

U.S. DEPARTMENT OF COMMERCE
NATIONAL BUREAU OF STANDARDS
WASHINGTON, D.C. 20234

REPORT OF CALIBRATION

Test No. 536-240107-87/1

SUBMITTED BY: ORNL/J. Bigelow

Date: 24 September 1987

FOR: M. G. Yalcintas
Oak Ridge National Laboratory
Oak Ridge, TN 37831

DESCRIPTION OF SOURCE: Source I. D.: NDS-107 Cf-252 Neutron Source.
Has a NSD or NZS-type source encapsulation with top threads removed.
See Fig. 1 and Fig. 2 (ORNL DWG 84-9614).

Californium Identification: CX-CF-49

Date of Analysis: 16 March 1977

Isotopic Composition:

<u>Nuclide</u>	<u>Atom Percent</u>
^{249}Cf	2.97
^{250}Cf	9.12
^{251}Cf	2.61
^{252}Cf	85.21
^{253}Cf	0.073
^{254}Cf	0.019

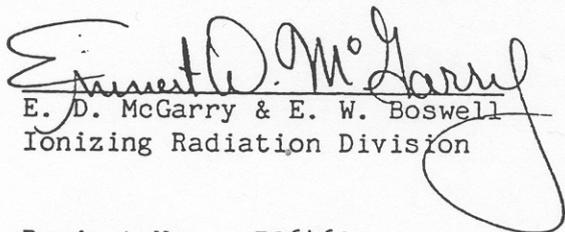
^{252}Cf Content (reported by ORNL as of 31 March 1987): 3.356 mg

NOTE: This neutron source is similar in construction to source NDS-87.

CALIBRATION: The source described above has been calibrated by comparing its strength to that of the NBS primary Ra-Be photoneutron standard source, "NBS-1." The neutron emission rate of the submitted source was found to be 7.63×10^9 neutrons/sec. The error is estimated as 1.5% standard error. April 30, 1987 is the reference calibration date.

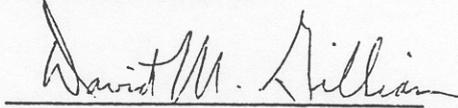
EXPERIMENTAL METHOD: The comparison of source strengths was made by activating a manganese sulfate bath and continuously counting the induced, saturated manganese-56 activity with a scintillation counter. The source was positioned in a small teflon cavity at the center of a 1.2 m diameter spherical bath. The bath was circulated to the scintillation counter, which was located in a shielded, stainless-steel beaker. The following corrections have been applied: 0.62% for fast neutron capture by oxygen and sulfur in the bath, 0.17% for fast and thermal neutron capture by fluorine in the teflon source holder, 0.05% for escape from the bath, and 0.19% for thermal neutron absorption in the source. The calibration data is recorded on 5/30/87 in data book No. 16. In April 1987, the emission rate of NBS-1, which has been absolutely determined, was 1.243×10^6 neutrons/second with an assigned uncertainty of $\pm 0.85\%$.

This calibration was performed by

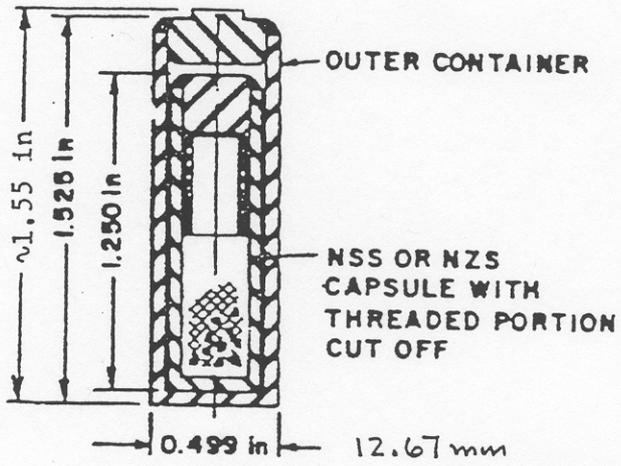

E. D. McGarry & E. W. Boswell
Ionizing Radiation Division

Project No.: 5364601

For the Director:


