

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE

NO.: NR-1018-D-101-E DATE: December 20, 1996 PAGE 1 OF 6

DEVICE TYPE: Explosives Detector

MODEL: Ion Mobility Spectrometer (IMS) Detector Series

DISTRIBUTOR: CPAD Technologies Inc.
The Galson Building
6601 Kirkville Road
East Syracuse, NY 13057

MANUFACTURER: CPAD Technologies Inc.
66 Slater Street
Ottawa, Ontario
Canada
K1P 5H1

SEALED SOURCE MODEL DESIGNATION: NRD Model N1001

<u>ISOTOPE:</u>	<u>MAXIMUM ACTIVITY:</u>
Nickel-63	3.3 millicuries (1.2 GBq)

LEAK TEST FREQUENCY: Not required

PRINCIPAL USE: (N) Ion Generator, Explosives Detector

CUSTOM DEVICE: _____ YES _____ X _____ NO

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DEVICE TYPE: Explosives Detector

DESCRIPTION:

The Ion Mobility Spectrometer (IMS) detector is contained within other devices to detect organic compounds. The complete device is designed to protect life and property by detecting explosives.

The IMS is installed as a component inside other devices, which are intended for both fixed and portable use. Uses range from operating in an airport type environment to field conditions where the conditions are those expected for exterior operation. The device may be mounted to a vehicle, but will not be installed in a fixed unprotected position outside, open to the environment. CPAD Technologies Inc. claims that the IMS can operate at temperatures of up to 260°C (500°F), can withstand corrosive atmospheres and vibration expected to be encountered during use, and because the device works in a dry nitrogen atmosphere, humidity and corrosion are not a problem. The device has no moving parts, as such it is not subject to fatigue.

The IMS detector measures 1.86 inches (4.72 cm) in length and 2.5 inches (6.75 cm) in diameter. The IMS detector is installed in what is referred to as the Analytical Unit. The Analytical Unit is a metal box measuring 12 inches (30.48 cm) in length, 6.75 inches (17.15 cm) in height, and 2.5 inches (6.35 cm) in depth. The Analytical Unit is then contained within a security closet.

The Ni-63 source is pressed into a recessed hole in a sheet of aluminum which is fitted into the Teflon source holder subassembly. The source is sandwiched into place in the source holder subassembly with an aluminum tube secured by two stainless steel bolts. This aluminum tube is used to form the ionization chamber. The source holder subassembly is then attached to the aluminum source base secured with two stainless steel screws. The source base is then attached to the aluminum base secured with four tamper proof screws. These tamper proof screws have an internal hex head with a pin that requires a special tool for their removal. The IMS detector is now securely fastened inside the Analytical Unit using three stainless steel screws.

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DESCRIPTION (Contd.):

The model number is a 15 character number. It is described as follows: (a) the first three letters will be IMS; (b) the next two will be either NI for devices using a Ni-63 source or PD for devices using photo ionization; (c) the next letter will either be P for particle capture and detection or a V for vapor capture and detection; (d) the next three numbers will represent the voltage, i.e., 110, 220, or 024 volts; (e) the next two will represent the current, i.e., AC or DC; and (f) the last four numbers will be the number on the IMS. The serial number is an eight digit number. It is described as follows: (a) the first two will be the year of manufacture; (b) the next three will be the Julian date of manufacture; and (c) the last three will be the number produced on a specific day.

LABELING:

The device is labeled in accordance with 10 CFR 32.29(b). An additional label is placed on the outside of the Analytical Unit which contains information similar to that on the label on the point of sale package.

DIAGRAM:

See Attachments 1, 2, and 3.

EXTERNAL RADIATION LEVELS:

The device contains a Ni-63 source which emits low energy beta radiation. The source is completely surrounded by aluminum with a wall thickness of 0.78 inches (2 cm), which is sufficient to absorb all of the radiation emitted by the source. Therefore, radiation levels on the detector's surface will be indistinguishable from background.

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LIMITATIONS AND/OR OTHER CONSIDERATIONS OF USE:

- The device shall only be used as a component in explosive detectors.
- The device will be used by individuals exempt from regulatory requirements pursuant to 10 CFR 30.20.

