

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES  
SAFETY EVALUATION OF SEALED SOURCE  
(CORRECTED PAGE 1-APRIL 24, 1998)

NO.: CA0471D106B

DATE: March 31, 1997

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SEALED SOURCE TYPE: Basis Weight and Thickness Gauge

MODEL: 303

MANUFACTURER/DISTRIBUTOR: NDC Systems  
5314 North Irwindale Avenue  
Irwindale, CA 91706  
(818) 960-3300 (voice)  
(818) 939-3870 (fax)

SEALED SOURCE MODEL DESIGNATION: Amersham Model PHC.C1

ISOTOPE: Promethium 147

MAXIMUM ACTIVITY: 500 millicuries

LEAK TEST FREQUENCY: Not to exceed six (6) months

PRINCIPAL USE: Beta Gauge (E)

CUSTOM SOURCE: \_\_\_\_\_ YES  NO

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DEVICE TYPE: Thickness Gauge

DESCRIPTION:

The Model 303 Beta Transmission Gauging System is specifically designed for thickness or mass measurement of thin plastic, paper or other essentially flat sheet material during the manufacture of that material, while the sensor housings are traversed across the material by a motorized scanning frame.

The Model 303 is the Beta Transmission Sensor component of NDC Beta Transmission gauging systems. The Model 303 consists of two separate housings defining an air gap between them through which resides the sample to be measured (Figure 1). The upper housing contains the radioactive source rigidly secured within a steel and tungsten composite holder utilizing a counter-bored retaining well and a locked plate cover. A radiation shutter provided for powered useful beam control is composed of brass and tungsten and is of fail-safe design. These assemblies are contained by a steel framework subassembly that is securely fastened into a cast housing (Figure 2). Additionally, a radiation shaping collimator aids in focusing the radiation towards the lower head. The lower head consists of a radiation detector and defines the measurement gap as nominally 1.0 cm.

The electrically powered useful beam control system is incorporated such that if power fails, the source will remain in, or return to, the OFF condition. This is accomplished by a spring return electrical actuator that must be electrically powered to maintain the source in the ON position (Figure 2). Conspicuously visible signals which positively indicate when the system is in the ON condition (a red signal light), and when it is in the OFF condition (a green signal light), are located adjacent to the radiation source housing (Figure 1). Multiple bulbs are used for each condition. The powered useful beam control system was tested continuously in excess of 100,000 cycles without failure to return to the OFF condition upon removal of electrical power.

LABELING:

The device is labeled in accordance with Sections 30192.1 of the California Radiation Control Regulations (equivalent to 10 CFR 32.51), 10 CFR 20.1901, and 10 CFR 20.1904 (Figures 3a and 3b).

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DEVICE TYPE: Thickness Gauge

DIAGRAM:

Figure 1: Model 303 Sensor Probe on Traversing Scanner with On/Off Indicator Lights

Figure 2: Model 303 Source Holder/Solenoid/Shutter/Shielding Assembly

Figures 3a and 3b: Model 303 Labeling

Figure 4: Radiation Profile-Model 303 Shutter Open & Closed

CONDITIONS OF NORMAL USE:

The device is intended to measure the thickness or mass of essentially flat sheet material in industrial environments.

The expected operating conditions are:

Temperature: 15°C to 50°C

Humidity: 0 to 100%

Pressure: Atmospheric

Vibration: Normal plant machinery vibration

Corrosion: Corrosive liquids sometimes used - probe materials designed to be resistant.

PROTOTYPE TESTING:

The units have been tested by the manufacturer for effects of severe vibration and at temperatures up to 100°C. Continuous vibration in accordance with the Class 4 test of ANSI, NBS Handbook No. 126 was carried out on a shake table. The unit was held at 60°C for several weeks. The shutter was operated in excess of 100,000 open-close cycles. The ANSI classification assigned by the manufacturer is 64-685-985-R4. This is based on tests in accordance with NBS 129, the ANSI classification of the Amersham source and materials of construction.

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EXTERNAL RADIATION LEVELS:

The radiation profiles with the shutter open and closed were taken with a Lansverk R Meter (Figure 4). With the source in the OFF position, the measured radiation is substantially less than 100 mrem/hr at 3.7cm. At 5 cm it is substantially less than 5 mrem/hr.

