

RECEIVED
REGION 1



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February 25, 2011

JOSEPH M. RICHARDS
Manager-Occupational Health and Safety

US Nuclear Regulatory Commission
ATTN: Licensing Branch
475 Allendale Road, Region I
King of Prussia, PA 19406-1415

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RECEIVED
REGION 1

Dear Sirs:

This letter is to request a license amendment to US NRC license #47-31367-01 (Licensee is Consolidation Coal Company, Shoemaker Mine Preparation Plant) regarding a change in the "Chemical and/or physical form" of licensed materials as listed in item #7 of the current license dated July 2, 2009.

ThermoFisher Scientific under their license #CA 3775-37 periodically replenishes Cf-252 sources in the cross-belt elemental analyzer for Consolidation Coal Company's Shoemaker Mine Preparation Plant. ThermoFisher Scientific is requesting that Shoemaker Plant's license be amended to allow the use of two additional source suppliers, providing ThermoFisher Scientific with the flexibility they need to better perform replenishment services. The source suppliers and source model descriptions which need added for the Cf-252 sources are listed below...

Source Suppliers	Source Model Descriptions
General Electric Hitachi Nuclear Energy America, LLC	GEN-Cf-100 Series
Eckert & Ziegler Isotope Products (dba Isotope Products Laboratories)	3004, 3014, N-252 Series

Note that the registry certificates as supplied by ThermoFisher Scientific of the sealed sources referenced, are attached.

We appreciate your help and cooperation. Should you have any questions or concerns, please contact me.

Sincerely,

On behalf of Consolidation Coal Company

Joe Richards

Copy to:

Matt Benusa Shoemaker Mine Preparation Plant

574526

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF SEALED SOURCE

Amended in its entirety

NO.: CA312S104S
(Supercedes CA 312S104U)

DATE: September 22, 2010

PAGE: 1 OF 5

SEALED SOURCE TYPE: Neutron Source

MODEL:

GEN-Cf-100 Series

MANUFACTURER/DISTRIBUTOR:

**General Electric Hitachi Nuclear Energy
America, LLC
Vallecitos Nuclear Center
Sunol, CA 94586**

ISOTOPE: Californium-252

MAXIMUM ACTIVITY: 2 curies

LEAK TEST FREQUENCY:

Six months

PRINCIPAL USE:

General Neutron Source Applications (H)

CUSTOM SOURCE:

___ YES X NO

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF SEALED SOURCE

Amended in its entirety

NO.: CA312S104S

DATE: September 22, 2010

PAGE: 2 OF 5

(Supercedes CA 312S104U)

SEALED SOURCE TYPE: Neutron Source

DESCRIPTION:

The unencapsulated material consists of a uniform distribution of californium-252 oxide particles in a palladium metal matrix in the form of cermet pellets or wire. **General Electric Hitachi Nuclear Energy (GEH-NE)** either: (1) receives californium-252 from **Oakridge National Laboratory (ORNL)** already encapsulated in inner capsule fabricated to the specifications of **Gen-Cf-1X Series (special form radioactive materials certificate USA/0141/S-96)** and adds an outer capsule fabricated to the specifications of the outer capsule of **Model Gen-Cf-100 Series (special form radioactive materials certificate USA/0058/S-96)**; or (2) receives the unencapsulated wire or pellets, as described above, from **Oakridge National Laboratory**, and encapsulates it in inner capsule fabricated to specifications of **Model Gen-Cf-1X Series**, and then encapsulates the inner capsule in an outer capsule fabricated to the specifications of the outer capsule, **Model Gen-Cf-100 Series**. The inner and the outer capsules are made of **304L stainless steel, 316L stainless steel or Zircaloy 2**. Both inner and outer capsules are sealed by **TIG (tungsten inert gas) welding**. Overall dimensions, including a threaded shank, are approximately 1.48 inches length and approximately 0.37 inches diameter.

