Tech /Ops

Radiation Products Division
40 North Avenue
Burlington Massachusetts 01803
Telephone (617) 272-2000

tech ops

71-9166
PDR
Return to
39655

December 28, 1982

Mr. Charles E. MacDonald, Chief
Transportation Certification Branch
Division of Fuel Cycle and Material Safety
Office of Nuclear Material Safety and Safeguards
U. S. Nuclear Regulatory Commission
Washington, D.C. 20555
Dear Mr. MacDonald:

This letter is written in response to your letter of 24 September 1982 regarding our application for approval of our Model 864 package dated 15 July 1982 (Docket No. 71-9166).

The changes requested in your letter have been reflected in our Safety Analysis Report for the Model 864 as Revision 1 and dated 27 December 1982. These changes are made as page changes as listed on the attached Insertion Instructions. The changes have been indicated by a vertical line in the right margin next to the affected section.

We trust this satisfies your comments regarding our Model 864 Type B package. If we can provide any additional information, please contact us.

Sincerely,

John J. Munro III
Technical Director

JJM/lep

FEE EXEMPT
21727

JAN 6 1983

SAFETY ANALYSIS REPORT

Tech/Ops Model 864

Docket Number 71-9166

Revision 1 Insertion Instructions

27 December 1982

Remove Page	Insert Page	Remarks
1-1	1-1	Revised Dimensions
1-4	1-4	Revised Handles, Specified Torque
1-5	1-5	Revised Drawing
1-6	1-6	Revised Drawing
1-7	1-7	Revised Drawing
1-8	1-8	Revised Drawing
1-9	1-9	Revised Drawing
1-10	1-10	Revised Drawing
2-2	2-2	Revised Paragraph 2.4.3.
---	2-2a	Added New Paragraph 2.4.4.
2-3	2-3	Deleted Old Paragraph 2.4.4.
2-7	2-7	Added Reference to Tie-down Test Report
---	2-23	Added Tie-down Test Report
---	2-24	Added Tie-down Test Report
---	2-25	Added Tie-down Test Report
7-6	7-6	Revised Dimensions and Contents
7-7	7-7	Deleted Old Receipt Instruction 1
---	7-7a	Added Notes and New Receipt Instruction 1
7-8	7-8	Deleted Old Receipt Instruction 1
7-10	7-10	Revised Steps 15, 16 and 18.
7-11	7-11	Added Note
7-13	---	Deleted ; Reset onto Page 7-11
8-1	8-1	Revised Paragraph 8.1.5.
8-2	8-2	Revised Paragraph8.2.3.

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8-2	8-2	Revised Paragraph8.2.3.

1. General Information

1.1 Introduction

The Tech/Ops 864 is designed for use as a source changer and shipping container for Type B quantities of radioactive material in special form. The Model 864 conforms to the criteria for Type B packaging in accordance with 10CFR71 and satisfies the criteria for Type B(U) packaging in accordance with IAEA Safety Series No. 6, 1973 Edition.

1.2 Package Description

1.2.1 Packaging

The Model 864 is 6.0 inches (152mm) in diameter and 9.56 inches (243mm) high. The package also incorporates handles which protrude from the sides of the package. The handle assembly is 8.31 inches (211 mm) wide at its widest point. The gross weight of the package is 67 pounds (31kg).

The radioactive material is sealed in source capsules which conform to the requirements of special form radioactive material. These source capsules are installed in source holder assemblies. These source holder assemblies are 0.275 inch (7.0mm) in diameter and 6.13 inches (156mm) long.

The source holder assemblies are housed in brass source tubes. The source tubes have an outside diameter of 0.313 inch (7.9mm) and an inside diameter of 0.281 inch (7.1mm).

The source tubes are surrounded by uranium metal as shielding. The mass of the uranium shield in 43 pounds (20kg).

The uranium shield assembly is encased in a carbon steel (ASTM 1020) housing. The shield is supported on the bottom by the base plate. The base plate is welded to the carbon steel shell. The shield assembly is supported on the top by the deck plate. The deck plate is also welded to the shell. The deck plate and base plate provide support for the shield in both vertical and horizontal directions. Copper separators are positioned between the shield and these plates to prevent any iron-uranium interfaces.

The void space between the uranium shield assembly and the steel housing is filled with a castable rigid polyurethane foam. This foam is installed through two one inch (25mm) diameter pour holes in the deck plate.

Mounted on the deck plate is the source latching assembly. This assembly is used to secure the radioactive sources and source holder assemblies in a shielded position during transport.

REV.	DATE	DESCRIPTION
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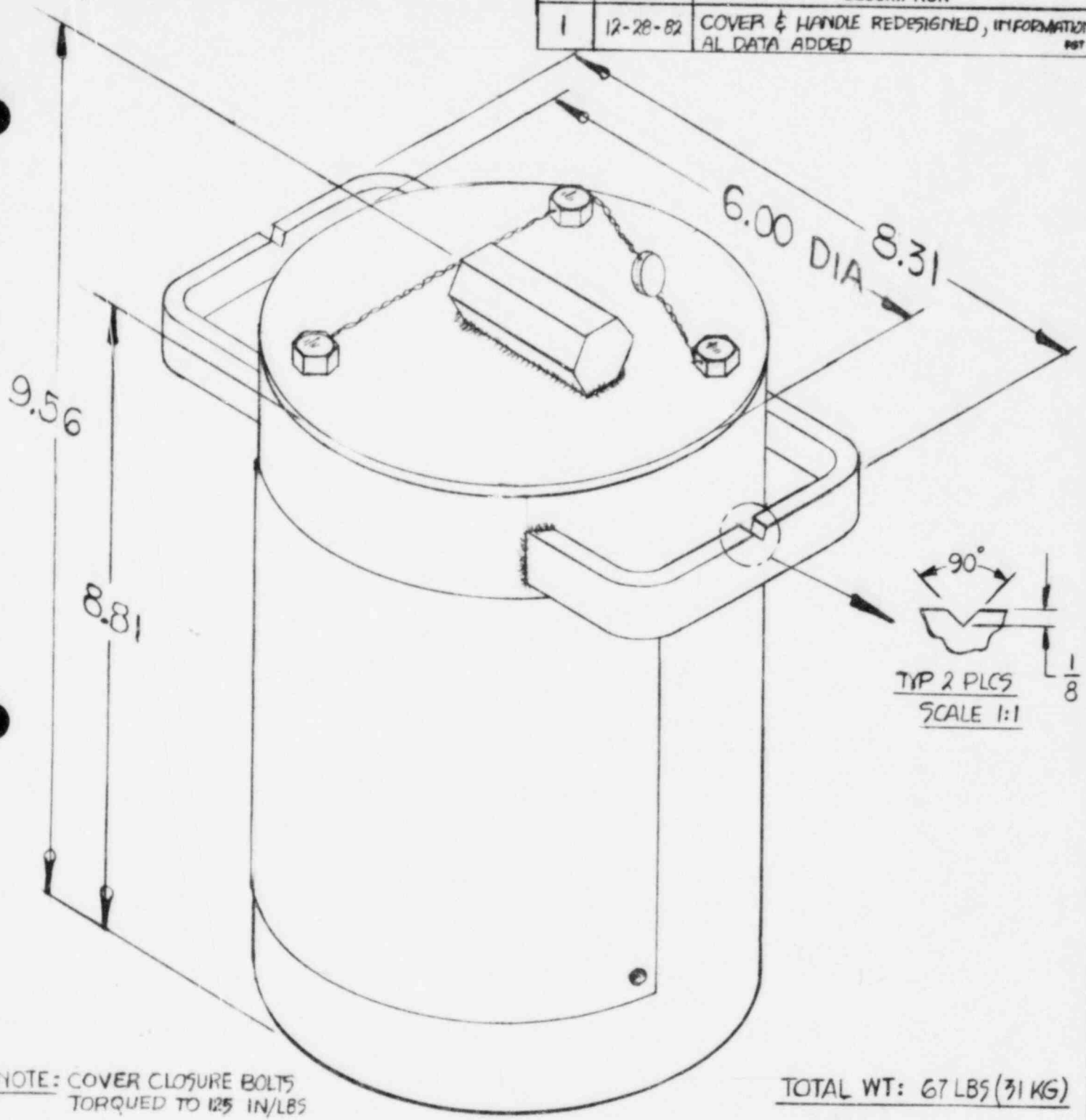


NOTE: COVER CLOSURE BOLTS TORQUED TO 125 IN/LBS

TOTAL WT: 67 LBS (31 KG)

MATERIALS: SEE SHTS 2 THRU 6

FINISH: ~~

DRAWN BY: J. Tinsley

CHECKED BY:

