

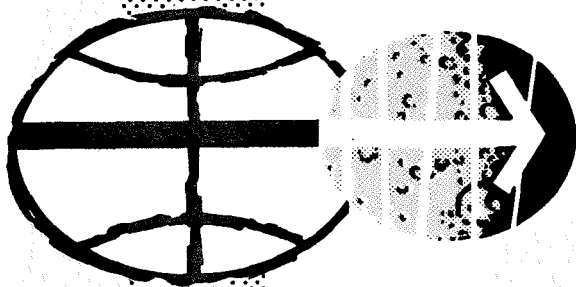


NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

APOLLO

LUNAR SURFACE SCIENTIFIC

DATA RECOVERY REQUIREMENTS



MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

April 7, 1969

APOLLO LUNAR SURFACE SCIENTIFIC DATA RECOVERY REQUIREMENTS

EASEP/LGE

Prepared by General Electric Company

for

Lunar Surface Project Office
Manned Spacecraft Center
Houston, Texas

under

Contract NASw-410
Task Order MSC No. 38

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PREFACE

This document presents operational requirements and precautionary information related to the recovery and return of Apollo Lunar Surface Scientific Data from Mission G-1.

Questions and comments should be directed to the Lunar Surface Operations Planning Office, TD4, HU3-2055.

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1.0 INTRODUCTION

1.1 PURPOSE

This document presents the requirements and precautions involved in the return to the Manned Spacecraft Center of lunar surface scientific data and equipment from the first Apollo lunar landing mission. The primary purpose of specifying these procedures is to assure the safe, timely handling of these lunar surface data after recovery of the spacecraft.

1.2 SCOPE

The requirements and precautions presented in this report apply to the handling and transport of lunar surface scientific data during the return of this data from the recovery zone to the MSC Lunar Receiving Laboratory after the first Apollo lunar landing mission.

1.3 BACKGROUND

The uncertainty associated with the possible existence of life forms on the Moon has necessitated quarantine recovery and return procedures for the crew and equipment of the first Apollo lunar landing mission. Quarantine of the crew and the spacecraft will be accomplished through the use of the Mobile Quarantine Facility (MQF). The MQF will be transported by ship from the Pacific Ocean recovery zone to a planned port and from there flown to Houston and the MSC Lunar Receiving Laboratory. Certain lunar surface scientific data and biomedical

samples must be analyzed as soon as possible after Command Module recovery. For these data special handling provisions will be provided to allow safe air transport from the ship to Houston.

1.4 REFERENCES

| <u>Title</u> | <u>Number</u> | <u>Date</u> |
|---|---|---------------|
| Preliminary Recovery Planning Information Apollo 11 | None | 16 Apr. 1969 |
| Recovery Quarantine Familiarization Manual | Preliminary Draft Copy - Not Yet Released | -- |
| Lunar Receiving Laboratory (MSC Building 37) Facility Description | -- | 10 Sept. 1968 |
| EASEP Familiarization Manual | EASEP-MF-01 | 31 Jan. 1969 |

2.0 LUNAR SURFACE SCIENTIFIC DATA AND EQUIPMENT

This section presents brief descriptions of the individual items of lunar surface scientific data and equipment for which recovery and handling requirements are defined in this document.

2.1 APOLLO LUNAR SAMPLE RETURN CONTAINER (ALSRC)

Two ALSRC's (P/N EM 64416) will be used to return the bulk of the lunar soil samples. The overall dimensions of the ALSRC are approximately 24" x 18" x 12" and the total return weight of each loaded box will be about 50 pounds.

2.2 APOLLO CONTINGENCY LUNAR SAMPLE RETURN CONTAINER

This container (P/N M 11329-EK-004) consists of a small plastic bag to be used by the crew to obtain a one-liter lunar soil sample early in the EVA. The bag will be closed by folding the open end and crimping an integral soft metal strip. The bag and soil sample will weigh about $2\frac{1}{2}$ pounds and its dimensions will be approximately 2" x 6" x 6".

2.3 FILM MAGAZINES

Film magazines from three different camera systems are to be recovered and returned as described below:

(a) Maurer 16 mm Data Acquisition Camera

6 magazines - P/N SEB 33100125

Magazine dimensions - 3" x 4" x $\frac{3}{4}$ "

(b) Hasselblad 70mm Data Camera

2 magazines - P/N SEB 33100082

Magazine dimensions - 4" x 4" x 3"

(c) Lunar Surface Stereo Camera (Gold)

1 magazine - P/N 2501-120

Magazine dimensions - TBD

2.4 DATA STORAGE ELECTRONICS ASSEMBLY (DSEA)

The DSEA (P/N LSC 360-12-5) is a magnetic tape recorder used to record voice communications originating from the LM or conference communications between the LM, CSM, and the Manned Spacecraft Flight Network (MSFN).

The information contained in the DSEA will be vital to the interpretation and analysis of the EVA activities in that the conversation between the astronauts during EVA will be recorded and may contain scientific comments pertinent to de-briefing.

