

Guide to the Apollo Collection

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NASA PHOTO

M. Louis Salmon Library
University of Alabama in Huntsville
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Guide to the Apollo Collection

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Descriptive Summary

Title: Apollo Collection

Collection number: Special Collections Apollo Collection

Creator: Charles Lundquist

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Administrative Information

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Scope and Content

The Apollo Collection (9 linear ft.) includes approximately 300 documents, books, letters, and film. Subjects covered within this collection include lunar exploration planning and material about each Apollo mission.

Background

The Group for Lunar Exploration Planning (GLEP) was established by NASA during a conference on lunar missions held in Santa Cruz, California from July 31 to August 13, 1967. GLEP had its first meeting during the final three days of the conference. The GLEP met frequently in the following years to formulate recommendations for Apollo landing sites on the Moon and for objectives of the Apollo missions. The Apollo Collection contains the minutes of the several GLEP meetings and various working papers used and generated by the group. The documents associated with a specific meeting are in one or more binders with an index in the front of each binder. The binders are shelved chronologically by the dates of the meetings.

During the Apollo Program, there were eleven rocket flights or missions that carried astronauts. These missions with human passengers are designated as Apollo 7 through Apollo 17. This collection contains eleven individual series corresponding to the eleven missions, namely the Apollo 7 Series through the Apollo 17 Series. As the name implies, each series has documents from preparation for the numbered mission, execution of that mission, and results from it.

Notes to the Researcher

The *Guide to the Apollo Collection* is divided into 17 major subjects, or series. These series are listed in the Table of Contents as

Series 1---Lunar Exploration Planning, which contains the documents relating to the planning prior to the 1965 Summer Conference on Lunar Exploration and Science at Falmouth, Massachusetts;

Series 2---Lunar Exploration Planning, which contains the documents relating to the planning at the 1965 Summer Conference and prior to the 1967 Summer Study on Lunar Exploration and Science at Santa Cruz, California;

Series 3---Lunar Exploration Planning, which contains the documents related to the 1967 Summer Study on Lunar Exploration and Science at Santa Cruz, California;

Series 4---Lunar Exploration Planning, which contains the documents from the meetings and activities of the Group for Lunar Exploration Planning beginning with the meeting in Houston on November 13-14, 1967 and continuing through the Apollo lunar landings;

Series 5---Saturn Apollo-Saturn 2 and 3 suborbital missions with Project High Water;

Series 6---Saturn orbital missions SA-8, SA-9, and SA-10 with Pegasus Satellites;

Series 7---Apollo 7 manned mission;

Series 12---Apollo 12 manned mission;

Series 8---Apollo 8 manned mission;

Series 13---Apollo 13 manned mission;

Series 9---Apollo 9 manned mission;

Series 14---Apollo 14 manned mission;

Series 10---Apollo 10 manned mission;

Series 15---Apollo 15 manned mission;

Series 11---Apollo 11 manned mission;

Series 16---Apollo 16 manned mission;

Series 17---Apollo 17 manned mission.

The Guide is available in print and also online from the Archives website at www.uah.edu/library. All materials of this collection---books, documents, letters, and films---are to be used in the Archives Dept. and may not circulate outside of the Library. Copies may be made and used with the proper citation: [Identification of item] Apollo Collection, Dept. of Archives/Special Collections, M. Louis Salmon Library, University of Alabama in Huntsville, Huntsville, AL.

Apollo Collection

Series 1 Lunar Exploration Planning pre-1965

- Location** 1.01 **Series** 1 Lunar Exploration Planning pre-1965
- Document Title** Minutes of Meetings of Working Group on Lunar Exploration
- Author** Jastrow, Robert, working group chair
- Source** NASA appointed working group **Date** 2/5/1959
- Abstract** This working group is formed for accomplishing the NASA lunar surface exploration project. The intent of this meeting was to arrive at tentative decisions regarding the best choice of scientific experiments to be put aboard the lunar exploration vehicles which may be launched during the next five years.
-
- Location** 1.02 **Series** 1 Lunar Exploration Planning pre-1965
- Document Title** Summary Minutes Lunar Science Subcommittee
- Author** Jastrow, Robert, chair
- Source** NASA Headquarters **Date** 4/13/1960
- Abstract** Dr. Jastrow outlined the purpose of this meeting and proceeded immediately to the first item on the agenda; a review and up-dating of the NASA Office of Space Sciences Ten-Year Program.
-
- Location** 1.03 **Series** 1 Lunar Exploration Planning pre-1965
- Document Title** Memorandum: Ranger (Agena) Spacecraft S-3 to S-5.
- Author** Hibbs, A.R.
- Source** JPL memo to Subcommittee on the Lunar Program **Date** 4/15/1960
- Abstract** A design study on the second series of Ranger spacecraft in nearing completion. This spacecraft has two major parts (1) the "bus" and (2) a separable rocket stage called the "capsule" capable of landing a survivable package on the lunar surface.
-
- Location** 1.04 **Series** 1 Lunar Exploration Planning pre-1965
- Document Title** Memo for internal use only, Estimated Lunar Spacecraft Capabilities
- Author** Eimer, M.
- Source** JPL **Date** 4/15/1960
- Abstract** The spacecraft listed are A) Atlas Centaur, B) Saturn C-1 and C) Saturn C-2.

Location 1.05 **Series** 1 Lunar Exploration Planning pre-1965
Document Title Rough Draft: Lunar Program
Author Meredith, L.H.
Source NASA Headquarters **Date** 4/29/1960
Abstract If one goal were to be selected which would most influence the overall NASA program during the next decade it would be manned flight to the moon. The manned space flight program, the program of unmanned lunar exploration and the booster development program are all oriented toward this goal.

Location 1.06 **Series** 1 Lunar Exploration Planning pre-1965
Document Title Revision for NASA Program Planning, Part II,G, "Lunar Sciences"
Author Hibbs, A.R.
Source JPL **Date** 5/2/1960
Abstract Objectives: The program of lunar sciences contains all the research on the moon and its environment, with the objective of understanding the nature and origin of the moon.

Location 1.07 **Series** 1 Lunar Exploration Planning pre-1965
Document Title Rough Draft 10 Yr Plan for Lunar Study Committee
Author Hibbs, A.R., Eimer, M., Buwalda, P.
Source JPL **Date** 5/12/1960
Abstract The objectives of the lunar exploration program are to obtain data leading to the understanding of the Moon as it exists today and as it was in the past and ultimately to establish scientific laboratories and observatories on the lunar surface.

Location 1.08 **Series** 1 Lunar Exploration Planning pre-1965
Document Title Trip Report; Meeting of Lunar Sciences Sub-Committee
Author Bucher, George C.
Source MSFC **Date** 5/16-17/1960
Abstract A review of the 10-year Plan for the Lunar Sciences Program was not completed due to lack of time, although a JPL version was presented by the JPL representatives. The relative scientific merits of various unmanned SATURN flights were discussed.

Apollo Collection

Series 2 Lunar Exploration Planning pre-1967

- Location** 2.01 **Series** 2 Lunar Exploration Planning pre-1967
- Document Title** NASA 1965 Summer Confeence on Lunar Exploration and Science
- Author** Allenby, Richard J.; Chairman
- Source** NASA SP-88 **Date** 07/19-31/1965
- Abstract** In summer, 1965, NASA conducted a Lunar Exploration and Science Conference in Falmouth, Massachusetts. The conference divided into Working Groups on: Geodesy-Cartography, Geology, Geophysics, Bioscience, Geochemistry, Particles- Fields, Lunar Atmospheres, and Astronomy. The recommended lunar program covers a 10-year period, beginning with the first Apollo flights. The first section of the report outlines conference results according to mission and discipline, and the second section contains the complete report of each working group.
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- Location** 2.02 **Series** 2 Lunar Exploration Planning pre-1967
- Document Title** NASA Lunar Exploration Program Plan
- Author** Lunar Exploration Working Group
- Source** NASA document 'for internal use **Date** 11/1/1966
only'
- Abstract** A Lunar Exploration Working Group was established in February, 1966, to examine the objectives and systems associated with its mission area. This document summarizes the considerations of the OMSF, OSSA, OART, and OTDA representatives assigned to the Lunar Exploration Working Group. It is a working paper that illustrates the firm belief of its contributors that an effective lunar exploration plan can result from careful matching of scientific objectives with the capabilities of unmanned systems and Apollo derivatives within a reasonable budgetary level.
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- Location** 2.03 **Series** 2 Lunar Exploration Planning pre-1967
- Document Title** Lunar Orbiter Sites Missions I, II, and III
- Author** Mapping Sciences Branch
- Source** NASA **Date** 1/1/1967
- Abstract** Map of the moon with photographic coverage areas for Lunar Orbiter Missions I, II, III.