APPROVED BY:

UNLESS OTHERWISE SPECIFIED TOLERANCES ARE

.X	±
.XX	±
.XXX	±
ANGLES	±
FRACTIONS	±

Tech Ops

Tech/Ops, Inc.
RADIATION PRODUCTS DIVISION
BURLINGTON, MA 01803

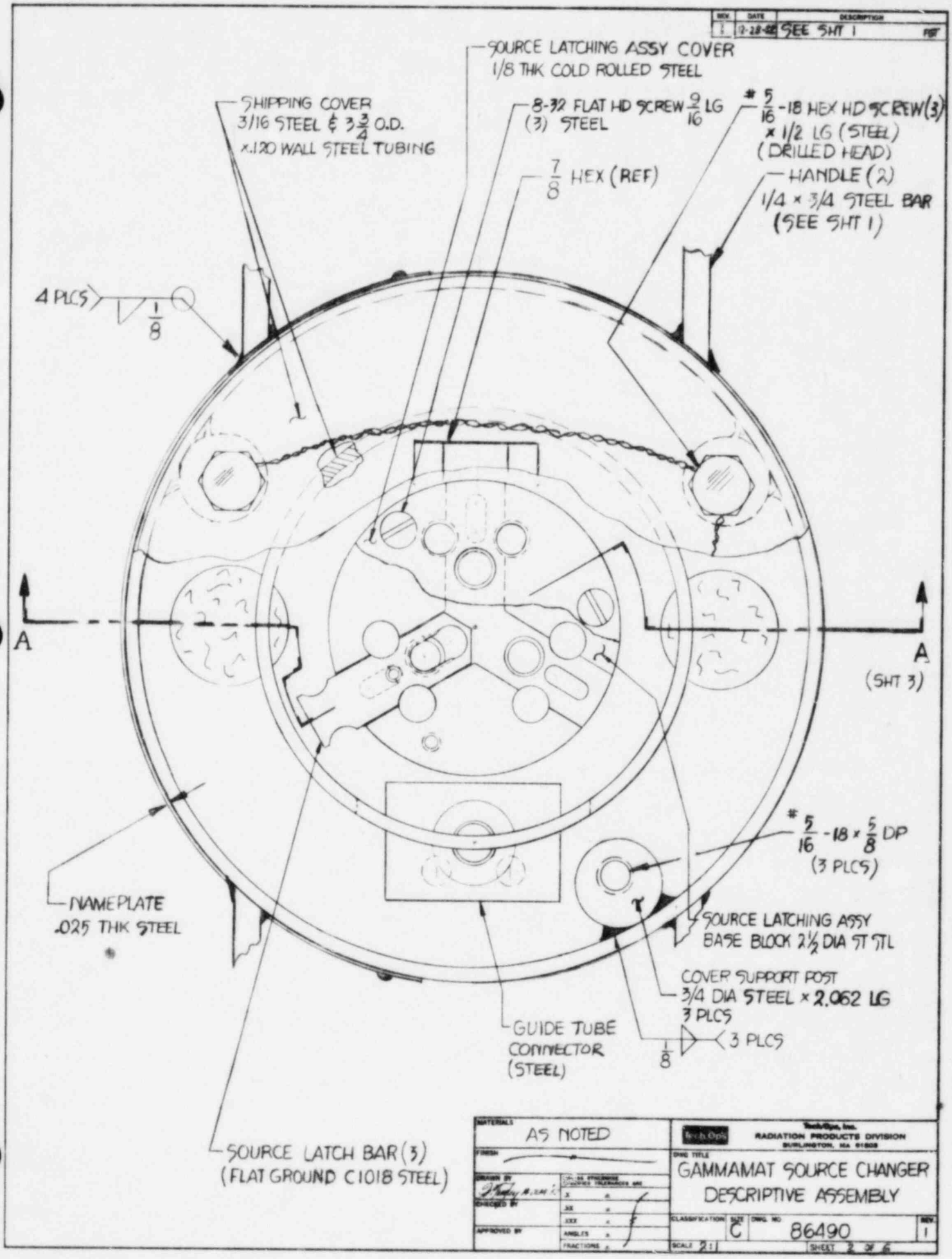
DWG TITLE

GAMMAMAT SOURCE CHANGER DESCRIPTIVE ASSEMBLY

CLASSIFICATION	SIZE	DWG. NO.	REV.
		86490	1

SCALE 1:2 SHEET 1 OF 6

SPAULDING CO., INC. 21-25486


REV. 1 | DATE 12-28-82 | DESCRIPTION SEE SHT 1 | PBF
SOURCE LATCHING ASSY COVER
1/8 THK COLD ROLLED STEEL
SHIPPING COVER
3/16 STEEL ¢ 3 3/4 O.D.
x.120 WALL STEEL TUBING
8-32 FLAT HD SCREW 9/16 LG
(3) STEEL
* 5/16 -18 HEX HD SCREW (3)
x 1/2 LG (STEEL)
(DRILLED HEAD)
7/8 HEX (REF)
HANDLE (2)
1/4 x 3/4 STEEL BAR
(SEE SHT 1)
4 PLCS
1/8
A
A
(SHT 3)
* 5/16 -18 x 5/8 DP
(3 PLCS)
NAMEPLATE
.025 THK STEEL
SOURCE LATCHING ASSY
BASE BLOCK 2 1/2 DIA ST STL
COVER SUPPORT POST
3/4 DIA STEEL x 2.062 LG
3 PLCS
GUIDE TUBE
CONNECTOR
(STEEL)
1/8
3 PLCS
SOURCE LATCH BAR (3)
(FLAT GROUND C1018 STEEL)
MATERIAL AS NOTED
FINISH
DRAWN BY
CHECKED BY
APPROVED BY
X ±
XX ±
XXX ±
ANGLES ±
FRACTIONS ±
Tech Ops, Inc.
RADIATION PRODUCTS DIVISION
BURLINGTON, MA 01803
DWG TITLE
GAMMAMAT SOURCE CHANGER
DESCRIPTIVE ASSEMBLY
CLASSIFICATION
SIZE C
DWG NO 86490
REV 1
SCALE 2:1
SHEET 2 OF 6

REV.	DATE	DESCRIPTION
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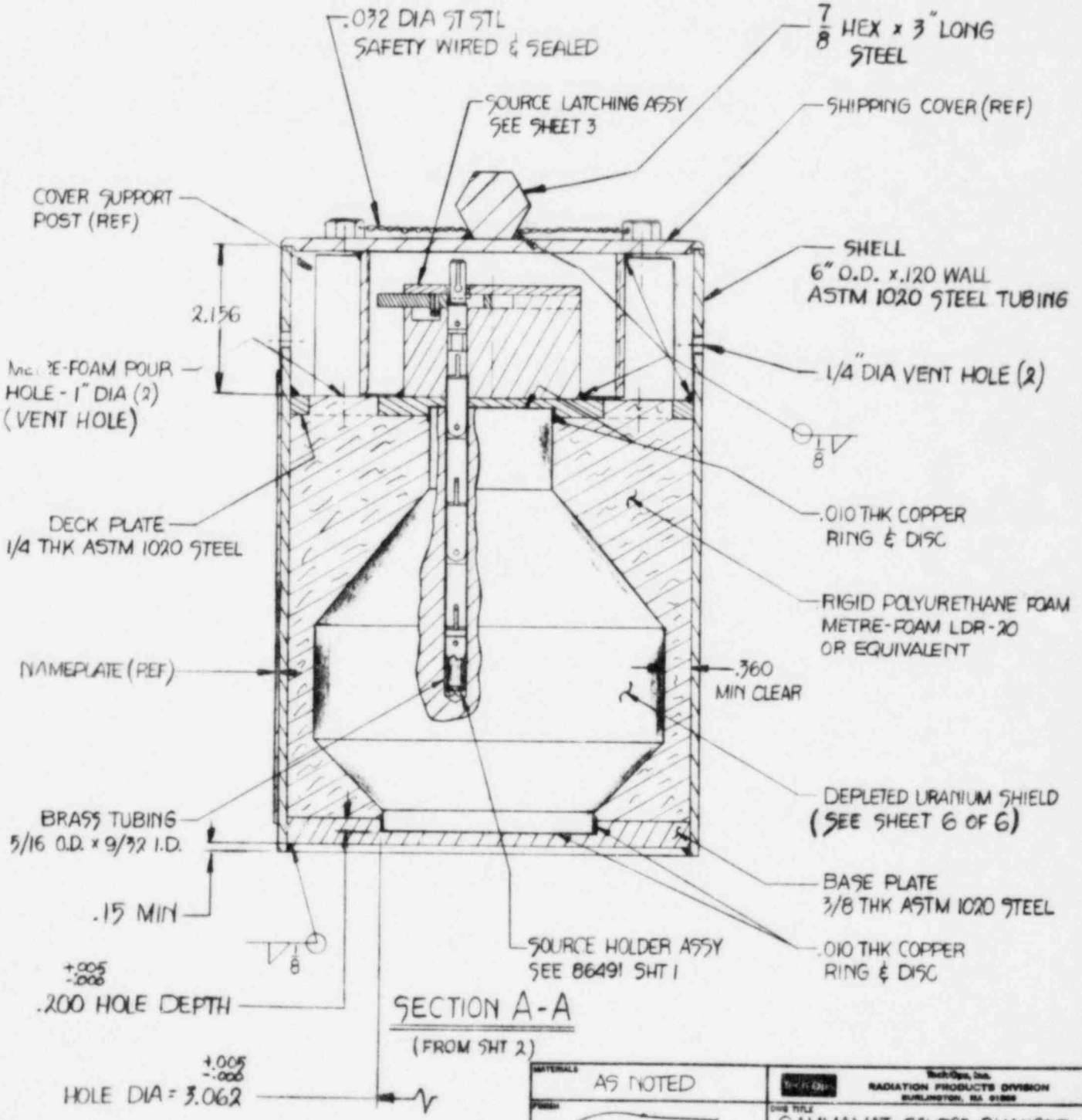

