

**MARTIN COMPANY**

Baltimore 3,  
Maryland

Mail No. 729

August 26, 1963

United States Atomic Energy Commission  
Division of Licensing and Regulation  
Washington 25, D. C.

Gentlemen:

It is requested that a Byproduct Material License be issued authorizing the use and transfer of a Martin Custom Sealed Source. A description of the source is herewith transmitted with the application for license.

This source is urgently needed at Martin's Radioisotope Production Facility located in Quehanna, Pennsylvania. It will be utilized and controlled by the Health Physics Group for hi-range instrument calibrations and dosimetry experiments to improve evaluation of personnel exposures.

If any additional information is required, please contact me at Area Code 301 - 687-3800, extension 9517.

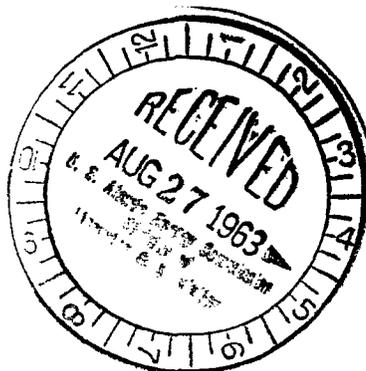
Very truly yours,



Richard J. Brisson, Chief  
Health Physics Section

RJB:ebc

Enclosures



B-70

THE AEROSPACE  
DIVISION OF  
**MARTIN**  
**MARIETTA** 

ATOMIC ENERGY COMMISSION  
**APPLICATION FOR BYPRODUCT MATERIAL LICENSE**

**INSTRUCTIONS.**—Complete Items 1 through 16. If this is an initial application, all application is for renewal of a license, complete only Items 1 through 7 and indicate new information or changes in the program as requested in Items 8 through 15. Use supplemental sheets where necessary. Item 16 must be completed on all applications. Mail three copies to: U.S. Atomic Energy Commission, Washington 25, D.C. Attention: Isotopes Branch, Division of Licensing and Regulation. Upon approval of this application, the applicant will receive an AEC Byproduct Material License. An AEC Byproduct Material License is issued in accordance with the general requirements contained in Title 10, Code of Federal Regulations, Part 30 and the Licensee is subject to Title 10, Code of Federal Regulations, Part 20.

<p>1. (a) NAME AND STREET ADDRESS OF APPLICANT. (Institution, firm, hospital, person, etc.)</p> <p>Martin Marietta Corporation Baltimore 3, Maryland</p>	<p>(b) STREET ADDRESS(ES) AT WHICH BYPRODUCT MATERIAL WILL BE USED (Indicate from (a))</p> <p>Radioisotope Production Facility Quehanna, Pennsylvania</p> <p>10-1398-30</p>
<p>2. DEPARTMENT TO USE BYPRODUCT MATERIAL</p> <p>Martin Company Health Physics Section</p>	<p>3. PREVIOUS LICENSE NUMBER(S). (If this is an application for renewal of a license, please indicate and give number.)</p> <p>None</p>
<p>4. INDIVIDUAL USER(S). (Name and title of individual(s) who will use or directly supervise use of byproduct material. Give training and experience in Items 8 and 9.)</p> <p>J. M. Toennies (previously submitted) R. J. Brisson (previously submitted) L. F. Tripp (See Items 8 &amp; 9)</p>	<p>5. RADIATION PROTECTION OFFICER (Name of person designated as radiation protection officer other than individual user. Attach resume of his training and experience as in Items 8 and 9.)</p> <p>Richard J. Brisson, Chief Health Physics Section</p>

<p>6. (a) BYPRODUCT MATERIAL. (Elements and mass number of each.)</p> <p>Strontium 90</p>	<p>(b) CHEMICAL AND/OR PHYSICAL FORM AND MAXIMUM NUMBER OF MILLCURIES OF EACH CHEMICAL AND/OR PHYSICAL FORM THAT YOU WILL POSSESS AT ANY ONE TIME. (If sealed source(s), also state name of manufacturer, model number, number of sources and maximum activity per source.)</p> <p>Sr<sup>90</sup>TiO<sub>2</sub> - 7,000 mc Maximum Martin Custom Sealed Source</p> <p>Source encapsulation described in Attachment A and Sketch of Source Holder.</p>
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7. DESCRIBE PURPOSE FOR WHICH BYPRODUCT MATERIAL WILL BE USED. (If byproduct material is for "human use," supplement A (Form AEC-313a) must be completed in lieu of this item. If byproduct material is in the form of a sealed source, include the make and model number of the storage container and/or device in which the source will be stored and/or used.)