Apollo Collection

Series 3 Lunar Exploration Planning 1967 Santa Cruz

- Location** 3.01 **Series** 3 Lunar Exploration Planning 1967
- Document Title** Questions to the Santa Cruz Summer Study on Lunar Exploration and Science
- Author** Scherer,Johnson,Woodward,Fosque,Grobaugh
- Source** NASA Lunar Exploration Working **Date** 8/1/1967
Group
- Abstract** The attached group of questions are submitted to the participants in the Santa Cruz Summer Study Conference to provide guidance to the Lunar Working Group in developing program plans and schedules for missions to accomplish lunar exploration and science in the AAP and post-AAP eras.
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- Location** 3.02 **Series** 3 Lunar Exploration Planning 1967
- Document Title** Group for Lunar Exploration Planning; final meeting at Santa Cruz
- Author** GLEP membership
- Source** Working paper from GLEP Santa **Date** 8/11/1967
Cruz
- Abstract** This is a two page summary of the final GLEP recommendations at the close of the Santa Cruz Conference. Recommended missions: 1. Manned Orbiter 1970, 2. Copernicus (Central Peaks) 1970, 3. Davy Rille or Hyginus Rille, 4. Copernicus (Walls), 5. Marius Hills LSSM to Cobra Head 1972, 6. Cobra Head LSSM to Hadley Rille, 7. Manned Orbiter 1973, 8. Alphonsus LSSM to Saabine-Ritter, 9. Sabine-Ritter (or end of LSSM traverse).
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- Location** 3.03 **Series** 3 Lunar Exploration Planning 1967
- Document Title** Agenda, Final Summary Session, Santa Cruz
- Author** Hess, W. N. chair
- Source** NASA agenda sheet. **Date** 8/12/1967
- Abstract** Agenda for Final Summary Session of Santa Cruz Summer Conference. The folder also contains the projection transparencies for the Geodesy-Cartography presentation at the Summary Session.
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- Location** 3.04 **Series** 3 Lunar Exploration Planning 1967
- Document Title** Review Copy: Lunar Exploration Summer Study
- Author** Hess, Wilmot N. chair
- Source** NASA **Date** 9/12/1967
- Abstract** This is the review copy of the Lunar Exploration Summer Study at Santa Cruz held July 31 to August 13, 1967. This binder contains various recommended changes to the review copy from members of the Geodesy-Cartography Working Group.

Location 3.05 **Series** 3 Lunar Exploration Planning 1967

Document Title Newspaper article on Lunar Orbiter accomplishments

Author Lannan, John

Source Sunday Herald Traveler **Date** 11/26/1967

Abstract News report on the five mission Lunar Orbiter Program

Location 3.07 **Series** 3 Lunar Exploration Planning 1967

Document Title Consistency of Lunar Orbiter Residuals with Trajectory and Local Gravity

Author Muller, Paul M.

Source JPL **Date** 1967

Abstract The fits to earth-based coherent two-way doppler data from Lunar Orbiter have consistently yielded residuals three orders of magnitude larger than the 0.1mm/sec normally observed with spacecraft at lunar distance. The results suggest need for a new or modified approach to the lunar potential model: 1) Higher order spherical harmonics, 2) Point mass grid solutions, or 3) Direct mapping of residual-accelerations to the lunar surface.

Apollo Collection

Series 4 Lunar Exploration Planning 1967 Houston

- Location*** 4.01 ***Series*** 4 Lunar Exploration Planning 1967 Houston
- Document Title*** Group for Lunar Exploration Planning meeting, November 13-14 1967, Houston
- Author*** Hess, Wilmot N. chair
- Source*** Document collection in binder ***Date*** 11/13-14/1967
- Abstract*** This binder contains the agenda, working papers, notes, draft mission plans and other material related to the GLEP meeting in Houston on November 13-14, 1967. It also contains notes on a follow-up Geodesy-Cartography meeting in Washington on November 30. The first page in the binder has a table of contents. Page 9 has a list of the first 5 planned Lunar Landing Missions with their landing sites, objectives and payloads. Subsequent pages give further details of the mission plans.
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- Location*** 4.02 ***Series*** 4 Lunar Exploration Planning 1967 Houston
- Document Title*** GLEP documents and notes from meeting in Washington on January 11, 1968
- Author*** Hess, Wilmot N. chair
- Source*** Document collection in binder ***Date*** 12/ 8-9/1967 to 1/11/1968
- Abstract*** This binder contains notes from a Site Selection Meeting on Dec. 8 and 9 in Washington. The binder also contains documents from the GLEP meeting on Jan. 11 in Washington. The first page of the binder has a table of contents. Page 232 starts a 'Status Report to the Lunar and Planetary Missions Board'. Page 258 starts 'A Lunar Science Exploration Plan'. It has detailed discussions of proposed landing sites.
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- Location*** 4.03 ***Series*** 4 Lunar Exploration Planning 1967 Houston
- Document Title*** A Lunar Exploration Program
- Author*** Hinnens, N.W., James, D.B., Schmidt, F.N.
- Source*** Bellcomm Inc., TM-68-1012-1 ***Date*** 1/5/1968
- Abstract*** A Lunar Exploraqtion Program has been developed which covers the period from the first lunar landing to the mid-70's.

Location 4.08 **Series** 4 Lunar Exploration Planning 1967 Houston
Document Title Agenda and Presentations from GLEP meeting in Houston on March 27, 1969
Author Hess, Wilmot N. chair
Source Document collection in binder **Date** 3/27/1969
Abstract This binder contains the agenda and presentations from the GLEP meeting in Houston on March 27, 1969. Presentations were: Review of Lunar Exploration Plan Options - Stoney and Loftus, Status Report - Hinnners and Sasser, Status of Lunar Exploration Program - Hess, and Status of Orbital Science Planning - Hess.

Location 4.09 **Series** 4 Lunar Exploration Planning 1967 Houston
Document Title Fourth GLEP Site Selection Subgroup Meeting on Jun 17, 1969
Author Hinnners, N.W.
Source Bellcomm Inc memos **Date** 6/23 and 8/4, 1969
Abstract The Apollo Site Selection Board would like us to recommend a mission assignment for the sites. The Site Selection Subgroup met on June 17 in order to prepare tentative mission assignments which could be discussed and possibly accepted. The resulting recommendations are given in Attachment A. Hinnners reported the recommendations on July 10 to the Apollo Site Selection Board, who approved the site recommendations. Site selection to Apollo 12 has settled down to the Surveyor-III site which will be known as Apollo Site 7.

Location 4.10 **Series** 4 Lunar Exploration Planning 1967 Houston
Document Title GLEP Meeting in Houston on August 23 and joint meeting, Sep 29-30, 1969
Author Calio, Anthony J. chair
Source Document collection in binder **Date** 8/23 and 9/29-30/1969
Abstract This binder contains documents associated with a GLEP meeting in Houston on August 23, 1969 and a joint meeting of the NASA Science and Technology Advisory Committee and of the Lunar Panel of the Lunar and Planetary Missions Board in Flagstaff on September 29-30. The binder has a table of contents. Page 63 and following have notes and documents on the Apollo 11 science results.

Location 4.11 **Series** 4 Lunar Exploration Planning 1967 Houston
Document Title Apollo Lunar Exploration Program Science Objectives and Mission Plans
Author Bellcomm staff
Source Bellconn Inc. document **Date** 9/4 and 9/9/1968
Abstract This plan was presented to the MSC Management on September 4, 1969 and to the Manned Space Flight Management Council on September 9, 1969. The purpose of this document is to present the scientific objectives of the Apollo Lunar Exploration Program and to describe a set of ten lunar landing missions to achieve those objectives. The document contains material on the mission objectives and on the selected sites and their associated mission plans.

Location 4.16

Series 4 Lunar Exploration Planning 1967 Houston

Document Title

Lunar International Observers Network program evaluation meeting July 29, 1970

Author

Hoover, Lawrence D. chair

Source

Document collection in binder **Date** 7/29/1970

Abstract

The Lunar International Observers Network program has been conducted on a mission-by-mission basis since Apollo 11. An informal session was scheduled in Houston on July 29, 1970 for a through evaluation of the program. Page 42 of the binder begins an Interim Report - The LION Program which was distributed at the meeting for the information of the attendees, including several members of GLEP.

Location 4.17

Series 4 Lunar Exploration Planning 1967 Houston

Document Title

Lunar Exploration, Strategy for Research, 1969-1975

Author

Hess, H.H. and Rubey, William W. chairs

Source

Space Sciences Board, **Date** 5/22/1975
National Academy of Sciences

Abstract

The goal of landing man on the surface of the moon and returning him to earth has been reached. On the assumption that broad national policy will entail a continuing commitment to manned spaceflight, this study addresses itself to the question of how best to utilize the manned lunar-landing capability to realize the scientific objectives of lunar exploration.

