



December 17, 1999

Via Certified Mail
Return Receipt # Z 481 135 872

United States Nuclear Regulatory Commission
Region I
475 Allendale Road
King of Prussia, PA 19406

Dear Sir/Madam:

Please accept this letter pursuant to 10 CFR 20.2201(b) as the written followup to the telephone notification to the NRC Operations Center on November 29, 1999 regarding the theft of a Filtec case inspection unit containing 100 millicuries of Americium 241 (NRC event number 36472). This unit was manufactured by Industrial Dynamics Company Limited, Torrance, California, model number CI-2GV, serial number 75009. The radioactive source serial number is 3428. The license for the radioactive source within the unit is held by Industrial Dynamics, under license number 1586-70GL.

This Filtec unit was removed from our manufacturing building and stored in a secured on-site warehouse with other spare parts and equipment during the summer of 1994. A triennial wipe test was last performed on this machine in our warehouse on August 19, 1996 with no leaks found. This spare parts warehouse was cleared of obsolete equipment during the first and second quarters of 1998. Bestfoods personnel segregated the warehouse to assist contractors with equipment removal. The contractor who performed the work was given explicit instructions as to which pieces could be removed from the warehouse. Bestfoods personnel believe that the unit was still in the warehouse after all other obsolete equipment was removed.

The facility became aware of the disappearance of the unit upon a triennial wipe test inspection performed on November 22, 1999. A search of all buildings within the facility was performed to no avail. A visit to the aforementioned contractor who cleared obsolete equipment from the warehouse also failed to locate the unit. This contractor is adamant that no unauthorized pieces were removed from the warehouse. Therefore, we concluded that the unit was stolen from our warehouse between the second quarter of 1998 and November 22, 1999.

According to the manufacturer, the radioactive material for this unit is contained in a ceramic cylinder, sealed by double fusion welds inside a stainless steel capsule. This capsule is mounted in an aluminum box, and this in turn is enclosed in a welded steel housing on the case

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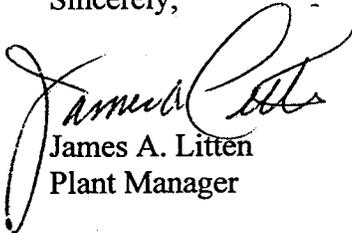
BESTFOODS

inspector support frame. We believe that damage to this unit is unlikely due to its construction. We have attached exposure measurements provided by the manufacturer for your information.

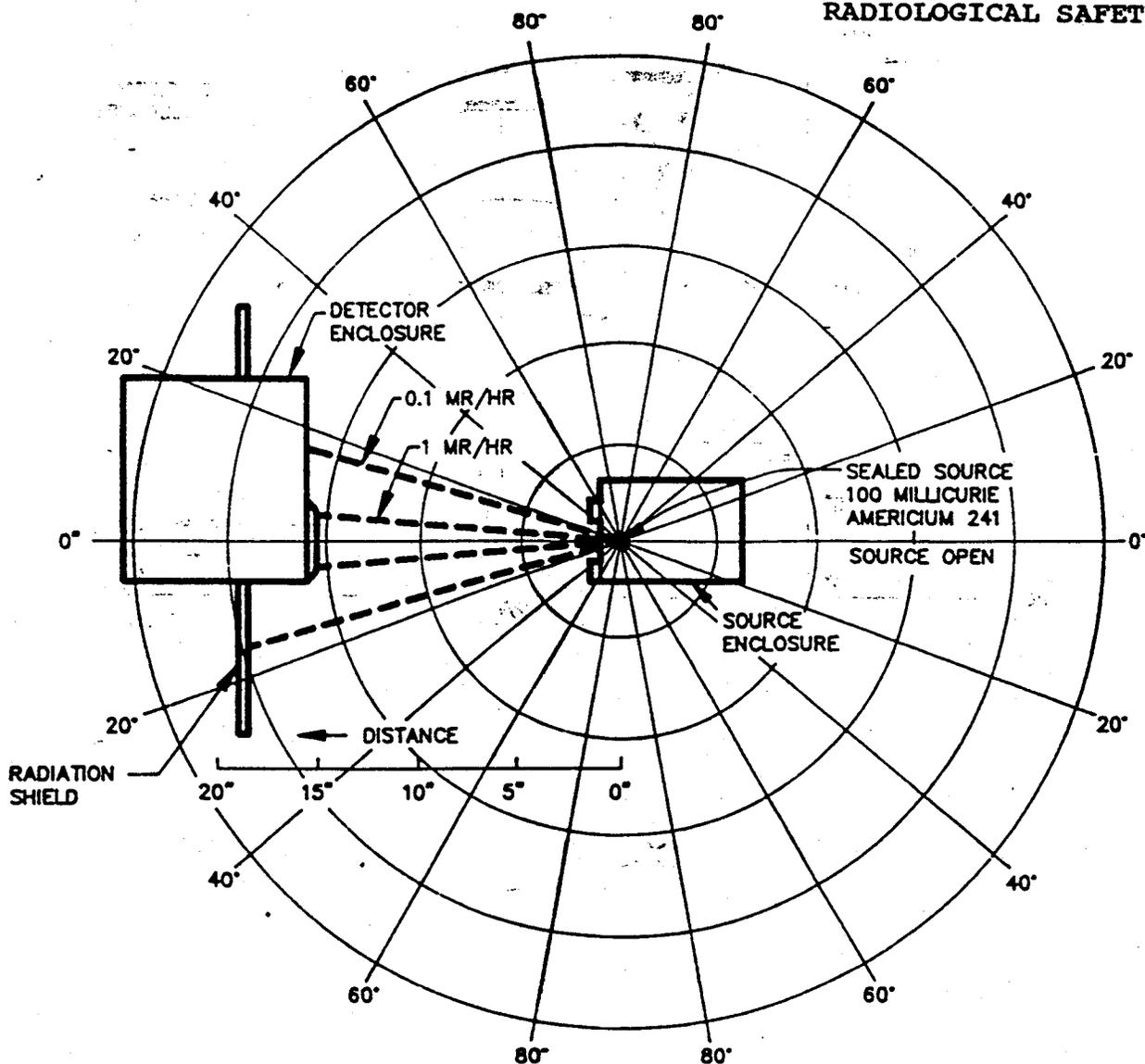
As a result of this incident, we are reexamining the need for all radioactive sources within our facility. Studies are being performed by our engineering and production personnel to replace this equipment with other types of detection devices. We hope all remaining radioactive sources can be returned to appropriate disposal/reuse facilities by the end of 2001.