Source will be used for dosimetry experiments and radiation detection instrument calibration. The source will be stored, when not in use, in Radiation Counter Laboratories Vertical Cast Iron Shield 2" thick - Model 15 - Mark 3.

**DUPLICATED**  
FOR DIV. OF COMPLIANCE

**ACKNOWLEDGED**

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TRAINING AND EXPERIENCE OF EACH INDIVIDUAL NAMED IN ITEM 4 (Use supplemental sheets if necessary)

8. TYPE OF TRAINING	WHERE TRAINED	DURATION OF TRAINING	ON THE JOB (Circle answer)	FORMAL COURSE (Circle answer)
a. Principles and practices of radiation protection	DuPont Savannah River Project Health Physics Supervisor	9 years	(Yes) No	Yes No
b. Radioactivity measurement standardization and monitoring techniques and instruments	DuPont Savannah River Project	9 years	(Yes) No	Yes No
c. Mathematics and calculations basic to the use and measurement of radioactivity	DuPont Savannah River Project Wake Forest College	9 years 2 years	(Yes) No	(Yes) No
d. Biological effects of radiation	DuPont Savannah River Project	9 years	(Yes) No	Yes No

9. EXPERIENCE WITH RADIATION. (Actual use of radioisotopes or equivalent experience.)

ISOTOPE	MAXIMUM AMOUNT	WHERE EXPERIENCE WAS GAINED	DURATION OF EXPERIENCE	TYPE OF USE
Fission Products	Multi-Mega curies	DuPont Savannah River Project Chemical Separation Areas Health Physics Shift Supervisor	9 years	Purex Process

10. RADIATION DETECTION INSTRUMENTS. (Use supplemental sheets if necessary.)

TYPE OF INSTRUMENTS (Include make and model number of each)	NUMBER AVAILABLE	RADIATION DETECTED	SENSITIVITY RANGE (mr/hr)	WINDOW THICKNESS (mg/cm <sup>2</sup> )	USE (Monitoring, surveying, measuring)
PREVIOUSLY SUBMITTED					

11. METHOD, FREQUENCY, AND STANDARDS USED IN CALIBRATING INSTRUMENTS LISTED ABOVE.

PREVIOUSLY SUBMITTED

12. FILM BADGES, DOSIMETERS, AND BIO-ASSAY PROCEDURES USED. (For film badges, specify method of calibrating and processing, or name of supplier.)

PREVIOUSLY SUBMITTED

INFORMATION TO BE SUBMITTED ON ADDITIONAL SHEETS

13. FACILITIES AND EQUIPMENT. Describe laboratory facilities and remote handling equipment, storage containers, shielding, fume hoods, etc. Explanatory sketch of facility is attached. (Circle answer) Yes (No) Refer to License 19-1398-29 and 19-1398-14

14. RADIATION PROTECTION PROGRAM. Describe the radiation protection program including control measures. If application covers sealed sources, submit leak testing procedures where applicable, name, training, and experience of person to perform leak tests, and arrangements for performing initial radiation survey, servicing, maintenance and repair of the source.

PREVIOUSLY SUBMITTED Leak Test Procedure - HPP-1 Revision A

15. WASTE DISPOSAL. If a commercial waste disposal service is employed, specify name of company. Otherwise, submit detailed description of methods which will be used for disposing of radioactive waste and estimates of the type and amount of activity involved.

None contemplated

CERTIFICATE (This item must be completed by applicant)

16. THE APPLICANT AND ANY OFFICIAL EXECUTING THIS CERTIFICATE ON BEHALF OF THE APPLICANT NAMED IN ITEM 1, CERTIFY THAT THIS APPLICATION IS PREPARED IN CONFORMITY WITH TITLE 10, CODE OF FEDERAL REGULATIONS, PART 30, AND THAT ALL INFORMATION CONTAINED HEREIN, INCLUDING ANY SUPPLEMENTS ATTACHED HERETO, IS TRUE AND CORRECT TO THE BEST OF OUR KNOWLEDGE AND BELIEF.