D. M. Gilliam, Assoc. Chief
Ionizing Radiation Division

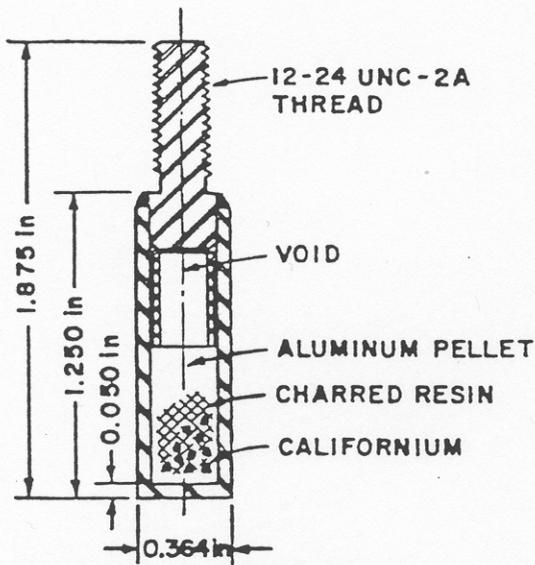
= 39.37mm
= 38.74mm
≈ 31.75mm



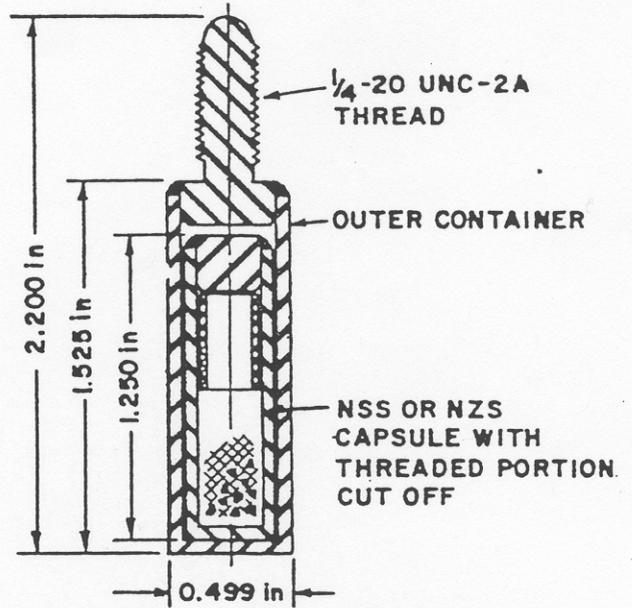
NSD-87 and NSD-107

→ 0.384 ← 9.75 mm

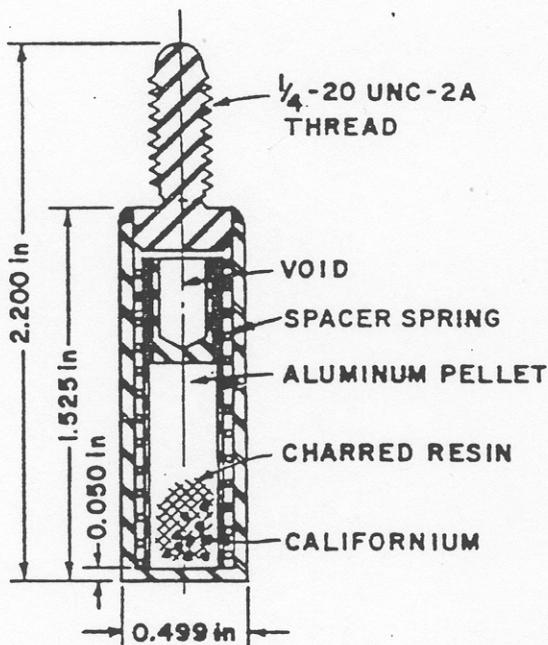
Fig. 1



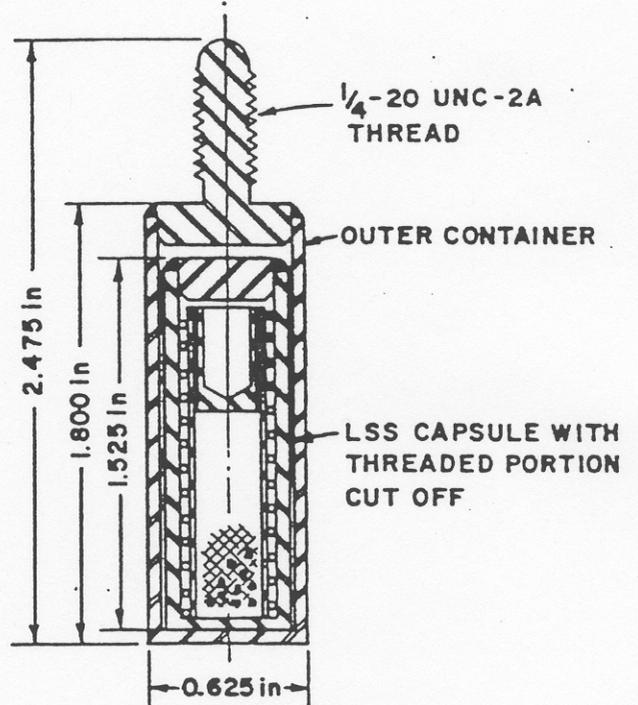
MODEL NSS OR NZS
(SINGLE ENCAPSULATION)



MODEL NSD OR NZD
(DOUBLE ENCAPSULATION)



MODEL LSS
(SINGLE ENCAPSULATION)



MODEL LSD
(DOUBLE ENCAPSULATION)

Fig. 2