Highwater Project

Location AP 5.01 **Series** 5 High Water Project

Date 9/29/1961

Document Title **Information Plan, Launch of Saturn SA-1 Test Vehicle.**

Author Lloyd, O.B.; Mittauer, R.T.; Slattery, Bart J.

Source NASA Headquarters and MSFC

Abstract The Saturn C-1 Heavy space vehicle will be launched experimentally this fall for the first time. In this first firing of the three stage rocket, only the booster will be "live" and it will be operating at a thrust somewhat lower (12%) than that planned for later Saturns

Location AP 5.02 **Series** 5 High Water Project

Date 7/27/1961 7/27-
28/1961

Document Title **Minutes: Astronomy Subcommittee of Space Sciences Steering Committee**

Author Roman, Nancy G., Chairperson

Source NASA Headquarters

Abstract Under Action Items on page 2: "Lundquist will investigate the possibility of carrying as ballast, the gaseous constituents of a comet in the form of, say, salt water and will report at the next meeting." This was an origin of what became the High Water Experiment.

Location AP 5.03 **Series** 5 High Water Project

Date 11/8/1961

Document Title **Release of Saturn Water Ballast**

Author Memo for Record; M-RP-P

Source MSFC Research Projects Division - Physics

Abstract It is now possible to say unequivocally that the release of the ballast water on a Saturn R&D firing would be of very great scientific interest. A no-interference with Saturn R&D missions is the basis on which this experiment is proposed.

Location AP 5.04 **Series** 5 High Water Project

Date 11/13/1961

Document Title **Organization of Water Release Experiment**

Author Lundquist, Charles A; M-RP-P,

Source MSFC Research Projects Division - Physics

Abstract On Monday, Nov 13, Dr. Nancy Roman discussed the proposed release of the Saturn Ballast water with the Space Science Steering Committee. In a subsequent telephone conversation between Dr. Roman and C.A. Lundquist, it was agreed that an ad hoc working group should be organized to draft an analysis and operational plan for the experiment.

Location AP 5.05 **Series** 5 High Water Project

Date 11/13/1961

Document Title **Weekly Notes to Director, (Dr. von Braun)**

Author Stuhlinger, Ernst

Source MSFC Research Projects Division

Abstract Dr. Lundquist held preliminary discussions with SSO, G&C, P&VE and others regarding the possibility of releasing the ballast water carried on one-stage Saturn C-1 vehicles near the apex of their trajectories. Injecting water of this vast amount at high altitudes, and observing ionosphere and atmospheric effects, would represent a scientific experiment of great value to many scientific groups. (reply in margin from vB; "Request more detailed plan.")

Location AP 5.06 **Series** 5 High Water Project

Date 11/16/1961

Document Title **Release of Saturn Water Ballast.**

Author Knothe, A.H.; M-LOD-TS

Source MSFC-Launch Operations Directorate

Abstract The only steps to be taken to enable this experiment are: a. Installation of prima cord in the second and third dummy stages, b. Information to pad safety, c. Furnishing of revised drawings and diagrams to Range Safety and d. Establishment of written agreement with Range Safety concerning transmission of the destruct command.

Location AP 5.07 **Series** 5 High Water Project

Date 11/1961

Document Title **Remarks on the Proposal to Release 200,000 lbs. of Water at 150 km**

Author Potter, Andrew E.

Source MSFC Reaction Kinetics Section

Abstract About one-sixth of 33,000 lbs of water will evaporate adiabatically and explosively from the liquid water released at 150 km. The remainder, or about 167,000 lbs. will freeze to form an ice cloud.

Location AP 5.08 **Series** 5 High Water Project

Date 11/21/1961

Document Title **Water Ballast Release Experiment on Block I Saturn C-1**

Author Lange, Oswald H., Director

Source MSFC Saturn Systems Office

Abstract In a discussion with Dr. von Braun it was decided to make preparations to release the water ballast at apex on the remaining flights of Block I vehicles. The decision as to which particular flights will include this experiment will be made at a later date.

Location AP 5.09 **Series** 5 High Water Project

Date 11/27/1961

Document Title **Configuration Control Action # 160**

Author Palaoro, H.R.

Source MSFC Saturn Configuration Control Board

Abstract It has been decided that SA-2 shall be modified so as to extend the existing primacord and to rupture vehicle SA-2 at apex on command. It was further agreed that this secondary mission for SA-2 would and shall not interfere with the prime mission.

Location AP 5.10 **Series** 5 High Water Project

Date 12/18/1961

Document Title **Letter to Dr. Robert F. Fellows, NASA Headquarters**

Author Johnson, William G.

Source MSFC Research Projects Division

Abstract I am enclosing a Plan for the Saturn Water Release Experiment. You will note that it is not a detailed programmatic document. However, it does cover the program of measurements that we think can be done in a reasonable manner.

Location AP 5.11 **Series** 5 High Water Project

Date 1/5/1962

Document Title **TWX to Director MSFC Huntsville Ala**

Author Newell, Homer E. and Rosen, Milton W.

Source NASA Headquarters

Abstract \$20,000 is being transferred to MSFC to cover cost of equipping Saturn Test Vehicle number two to release water ballast at apex of trajectory. It is our understanding that Dr. Charles Lundquist and Dr. W. S. Johnson are responsible for coordinating the experiment and the observational program.

Location AP 5.12 **Series** 5 High Water Project

Date 1/9/1962

Document Title **Memorandum to Distribution; Saturn Water Release Experiment**

Author Lundquist, Charles A.

Source MSFC Research Projects Division

Abstract Enclosure 1 is a copy of the technical sections of the Plan for Saturn Water Release Experiment submitted to the Office of Space Sciences on December 18, 1961. This document was prepared by Dr. William G. Johnson. Enclosure 2 is a copy of the NASA Headquarters action accepting the Plan, citing transfer of funds and assigning responsibility for the project to MSFC.

Location AP 5.13 **Series** 5 High Water Project

Date 1/1962

Document Title **Letter to Milton W. Rosen, Office of Manned Space Flight, NASA Hqrs.**

Author von Braun, Wernher

Source MSFC Director

Abstract The conditions in your teletype of January 5 concerning the release of the water ballast carried by Saturn (SA-2) are agreeable to the Marshall space Fligh Center. Within MSFC the following individuals have been designated roles in the project (list of individuals and roles follows). For Brevity, the code name "High Water" is recommended for this project.

Location AP 5.14 **Series** 5 High Water Project

Date 1/1962

Document Title **Leter to Homer E. Newell, Office of Space Sciences, NASA Hqrs.**

Author von Braun, Wernher

Source MSFC Director

Abstract The conditions in your teletype of January 5 concerning the release of the water ballast carried by Saturn (SA-2) are agreeable to the Marshall space Fligh Center. Within MSFC the following individuals have been designated roles in the project (list of individuals and roles follows). For Brevity, the code name "High Water" is recommended for this project.

Location AP 5.15 **Series** 5 High Water Project

Date 1/24/1962

Document Title **Memorandum to Distribution, High Water**

Author von Braun, Wernher

Source MSFC Director

Abstract A teletype has been received from Dr. Newell and Mr. Rosen which authorizes MSFC to procede with the preparation for the release of the Saturn ballast water. Within MSFC the following individuals are designated roles in this project; (list of individuals and roles follows).

Location AP 5.16 **Series** 5 High Water Project

Date 1/29/1962

Document Title **Memorandum to M-LOD-DIR**

Author Lindstrom, Robert E.

Source MSFC C-1 Project Manager

Abstract It is requested that the Launch Operations Directorate prepare the necessary planning for initiation of command destruct on SA-2 when the vehicle reaches an altitude of 105 km.

Location AP 5.17 **Series** 5 High Water Project

Date 2/1/1962

Document Title **Memorandum to M-LOD-DIR; SA Flight Test Data Req.(SA-2,SA-3,SA-4)**

Author Speer, Fridtjof

Source MSFC Chairman Flight Evaluation Working Group

Abstract The enclosed document contains requirements similar to the Saturn Block I Flight Test Data Requirements document dated June 15, 1961 and is a revised version of that document.

Location AP 5.18 **Series** 5 High Water Project

Date 2/1962

Document Title **Project High Water - Water Ballast Release Experiment**

Author Project personnel

Source MSFC

Abstract The High Water project is now established as a recognized NASA Space Sciences project, however, permission to execute the actual release has been withheld pending the completion of plans for the observational program and a study of expected effects. The study of expected effects is being conducted by a committee under the chairmanship of Dr. W. W. Kellogg of the Rand Corporation.

