FORM NRC-7
(7-78)
10 CFR 110

U.S. NUCLEAR REGULATORY COMMISSION

ACC
APPROVED BY GAO
B-180225(R0362)

APPLICATION FOR LICENSE TO EXPORT NUCLEAR MATERIAL AND EQUIPMENT *(See Instructions on Reverse)*

1. APPLICANT'S USE	a. DATE OF APPLICATION	b. APPLICANT'S REFERENCE	2. NRC USE	a. LICENSE NO.	b. DOCKET NO.
	4-17-80	V-8517		XCOM0401	11002044

3. APPLICANT'S NAME AND ADDRESS	RIS	4. SUPPLIER'S NAME AND ADDRESS *(Complete if applicant is not supplier of material)*	RIS
a. NAME: REUTER-STOKES,		a. NAME	
b. STREET ADDRESS: 18530 SOUTH MILES PARKWAY		b. STREET ADDRESS	
c. CITY: CLEVELAND; STATE: OHIO; ZIP CODE: 44128		c. CITY; STATE; ZIP CODE	
d. TELEPHONE NUMBER *(Area Code – Number – Extension)*: 216-475-3434			

5. FIRST SHIPMENT SCHEDULED	6. FINAL SHIPMENT SCHEDULED	7. APPLICANT'S CONTRACTUAL DELIVERY DATE	8. PROPOSED LICENSE EXPIRATION DATE	9. U.S. DEPARTMENT OF ENERGY CONTRACT NO. *(If Known)*
90 Days After License	90 Days After License	90 Days After License	May 1, 1981	

10. ULTIMATE CONSIGNEE	RIS	11. ULTIMATE END USE *(Include plant or facility name)*
a. NAME: ATOMIC ENERGY OF CANADA LTD.		See attached statement of end use from ultimate consignee.
b. STREET ADDRESS		
c. CITY – STATE – COUNTRY: PINAWA, MANITOBA CANADA		11a. EST. DATE OF FIRST USE
12. INTERMEDIATE CONSIGNEE	RIS	13. INTERMEDIATE END USE
a. NAME: REUTER-STOKES, CANADA LTD.		Intermediate consignee will receive shipment, but will not use product. He will reship to ultimate consignee.
b. STREET ADDRESS: 465 DOBBIE DRIVE		
c. CITY – STATE – COUNTRY: CAMBRIDGE, ONTARIO CANADA		13a. EST. DATE OF FIRST USE
14. INTERMEDIATE CONSIGNEE	RIS	15. INTERMEDIATE END USE
a. NAME		
b. STREET ADDRESS		
c. CITY – STATE – COUNTRY		15a. EST. DATE OF FIRST USE

16. NRC USE	17. DESCRIPTION *(Include chemical and physical form of nuclear material; give dollar value of nuclear equipment and components)*	18. MAX. ELEMENT WEIGHT	19. MAX. WT. %	20. MAX ISOTOPE WT.	21. UNIT
	~~URANIUM 235 DEPOSITED AS UO_2 ON INTERNAL SURFACE OF~~ REUTER-STOKES MODEL RS-C3-2510-114 RADIATION DETECTOR. EACH DETECTOR CONTAINS 1.4 (CRAMS) URANIUM. FIGURES AT RIGHT ARE FOR THE TOTAL OF ONE DETECTOR TO BE SUPPLIED. VALUE OF EACH DETECTOR IS $1,370.00 (U.S.)	1.4 grams	93	1.3 grams	

22. COUNTRY OF ORIGIN – SOURCE MATERIAL	23. COUNTRY OF ORIGIN – SNM WHERE ENRICHED OR PRODUCED	24. COUNTRIES WHICH ATTACH SAFEGUARDS *(If Known)*
U.S.A.	U.S.A.	

25. ADDITIONAL INFORMATION *(Use separate sheet if necessary)*

Engineering data Sheet 9.08 Attached.

RECEIVED IP
4-22-80

26. The applicant certifies that this application is prepared in conformity with Title 10, Code of Federal Regulations, and that all information in this application is correct to the best of his/her knowledge. Joseph D. Skarupa

27. AUTHORIZED OFFICIAL	a. SIGNATURE	b. TITLE
	Joseph D. Skarupa	8005210128

copy annote Eckhout.

