

December 22, 1982

U.S. Nuclear Regulatory Commission
Procedures and Certification Branch
Washington, D.C. 20555

Attn: Mr. Bernard Singer

Gentlemen:

Under cover of this letter, we are submitting the "NER-478C Am-241 Disc Source Prototype Environment Testing Report" for the purpose of your evaluation to upgrade the present ANSI N542-1977 performance classification for the NER-478C sources. We request that you amend the Certificate of Registration to ANSI N542-1977 performance classification C66544. The enclosed test results indicate qualification of the source to the higher external pressure and impact tests.

Thank you for your early review and comment. Please contact me if I may be of further assistance.

Very truly yours,

NEW ENGLAND NUCLEAR CORP.

John Sumares

John Sumares
Design Engineer

Enclosure

JS/dk



9602140296 95042B
PDR RC * PDR
SSD

NER-478C AM-241 DISC SOURCE

PROTOTYPE ENVIRONMENTAL TESTING REPORTI. SOURCE IDENTIFICATION

- A. Design and construction details of the Model NER-478C dummy sources (LE316 and LE316A capsules), which were subjected to the environmental tests stated below, are described on dwg. 313-301. The two exceptions to the specifications are 1) the ceramic matrix contains no radioactivity, and 2) a copper foil (0.08 x 0.08 x 2 mils thick) electroplated with 15 μ Ci of Co-57 was placed in the concave recess of the ceramic matrix in order to conduct a leak test per ANSI N542-1977 Procedure A2.1.3.
- B. Four dummy sources were subjected to the class 6 external pressure test - two LE316 capsules and two LE316A capsules.
- C. Four dummy sources were subjected to the class 5 impact test - two LE316 capsules and two LE316A capsules.

All of the dummy sources passed the environmental tests and thus qualifies the Model NER-478C source design for a higher performance classification - ANSI N542-1977 performance classification C66544.

II. LEAK TESTING

- A. Immersion with Boiling Test - Each capsule was immersion tested before and after each test for radioactivity leakage per ANSI N542-1977 Procedure A2.1.3. Sample aliquots were measured by an LSC system which yield a sensitivity of 1×10^{-4} μ Ci of Co-57.

III. ENVIRONMENTAL TESTING

The prototype capsules were subjected to class 5 impact and class 6 external pressure tests. The tests were conducted per the applicable

procedures of ANSI N542, Section 7, and the test parameters described in Table I.

A. Impact Test - N542-1977 - Section 7.4, class 5 (5 kg from 1 meter)

Immersion Test:	LE316-1	4.5×10^{-4} μCi
	LE316-2	2.0×10^{-4} μCi
	LE316A-1	1.4×10^{-4} μCi
	LE316A-2	5.4×10^{-4} μCi

Results: All capsules pass class 5 impact test. The only physical damage to the capsules are a flattening of welds.

B. External Pressure - N542-1977 - Section 7.3, class 6 (25000 psi for 5 minutes-twice)

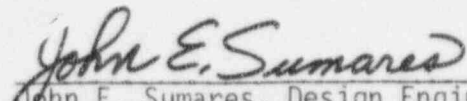
Immersion Test:	LE316-3	3.1×10^{-4} μCi
	LE316-4	2.4×10^{-4} μCi
	LE316A-3	4.2×10^{-4} μCi
	LE316A-4	3.1×10^{-4} μCi