Please advise should you need any additional information or clarification.

Sincerely,



James A. Litten
Plant Manager



RADIATION DATA

- 1 ALL MEASUREMENTS WERE TAKEN WITH A TECHNICAL ASSOCIATES MODEL PUG-1 SURVEY METER THAT WAS CROSS CALIBRATED AGAINST AN AIR-IONIZATION CHAMBER SURVEY METER WHOSE RESPONSE WAS CORRECTED AGAINST AN AMERICIUM-241 TEST SOURCE.
- 2 SOURCE SHUTTER CLOSED - THE RADIATION LEVELS ARE LESS THAN 0.05 MR/HR AT DISTANCES GREATER THAN 5 CM FROM ANY SURFACE OF THE GAUGE (INCLUDING INSIDE THE TUNNEL).
- 3 SOURCE SHUTTER OPEN - THE EXTENT OF THE MAIN GAMMA BEAM IS COMPLETELY CONTAINED WITHIN THE TUNNEL FORMED BY THE INSPECTION HEADS AND SHIELDING. ALL RADIATION LEVELS OUTSIDE THE MAIN BEAM ARE LESS THAN 0.05 MR/HR.
- 4 EXPOSURE RATE IN MAIN BEAM IS MEASURED TO BE APPROXIMATELY 20 MR/HR AT 5 CM FROM SOURCE ENCLOSURE CONTAINING 100 MILLICURIES.

RADIATION EXPOSURE PROFILES

MODEL CI SERIES CASE INSPECTOR
 WITH 100 mCi SOURCE
 ELEVATION VIEW

FIGURE V

12/88

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE

(AMENDED PAGE December 21, 1995)

NO.: CA378D105G

DATE: October 21, 1988

PAGE: 1 of 12

DEVICE TYPE: Density Gauge

MODEL: CI Series

MANUFACTURER/DISTRIBUTOR: Industrial Dynamics Company, Ltd.
2927 Lomita Boulevard
Torrance, CA 90509
(310) 325-5633

SEALED SOURCE MODEL DESIGNATION: Industrial Dynamics Co., Ltd. Model 06765
and 19567

ISOTOPE: Americium-241 MAXIMUM ACTIVITY: 100 millicuries, Model 06765
300 millicuries, Model 19567

LEAK TEST FREQUENCY: Three (3) years

PRINCIPAL USE: Gamma Gauge (D)

CUSTOM SOURCE: Yes No

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES

SAFETY EVALUATION OF DEVICE

NO.: CA378D105G

DATE: October 31, 1988

PAGE: 2 of 12

DEVICE TYPE: Density Gauge

DESCRIPTION: The case inspector is a density gauge normally mounted over a production conveyor line to detect missing and/or unfilled containers (packages) in a case. It consists of one or two radioactive source assemblies mounted on one side of the conveyor and one or two scintillation detectors mounted on the other side, arranged in a manner so the collimated gamma beam from the source passes through the containers in the case to be inspected and is intercepted by the scintillation detector.

Table I summarizes the differences in the models of the CI Series. There are three differences described in this table: (1) model designation and number of sealed sources, (2) model of sealed source assemblies, (3) modality of the sealed source/detector enclosure assemblies, whether fixed or variable in height.