LABELING:

All sources will be engraved/etched with **GEH (company name), Cf (Isotope), model number, serial number** and either trefoil symbol or caution: radioactive material. "**GEH-Cf-100-XXX**" is an example of labeling on the source, the last three digits indicated by "**XXX**" represent the serial number.

DIAGRAM:

There is one attachment.

Attachment 1: General Electric ²⁵²Californium neutron source 100 series.

CONDITIONS OF NORMAL USE:

The source is designed and manufactured for use in general neutron source applications. The source may be used in harsh environment but shall not be subjected to environment that exceeds its **ANSI N542-1999 classification of 99E66524**.

The estimated working life of the source is typically 7.5 years, at which point the source may be returned to **GEH-NE**.

PROTOTOTYPE TESTING:

**REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF SEALED SOURCE**

Amended in its entirety

NO.: CA312S104S

DATE: September 22, 2010

PAGE: 3 OF 5

(Supercedes CA 312S104U)

SEALED SOURCE TYPE: Neutron Source

In as much as the GEH-NE sources are fabricated to the specifications of Savannah River sealed source Model SR-Cf-100 Series, the prototype test results of the Savannah River sealed source are assumed to apply to the GEH-NE sealed sources (See the U.S. AEC sheet on U.S. Atomic Energy Commission, Savannah Rivers Operation Office, and Model SR-Cf-100 Series). One prototype test involved subjecting a test capsule to helium pressure equivalent to hydrostatic pressure at 10 miles depth in a bore hole. Subsequent tests indicated no leakage.

Monsanto Research Corporation and GEH-NE tested GEN-Cf-100 as per the requirements of ISO 2919-1999 and reported that it warrants the designation of 99E66524.

EXTERNAL RADIATION LEVELS:

The radiation levels of Gen-Cf-100 source will vary with activity. Listed below are the radiation levels for 30 μ g (0.016 curies) of californium-252 source. Gamma exposure rates were measured using Eberline portable ion chamber at 100 cm and dose rates at 5cm and 30 cm were calculated using the inverse square law. Neutron dose rates were measured for 30 μ g (0.016 Curies) of californium-252 at 100 cm using a 30 Eberline ASP2e neutron survey meter and dose rates at 5 cm and 30 cm were calculated using the inverse square law.

	Distance from source		
	5 cm	30 cm	100 cm
Gamma Dose rate	10 R/hr	278 mR/hr	25 mR/hr
Neutron Dose rate	110 rem/hr	3.0 rem/hr	275 mrem/hr

The theoretical neutron dose rate from 30 μ g of Cf-252 at 100 cm is 66 mrem/hr and the gamma dose rate from 30 μ g of Cf-252 at 100 cm is 5.7 mrem/hr. Ref: Production, Distribution, and Application of Californium-252 Neutron Sources by R.C. Martin, J. B. Knauer, and P. A. Balo, Chemical Technology Division, Oak Ridge National Laboratory, presented at 4th Topical Meeting on Industrial Radiation and Radioisotope Measurement Applications, Raleigh, North Carolina, October 1999.

QUALITY ASSURANCE AND CONTROL:

GEH-NE maintains a quality assurance and control program which has been deemed acceptable for licensing purposes by California Department of Public Health. A copy of the program is on file with this issuing agency. The program is designed to satisfy the requirements of 10 CFR Part 50 (B).

**REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF SEALED SOURCE**

Amended in its entirety

NO.: CA312S104S

DATE: September 22, 2010

PAGE: 4 OF 5

(Supercedes CA 312S104U)

SEALED SOURCE TYPE: Neutron Source

GEH-NE states that its quality control program for this model source meets or exceeds all items of the Savannah River specifications. That program includes welding control, helium leak testing, liquid nitrogen-bubble leak testing, and contamination control.

