolts.

The automatic securing assembly for the 'A' and 'B' versions provides security of the source by the following:

1). the sealed source is automatically secured in the shielded position when the source is returned to the exposure device;

2). the control unit cannot be disconnected unless the source is in the fully stored position in the

device;

3). the source cannot be exposed unless a secure connection of the source assembly to the drive cable has been made and the locking slide is unlocked.

4). the locking slide cannot unlock the source until all of the following conditions are met:
- the key lock is unlocked;
- the drive cable has been connected to the source assembly;
- the control unit has been connected to the exposure device;
- the selector ring has been rotated to the "Operate" position; and
- the locking slide is manually moved to the unlocked position.

NOTE: When the locking slide is in the locked position a green-colored indicator is visible on the left side of the selector ring. When the slide is in the unlocked position, a red-colored indicator can be seen on the right side of the selector ring. These colored indicators cannot be seen by the operator of the model 680 and 741 devices when they are used inside the protective box.

The design of the locking mechanism is such that the source cannot be exposed unless the male half of the connector, which is swaged onto the control cable, is properly seated within the female half, which is swaged onto the source assembly. In addition, the control cable cannot be disconnected unless the source is properly stored in the shield, with the female half of the connector protruding from the end of the selector. To allow control cable disconnection when a radioactive source is not being stored in the device, a dummy source assembly is provided, and is stored in the storage cover.

All units have a dust cover cap installed into the lock assembly in order to prevent the ingress of dirt. In addition, a shipping cover, manufactured out of 0.25 inch (6.3 mm) steel, can be secured over the locking assembly with six bolts and lock washers. This cover must be removed prior to using the device.

The Models 680-OP and 741-OP are mobile devices and consist of the Model 680 or 741 series exposure devices placed in a protective box in order to meet the drop test requirements of ANSI N432. The boxes have protective inserts and are placed on a cart for movement. The boxes have sliding doors in either end in order to allow connection of the controls and guide tube to the 680 or 741 exposure devices. The exposure devices are used in the box, connecting the controls and guide tubes through the doors at either end of the box or by lifting the lid of the box. The box is of folded and welded steel construction formed from a 1/16 inch **(1.6 mm)** carbon steel sheet. It is 32 inches

DEVICE TYPE: Radiographic Exposure Device

(81.3 cm) long, 19 inches (48.3 cm) wide and 18.5 inches (47 cm) high. The box with exposure device weighs approximately 515 pounds (233.6 kg) with the 741 and 615 pounds (279 kg) with the 680 exposure device.

Under certain conditions, restrictions of size and weight in the work environment may not permit the use of Model 680 and 741 series of exposure devices in their protective box (OP). Please see the section titled "Limitations and/or Other Considerations of Use," for further information on use under these conditions.

LABELING:

A stainless steel plate fastened to the device is engraved with information necessary to comply with 10 CFR Parts 20, 34 and 71, as well as 49 CFR and ANSI N432. The label also contains the manufacturer's name and the depleted uranium information. A separate source identification tag/plate is secured to the device indicating the:

- isotope
- source model number
- source serial number
- source activity
- date the activity was measured

DIAGRAM:

Drawings of the AEA series of cobalt exposure devices are presented in Attachments 1 through 26.

CONDITIONS OF NORMAL USE:

The Operation and Maintenance Manual supplied with the exposure devices contains general information on all of the components of the device, recommended safety precautions, operating instructions and a section on maintenance of the unit.

These devices will typically be used in environments associated with industrial radiography. These environments may subject the components to extremely harsh environmental use conditions.

The expected working life of these devices is approximately 10 years, although this can vary significantly depending on environments of use and the quality of the inspection and maintenance

DEVICE TYPE: Radiographic Exposure Device

performed.

PROTOTYPE TESTING:

Model 680, 684 and 741 series of devices have been in use since 1974 with no reported incidents of failure during use. Model 676 devices have been in use since 1977 with no reported incidents of failure during use.

Original testing/engineering analysis performed on these units in 1974 and 1977 had demonstrated the devices' ability to meet all the requirements of 10 CFR 71. Additional testing conducted from 1991 through 1996 demonstrated that the devices continued to meet 10 CFR 71 and also met the requirements of ANSI N432 for the exposure devices, the controls and the guide tubes.

Subsequent Type B retesting of the models 680 and 741 units under more stringent and controlled conditions in 1998 resulted in placing these models in a protective box in order to successfully pass the required hypothetical accident condition tests described in 10 CFR 71 and ANSI N432 for mobile devices. The Model 676 devices have been reclassified as a fixed device as defined in ANSI N432, and does not need to meet the hypothetical accident conditions. The model 684 is no longer manufactured and has also been reclassified as a fixed device. **The Model 676 and 684 series of devices may only be used for the storage of radiographic sources because they do not have an automatic securing mechanism as required by 10 CFR 34.20 and 105 CMR 120.315.**

The exposure devices and their associated equipment have demonstrated their ability to pass the required ANSI N432 endurance and tensile tests. The use of the protective box for the models 741-OP and 680-OP will have no detrimental effect on the ability of the exposure device/associated equipment to pass the endurance and tensile tests.

The models 680-OP and 741-OP have been tested and found to meet the requirements of ANSI N432.

AEA Technology QSA, Inc. conducted a four foot drop test of the Model 680B and 741B devices without the protective overpack in April of 2000. The results demonstrated that Model 680B and 741B devices were able to pass the test requirements of Section 8.4.4 of ANSI N432-1980 and could be used at distances of up to 1.2 meters (4 feet) above a sound working surface. However, AEA Technology QSA, Inc. has not demonstrated the Model 680B and 741B devices, without the overpack, meet the 30 foot (9 meter) drop test requirement of ANSI N432, 10 CFR 34.20, and 105 CMR 120.315.

DEVICE TYPE: Radiographic Exposure Device

EXTERNAL RADIATION LEVELS:

All source activities are reported as output curies as defined in ANSI N432.

Model 676 Series- the maximum radiation levels extrapolated to 330 curies **(12.2 TBq)** of cobalt-60 in a model 676 exposure device are 110 mR/hr **(1.10 mSv/hr)** (at the surface), and 1-2 mR/hr **(10-20 μSv/hr)** at one meter **(3'31/4")** from the surface.

Model 680 Series- the maximum radiation levels extrapolated to 110 curies **(4 TBq)** of cobalt-60 in a model 680 exposure device are 140 mR/hr **(1.40 mSv/hr)** at the surface, and 1.9 mR/hr **(19 μSv/hr)** at one meter **(3'31/4")** from the surface.

Model 684 Series- the maximum radiation levels extrapolated to 11 curies **(407 GBq)** of cobalt-60 in a model 684 exposure device are 168 mR/hr **(1.68 mSv/hr)** at the surface, and 1.6 mR/hr **(16 μSv/hr)** at one meter **(3'31/4")** from the surface. The maximum radiation levels extrapolated to 240 curies **(8.88 TBq)** of iridium-192 are 4.3 mR/hr **(43 μSv/hr)** at the surface, and 0.5 mR/hr **(5 μSv/hr)** at one meter **(3'31/4")** from the surface.

Model 741 Series- the maximum radiation levels extrapolated to 33 curies **(1.22 TBq)** of cobalt-60 in a model 741 exposure device are 140 mR/hr **(1.40 mSv/hr)** at the surface, and 1.9 mR/hr **(19 μSv/hr)** at one meter from the surface. The maximum radiation levels extrapolated to 240 curies **(8.88 TBq)** of iridium-192 are 2.8 mR/hr **(28 μSv/hr)** at the surface, and 1 mR/hr **(10 μSv/hr)** at one meter **(3'31/4")** from the surface.

The models 680-OP and 741-OP would have lower radiation levels than those shown above for the exposure device alone, since the exposure device would be inside the protective box.

QUALITY ASSURANCE AND CONTROL:

AEA Technologies QSA, Inc. employs a quality assurance program to ensure that each component is manufactured to the required specifications. The program complies with the terms and conditions of Subpart H of 10 CFR 71 under Approval Number 71-0040 and ISO 9001, and has been reviewed and approved by the US Nuclear Regulatory Commission.

DEVICE TYPE: Radiographic Exposure Device

LIMITATIONS AND/OR OTHER CONSIDERATIONS OF USE:

- **Outside the protective box, the Model 680 and 741 devices do not meet the 30-foot drop test requirement of ANSI N432-1980, and therefore, do not meet the same requirement in 10 CFR 34.20 and 105 CMR 120.315.**

  Licensees may request a specific regulatory authorization (or exemption from the requirements of 10 CFR 34.20 or 105 CMR 120.315) to use the Model 680 and 741 series of devices outside of the protective box (overpack), to overcome constraints imposed by the temporary job site working space and/or weight of the device. If a special authorization is considered for the use of the Model 680 and 741 series of devices outside the protection of the box it is recommended that the restrictions should, as a minimum, include a limitation that the device should not be lifted or used more than 4 feet (1.2 meters) above a sound working surface (i.e., capable of withstanding the assembled device drop from a height of four feet).

  The Model 676 and 684 series have been classified as fixed devices and are not equipped with protective boxes. In addition, versions of these models not designated with 'A' or 'B' have no automatic securing mechanism and do not meet the current requirements of 10 CFR 34.20 and 105 CMR 120.315. The Model 676 and 684 series of devices without an 'A' or 'B' designation are prohibited from use and remain on this certificate for information purposes only.

- The exposure devices shall be distributed only to persons specifically licensed by the NRC or an Agreement State.

- The sealed sources shall be leak tested at intervals not to exceed 6 months using techniques capable of detecting 0.005 microcuries **(185 Bq)** of removable contamination.

- The exposure devices shall be leak tested at intervals not to exceed 12 months using techniques capable of detecting 0.005 microcuries **(185 Bq)** of removable contamination for depleted uranium.

- The exposure devices can be used with their corresponding sealed source assembly(s) as stated under the "Sealed Source Model Designation" on the first page of this certificate and/or other sealed sources or uses as specified in a registration certificate issued by the NRC or an Agreement State.

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE

NO: **MA-1059-D-137-S** DATE: **January 31, 2001**
(Supercedes NR-0628-D-101-S) **(Amended in its Entirety)**

DEVICE TYPE: Radiographic Exposure Device

- The exposure devices shall only be used with the associated equipment listed in Attachment 27 of this registration sheet, or other associated equipment meeting the requirements of 10 CFR 34 (or equivalent requirements) as specified by the NRC or an Agreement State.
- Handling, storage, use, transfer and disposal are to be determined by the licensing authority.
- This registration sheet and the information contained in the references shall not be changed without the written consent of the Massachusetts Department of Public Health.

SAFETY ANALYSIS SUMMARY:

Based on our review of the information and the test data cited below, we continue to conclude that the **'A' or 'B' designated models from the series** 676, 680, 684 and 741, and the 680-OP and 741-OP **exposure devices**, are acceptable for specific licensing purposes **under** normal conditions of use and accidental conditions which might occur during uses specified in this certificate. **Restrictions on the use of the Model 680 and 741 series of radiography cameras outside of the overpack may be considered by the host Agreement State or the NRC for States under NRC jurisdiction, for specific licensing purposes.**

Furthermore, we continue to conclude that the **'A' or 'B' designated models from the series** 676, 680, 684 and 741 exposure devices, and the 680-OP and 741-OP devices, would be expected to maintain their integrity **under** normal conditions of use and accidental conditions which might occur during uses specified in this certificate.

REFERENCES:

1. Model 676 Series

   The following documents for the model 676 series of exposure devices are hereby incorporated by reference and made a part of this registry document:

   - Tech/Ops letter dated December 1, 1970, with enclosures thereto.

2. Model 680 Series

DEVICE TYPE: Radiographic Exposure Device

The following documents for the model 680 series of exposure devices are hereby incorporated by reference and made part of this registry document:

- Tech/Ops application dated July 10, 1970, and letter dated July 10, 1970, with enclosures thereto.

3. Model 684 Series

The following documents for the model 684 series of exposure devices are hereby incorporated by reference and made part of this registry document:

- Tech/Ops Letters dated December 1, 1970, January 7, 1971, February 10, 1971, and May 30, 1975, with enclosures thereto.

4. Model 741 Series

The following documents for the model 741 series of exposure devices are hereby incorporated by reference and made part of this registry document:

- Tech/Ops letter dated February 21, 1985, with enclosures thereto.

5. All Referenced Models

- Amersham Corporation letters dated April 20, 1993, February 12, 1993, June 18, 1992, April 14, 1992, February 20, 1992, October 17, 1991, September 16, 1991, August 5, 1991, and letter received January 4, 1989, with enclosures thereto.

- AEA Technologies QSA, Inc., applications dated September 24, 1999; October 22, 1999; and November 19, 1999, with enclosures thereto.

- **AEA Technologies QSA, Inc., telefaxed letters dated April 21, 2000, and May 24, 2000, with enclosures thereto.**

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE

NO: **MA-1059-D-137-S** DATE: **January 31, 2001**
(Supercedes NR-0628-D-101-S) **(Amended in its Entirety)**

DEVICE TYPE: Radiographic Exposure Device

ISSUING AGENCY:

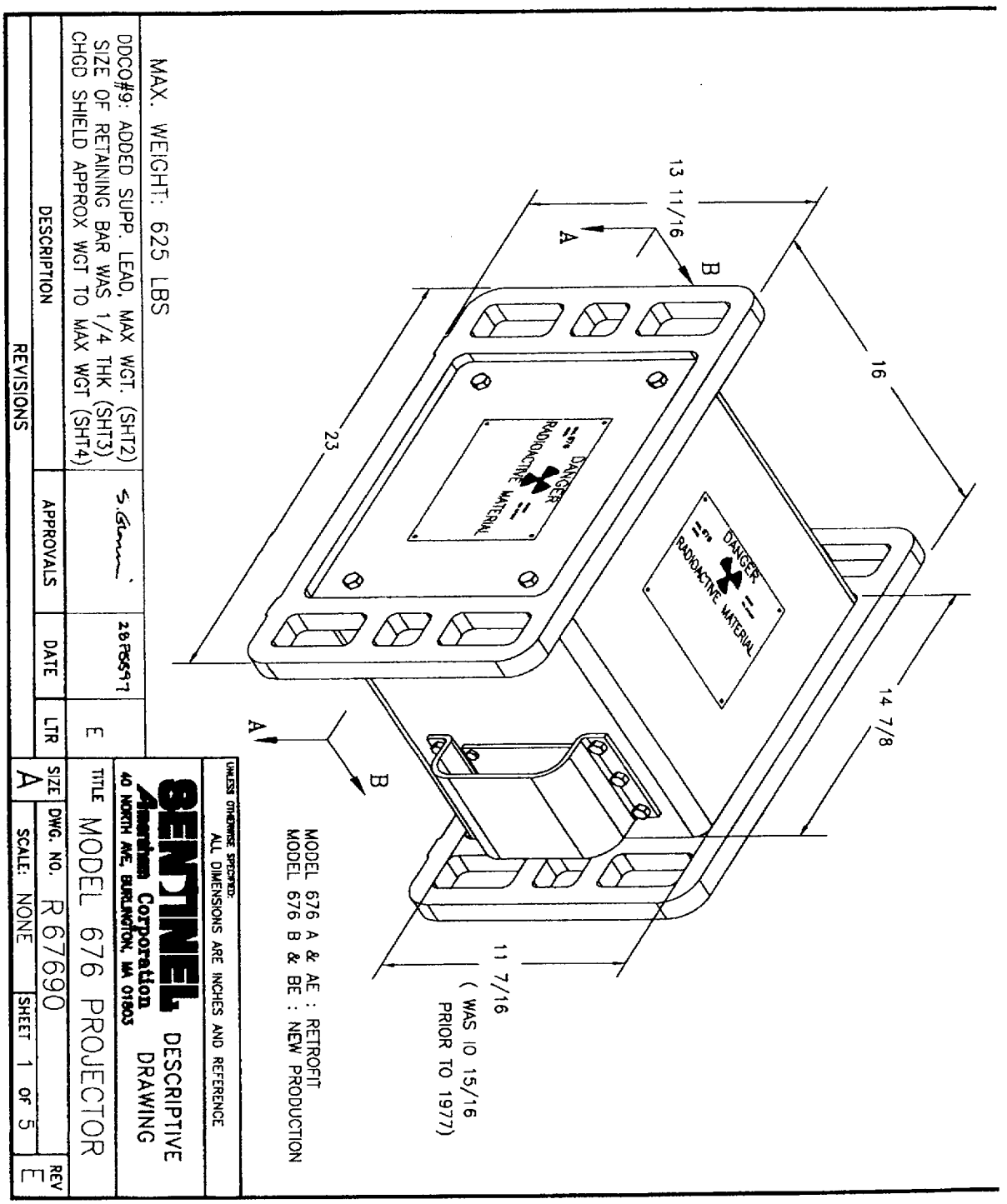
Massachusetts Department of Public Health
Radiation Control Program

Date: _____ Reviewer _____
Kenath O. Traegde

Date: _____ Concurrence: _____
Robert Walker

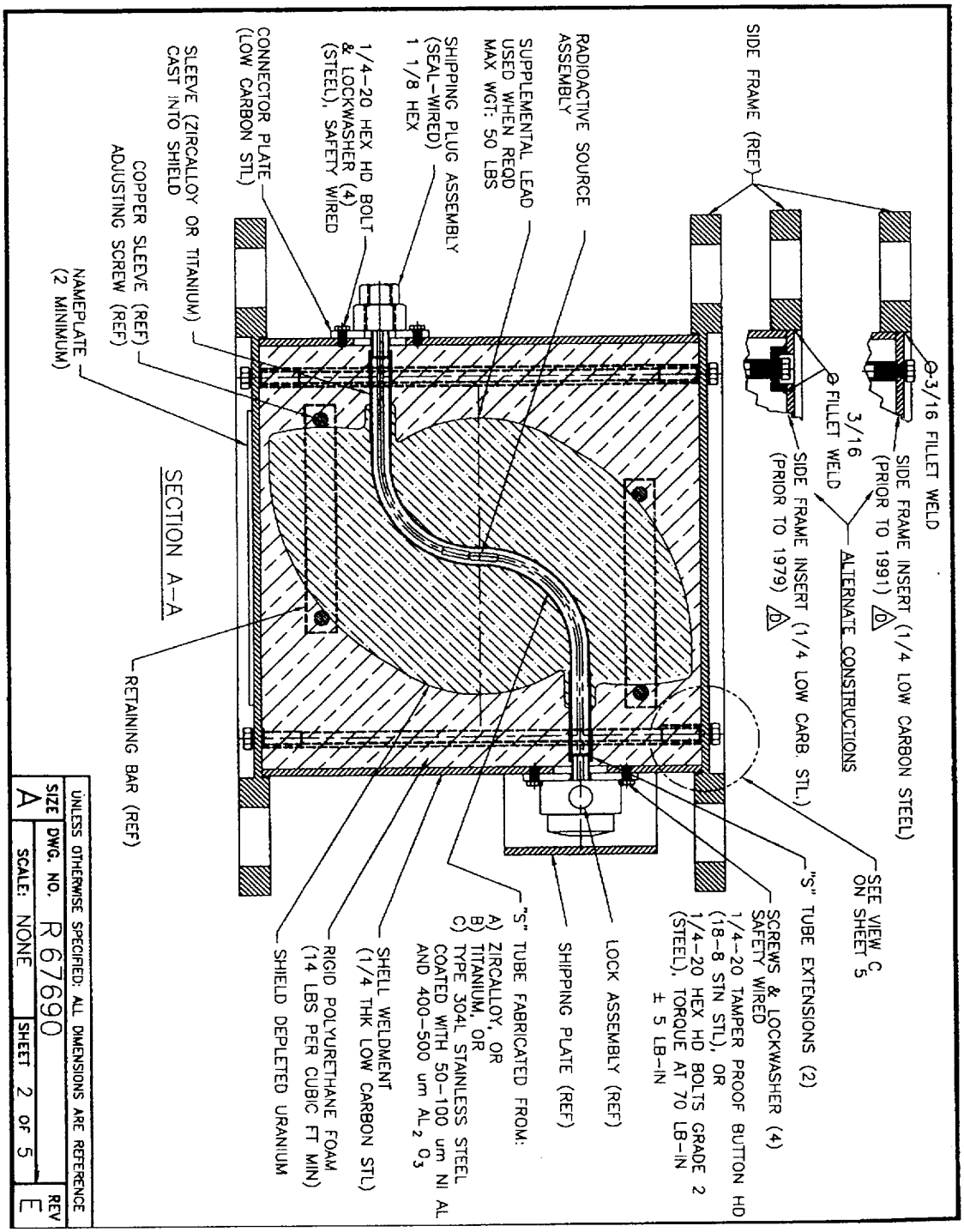
REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE

NO: **MA-1059-D-137-S** DATE: **January 31, 2001** ATTACHMENT 1 OF 27
(Supercedes NR-0628-D-101-S) **(Amended in its Entirety)**



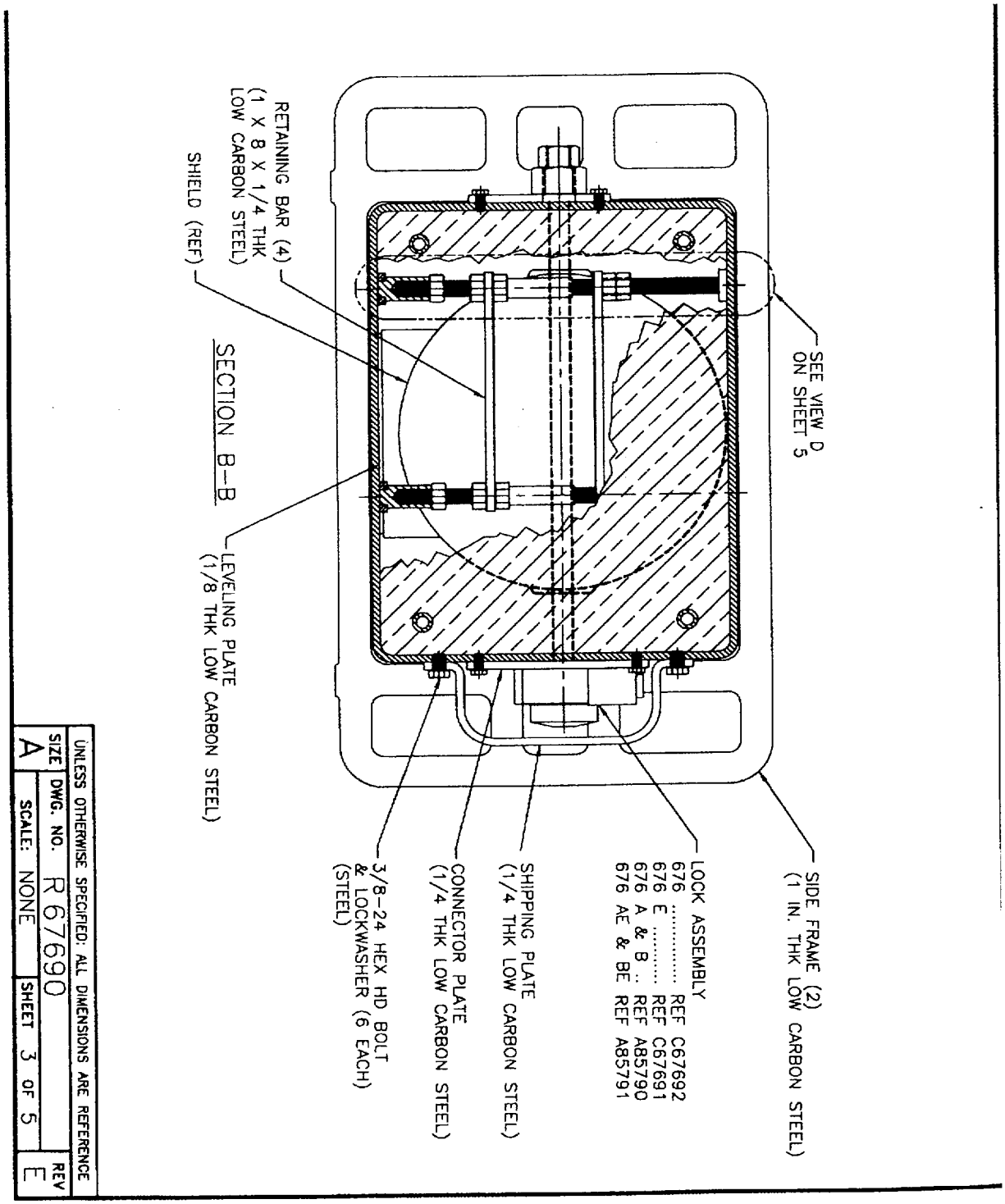
REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE

NO: **MA-1059-D-137-S** DATE: **January 31, 2001** ATTACHMENT 2 OF 27
(Supercedes NR-0628-D-101-S) **(Amended in its Entirety)**



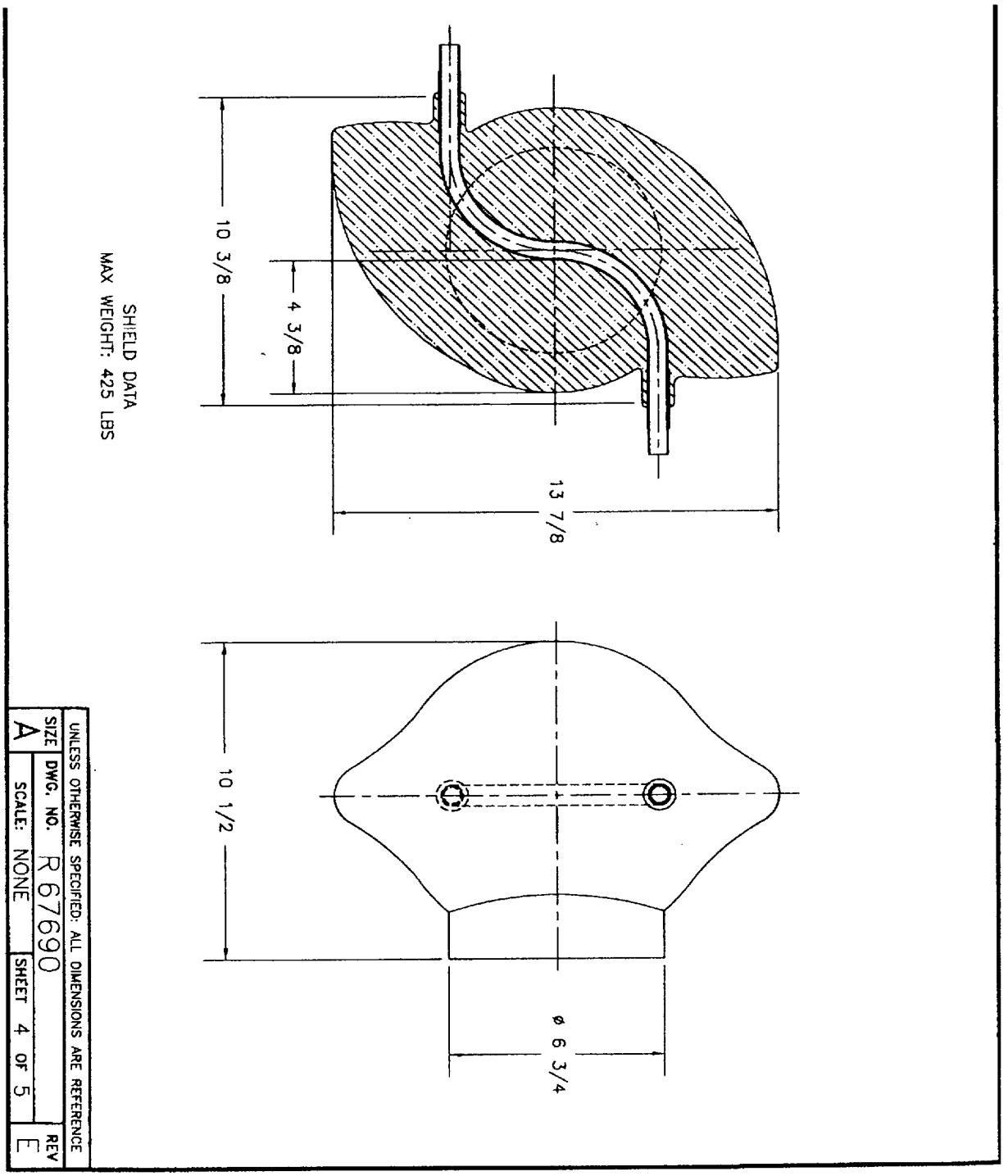
REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE

NO: **MA-1059-D-137-S** DATE: **January 31, 2001** ATTACHMENT 3 OF 27
(Supercedes NR-0628-D-101-S) **(Amended in its Entirety)**