MATERIALS: AS NOTED	Tech Ops, Inc. RADIATION PRODUCTS DIVISION BURLINGTON, MA 01803	
FINISH	DWG TITLE: GAMMAMAT SOURCE CHANGER DESCRIPTIVE ASSEMBLY	
DRAWN BY: J. Gaughan	CLASSIFICATION: C	DWG. NO. 86490 REV. 1
CHECKED BY	SCALE: 1:1	SHEET 5 OF 6
APPROVED BY		

REV.	DATE	DESCRIPTION
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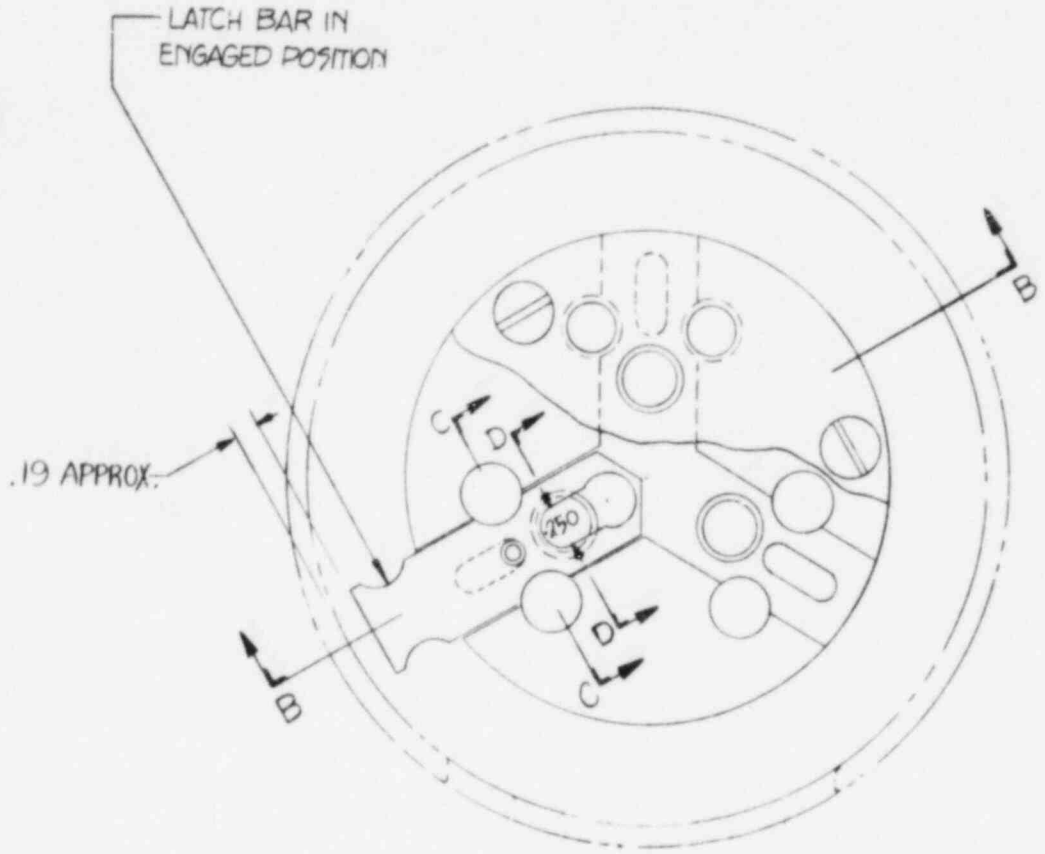
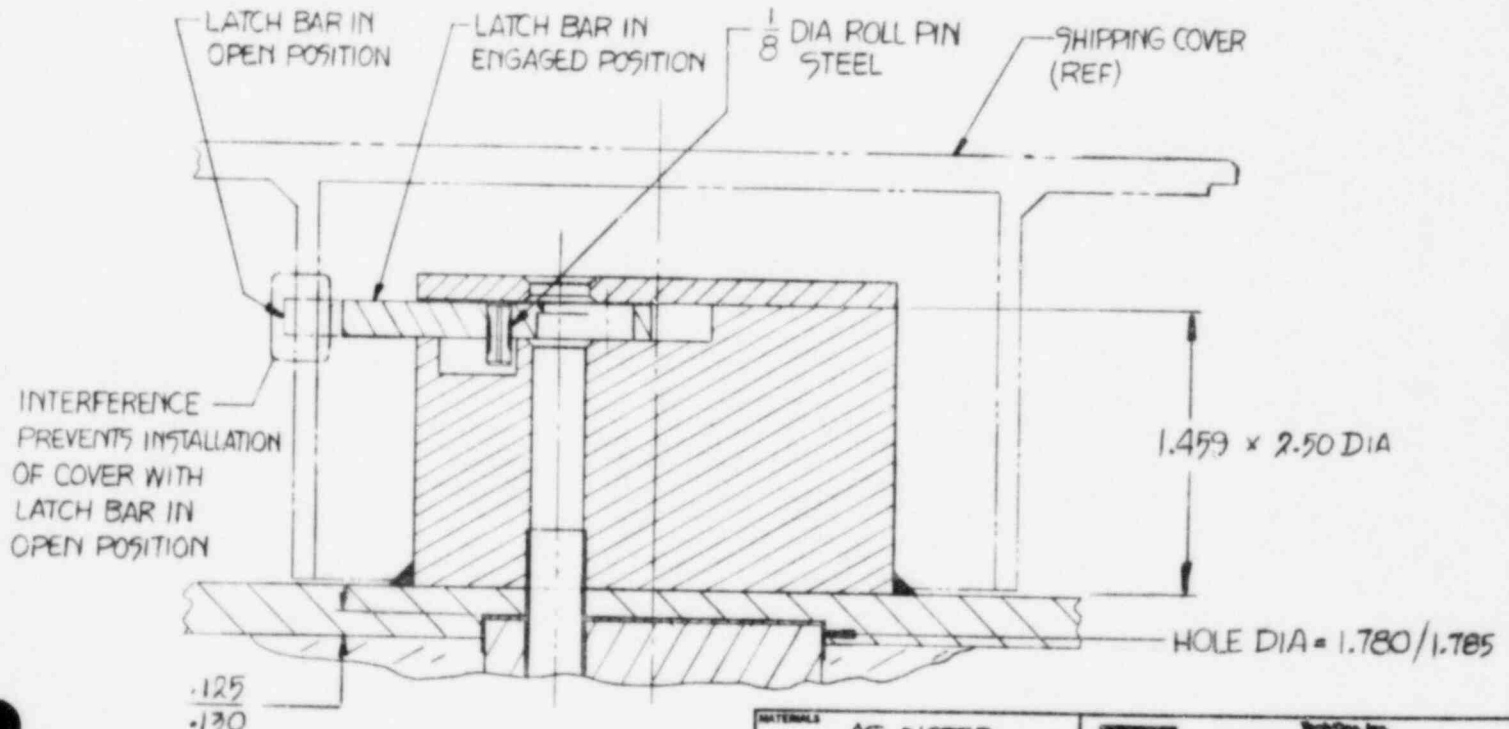


SOURCE LATCHING ASSY



SECTION B-B
(ROTATED 30° C.W.)