LIMITATIONS AND/OR OTHER CONSIDERATIONS OF USE:

- **The source shall be distributed to persons specifically licensed by the NRC or an Agreement State.**
- **This source is intended to be used by trained personnel for use in general neutron source applications. It should not be subjected to conditions of normal use exceeding its ISO 2919-1999 classification of 99E66524.**
- **Handling, use, storage, transfer and disposal: To be determined by the licensing authority. Remote handling tools and localized shielding, including neutron thermalizing media, should be used to avoid high dose rate potential from sources containing more than a few microcuries of californium-252.**
- **The source shall be stored in its original shielded container provided by the manufacturer until it is incorporated into an approved device.**
- **The source shall be leak tested at intervals not to exceed 6 months using techniques capable of detecting 185 Bq (0.005 μ Ci) of removable contamination.**
- **GEH-NE has stated that they will accept return of GEH-Cf-100 sources when the sealed source's activity does not meet the customer's specification provided the shipping requirements are satisfied and these source have been used for the originally intended applications**
- **This registration sheet and the information contained within the references shall not be changed without the written consent of California Department of Public Health.**

SAFETY ANALYSIS SUMMARY:

Based on our review of the information and the data provided, we continue to conclude that Gen-Cf-100 series sources are acceptable for licensing purposes and the intended use specified in this registry certificate. The source has passed performance tests exceeding those required for General Neutron Source application.

Furthermore, we continue to conclude that the source would be expected to maintain its containment integrity for normal conditions of use and accidental conditions which might occur during uses specified in this certificate.

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF SEALED SOURCE

Amended in its entirety

NO.: CA312S104S

DATE: September 22, 2010

PAGE: 5 OF 5

(Supercedes CA 312S104U)

SEALED SOURCE TYPE: Neutron Source

REFERENCES:

The following supporting documents for the Model GEN-CF-100 Series are hereby incorporated by reference and are made part of this registry document.

- (1) Letter dated June 1, 2010, signed by David W. Turner, Manager Vallecitos Nuclear Center, GEH-NE along with the supporting documents.
- (2) Letter dated June 6, 2010, signed by David W. Turner, Manager, Vallecitos Nuclear Center, General Electric.
- (3) Email dated June 9, 2010 with Quality Assurance for welding procedure as attachment from Adam Abraham, Special Project Manager, GEH-NE.
- (4) Letter dated June 18, 2010, signed by Adam Abraham, Special Project Manager, GEH-NE.
- (5) Letter dated July 27, 2010, signed by David W. Turner, Manger Vallecitos Nuclear Center, GEH-NE.
- (6) Email dated August 13, 2010, by Adam Abraham, Special Project Manager, GEH-NE.
- (7) Letter dated September 21, 2010, signed by Adam Abraham, Special Project Manager, GEH-NE with regards to dose rates of the source.
- (8) Email dated September 21, 2010, with attached Calibration Certificate for neutron survey meter, by Adam Abraham, Special Project Manager, GEH-NE.
- (9) Email dated September 21, 2010, with QAP-2 as attachment, by Adam Abraham, Special Project Manager, GEH-NE.
- (10) Letter dated September 28, 2010, signed by Adam Abraham, Special Project Manager, GEH-NE with calibration certificate of RO-20 as attachments,
- (11) IAEA Certificate of Competent Authority Special Form Radioactive Materials Certificates USA/0058/S-96 and USA/0141/S-96.

ISSUING AGENCY: California Department of Public Health

DATE: September 22, 2010

REVIEWED BY:

Vandana Kohli

Vandana Kohli

DATE: September 22, 2010

CONCURRED BY:

Ronald Rogus

Ronald Rogus

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES SAFETY EVALUATION OF SEALED SOURCE