Location AP 5.19 **Series** 5 High Water Project

Date 2/7/1962

Document Title **Status Report on Project High Water**

Author Miller, Raymond

Source NASA Office of Space Sciences

Abstract Responsibility for planning and coordinating the experimental program was assigned to MSFC. Membership of the working group to identify expected effects of the experiment is listed. GSFC is planning to conduct two water release experiments with Nike-Cajun rockets as preliminary investigations of the behavior of water when released in the ionosphere. Tentative launch dates are March 1 and 2.

Location AP 5.20 **Series** 5 High Water Project

Date 2/13/1962

Document Title **Working paper following meeting at NASA Headquarters**

Author NASA Hdqrs. personnel

Source NASA Headquarters

Abstract Planning for the Project High Water Observational Program advanced quite rapidly as a result of a meeting held 13 February at NASA Headquarters. Three related efforts are in progress. The first is Project High Water. The second is a small scale water release experiment being planned by Dr. Bertram Donn at GSFC. As the third of the related efforts, MSFC has begun some laboratory model studies of the explosive release of water under vacuum conditions.

Location AP 5.21 **Series** 5 High Water Project

Date 2/14/1962

Document Title **Photochemistry of the Saturn Water Release**

Author Potter, A. E. Jr.

Source NASA Lewis Research Center

Abstract The vapor clouds in the Saturn water release will be photolysed to yield H and OH at an appreciable rate. The OH will react rapidly with ambient O to yield more H and O₂.

Location AP 5.22 **Series** 5 High Water Project

Date 2/19/1962

Document Title **Review of Saturn High Water Experiment**

Author Kellogg, William W., chairman of ad hoc panel

Source Rand Corporation

Abstract On February 16, 1962 an ad hoc Panel met at NASA to consider the effects likely to occur from the release of about 100 tons of water in the ionosphere. It is now possible to describe roughly what will occur, and it can be said with some assurance that no major change in the atmosphere will take place that will hinder human activities.

Location AP 5.23 **Series** 5 High Water Project

Date 3/19/1962

Document Title **Minutes of Meeting, Project High Water.**

Author Abercrombie, Jack D.

Source NASA Test Support Office

Abstract A meeting was held on 15 March 1962 at the Air Force Missile Test Center to discuss operational planning to complete the Project High Water experiment to be conducted on the SA-2 flight test. Dr. Bertram Donn of GSFC gave a description of a miniature high water test recently performed at Wallops Island. After a discussion period on the Wallops Island experiment, Mr. Abercrombie presented to the group all planning requirements which had been submitted to Atlantic Missile Range requiring their support. Mr. Fred Bohlen, PAA Saturn Program Manager, stated that the range would be able to meet all requirements as presented.

Location AP 5.24 **Series** 5 High Water Project

Date 3/20/1962

Document Title **Letter to Dr. Homer Newell**

Author Johnson, William G.

Source MSFC Research Projects Division

Abstract The review of the results of the entire planning program for the High Water project was presented. In view of this status, it was recommended that permission to proceed with the experiment as now planned be granted.

Location AP 5.25 **Series** 5 High Water Project

Date 3/26/1962

Document Title **Weekly Notes to Director, (Dr. von Braun)**

Author Stuhlinger, Ernst

Source MSFC Research Projects Division

Abstract Saturn Water Dump: On March 15, a meeting of agencies participating in the High Water project on SA-2 was held at Patrick Air Force Base. An instrumentation list and a refined statement of scientific objectives was forwarded to the Office of Space Sciences on Mar 22. Would you like to have detailed information on the experiments? (Note in margin from vB; yes, please, 1/2 hour briefing) Annotation at top of page "Briefing made Thursday Apr 12".

Location AP 5.26 **Series** 5 High Water Project

Date 3/29/1962

Document Title **Letter to MSFC Attn Dr. Wernher von Braun**

Author Newell, Homer E.

Source NASA Office of Space Sciences

Abstract In view of the report of Dr. Kellogg's study group that there is no foreseeable basis to expect any deleterious change in the atmosphere, and the widespread scientific interest in participating in the experiment as evidenced by the summary report of the proposed observational program and scientific objectives prepared by Dr. W. G. Johnson, the Office of Space Science approves and authorizes the conduct of the experiment.

Location AP 5.27 **Series** 5 High Water Project

Date 4/7/1962

Document Title **Project High Water Observational Program and Scientific Objectives**

Author Johnson, William G.

Source MSFC Research Projects Division

Abstract A review of the entire planning program for the project indicates that 1. Release of 86,000 kg of water at an altitude of 105 km will introduce a perturbation in the concentrations of the naturally occurring constituents of the atmosphere sufficient to permit a worthwhile study of the system as it returns to its equilibrium state. 7. Permission to execute the release of the water has now been granted.

Location AP 5.28 **Series** 5 High Water Project

Date 4/22/1962

Document Title **News Release; NASA to Launch Second Saturn Vehicle**

Author NASA Public Affairs personnel

Source NASA Public Affairs Office

Abstract The second Saturn C-1 heavy space vehicle will be launched from Cape Canaveral no earlier than April 25, 1962. The main purpose will be to further test the propulsion system of the booster first stage. As a secondary objective, the Saturn vehicle will be deliberately destroyed some 45 seconds after booster burnout. This experiment is known as Project High Water.

Location AP 5.29 **Series** 5 High Water Project

Date 4/25/1962

Document Title **Photographs of SA-2 High Water Experiment**

Author Atlantic Missile Range camera operators

Source Atlantic Missile Range

Abstract This folder contains 8 by 10 inch photographs and negatives of the SA-2 High Water Experiment. Some of these were used in the Debus et al paper at the XIII International Astronautical Congress in Varna, Bulgaria.

Location AP 5.30 **Series** 5 High Water Project

Date 5/17/1962

Document Title **Letter to Dr. Robert Fellows, NASA Hqrs.**

Author Johnson, William G.

Source MSFC Research Projects Division

Abstract Data now being gathered from the High Water experiment indicates that in addition to being a mildly spectacular display, there was indeed some quite worthwhile science involved.

Location AP 5.31 **Series** 5 High Water Project

Date 5/25/1962

Document Title **Project High Water Tape Recording Transcription**

Author Carter, James W.

Source MSFC

Abstract This is a transcription of the sequence of events during the observation of the High Water Experiment by the pilot and copilot of an Air Force aircraft.

Location AP 5.32 **Series** 5 High Water Project

Date 5/1962

Document Title **Map of western end of Atlantic Missile Range.**

Author unknown

Source Atlantic Missile Range

Abstract This map shows the location of Atlantic Missile Range instrumentation involved in High Water measurements.

Location AP 5.33 **Series** 5 High Water Project

Date 6/1962

Document Title **Draft for Comment, Saturn SA-2 Water Experiment**

Author Debus, Kurt; Johnson, William; Hembree, Ray; Lundquist, C.A.

Source NASA

Abstract This is the draft for comment of a paper to be presented at the XIII International Astronautical Congress in September, 1962

Location AP 5.34 **Series** 5 High Water Project

Date 9/1962

Document Title **A Preliminary Review of the Upper Atmosphere Observations Made during the Saturn High Water Experiment**

Author Debus, Kurt; Johnson, William; Hembree, Ray; Lundquist, C.A.

Source Proceedings of the XIII International Astronautical Congress,p182-196

Abstract A secondary objective of the second flight test of the Saturn booster stage was to observe phenomena associated with the release of a large quantity of water into the lower ionosphere. Visually, a rapidly expanding cloud was observed which reached a diameter of the order of 10 km in about 3 sec. Photographic, radio and radar observations of the event were made and analyzed.

Location AP 5.35 **Series** 5 High Water Project

Date 9/1962
9/1962

Document Title **Analysis of Photographic Coverage of the Saturn SA-2 Water Experiment on April 25, 1962**

Author Edwards, H.D.; Young, L.C.; Kustus, C.G.

Source Georgia Institute of Technology, Engineering Experiment Station

Abstract This is Tech.Report No 1 on Project A-637. It describes the results obtained from photographic studies of a release of 86,000 kg of water from the SA-2 space vehicle at an altitude of approximately 105 km.

Location AP 5.36 **Series** 5 High Water Project

Date 11/13/1962

Document Title **News Release; Third Saturn Rocket to be Launched**

Author NASA Public Affairs personnel

Source NASA Public Affairs Office

Abstract NASA will launch its third Saturn C-1 Space vehicle (SA-3) from Cape Canaveral within the next few days, no earlier than November 16. As in the SA-2 flight, the booster and water-laden upper stages will be destroyed following completion of other missions in a bonus scientific experiment called "Project High Water". About 95 tons of water will be released in the ionosphere at the apex of the trajectory - about 104 miles.