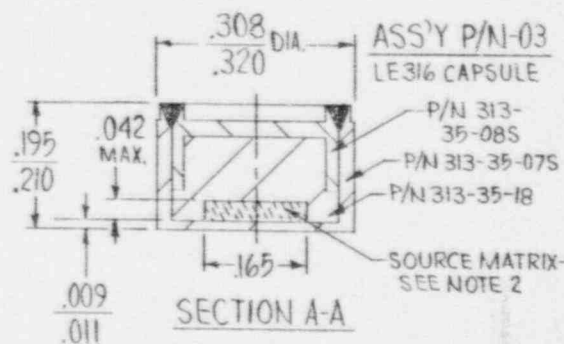
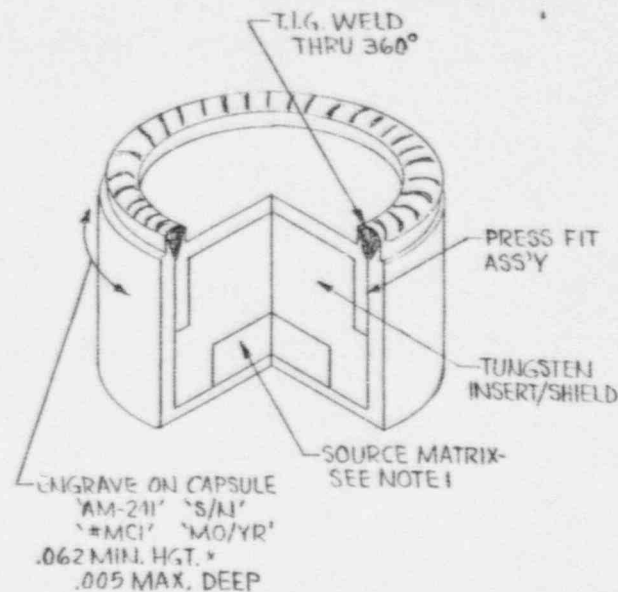
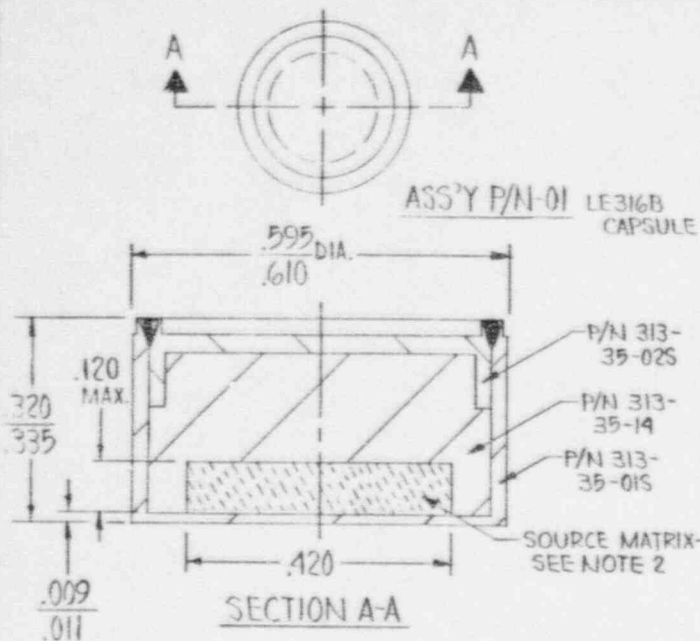
Results: All capsules pass class 6 external pressure test. The only physical damage to each capsule is a compression of the ceramic matrix which bowed the capsule windows inward by a maximum of 0.02 inches.

IV. SUMMARY

The Environmental Testing Report of the NER-478C ^{241}Am disc source has indicated qualification of the capsule designs pursuant to ANSI N542-1977 requirements for Performance Classification C66544.

DATE: December 21, 1982


John E. Sumares, Design Engineer
Nuclides and Sources Operations



NOTES

- SOURCE MATRIX CONSISTS OF AM-241 AS A VITREOUS CERAMIC AND FUSED TO THE TUNGSTEN INSERT, FORMING A CERAMIC GLAZE
- MAXIMUM ACTIVITY CONTENT:
LE316 2000 MCI.
LE316A 2000 MCI.
LE316B 2000 MCI.
- NOMINAL ACTIVITY TOLERANCE-SEE NOTE 8 BELOW
- LEAK TEST PER ANSI N5-42-1977 PROCEDURES A2.1.1 SMEAR TEST, OR A2.1.3 IMMERSION TEST, AND A2.2.1 BUBBLE TEST PER UMD-203. LIMIT 1×10^{-3} MCI.
- ANSI N542-1977 PERFORMANCE CLASSIFICATION
ANSI CG-5.14.
- COMPETENT AUTHORITY CERTIFICATE NO. USA/0159/S PURSUANT TO IAEA MARGINAL C-6.1.
- SOURCE 59.4 KEV PHOTON EMISSION SHALL BE MEASURED AT SPATIAL PEAK GEOMETRY. SEE NOTE 8 BELOW.
- CONTENT ACTIVITY TO BE DETERMINED BY TRANSFERRED WEIGHT OF AM-241/CERAMIC INTO THE SOURCE MATRIX. NOMINAL 59.4 KEV PHOTON EMISSION TO BE READ FROM GRAPH/DWG. NO. 510-074. NOMINAL EMISSION TOLERANCE TO BE $\pm 15\%$, -10% .

SOURCE CAPSULE

LE316B
LE316A
LE316

DWG. NO. 510-074

GRAPH #1
GRAPH #2
GRAPH #3 OR
GRAPH #4

NEW ENGLAND NUCLEAR CORP.

BOSTON, MASS.

D 10-21-82	CHANGE NOTE 5 ANSI CLASSIFICATION	JS
C 5-7-80	CHANGE NOTE 8 TO ADD GRAPH #4	JS
B 2-4-80	CHANGE NOTES 3 & 7 ADD NOTE 8	JS
A 7-2-79	CHANGE MAX. WGT. OF MATRIX & NOTES 4, 5, 6 & 7	JS

MATERIAL SPECIFICATIONS		FRACTIONAL	DECIMAL	ANGULAR
CRES 316L STN. STL.		$\frac{1}{4}$.005	$\pm 30'$
DRAWN	J. SUMARES	REV.	DATE	SCALE
CHECKED		D	8-29-78	N.T.S.
APPRO'D		DO NOT SCALE DRAWING		

NER-478C AM-241 L.E.
PHOTON SOURCE

DRAWING NO.
313-301

NER-478C AM-241 DISC SOURCE

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Results: All capsules pass class 5 impact test. The only physical damage to the capsules are a flattening of welds.

