QSA Global, Inc.
40 North Avenue
Burlington, MA 01803
Telephone: (781) 272-2000
Toll Free: (800) 815-1383
Facsimile: (781) 273-2216

Radioactive Sealed Source Certificate and Test Report

Model: *AMN.CY3* Radionuclide: *AM241/BE* Nominal Activity: *5.00 Ci*
Product Code No: *AMN2645* ANSI/ISO Classification: *E6X545*
Special Form Certificate No: *USA/0635/S-96*

Description: *Am-241/Be Neutron OWL Source*
Capsule: *X2064/X1276*

Classifications are based on testing of specimen sources and give the levels expected from the production sources.

See other side for explanation.

Source Serial Number	Measurements		Leakage Test		Contamination Test	Other Tests
			Type	Type	Type	
			See other side for description of tests.			
	Measurement	Date	Date Passed	Date Passed	Date Passed	Description
96386B	*1.14E+07 N/sec*	*Feb-18-2014*	*D Feb-18-2014*	*M Feb-21-2014*	*A May-23-2014*	*N54738-102 0414-3980*

Notes:
This X2064 source capsule passed a pressure test of 1 X 15 minute period at 30,000 psi IAW SPS-L-1722 on 23 May 2014.
Capsule X2064 assembled IAW AEA Technology QSA drawing BA11136 Rev A. Date of Manufacture = 23 May 2014.
Immersion and Bubble Test are on the X1276 inner capsule.
X Represents pressure rating of 50,000 psi. Made in the USA.

Customer: *BAKER HUGHES HOUSTON TECHNOLOGY CTR* Sales Order: *273880* *Aug-05-2014*

Signed: C. A. Gruitte

BAKER HUGHES

Houston Technology Center

Certificate of Leak Test

Name and Address:

Baker Hughes Houston Technology Center
2001 Rankin Road
Houston, Texas 77073
USA

Serial No: 96386B **Source Type:** NLS

Isotope: Am 241 Be **Activity:** 5 Ci

Date: 8-Feb-17

Below This Line for Authorized Personnel Only

This is to certify that the leak test on the above indicated source has been counted on the specified date and the results shown accurately represent the level of removable contamination.

Leak Test Analysis Results

Removable Contamination:

ALPHA	BETA-GAMMA
<.005 µCi	<.005 µCi

Certified by: _____ **Date:** 8-Feb-2017

Representative
Baker Hughes Houston Technology Center

Results shown above are in accordance with 25 TAC and 10 CFR regulations for sealed sources. Any removable contamination less than .005 microcuries is within regulatory guidelines.

Texas Department of State Health Services Radioactive Material License L04452.

`FORM 7
"Statement of Certification"
for
Baker Hughes Oil Well Logging Source

Source Type:	5 Ci AmBe
Baker Hughes INTEQ Source (Bull Plug) No.:	96386B
Inner Encapsulation Source No.:	96386B
Source/Bull Plug Pressure Rating:	30K psi on inner source/40K psi on bull plug

This document certifies that the subject source was manufactured in accordance with Baker Hughes INTEQ specifications. Part fit-up, welding, and non-destructive inspections were performed in accordance with Baker Hughes INTEQ Drawing Nos. SK9312XX (Cesium-137 sources) or SK9401XX (Americium-241/Beryllium), as applicable, ANSI Specification No. N542 77 Appendix A, and as specified in the following B&W procedures:

☒ Baker Hughes Project Number 4506480538 B&W Project Number L-2000-014-020

☒ TP-820 (Rev. 10), "Milling of Baker Hughes INTEQ Oil Well Logging Sources", dated April 18, 2012

☒ TP-821 (Rev. 9), "Welding of Baker Hughes INTEQ Oil Well Logging Sources", dated April 7, 2014

☒ TP-822 (Rev. 9B), "Inspections of Baker Hughes INTEQ Oil Well Logging Sources", dated March 13, 2104

☒ Generic Project Technical Plan (Rev. 3), "Encapsulation of Baker Hughes INTEQ Oil Well Logging Sources", dated April 21, 2014

☒ B&W NMIS Standard Practice QA Plan Revision 13 Dated April 2014

Certification for use of this source in oil well logging applications is demonstrated by the following:

☒ Original Certification of Inner Encapsulation (attached)

☒ Documented lack of damage to inner encapsulation based on visual inspection and dry wipe test results (attached)

☒ Documented satisfactory weld condition of bull plug as shown by visual, liquid penetrant, dry wipe test, pressurization leak test, destructive test (batch dummies), and production weld parameter results (attached).