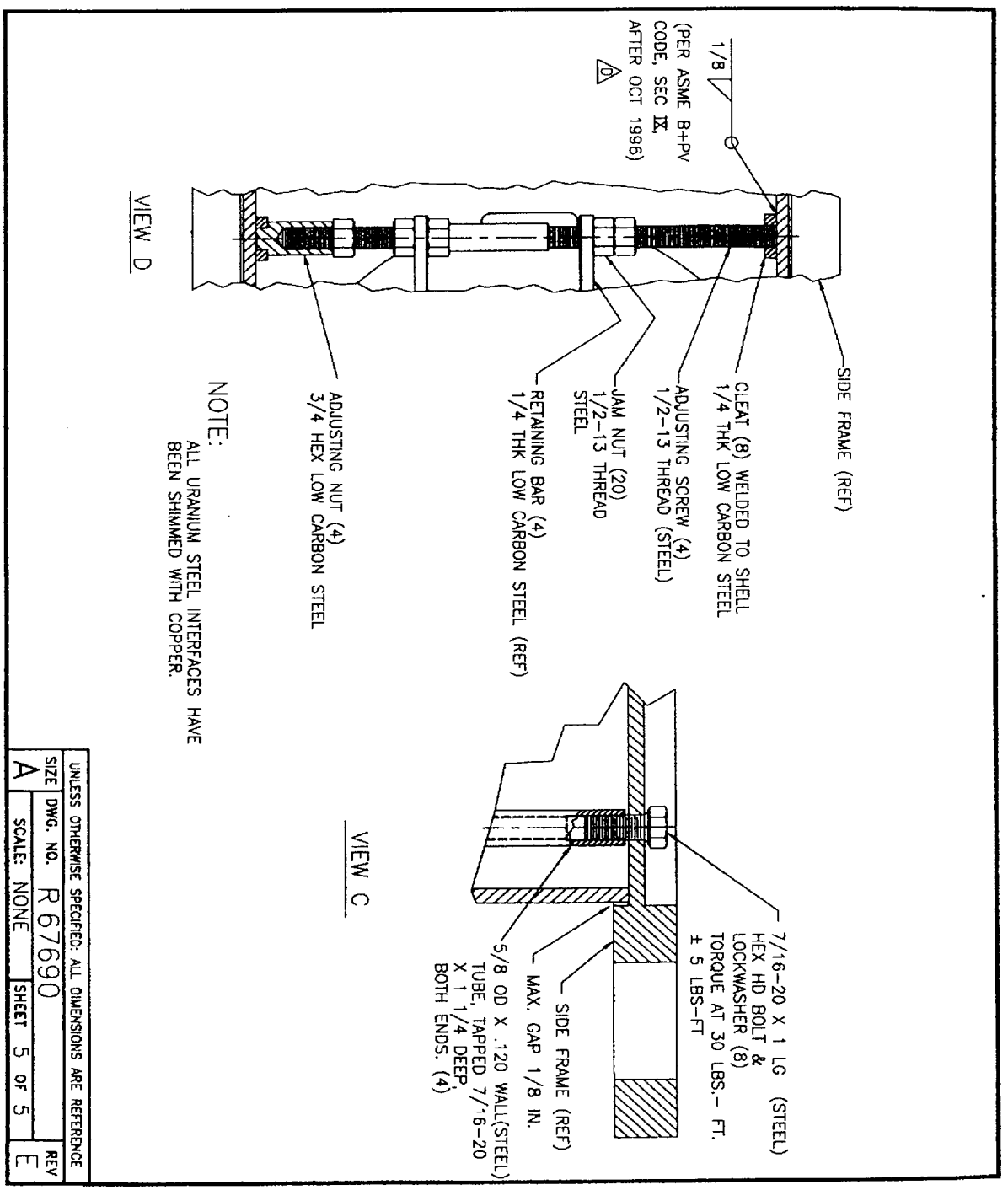
REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE

NO: **MA-1059-D-137-S** DATE: **January 31, 2001** ATTACHMENT 4 OF 27
(Supercedes NR-0628-D-101-S) **(Amended in its Entirety)**



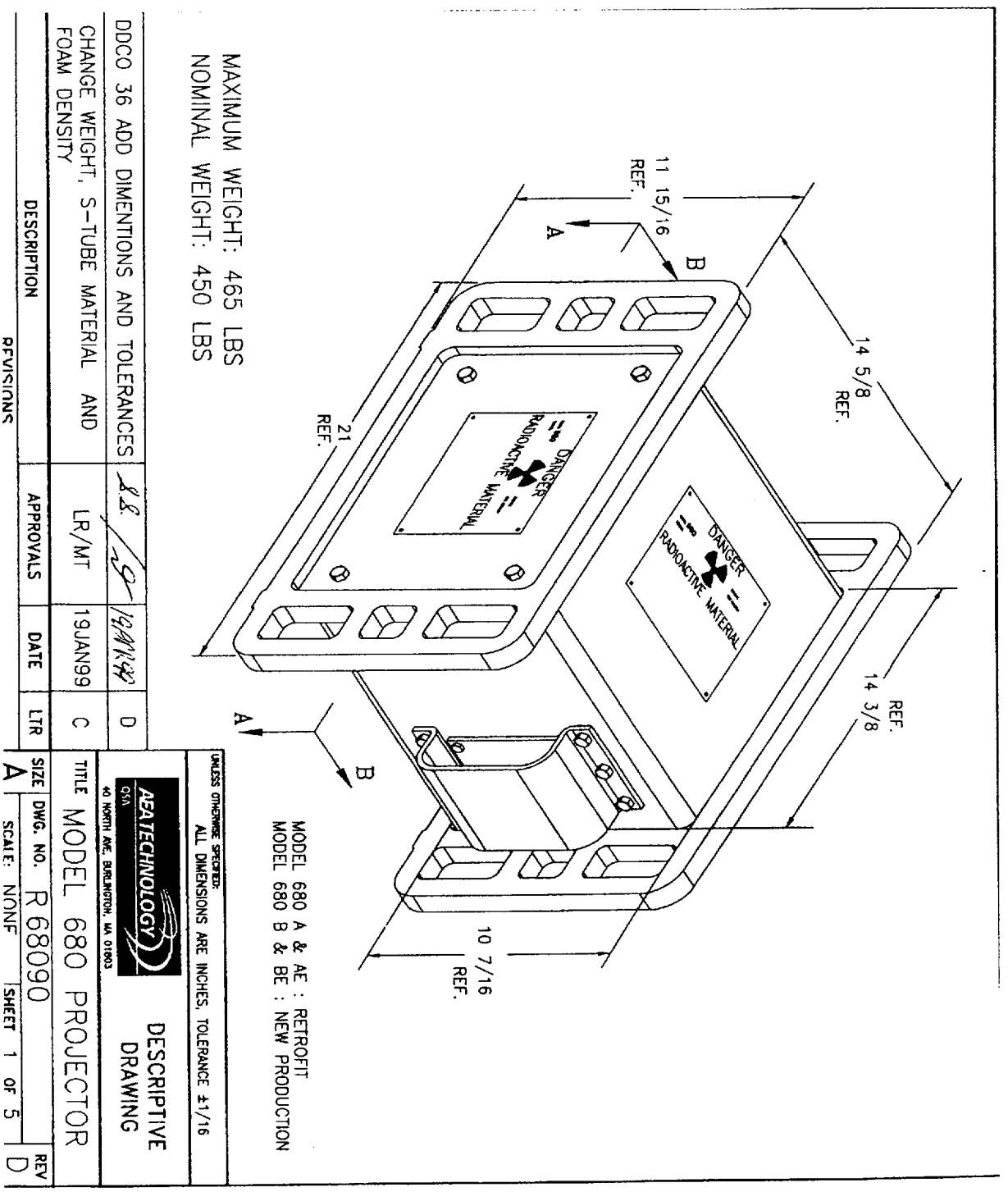
REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE

NO: **MA-1059-D-137-S** DATE: **January 31, 2001** ATTACHMENT 5 OF 27
(Supercedes NR-0628-D-101-S) **(Amended in its Entirety)**



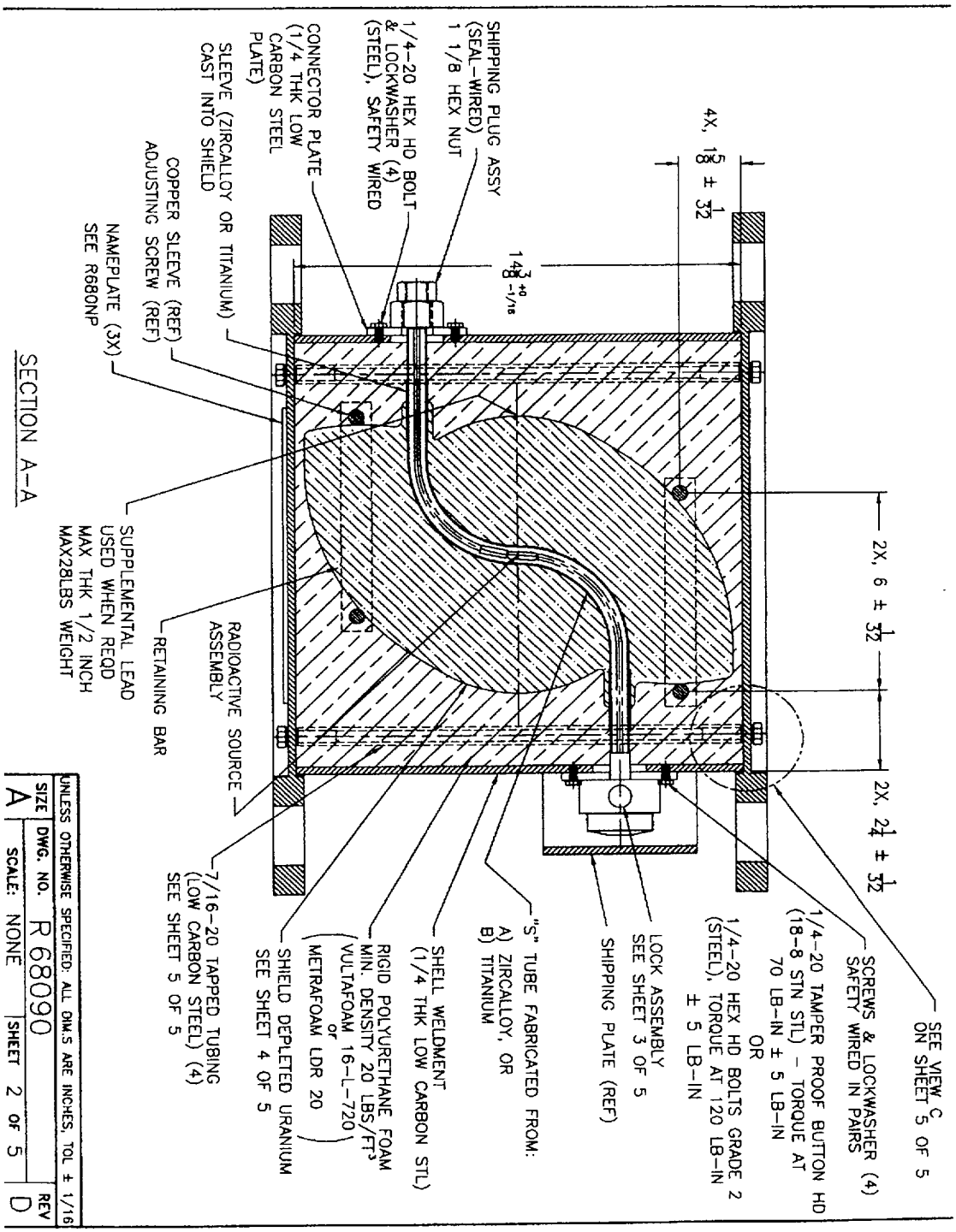
REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE

NO: **MA-1059-D-137-S** DATE: **January 31, 2001** ATTACHMENT 6 OF 27
(Supercedes NR-0628-D-101-S) **(Amended in its Entirety)**



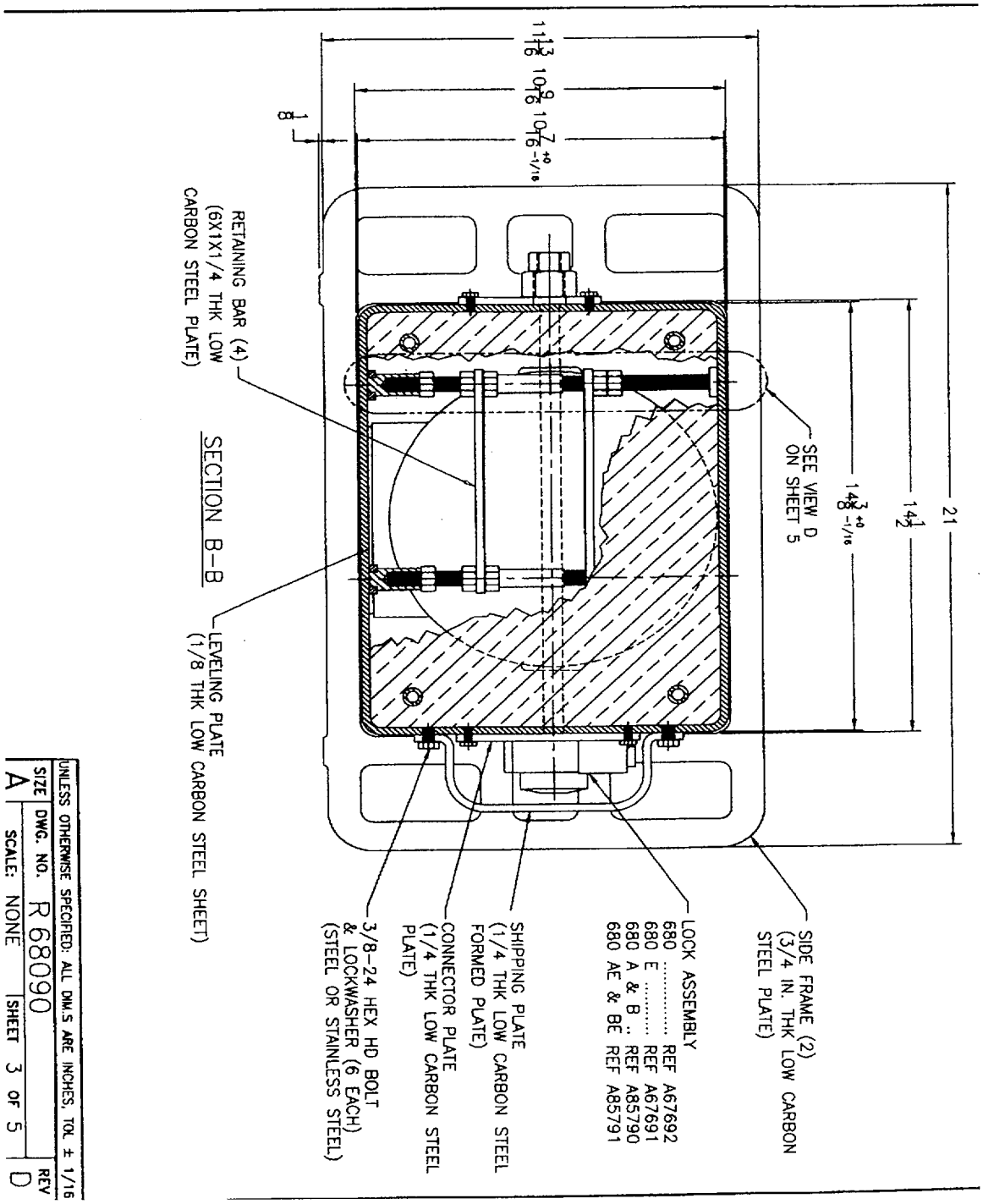
REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE

NO: **MA-1059-D-137-S** DATE: **January 31, 2001** ATTACHMENT 7 OF 27
(Supercedes NR-0628-D-101-S) **(Amended in its Entirety)**



REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE

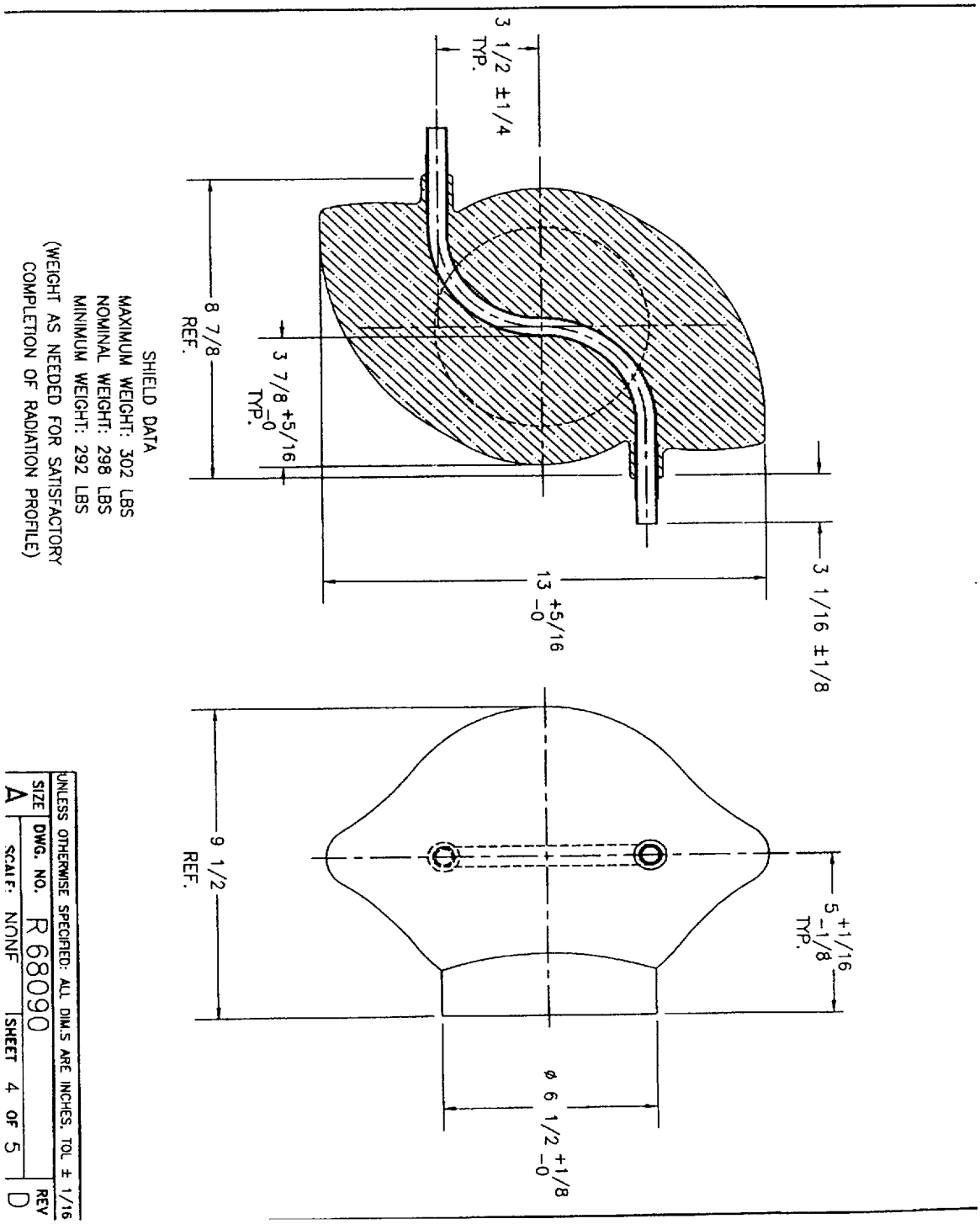
NO: **MA-1059-D-137-S** DATE: **January 31, 2001** ATTACHMENT 8 OF 27
(Supercedes NR-0628-D-101-S) **(Amended in its Entirety)**



UNLESS OTHERWISE SPECIFIED: ALL DIM.S ARE INCHES. TOL ± 1/16			
SIZE	DWG. NO.		REV
A	R 68090		D
SCALE: NONE		SHEET 3 OF 5	

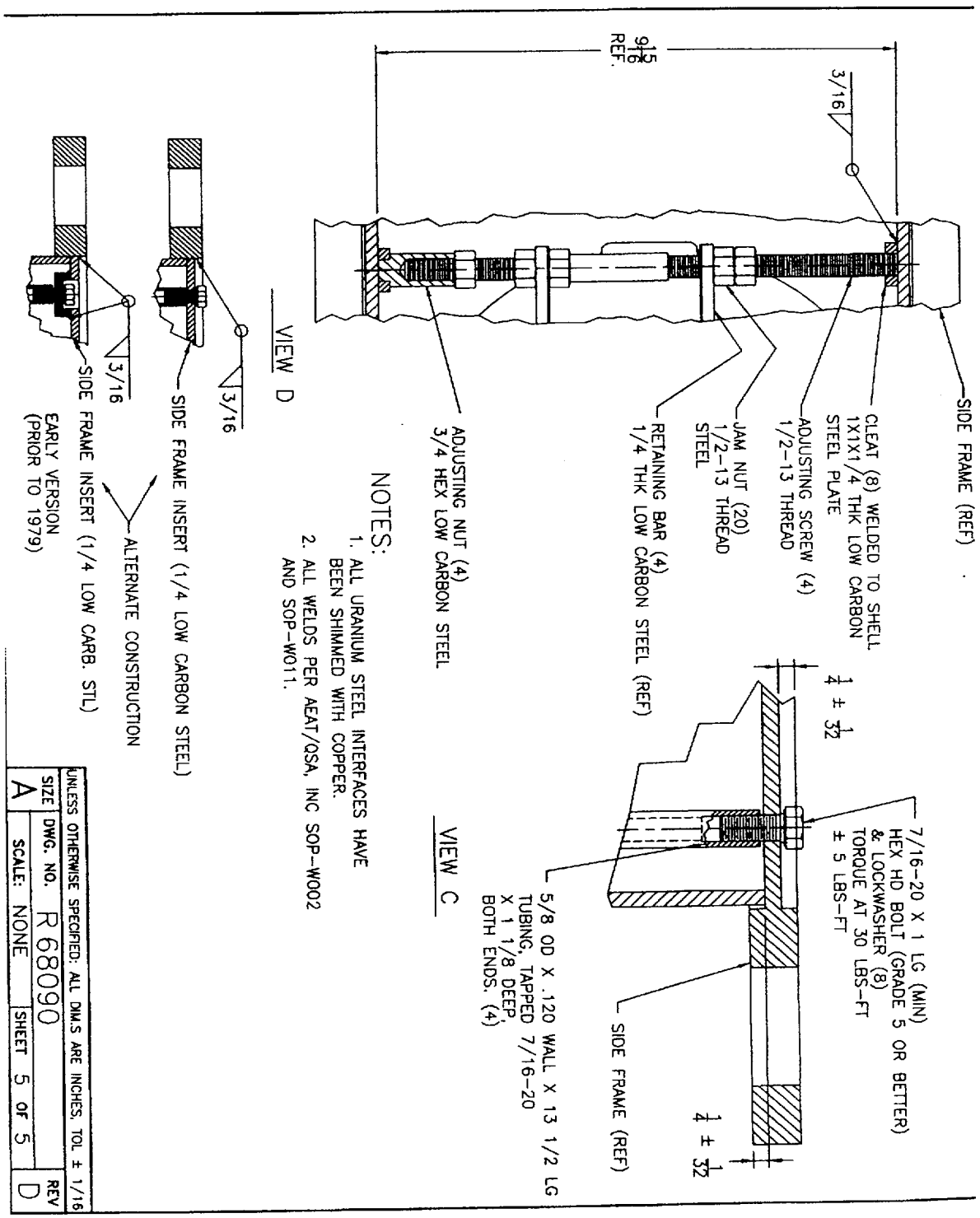
REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE

NO: **MA-1059-D-137-S** DATE: **January 31, 2001** ATTACHMENT 9 OF 27
(Supercedes NR-0628-D-101-S) **(Amended in its Entirety)**



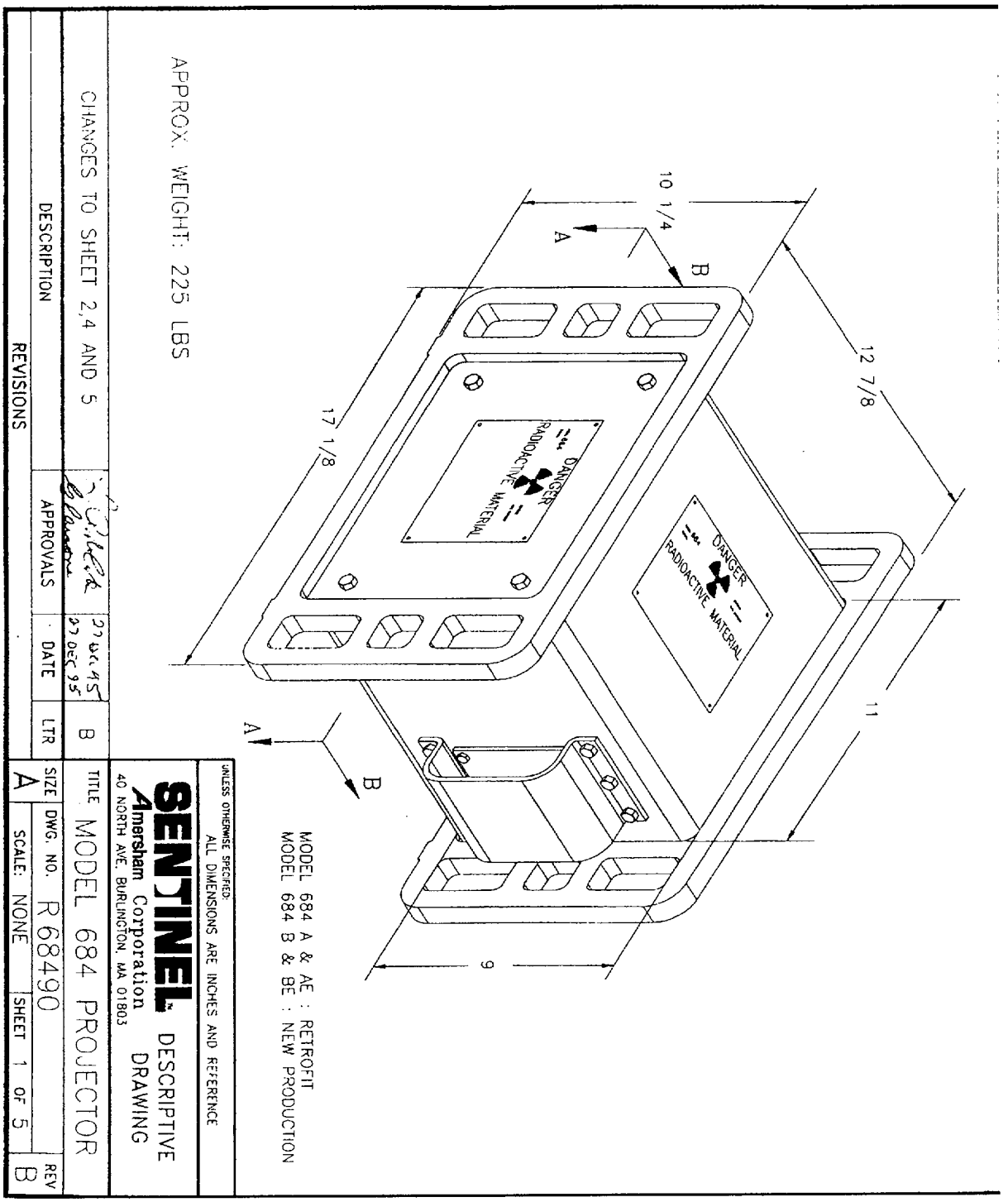
REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE

NO: **MA-1059-D-137-S** DATE: **January 31, 2001** ATTACHMENT 10 OF 27
(Supercedes NR-0628-D-101-S) **(Amended in its Entirety)**



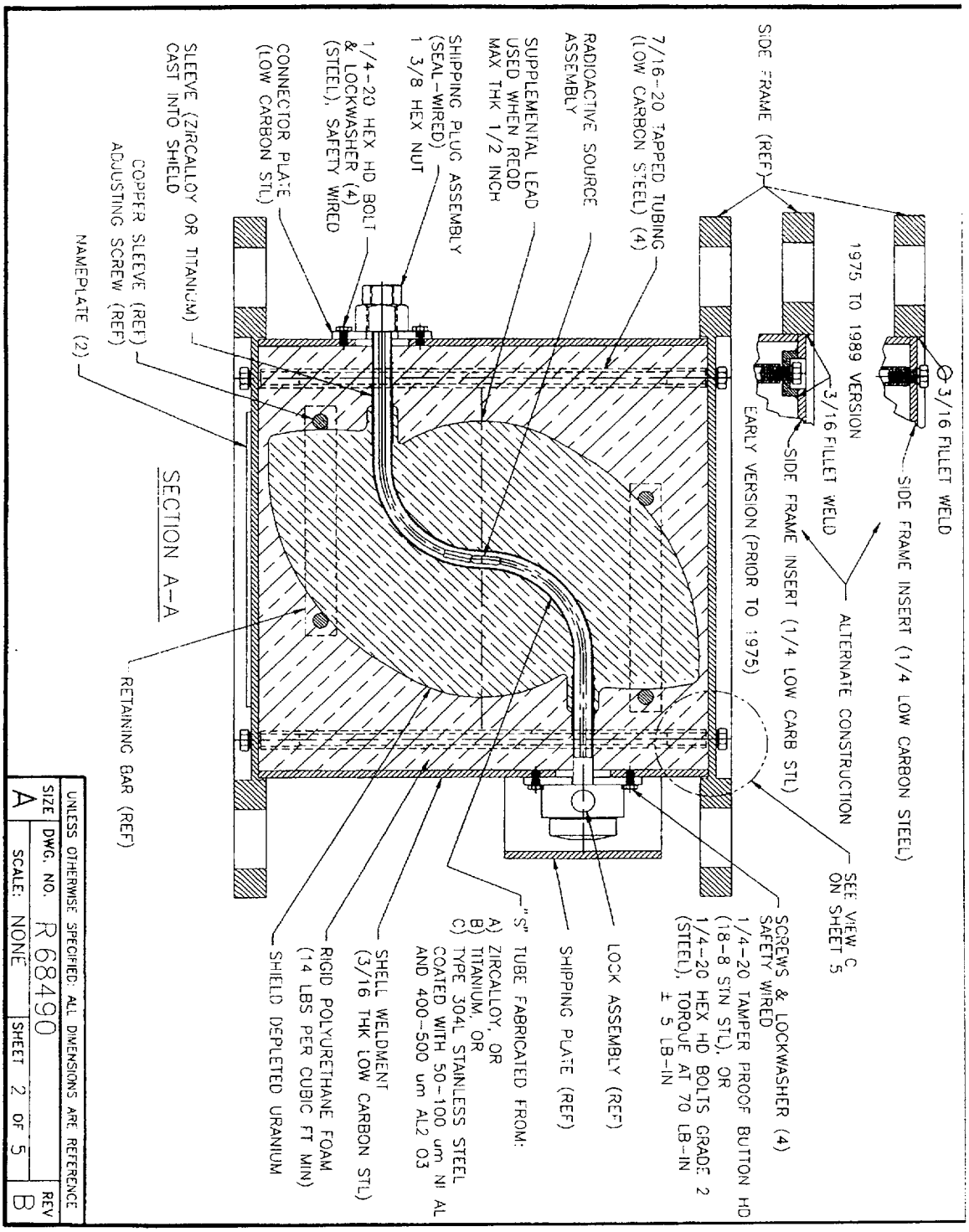
REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE

NO: **MA-1059-D-137-S** DATE: **January 31, 2001** ATTACHMENT 11 OF 27
(Supercedes NR-0628-D-101-S) **(Amended in its Entirety)**



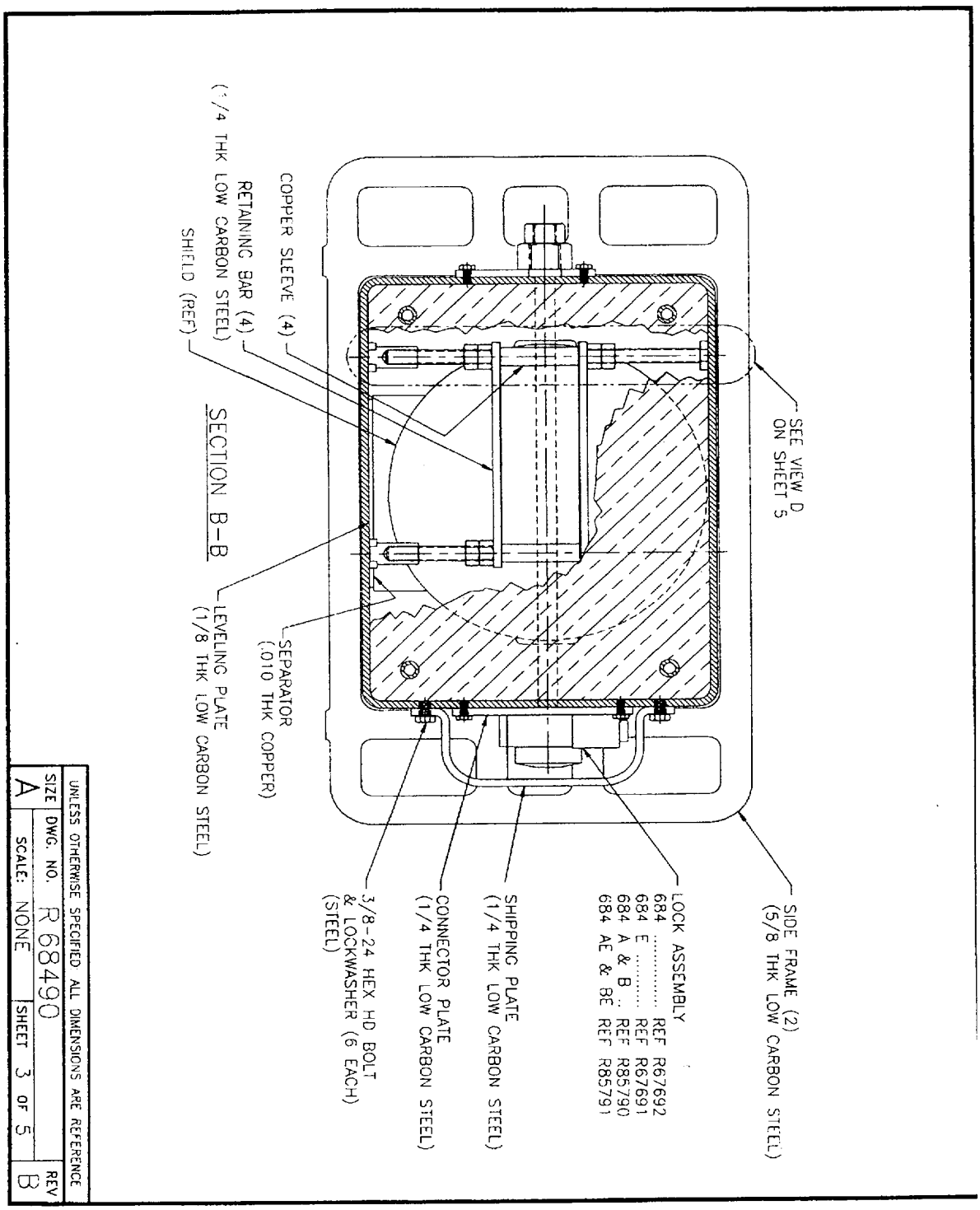
REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE

NO: **MA-1059-D-137-S** DATE: **January 31, 2001** ATTACHMENT 12 OF 27
(Supercedes NR-0628-D-101-S) **(Amended in its Entirety)**



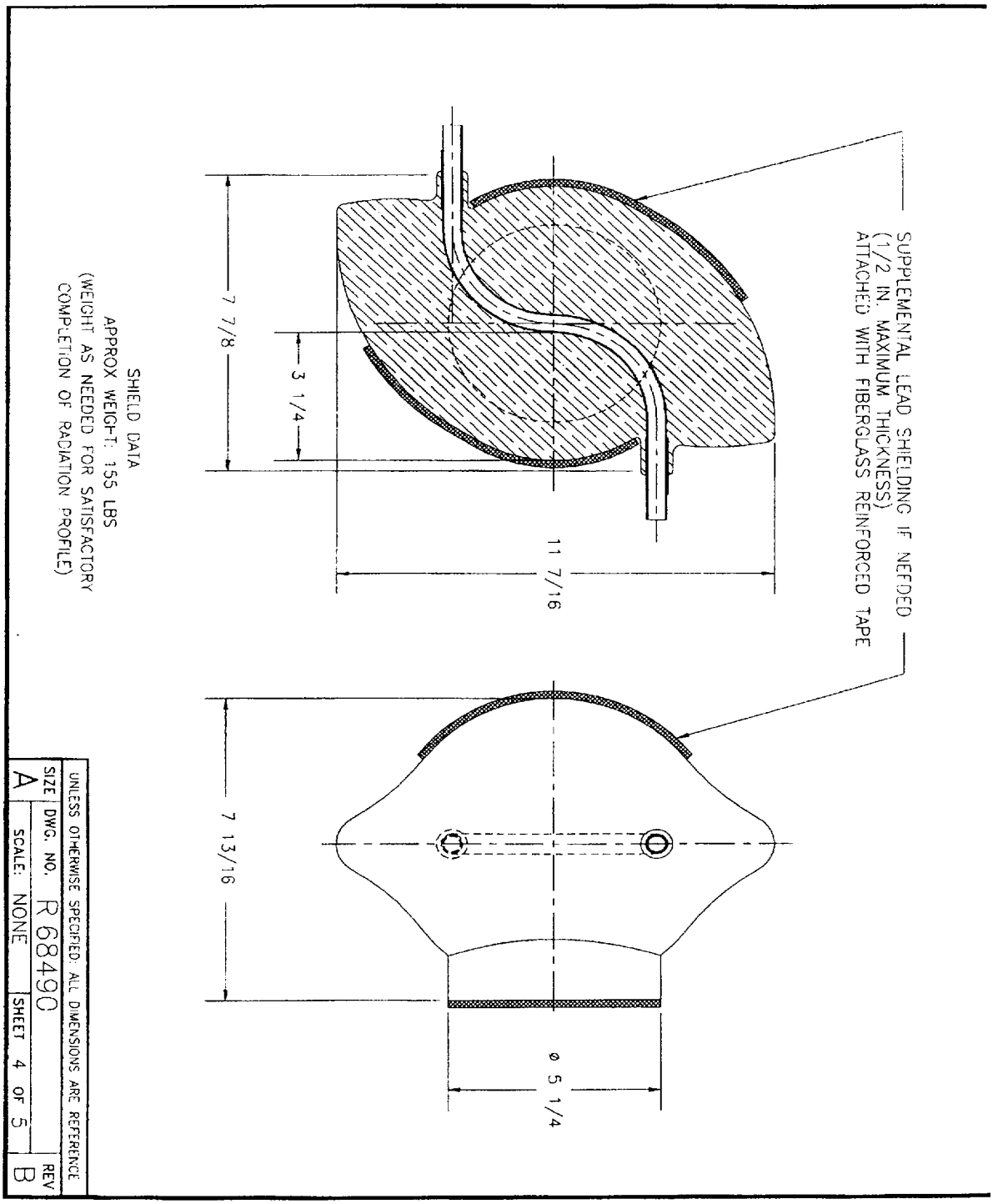
REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE

NO: **MA-1059-D-137-S** DATE: **January 31, 2001** ATTACHMENT 13 OF 27
(Supercedes NR-0628-D-101-S) **(Amended in its Entirety)**



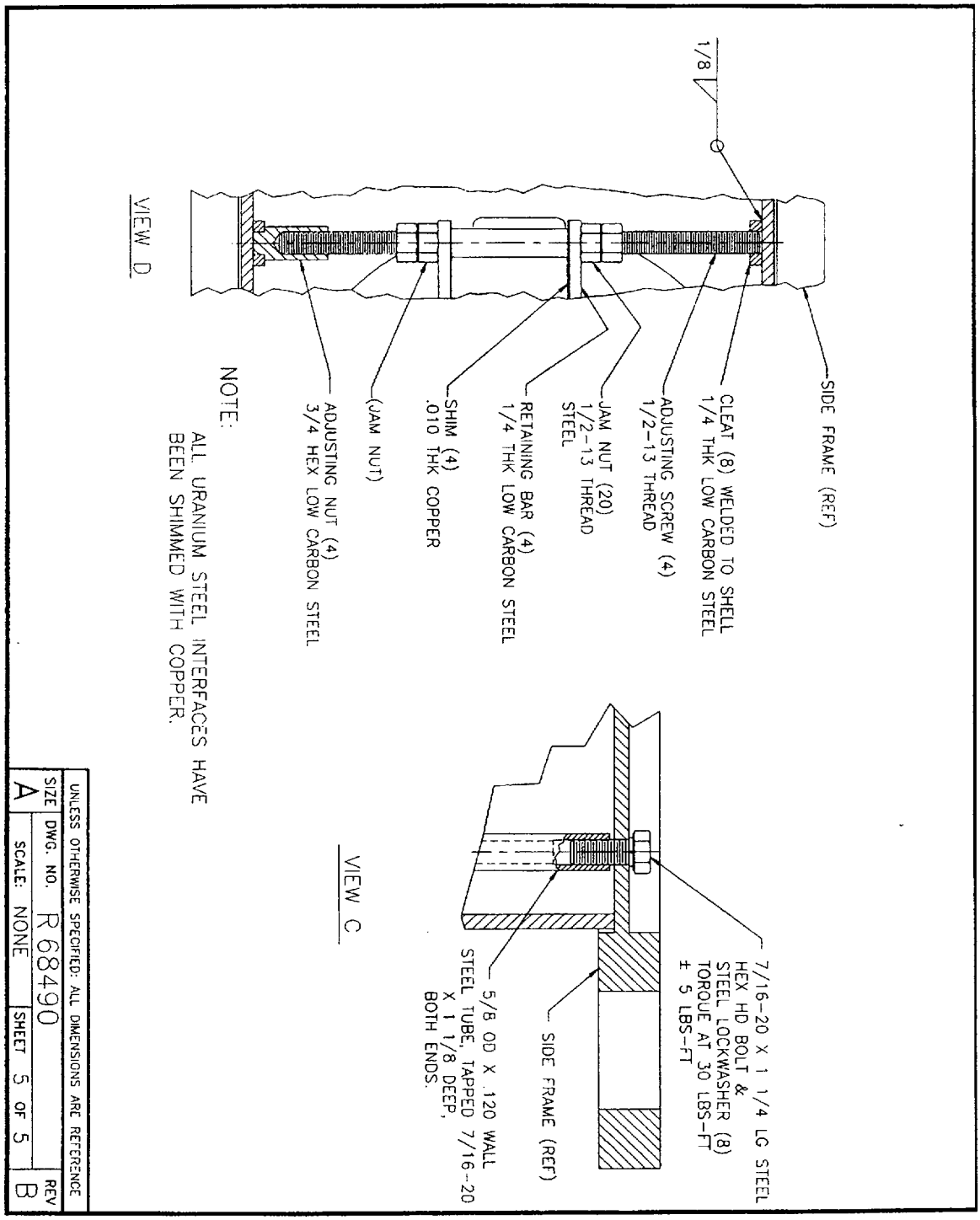
REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE

NO: **MA-1059-D-137-S** DATE: **January 31, 2001** ATTACHMENT 14 OF 27
(Supercedes NR-0628-D-101-S) **(Amended in its Entirety)**



