

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

NO: MA-1059-S-816-S  
(Supercedes IL-0136-S-282-S)

DATE: December 21, 2001

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SEALED SOURCE TYPE: High Energy Photon Source

MODEL: CKC.CDn (n = 2, 3, 4, .....12, uniquely identifies a specific outer capsule design)

DISTRIBUTOR: AEA Technology QSA Incorporated  
40 North Avenue  
Burlington, MA 01803

Formerly

Amersham Corporation  
2636 S. Clearbrook Drive  
Arlington Heights, IL 60005

MANUFACTURER: Amersham International Plc.  
White Lion Road Amersham  
Buckinghamshire, England HP79LL  
0204-4444

ISOTOPE:

Cobalt-60

MAXIMUM ACTIVITY

5 Curies (185 GBq)

LEAK TEST FREQUENCY: 6 months

PRINCIPAL USE: (F) Oil Well Logging

CUSTOM DEVICE: YES \_\_\_ NO X

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DESCRIPTION: This source is no longer manufactured. The following description was active at the time of manufacture.

All sources in the CKC.CDn series contain the CKC.P1 capsule as an inner component. The CKC.P1 is described in certificate # IL-136-S-250-S. The outer capsule designs in the CKC.CDn series are the same as the CDC.CYn series which are described in certificate # IL-136-S-191-S for cesium-137. Metal inserts will be used to locate the CKC.P1 within and completely fill the internal volumes of the CKC.CYn outer capsules. Final closure of the outer capsules is achieved by tungsten inert gas welding as described in certificate # IL-136-S-191-S for the CDC.CYn outer capsules.

LABELING:

All sources are permanently marked according to customer specifications which must include details of 1) "Caution Radioactive", 2) unique serial number, 3) radiation symbol. The nuclide, activity, and identity of the manufacturer will be included as space permits. Each source is accompanied with a test report documenting the leak test and contamination test results as well as the determined activity. The report also states that the source passed the required 30,000 psi pressure test.

DIAGRAM:

The model CKC.CDn capsules have the same dimensions as indicated in certificate # IL-136-S-191-S for the corresponding CDC.CYn capsules.

CONDITIONS OF NORMAL USE:

The model CKC.CDn source series is expected to encounter harsh industrial down-hole oil well logging environments such as shock, impact, vibration, and high external pressure.

PROTOTYPE TESTING:

Prototype cesium-137 CDC.CYn series capsules were tested and assigned ANSI integrity ratings of 77C66534. The CKC.CDn series have been assessed to have this rating, as a minimum, since the CKC.P1 together with the insert within which it will be contained, will provide equal or improved mechanical/structural support for the outer capsule, compared to the original CDC.CYn inner capsule. Note that the CKC.P1 has Special Form status.

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EXTERNAL RADIATION LEVELS:

The manufacturer provided the following calculated dose rates for a source containing 5 curies of cobalt-60:

<u>Distance</u>	<u>Dose Rate</u>
5 cm	2500 R / hr (25 Sv / hr)
30 cm	72.5 R / hr (725 mSv / hr)
100 cm	6.5 R / hr (65 mSv / hr)

QUALITY ASSURANCE AND CONTROL: The source is no longer manufactured.

All material used in the fabrication of the capsules and sources is checked against suppliers' specifications prior to manufacture.

Weld integrity of the CKC.P1 and finished CKC.CDn sources is checked by visual inspection and vacuum leak test methods. Freedom from leakage and contamination is checked by wipe and immersion testing. The removable activity must be less than 0.005 microcurie (185 Bq) before the source can be released.

All CKC.CDn series sources which will be used for down-hole oil well logging applications will be individually pressure tested at 30,000 psi at room temperature, and will conform to all other oil well-logging criteria.

The activity of each source is checked by measurement in a  $4\pi$  ionization chamber. This instrument is calibrated with standards which are traceable to national standards.

LIMITATIONS AND/OR CONSIDERATION OF USE: The source is no longer manufactured.

- The source shall be distributed to persons specifically licensed by the NRC or an Agreement State.
- Handling, storage, use, transfer, and disposal: To be determined by the licensing authority. This source emits very high radiation dose rates compared to Cs-137 well logging sources. Remote handling tools are required.
- 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 contamination.

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LIMITATIONS AND/OR CONSIDERATION OF USE (Cont'd.):

- The source shall not be subjected to conditions that exceed its ANSI performance classification 77C66534.
- This registration certificate and the information contained within the references shall not be changed or transferred without the written consent of the Commonwealth of Massachusetts, Radiation Control Program.

SAFETY ANALYSIS SUMMARY: The source is no longer manufactured.

In 1988, based on the prototype tests, the claimed ANSI source classification, and the information contained in the references below, the Illinois Department of Nuclear Safety concluded that the model CKC.CDn series sources are acceptable for licensing purposes.

In 2000, the manufacturer reported that the model CKC.CDn series sources are no longer manufactured or distributed, and no design changes have been made since the last registration amendment.

REFERENCES:

The following supporting documents for the model CKC.CDn series sealed sources are hereby incorporated by reference and are made part of this registry document.

- Amersham Corporation letter dated October 26, 1987, with enclosures thereto.
- AEA Technology letter dated April 13, 2000, with enclosures thereto.

ISSUING AGENCY: Massachusetts Department of Public Health, Radiation Control Program

Date 12-21-01

Reviewer John Sumares  
John Sumares

Date 12-26-01

Concurrence Kenath Traegde  
Kenath Traegde