Certified by:	Reviewed by:
3/23/15	Harriet L Bragley 3/24/15
Technical Project Leader Date	Quality Assurance Specialist Date

U.S. Department
of Transportation
**Pipeline and
Hazardous Materials
Safety Administration**

East Building, PHH-23
1200 New Jersey Avenue Southeast
Washington, D.C. 20590

IAEA CERTIFICATE OF COMPETENT AUTHORITY
SPECIAL FORM RADIOACTIVE MATERIALS
CERTIFICATE USA/0635/S-96, REVISION 3

This certifies that the source described has been demonstrated to meet the regulatory requirements for special form radioactive material as prescribed in the regulations of the International Atomic Energy Agency[1] and the United States of America[2] for the transport of radioactive material.

1. Source Identification - QSA Global, Inc. Model X.1276 (Manufactured on or after July 29, 1980).

2. Source Description - Cylindrical single encapsulation made of stainless steel and tungsten inert gas or laser seal welded. Approximate exterior dimensions are 13.5 mm (0.53 in.) in diameter and 40.9 mm (1.61 in.) in length. Minimum wall thickness is 1.27 mm (0.05 in.). Construction shall be in accordance with attached AEA Technology QSA, Inc. Drawing No. RBA62672, Rev. A.

3. Radioactive Contents - No more than 185.0 GBq (5.0 Ci) of Americium-241. The Am-241 is in the form of an oxide mixed with a beryllium powder and pressed into a solid pellet.

4. Quality Assurance - Records of Quality Assurance activities required by Paragraph 310 of the IAEA regulations[1] shall be maintained and made available to the authorized officials for at least three years after the last shipment authorized by this certificate. Consignors in the United States exporting shipments under this certificate shall satisfy the applicable requirements of Subpart H of 10 CFR 71.

5. Expiration Date - This certificate expires on August 31, 2017.

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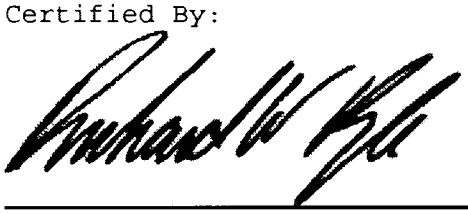
[1] "Regulations for the Safe Transport of Radioactive Material, 1996 Edition (Revised), No. TS-R-1 (ST-1, Revised)," published by the International Atomic Energy Agency(IAEA), Vienna, Austria.

[2] Title 49, Code of Federal Regulations, Parts 100-199, United States of America.

CERTIFICATE USA/0635/S-96, REVISION 3

This certificate is issued in accordance with paragraph 804 of the IAEA Regulations and Section 173.476 of Title 49 of the Code of Federal Regulations, in response to the August 22, 2012 petition by QSA Global, Inc., Burlington, MA, and in consideration of other information on file in this Office.

Certified By:



Dr. Magdy El-Sibaie
Associate Administrator for Hazardous Materials Safety

Sep 28 2012
(DATE)

Revision 3 - Issued to extend the expiration date.

GAMMATRON
P.O. Box 266677
Houston, Texas 77207-6677
(713) 641-3640
Fax (713) 242-9039

CERTIFICATION OF TEST RESULTS
FOR GAMMATRON INC.
DOT 7A CONTAINER
MODEL BHI5NTL REV. #1

1. Common Name of Container
   Neutron source shipping container.
   Top Loading.

2. Authorized Use
   Multiple trip, reusable container.

3. Authorized Contents
   Type "A" quantities of special form radioactive materials.
   Not to exceed 5 Curies of Am-241Be.