Martin-Barletta Corporation

Date August 23, 1963

By Richard J. Brisson, Chief Health Physics Section

Title of certifying official



WARNING - It is a crime under Section 1001, Title 18, U.S.C. and 18 U.S.C. 1001, to make a willfully false statement or representation to any department or agency of the United States or to any State within its jurisdiction.

ATTACHMENT A

The radioactive pellet contained in this Martin Custom Sealed Source is in the form of Strontium 90 Titanate approximately  $1/4$  inch thick by  $3/4$  inch in diameter. Measurements performed on this pellet have indicated that the pellet contains a maximum of 7 curies of Strontium 90. This pellet was fabricated by Martin several years ago under Byproduct License No. 19-1398-14, as part of the developmental research program for the current Quehanna isotopic fuel process.

The encapsulation of this pellet was performed in the following manner:

(Refer to the attached sketch for detail and dimensions.)

1. The pellet was placed within a machined stepped cavity in a machined aluminum block.
2. White lead gasketing material was placed at the interface of the source cover and the aluminum block.
3. Two 1100S aluminum discs of 0.006 inch thickness each, were placed over the pellet.
4. An aluminum retaining washer was placed over the discs.
5. The completed source encapsulation assembly was then firmly fastened to the aluminum block.
6. A second aluminum block was fabricated to be bolted above the source pellet to provide shielding during source handling and protection for the thin source cover when the source was not in use. The adjacent interfaces of the aluminum blocks were machine finished.
7. The aluminum block containing the radioactive pellet has been marked, "CAUTION RADIOACTIVE MATERIAL - STRONTIUM 90 - 7 curies - MARTIN-MARIETTA CORPORATION".

This source was encapsulated with a thin source window to allow transmission of some of the beta particles in order to provide a means of:

1. Checking the beta response and calibration of hi-range radiation detection instruments.
2. Conduct of dosimetry experiments.

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The encapsulated source has been repeatedly leak tested. Leak tests were conducted daily during the first two weeks after encapsulation and periodically thereafter. To date, no leakage has been detected. The leak tests were, and will continue to be conducted in accordance with the Martin Company Procedures for Leak Testing Sealed Radiation Sources (HPP-1 Rev. A).