T•
REUTSTOKE CMEG

AECL WNRE PIN

W72 1980 APRIL 07 2:24PM

J• AGNEW

REOUR WS-19J-69973 END USE AS FOLLOWS:

AS PART OF THE CANADIAN EFFORT IN SAFEGUARDING NUCLEAR REACTORS, INSTRUMENTS ARE BEING DESIGNED AND TESTED WHICH WILL PROVIDE IAEA INSPECTORS WITH INDEPENDENT DATA ON A REACTOR'S FUEL INVENTORY. THE FISSION CHAMBER WILL BE USED AS PART OF A CORE OUTPUT MONITOR FOR A CANDU REACTOR WHERE IT WILL BE USED TO DETECT NEUTRONS FROM SPENT FUEL BUNDLES.

MISS D G BEESKAU
ATOMIC ENERGY OF CANADA LTD
PINAWA MANITOBA

APR 14 1980

AECL WNRE PIN

RS-C3-2510-114 Fission Counter/ Chamber

For Reactor Control (Wide Range)

The RS-C3-2510-114 has proven itself as the standard high-sensitivity fission counter/chamber for wide range reactor instrumentation.

It is designed for measurement of the neutron flux levels from shutdown to full power of nuclear reactor. The detector can be used to detect individual neutrons (counting mode) to 10^6 nv in the presence of an incident gamma flux of 10^6 R/hr.

It can also be used as a wide-range neutron sensor in conjuction with mean-square-voltage (MSV) type circuitry over a range of 10^4 to 10^{10} nv in the presence of an incident gamma flux of 10^6 R/hr.

Operation, as specified here, is greatly dependent on associated electronics. All data presented here is based on measurement using a wide band pre-amplifier such as the model PA-5 manufactured by General Atomic.

Concentric cylinders with uranium coatings provide the neutron sensitive area. Aluminum alloy is used in construction to minimize neutron absorption and residual activity. All seals are directly bonded ceramic to metal. Insulators are high-purity alumina ceramic and are designed to assure stable, long-term noise-free operation of the chambers even at elevated temperature.

This chamber meets the U.S. Specification RDT C15-1T "Fission Type Neutron Detector Assembly" which is part of LMFBR instrumentation development. It can be supplied to the RDT specification which includes integral cable detector housing and cable seals for minimum interference from external noise. The sketch on the back shows this design which is designated Reuter-Stokes model RS-E1-0050.

Another version of this chamber has a 40" sensitive length for core flux averaging in power reactors and is designated model RS-C3-2540-102.

Specifications

MECHANICAL

Maximum diameter	8.02 cm
Maximum overall length	33.18 cm
Connectors	Type HN
Net weight	2.4 kg

MATERIAL

Outer shell and inner electrodes		1100 Aluminum
Connector		6061 Aluminum
Insulation:	Detector	Alumina ceramic
	Connector	Alumina ceramic
Neutron sensitive material		Uranium enriched > 93% in U-235
		Total quantity U-235 = 1.3 gm

CAPACITANCE (See Note 1)

Signal electrode to shell	150 pf
HV electrode to shell	250 pf

RESISTANCE @ 25° C

Signal electrode to shell	10^{13} ohms (minimum)
HV electrode to shell	10^{12} ohms (minimum)

MAXIMUM RATINGS

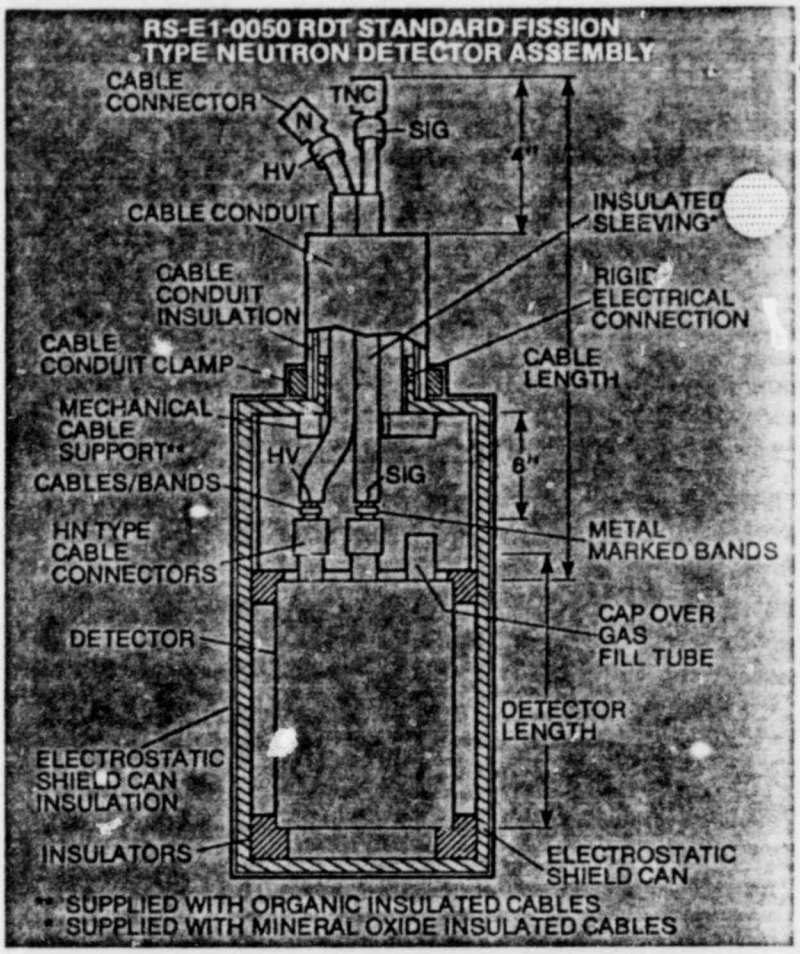
Inter-electrode voltage	1000 Volts
Temperature	300° C
Burn-up life:	
for 10% decrease in sensitivity	3×10^{20} nvt (thermal)