QUALITY ASSURANCE AND CONTROL:

There is a quality inspection of all incoming components as well as those manufactured by NDC. An independent check is made by a quality assurance inspector who verifies proper construction of each device using specific tests prior to shipment.

LIMITATIONS AND/OR OTHER CONSIDERATIONS OF USE:

1. These devices shall be distributed to persons specifically or generally licensed by the NRC or Agreement States.
2. Initial first use training and all repairs shall be performed by NDC or by persons specifically licensed to do so by the NRC or Agreement States.
3. Relocation shall be performed by NDC or by persons specifically licensed to do so by the NRC or Agreement States.
4. Disposal or transfer shall be only to NDC or to persons specifically licensed by the NRC or Agreement States to dispose of or receive the device.
5. The device shall be tested for radioactive leakage and proper functioning of the on/off mechanism at intervals of not longer than six months. The leak test shall be capable of detecting 0.005 microcuries/4.0 bequerels of removable contamination.
6. General licensees are provided with instructions on calibration and shutter manipulation. The requirement of specific licensure for leak tests, relocation, repair, and disposal is emphasized within the "User Manual".
7. Specific licensees of these devices are expected to seek authorization for leak test collection, shutter checks, and relocation. Such procedures are provided upon installation by NDC.

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LIMITATIONS AND/OR OTHER CONSIDERATIONS OF USE (Continued):

8. Generally licensed users are authorized to follow the manufacturer's directions and collect a leak test sample from the device with the shutter closed. The test must be performed by persons with a specific license. **Generally licensed users are authorized to check the proper functioning of the shutter at intervals not to exceed six months, using instructions provided by the manufacturer. This check must be documented.**
9. This registration sheet and the information contained within the references shall not be changed without the written consent of the California Department of Health Services.

SAFETY ANALYSIS SUMMARY:

Based on our review of the information referenced below we conclude that Model 303 gauge is acceptable for licensing purposes. Furthermore, it is highly unlikely that even specific licensees would receive doses in excess of those specified in 10 CFR 20.1201.

REFERENCES:

The following supporting documents for the NDC Systems Model 303 gauge are hereby incorporated by reference and are made part of this registry document:

1. NDC Systems application dated July 28, 1993, with attached drawings and quality control procedures as modified by the letters with attachments dated December 3, 1993 and January 28, 1994.
2. NBS Handbook No. 126, "ANSI N542, Sealed Radioactive Sources, Classification" (1977)
3. NBS Handbook No. 129, "ANSI N538, Classification of Industrial Ionizing Radiation Gauging Devices" (1979).
4. NDC Systems letters (with attachments), dated December 2, 1994, and March 17, 1995.

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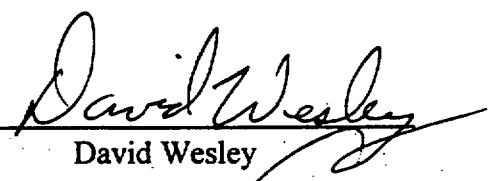
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DEVICE TYPE: Thickness Gauge

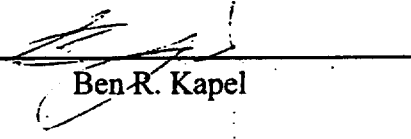
DATE: April 28, 1995

AMENDED BY:

  
David Wesley

DATE: April 28, 1995

CONCURRED BY:

  
Ben R. Kapel

ISSUING AGENCY: California Department of Health Services

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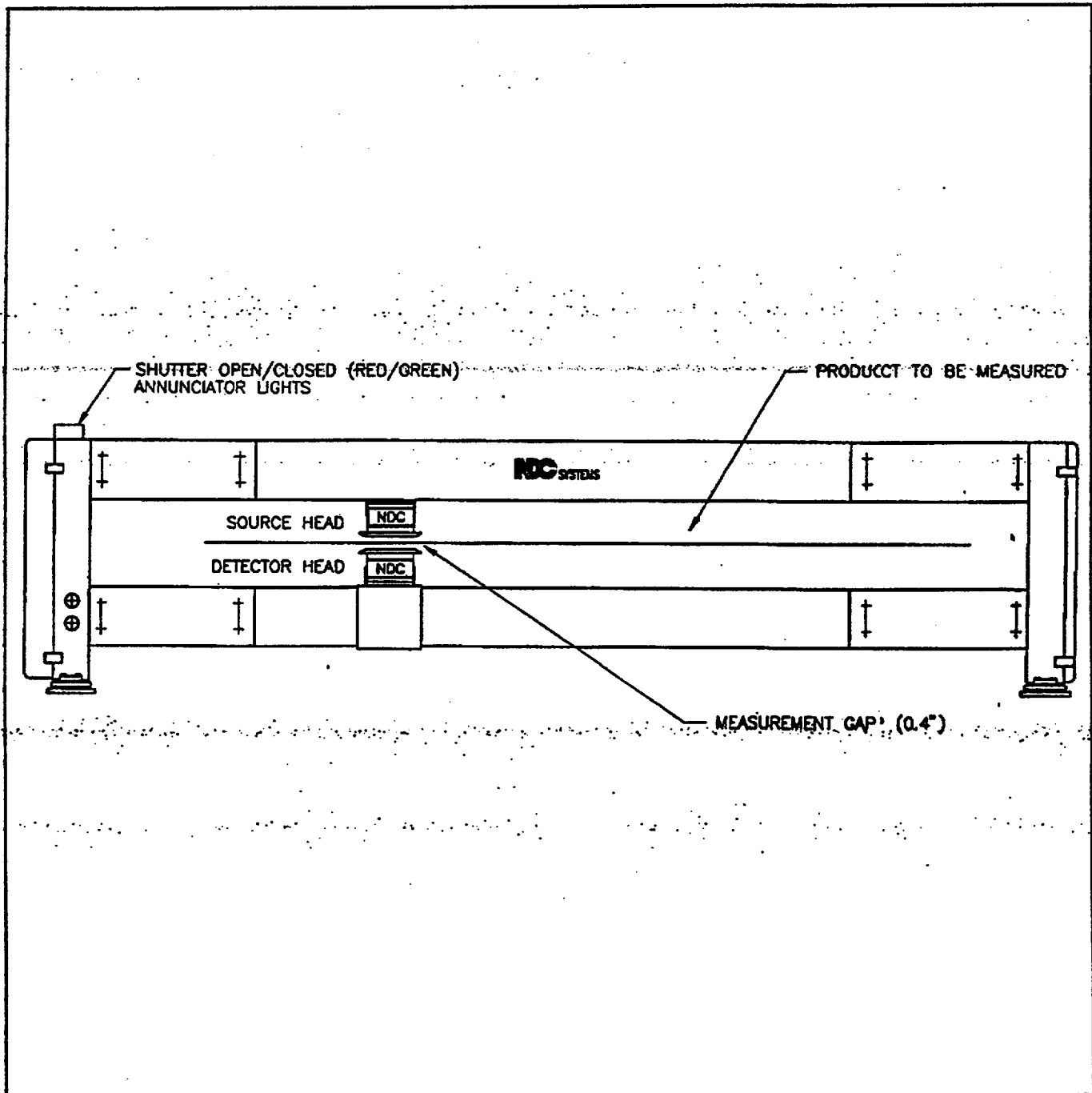


