REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE
(AMENDED IN ITS ENTIRETY)

NO: NR-1129-D-101-S DATE: **June 6, 2002** PAGE: 1 OF 8

(supercedes NR-0155-D-125-S)

DEVICE TYPE: Chemical Agent Detector

MODEL: GID-3

DISTRIBUTOR: **Department of the Army**
U.S. Army Soldier and Biological Chemical Command (SBCCOM)
ATTN: AMSSB-RIM(N)
Kansas Street
Natick, MA 01760-5000

MANUFACTURER: Graseby Dynamics Limited
Park Avenue
Bushey, Hertfordshire
England WD2 2BW

ISOTOPE:
Nickel-63

MAXIMUM ACTIVITY:
30 mCi (1.11 GBq) (2 sources at 15 mCi (0.56 GBq) each)

SEALED SOURCE MODEL DESIGNATION: AEA Technology QSA, Inc. (formerly Amersham Corporation) Model NBC or NBCD

LEAK TEST FREQUENCY: Variable - see Limitations

PRINCIPAL USE: (N) Ion Generators, Chromatography

CUSTOM DEVICE: X YES _____ NO

CUSTOM USERS: All U.S. Federal Government agencies

DESCRIPTION:

The Graseby Ionics Detector-3 (GID-3), also known as the M22 Automatic Chemical Agent Alarm, is a portable gas detector used by military personnel to detect concentrations of hazardous chemicals. The GID-3 contains two ion mobility spectrometry (IMS) cells, each containing a Ni-63 plated source of up to 15 mCi (0.56 GBq). The device is designed to be either operated on the ground or mounted for use on military vehicles. The GID-3 has dimensions of 5.0 x 6.0 x 9.0 inches (12.7 x 15.2 x 22.9 cm) and weighs 10.63 pounds (4.8 kg).

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When the device has all of its accessories attached, it weighs 23.65 pounds (10.6 kg).

Each IMS cell consists of two parts: the cell assembly and drift tube assembly. The cell assembly contains the Ni-63 source. The source is held in place by a cylindrical source screen made of stainless steel with three equally spaced internal tabs. The cylindrical source and the screen are housed in a polymeric insulator with a cover within the cell assembly. Each IMS cell is inserted into a bore of a machined block of aluminum alloy that has been nickel plated. There are two bores, one for each cell, adjacent to each other in the block of aluminum material. One end of the drift tube assembly is fastened to the air inlet manifold by four screws which have thread locking sealant applied to them at assembly. The opposite end of the assembly is attached to a manifold assembly by four screws. This arrangement closes off the radioactive source with the exception of the sampling air passages which are a nominal 0.06 inches (1.5 mm) in diameter.

Access to the IMS cells and the internal mechanisms of the device, such as the pump assemblies, is made through the top and bottom plates of the device's case. These plates are held in place by screws requiring special tools to remove.

As of May 1999, the eight screws which attach the manifolds to each end of the drift tube body are button head style tamper resistant screws.

DESCRIPTION (cont.):

In December 1999, this certificate was amended to remove the New England Nuclear Model NER-004R source as a source approved for use in the device. The device distributor states that there have been no devices manufactured or distributed that have contained the NER-004R source.

LABELING:

The device is labeled in accordance with 10 CFR 20.1901 and 1904. In addition to the labeling on the outside of the device, each IMS cell is labeled with the following wording: "Ionising source, Ni63, and 560 MBq," and the standard radiation trefoil. The module assembly containing the two IMS cells is labeled with a serial number. Prior to July 2001, the cells were labeled with the nominal 10 mCi (370 MBq). As of July 31, 2001, the cells are labeled with the maximum activity of 15 mCi (560 MBq). During the period of January 25, 2001, to July 30, 2001, cells labeled with the nominal activity can continue to be distributed to Department of Defense licensees.

DIAGRAM:

See Attachments 1 and 2.

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CONDITIONS OF NORMAL USE:

The device will be used in ambient environments throughout the world, both outdoors and indoors. The device will be used for the detection of military chemical agents. The device may be stored in temperatures in the range of -62 ± 3^0C to 71 ± 3^0C (-80 ± 3^0F to 160 ± 3^0F) and used in temperatures in the range of -30 ± 3^0C to 52 ± 3^0C (-22 ± 3^0F to 126 ± 3^0F) and relative humidity in the range of 5 to 100%. The device is also expected to withstand the vibration experienced during use in vehicles, both on the move and stationary. The expected useful life of the device is 15 years, based upon previous military devices of a similar nature and purpose, technology advancement, physical wear, DOD affordability, and threat.

PROTOTYPE TESTING:

The Department of the Army reports that the device was extensively field tested by the Department of Defense. The range of environmental and physical tests that the GID-3 was put through are found in Military Standard 810E, "Environmental Test Methods and Engineering Guidelines." This standard provides direction on how to conduct the tests, number of cycles, and all physical conditions. The specific tests are developed in accordance with this standard and incorporate the environmental and physical conditions in which the devices will be subjected. These tests are described in the ACADA System Performance Specification document. Among others, the device was prototype tested by performing drop tests from two different heights, several different vibration tests simulating shocks and different types of vehicles, and temperature and humidity extremes.

