REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE

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DEVICE TYPE: Chemical Agent Detector

MODEL: M3A1

DISTRIBUTOR: Department of the Army
U.S. Army Armament Material Readiness Command
(DRSAR-SF)
Rock Island, IL 61299

MANUFACTURER: Any specific licensee of the NRC or an Agreement State that is under contract to the Department of the Army.

SEALED SOURCE MODEL DESIGNATION: Amersham Corporation Foil Source Model AMM1001

ISOTOPE: Americium-241 MAXIMUM ACTIVITY: 250 microcuries

LEAK TEST FREQUENCY: 36 months (see Limitations and/or Other Considerations of Use)

PRINCIPAL USE: (P) Ion Generators, Smoke Detectors

CUSTOM DEVICE: X YES ____ NO

CUSTOM USER: U.S. Department of Defense

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DESCRIPTION:

The Model M43A1 chemical agent detector is made up of three major components: (1) the electronics package, (2) the air pump assembly and (3) the detector cell assembly which contains the Americium source. These three components are secured in a high impact plastic case. The use of these components allows rapid non-technical repair of a unit in the field. The device also has an optional battery pack that can be secured to the bottom of the device or it can be powered by a 24-volt supply line. The device can be a portable unit or a mounted at a fixed location, depending on the situation. The unit has been constructing using materials that provide for its use in a wide range of environs.

LABELING:

The source housing is labeled with the trefoil symbol isotope, activity, date of assay, the words, "Caution-Radioactive Material," and the words, "Radiation Exposure Can Occur When Cell Module Is Opened, Cell Module Should Not Be Dis-Assembled." Additionally, the outside of the case is labeled with the isotope, activity, trefoil symbol, the words, "Caution-Radioactive Material," the words, "Control Disposal Required," and the words, "If Found, Return To Nearest Military Activity."

DIAGRAM:

See attachment.

CONDITIONS OF NORMAL USE:

The device will be used in ambient environmental conditions throughout the world as an automatic chemical agent alarm.

PROTOTYPE TESTING:

The foil source design used in the device has been deemed acceptable for licensing purposes by the NRC. See registration sheet No. NR-136-S-174-U for additional information. Additionally, the Radiochemical Center in England (Amersham) subjected the foil source to the following tests:

- Specified form per requirements of IAEA transportation.
- Isotope testing in accordance with 1968 requirements.
- Exposure to sulphur dioxide, ammonia, hydrogen sulfide, hydrochloric acid, salt spray, and ozone.

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PROTOTYPE TESTING (Cont'd):

- o Immersion in simulated body fluid.
- c Abrasion tests
- o Elevated temperature tests up to 1200°C.
- o Vibration tests
- o Exposure to cleaning fluids, ethel, acetore trichlorcethylene.

The manufacturer reported no leakage above .005 microcuries for any of the foil sources tested.

The entire device was subjected to environmental testing as required by Military Standard 810C. The device was subjected to tests that simulated the worst conditions that may arise during field use. Devices were smear tested after each test. No leakage in access of .005 microcuries was reported.

EXTERNAL RADIATION LEVELS:

The Department of the Army reports that:

- o The maximum radiation dose from the detector is 0.6 mr/hr at the surface, .04 mr/hr at six inches and 0.005 mr/hr at 36 inches.

- o The maximum radiation dose rate from the cell module (source housing) are 1.4 mr/hr at the surface, 0.7 mr/hr at six inches and 0.06 mr/hr at 36 inches.

These readings were taken directly in front of the foil face. In other directions the levels are insignificant.

QUALITY ASSURANCE AND CONTROL:

The devices are to be manufactured by a company under contract to the U.S. Department of the Army. The contract clearly specifies what is to be the acceptable specification of the device. Also, devices are periodically tested by the Army to ensure that they meet these specifications. Any device that does not meet the specifications is deemed not acceptable for use until the problem can be corrected by the manufacture.

LIMITATIONS AND/OR OTHER CONSIDERATIONS OF USE:

- o The device shall be distributed by the Department of the Army Hq, U.S. Army Armament Material Readiness Command, Rock Island, IL., for use by the Department of Defense anywhere deemed acceptable by the licensee.

- o Handling, storage, use, transfer, and disposal shall be determined by the licensing authority.

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LIMITATIONS AND/OR OTHER CONSIDERATIONS OF USE (Cont'd):

- The areas where the cell modules are repaired or stored should be tested for removable contamination at a time interval to be determined by the Department of the Army, Radiation Safety staff.
- This registration sheet and the information contained within the references shall not be changed or transferred without the written consent of the NRC.
- In view of the extended leak test interval, the applicant should develop an accountability control program to keep track of all devices in storage and use.
- The devices shall be leak tested at 36-month intervals using procedures as described in the licensees application dated March 29, 1982.