Table I

<u>Model Designation/No. Sources</u>	<u>Sealed Source Model</u>	<u>Modality</u>
CI-2/1	06765	Fixed
CI-2G/1	06765 or 19567	Fixed
CI-2GV/1	06765 or 19567	Vertically Adjustable
CI-2CC/2	06765 or 19567	Fixed
CI-2CCV/2	06765 or 19667	Vertically Adjustable

Models CI-2G and CI-2CC are modifications of the original Model CI-2 (discontinued) in regard to source/detector mounting configuration, number of sources, gamma beam shields, and case/conveyor configuration. The Model CI-2 incorporated a removable plastic tunnel as a human barrier to guard against inadvertent body exposure to the gamma beam; in the newer models, the plastic tunnel has been replaced by a fixed nonremovable welded tubular steel frame structure. This structure acts as the human barrier and also serves as the mounting platform for the radioactive source and scintillation detector enclosures (inspection heads). The distance between these inspection heads may be varied from 6 to 16 inches depending upon the application. Models designated with the letter "V" have inspection heads that can be manually adjusted by the operator in the vertical direction for different case and container configurations. The overall dimensions of Models CI-2G and CI-2GV are 40 inches high by 36 inches wide by 27 inches long.

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES

SAFETY EVALUATION OF DEVICE

NO.: CA378D105G

DATE: October 31, 1988

PAGE: 3 of 12

DEVICE TYPE: Density Gauge

DESCRIPTION: (Cont.)

Models CI-2CC and CI-2CCV utilize two sets of inspection heads (dual sources and detectors) that can be independently set in the vertical direction at different heights relative to the production conveyor line to examine double tier cases. The configuration of this model is identical to Models CI-2G and CI-2GV except the structure has been made longer to contain the two sets of inspection heads. The overall dimensions of Models CI-2CC and CI-2CCV are 40 inches high by 36 inches wide by 42 inches long.

Each source assembly has two shutters for safety purposes. The primary shutter is manually operated and is an integral part of the radioactive source housing. The secondary shutter is a solenoid driven device that automatically closes and blocks the gamma beam when the source enclosure is removed and/or the production line power is turned off. Red and green indicator lights mounted on the source assembly enclosure show the position of the secondary automatic shutters, red for open and green for shutter closed. See CA378S102S and CA378S107S for source assembly specification.

LABELING:

The Model CI Series are labeled in accordance with Sections 30192.1 and 30278 of the California Code of Regulations (equivalent to 10CFR, Parts 32.5 and 20.203 respectively). The information is provided on a 1/32 inch aluminum sheet fastened with rivets to each source enclosure cover.

DIAGRAM:

Refer to Figures 1, 2, 3, 4, 5, and 6 on pages 4, 5, 6, 7, 8, and 9.