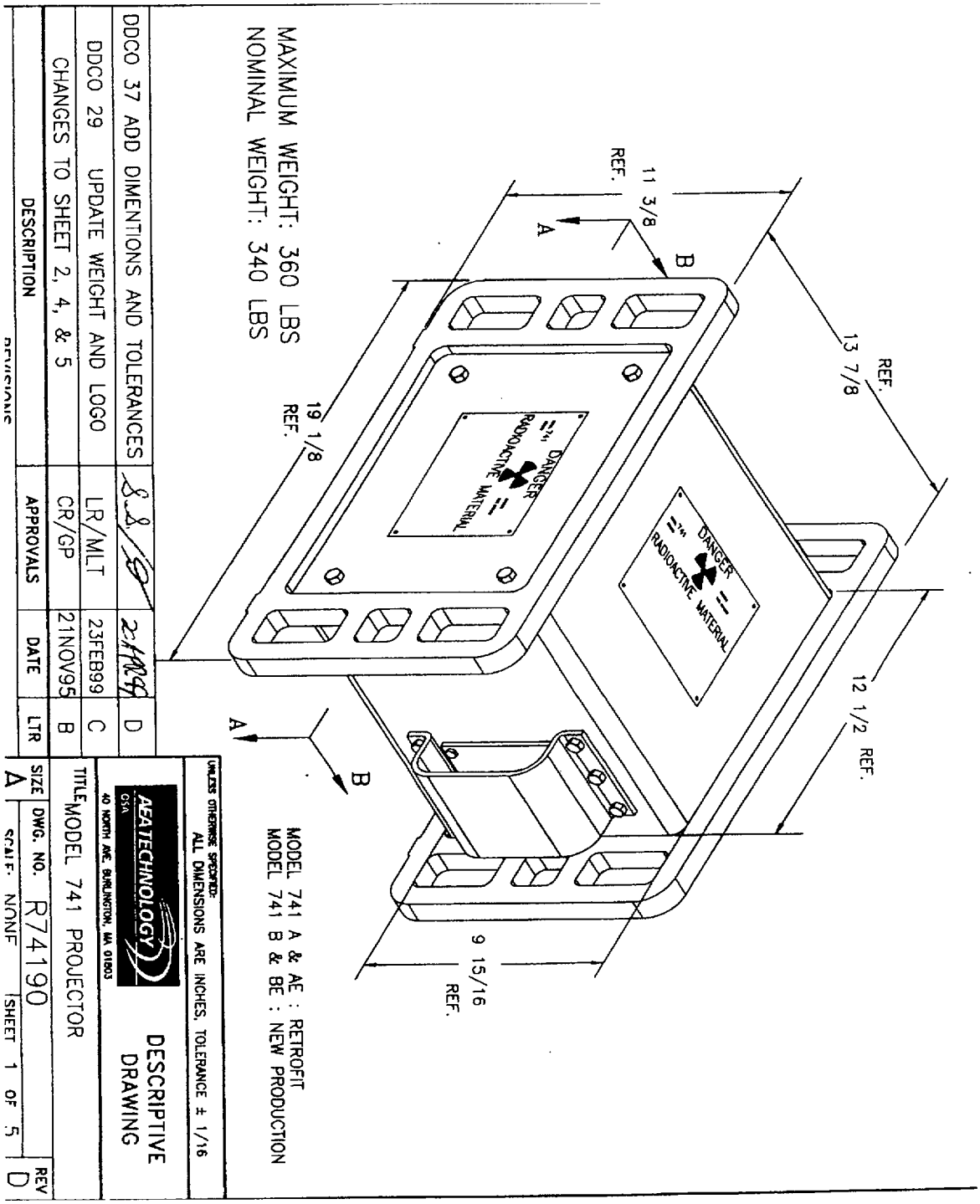
REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE

NO: **MA-1059-D-137-S** DATE: **January 31, 2001** ATTACHMENT 15 OF 27
(Supercedes NR-0628-D-101-S) **(Amended in its Entirety)**



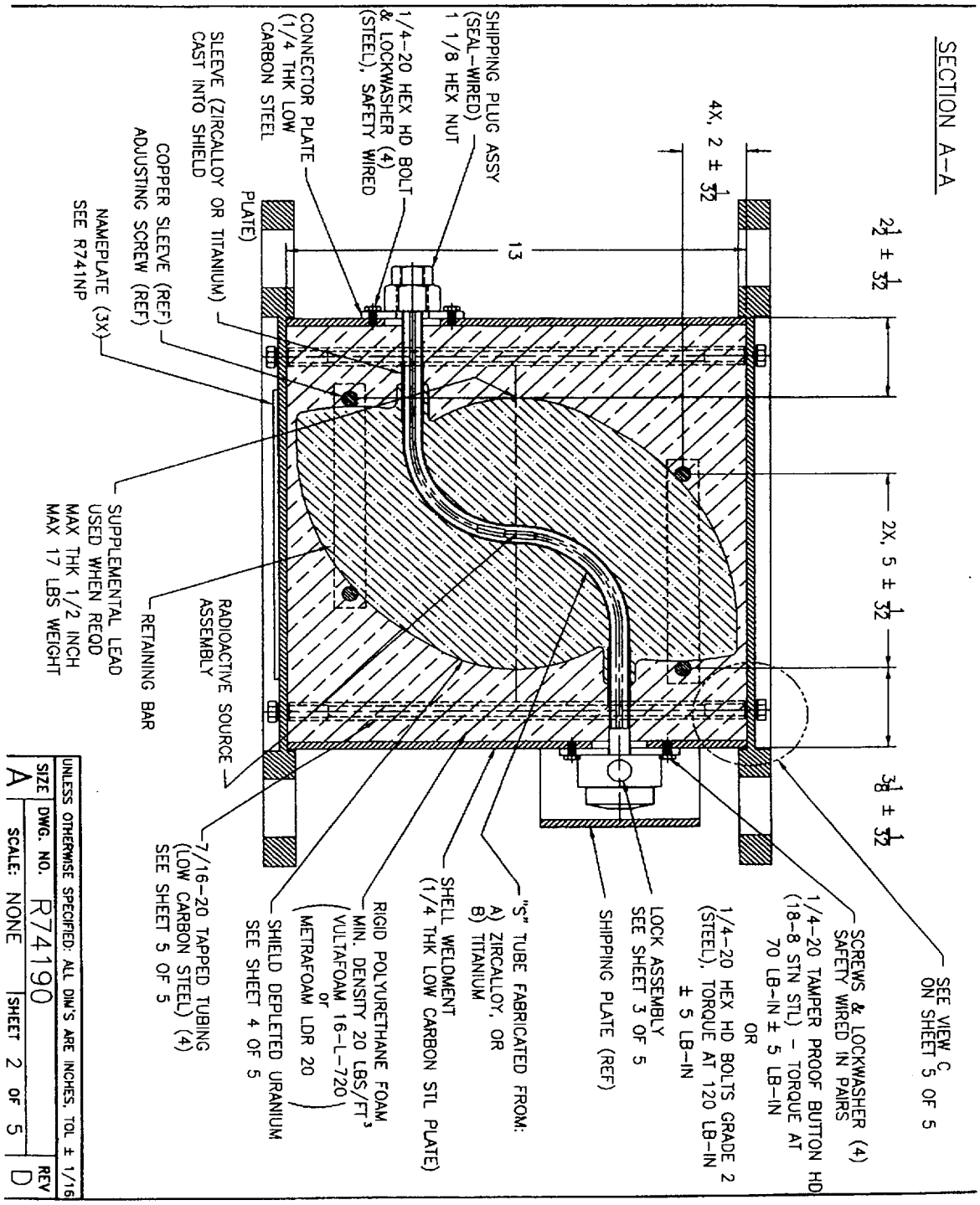
REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE

NO: **MA-1059-D-137-S** DATE: **January 31, 2001** ATTACHMENT 16 OF 27
(Supercedes NR-0628-D-101-S) **(Amended in its Entirety)**



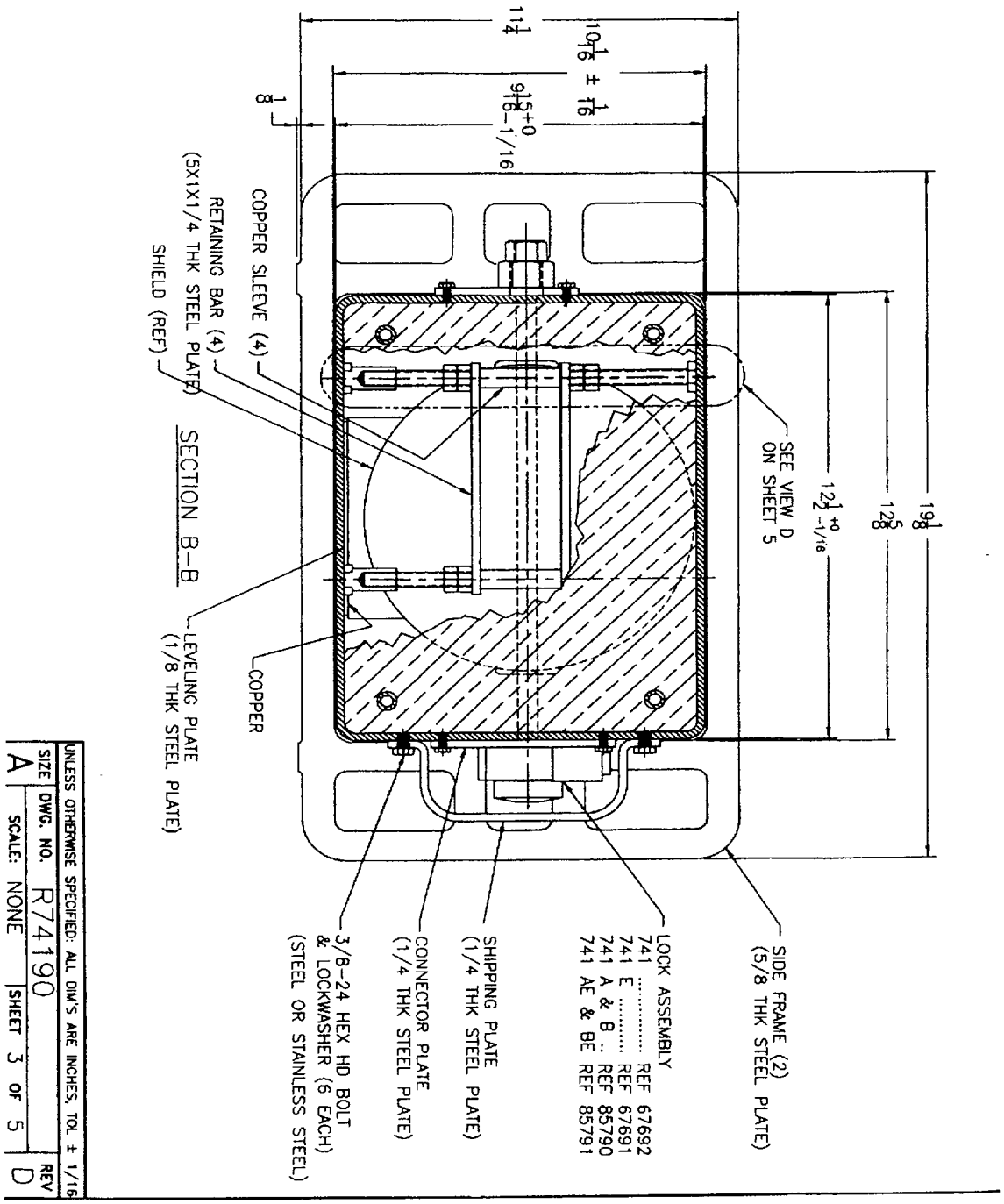
REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE

NO: **MA-1059-D-137-S** DATE: **January 31, 2001** ATTACHMENT 17 OF 27
(Supercedes NR-0628-D-101-S) **(Amended in its Entirety)**



REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE

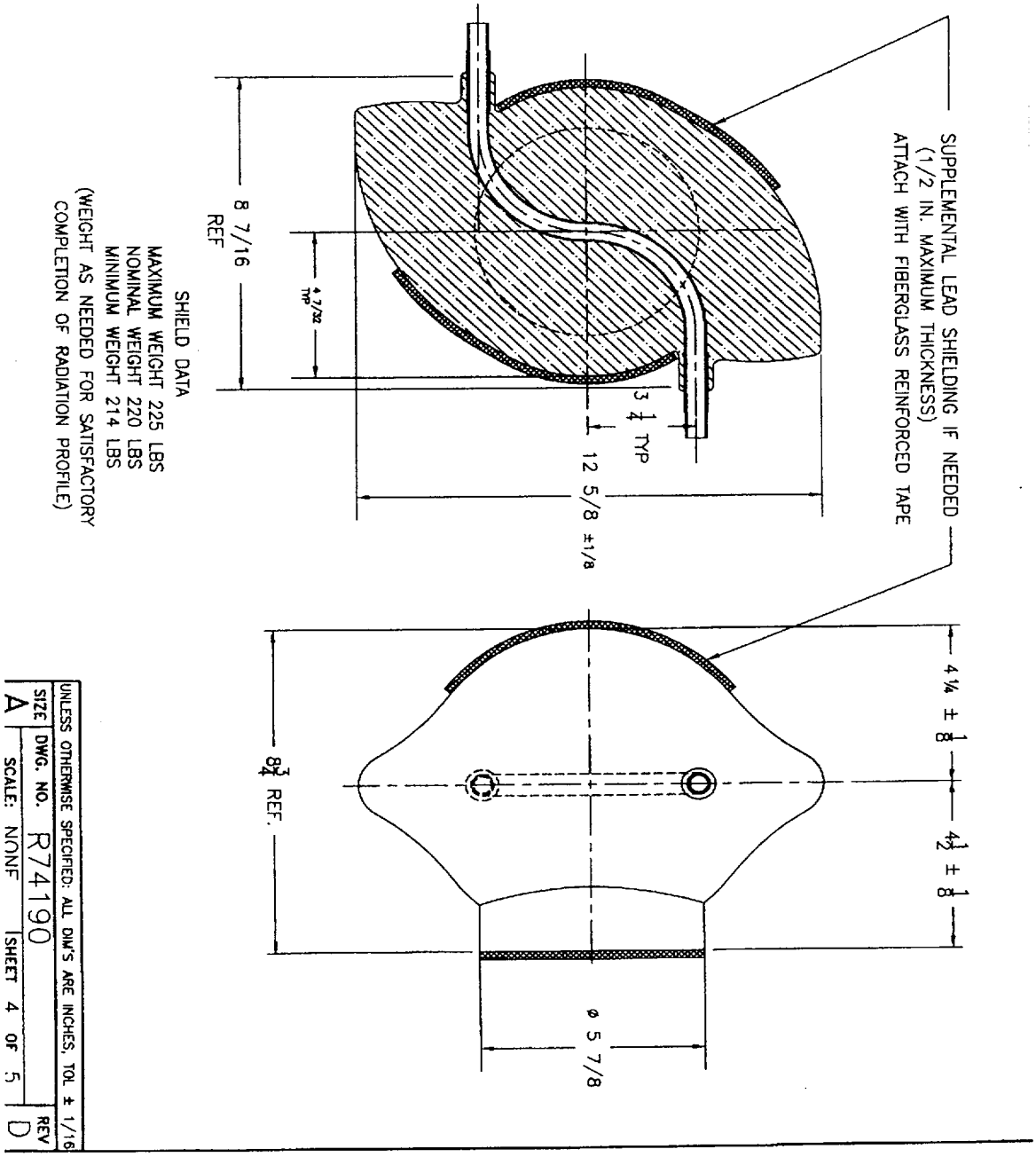
NO: **MA-1059-D-137-S** DATE: **January 31, 2001** ATTACHMENT 18 OF 27
(Supercedes NR-0628-D-101-S) **(Amended in its Entirety)**