EXTERNAL RADIATION LEVELS:

The Department of the Army reported there is no detectable radiation on any accessible surface of the device. The device contains two Ni-63 sources which emit low energy beta radiation. The sources are completely surrounded by aluminum with a wall thickness sufficient to absorb all of the radiation emitted by the sources. Therefore, radiation levels on the detector's surface will be indistinguishable from background. The Department of the Army demonstrated this by placing a thermoluminescent dosimeter facing the IMS cell modules as close as possible for over 27 hours. The results showed that there is no measurable dose (less than 0.0005 rem [5 uSv]) over this time period.

QUALITY ASSURANCE AND CONTROL:

The devices are to be manufactured by a company under contract to the Department of the Army. Under this contract, the company must follow an approved Quality Program Plan and Configuration Management Plan. Prior to a change being made in either program, the

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Department of the Army must give its approval. In addition, the Defense logistics Agency Defense Contracts Management Command (DCMC) provides oversight of the manufacturer to ensure conformance to the Quality Program Plan and Configuration Management Plan. DCMC provides direct feedback to the GID-3 program office regarding potential areas of concern and recommended corrective actions.

LIMITATIONS AND/OR OTHER CONSIDERATIONS OF USE:

- The device shall be distributed by the Department of the Army, U.S. Army Soldier and Biological Chemical Command (SBCCOM), ATTN: AMSSB-RIM(N), Commander, Kansas Street, Natick, MA 01760-5000 for use by any U.S. Federal Government agency anywhere authorized by the applicable specific license.

- Custom users other than Department of Defense are limited to perform only external maintenance on the detector, with the exception of the modular sieve pack. For all internal maintenance and repair, with the exception of the modular sieve replacement, the detector will be returned to the Army for repair either by the manufacturer or by trained Department of Defense personnel/contractors.

- 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.

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

- Reviewer Note: Department of Defense (D**O**D) licensees must ensure that only trained maintenance personnel will have access to internal mechanisms of the Model GID-3 to effect necessary repairs of the device and that operators of the device are permitted to only provide maintenance on components on the exterior of the device. None of the repair activities **should** require non-D**O**D users to open the source housing cells nor have any direct contact with the Ni-63 sources.

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

- The device shall be leak tested using techniques capable of detecting 0.005 microcurie (185 Bq) of removable contamination, using procedures as described in the licensees application dated March 29, 1982, and at the following intervals:

  After any removal and reinstallation of the same source module, a leak test will be performed taking a sample from the outer surface of the module at a point that is the most directly accessible to the nickel-63 source.

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After replacement with a new source module, a leak test will be performed on the new source module taking a sample from the outer surface of the module at a point that is the most directly accessible to the nickel-63 source.

- In addition to a leak test, the module membrane will be inspected after repair involving disassembly of the source module: (a) a visual inspection of the module membrane will be performed to detect any signs of damage or deterioration, and if any such signs are detected, the source module shall not be put back into service until the membrane has been replaced or repaired by a person authorized by an NRC or an Agreement State license to perform this activity; and (b) in any event, a leak test will be performed prior to the source module being sealed, taking a sample from the most directly accessible point available to the nickel-63 source, with due care not to damage the source or the membrane.

- Prior to July 2001, the cells were labeled with the nominal 10 mCi (370 MBq). As of July 31, 2001, the cells are labeled with the maximum activity of 15 mCi (560 MBq). During the period of January 25, 2001, to July 30, 2001, cells labeled with the nominal activity can continue to be distributed to Department of Defense licensees**.**

- This registration sheet and the information contained within the references shall not be changed without the written consent of the NRC.

SAFETY ANALYSIS SUMMARY:

Based on our review of the information contained in the references cited below, and that the device will be used by persons trained in its use, we continue to conclude that the Department of the Army has provided sufficient information to provide reasonable, assurance that:

1. The device can be safely operated, in accordance with the limitations set forth in this registration certificate and in the references listed below, by the custom users listed on this registration certificate specifically licensed by the NRC; and

2. Under ordinary conditions of handling, storage, and use of the device, the radioactive material contained in the device will not be released or inadvertently removed from the device and it is unlikely that an operator will receive in 1 year an occupational dose in excess of the annual limits specified in 10 CFR 20.1201(a).

Based on review of the Model GID-3, and the information and test
data cited herein, we continue to conclude that the device is acceptable for custom licensing purposes.