MATERIALS	AS NOTED
FINISH	
DRAWN BY	
CHECKED BY	
APPROVED BY	
UNLESS OTHERWISE SPECIFIED TOLERANCES ARE: .X ±, .XX ±, .XXX ±, ANGLES ±, FRACTIONS ±	

Tech Ops, Inc.
RADIATION PRODUCTS DIVISION
BURLINGTON, MA 01803

DWG TITLE
GAMMAMAT SOURCE CHANGER
DESCRIPTIVE ASSEMBLY

CLASSIFICATION	SIZE	DWG. NO	REV.
	C	86490	1

SCALE 2:1 SHEET 4 OF 6

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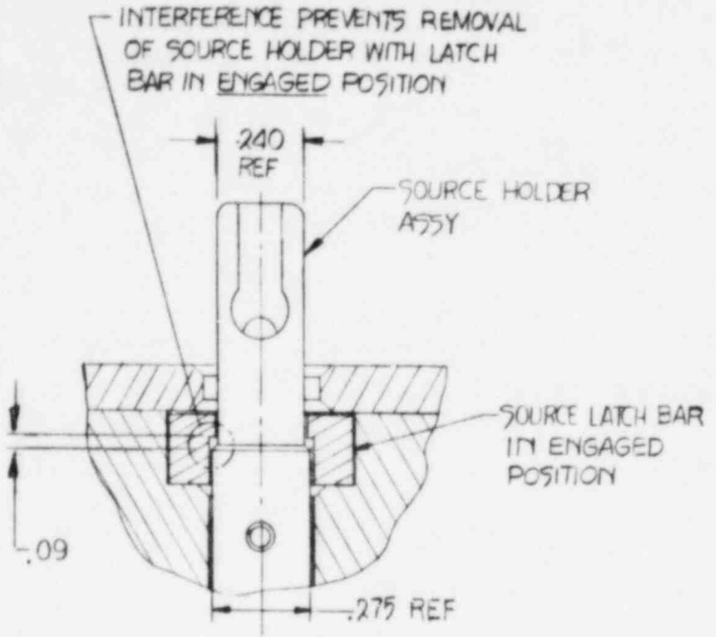
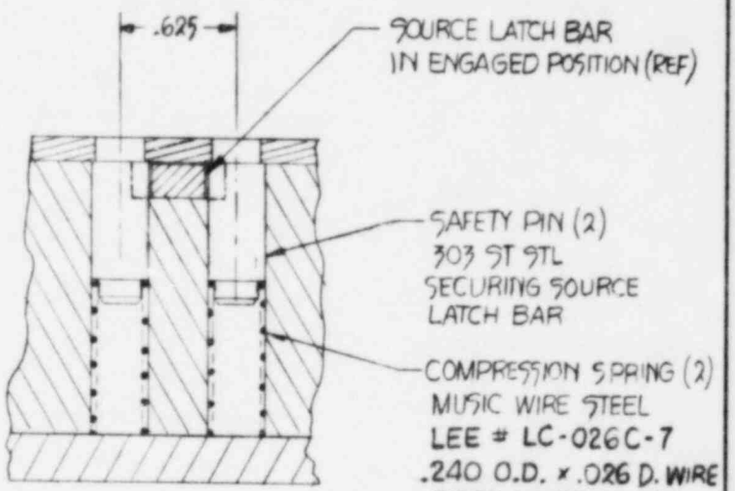
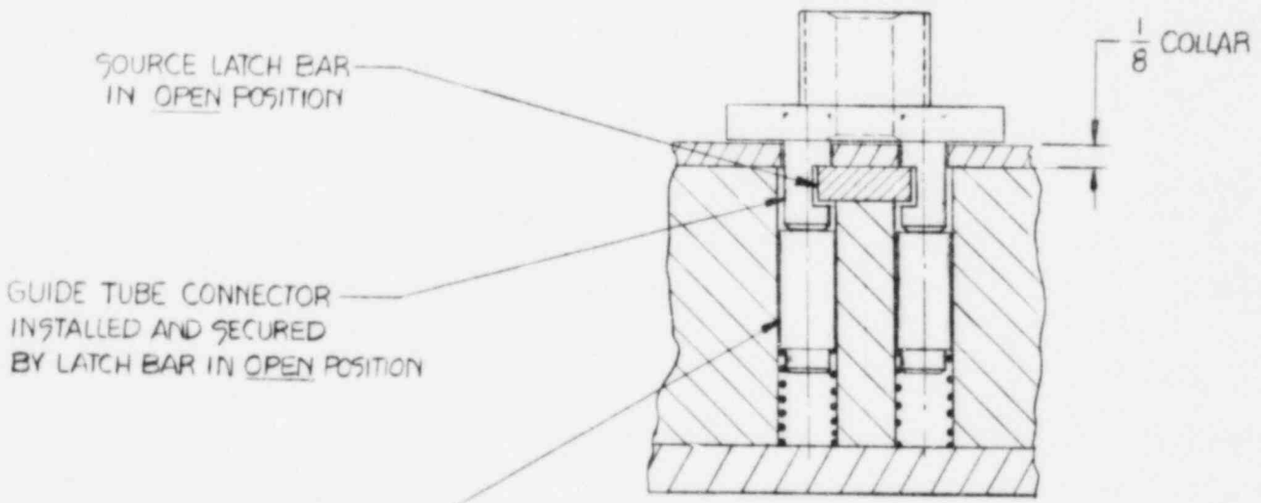


SECTION D-D
TYP 3 PLACES
SCALE 4:1



SECTION C-C
TYP 3 PLACES
SCALE 2:1



SECTION X-X
SCALE 2:1

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FINISH	DWG. TITLE: GAMMAMAT SOURCE CHANGER DESCRIPTIVE ASSEMBLY	
DRAWN BY: J. Tinsley 2-16-82	UNLESS OTHERWISE SPECIFIED TOLERANCES ARE: X ±, XX ±, XXX ±, ANGLES ±, FRACTIONS ±	
CHECKED BY		
APPROVED BY	CLASSIFICATION:	SIZE: C DWG. NO: 86490 REV: 1
	SCALE: NONE	SHEET 5 OF 6

REV.	DATE	DESCRIPTION	
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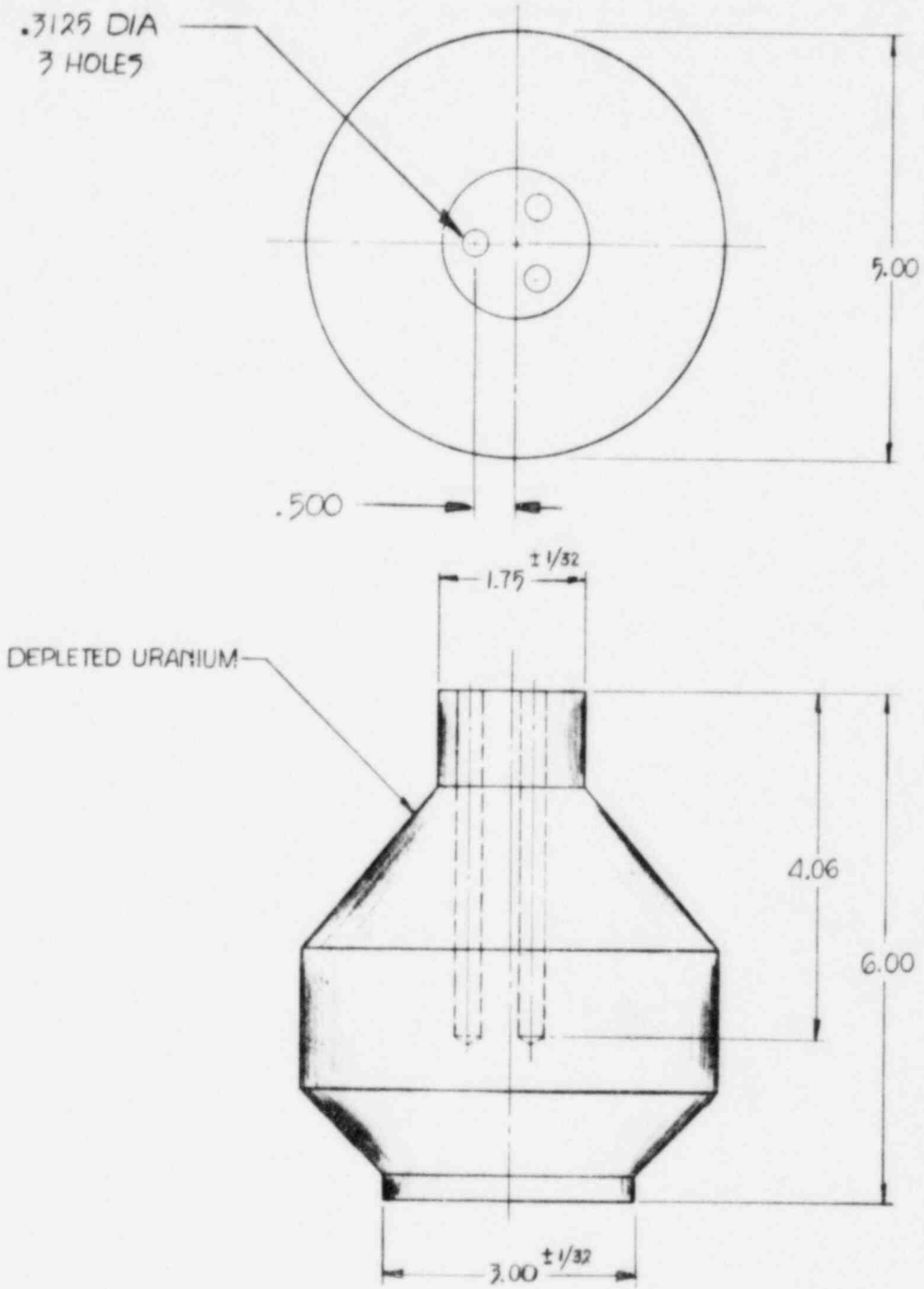