4. Dimensions
   Total height 18", 14" diameter.

5. Description of Container
   Cylindrical shaped, 1/8" stainless steel shell, coned at ends to 5" diameter filled with polypropylene beads and water extended polymer (WEP) shielding, stainless inner cavity. Chain plates 6" in lenght welded 90 degrees from each other in the middle of the sides of container.
   Weight of container is 90 lbs. (40.9 kgm)

6. Specifications and Restrictions
   a. Marking must be in compliance with CFR 49 173.24(c)(1).
   b. A seal must be provided as required in CFR 49 173.412 (b).
   c. Contamination external radiation levels and labeling must be in compliance with CFR 49 173.443, 173.441, 173.444.

7. Test Results

Environmental Conditions

Test	Results	Discussion
a. Heat +130°F	Pass	Temperature resistance within normal operating range for materials of construction.
b. Cold -40°F	Pass	Temperature resistance within normal operating range for materials of construction.
c. Vibration	Pass	Containers have withstood years of transport with no occurrence of significant damage due to normal vibration.
d. Water Spray	Pass	Containers have withstood years of transport with no apparent weakening of integrity. CFR 49 173.465(b), CFR 49 173.461(a).
e. Free Drop(4ft.)	Pass	Containers passed 4 feet drop requirement with no significant damage. CFR 49 173.465 (c).
f. Penetration	Pass	Container passed penetration test with no loss of integrity. CFR 49 173.654 (e)
g. Compression	Pass	Container passed the compression test requirement by supporting 1200 lbs. for 24 hours with no significant damage CFR 49 173.465 (d)

Test conditions and data are available for review. For additional information contact:

Charles T. Gallagher
Gammatron Inc.
P.O. Box 266677
Houston, Texas 77207-6677

This is to certify that Gammatron, Inc., has completed the test as described above on a container provided by Gammatron, Inc.

Date: 02/02/2004

Charles T. Gallagher, President
Gammatron, Inc.

Safety Data Sheet

Neutron Logging Source (LWD)

1. Product and company identification

Product name	: Neutron Logging Source (LWD)
Supplier	: Baker Hughes Oilfield Operations, Inc. 2001 Rankin Road Houston, Texas 77073 For Product Information / SDS Call: 800-231-3606 (8:00 a.m. – 5:00 p.m. CST, Monday – Friday) 281-276-5400
Material uses	: Oil Well Logging
Code	: NL
Validation date	: 04 June 2013
Print date	:
Version	: 1
Responsible name	: Global Chemical Regulatory Affairs Telephone: 281-276-5400 or 800-231-3606
In case of emergency	CHEMTREC: 800-424-9300 (U.S. 24 hours) CHEMTREC Int'l: 01-703-527-3887 (International 24 hours) CANUTEC: 613-996-6666 (Canada 24 hours)

2. Hazards identification

External exposure to emitted ionizing radiations (neutron and gamma). No hazard from internal exposure if capsule remains intact. In the event of loss of containment from the sealed source, all precautions should be taken to prevent inhalation, ingestion or skin and eye contact of the material.

Contains a substance known to cause cancer in humans.

Various governmental agencies have exempted radioactive materials from their hazard communication requirements. The Globally Harmonized System of Classification and Labeling of Chemicals does not include radioactive materials as a hazard class.

This Safety Data Sheet is provided to convey an understanding of the properties and hazards associated with this source.

3. Composition / information on ingredients

Contents	: 185GBq of Americium – 241/Beryllium
Encapsulation	: Bonded Stainless Steel Special Form Capsule
Certification	: Applicable Special Form Certificates are documented for each individual source on the manufacturer's certificate.

4. First aid measures

None recommended, but seek medical attention if effective dose exceeds 100mSv.

5. Fire-fighting measures

Nothing additional recommended, but arrange for the area to be surveyed by trained and authorized persons for radioactive contamination after a fire involving the source or its container is brought under control, when there is any indication that the source capsule may have been damaged.

6. Accidental release measures

Radiation contamination will only be produced if the integrity of the source capsule is breached. Alert and clear everyone from the area. Place a barrier around the source with a minimum distance of five meters. Identify the area as a radioactive contamination hazard area. Summon qualified, trained assistance for clean-up and decontamination.