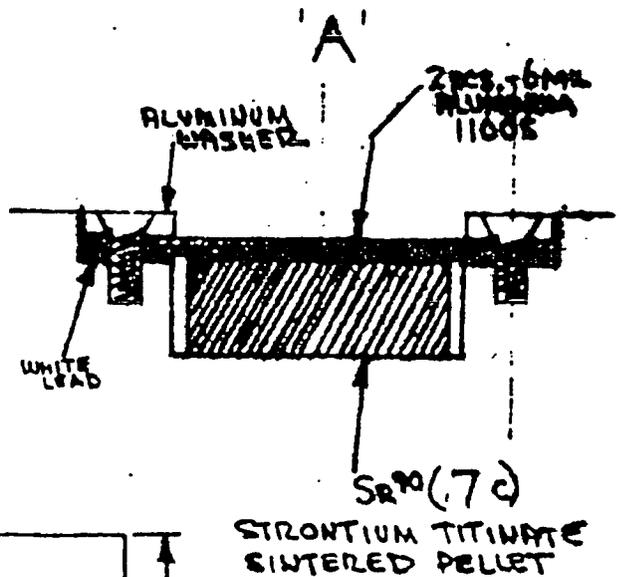
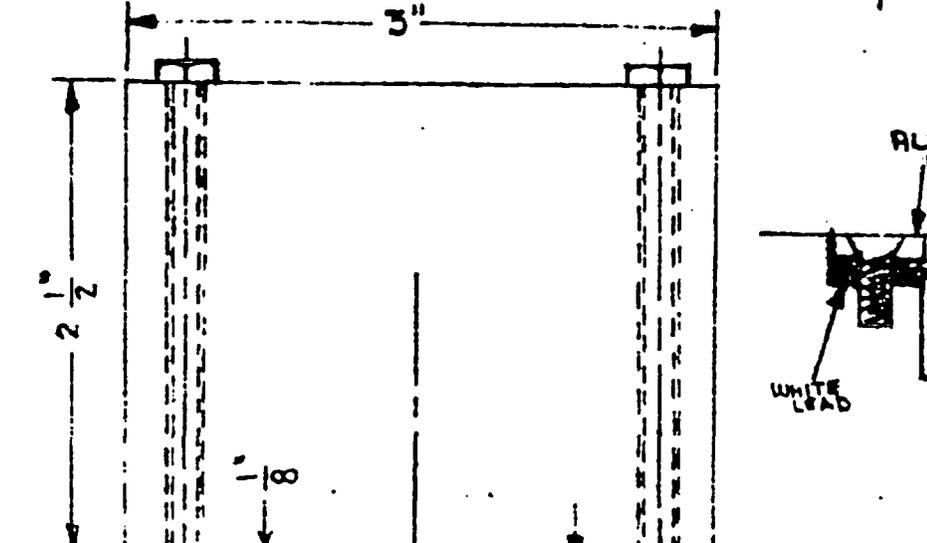
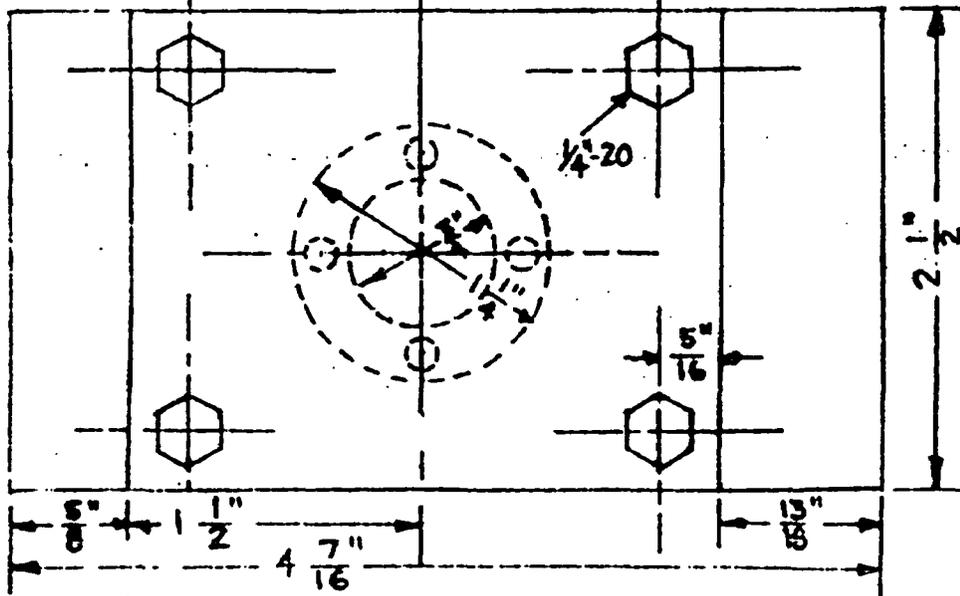
Intentions are to package and ship this source from the Martin Company, Baltimore, Maryland to the Martin Company, Quehanna, Pennsylvania where it will be used by the Health Physics Group. Shipment of the source will be made in compliance with I.C.C. Regulations.

The source, when not in use, will be placed in a Radiation Counter Laboratory Vertical Cast Iron Shield of 2 inch minimum thickness (RCL Model 15 - Mark 3). The source in the cast iron shield will be stored in a locked area, access controlled by the Health Physics Group.

RJB:ebc

August 26, 1963

# SOURCE HOLDER



MACHINE FINISH ON  
BOTH SURFACES PRIOR  
TO SOURCE ENCAPSULATION.