SHIELD DATA

WEIGHT: 47 LBS

MATERIALS: AS NOTED	RadOps, Inc. RADIATION PRODUCTS DIVISION BURLINGTON, MA 01803	
FINISH:	DWG TITLE: GAMMAMAT SOURCE CHANGER DESCRIPTIVE ASSEMBLY	
DRAWN BY:	CLASSIFICATION:	SIZE: C
APPROVED BY:	DWG. NO: 86490	REV: 1
UNLESS OTHERWISE SPECIFIED TOLERANCES ARE: X ± .XX ± .XXX ± ANGLES ± FRACTIONS ±	SCALE: 1:1	SHEET 6 OF 6

REV.	DATE	DESCRIPTION
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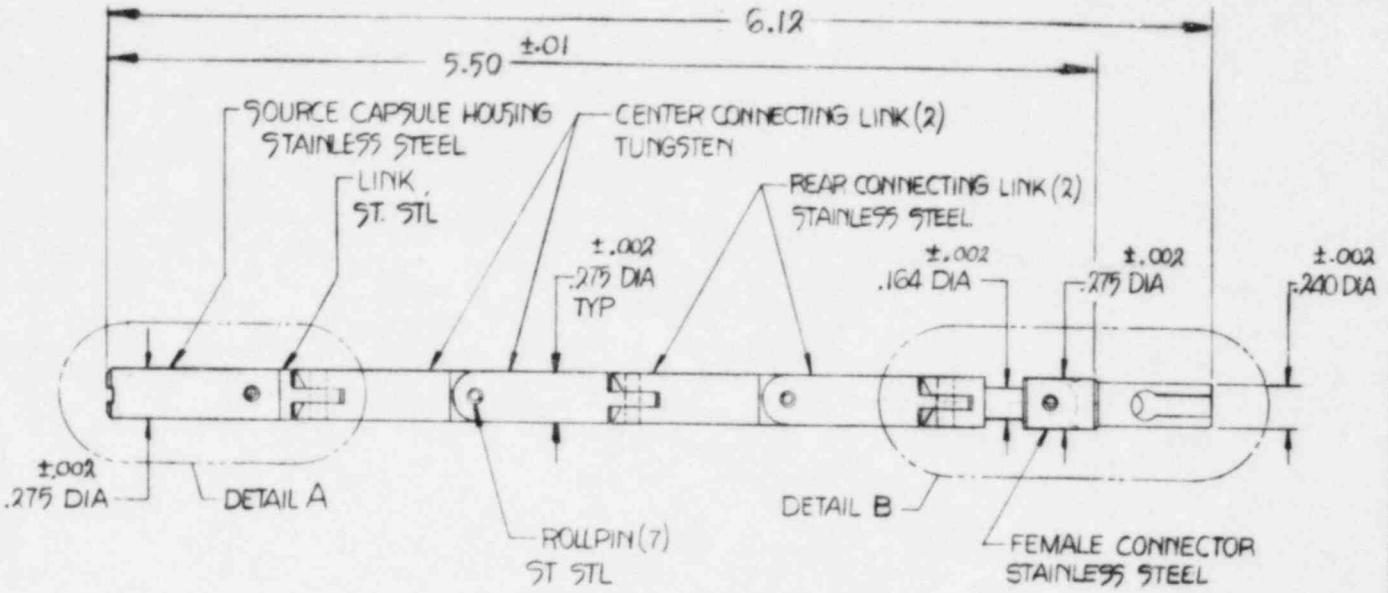
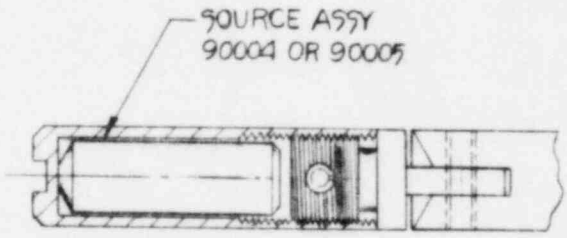
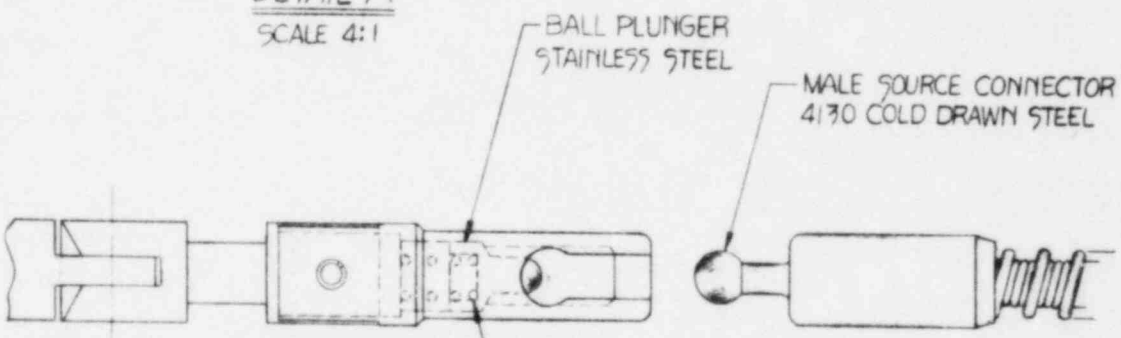




DETAIL A
SCALE 4:1



DETAIL B
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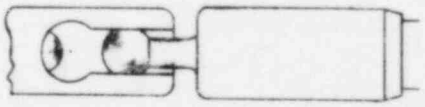

MATERIALS: AS NOTED		Ludlum Measurements, Inc. RADIATION PRODUCTS DIVISION SWEETWATER, TEXAS	
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DRAWN BY:	UNLESS OTHERWISE SPECIFIED TOLERANCES ARE:	CLASSIFICATION:	SIZE: C DWG. NO: 86491 REV: 1
CHECKED BY:	.X ± .XX ± .XXX ±	SCALE: 2:1 & 4:1	SHEET OF
APPROVED BY:	ANGLES ± FRACTIONS ±		

2.4 General Standards for All Packages

2.4.1 Chemical and Galvanic Reactors

The materials used in the construction of the Model 864 are uranium metal, steel, brass, tugnsten and copper. There will be no significant chemical or galvanic action between any of these components.

The possibility of the formation of the eutectic alloy ironuranium at temperatures below the melting temperatures of the individual metals has been considered. The iron-uranium eutectic alloy temperature is approximately 1337°F. However, vacuum conditions and extreme cleanliness of the surfaces are necessary to produce tha alloy at this low temperature. Due to the conditions under which the shields are mounted, sufficient contact for this effect does not exist.

In support of this conclusion, the following test results are presented. A thermal test of a sample of bare depleted uranium metal was performed by Nuclear Metals, Inc. The test indicated that the uranium sample oxidized such that the radial dimension was reduced by 1/32 inch (0.8mm). A subsequent test was performed in which a sample of bare depleted uranium metal was placed on a steel plate and subjected to the thermal test conditions. The test showed no metling or alloying characteristics in the sample, and the degree of oxidation was the same as evidenced in the first test. Copies of the test reports are included in Section 2.10.

