

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES  
SAFETY EVALUATION OF DEVICE

NO.: NR536D109B

DATE: April 30, 1982

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DEVICE TYPE: Electron Capture Detector Cell Assembly

MODEL: N600-0113

MANUFACTURER/DISTRIBUTOR: Perkin-Elmer Corp.  
Main Avenue  
Norwalk, CT 06856

MANUFACTURER/DISTRIBUTOR:

SEALED SOURCE MODEL DESIGNATION: New England Nuclear NER-002  
Nuclear Radiation Development N1001  
Amersham NBC-7020

ISOTOPE: Nickel-63

MAXIMUM ACTIVITY: 15 millicuries

LEAK TEST FREQUENCY: 6 months

PRINCIPAL USE: Ion Generators, Chromatography

CUSTOM DEVICE: ☐ YES ☒ NO

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DESCRIPTION:

The Model N600-0113 detector cell assembly is similar to the previously approved Model 030-0119 (Certificate of Registration dated June 29, 1981). Differences in the two models may be described as follows: (i) in the Model 030-0119 the electron capture detector cell (ECD) is distinct from its heating device which is incorporated within the body of the gas chromatograph; the Model N600-0113 has been incorporated with its heating element into a single module. Other basic differences in the two model devices are:

- ° Heater Block: The heater block in the Model N600-0113 is constructed of aluminum rather than an alloy of aluminum and bronze. Because of the lower melting point of aluminum, it is expected that the heater block would self destruct before a temperature sufficient to damage the ECD cell or the source was reached.
- ° Heater: In consideration of the lower melting temperature and smaller mass of the heater block, a lower powered heater has been employed (100 watts versus 300 watts).
- ° Tamper Proof Screws: Four tamper proof screws seal the two halves of the cylindrical detector body and keep users from gaining access to the inner cavity which houses the corrosion resistant metal foil substrate with the radioactive material electrolytically deposited on one side. The previously approved Model 030-0119 has one tamper proof screw in the secured collar of the ECD which prevents access to the source.

When in use in the Perkin-Elmer Sigma Series gas chromatograph, a double level of temperature protection against accidental over-heating of the nickel-63 foil source of ECD is provided. The first level of protection is provided through the micro processor temperature circuitry of the gas chromatograph. The second level provides protection through the differential expansion thermostat mounted on the ECD and heater assembly. This thermostat disconnects power to the heater if the heater block temperature exceeds temperatures within the range of 453°C to 502°C.

LABELING:

The device is labeled in accordance with the requirements of 32.51(3). The label is attached to the ECD cell assembly by a wire tether similar to the one used for the previously approved Model 030-0119.

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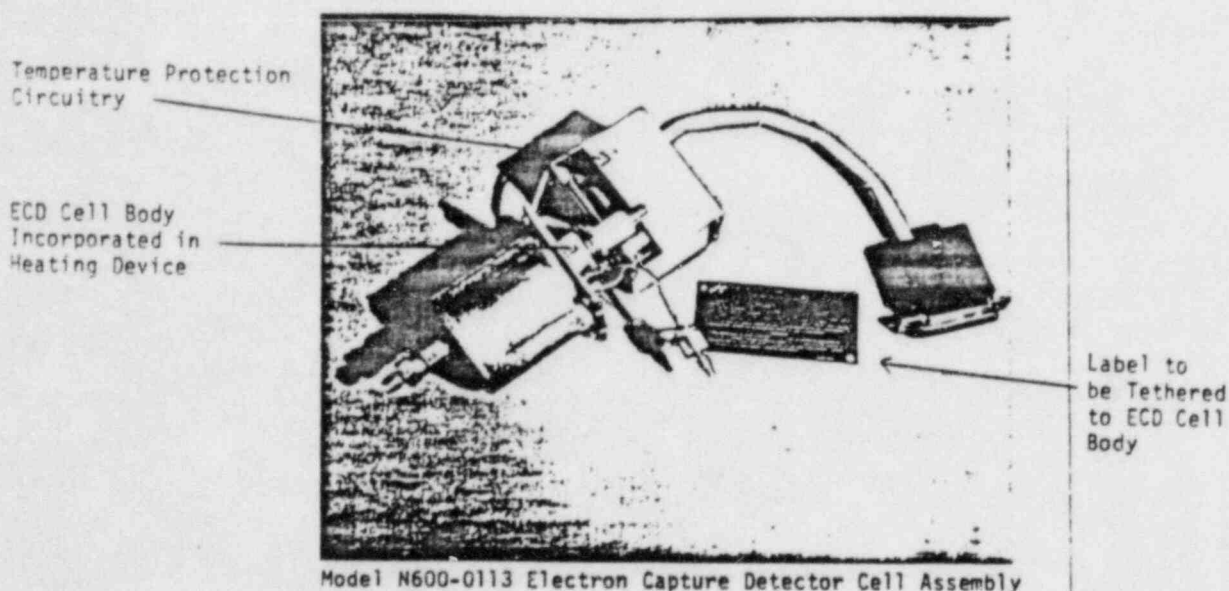
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DEVICE TYPE: Electron Capture Detector Cell Assembly

