

31 March 1972

MILITARY SPECIFICATION

LIQUID SCINTILLATION SYSTEM FOR
RADIOACTIVE FIRE CONTROL

1. SCOPE

1.1 This specification covers a liquid scintillation system hereinafter referred to as "system".

2. APPLICABLE DOCUMENTS

2.1 The following documents of the issue in effect on date of invitation for bids form a part of this specification to the extent specified herein:

SPECIFICATIONS

Military

MIL-F-13926 Fire Control Materiel, General Specification
Governing the Manufacture and Inspection of

STANDARDS

Military

MIL-STD-105 Sampling Procedures and Tables for
Inspection by Attributes

MIL-STD-109 Inspection Terms and Definitions

MIL-STD-810 Environmental Test Methods

3. REQUIREMENTS

3.1 Sample capacity.- The system shall be capable of accepting a minimum of 25 samples for counting.

3.2 Isotopes.- The system shall be capable of measuring the removable radiological contamination from promethium 147 (Pm 147) and tritium (H3) sources.

3.3 Counting accuracy.- This requirement shall be met at temperatures of 70° Fahrenheit (F) and 85°F. Corrected counting accuracy in disintegrations per minute (DPM) shall be within ten percent of the true count when counted for a period yielding 2000 disintegrations.

3.4 Automatic counting.- The system shall be capable of automatically recording the correct count in DPM of each sample.

3.5 Low-count rejection.- The system shall be capable of rejecting samples having a count less than 400 counts per minute.

3.6 Operating voltage.- The current required to operate the system shall be 115 ±10 volts, 60 cycles.

3.7 Size and weight.- Size of the system shall not exceed 25 cubic feet. Shipping weight shall not exceed 1000 pounds.

3.8 Transit case.- The transit case shall provide protection for the system against shock and vibration which may be encountered during shipment.

3.8.1 Transit case design.

3.8.1.1 Materials.- The case shall be constructed of aluminum, plastic, or a three or more ply combination resin-bonded material and strong enough to meet the requirements of this specification.

3.8.1.2 Corners.- All corners shall be rounded with at least a 1/2 inch radius.

3.8.1.4 Latches.- The case shall be provided with quick-opening, spring-loaded, or pull-down tension type latches.

3.8.1.5 Rainfall.- The shipping container shall be capable of withstanding Procedure I of the Rain Test defined in MIL-STD-810 with no visible evidence of water penetration.

3.8.1.6 Reusability.- The case shall be designed to be reusable.

3.8.1.7 Forklift provisions.- The case shall be designed to permit lifting and transportation by forklift vehicles.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection.- Unless otherwise specified in the contract or purchase order, the supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified, the supplier may utilize his own facilities or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.1.1 General provisions.- The component and subassembly inspection requirements of MIL-F-13926 form a part of the quality assurance provisions of this specification. Definitions of inspection terms shall be as listed in MIL-STD-109.

4.2 First article (initial production) approval.- The requirement for first article approval and responsibility (Government or contractor) for first article testing shall be as specified in the contract. The sample for first article approval tests shall consist of one (1) system manufactured in the same manner, using the same materials, equipment, processes, and procedures as used in regular production. All parts and materials, including packaging and packing, shall be obtained from the same source of supply as used in regular production.

4.2.1 Government testing.- When the Government is responsible for conducting first article approval tests, the contractor, prior to submitting the sample to the Government, shall inspect the sample to insure that it conforms to all the requirements of the contract and submit a record of this inspection with the sample, including certificates of conformance for materials.

4.2.2 Contractor testing.- When the contractor is responsible for conducting first article approval tests, the sample shall be inspected by the contractor for all the requirements of the contract. The sample and a record of this inspection, including certificates of conformance for materials shall be submitted to the Government for approval. The Government reserves the right to witness the contractor's inspection.

4.3 Inspection provisions.

4.3.1 Submission of product.- Unless otherwise specified by the contracting officer, inspection lot size, lot formation and presentation of lots shall be in accordance with "Submission of Product" provisions of MIL-STD-105.

4.3.2 Final acceptance inspection.- Subsequent to first article approval, examinations and tests related to Section 3 shall be performed on a single defect basis in accordance with MIL-STD-105. Unless otherwise specified, the characteristics noted in Table I shall be inspected or tested on a 100% basis.