Notwithstanding these test results, copper shims are used as separators at all iron-uranium interfaces to prevent contact and to preclude the possibility of the formation of this eutectic alloy.

2.4.2 Positive Closure

The source assemblies in the Model 864 cannot be exposed without opening a latch bar. Access to the latch bar requires removal of the cover. The cover is seal wired and provided with a tamperproof seal.

2.4.3 Lifting Devices

The Model 864 is designed to be lifted by its handles. Each handle is attached to the package by a 1/8 inch fillet weld around each end of the handle. The minimum cross-sectional area of each of these welds is 0.13 in^2 (85.5mm^2). The minimum shear strength of these welds is assumed to be 20,000 pounds per square inch (138 MN/m^2). Therefore the minimum shear strength of each weld is 2600 pounds (11,800 newtons) which is more than thirty times the weight of the package. Therefore, the lifting device can support five times the weight of the package without exceeding the yield strength of the material.

2.4.4 Tiedown Devices

The Model 864 can be tied down by means of the handles. A prototype Model 864 was subjected to the loads prescribed in 10 CFR 71.31 (d) in a worst case analysis where the tiedown arrangement was attached at one end of the handle applying the stress to one welded end. The handle arrangement did not yield during the test. The maximum stress at the handle attachment was calculated to be 71,000 psi. A copy of this test report is included in the Appendix.

In order to reduce the stress in the package, the handle arrangement has been designed to facilitate attachment of the tiedown at the center of the handle. This will reduce the stress by more than half due to sharing the load between both ends of the handle and increasing slightly length of the moment arm. The operating procedure in Section 7.4 reflectsan instruction to secure tiedown apparatus at the notches of the handles.

Consequently, the maximum stress generated in the package as a result of the tiedown condition of 10CFR 71.31(d) would be less than 36,000 psi. This is well below the yield strength of ASTM 1020 carbon steel (55,000 psi) Therefore, we conclude that the Model 864 satisfies the tiedown condition.

2.5 Standards for Type B and Large Quantity Packages

2.5.1 Load Resistance

Considering the package as a simple beam supported on both ends with a uniform load of five times the package weight evenly distributed along its length, the maximum stress can be computed from:

$$S=\frac{Fl}{8Z}$$

Where S: Maximum Stress
F: Total load (335 pounds; 1.5 kN)
l: Length of Beam (8.96 inches; 228mm)
Z: Section Modulus (3.19 in^3, 52,352mm^3)

(Reference: Machin y's Handbook, 21st Edition, P 373)

The load is assumed to be 335 pounds (1.5 kN). The container is assumed to be a cylinder with an outside diameter of 6.0 inches (152mm), a wall thickness of 0.120 inch (3.0mm) and a length of 8.96 inches (222mm). Consequently, the section modulus of the beam is 3.19 in^3.

Therefore, the maximum stress generated in the beam is 117 pounds per square inch (0.81 MN/m^2) which is far below the yield strength of the material.

2.5.2 External Pressure

The Model 864 is open to the atmosphere. Therefore, there will be no differential pressure acting on it. The collapsing pressure of the source capsules is calculated assuming that the capsules are thin wall tubing with a wall thickness equal to the minimum depth of weld penetration (0.020 inch; 0.5 mm). The collapsing pressure is calculated from:

$$P=86{,}670\ \frac{t}{d} - 1386$$

where P: collapsing pressure in pounds per square inch
t: Wall thickness (0.020 inch)
d: outside diameter (0.205 inch)

(Reference: Machinery's Handbook, 21st Edition, p 440)

2.10 APPENDIX

Descriptive Assembly Drawings - Source Capsules

Test Report: Uranium Thermal Test

Test Report: Model 864 Penetration Test

Test Report: Model 864 Compression Test

Test Report: Model 864 Free Fall and Puncture Tests

IAEA Certificate of Competent Authority USA/0179/S

Test Report: Model 864 Handle Tie-down Test

REPORT

RADIATION PRODUCTS DIVISION

By: John A. McElman, Ph.D.

Date: 20 December 1982

Subject: Test of Tie-Down Arrangement of Tech/Ops Model 864 Package

---

Tests of the tie-down method for Tech/Ops Model 864 container described by Tech/Ops Drawing 86490 were conducted in the Mechanical Engineering Laboratory at the University of Lowell, Lowell, Massachusetts. The regulatory specifications required the following static loads at the center of gravity:

Z direction : 2G

Y direction : 5G

X direction : 10G

The total weight of the container was assumed to be 70 pounds. A static analysis was conducted as follows. The loads applied are shown in Figure 1.

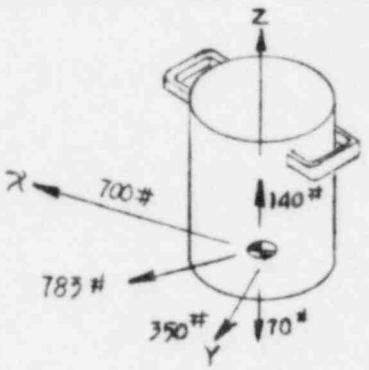


Figure 1

It is assumed that the worst case is produced when the restraining force, P, is applied at one corner of a tie-down handle. Under this assumption, the static problem is shown in Figure 2.

Summing the moments about Point A yields P = - 1150 pounds which produces a bending stress at the weld of 78,000 psi and a shear stress of 6100 psi.

The container was then instrumented with strain gages and statically tested. A load of 1150 pounds was applied to each handle (see Figures 3 & 4) . This produced a strain of 1690 μin/in which was linearly extrapolated to a strain of 2370 μin/in at the weld. This strain is equivalent to 71,000 psi. No yielding was evident since the strain gages returned to zero strain when the load was removed.