**CAUTION**  
Radioactive Material  
Strontium 90 - 7 curies  
Martin Mariette Corp 11/15/62

STRONTIUM<sup>90</sup> SOURCE  
HEALTH PHYSICS  
MARTIN MARIETTE

ENCAPSULATED 11/62

August 28, 1962

GENERAL PROCEDURES FOR LEAK TESTING SEALED RADIATION SOURCES

## I. Purpose

Sealed radiation sources are leak tested for the purpose of detecting faulty or damaged source encapsulation which would allow release of radioactive material to the environment thereby creating a hazard to working personnel and possibly the public.

## II. Sealed Sources Utilized in Remotely Operated Radiographic Devices

A. General

The sources included in this section are all sealed radiography sources incorporated in remotely operated radiographic equipment.

B. Procedure

1. At the time of the initial survey of a new radiographic exposure device, the Health Physicist will designate the nearest accessible area(s) which makes intimate contact with the source. This appropriate measuring point(s) shall be used thereafter as the location to be inspected by the wipe technique.
2. Wipes shall be taken using a cotton swab attached to a wooden stick, ("Q-Tip"). The swab shall be dipped in acetone or alcohol prior to wiping the area(s).
3. The swab shall be placed in an envelope and taken to the Health Physics Laboratory for counting.
4. The dry swab shall be counted using a thin window geiger-counter or gas flow proportional counter and associated scaler. The counter shall be sufficiently sensitive to detect concentrations as low as those specified in 10 CFR 32.90.

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5. Results of all radiographic source leak tests shall be recorded in the Health Physics Monthly Source Inventory Log in units of microcuries and maintained for future reference. In the event that activity is measured, its significance will be noted and a recommended course of action will be followed. If the activity measured equals or exceeds the limits specified in the Commission regulations, the source will immediately be removed from service and sealed in a container to prevent the spread of contamination. As soon as practicable, the leaking source will be decontaminated and repaired or disposed of in accordance with 10 CFR 20.301 and 31.105.

6. Hazards and Precautions

The main hazard associated with leak testing these sources is the possibility of the surveyor's hand becoming contaminated. Immediately after performing the test and sealing the swab in the envelope provided, the person shall monitor his hands and thoroughly wash them, if necessary.

7. Test Frequency

All sources shall be leak tested upon delivery to the Plant. Thereafter, they shall be leak tested with a frequency depending upon utilization. The more frequently a source is used, the more frequently it shall be tested. However, all sources shall be tested at least once every six months and at any time at the request of the user. The testing frequency shall be determined by the Health Physics Department.

E. Sensitivity

The test described above will detect down to  $10^{-5}$   $\mu\text{c}$  on a cotton swab.

F. Pertinent Experience of Personnel Performing Leak Testing

All Health Physics Personnel having demonstrated proficiency in the use and operation of all types of health physics survey and counting equipment and completed a minimum of 6 months on-the-job training will be assigned the task of leak testing radiation sources. Although some personnel have specialties within the scope of the health physics operations, every man must be able to perform all of the tasks required. This is done in order to establish a desirable degree of flexibility within the Health Physics Section. All leak testing will be performed under the supervision of the Chief, Health Physics Section.

III Sealed Sources Utilized in a Gamma Pool Facility

A. General

The sources included in this section are all sealed sources utilized in a pool type irradiator.

B. Procedure

1. a. Circulate the pool water using the circulation pump for 30 minutes prior to sampling in order to obtain a representative sample. Obtain a one (1) liter sample, after mixing, for analysis.
- c. Alternate method for obtaining a representative sample in the event of power or pump failure, obtain three one (1) liter samples from the following depths:
  - (1) 1 foot below the pool surface.

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(2) 8 feet below the pool surface.

(3) directly above the source configuration.

Mix the three samples together and pour off a one (1) liter composite sample for analysis.