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES

SAFETY EVALUATION OF DEVICE

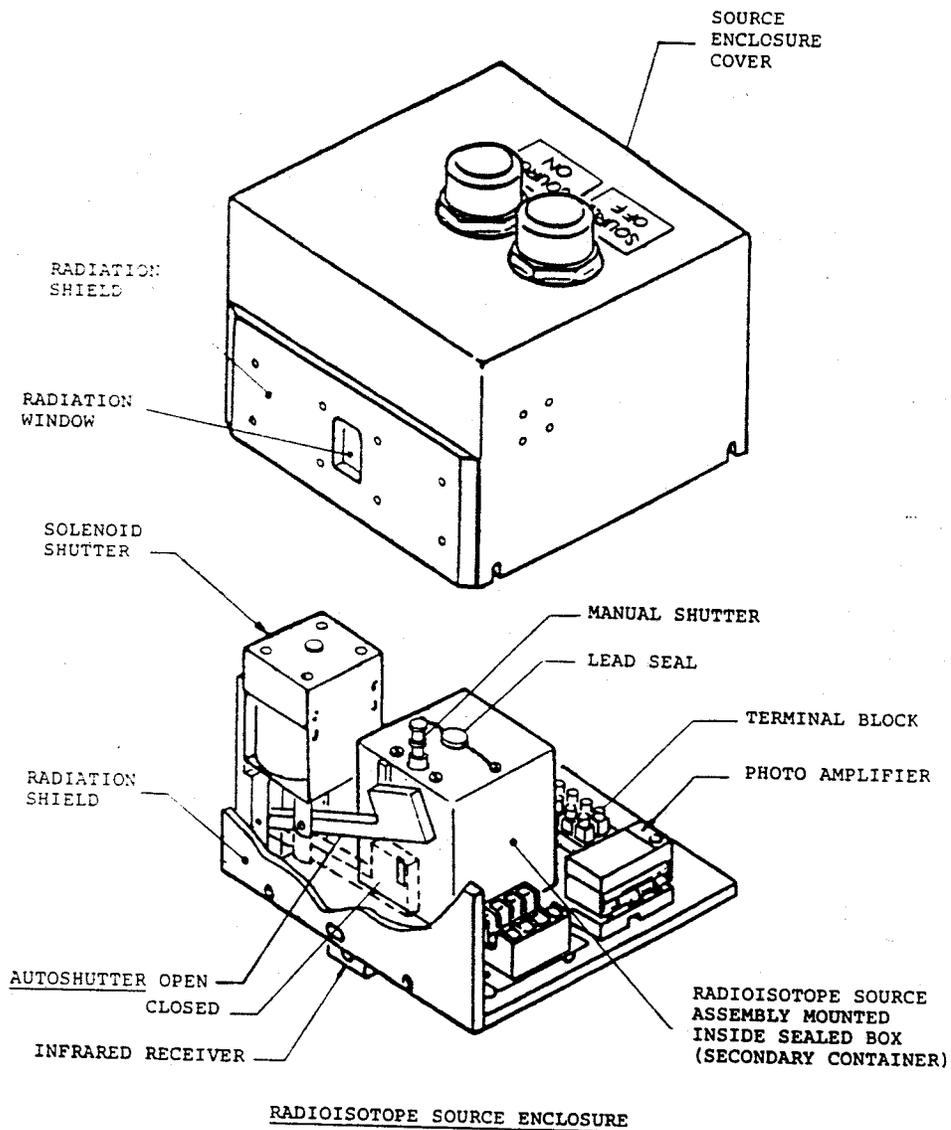
NO.: CA378D105G

DATE: October 31, 1988

PAGE: 4 of 12

DEVICE TYPE: Density Gauge

Figure 1, Source Enclosure in CI Series



REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES

SAFETY EVALUATION OF DEVICE

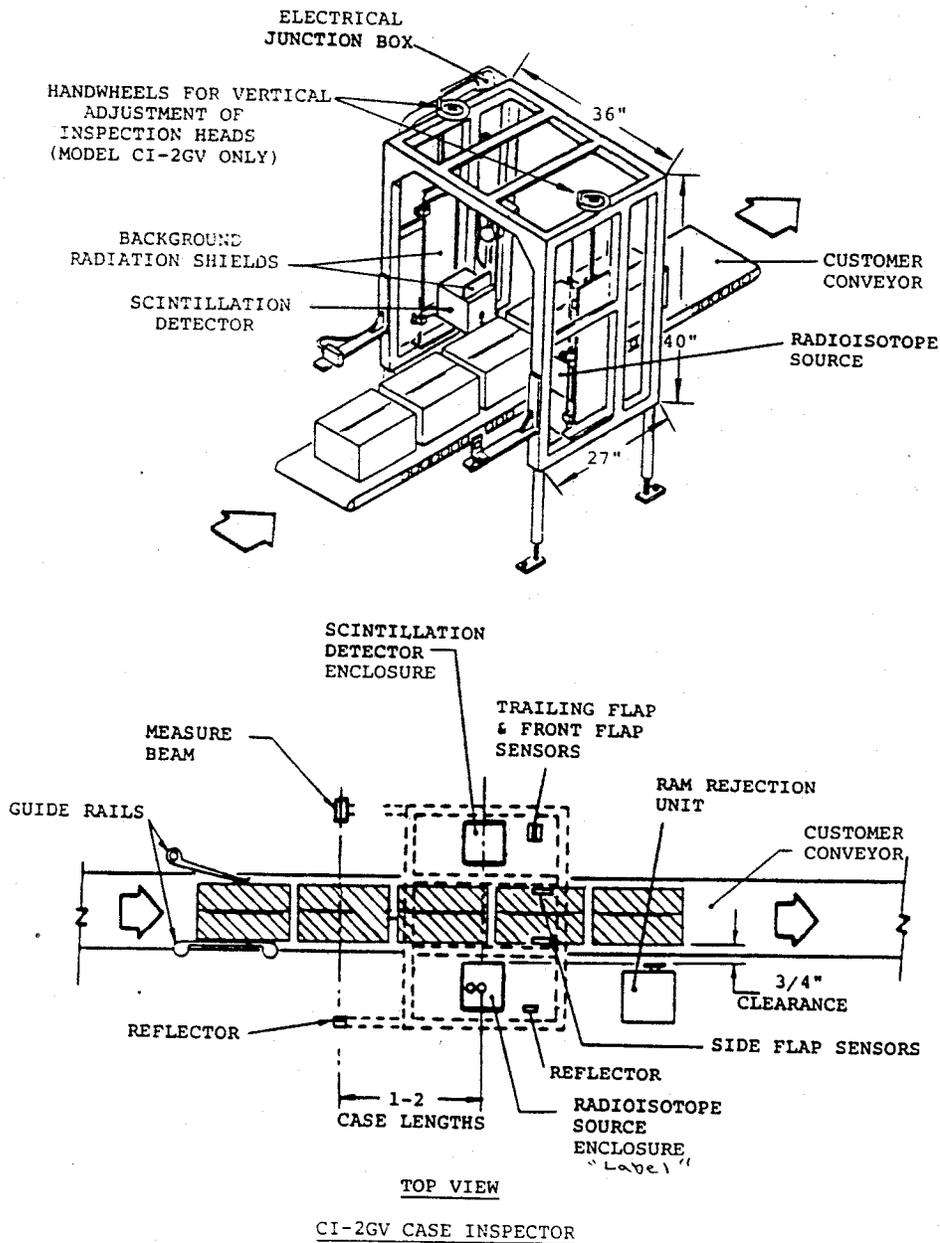
NO.: CA378D105G

DATE: October 31, 1988

PAGE: 6 of 12

DEVICE TYPE: Density Gauge

Figure 3: CASE INSPECTOR MODEL CI-2G SERIES



REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES

SAFETY EVALUATION OF DEVICE

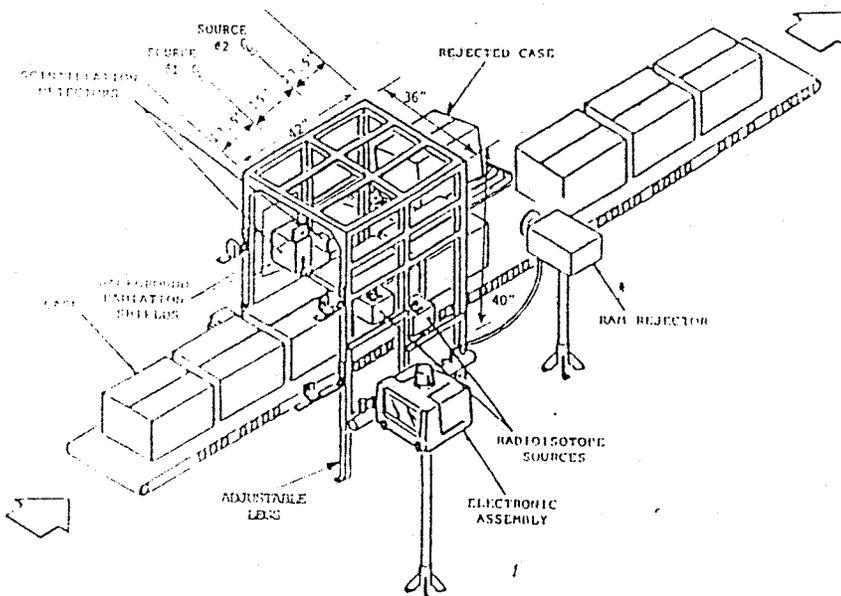
NO.: CA378D105G

DATE: October 31, 1988

PAGE: 7 of 12

DEVICE TYPE: Density Gauge

Figure 4: CASE INSPECTOR MODEL CI-2CC SERIES



REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES

SAFETY EVALUATION OF DEVICE