Figure 1: Model 303 Sensor Probe on Traversing Scanner

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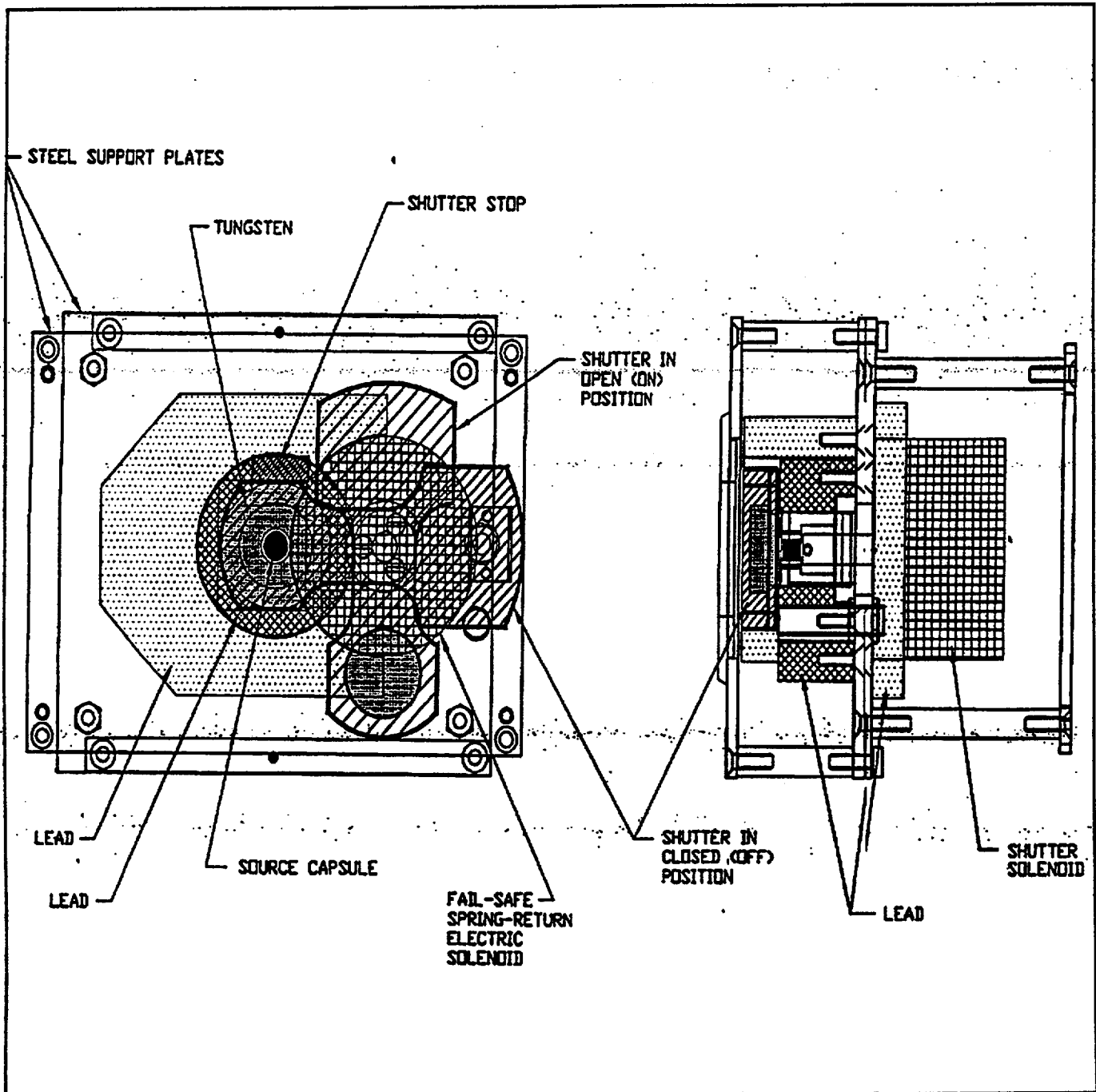