Location AP 5.37 **Series** 5 High Water Project

Date 11/16/1962

Document Title *Radiation Measurements for Project High Water*

Author Tori, J. J.

Source Martin Company, Orlando Florida; Aerospace Division of Martin Marietta

Abstract The objective was to detect and measure electromagnetic disturbances caused by the release of water from the Saturn vehicles fired on November 16, 1961.

Location AP 5.38 **Series** 5 High Water Project

Date 4/25/1962 and 11/16/1962

Document Title *High Water, Roll of 16mm movie film.*

Author various

Source various

Abstract This film contains motion pictures of the clouds generated by the High Water experiments.

Location AP 5.39 **Series** 5 High Water Project

Date 12/20/1962

Document Title *Letter to William G. Johnson, MSFC, with attached report.*

Author Gulick, J.R. (MIC, Miami Unit)

Source US Dept. of Commerce, Project Mercury Weather Support Group

Abstract Three Weather Bureau radar stations participated in the Project High Water experiment conducted November 16, 1962. Each Station observed at least part of the experiment although the range was near the upper limits of capability of the WSR-57 radar.

Location AP 5.40 **Series** 5 High Water Project

Date 11/1961 - 4/1963

Document Title **High Water Note Binder**

Author various

Source various

Abstract This binder contains various notes, many hand written, and incidental documents related to the High Water experiments. Items are in chronological order.

Location AP 5.41 **Series** 5 High Water Project

Date 10/25/1963

Document Title **An Analysis of the Second Project High Water Data**

Author Woodbridge, D.D.; Lasater, J.A.; Fultz, B.M.;Clark, R.E.;Wylie, N.

Source International Space Corporation, Melbourne, Florida

Abstract An analysis has been performed of the optical, ELF-VLF radiofrequency and radar data obtained in conjunction with the second Project High Water experiment.

Location AP 5.42 **Series** 5 High Water Project

Date 3/6/1965

Document Title **An Analysis of Project High Water Data.**

Author Woodbridge, David D. and Lasater, James A.

Source International Space Corporation, Melbourne, Florida

Abstract The two Project High Water experiments have produced optical, ELF, radiofrequency, and radar data essential to understanding the effects of release of large quantities of water in the ionosphere. These data have been analyzed and a physical model of the expansion process has been developed.

Location AP 5.43 **Series** 5 High Water Project

Date 5/23/1988 and 4/19/1989

Document Title **Letters to Charles A. Lundquist, UAH**

Author Rather, John D. G.

Source Kaman Aerospace Corporation, Arlington VA

Abstract The letters confirm the loan and return of the High Water files then in the possession of C.A. Lundquist. These files now constitute the bulk of this series in the Apollo Collection in the UAH Archives.

Location AP 5.44 **Series** 5 High Water Project

Date 2/1/1990
2/1/1990

Document Title **Release of Liquid Water from the Space Shuttle**

Author Pike, C.P. and 14 additional authors

Source Geophysical Research Letters, Vol 17, No 2, p 139-142

Abstract This reprint is not strictly a High Water paper, but it is closely related.

Location AP 5.45 **Series** 5 High Water Project

Date 7/1/1981

Document Title **Project Waterhole**

Author Yau, A.W.; Whalen, B.A.; Creutzberg, F.

Source Journal of Geophysical Research, Vol 86?, No A,p 5601-5613

Abstract This reprint is not strictly a High Water paper, but it is closely related.

Pegasus Satellites and Apollo Missions

Location 06.01 **Series** 6 Apollo Collection

Document Title *NASA Facts, Pegasus*

Author NASA Educational Programs and Service Office

Source NASA Headquarters **Date** 1965

Abstract Pegasus collects data on the particles of matter in space called meteoroids. Plans call for three Pegasus launches.

Location 06.02 **Series** 6 Apollo Collection

Document Title *Press clippings on Pegasus*

Author News reporters

Source Newspapers **Date** 1965

Abstract This folder contains several press clippings on the Pegasus launches by the Saturn rocket.

Location 06.03 **Series** 6 Apollo Collection

Document Title *Recent NASA Meteoroid Penetration Results from Satellites*

Author D'Aiutolo, C.T.;Kinard, W.H.;Naumann, R.J.

Source NASA SP-135, pages 239 – 251 **Date** 1967

Abstract This is a paper from the Proceedings of a Symposium, Meteor Orbits and Dust held August 9-13 at the Smithsonian Astrophysical Observatory. The proceedings are also Volume 11 of the Smithsonian Contributions to Astrophysics, editor Gerald S. Hawkins.

Location 06.04 **Series** 6 Apollo Collection

Document Title *Bibliography of Pegasus results*

Author Naumann, Robert J.and others

Source One page bibliography **Date** 1966 - 1973

Abstract This is a nine entry bibliography of some Pegasus results. Three Pegasus satellites were launched by Saturn 1 vehicles SA-8, SA-9 and SA-10. The objective of the Pegasus satellites was to determine the meteoroid flux in Earth orbit to support planning for later Apollo missions.

Location 07.01 **Series** 7 Apollo Collection

Document Title *Chariots for Apollo, A History of Manned Lunar Spacecraft*

Author Brooks, Courtney G.;Grimwood, James M.;Swenson, Loyd S.

Source NASA SP-4205 **Date** 1979

Abstract Apollo was America's program to land men on the moon and get them safely back to earth, This book begins with the creation of NASA and with the definition of the manned space flight program to follow Mercury. Manned Apollo missions began with the Apollo 7 earth orbital mission. The book ends with Apollo 11 when America attained its goal for the 1960's. The focal points of this story are the spacecraft - the command and service modules and the lunar module.

Location 07.02 **Series** 7 Apollo Collection

Document Title *Press clippings on Apollo 7 mission*

Author News reporters

Source News magazines **Date** 1968

Abstract This folder contains several press clippings on the Apollo 7 earth orbital mission. This was the first manned mission launched by the Saturn vehicle.

Location 08.01 **Series** 8 Apollo Collection
Document Title *Analysis of Apollo 8 Photographic and Visual Observations*

Author Allenby, Richard J.; introduction

Source NASA SP-201 **Date** 1969

Abstract Apollo 8 was the first manned lunar orbiter. The primary purpose of this mission was to further progress toward the goal of landing men on the Moon by gaining operational experience and testing the Apollo systems. However, a great effort was also made to accomplish worthwhile scientific tasks with photography and visual observations by the astronauts.

Location 08.02 **Series** 8 Apollo Collection

Document Title *Report on Communications Support for Transient Lunar Phenomena during Apollo 8*

Author Citron, Robert

Source Smithsonian Center for Short-Lived Phenomena **Date** 1/5/1969

Abstract The purpose of this report is to document the communications procedures used and the lunar event reports received and transmitted by the Center for Short-Lived Phenomena during the Apollo 9 mission.

Location 08.03 **Series** 8 Apollo Collection

Document Title *Apollo 8 Binder I*

Author various authors

Source Smithsonian Astrophysical Observatory **Date** 1968-1969

Abstract This first binder contains documents pertinent to the optical tracking and observations of the events of the Apollo 8 mission. The binder has a table of contents in front.

Location 08.04 **Series** 8 Apollo Collection

Document Title *Apollo 8 Binder II*

Author various authors

Source Several organizations

Date 1969

Abstract This second binder contains later documents pertinent to the optical tracking and observations of the events of the Apollo 8 mission. The binder has a table of contents in front. In particular the binder holds reports by several organizations giving results of observations of Apollo 8.

Location 08.05 **Series** 8 Apollo Collection

Document Title *Apollo 8 Photometry*

Author various authors

Source Smithsonian Astrophysical Observatory **Date** 1969

Abstract This binder contains working papers from the photometric analysis of the photographs of Apollo 8 events.

Location 08.06 **Series** 8 Apollo Collection

Document Title *Lunar Gravity Fields Determined from Apollo 8 Tracking Data*

Author Felsentreger, T.L.; Murphy, J.P.; Ryan, J.W.; Salter, L.M.

Source NASA GSFC; X-552-69-317 **Date** 7/1969

Abstract Tracking data from the eight near-circular lunar orbits made by the Apollo 8 spacecraft were analyzed in an attempt to determine spherical harmonic lunar gravity models suitable for use in future Apollo missions. Thirty-one determinations through degree and order six are presented, in addition to test and evaluation results of many of the models.

Location 08.07 **Series** 8 Apollo Collection
Document Title *Lunar Mascon Evidence from Apollo Orbits*
Author Murphy, James P. and Siry, Joseph W.
Source NASA GSFC **Date** 7/1969
Abstract Apollo VIII tracking data have been analyzed to obtain new evidence for a mascon in the neighborhood of Sinus Aestuum

Location 08.08 **Series** 8 Apollo Collection
Document Title *Dense Material Lunar Deposits*
Author NASA Public Affairs staff
Source NASA Headquarters Press Release NO. 68-143 **Date** 8/16/1968
Abstract Mass concentrations of dense material have been discovered beneath the surface of the moon by two researchers, Paul M. Muller and William L. Sjogren, at the NASA's Jet Propulsion Laboratory. The mass concentration areas were found to be centered below all five large ringed seas on the near face of the Moon.