2. Place the liter sample in a poly bag.
3. Take several smears on the floor area adjacent to the sampling location.
4. Transport both the liquid and smear samples to the Health Physics Laboratory for analysis.
5. Transfer the pool sample to an evaporation vessel, add 2 milliliters of 1 N-HNO<sub>3</sub> and evaporate same down to approximately 50 ml. Transfer the 50 ml volume to a smaller vessel, rinse the large vessel thoroughly with demineralized water ( $\leq 10$  ml) and continue the evaporation to 5 ml. Transfer the 5 ml sample to a counting planchet, rinse the evaporation vessel to insure complete transfer ( $\leq 2$  ml) and evaporate to dryness.
6. The evaporated sample shall be counted using a thin window geiger-mueller or gas flow proportional counter and associated scaler. The counter shall be sufficiently sensitive to detect contamination levels far less than those specified in 10 CFR 20.303.
7. The results of all leak tests shall be recorded in the Gamma Pool Shield Water Log in units of microcuries per milliliter and maintained as permanent records for future reference. The results of previous analyses shall be compared with the present sample analysis to determine continued source integrity allowing for the fluctuations caused by the deionizer or addition of new

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sources. The Health Physicist shall be notified in the event that the activity measured approaches  $1/10$  the limit specified in 10 CFR 20.303. If the activity measured exceeds the limit specified in the Commission regulations, the sources will be isolated one at a time and analyses will be performed to determine which source has ruptured. As soon as the faulty source has been identified, it will be removed from service and sealed in a container to prevent further spread of contamination. The leaking source will either be decontaminated and repaired by persons specifically authorized to do so by the Commission or it shall be disposed of in accordance with 10 CFR 20.301.

C. Hazards and Precautions

The main hazard associated with leak testing these source is the possibility of the surveyor's hand becoming contaminated while sampling. Care shall be exercised not to drip pool water on the floor adjacent to the pool facility. Immediately after obtaining the sample and placing it in the poly bag, the surveyor shall monitor his hands and thoroughly wash them, if necessary.

D. Test Frequency

The Gamma Pool Shield Water shall be analyzed at least once every six months. Additional analyses are conducted on a schedule consistent with sound radiological safety practices to ensure protection against radiation.

IV. Sealed Sources Utilized in a Shielded Gamma Irradiator for Dry Sample Irradiation.

A. General

The sources included in this section are all sealed sources utilized in a shielded dry irradiator.

B. Procedure

1. At the time of the initial survey of a new gamma irradiator, the Health Physicist will designate the nearest accessible area (s) which makes intimate contact with the source. This appropriate measuring point(s) shall be used hereafter as the location(s) to be inspected by the wipe technique.
2. Wipes shall be taken using a cotton swab attached to a wooden stick ("Q-Tip"). The swab shall be dipped in acetone or alcohol prior to wiping the area(s).
3. The swab shall be placed in an envelope and taken to the Health Physics Laboratory for counting.
4. The dry swab shall be counted using a thin window geiger-mueller or gas flow proportional counter and associated scaler. The counter shall be sufficiently sensitive to detect contamination levels far less than those specified by the Commission.
5. Results of all dry irradiator source leak tests shall be recorded in the Health Physics Source Inventory Log in units of micro-curies and maintained as permanent records for future reference. In the event that activity is measured, its significance will be noted and compared with previous test results to determine source integrity. If the activity measured equals or exceeds

the limit specified by the Commission, the source will immediately be removed from service and sealed in a container to prevent the spread of contamination. As soon as practicable, the leaking source will be decontaminated and repaired by persons specifically authorized to do so by the Commission or disposed of in accordance with 10 CFR 20.301.

C. Hazards and Precautions

The main hazard associated with leak testing these sources is the possibility of the surveyor's hand becoming contaminated. The person performing the test shall monitor his hands and thoroughly wash them, if necessary, immediately after performing the test and sealing the swab in the envelope.

D. Test Frequency

The shielded gamma dry irradiator assembly(s) shall be leak tested at least once every six months. Additional analyses are conducted on a schedule consistent with sound radiological safety practices to ensure protection against radiation.

V. Sealed Sources Utilized for Instrument Calibration, Reactor Startup, Density Gauging, Space Experimental Studies and Thermo-Electric Devices.

A. General

The sources included in this section are all licensed alpha, beta gamma and neutron sources used for instrument calibration, reactor startup, density gauging, space radiation simulation studies and thermo-electric devices.