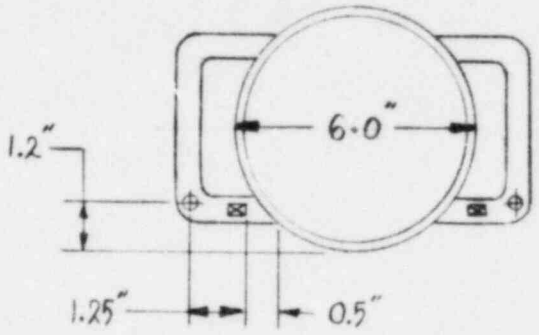


FIG. 4 GAGE LOCATIONS

TOP VIEW

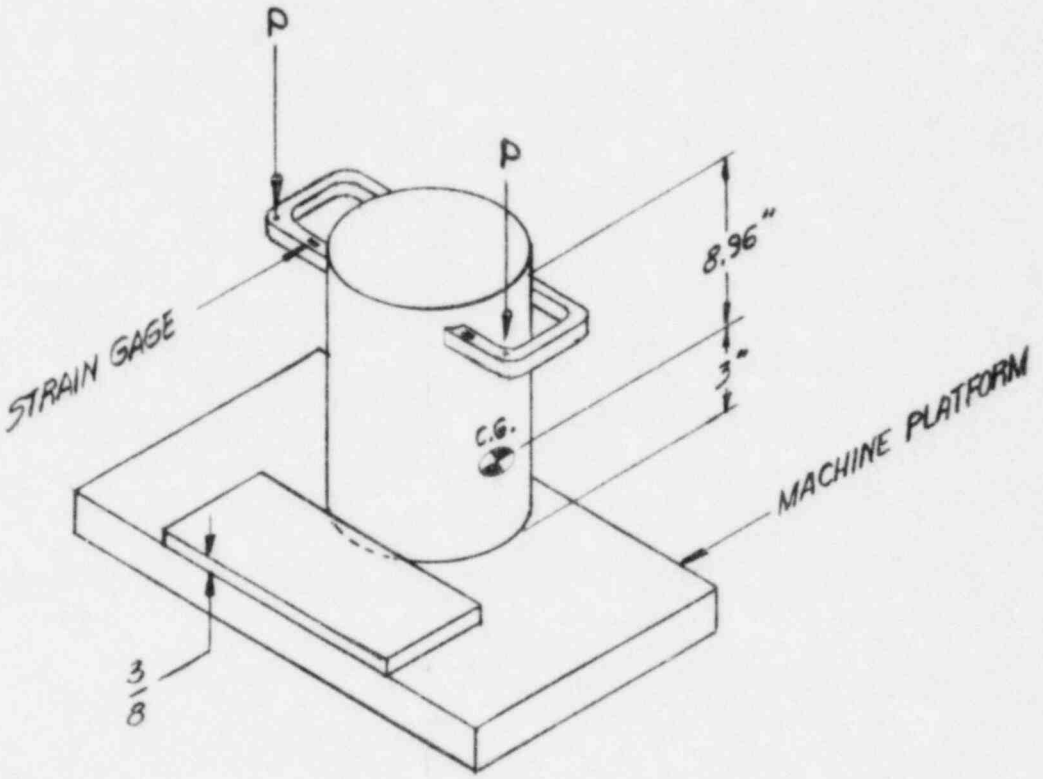


FIG. 3 LOADING DIAGRAM

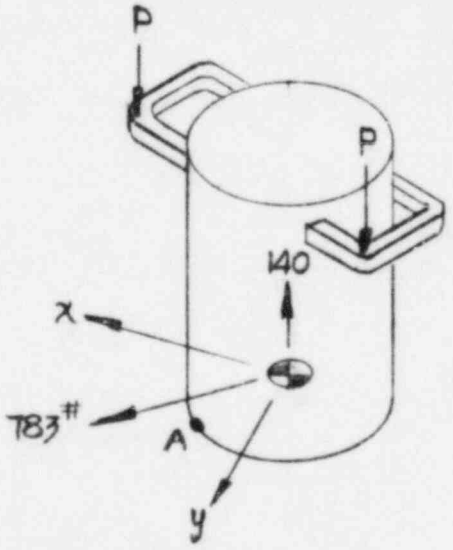
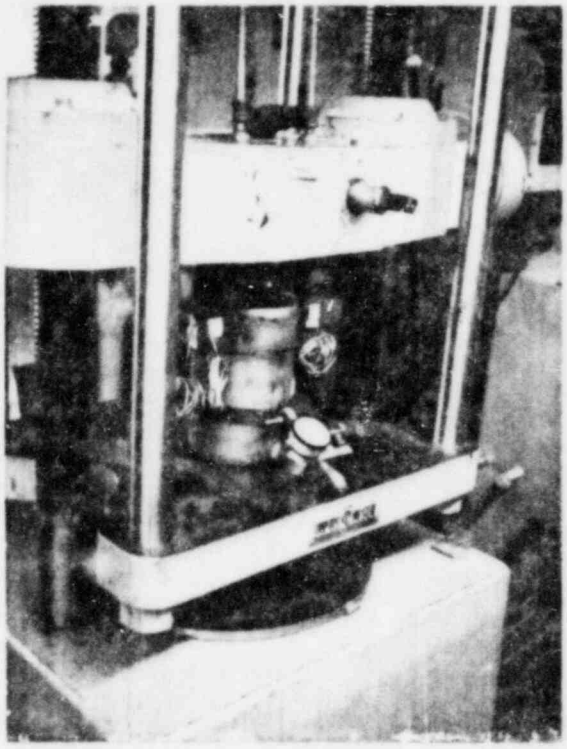
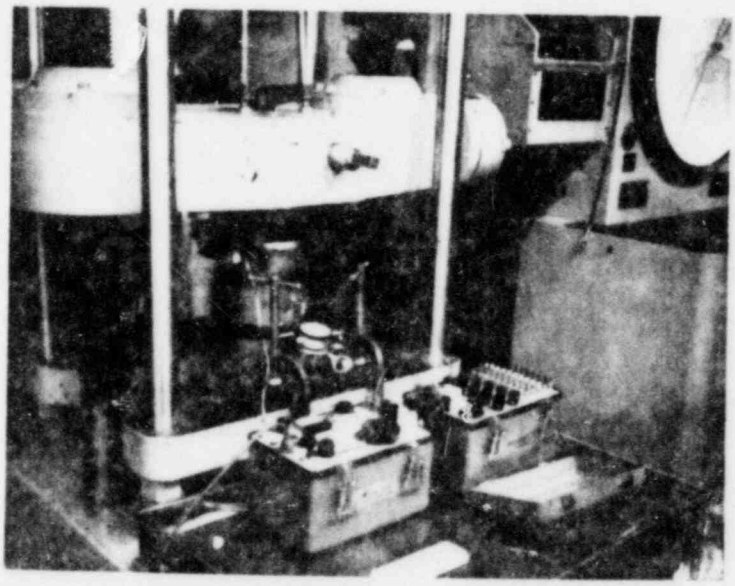
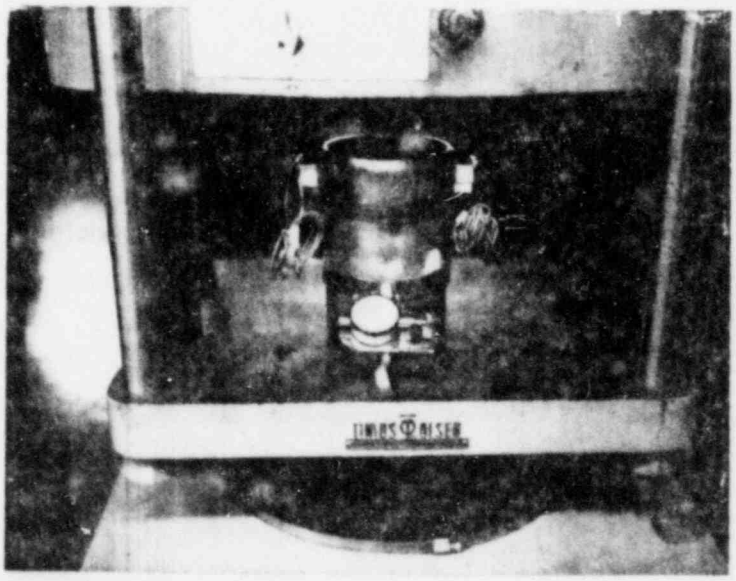


FIG. 2 STATIC ANALYSIS

REVISION 1
27 DECEMBER 1982







TECH/OPS MODEL 864

SOURCE CHANGER-SHIPPING CONTAINER

OPERATION MANUAL

Technical Data

Size:	6.00 inches diameter; 9.56 inches high (152 mm diameter; 243 mm high)
Weight:	67 Pounds (31kg)
Capacity:	360 Curies of iridium-192 as special form source assembly configuration shown in drawing 86491.
Transport Status:	Type B(U) USNRC USA/9166/B IAEA USA/9166/B(U)
Shielding:	Depleted Uranium 43 pounds (20kg)

General

The Model 864 source changer-shipping container is designed for transferring encapsulated radioisotope sources into radiographic devices and for transporting these sources.

The US Nuclear Regulatory Commission allows the use of this source changer only if the user is specifically authorized by the terms of his license. If the user is not authorized to make source exchanges, contact Tech/ops, Inc. It has personnel who are authorized to perform this operation. If the user wishes to be licensed to make source exchanges, application should be made to:

Radioisotope Licensing Branch
Division of Fuel Cycle and Material Safety
Office of Nuclear Safety and Safeguards
US Nuclear Regulatory Commission
Washington, DC 20555

Prior to the first shipment of this source changer, the user should also register with:

Transportation Certification Branch
Division of Fuel Cycle and Material Safety
Office of Nuclear Material Safety and Safeguards
US Nuclear Regulatory Commission
Washington, DC 20555

General Safety Considerations

All personnel who enter a restricted area or are present during source changing operations should wear a direct reading pocket dosimeter with a range from zero to at least 200 milliroengens and either a film badge or a thermoluminescent

dosimeter (TLD). The pocket dosimeter should be recharged prior to the start of the source changing operation. The operator should periodically check the pocket dosimeter reading throughout the operation. Records of the initial and final readings of the pocket dosimeter should be maintained.

In the event that an individual's pocket dosimeter is found to be off scale, that person should immediately stop all work with radiation. His film badge or TLD should be immediately sent for processing and he should not reenter a restricted area until it has been determined that he received less than maximum allowable occupational exposure. Source changing personnel should have a calibrated and operable radiation survey meter capable of measuring from 2mr/hr to 1000mr/hr to determine radiation levels when performing source changing operations.

Areas in which source changing operations are being conducted must be restricted to minimize radiation exposure to individuals. Restricted areas should be posted with the appropriate warning signs as required by governmental regulation. Source changing operatiors should guard against unauthorized entry in these areas at all times.

Shipping Information

The Model 864 source changer is shipped to the user with the following items in addition to the radioisotope source(s).

1. For each source
   A. Source Decay Chart
   B. Source Leak Test Certification
   C. Verification of Source Physical Dimensions
   D. Source Identification Label

2. Tamperproof Seals

3. Return Shipping Labels

4. Source Guide Tube Connector

5. Operation Manual

-NOTE-

The user if urged to perform the source changing operation as soon as possible after receipt and to return the source changer immediately upon completion of the changing operation. Only in this way can we keep these source changers in continued use.