Figure 2: Model 303 Source Holder / Solenoid / Shutter / Shielding Assembly



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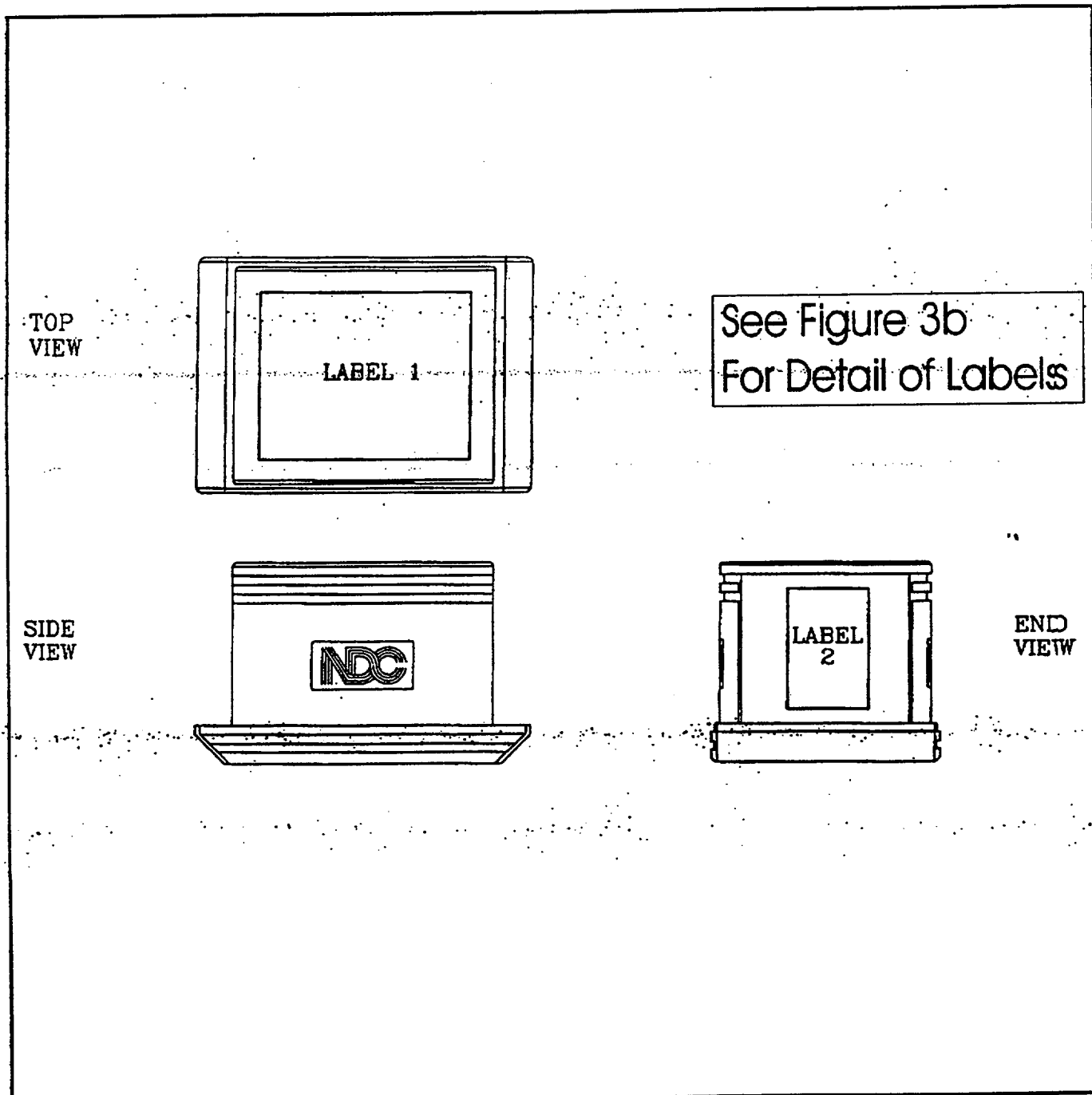


Figure 3a: Model 303 Labeling

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DEVICE TYPE: Thickness Gauge

**NDC SYSTEMS - MONROVIA, CALIFORNIA 91016 - 818-368-1871 - Model 300 Series**

The receipt, possession, use and transfer of this device are subject to a general license or equivalent and the regulations of the U.S. NRC or of a state with which the NRC has entered into an agreement for the exercise of regulatory authority.

Operation of this device shall be immediately suspended until any necessary repairs have been made, if there is any indication of possible failure of, or damage to the shielding or containment of radioactive material or to the shutter mechanism or indicator.

This device shall be tested for proper operation of the on-off mechanism and indicator at intervals not to exceed six months. Generally licensed users may perform the shutter check using instructions provided by the manufacturer in the Radiation Safety Section of the Users Manual.

The sealed radioactive source (Promethium-147 or Strontium-90) contained in this device shall be tested at installation and every six months thereafter for leakage of radioactive material. Krypton-85 does not require this test. Generally licensed users may collect the sample using the instructions provided by the manufacturer in the Radiation Safety Section of the Users Manual. NDC or other specifically licensed persons must perform the test.

Maintenance, tests or other service involving the radioactive material, its shielding and containment shall be performed by persons holding a specific radioactive materials license to provide these services.

Installation, relocation, maintenance, repair and initial radiation survey of this device and leak testing, installation, replacement, and disposal of sealed sources containing radioactive material used in this device shall be performed only by persons holding a specific radioactive material license to provide these services.

This device shall not be transferred, abandoned or disposed of except by transfer to a person holding a specific radioactive material license to receive this device.

Removal of this label is prohibited.

SOLD UNDER CALIFORNIA  
GENERAL LICENSE GL-1933-70

Made in USA

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**CAUTION: RADIOACTIVE  
MATERIAL**

SOLD UNDER CALIF. GENERAL  
LIC. GL-1933-70

NDC SYSTEMS MONROVIA, CA.