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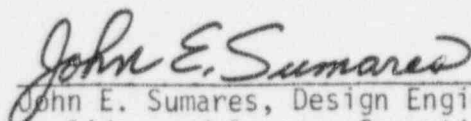
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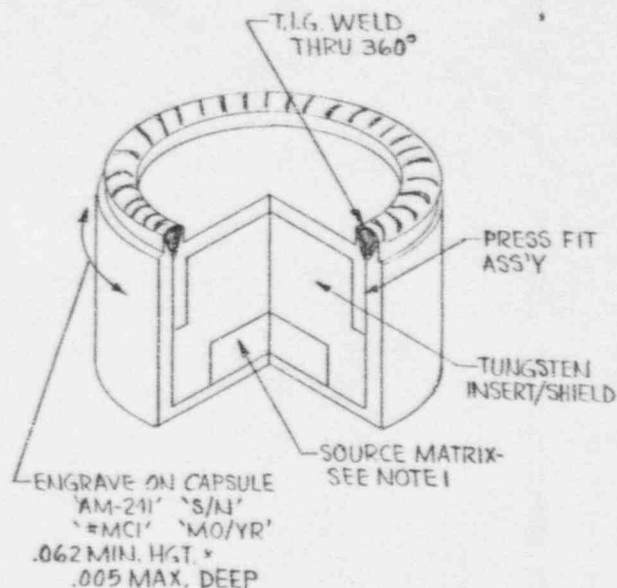
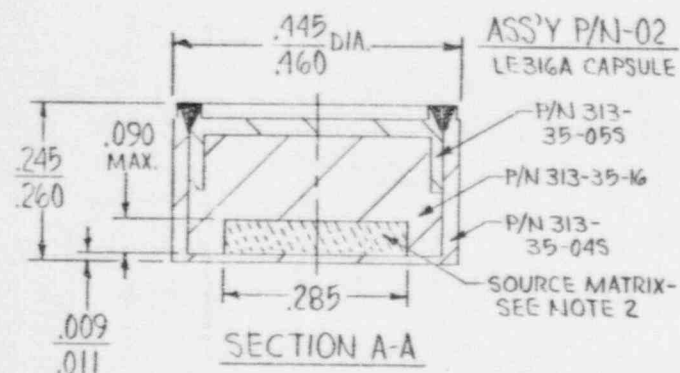
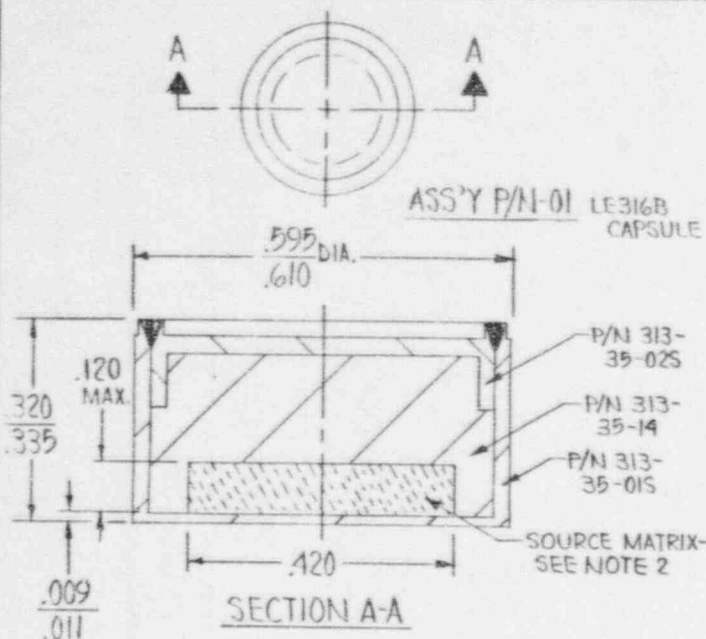
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- ANSI N542-1977 PERFORMANCE CLASSIFICATION
ANSI C66514.
- COMPETENT AUTHORITY CERTIFICATE NO. USA/0159/S PURSUANT TO IAEA MARGINAL C-6.1.
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SOURCE CAPSULE

LE316B
LE316A
LE316

DWG. NO. 510-074

GRAPH #1
GRAPH #2
GRAPH #3 OR
GRAPH #4

NEN CONTROL SPECIFICATION

MATERIAL SPECIFICATIONS			FRACTIONAL	DECIMAL	ANGULAR	NEW ENGLAND NUCLEAR CORP. BOSTON, MASS.	
CRES 316L STN. STL.			$\pm \frac{1}{64}$	$\pm .005$	$\pm 30'$		
DRAWN J. SUMARES			REV. D	DATE 8-29-78	SCALE N.T.S.	NAME NER-478C AM-241 L.E.	DRAWING NO. 313-301
CHECKED			DO NOT SCALE DRAWING				
APPROD			PHOTON SOURCE				

D 12-2-82	CHANGE NOTE 5 ANSI CLASSIFICATION	JS
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NER-478C AM-241 L.E. PHOTON SOURCE		DRAWING NO. 313-301
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