The DSEA is designed to be hermetically sealed so that the complete DSEA must be removed from the LM and returned to LRL for removal of the voice tape. The DSEA overall dimensions are approximately 7" x 4½" x 2-1/8" and weighs three (3) pounds.

2.5 ASTRONAUT FLIGHT LOGS

The flight logs brought back by the astronauts will contain information vital to the interpretation and analysis of the lunar surface activity. These logs will remain with the astronauts in the MQF during its return to MSC.

3.0 HANDLING AND TRANSPORT REQUIREMENTS

The requirements for handling and transporting from the recovery area to the MSC Lunar Receiving Laboratory (LRL) of the items described in Section 2.0, are presented herein. The return of certain items is time-critical and will require special provisions for air transport (Section 3.3).

3.1 TRANSFER OF SCIENTIFIC ITEMS FROM CM TO MQF

After the CM has been positioned adjacent to the MQF, and the quarantine tunnel installed, the CM will be opened to allow the transfer of the scientific data and equipment from the CM to the MQF. No special requirements are involved in the transfer of the scientific items of Section 2.0 except that the Contingency Apollo Lunar Sample Return Container, stored in Stowage Compartment A-5, will not by itself be removed from the CM. Instead, the complete A-5 Stowage Compartment will be removed from the Command Module and transferred into the MQF. This is to be done to avoid loss of any of the contingency sample should the plastic bag of the sample container be torn.

3.2 REMOVAL OF ITEMS FROM THE MQF

3.2.1 During the quarantine period, an item to be removed from the MQF will be processed as follows: The item will be placed in a plastic Biological Isolation Container (BIC), the internal pressure of the BIC reduced by the use of a vacuum pump, and the BIC heat sealed. After being sealed in a BIC, an item may be removed from the MQF only after

the external surface of the BIC has been completely bathed or rinsed in decontaminant (now specified as sodium hypochlorite solution). Safe passage of a suitably prepared item out of the MQF is accomplished through a transfer portal in the MQF, provided for this specific purpose.

3.2.2 A "Sign Off Sheet" will be prepared for each item removed from the MQF. The "Sign Off Sheet" will establish accountability and will accompany the item until it is released to the LRL, MSC.

3.3 RETURN OF SCIENTIFIC ITEMS TO LRL

Return of the items described in Section 2.0 to MSC-LRL will be accomplished in two different ways depending upon the time-criticality of the data or sample.

3.3.1 Time-Critical Scientific Items

3.3.1.1 The scientific data items listed below must be returned to MSC-LRL for analysis as soon as possible after recovery:

- (a) Both of the Apollo Lunar Sample Return Containers (Section 2.1)
- (b) All film magazines (Section 2.3)
- (c) The DSEA (Section 2.4)

If neither of the ALSRC's are available for return, then the Apollo Contingency Sample Return Container (Section 2.2), must be returned instead. In this instance, the contingency sample must be treated as a high priority, time-critical recovery item.

3.3.1.2 The items listed in paragraph 3.3.1.1 will be removed from the MQF, as described in Section 3.2, flown from the recovery ship to the nearest suitable airfield, and transferred to long range aircraft for flight direct to Ellington Air Force Base, Houston.

3.3.1.3 Shipping containers to protect these items from excessive shock and temperature during flight and handling will be provided by the Landing and Recovery Division. All flight operations must be conducted with multiple or similar items divided between two aircraft to minimize the scientific impact in the event an aircraft is lost.

3.3.1.4 Transporting of both the time-critical scientific items (paragraph 3.3.1.1) and the MQF (paragraph 3.3.2) from EAFB to IRL, will be accomplished by motor vehicle. Security measures must be taken to ensure safe arrival of the transporting vehicle(s) to the IRL.

3.3.2 Items returned in the MQF

The Astronaut Flight Logs (Section 2.5) will be retained in the personal possession of the crew in the MQF. Copies of the logs will be made after return to MSC-IRL. The Contingency Sample Return Container, not considered a time-critical item, will also be retained in the MQF. Exceptions are as noted in Section 3.3.1 or in the event the sample should be reclassified a priority item and its return to IRL on a priority flight considered desirable. In this instance, the Contingency Sample Return Container will be placed in the same shipping container used for the DSEA.

3.3.3 Other Related Items

In addition to the time-critical scientific items listed in Section 3.3.1 there are other data and samples which also will be flown off the

ship to speed their return to LRL, Houston. Included in this group are the following, presented for information only:

(a) Biomedical Samples, including blood samples, bacterial swabs, and urine specimens. Provisions for handling and transporting of these items are already defined by the Biomedical Research Office and furnished by Landing and Recovery Division.

(b) The Data Storage Equipment (DSE) tape from the CM. The return of this tape is considered time-critical by ASPO Test Division since it is the only source of telemetry available during the period of CM re-entry communications blackout.

A duplicate copy of the tape is required by the Science and Applications Directorate due to the possibility of information relevant to science being contained on the voice track.

3.4 DELIVERY OF ITEMS TO LRL

The scientific items described in Section 3.3.1 will be delivered to the LRL CRA dock adjacent to the Ultra-Violet Lock (RML-37). Transfer of items from the Courier to LRL Personnel will be accomplished at this time.