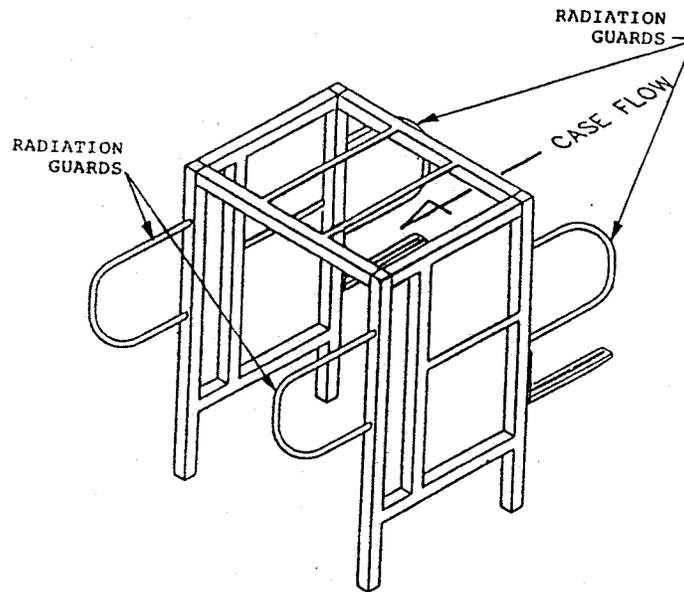
NO.: CA378D105G

DATE: October 31, 1988

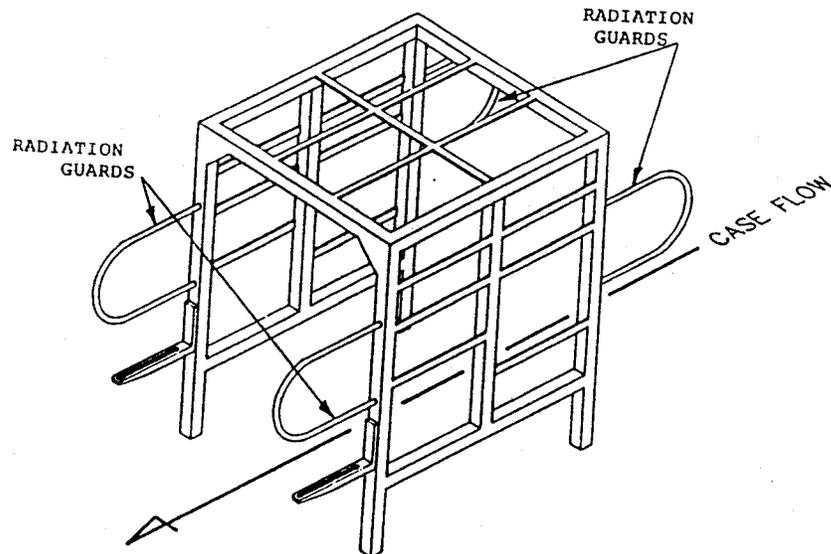
PAGE: 8 of 12

DEVICE TYPE: Density Gauge

Figure 5, Support Frames



CI-2G&GV SUPPORT FRAME



CI-2CC & 2CCV SUPPORT FRAME

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES

SAFETY EVALUATION OF DEVICE

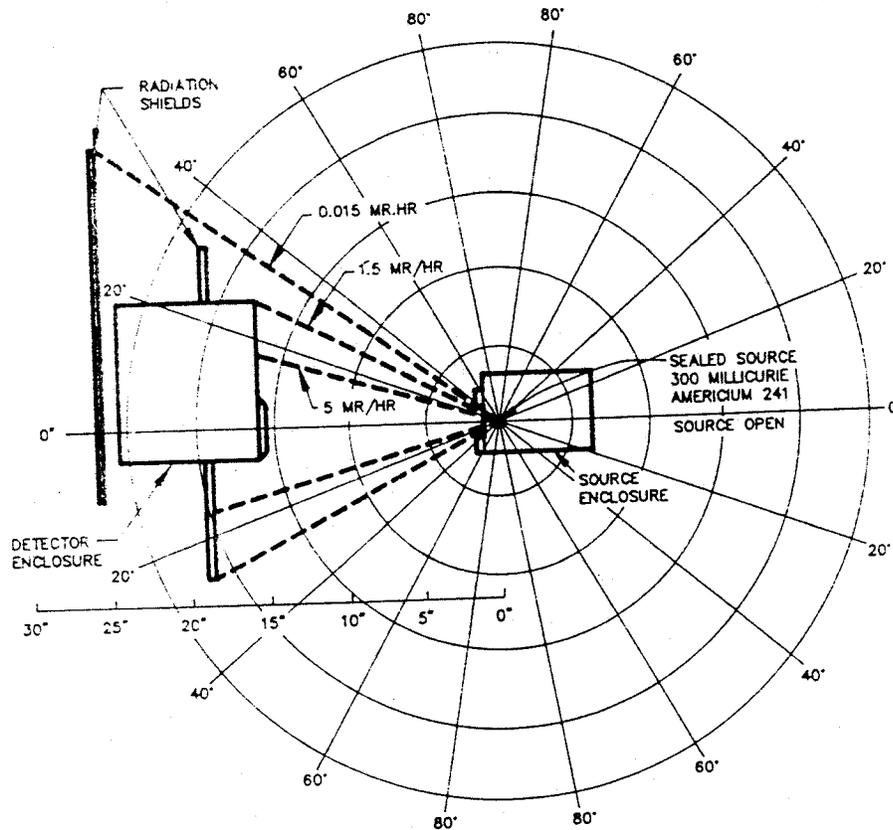
NO.: CA378D105G

DATE: October 31, 1988

PAGE: 9 of 12

DEVICE TYPE: Density Gauge

Figure 6



RADIATION DATA

- 1 ALL MEASUREMENTS WERE TAKEN WITH A TECHNICAL ASSOCIATES MODEL PUG-1 SURVEY METER THAT WAS CROSS CALIBRATED AGAINST AN AIR-IONIZATION CHAMBER SURVEY METER WHOSE RESPONSE WAS CORRECTED AGAINST AN AMERICIUM-241 TEST SOURCE.
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- 4 EXPOSURE RATE IN MAIN BEAM IS MEASURED TO BE APPROXIMATELY 60 MR/HR AT 5 CM FROM SOURCE ENCLOSURE CONTAINING 300 MILLICURIES.

RADIATION EXPOSURE PROFILES

MODEL CI-SERIES CASE INSPECTOR
WITH 300 mCi SOURCE
ELEVATION VIEW

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES

SAFETY EVALUATION OF DEVICE

NO.: CA378D105G

DATE: October 31, 1988

PAGE: 10 of 12

DEVICE TYPE: Density Gauge

CONDITIONS OF NORMAL USE:

The CI Series devices are intended to perform fill level and density measurements in an industrial production environment.

PROTOTYPE TESTING:

Prototype tests have shown that each model of the CI Series gauges meets the classification of ANSI 33-985-985-R2, in accordance with ANSI N. 538, 1979.

EXTERNAL RADIATION LEVELS:

Tests were conducted in accordance with ANSI N. 538, 1979. Each device incorporates a 1/4-inch thick stainless steel plate mounted above, behind, and below the detector enclosure to intercept any stray radiation (Figure 6).