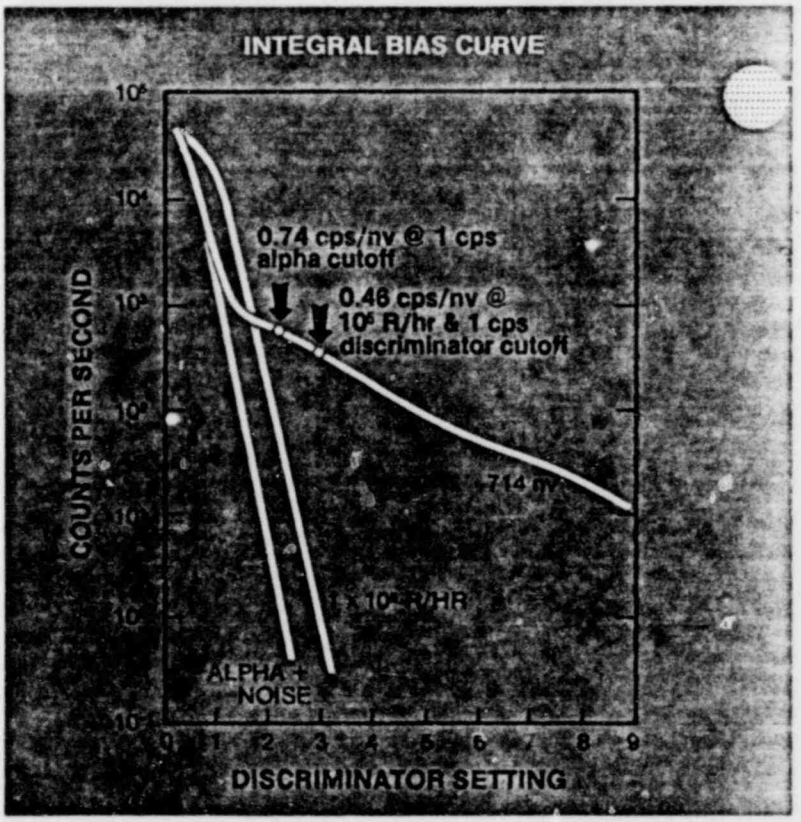
TYPICAL OPERATING CHARACTERISTICS (See Note 2)

AC thermal neutron sensitivity	$>1 \times 10^{-10} V^2/nv$
DC thermal neutron sensitivity	$>1.2 \times 10^{-13}$ amp/nv ± 20%
Counting sensitivity @ alpha cutoff	0.7 cps/nv
AC gamma sensitivity	$<1 \times 10^{-10} V^2/R/hr$
DC gamma sensitivity	$<5 \times 10^{-11}$ amp/R/hr
AC neutron/AC gamma ratio	>4.5 R/hr/nv
DC alpha current	$<8 \times 10^{-9}$ amp
AC alpha and noise component	10^4 nv equivalent
Voltage range	400 to 700 volts
Thermal neutron flux range	
in counting mode	to 10^6 nv
in MSV mode	$>10^4$ to 10^{10} nv

NOTE 1: With other electrode grounded.

NOTE 2: Operating characteristics are greatly dependent on electronics. All data presented here is based on measurement using a wide band preamplifier such as the model PA-5 manufactured by General Atomic.





reuter RS stokes
18530 South Miles Parkway • Cleveland, Ohio 44128 U.S.A.
Phone (216) 475-3434 Telex 985253

Litho in U. S. A. 4M-12/77