B. Procedure

1. The Health Physicist will designate the area(s) on the source or the nearest accessible area(s) which makes intimate contact with the source at the time of the initial survey of a new source, or shield assembly containing a new source. The designated measuring point(s) shall be used thereafter as the location(s) to be inspected by the wipe technique.
2. Wipes shall be taken using either a Q-Tip dipped in acetone or a dry 4.25 cm chemical filter paper attached on an extension rod, if necessary.
3. The Q-Tip or filter paper shall be placed in an envelope and taken to the Health Physics Laboratory for counting.
4. The wipe(s) shall be counted using a thin window geiger-mueller or gas flow proportional counter and associated scaler. The counter shall be sufficiently sensitive to detect contamination levels far less than those specified by the Commission.
5. The results of all source leak tests shall be recorded in the Health Physics Source Inventory Log in units of microcuries and maintained as permanent records for future reference. In the event that activity is measured, its significance will be noted and compared with previous test results to determine source integrity. If the activity measured equals or exceeds the limits specified by the Commission, the source will immediately be removed from service and sealed in a container to prevent the spread of contamination. As soon as practicable, the leaking source will be decontaminated and repaired by persons specifically authorized to do so by the Commission, or

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disposed of in accordance with 10 CFR 20.301.

C. Hazards and Precautions

The main hazards associated with leak testing these sources is the potential exposure and possibility of the surveyor's hand becoming contaminated. The person performing the test shall exercise care to minimize his exposure and shall monitor his hands and thoroughly wash them, if necessary, immediately after performing the test and sealing the wipes in the envelope.

D. Test Frequency

All licensed sources shall be leak tested at least once every six months. Additional leak tests are conducted on a schedule consistent with sound radiological safety practices to ensure protection against radiation.

Richard J. Brisson  
Richard J. Brisson  
Sr. Health Physicist

Approved:

Richard H. Boutelle  
Richard H. Boutelle, Chief  
Health Physics Section

100:ebc

ATTACHMENT A

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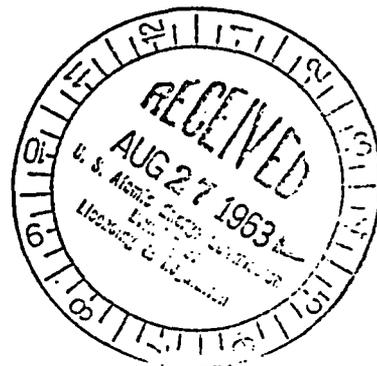
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(Refer to the attached sketch for detail and dimensions.)

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6. A second aluminum block was fabricated to be bolted above the source pellet to provide shielding during source handling and protection for the thin source cover when the source was not in use. The adjacent interfaces of the aluminum blocks were machine finished.
7. The aluminum block containing the radioactive pellet has been marked, "CAUTION RADIOACTIVE MATERIAL - STRONTIUM 90 - 7 curies - MARTIN-MARIETTA CORPORATION".

This source was encapsulated with a thin source window to allow transmission of some of the beta particles in order to provide a means of:

1. Checking the beta response and calibration of hi-range radiation detection instruments.
2. Conduct of dosimetry experiments.