SAFETY ANALYSIS SUMMARY:

The Model M43A1 chemical agent detector has been designed to give fast, accurate readings of the concentration of specific gases and to warn of concentration that may be hazardous to the persons deployed in that area.

Based on our review of the information and test data cited below, and that the device will be used by persons trained in its use, we conclude that the chemical agent detector design is acceptable for licensing purposes.

Furthermore, we conclude that the devices would be expected to maintain their containment integrity of the source for the uses specified in this certificate.

REFERENCES:

The following supporting documents for the Model M43A1 chemical agent detector are hereby incorporated by reference and are made a part of this registry document:

- U.S. Department of the Army, Hq., ARRCOM, Rock Island, IL., application dated March 29, 1982, with enclosures thereto and letter dated June 3, 1983.

ISSUING AGENCY:

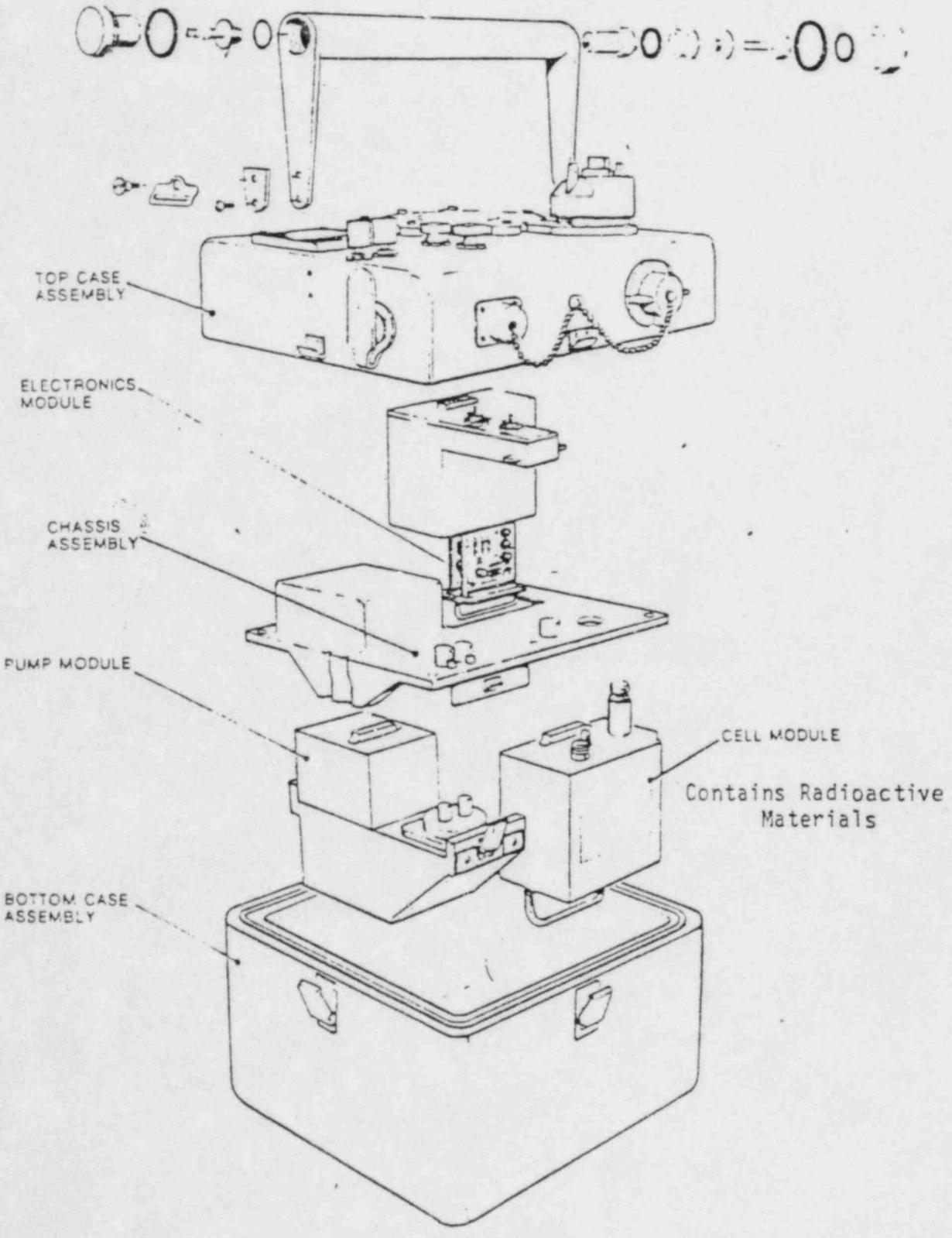
U.S. Nuclear Regulatory Commission

Date: JUN 15 1983 Reviewer: Don Bayne

Date: JUN 15 1983 Concurrence: Joseph M. Bowing

NO: NR-155-D-118-S

DATE: JUN 1 5 1983



Isometric Sketch of the M43A1 Detector Unit