The measured exposure rate in the useful beam (from 300 mCi, Model 19567) is less than 60 mR/hr at 5 cm from the source enclosure. The exposure rate outside the main beam is less than 0.05 mR/hr and is intercepted by the steel plate behind the detector enclosure. With either the manual or automatic shutter in closed position, the exposure rate at 5 cm for the source enclosure is less than 0.05 mR/hr.

QUALITY ASSURANCE AND CONTROL:

Since the source assembly itself is a safe integral unit, the integrity of the source enclosure is important for containment and protection purposes only. The primary quality assurance and control functions that apply to the source enclosure involves the examination and testing of the mounting platform for the source assembly and the retaining/ securing devices for the internal secondary container and source enclosure cover. These items are checked at the time of assembly and again at installation. The mechanical fit between the source assembly and the secondary container is always tested to make sure the manual shutter moves freely and the radiation beam can be turned completely OFF. This can be easily checked

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE

(AMENDED PAGE December 21, 1995)

NO.: CA378D105G

DATE: October 31, 1988

PAGE: 11 of 12

DEVICE TYPE: Density Gauge

QUALITY ASSURANCE AND CONTROL: (contd.)

by visual means and by measuring the output of the detector on the display panel of the system. The automatic shutter is checked for electrical actuation and to be sure it is not binding which would prevent closing.

The limit switches for the automatic shutter are also checked during this procedure.

LIMITATIONS AND/OR OTHER CONSIDERATIONS OF USE:

- a. The device may be used by specific or general licenses of the NRC or Agreement States.
- b. Installation, initial testing, training, and repair shall be performed by Industrial Dynamics Ltd. or persons specifically licensed to do so by the NRC or Agreement States.
- c. Dismantling and relocation shall be performed by Industrial Dynamics, Ltd. or by persons specifically licensed to do so by the NRC or Agreement States.
- d. Disposal or transfer shall be only to Industrial Dynamics, Ltd. or to persons specifically licensed by the NRC or Agreement States to dispose of or receive the device.
- e. **The device shall be tested for leakage and proper functioning of the on/off mechanism by Industrial Dynamics, Ltd. or persons specifically licensed to do so by the NRC or an Agreement State, at the time of installation and at intervals not exceeding three years thereafter. The leak test shall be capable of detecting 0.005 microcuries of removable contamination.**
- f. 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 and test data cited below, we conclude that CI Series gauging device design is acceptable for licensing purposes. Furthermore, we conclude that this device would be expected to maintain its containment integrity for normal conditions of use and accidental conditions which might occur during uses specified in the certificate. The following information is provided to substantiate these conclusions:

- A. The inspection head assembly is made of heavy duty stainless steel sheet metal in a welded configuration. The source assembly is housed in a secondary sealed stainless steel source box assembly that is safety wired into the inspection head.

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE

(AMENDED PAGE December 21, 1995)

NO.: CA378D105G

DATE: October 31, 1988

PAGE: 12 of 12

DEVICE TYPE: Density Gauge

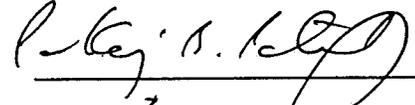
SAFETY ANALYSIS SUMMARY: (contd.)

- B. The inspection tunnel formed by the inspection head structure and the shielding bar is "fixed" at the factory and cannot be changed in the field. This prevents anyone from changing the radiation exposure profile of the device once it leaves the manufacturer's facility.
- C. The design of the gauge, the collimation contained within the source assembly, the external shielding employed on the gauge itself, and the manner in which it is mounted over the production conveyor line makes it virtually impossible for persons operating or working near the device to receive radiation doses in excess of that allowed by the regulations. The only part of the body that can be exposed to the main radiation beam is the hand and forearm, and this must be done by a deliberate act of reaching into the tunnel of the gauge.

REFERENCES:

The following supporting documents for the CI Series device are hereby incorporated by reference and made part of this registry document.

1. Industrial Dynamics Company, Ltd. letter dated October 31, 1986 and as amended by letters (with attachments) dated January 29 and September 12, 1988.
2. Industrial Dynamics Company, Ltd. letter dated February 9, 1995.
3. Industrial Dynamics Company, Ltd. letter with attachments dated July 7, 1995 regarding extension of leak test interval.
4. Industrial Dynamics Company, Ltd. letter dated December 20, 1995 regarding inspection interval for the on-off mechanism of the device.

DATE: December 21, 1995 AMENDED BY: 

DATE: December 22, 1995 CONCURRED BY: 

ISSUING AGENCY: California Department of Health Services

STATE OF CALIFORNIA
DEPARTMENT OF HEALTH

Page 1 of 3 pages

GL

RADIOACTIVE MATERIAL LICENSE

Pursuant to the California Administrative Code, Title 17, Chapter 5, Subchapter 4, Group 2, Licensing of Radioactive Material, and in reliance on statements and representations heretofore made by the licensee, a license is hereby issued authorizing the licensee to receive, use, possess, transfer or dispose of radioactive material listed below; and to use such radioactive material for the purpose(s) and at the place(s) designated below. This license is subject to all applicable rules, regulations and orders of the Department of Health now or hereafter in effect and to any conditions specified in this license.