Amended in its entirety

NO.: CA312S104S

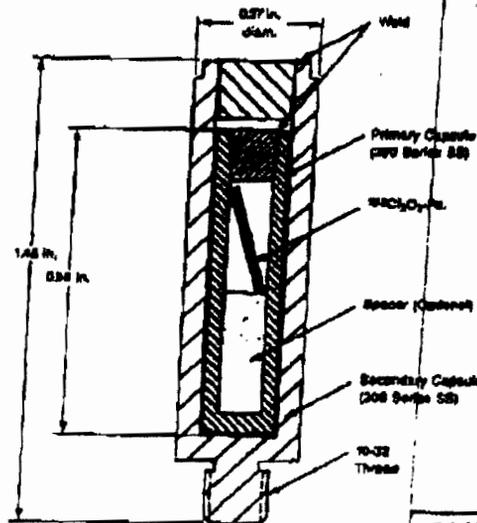
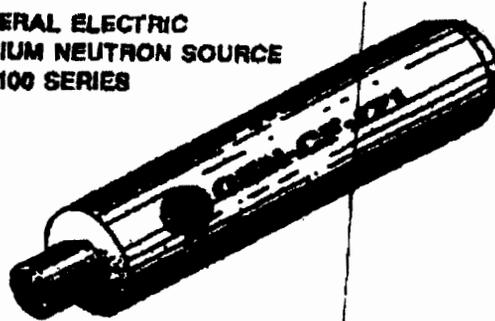
DATE: September 22, 2010

ATTACHMENT 1

(Supercedes CA 312S104U)

SEALED SOURCE TYPE: Neutron Source

GENERAL ELECTRIC ²⁵²CALIFORNIUM NEUTRON SOURCE .100 SERIES



Ref: GE Drawing
100-4999
WEA Certificate No.
USA00000

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

NO.: CA0406S102S

DATE: December 20, 2010

PAGE: 1 of 5

SEALED SOURCE TYPE: Neutron Source and Well Logging

MODEL: 3004
3014
N-252 Series

MANUFACTURER / DISTRIBUTOR: Eckert & Ziegler Isotope Products
dba Isotope Products Laboratories
24937 Avenue Tibbitts
Valencia, CA 91355
(661) 309-1010 (voice)
(661) 257-8303 (fax)

MANUFACTURER: Eckert & Ziegler Cesio
Radiova 1
102 27 Prague 10
Czech Republic

Eckert & Ziegler Nuclitec GmbH
Gieselweg 1
D-38110 Braunschweig
Germany

ISOTOPE:
Californium-252

MAXIMUM ACTIVITY:
30 millicuries (1.11 GBq) \pm 15%

LEAK TEST FREQUENCY: Six (6) months

PRINCIPAL USE: (F) Well Logging
(H) General Neutron Applications

CUSTOM SOURCE: Yes No

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

NO.: CA0406S102S

DATE: December 20, 2010

PAGE: 2 of 5

SEALED SOURCE TYPE: Neutron Source and Well Logging

DESCRIPTION:

This series of sources is doubly encapsulated and constructed of Type 304 or 304L stainless steel. Both capsule types (3014 and 3004) are 1.43" long x 0.37" diameter, with one end having a 10-32 thread. Both the primary and secondary encapsulations are sealed by fusion (electron beam) welding. The chemical form of the active element is oxide in ceramic, aluminum, or palladium metal wire. Both 3004 and 3014 capsules are designated as "Special Form" and have been issued a Special Form Certificate, Number USA/0351/S-96, Revision 7 (also referred to as Model N-252 Series). For well logging sources, californium oxide is in palladium matrix which is formed into palladium wire. These well logging sources satisfy the requirements of 10 CFR 39.41 including double encapsulation and as non dispersible and insoluble as practical.

The source activity range shall be $\pm 15\%$ for all models.

Table 1 and 2 list the source model identification scheme used for sources within this SS&DR.