TABLE I

| <u>Characteristic</u> | <u>Requirement</u> | <u>Test Method</u> |
|-----------------------------|--------------------|--------------------|
| 101. Sample capacity | 3.1 | Visual-tactile |
| 102. Isotopes | 3.2 | 4.6.1 |
| 103. Counting accuracy | 3.3 | 4.6.2 |
| 104. Automatic counting | 3.4 | 4.6.2 |
| 105. Low-count rejection | 3.5 | 4.6.2 |
| 106. Operating voltage | 3.6 | 4.6.2 |
| 107. Size and weight | 3.7 | 4.6.3 |
| 108. Transit case-corners | 3.8.1.2 | 4.6.3 |
| 109. Transit case - cover | 3.8.13 | 4.6.3 |
| 110. Transit case - latches | 3.8.1.4 | 4.6.3 |

4.3.3 Acceptance and rejection.- Rejected lots shall be screened for all defective characteristics. Removal or correction of defective units and resubmittance of rejected lots shall be in accordance with

"Acceptance and Rejection" as specified in MIL-STD-105.

4.4 Special sampling.- The first article sample shall be subjected to the tests specified in Table II. The sample shall have successfully met the requirements specified in Table I and Table III. Subsequent acceptance shall be by certification.

TABLE II

| <u>Characteristic</u> | <u>Requirement</u> | <u>Test Method</u> |
|---------------------------------------|--------------------|--------------------|
| 301. Transit case - shock & vibration | 3.8 | 4.6.4 |
| 302. Transit case - rainfall | 3.8.1.5 | 4.6.5 |

4.5 Certification.- Certification shall include test data and results from all material specified below. Certification shall be required prior to performing final acceptance and shall suffice for the remainder of the contract provided the manufacturing processes and techniques used to produce the items for which certification was issued have not been revised or changed. Any alteration in processes, techniques or materials that indicate an adverse change in performance capabilities or reliability as determined by the contracting officer shall require a new certification.

TABLE III

| <u>Characteristic</u> | <u>Test data to comply with</u> |
|--|---------------------------------|
| 401. Transit case - materials | 3.8.1.1 |
| 402. Transit case - reusability | 3.8.1.6 |
| 403. Transit case - fork lift provisions | 3.8.1.7 |

4.6 Test Methods and Procedures

4.6.1 Isotopes. - The system shall be calibrated to measure sources of tritium (H^3) and promethium (PM^{147}) radioactive contamination. The radioactive measurements shall be compared to standard traceable to the National Bureau of Standards.

4.6.2 Counting accuracy.- This test shall be performed at room ambient temperatures specified in 3.3. The system shall be energized as specified in 3.6. Samples of the radioactive contaminants shall be placed into containers and thoroughly mixed with the scintillation liquid to obtain a homogeneous mixture. The samples shall then be placed into the system. The system shall measure, count and automatically record the disintegrations counts as specified in 3.3 and 3.4. Samples having a low count as specified in 3.5 shall be rejected.

4.6.3 Transit case design.- The size and weight, corner construction, cover and latches shall be inspected by utilizing standard shop type measuring equipment, scales and tactile means to comply with the requirements specified in 3.7; 3.8.1.2; 3.8.1.3 and 3.8.1.4.

4.6.4 Transit case - Shock and Vibration.- This test shall be performed as specified in MIL-F-13926, Procedure IV, TABLE XII. The duration of the test shall be for one-half (1/2) hour at each of the indicated speeds. At the conclusion of the test, the system and transit case shall be inspected by visual and tactile means for evidence of physical damage.

4.6.5 Transit case - Rainfall.- The case shall be tested as specified in MIL-STD-810, Method 506, Procedure I. At the conclusion of the test, the case shall be visually inspected for water penetration of physical damage.

5. PREPARATION FOR DELIVERY - Not Applicable

6. NOTES

6.1 The liquid scintillation system is primarily intended to measure removable radiological contamination from Pml47 and H3 sources.

Custodian:

Army - MU

Preparing Activity:

Army - MU

Project No. 1290-A209