UNLESS OTHERWISE SPECIFIED: ALL DIM'S ARE INCHES, TOL ± 1/16			
SIZE A	DWG. NO. R74190		REV D
SCALE: NONE	SHEET 3 OF 5		

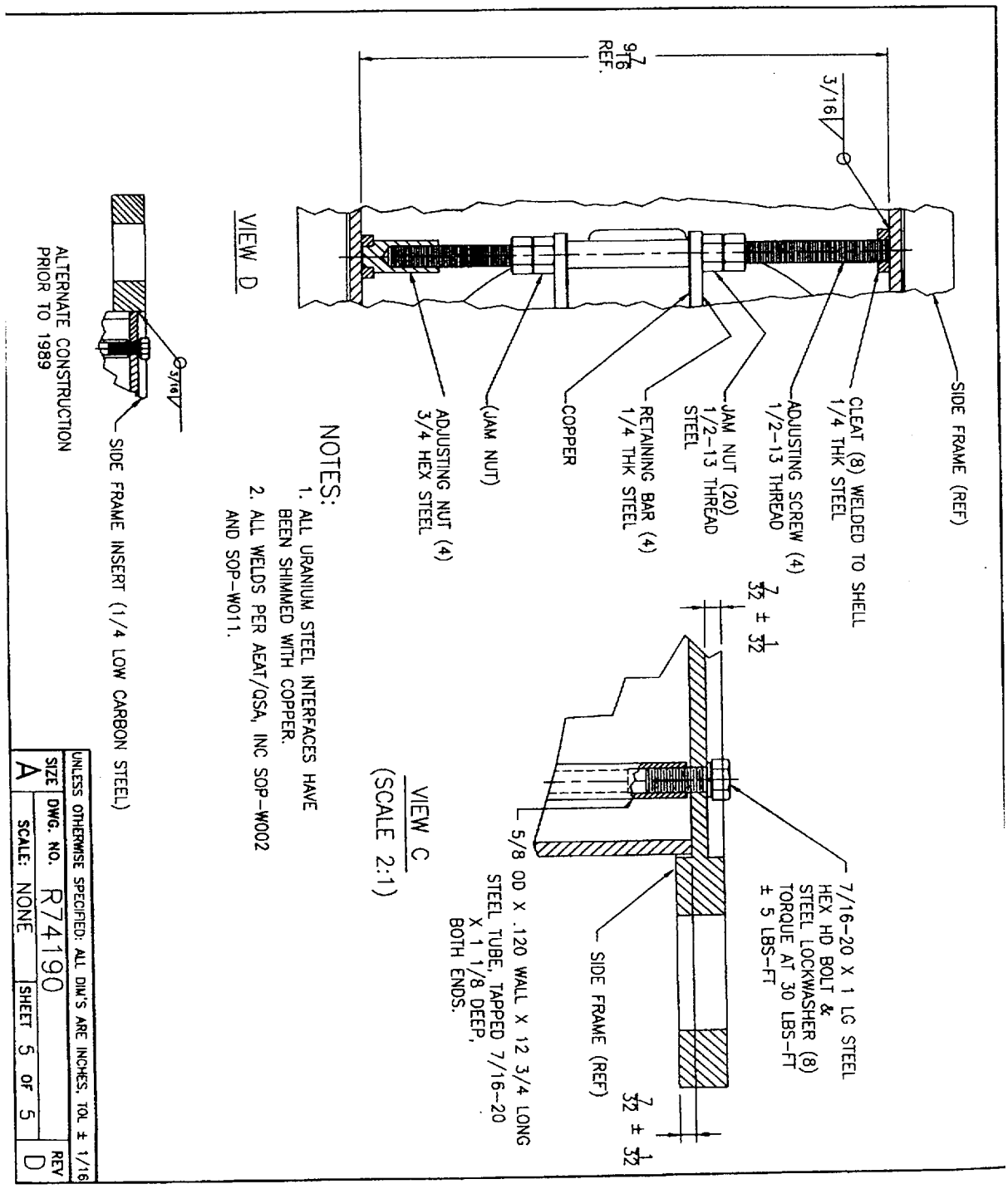
REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE

NO: **MA-1059-D-137-S** DATE: **January 31, 2001** ATTACHMENT 19 OF 27
(Supercedes NR-0628-D-101-S) **(Amended in its Entirety)**



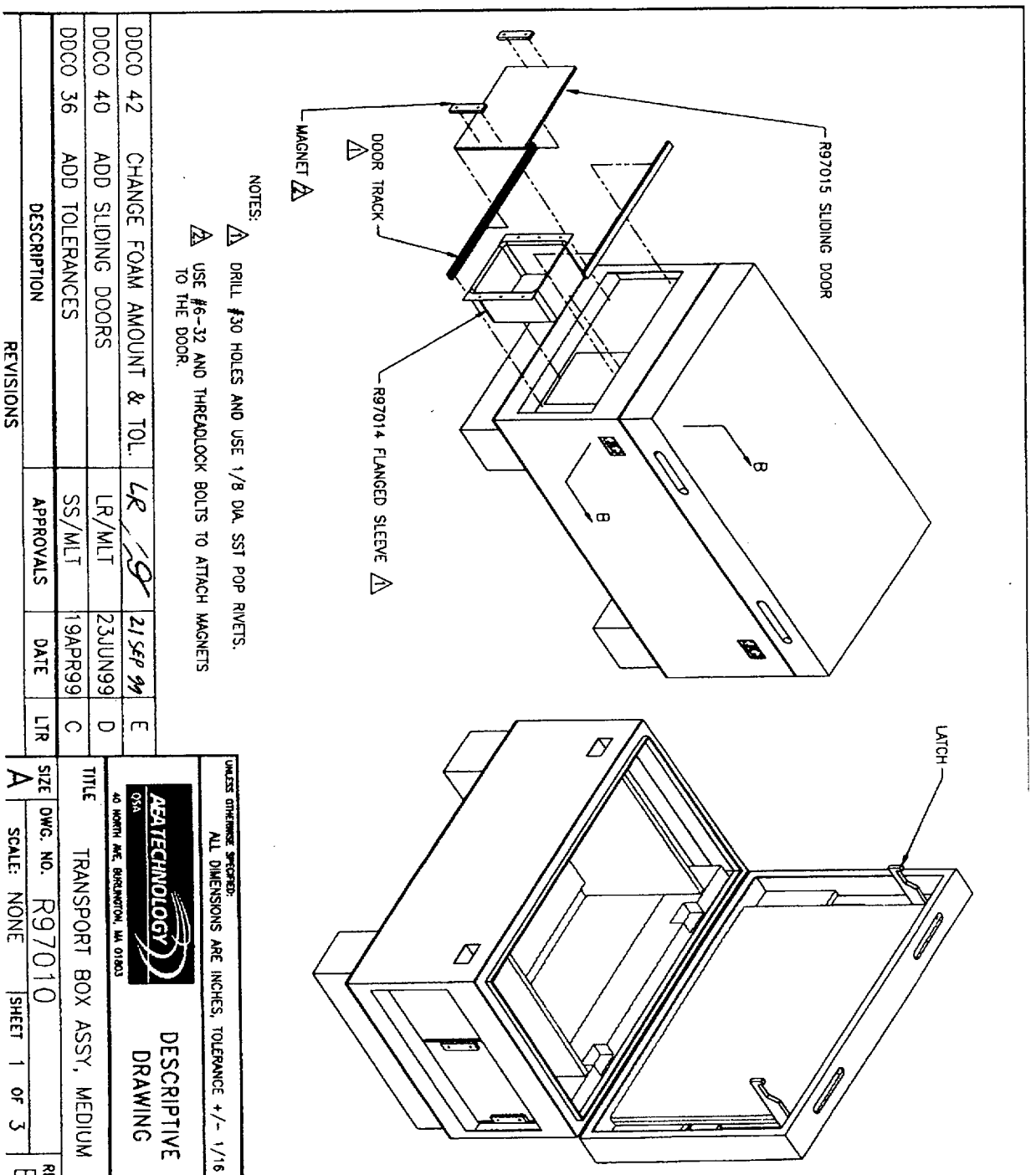
REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE

NO: **MA-1059-D-137-S** DATE: **January 31, 2001** ATTACHMENT 20 OF 27
(Supercedes NR-0628-D-101-S) **(Amended in its Entirety)**



REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE

NO: **MA-1059-D-137-S** DATE: **January 31, 2001** ATTACHMENT 21 OF 27
(Supercedes NR-0628-D-101-S) **(Amended in its Entirety)**



NOTES:
1. DRILL #30 HOLES AND USE 1/8 DIA. SST POP RIVETS.
2. USE #6-32 AND THREADLOCK BOLTS TO ATTACH MAGNETS TO THE DOOR.

LTR	DESCRIPTION	DATE	APPROVALS
E	DDCO 42 CHANGE FOAM AMOUNT & TOL.	21 SEP 99	LR
D	DDCO 40 ADD SLIDING DOORS	23JUN99	LR/MLT
C	DDCO 36 ADD TOLERANCES	19APR99	SS/MLT

REVISIONS

UNLESS OTHERWISE SPECIFIED:
ALL DIMENSIONS ARE INCHES, TOLERANCE +/- 1/16

AEA TECHNOLOGY USA
40 NORTH AVE. BURLINGTON, MA 01803

DESCRIPTIVE DRAWING

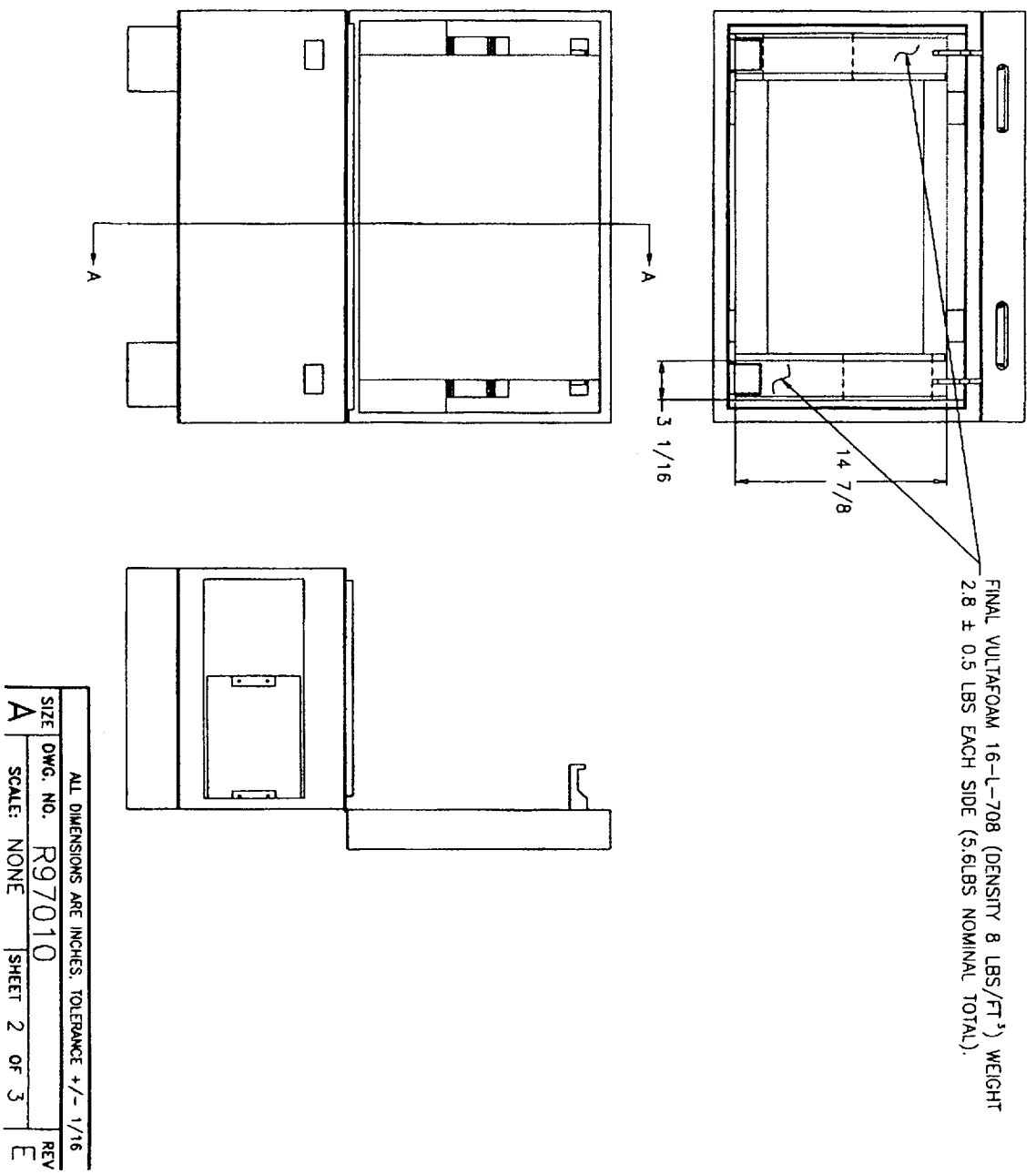
TITLE TRANSPORT BOX ASSY, MEDIUM

SIZE A | DWG. NO. R97010 | REV E

SCALE: NONE | SHEET 1 OF 3

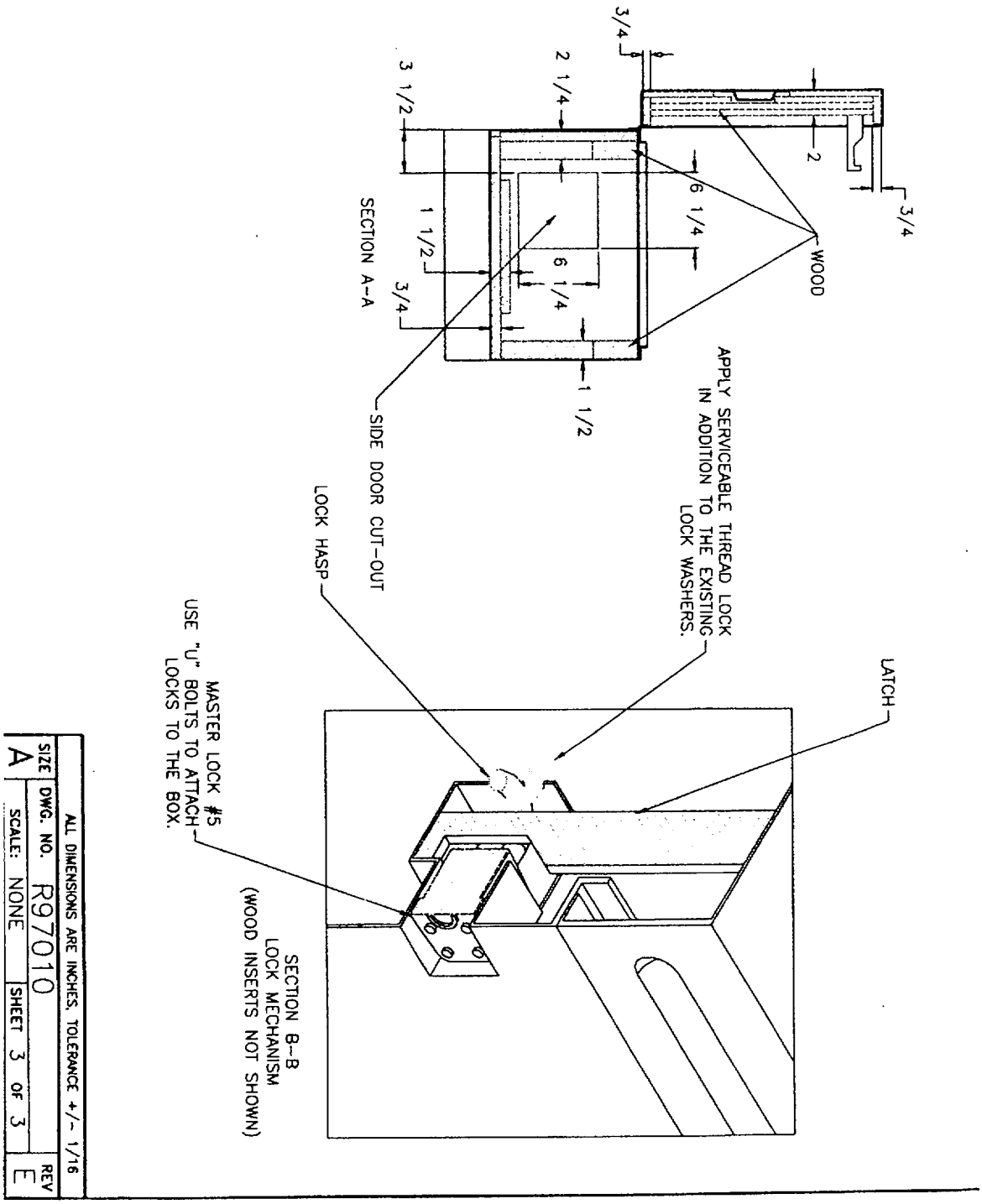
REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE

NO: **MA-1059-D-137-S** DATE: **January 31, 2001** ATTACHMENT 22 OF 27
(Supercedes NR-0628-D-101-S) **(Amended in its Entirety)**



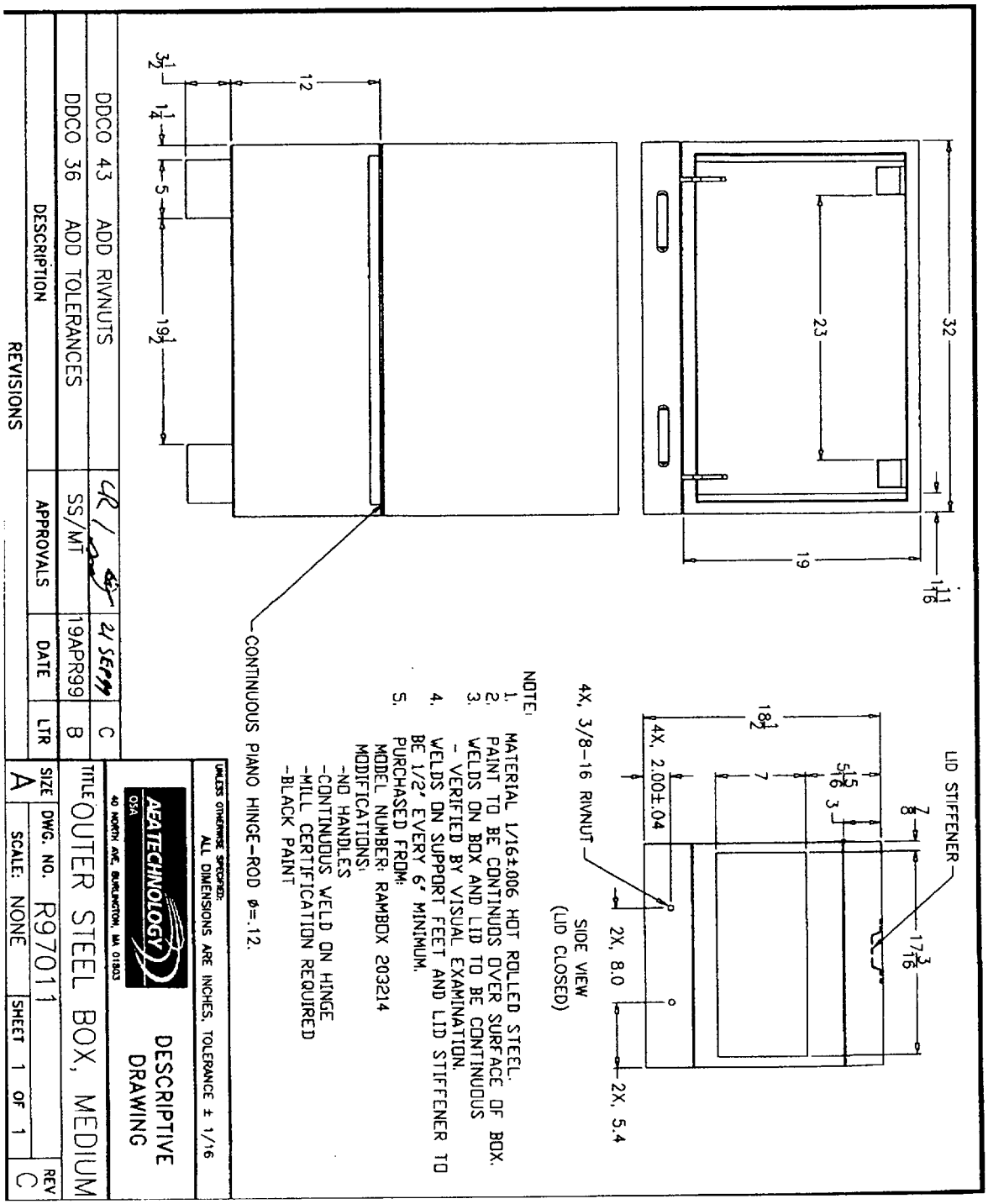
REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE

NO: **MA-1059-D-137-S** DATE: **January 31, 2001** ATTACHMENT 23 OF 27
(Supercedes NR-0628-D-101-S) **(Amended in its Entirety)**



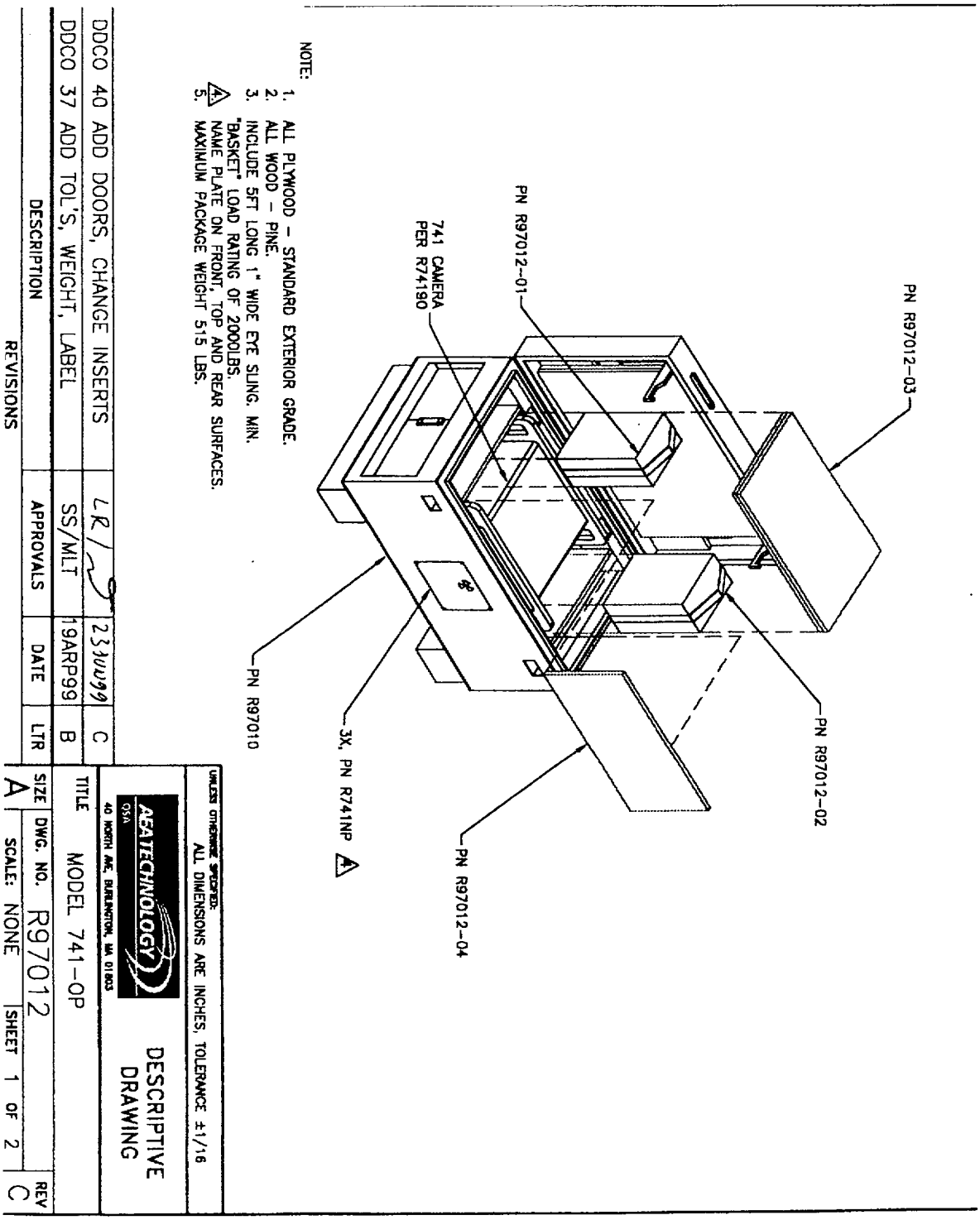
REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE

NO: **MA-1059-D-137-S** DATE: **January 31, 2001** ATTACHMENT 24 OF 27
(Supercedes NR-0628-D-101-S) **(Amended in its Entirety)**



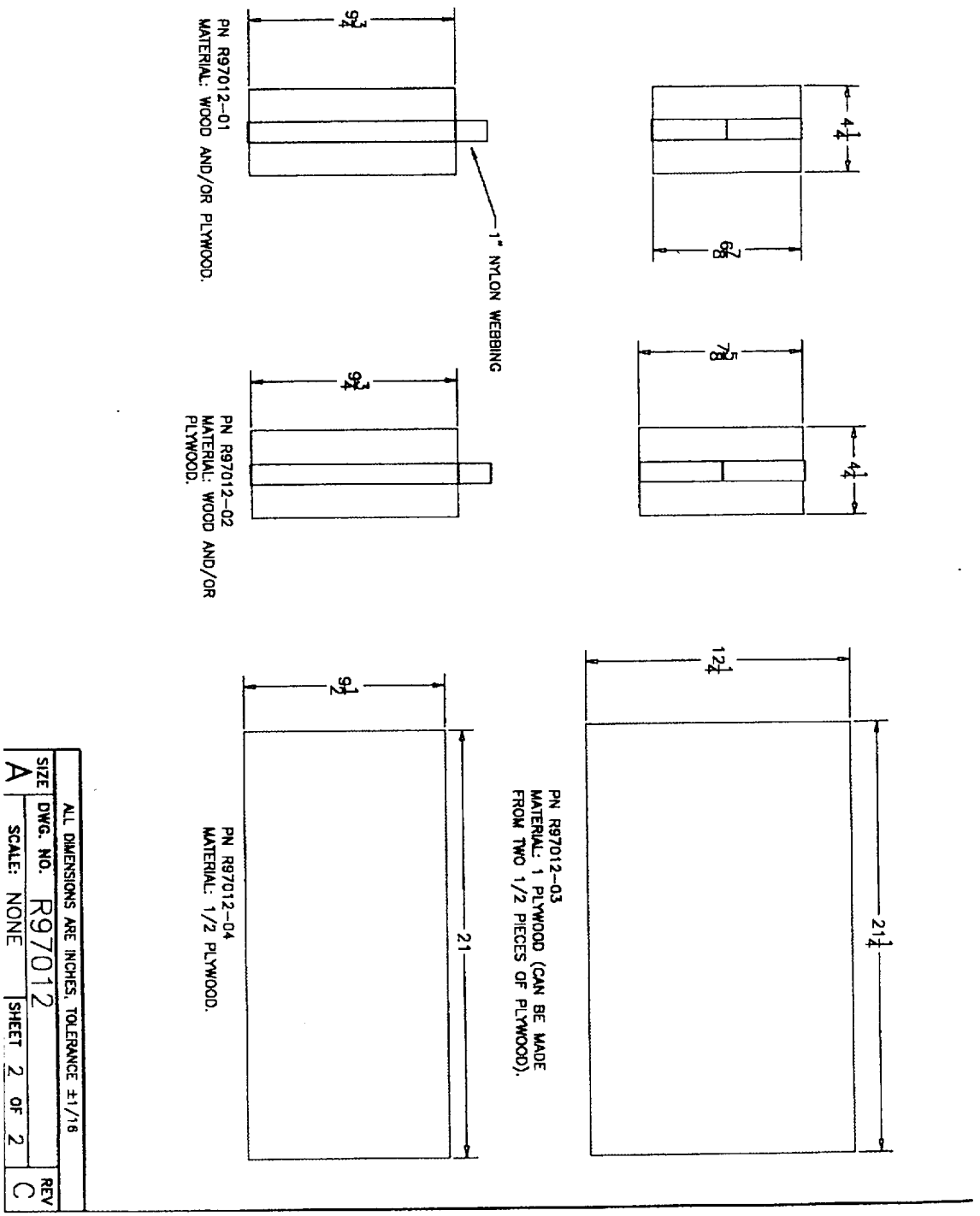
REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE

NO: **MA-1059-D-137-S** DATE: **January 31, 2001** ATTACHMENT 25 OF 27
(Supercedes NR-0628-D-101-S) **(Amended in its Entirety)**



REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE

NO: **MA-1059-D-137-S** DATE: **January 31, 2001** ATTACHMENT 26 OF 27
(Supercedes NR-0628-D-101-S) **(Amended in its Entirety)**



REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE

NO: **MA-1059-D-137-S** DATE: **January 31, 2001** ATTACHMENT 27 OF 27
(Supercedes NR-0628-D-101-S) **(Amended in its Entirety)**

676 Series - Model Numbers of Approved Associated Equipment			
Guide Tubes	**Control Tubes**	**Sealed Sources**	**Cranks**
67606 67605 w/69109* 67605 64000	591xx Series	A424-13	692 693 664 (reel) 657 957

680 Series - Model Numbers of Approved Associated Equipment			
Guide Tubes	**Control Tubes**	**Sealed Sources**	**Cranks**
40210 40210 w/69104* 48906 48907 72300	591xx Series	A424-14 943	692 693 664 (reel) 657 957

684 Series - Model Numbers of Approved Associated Equipment			
Guide Tubes	**Control Tubes**	**Sealed Sources**	**Cranks**
40210 40210 W/69104* 48906 48907 72300	591xx Series	A424-15 A424-20	692 693 664 (reel) 657 957

741 Series - Model Numbers of Approved Associated Equipment			
Guide Tubes	**Control Tubes**	**Sealed Sources**	**Cranks**
40210 40210 W/69104* 48906 48907 72300	591xx Series	A424-18 A424-9	692 693 664 (reel) 657 957

Note: The source guide tubes and control tubes may be ± 2 feet **(61 cm)** different in length than stock models due to repairs on the originals (i.e. - replacement of connectors and source stops).

* Part numbers 69104 and 69109 are removable source stops.