Table 1. 3004, 3014

Model Number	Description
aaaa	aaaa represents the capsule/drawing number.
<p>Note: The model number may contain additional information such as XxYaaaazzzzM; "Xx" is the isotope code, "Y" is the last digit of the isotope number, aaaa represents the capsule/drawing number, zzzz represents the activity, M represents the units in millicuries.</p>	
<p>For example: CF230140030M = Cf-252 in 3014 capsule with 30 mCi.</p>	

Table 2. N-252 Series

Model Number	Description
N-252-b	"b" is related to the activity in the source
<p>For example: N-252-1 = Cf-252 with contained activity 5-25 μCi</p>	

LABELING:

The sources are engraved with the manufacturer's name or manufacturer's logo, nuclide, nominal activity, and serial number. Due to small size of the source, the standard radiation caution symbol may not be included on the source.

The source storage and shipping container is labeled with the manufacturer's name or logo, the radiation symbol, isotope, activity, serial number, reference date, and the words, "DANGER-RADIOACTIVE MATERIAL".

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

NO.: CA0406S102S

DATE: December 20, 2010

PAGE: 3 of 5

SEALED SOURCE TYPE: Neutron Source and Well Logging

DIAGRAM:

Attachment 1: Model 3004 (also referred to as N-252) Drawing

Attachment 2: Model 3014 (also referred to as N-252) Drawing

CONDITIONS FOR NORMAL USE:

The sources are installed in gauging devices, well logging tools, or used by health physicists and research scientists for checking neutron detector function. The manufacturer recommends a typical useful life of 15 years for the sources.

Oil-well logging, general neutron source and research and development applications are acceptable provided that the environmental conditions do not exceed the conditions provided by their ANSI N542/ISO 2919 classification as stated in the Prototype testing section.

PROTOTYPE TESTING:

Prototypes of Model 3004 and 3014 (also referred to as Model N-252 Series) source design achieved a classification of ANSI 77C66535 as described in ANSI N542-1977 / ISO 2919:1999. This meets or exceeds the required rating of C43323 for "General neutron source application" and C56522 for "Oil-well logging" as defined in ISO 2919:1999.

For use in down-hole applications, each production source will be pressure tested to 25,000 PSIG minimum. This requirement does not apply to those used for calibration, or research applications.

EXTERNAL RADIATION LEVELS:

The external radiation levels from the neutron and oil well-logging sources were calculated using the data reference, Nuclear Chemistry: Theory and Applications, G.R. Choppin & J. Ryndberg, Pergamon Press, 1980. Source calculations were chosen to approximate dose rates for the Model N-252 Series (assuming a length of 1.43 inches and diameter of 0.37 inches) general neutron application sources and oil well-logging sources at the 3 standard distances of 5 cm, 30 cm, and 100 cm. The dose rates in mrem/hr are calculated with the respective maximum activity plus tolerance, as listed below.

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

NO.: CA0406S102S

DATE: December 20, 2010

PAGE: 4 of 5

SEALED SOURCE TYPE: Neutron Source and Well Logging

Models 3004, 3014 (also referred to as N-252 Series)

Note: The total gamma and neutron dose rate is noted below for Cf-252.

Nuclide	Maximum Activity, Including Tolerance (mCi)	Dose rate (mrem/hr)		
		Distance from Source		
		5 cm	30 cm	100 cm
Californium-252	34.5	60,761	1,687	152

QUALITY ASSURANCE AND CONTROL:

Program: The Eckert & Ziegler Isotope Products Quality Manual details the quality control of these sources from raw materials to finished product. The program is designed to satisfy 10 CFR Part 50 (B) and is ISO 9001 certified. The program covers design and document control, purchasing, training, calibration records, source numbering, production, incoming raw materials, assay quality control, leak testing, and confirming orders.

Activity: Activity levels are held to within $\pm 15\%$ of nominally desired activity.

Eckert & Ziegler Isotope Products maintains a quality program which has been deemed acceptable for licensing purposes by the California Department of Public Health. A copy of the program is on file with the California Department of Public Health.