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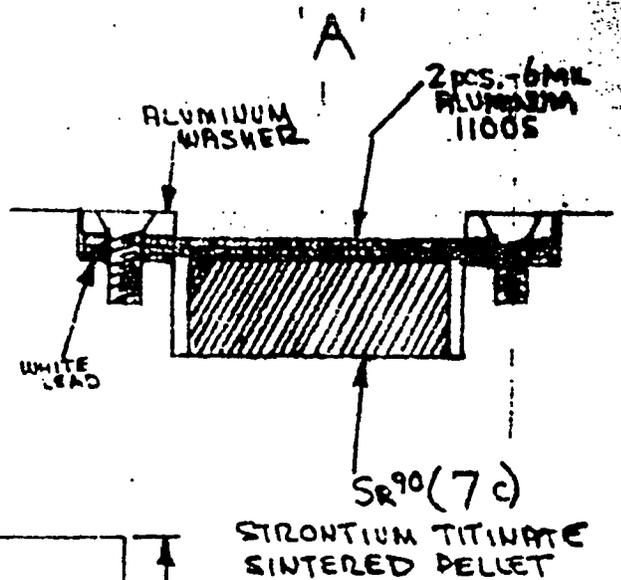
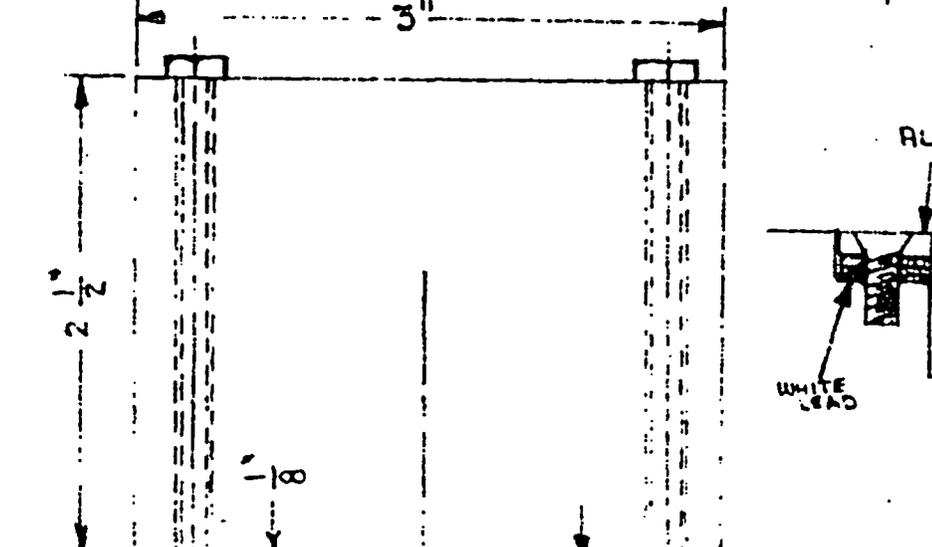
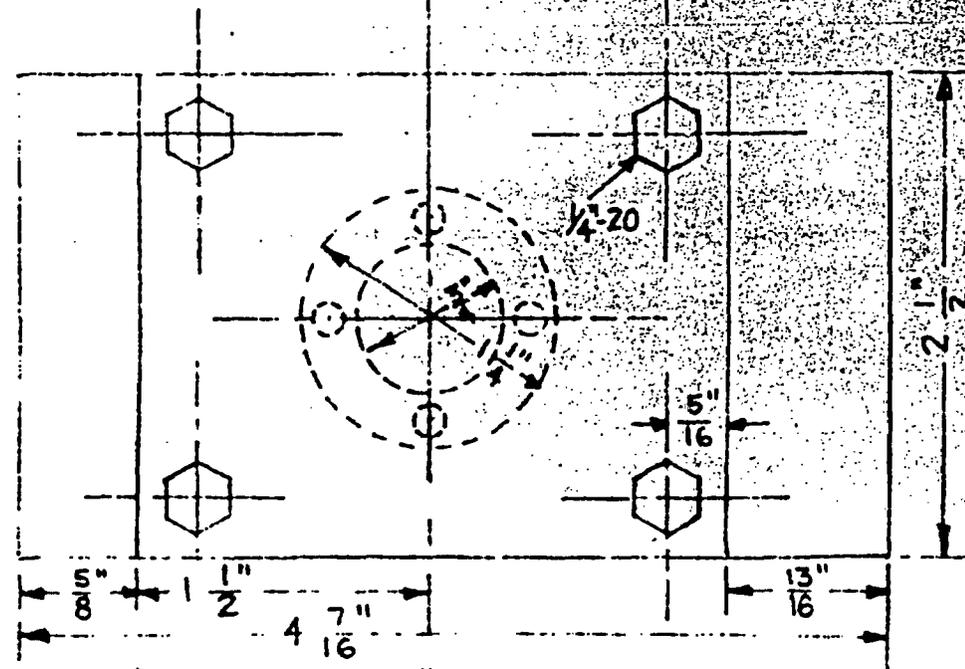
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RJB:etc

August 26, 1963

SOURCE HOLDER



MACHINE FINISH ON  
BOTH SURFACES PRIOR  
TO SOURCE ENCAPSULATION

**CAUTION**  
Radioactive Material  
Strontium 90 - 7 curies  
Martin Marietta Corp 11/15/62

STRONTIUM<sup>90</sup> SOURCE  
HEALTH PHYSICS  
MARTIN BALTIMORE

ENCAPSULATED 11/62