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

REFERENCES:

The following supporting documents for the GID-3 design are hereby incorporated by reference and are made a part of this registry document:

- Department of the Army application dated October 3, 1996, letters dated February 18, 1997, February 24, 1997, and April 24, 1997, with enclosures thereto.
- Department of the Army facsimiles dated January 17, 1997, and August 5, 1997.
- Department of the Army e-mails dated February 7, 1997, February 25, 1997, April 9, 1997, April 10, 1997, April 28, 1997, and May 1, 1997.
- Department of the Army materials hand delivered on May 15, 1997.
- Department of the Army letters dated October 21, 1999, October 22, 1999, December 9, 1999, December 29, 1999, February 25, 2000, April 14, 2000, August 17, 2000, December 6, 2000, December 8, 2000 (re: GID-3), December 8, 2000 (re: M43A1 and CAM/ICAM), January 16, 2001, and February 2, 2001, with enclosures thereto.
- Department of the Army electronic mail received January 8, 2001.
- AEA Technologies (US) letter dated December 6, 2000.
- **Department of the Army electronic mail received April 4, 2002.**

ISSUING AGENCY:

U.S. Nuclear Regulatory Commission

Date: **June 6, 2002** Reviewer: /***RA***/
Ujagar S. Bhachu

Date: **June 6, 2002** Concurrence: /***RA***/
John P. Jankovich

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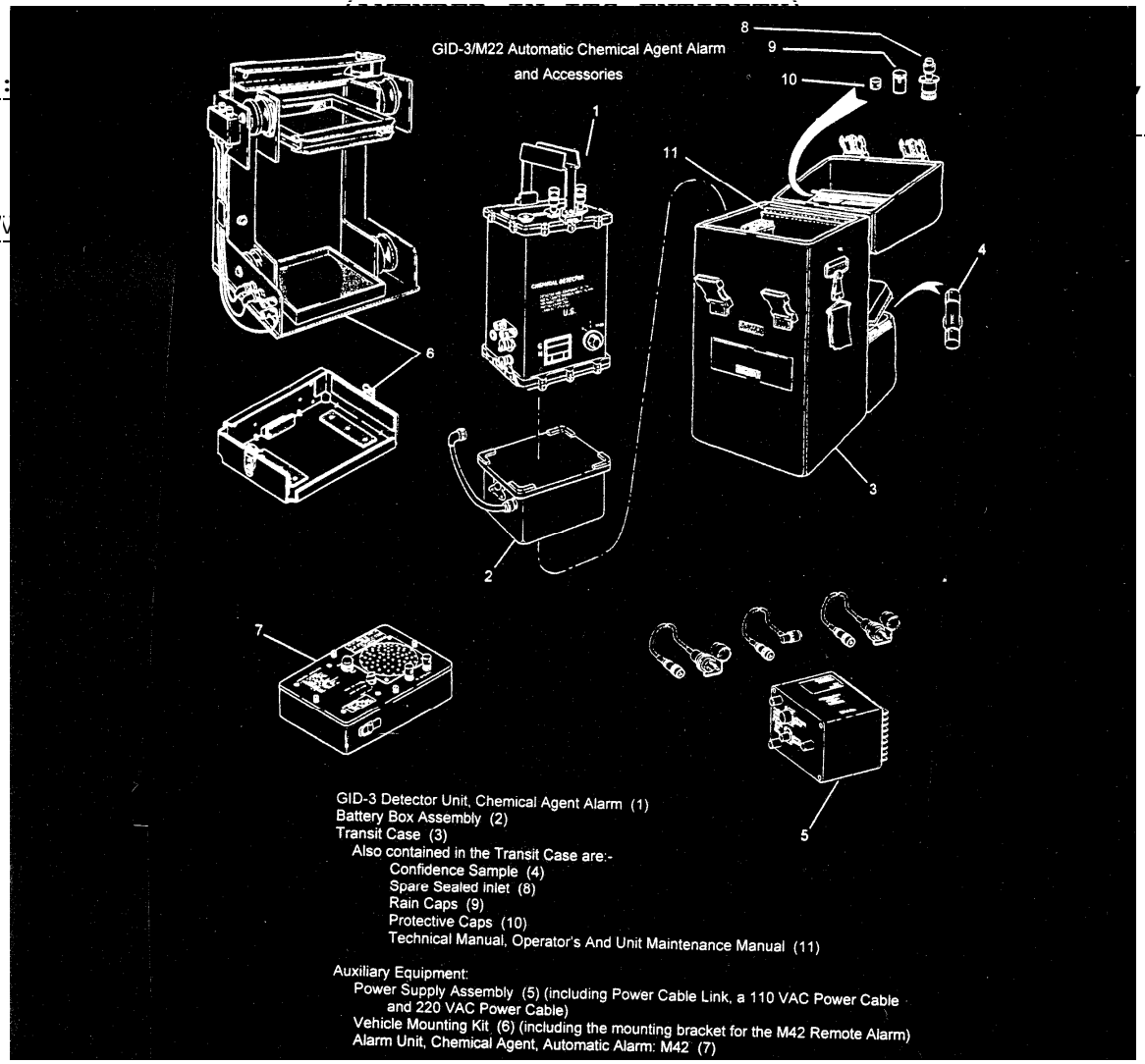
DEV



GID-3 and Accessories