Receipt

NOTES:

1. A package of radioactive material must be accepted from the carrier at the time it is offered for delivery.

2. If a package of radioactive material is to be picked up by the consignee at the carrier's terminal, the consignee must make arrangements to receive notification from the carrier of the arrival of the package at the the time of arrival. The consignee must pick up the package expeditiously upon receipt of notification from the carrier of its arrival.

1. Upon receipt of the source changer, survey all exterior surfaces of the source changer to assure that the radiation levels do not exceed 200 milliroentgens per hour. Survey at three feet from all exterior surfaces of the source changer to assure that the radiation levels do not exceed ten milliroentgens per hour. If either of these limits are exceeded, the consignee must notify the U.S. Nuclear Regulatory Commission and the final delivering carrier in accordance with 10 CFR 20.205 (c).

   NOTE: These surveys should be performed as soon as practicable after receipt of the source changer but no later than three hours after the source changer is received at the consignee's facility if received during the normal working hours or 18 hours if received after normal working hours.

2. Check the source changer for obvious damage.

3. Check the packing list and shipping papers to assure that the shipment is intact and complete.

4. If there are any discrepancies, do not use the source changer and contact Tech/Ops, Inc. immediately to resolve discrepancy. (Tel. 800-225-1383, Telex 949313). If items 1-3 are determined to be in order, place the source changer in a restricted area until ready to use.

Operation

Note: All the precautions used when making radiographic exposures must be followed. Wear personnel monitoring devices during all source changing operations. Monitor all operations with a calibrated, operable survey meter.

1. Survey the source changer upon receipt to ensure that all sources are in the proper storage positions. Radiation levels should not exceed 200 milliroentgens per hour at the surface of the source changer, nor 10 milliroentgens per hour at three feet from the surface.

2. Locate the source changer and exposure device(s) in a restricted area. Position the source changer in an upright position and near the exposure device so that one section of source guide tube will connect them with no sharp turns or bends. The bend radius of the guide tube should never be less than twenty inches. Shorter bend radii can restrict source movement in the source guide tube.

WARNING

The source changer must remain in an upright position during source changing operations. Do not position source changer on its side.

3. Remove any foreign matter from the source guide tube and attach the source guide tube connector to the source guide tube. Attach the source guide tube to the exposure device. Remove the source changer cover by breaking the seal wires and removing the bolts. Attach the source guide tube connector to an empty chamber of the source changer. Assure that the latch assembly of the chambers containing sources are in the engaged (latched) position. Open (unlatch) the latch assembly over the empty chamber.

4. Attach the control unit to the exposure device following the exposure device operating instructions.

5. Ensure that no unauthorized personnel are inside the restricted area. Crank the source rapidly from the exposure device to the source changer.

the source guide tube from the source guide tube connector. Install the source guide tube connector in its receptical in the source changer.

14. Remove the source identification plate(s) from the exposure device(s) and attach with seal wire to the source changer. Attach the identification plate(s) for the new source(s) to the exposure device(s).

15. Assure that all latch bars are engaged and properly securing the source assemblies. Bolt the cover plate to the source changer. Torque the cover plate bolts to 120-130 inch-pounds. Secure the bolts with seal wires using security seals.

16. Survey all exterior surfaces of the source changer to ensure that radiation levels do not exceed 200 milliroentgens per hour at contact. Measure the radiation level three feet from all exterior surfaces of the source changer and ensure that the radiation level is less than 10 milliroentgens per hour. The maximum radiation level measured three feet from any exterior surface is the transport index. (Example: With a maximum radiation level of 2.2 milliroentgens per hour, the transport index is 2.2).

    NOTE: Under normal conditions, the maximum radiation level on the top surface of the package would not exceed 10 mR/hr. The Transport Index would be approximately 1.0. If measured radiation levels exceed these usual values, investigate the cause and reassure that the source assembly is secured in the proper shielded storage position.

17. Select the proper shipping labels according to the radiation levels at the surface and at 3 feet from the surface of container as described in the following table. Complete two labels listing the radioisotope contained (Iridium-192), the activity (the number of curies),and the Transport Index as determined above.

18. Assure that the old shipping labels are removed. Apply the shipping labels, properly completed, to two opposite sides of the container. Inspect the source changer for tightness of fasteners, proper seal wires and general condition prior to shipment.

19. Properly complete the shipping papers indicating:

    a. Proper shipping names (i.e., Radioactive Material, Special Form, n.o.s. NA 9182 and Radioactive Device, n.o.s., UN 2911).

    b. Name of radionuclide (iridium-192 and uranium-238)

    c. Activity of source (expressed in curies).

    d. Category of label applied (i.e., Radioactive Yellow III).

    e. Transport Index

    f. USNRC Identification Number (USNRC: USA/9166/B)

g. For international shipments, IAEA Identification number IAEA: USA/9166/B(U)

h. Shipper's Certification:

"This is to certify that the above named materials are properly classified, described, packages, marked and labeled and are in proper condition for transport according to the applicable regulations of the department of transportation."

NOTES:

1. For air shipments, the following shipper's certification may be used:

"I hereby certify that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked and labeled and are in proper condition for carriage by air according to applicable national governmental regulations."

2. For air shipments to, from or through the United States, the package must be labeled with a "CARGO AIRCRAFT ONLY" label and the shipping papers must state:

"THIS SHIPMENT IS WITHIN THE LIMITATION PRESCRIBED FOR CARGO - ONLY AIRCRAFT."

20. Return the container to Tech/ops, Inc., according to proper procedures for transporting radioactive material as established in Title 49 Code of Federal Regulations, Parts 172-178.

NOTE: To prepare an empty package for transport, follow the instruction of the operating procedures above beginning with Step 15 with the following exceptions:

a. The proper shipping name is Radioactive Device, n.o.s. UN 2911

b. Radionuclide is Uranium-238

NOTE: Please return container promptly. Demurrage charges will be made for containers held beyond normal transportation time.

NOTE: When securing package in the transport vehicle, secure the tiedown apparatus at the notches of the handle. This instruction should appear on the shipping papers for this package.

8. Acceptance Tests and Maintenance Program

8.1 Acceptance Tests

8.1.1 Visual Inspection

The package is visually examined to assure that the appropriate fasteners are properly seal wired and that the package is properly marked.

The seal weld of the radioactive source capsule is visually inspected for proper closure.

8.1.2 Structural and Pressure Tests

The source holder assembly is subjected to a static tensile test with a load of one hundred pounds.

8.1.3 Leak Tests

The radioactive source capsule (the primary containment) is wipe tested for leakage of radioactive contamination. The source capsule is subjected to a vacuum bubble leak test. The capsule is then subjected to a second wipe test for radioactive contamination. These tests are described in Section 7.4. Failure of any of these tests will prevent use of this source assembly.

8.1.4 Component Tests

The latch assembly of the package is tested to assure that the security of the source will be maintained. Failure of this test will prevent use of the package until the lock assembly is corrected and retested.

8.1.5 Tests for Shielding Integrity

With the source changer containing a source assembly in the configuration shown in drawing 86491, the radiation levels at the surface of the package and at three feet from the surface are measured using a small detector survey instrument (i.e., AN/PDR-27). These radiation levels, when extrapolated to the rated capacity of the package, must not exceed 200 milliroentgens per hour at the surface nor ten milliroentgens per hour at three feet from the surface of the package. Failure of this test will prevent use of the package.

Under normal conditions the maximum surface radiation level on the top surface of the package would not exceed ten milliroentgens per hour and the maximum radiation levels at three feet from the surface would not exceed one milliroentgen per hour. If unusual radiation intensities are observed, the cause will be investigated and corrected.

8.1.6 Thermal Acceptance Tests

Not Applicable

8.2 Maintenance Program

8.2.1 Structural and Pressure Tests

Not Applicable

8.2.2 Leak Test

As described in Section 8.1.3, the radioactive source assembly is leak tested at manufacture. Additionally, the source assembly is wipe tested for leakage of radioactive contamination every six months.

8.2.3 Subsystem Maintenance

The latch assembly is tested as described in Section 8.1.4 prior to each use of the package. Additionally, the package is inspected for tightness of fasteners, proper seal wires and general condition prior to each use.

8.2.4 Valves, Rupture Discs and Gaskets

Not Applicable

8.2.5 Shielding

Prior to each use, a radiation survey of the package is made to assure that the radiation levels do not exceed 200 milliroentgens per hour at the surface nor ten milliroentgens per hour at three feet from the surface.

8.2.6 Thermal

Not Applicable

8.2.7 Miscellaneous

Inspections and tests designed for secondary users of this package under the general licensing provisions of 10CFR71.12(b) are included in Section 7.4.