SAFETY ANALYSIS SUMMARY:

Based on our review of CPAD Technologies' model IMS detector, and the information and test data cited below, we conclude that the product is designed and manufactured so that:

- In normal use and disposal of a single exempt unit, and in the normal handling and storage of the quantities of exempt units likely to accumulate in one location during marketing, distribution, installation, and servicing of the product, it is unlikely that the external radiation dose in any one year, or the dose commitment resulting from the intake of radioactive material in any one year, to a suitable sample of the group of individuals expected to be most highly exposed to radiation or radioactive material from the product will exceed the dose to the appropriate organ as specified in Column I of the following table.
- It is unlikely that there will be a significant reduction in the effectiveness of containment, shielding, or other safety features of the product from wear and abuse likely to occur in normal handling and use of the product during its useful life.
- In use and disposal of a single exempt unit, or in handling and storage of the quantities of exempt units likely to accumulate in one location during marketing, distribution, installation, and servicing of the product, the probability is low that the containment, shielding, or other safety features of the product would fail under such circumstances that a person would receive an external radiation dose or

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SAFETY ANALYSIS SUMMARY (Contd.):

dose commitment in excess of the dose to the appropriate organ as specified in Column II of the table below, and the probability is negligible that a person would receive an external radiation dose or dose commitment in excess of the dose to the appropriate organ as specified in Column III of the table below.

TABLE OF ORGAN DOSES (Rem)

<u>Part of the body</u>	<u>Col. I</u>	<u>Col. II</u>	<u>Col. III</u>
WB, head, trunk, gonads, eyes	0.005	0.5	15
Extremities, skin	0.075	7.5	200
Other organs	0.015	1.5	50

Based on review of CPAD Technologies' model IMS detector, and the information and test data cited below, we conclude that this device is acceptable for licensing purposes.

Furthermore, we conclude that the model IMS detectors would be expected to maintain their containment integrity for normal conditions of use and accidental conditions which might occur during uses specified in this certificate.

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REFERENCES:

The following supporting documents for the Model IMS Detector organic compound detector are hereby incorporated by reference and are made a part of this registry document.

- CPAD Technologies Inc.'s (Canada) application received July 10, 1996 (no date on letter), letters dated September 23, 1996, October 11, 1996, October 24, 1996, and November 5, 1996, and facsimiles dated September 4, 1996, September 23, 1996, October 25, 1996, November 6, 1996, November 15, 1996, December 13, 1996, December 16, 1996 (2), and December 19, 1996, with enclosures thereto.

ISSUING AGENCY:

U.S. Nuclear Regulatory Commission

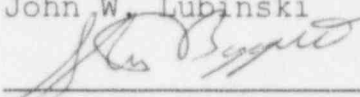
Date: December 20, 1996

Reviewer:


John W. Lubinski

Date: December 20, 1996

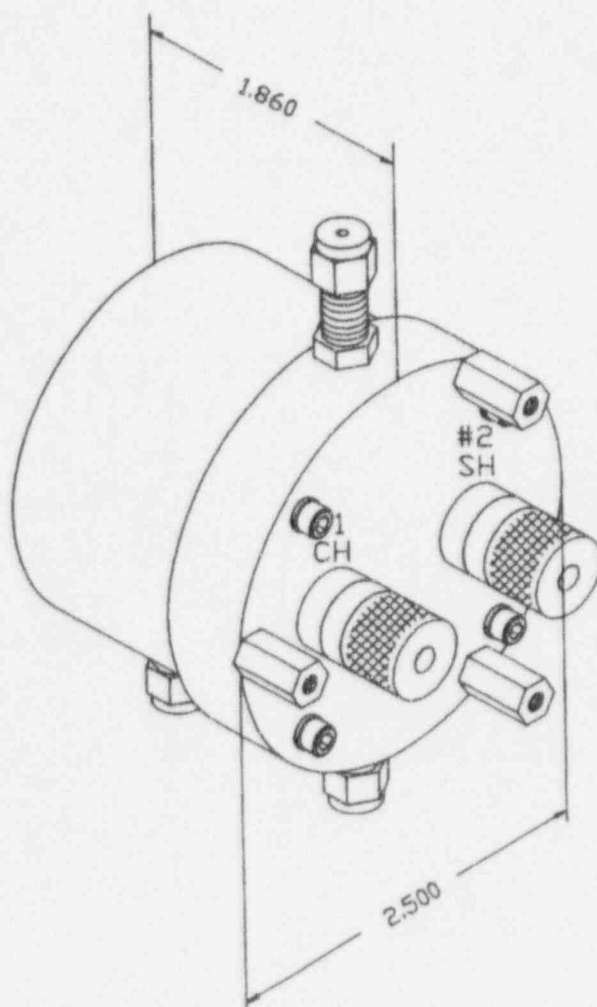
Concurrence:


Steven L. Baggett

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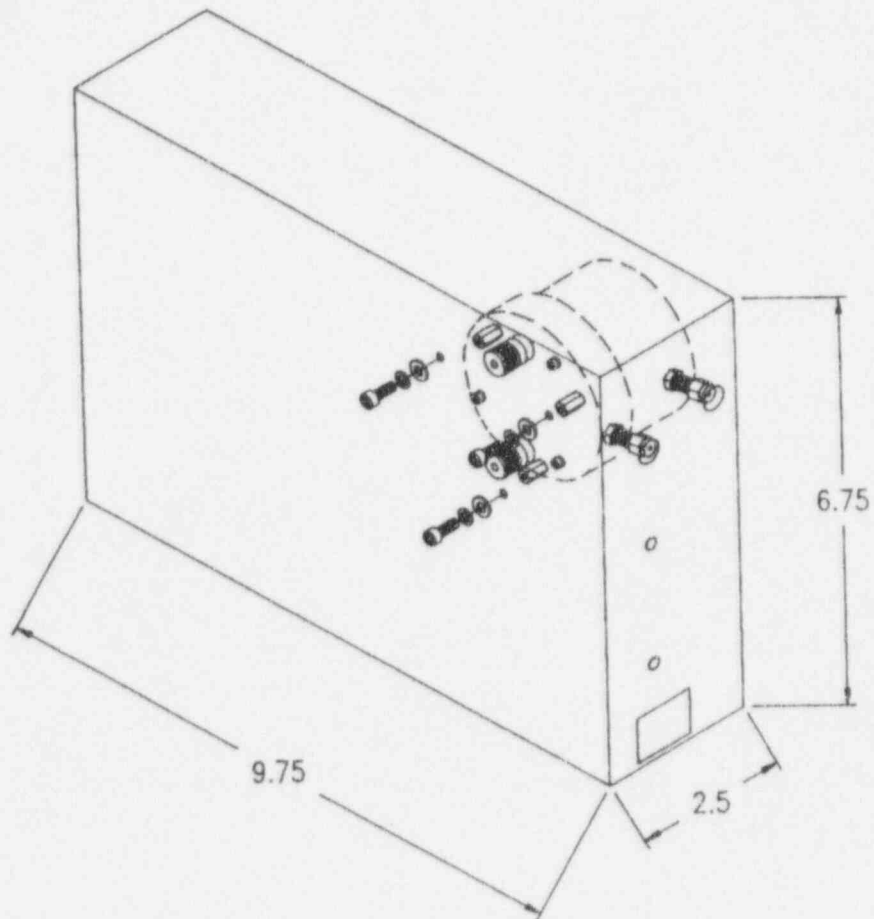


IMS Detector

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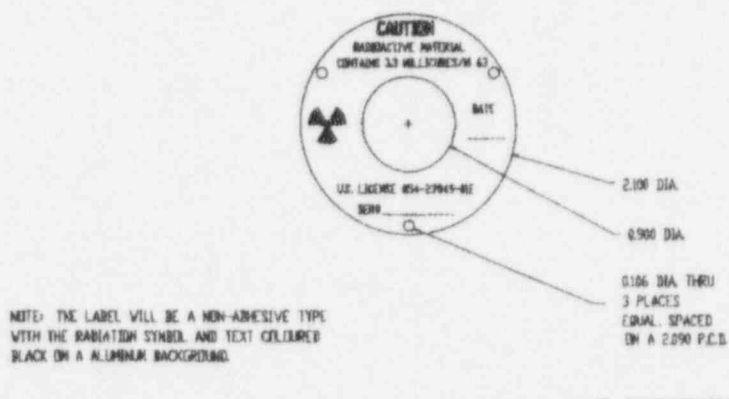


Analytical Unit

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IMS Radiation Warning Label