MODEL

S/N

SOURCE

STRENGTH

DATE

**DO NOT REMOVE LABEL  
MADE IN U.S.A.**

LABEL 2

Figure 3b: Model 303 Labeling

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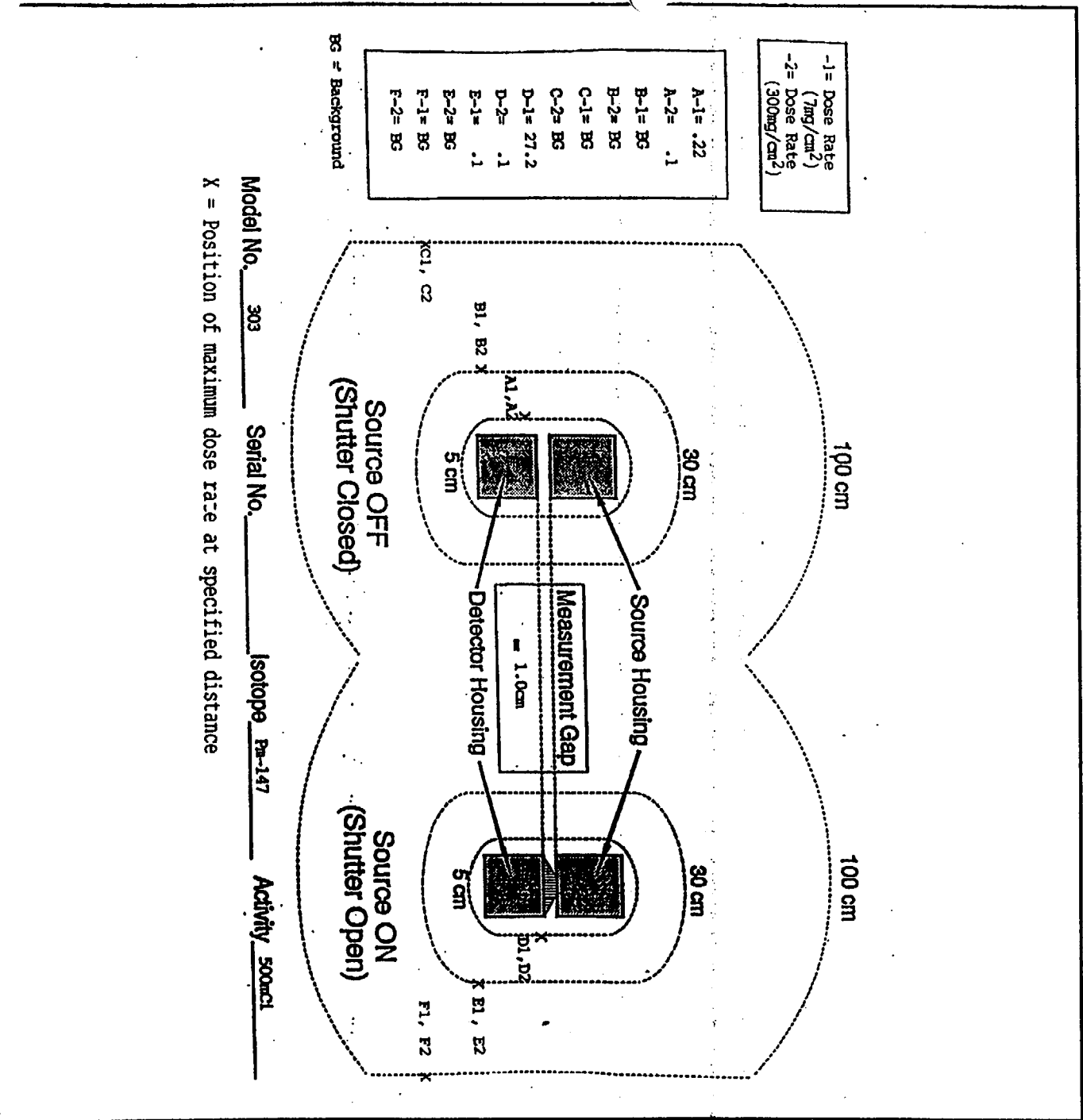


Figure 4: Radiation Profile Model 303 Shutter Open & Closed