1. Licensee Industrial Automation Corp	3. License No. 2424-GL is hereby amended in its entirety Amendment No. 2
2. Address P.O. Box 1203 6740 Cortona Drive Goleta, CA 93017	4. Expiration date March 3, 1986
Attention: Robert A. Audell Radiation Safety Officer	5. Inspection agency Division of Occupational Safety & Health-s

- | | | |
|-------------------|---|---|
| 6. Nuclide | 7. Form | 8. Possession limit |
| A. Americium 241 | A. Sealed sources,
Amersham/Searle Model
AMC-36 | A. Not applicable, (see License No. 2273) |

9. Authorized use

- A. The licensee is authorized to distribute an Industrial Automation Corporation Fill Level Inspector Gauge Model 19000AS to persons generally licensed pursuant to Title 17, California Administrative Code, Section 30192 (c)(1).

10. This license is subject to an annual fee of twenty (20) dollars due and payable on the anniversary of the date of issue of this license, March 3, 1973.

11. Each Model 19000AS Gauge distributed under this license shall contain not more than 125 millicuries of Americium 241.

12. Except as specifically provided otherwise by this license, the licensee shall possess and use radioactive material described in Items 6, 7, and 8 of this license in accordance with statements, representations and procedures contained in the following documents:

- (a) letter (with attachments) dated April 23, 1979 signed by Michael H. Dunn.
- (b) letter dated February 22, 1973 signed by Robert Audell and enclosures thereto.
- (c) letter dated November 30, 1972 signed by Philip R. Gantt and enclosures thereto.
- (d) letter dated October 16, 1972 signed by Philip R. Gantt and enclosures thereto.
- (e) Completed form RH 3065 dated September 20, 1972 signed by Robert A. Audell and enclosures thereto.
- (f) letter dated September 19, 1972 signed by Philip R. Gantt and enclosures thereto.
- (g) letter dated August 11, 1972 signed by John Handloser.
- (h) letter dated August 9, 1972 signed by John Handloser and enclosures thereto.
- (i) letter dated July 31, 1973 signed by Robert Audell and enclosures thereto.

STATE OF CALIFORNIA
DEPARTMENT OF HEALTH SERVICES

Page 2 of 3 pages

RADIOACTIVE MATERIAL LICENSE

License Number 2424-GI

Supplementary Sheet

Amendment Number 2

continued

13. Each gauge distributed under this license shall bear durable, clearly visible labels containing the radiation caution symbol of purple or magenta on a yellow background, the words "Caution-Radioactive Material," the quantity and isotope contained, the date of assay, the manufacturer's name and address, the model and serial number of the gauge head and statements as follows:
- (a) "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."
 - (b) "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."
 - (c) "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 the on-off mechanism or indicator."
 - (d) "This device shall be tested for proper operation of the on-off mechanism and indicator at intervals not to exceed six months."
 - (e) "The sealed radioactive source contained in this device shall be tested at installation and every six months thereafter for leakage of radioactive material."
 - (f) "Maintenance, tests or other service involving the radioactive material, its shielding and containment shall be performed by persons holding a specific radioactive material license to provide these services."
 - (g) "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."
 - (h) "Each label required under this condition shall bear the legend 'Removal of this label is prohibited.'"
14. The licensee shall furnish each licensee to whom it transfers a gauge described in this license with the following:
- (a) A copy of an instruction manual containing the radiation safety instruction sheet.

RADIOACTIVE MATERIAL LICENSE

License Number 2424-GL

Supplementary Sheet

Amendment Number 2

continued

14. (cont'd)

- (b) A copy of the general license contained in Title 17, California Administrative Code, Section 30192(c)(2) and all sections of the California Administrative Code, referenced in Section 30192(c)(2) or the equivalent portions of regulation of the United States Nuclear Regulatory Commission or of an Agreement State.

The general licensee shall receive regulations referenced above of the agency which has regulatory responsibility for byproduct material at the general licensee's address.

- (c) The address and telephone number of the nearest office of the agency having regulatory responsibility for byproduct material at the general licensee's address.

15. The licensee shall report all transfers of radioactive material under this license. Reports shall be filed with the agency having regulatory responsibility for byproduct material at the generally licensed recipient's address within 30 days after the end of each calendar quarter in which such transfer has occurred. These reports shall specify:

- (a) The name and address of the regulatory agency to whom the report is directed.
- (b) The authority for transfer, i.e., the name of the licensee specified in Item 1 of this license, and the license number specified in Item 3.
- (c) The name and address of the generally licensed recipient.
- (d) The numbers and models of devices, together with an indication of nuclides and quantities contained in each device transferred to said recipient.

Copies of all reports required by this condition shall be maintained subject to inspection by representatives of the Department.

For the State Department of Health Services

Date May 28, 1980

by

Oliver D. Zalla Ph.D.

RH 2551 (9/79)

Radiologic Health Section

714 P Street, Sacramento, CA 95814

III