Location 08.09 **Series** 8 Apollo Collection
Document Title *New Conclusions Concerning the Observation of Faint Sources from a sunlit Spacecraft*
Author Grobman, Warren D. and Buffalano, Charles
Source Bellcomm Inc. Washington D.C. **Date** 1969
Abstract We conclude that the outlook for space astronomy in the sunlight is much more favorable than other estimates have indicated.

Location 08.10 **Series** 8 Apollo Collection
Document Title *The Temperature and Size Histories of Liquid H₂, O₂ and H₂O Particles in Space*
Author Buffalano, A.C. and Sharma, R.D.
Source Bellcomm Inc; TR-70-105-5-1 **Date** 3/6/1970
Abstract Micron-sized droplets of liquid H₂, O₂ and H₂O released in space during Apollo missions quickly freeze and reach equilibrium where the loss of energy from sublimation and emission of radiation just equals the absorption of radiation that is incident from the earth and the sun.

Location 08.11 **Series** 8 Apollo Collection
Document Title *A Physical Model of Apollo Oxygen Releases - Case 340*
Author Buffalano, Charles
Source Bellcom Inc.; TM-70-1011-3 **Date** 4/29/1970
Abstract During an Apollo Mission, the S-IVB stage propels the Apollo spacecraft into a lunar trajectory. The S-IVB then separates, turns perpendicular to the flight path, and is placed into solar orbit. The thrust for this final maneuver is provided by thousands of kilograms of unburned liquid oxygen which are blown out through the S-IVB's engines. The photographed cloud from this operation is about 45,000 kilometers from the earth.

Location 09.01 **Series** 9 Apollo Collection
Document Title *Saturn V/SA-504 Flight Sequence (Mission D)*
Author staff Mission Operations Section, NASA MSFC
Source Drawing Number 10M30524, Revision D **Date** 2/21/1966
Abstract The purpose of this document is to present the Saturn V/SA-504 vehicle flight sequence requirements of the Propulsion and Vehicle Engineering Laboratory for the D mission. The flight sequence includes all events from instrument unit umbilical disconnect through the completion of the launch vehicle operations.

Location 09.02 **Series** 9 Apollo Collection
Document Title *Apollo 9 Scheduled Feb 28, NASA Press Release*

Author staff NASA public affairs office

Source NASA Headquarters **Date** 1/8/1969

Abstract Following insertion into a 109-by-112 nautical mile Earth orbit, the crew will perform a simulated translunar insertion. This will be followed by Command service module separation, transposition, and docking with the lunar module, still attached to the rocket's third stage.

Location 09.03 **Series** 9 Apollo Collection

Document Title *AS-504 Mission D Profile*

Author none

Source MSFC **Date** 1969

Abstract This is a 2-page document illustrating the AS-504 Mission D Profile and the Dual Restart Flight Sequence

Location 09.04 **Series** 9 Apollo Collection

Document Title *Targets of Opportunity Earth Flight Chart; 1st Edition*

Author staff Aeronautical Chart and Information Ctr.

Source U.S. Air Force **Date** 1/27/1969

Abstract This is a map of the earth with targets of opportunity defined for possible observations during the Apollo 9 mission.

Location 09.05 **Series** 9 Apollo Collection

Document Title *Apollo 9 Mission D Launch Vehicle Ground Support Plan*

Author Golden,Harvey;Hammer,R.Scott; Speer,F.A.

Source NASA Report #1-MO-4-69; MSFC Mission Operations Office **Date** 2/1969

Abstract The purpose of this document is to define the launch vehicle ground network support for flight control operations and for post-flight engineering evaluation of the mission. This Ground Support Plan provides additional mission oriented information as a background for the ground support and mission planning.

Location 09.06 **Series** 9 Apollo Collection

Document Title *Saturn V/SA-504/S-IVB Stage Passivation*

Author Vaniman, J.L.

Source Brown Engineering **Date** 2/13/1969

Abstract An analysis has been conducted to determine propellant tank pressure, dump and venting flow rates, thrusts and impulses during SA-504 stage passivation.

Location 09.07 **Series** 9 Apollo Collection

Document Title *Photography of the Apollo 9 Debris Coma*

Author Buffalano, A. C.

Source Bellcomm Inc. **Date** 2/24/1969

Abstract The Smithsonian Astrophysical Observatory's Baker-Nunn camera system is capable of photographing some of the components of the Apollo 9 debris coma from the ground. Ice crystals formed during urine dumps and the Environmental Control System's waste water dump will be bright enough to photograph.

Location 09.08 **Series** 9 Apollo Collection
Document Title *Baker-Nunn Observations of Apollo 9 S-IVB*

Author staff Smithsonian Astrophysical Observatory

Source SAO 903-27 **Date** 3/7/1969

Abstract As part of its support of the NASA Apollo 9 mission, Smithsonian Astrophysical Observatory photographed the SIVB rocket stage after its final burn. The photographs showed clouds due to residual propellant venting.

Location 09.09 **Series** 9 Apollo Collection

Document Title *Apollo 9 Binder*

Author various authors

Source SAO **Date** 1969

Abstract This binder contains notes and documents related to the Baker Nunn camera observation program for Apollo 9.

Location 09.1 **Series** 9 Apollo Collection

Document Title *Apollo 9 Photometry*

Author various authors

Source SAO **Date** 1969

Abstract This binder contains working papers from the photometric analysis of the photographs of the Apollo 9 venting clouds.

Location 10.01 **Series** 10 Apollo Collection

Document Title *Apollo 10 Binder*

Author several authors

Source Binder **Date** 1969

Abstract This binder contains a number of documents related to the optical tracking of the Apollo 10 events. The Apollo 10 mission placed a manned spacecraft in orbit around the moon and returned the crew to earth.

Location 10.02 **Series** 10 Apollo Collection

Document Title *Communications Support for Transient Lunar Phenomena during the Apollo 10 Mission*

Author Citron, Robert

Source Smithsonian Institution, Center for Short-Lived Phenomena **Date** 5/28/1969

Abstract This report documents the lunar observing program planned, the communications procedures used, and the lunar event reports received and transmitted by the Center for Short-Lived Phenomena during the Apollo 10 mission.

Location 10.03 **Series** 10 Apollo Collection

Document Title *Transient Lunar Phenomena Reports during Apollo 10*

Author Staff, Center for Short-Lived Phenomena

Source Smithsonian Institution, Center for Short-Lived Phenomena **Date** 6/28/1969

Abstract The purpose of this report is to document the positive and negative reports on transient lunar phenomena received during the period of the Apollo 10 mission, 19-26 May 1969

Location 10.04 **Series** 10 Apollo Collection

Document Title *Apollo 10 Folder*

Author several authors

Source Folder **Date** 1969

Abstract This folder holds a few incidental documents pertinent to the Apollo 10 mission.

Location 10.05 **Series** 10 Apollo Collection

Document Title *Proposal to NASA for Apollo Contamination Analysis, Jun 1 1969 - Jun 30, 1970*

Author Buffalano, Charles and Latimer, James H.

Source SAO Proposal P174-4-69 **Date** 4/1969

Abstract The proposed experiment is in direct support of the manned space flight program and in particular of the Apollo Telescope Module program. The purpose of the experiment is to determine the size, lifetime and dynamics of small crystals formed from liquids dumped from the S-IVB and Command and Service Module during the Apollo lunar missions.

Location 11.01 **Series** 11 Apollo Collection

Document Title *Apollo 11 Mission Report*

Author Low, George and Mission Evaluation Team

Source NASA SP-238. Scientific and Technical Information Office **Date** 1971

Abstract The purpose of the Apollo 11 mission was to land men on the lunar surface and to return them safely to earth. The space vehicle was launched on July 16, 1969. Landing on the moon was on July 20, 1969. The command module and crew landed in the Pacific on July 24, 1969.

Location 11.02 **Series** 11 Apollo Collection

Document Title *Apollo 11 Preliminary Science Report*

Author Hess, W.N. and Calio, A.J. authors of Summary

Source NASA SP-214; Scientific and Technical Information Division **Date** 10/31/1969

Abstract The scientific objectives of the Apollo 11 mission, in order of priority, were the following: (1) To collect early in the extra vehicular activity a sample of approximately 1 kg of lunar surface material. (2) To fill rapidly one of the sample return containers with approximately 10 kg of lunar material. (3) To deploy three experiments on the lunar surface, a) a passive seismometer, b) an optical corner reflector, c) a solar-wind composition experiment. (4) To fill a second sample return container with selected lunar material, including two core tubes with lunar material. The Apollo 11 lunar module landed in the southwestern part of Mare Tranquillitatis. Twenty major findings are indentified in the summary. Ten reports of individual investigations follow the Summary.