LIMITATIONS AND/OR OTHER CONSIDERATIONS OF USE:

- The source shall be distributed to persons specifically licensed by the U.S. Nuclear Regulatory Commission or an Agreement State.
- **Handling, storage, use, transfer, and disposal:** To be determined by the licensing authority. In view that these sources exhibit high dose rates, the sources should be handled by experienced licensed personnel using adequate handling equipment and procedures.
- The source shall be leak tested at intervals not to exceed 6 months using techniques capable of detecting 0.005 microcuries (185 Bq) of removable radioactive material, and be performed only by specific licenses of the NRC or Agreement States.
- **Models 3004 and 3014 (also referred to as N-252 Series)** sources are intended to be used in neutron source applications and as components in well logging tools. These sources shall not be subjected to conditions exceeding their ANSI N542-1977 / ISO 2919 classification, 77C66535.

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

NO.: CA0406S102S

DATE: December 20, 2010

PAGE: 5 of 5

SEALED SOURCE TYPE: Neutron Source and Well Logging

- This registration sheet and the information contained within the references shall not be changed without the written consent of the California Department of **Public Health**.

SAFETY ANALYSIS SUMMARY

Based on our review of the information and test data provided, we **continue** to conclude that 3004 and 3014 (also referred to as N-252 Series) sealed sources are acceptable for licensing purposes and the intended uses specified in this registry certificate. This series of sources has passed performance tests exceeding those required for "General neutron source application (excluding reactor start up)", and "Oil well logging" as defined in NBS Handbook No. 126 (ANSI N542 -1977). The manufacturer states that since the Model 3014 capsule passed the physical tests for an ANSI classification of 77C66535, and since the 3004 is very similar in construction, this agency concurs that the Model N-252 sealed source be given a rating of 77C66535.

Furthermore, we **continue** to conclude that the source would be expected to maintain its containment integrity for normal conditions of use and accidental conditions which might occur during uses specified in this certificate.

REFERENCES:

This certificate of registration is based on information and test data contained in the following supporting documents which are hereby incorporated by reference and made part of this registry document:

1. Isotope Products Laboratories Quality Assurance Manual.
2. California Registry Certificate No. CA406S102U dated December 23, 1970
3. Isotope Products Laboratories letter dated September 9, 1991 regarding external radiation levels.
4. Isotope Products Laboratories letter dated November 2, 1994 with attached draft registration certificate, test data, and drawings.
5. Eckert & Ziegler Isotope Products letters dated September 29, 2010, November 5, 2010, and November 17, 2010, with attachments thereto.