7. Handling and storage

The source should be stored and used in accordance with the conditions set out in the radioactive source license issued by the state regulatory authority. All radioactive sources must be accounted for at all times. When not in use all radioactive sources should be stored within their transport container and in a designated locked & secured storage area. Record all movements of the source to and from the storage area.

The radioactive source must only be removed from storage/container by trained and authorised persons equipped with the correct personal dosimeter (from which both neutron and gamma doses can be assessed).

All radioactive source manipulations should be performed using the correct handling tools provided by Baker Hughes. The handler should at all times keep their body more than one meter from the exposed source.

Never touch the radioactive source directly with your hand.

Only remove the source from its container in a restricted area and prevent access to all persons who are not involved with the work in progress.

Perform pre & post radiation surveys of restricted area after every usage of the radioactive source to ensure it is safely put back in its container for storage. Document these radiation surveys.

8. Exposure controls / personal protection

External: Exposure to emitted radiation must be kept **As Low As Reasonably Achievable (ALARA)**. This is achieved by the use of shielding, maximizing the distance from source and by keeping exposure times to a minimum.

Follow the applicable local regulations for radiation dose limits, local procedures and use of handling and storage procedures summarized in Section 7.

At intervals not exceeding 6 months, leak test the source to assure the continued integrity of the containment capsule.

No additional personal protective equipment is recommended.

Internal: Sealed sources pose no internal radiation hazard. However in the event of loss of containment by the sealed source all precaution should be taken to prevent inhalation or ingestion of the material.

9. Physical and chemical properties

The contained radioactive material is in a solid form of a compacted mixture of Americium oxide with beryllium metal.

10. Stability and Reactivity

The material is present inside a sealed capsule, do not pose any other physical or chemical hazards and non-reactive. (non-fissile).

11. Toxicological information

The contained material is radioactive and emits ionizing radiation.

Beryllium is a suspected carcinogen and is known to produce cumulative lung damage (Berylliosis)

12. Ecological information

Beryllium LC50: 0.8 mg/L (48 hours)

Americium 241 has a half-life of 430 years.

13. Disposal considerations

All Baker Hughes sources should be returned to the Baker Hughes Houston Technology Center for evaluation. Disposals if warranted will be handled with an approved licensed agent.

14. Transportation information

Regulatory Information	UN Number	Proper Shipping Name	Classes	PG*	Label	Additional Information
DOT Classification	UN3332	Radioactive Material, Type A Package, Special Form,	7	Not applicable		Transport only in a suitably marked and labeled Type A package.
TDG Classification	UN3332	Radioactive Material, Type A Package, Special Form,	7	Not applicable		Transport only in a suitably marked and labeled Type A package.
IMDG Class	UN3332	Radioactive Material, Type A Package, Special Form,	7	Not applicable		Transport only in a suitably marked and labeled Type A package.
IATA-DGR Class	UN3332	Radioactive Material, Type A Package, Special Form,	7	Not applicable		Transport only in a suitably marked and labeled Type A package.

PG*: Packing group
May be transported by road, rail, sea or air when done so in compliance with the national and international requirements applicable to the mode of transport and to any additional regulations in place in, to or from which the shipment is being commenced.

DOT Reportable Quantity	: 0.01 (Ci), 0.00037 (TBq)
North-America Emergency Response Guidebook (NAERG)	: 164

15. Regulatory information

HCS Classification : Not applicable (exempt)

16. Other information

Notice to reader

NOTE: The information on this SDS is based on data which is considered to be accurate. Baker Hughes Oilfield Operations, Inc., however, makes no guarantees or warranty, either expressed or implied of the accuracy or completeness of this information.

The conditions or methods of handling, storage, use and disposal of the product are beyond our control and may be beyond our knowledge. For this and other reasons, we do not assume responsibility and expressly disclaim liability for loss, damage or expense arising out of or in any way connected with the handling, storage, use or disposal of this product.

This SDS was prepared and is to be used for this product. If the product is used as a component in another product, this SDS information may not be applicable.