Location 11.03 **Series** 11 Apollo Collection

Document Title *Operations Plan for Transient Lunar Phenomena Observations during Apollo 11.*

Author Staff, Center for Short-Lived Phenomena

Source Lunar International Observers Network **Date** 6/27/1969

Abstract This is the Operations Plan and Observing Schedule for the Transient Lunar Phenomena Observing Program during the Apollo 11 Manned Lunar Mission, 16 July-3 August 1969

Location 11.04 **Series** 11 Apollo Collection

Document Title *Communications Support for Tranient Lunar Phenomena during the Apollo 11 Mission*

Author Staff, Center for Short-Lived Phenomena

Source Smithsonian Institution, Center for Short-Lived Phenomena **Date** 8/25/1969

Abstract 216 astronomical observing stations in 30 countries and 14 states cooperated in keeping the lunar surface under nearly continuous 24 our a day surveillance for 6 consecutive days.

Location 11.05 **Series** 11 Apollo Collection

Document Title *Tranient Lunar Phenomena Reports during Apollo 11*

Author Staff, Center for Short-Lived Phenomena

Source Smithsonian Institution, Center for Short-Lived Phenomena **Date** 8/25/1969

Abstract This report documents the reports of transient lunar phenomena that have been received by the CFSLP during the Apollo 11 mission, 16-24 July 1969.

Location 11.06 **Series** 11 Apollo Collection
Document Title *Operation Lion: Report for the Flight of Apollo 11*
Author Middlehurst, Barbara; Allen, Norman; Walker, W
Source Lockheed Electronics Company for NASA MSC **Date** 9/8/1969
Abstract Operation LION functioned during the flight period of Apollo 11, to provide evaluation of incoming reports of lunar changes or unusual appearances both from the ground and from the spacecraft.

Location 11.07 **Series** 11 Apollo Collection
Document Title *Apollo 11 lunar photographs*
Author NASA
Source NASA **Date** 7/20/1969
Abstract This is a collection of 19 photographs of the Moon taken during the Apollo 11 mission. The first is identified as AS11-36-5589 and the last as AS11-43-6461.

Location 11.08 **Series** 11 Apollo Collection
Document Title *Apollo 11 Binder*
Author several
Source Smithsonian Astrophysical Observatory **Date** 7/20/1969
Abstract This binder contains various documents related to the optical tracking of the Apollo 11 spacecraft.

Location 11.09 **Series** 11 Apollo Collection
Document Title *Apollo 11 Special Issue, Goddard News*
Author Public Affairs Office, Goddard Space Flight Ctr.
Source NASA, Goddard News, Vol 17, No 5 **Date** 8/11/1969
Abstract Goddard's role in Apollo 11 centered on the vital tracking and communications links of the Manned Space Flight and NASCOM Networks. During the mission, the MSFN used 17 ground stations, four tracking ships, and eight instrumented aircraft.

Location 11.1 **Series** 11 Apollo Collection
Document Title *Apollo 11 Lunar Science Conference Abstracts*
Author Manned Spacecraft Center staff
Source NASA MSC, Albert Thomas Convention Center, Houston TX **Date** 01/5-8/1970
Abstract Program and abstracts of the Apollo 11 Lunar Science Conference. Welcome by T. Paine, NASA Administrator and by A.J. Calio, Director of Science and Applications, MSC.

Location 12.01 **Series** 12 Apollo Collection
Document Title *Apollo 12 Preliminary Science Report*
Author Calio, A.J. introduction; Stephenson, W.K. mission description
Source NASA SP-235, Scientific and Technical Information Division **Date** 6/1/1970
Abstract The Apollo 12 mission provided the first opportunity in the scientific exploration of the Moon to sample extensively the rocks within a radius of 1/2 km of the landing site, to obtain geological data, to measure the vector components of the lunar magnetic field, to measure the pressure of the lunar atmosphere and to collect seismic data on the interior of the Moon.

Location 12.02 **Series** 12 Apollo Collection
Document Title *Communications Support for Transient Lunar Phenomena during the Apollo 12 Mission*
Author Staff, Center for Short-Lived Phenomena
Source Smithsonian Institution, Center for Short-Lived Phenomena **Date** 11/28/1969
Abstract The purpose of this report is to document the lunar observing program planned, the communications procedures used, and the reports received and transmitted during the Apollo 12 mission.

Location 12.03 **Series** 12 Apollo Collection
Document Title *Transient Lunar Phenomena Reports during Apollo 12*
Author Staff, Center for Short-Lived Phenomena
Source Smithsonian Institution, Center for Short-Lived Phenomena **Date** 12/19/1969
Abstract This report documents the positive reports of transient lunar phenomena that have been received by the CFSLP during the Apollo 12 mission, 14-24 November, 1969.

Location 12.04 **Series** 12 Apollo Collection
Document Title *Apollo 12 binder, photographic records of mission events*
Author various
Source Smithsonian Astrophysical Observatory **Date** 11/14-24/1969
Abstract This binder contains various documents related to the optical tracking of the Apollo 12 spacecraft.

Location 12.05 **Series** 12 Apollo Collection
Document Title *Preliminary Results from the Lunar Ionosphere Detector*
Author Freeman, J.W.; Balsiger, H. and Hills, H.K.
Source Rice University, Houston Texas **Date** 1/1970
Abstract The performance of the Lunar Ionosphere Detector has been good. This report contains preliminary data analysis

Location 12.06 **Series** 12 Apollo Collection
Document Title *Interpretation of Visual Observations of Apollo Water Dumps.*
Author Buffalano, A.C.; Kratage, M.L. and Sharma, R.D.
Source Bellcomm Inc. Washington D.C. **Date** 1969
Abstract James Young visually observed a water dump during the Apollo 12 mission using the 24 inch Cassegrain telescope at the Table Mountain Observatory. He recorded the ice-cloud's size and magnitude for almost an hour.

Location 12.07 **Series** 12 Apollo Collection
Document Title *Mineralogy and Petrology of the Apollo 12 Lunar Sample*
Author Wood, J.A.; Marvin, U.B.; Reid, J.B. Jr.; Taylor, G.J.; Bower, J.F.; Powell, B.N. and Di
Source Smithsonian Astrophysical Observatory Special Report 333 **Date** 5/20/1971
Abstract We sectioned, examined and classified 499 coarse (>0.6 mm) particles from five of the Apollo soil samples.

Location 13.01 **Series** 13 Apollo Collection
Document Title *Geologic Maps of Fra Mauro Landing Site*
Author Offield, T.W. and Eggleton, R.E.
Source United States Geological Survey **Date** 4/11-17/1970
Abstract These are geological maps of the Fra Mauro landing site planned for Apollo 13. Due to spacecraft problems, no lunar landing was made.

Location 13.02 **Series** 13 Apollo Collection
Document Title *Apollo 13 binder, photographic records of mission events*
Author various
Source Smithsonian Astrophysical Observatory **Date** 4/11-17/1970
Abstract This binder contains various documents related to the optical tracking of the Apollo 13 spacecraft.

Location 13.03 **Series** 13 Apollo Collection
Document Title *Transient Lunar Phenomena Reports during Apollo 13*
Author Staff, Center for Short-Lived Phenomena **Date** 4/22/1970
Source Smithsonian Institution, Center for Short-Lived Phenomena
Abstract This report documents the positive reports of transient lunar phenomena that have been received by the CFSLP during the Apollo 13 mission, 11-17 April, 1970.

Location 13.04 **Series** 13 Apollo Collection
Document Title *Letter to Lawrence D. Hoover, Manned Spacecraft Center*
Author Citron, Robert
Source Smithsonian Institution, Center for Short-Lived Phenomena **Date** 5/26/1970
Abstract Enclosed is a table which is a compilation of LION Transient Lunar Phenomena program statistics for Apollo Missions 8, 10, 11, 12 and 13

Location 14.01 **Series** 14 Apollo Collection
Document Title *Apollo 14 Preliminary Science Report*
Author Low, George:Forword; McDivitt, James A. Intro.
Source NASA SP-272 **Date** 6/1/1971
Abstract Apollo 14, the third mission during which men worked on the surface of the moon explored the Fra Mauro Formation. The topography in the landing area was extremely interesting and the geological and geochemical returns were great.