ISSUING AGENCY: California Department of **Public Health**

DATE: December 20, 2010

REVIEWED BY: *Vandana Kohli*

Vandana Kohli

DATE: December 20, 2010

CONCURRED BY: *Ronald Rogus*

Ronald Rogus

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

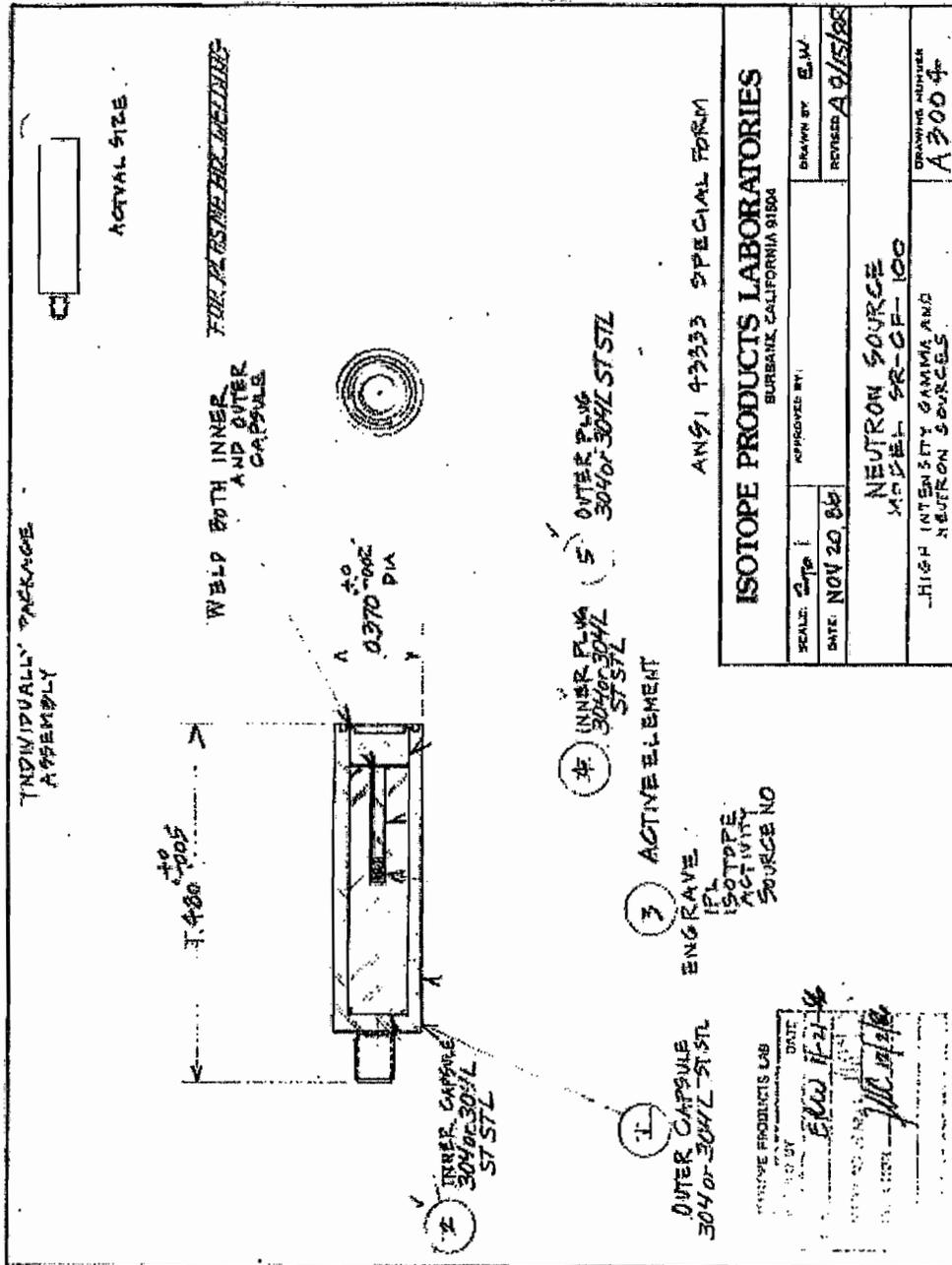
NO.: CA0406S232S

DATE: December 20, 2010

ATTACHMENT: 1

SEALED SOURCE TYPE: Neutron and Well Logging Source

Model 3004 (also referred to as N-252)



ISOTOPE PRODUCTS LABORATORIES BURBANK, CALIFORNIA 91004	
SCALE: 2:1	APPROVED BY: ELM
DATE: NOV 20, 86	REVISED: 9/15/88
NEUTRON SOURCE MODEL SR-GF-100	
HIGH INTENSITY GAMMA AND NEUTRON SOURCES	
DRAWING NUMBER A 3004	

ISO TOPE PRODUCTS LAB	DATE
DESIGNED BY: ELM	11-21-86
CHECKED BY: JMC	

This is to acknowledge the receipt of your letter/application dated

2/25/2011, and to inform you that the initial processing which includes an administrative review has been performed.

AMEND. 47-31367-01
There were no administrative omissions. Your application was assigned to a technical reviewer. Please note that the technical review may identify additional omissions or require additional information.

Please provide to this office within 30 days of your receipt of this card

A copy of your action has been forwarded to our License Fee & Accounts Receivable Branch, who will contact you separately if there is a fee issue involved.

Your action has been assigned **Mail Control Number** 574526.
When calling to inquire about this action, please refer to this control number.
You may call us on (610) 337-5398, or 337-5260.