DIAGRAM:



CONDITIONS OF NORMAL USE:

The Electron Capture Detector Cell (ECD) is designed to produce an ionized atmosphere for quantitative or qualitative measurement of elements in gas streams. It is an integral component of gas chromatographs of the Perkin-Elmer Corporation's Sigma Series and will be used in ambient laboratory conditions. The detector is designed for operational temperature of up to 450°C. The foil source is fully shielded in the ECD cell and the gas chromatograph operator is not required to handle or service either the source or the detector cell.

PROTOTYPE TESTING:

Additional prototype testing on the Model N600-0113 ECD assembly consisted of evaluation of five ECD thermal trips for proper operation of microswitches to turn off AC power to the ECD heater within operational temperature range. All of the thermal trips operated within the temperature range 453°C minimum and 502°C maximum.

The manufacturer has presented calculations which demonstrate compliance with the requirements of §§ 32.51(2)(ii) and 32.51(2)(iii) regarding radiation doses and dose commitments.

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EXTERNAL RADIATION LEVELS:

Since the walls of the detector cell are far in excess of the range of the maximum energy beta particles emitted from the contained source, surface readings on the cell should not be expected to exceed ambient background levels.

QUALITY ASSURANCE AND CONTROLS:

Each ECD cell is 100 percent inspected as follows:

1. Cell closure seals are inspected for leakage by pressurizing blocked off cells with dry nitrogen at 30 lbs in.
2. Cell saturation current is measured to specified levels.
3. Each cell is baked out for two hours in a vacuum furnace at 200°C temperature and at air pressure of approximately 4 x 10 mm of mercury.
4. 100 percent wipe tested.
5. Functional test made on each cell.

LIMITATIONS AND/OR OTHER CONSIDERATIONS OF USE:

1. The device may be distributed to persons specifically licensed or generally licensed by the NRC or Agreement States.
2. Labeling of the device shall be in accordance with the requirements of §20.203, 10 CFR 20, when distributed to persons specifically licensed and in accordance with the requirements of § 32.51, 10 CFR 32, when distributed to persons generally licensed.
3. The generally licensed device shall be installed or removed from gas chromatographs only by the manufacturer of the device or by persons specifically licensed by the NRC or Agreement States.
4. The device shall be leak tested at six month intervals either by:
  - a. Persons specifically licensed by the NRC or an Agreement State.



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LIMITATIONS AND/OR OTHER CONSIDERATIONS OF USE (CONT'D):

- b. The general licensee using the leak test kit (Perkin-Elmer Corp. Part No. 009-1567) and the "Special Instructions for Electron Capture Detector Cell Purchasers who are NOT Specifically Licensed to Handle Radioactive Material," supplied with the device.
5. Labeling: In lieu of using the conventional radiation caution colors (magenta or purple on yellow background) as specified in § 20.203(a)(1), Title 10, Code of Federal Regulations, Part 20, black anodized background with silver lettering and radiation symbol is authorized for use with the Model N600-0113 ECD detector labels, due to normal use temperatures.

SAFETY ANALYSIS SUMMARY:

Based on our review of the information and test data contained in the references listed below, we conclude that the Perkin-Elmer Model N600-0113 Electron Capture Detector device can be safely used by persons not having training in radiological protection. Furthermore, under conditions of use, the nickel-63 foil source contained in the Model N600-0113 ECD device cannot be inadvertently removed for either routine or emergency conditions of use, and it is unlikely that any person will receive an external radiation dose or dose commitment in excess of the dose to the appropriate organ as specified in §§ 20.101, 10 CFR 20, and 32.24, 10 CFR 32.

REFERENCES:

The following supporting documents for the Model N600-0113 are hereby incorporated by reference and are made a part of this registry document.

- ° NRC Catalog Sheet dated December, 1977, letters with enclosures dated December 16, 1980 and June 16, 1981.
- ° NRC Catalog Sheet for ECD Cell Model 030-0113 dated June 29, 1981.
- ° Application dated December 30, 1981.
- ° Letter with enclosures dated April 2, 1982.
- ° Telegram dated April 16, 1982.

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REFERENCES (CONT'D)

Date April 30, 1982

Reviewed by /s/  
Joseph M. Brown, Jr.

Date April 30, 1982

Concurrence /s/  
Bernard Singer

ISSUING AGENCY:

U.S. Nuclear Regulatory Commission