Location 14.02 **Series** 14 Apollo Collection
Document Title *Apollo 14 Binder*
Author various
Source Several organizations **Date** 1/1971
Abstract This binder contains various documents related to the observations of the Apollo 12 spacecraft.

Location 14.03 **Series** 14 Apollo Collection
Document Title *Ground Based Observations-Apollo 14 and Salyut Report*
Author Bever,H.E.; Brown,C.C.; Ress,E.B.; Harvey,H.J.; Wilson,R.W.
Source Martin Marietta Company **Date** 9/30/1971
Abstract The purpose of this document is to discuss data obtained from Apollo 14 Flight by means of Ground Based Observation. Attempts and methods of obtaining similar data from Russia's Salyut Spacecraft and Apollo 15 are also described.

Location 14.04 **Series** 14 Apollo Collection
Document Title *Accelerastion Levels on the Heat Flow and Convection Demonstration-Apollo 14*
Author Gatewood, E; Morris, M.G.; Holland, R.L.
Source NASA TN X-64644, MSFC **Date** 2/11/1972
Abstract The method and data for determining the accelerations on the Heat Flow and Convection Demonstration are presented.

Location 15.01 **Series** 15 Apollo Collection

Document Title *Apollo 15 Preliminary Science Report*

Author Fletcher, James C. forward; Calio, A.J. introduction

Source NASA SP-289 **Date** 12/8/1971

Abstract The primary scientific objectives of the Apollo 15 mission were to perform selenological inspection, survey, and sampling of materials and surface features in a preselected area of the Hadley-Apennine region; to emplace and activate surface experiments; and to conduct inflight experiments and photographic tasks from lunar orbit.

Location 15.02 **Series** 15 Apollo Collection

Document Title *Opportunities for Participation in SpaceFlight Investigations*

Author Naugle, John E.

Source NASA Memorandum Change 36, NHB 8030.1A **Date** 2/1/1971

Abstract The purpose of this memorandum change is to solicit proposals for participation in the analysis of space flight data resulting from photography and auxiliary records acquired on Apollo 15, 16 and 17 Lunar Exploration Missions.

Location 15.03 **Series** 15 Apollo Collection

Document Title *Apollo 15 Contamination Photography*

Author Naumann, Robert J.

Source NASA TM X-64681, MSFC **Date** 7/5/1972

Abstract The problem of optical contamination in the form of particulates in the vicinity of a spacecraft has been a source of concern for any astronomical experiment that must be performed in sunlight. This concern prompted a photographic photometric experiment on Apollo 15 to measure the brightness of the residual contamination cloud as well as the cloud produced by dumping waste water overboard.

Location 15.04 **Series** 15 Apollo Collection

Document Title *Moonwatch communication: Apollo 15 Mission Completed*

Author SAO Moonwatch Headquarters

Source Vol. XIX No. 8 **Date** 8/31/1971

Abstract The conditions for optically observing various stages of the Apollo 15 flight were not good.

Location 16.01 **Series** 16 Apollo Collection

Document Title *Apollo 16 Preliminary Science Report*

Author Fletcher, James C. forward; Calio, A.J. introduction

Source NASA SP-315 **Date** 11/10/1972

Abstract The landing site for Apollo 16 was in the lunar highlands north of the crater Descartes. The primary scientific objectives of the mission were to geologically survey and sample surface features in a preselected area of the Descartes region, to emplace and activate surface experiments, and to conduct inflight experiments and photographic tasks from lunar orbit. Ten lunar surface experiments and 12 lunar orbit experiments were conducted.

Location 16.02 **Series** 16 Apollo Collection

Document Title *On the Moon with Apollo 16, Guidebook to the Descartes Region*

Author Simmons, Gene; preface

Source NASA EP-95 **Date** 4/1972

Abstract The purpose of this guidebook is to give in simple terms information about the Apollo 16 mission to the moon so that others can share the excitement of the scientific exploration of the Descartes region of the Moon.

Location 16.03 **Series** 16 Apollo Collection
Document Title *Apollo 16 Event Timeline*
Author none
Source NASA **Date** 4/16/1972
Abstract This is a one sheet event timeline for the Apollo 16 mission.

Location 16.04 **Series** 16 Apollo Collection
Document Title *Apollo 16 Ultraviolet Astronomy Observations*
Author Carruthers,George R.
Source Naval Research Reviews **Date** 9/1972
Abstract The Naval Research Laboratory Far-Ultraviolet Camera/Spectrograph was successfully operated on the lunar surface during the Apollo 16 mission. One of the primary objectives was to obtain imagery and spectrographic data on the Earth's upper atmosphere and the outermost extension of it which consists mostly of atomic hydrogen.

Location 16.05 **Series** 16 Apollo Collection
Document Title *Apollo 16 Subsatellite*
Author none
Source news clipping **Date** 1972
Abstract The lunar orbiting subsatellite launched by Apollo 16 is rapidly decreasing in altitude and it now appears it will impact the moon June 2.

Location 17.01 **Series** 17 Apollo Collection
Document Title *Apollo 17 Preliminary Science Report*
Author Fletcher,James C.forward;Calio,A.J. introduction
Source NASA SP-330 **Date** 1973
Abstract The landing site for Apollo 17 was on the south-eastern rim of Mare Serenitatis in a dark deposit between mass is units of the southwestern Montes Taurus. Scientific objectives of the mission include geological surveying and sampling of materials and surface features in a preselected area of the Taurus-Littrow region, deploying and activating surface experiments, and to conducting inflight experiments and photographic tasks during lunar orbit and transearth coast.

Location 17.02 **Series** 17 Apollo Collection
Document Title *Apollo 17 Binder*
Author several authors
Source Binder **Date** 1972
Abstract This binder contains several incidental documents pertinent to the Apollo 17 mission.

Location 17.03 **Series** 17 Apollo Collection
Document Title *Apollo Contamination Analysis,*
Author Buffalano, Charles
Source SAO, Final Report NGR 09-015-105 **Date** 12/1971
Abstract The broad objectives of the Apollo Contamination Analysis project were a quantitative analysis of the clouds formed by liquids vented into space during the Apollo missions and the generation of models representing the behavior of these clouds. The liquids released into space are primarily oxygen, hydrogen or water. In a vacuum, a fraction of the released liquid immediately vaporizes, freezing the remaining material into a cloud of small solid particles.

Location 17.04

Series 17 Apollo Collection

Document Title *Visual Sensations Induced by Cerenkov Radiation*

Author McNulty, P.J.; Pease, V.P. and Bond, V.P.

Source Science, Vol 189, pp 453 ad 454

Date 8/8/1975

Abstract Pulses of relativistic singly charged particles entering the eyeball induce a variety of visual phenomena by means of Cerenkov radiation generated during their passage through the vitreous. These phenomena are similar in appearance to many of the visual sensations experienced by Apollo astronauts exposed to the cosmic rays in deep space.

Location 17.05

Series 17 Apollo Collection -

Document Title *Summary of Earth-Based Observations of Apollo Water Dumps*

Author Buffalano, Charles and McLaughlin, W.I.

Source Belcomm Inc; B70 10018

Date 10/2/1970

Abstract All known observations of waste water dumps obtained during optical coverage of Apollo missions 9 through 13 are summarized.

Get all Apollo stats and find guides to help you play Smite created by players on SMITEFire. There are none without admiration for Apollo, God of Music. He is brash, cavalier, and dauntless, with the power to bring hope to the hopeless and change the course of battle with a single arrow. Voices of soldiers, mothers, kings and emperors, even Gods rise in glorious melody in honor of him; and he, basking in their adoration, shines victoriously. Though Hera, Queen of Gods, challenged his very birth, sending the great serpent Pylos to slay Apollo, his twin sister Artemis, and their mother Leto, not even she could deny him victory. Merely four days old, Apollo, gifted with a legendary bow, Rob Loukotka is raising funds for The Apollo 11 Collection on Kickstarter! Posters of every item NASA sent to the moon. 69 drawings of gadgets, dehydrated foods, space suits and more! The Apollo 11 Collection. Posters of every item NASA sent to the moon. 69 drawings of gadgets, dehydrated foods, space suits and more! Buy a poster here! Apollo 11 at 50: A Complete Guide to the Historic Moon Landing. By Chelsea Gohd 2019-07-16T11:50:31Z. Relive the drama! Project Apollo ran from 1961 to 1972, even though NASA accomplished Kennedy's goal in 1969. Although other astronauts visited the lunar surface after Apollo 11, the triumphant first landing remains a pinnacle in spaceflight history. The package also held additional scientific instruments and equipment for sample collection on the surface. Apollo 11 carried the first geological samples from the moon back to Earth. In total, Armstrong and Aldrin collected 48.5 lbs. (22 kilograms) of material from the moon, including 50 moon rocks, lunar soil, pebbles, sand and dust.