

Mohole, LOCO, CORE, and JOIDES

A brief chronology

Mar. 23, 1957: At a meeting of the National Science Foundation Advisory Panel for Earth Sciences, Walter Munk suggested the possibility of drilling a deep hole through the crust of the earth to the mantle. Harry Hess referred the project to the American Miscellaneous Society for action.

Apr. [ca] 20, 1957: At an AMSOC meeting (the "wine breakfast") at Munk's house, with Gordon Lill as chairman, the following members of a deep-drilling committee were named: Roger Revelle, Joshua Tracey, Harry Ladd, Harry Hess, and Walter Munk.

In the next two to three weeks William Rubey, Maurice Ewing, and Arthur Maxwell were added to the committee.

July 15, 1957: Gordon Lill submitted AMSOC's proposal P-3831 to NSF.
(This was withdrawn Mar. 27, 1958.)

Dec. 8, 1957: AMSOC's deep-drilling project was accepted by NAS-NRC.

Apr. 2, 1958: The Division of Earth Sciences of NAS-NRC submitted to NSF proposal P-4773 for \$30,000 for a feasibility study of drilling to Moho.

June 26, 1958: NSF granted \$15,000 for the feasibility study.

July 12, 1958: Willard N. Bascom was asked by the AMSOC Committee to become its Executive Secretary, on a part-time basis.

From October, 1958 to May, 1959, various additions were made to the AMSOC Committee. During October, 1958 three panels were established: Drilling Panel, William B. Heroy, Sr., chairman; Site Selection Panel, Harry H. Hess, chairman; Scientific Objectives and Measurements Panel, Harry S. Ladd, chairman. Members of the last two committees were appointed within the next few months.

April 1, 1959: Bascom became Technical Director for the Mohole Project.

June 1-5, 1959: AMSOC Executive Board arrived at a budget of \$14 million. Concluded that the AMSOC Committee, under NAS, should manage the project, not only advise on it.

June 14, 1959: NAS Governing Board granted permission for the AMSOC Committee to proceed with the project as conceived and to ask for funds as needed, up to \$2,500,000 for preliminary studies and Phase I.

Sept. 1, 1959: "Drilling Thru the Earth's Crust," NAS-NRC publication #717, was published, and the Mohole Project was announced to news reporters during the First International Oceanographic Congress in New York.

Nov. 28, 1959: The Drilling Techniques Panel concluded that CUSS I would meet the requirements for experimental drilling.

- Feb. 11, 1961: CUSS I was released by Shell Oil and moved to National Steel and Shipbuilding in San Diego for modifications.
- Mar. 6-15, 1961: the first test drilling was performed off La Jolla.
- Mar. 28 - Apr. 12, 1961: Drilling carried out at the Experimental Mohole site off Guadalupe Island. Depth of water 11,672 ft., depth of maximum drilling 601 ft., reached "second layer," which proved to be basalt.
- June 12, 1961: The Drilling Techniques Panel agreed that the ultimate Mohole vessel should be developed immediately, rather than beginning with an intermediate ship. They noted that reaching the "Moho" was desired by the President's Scientific Advisory Committee.
- June 13, 1961: The AMSOC Committee strongly recommended that an intermediate drilling program be initiated during fiscal year 1962. It noted that the Drilling Techniques Panel and the prime contractor might choose to start immediately on an ultimate ship. The committee named the qualifications necessary for a prime contractor.
- July 19, 1961: Gordon Lill resigned as chairman of the AMSOC Committee because of employer (Lockheed)'s interest in becoming prime contractor. William F. Bates and Roger Revelle resigned from the committee for the same reason. Harry Ladd became acting chairman.
- July 27, 1961: NSF held a briefing to inform representatives of interested organizations about the objectives of the Mohole Project. Those present were requested to submit proposals on how they would manage the project. Most invitees were from private industry; only university groups invited were Lamont and SIO.
- Sept. 8, 1961: SIO submitted a letter response to NSF that it would be willing to: become prime contractor for the project, or be a co-prime contractor for the scientific program, or be a subcontractor for the scientific program.
- Oct., 1961: The Naval Architecture Panel of the AMSOC Committee was formed, Harold E. Saunders, chairman.
- Oct. 7, 1961: The AMSOC Committee took note of the fact that both the Russians and the Canadians had announced plans to drill to the "Moho."
- Oct. 13, 1961: William L. Petrie was appointed Executive Secretary of the AMSOC Committee.
- Dec. 9, 1961: Hollis D. Hedberg accepted the chairmanship of the AMSOC Committee, replacing Lill. (Hedberg, Frank Press, and E. R. Piore had been requested by NAS-NRC President Bronk to join the committee on Sept. 20, 1961). From early 1962 Hedberg continually urged that the program plan on two ships, one for intermediate drilling of many holes, and an ultimate ship for the Mohole.
- Dec. 19, 1961: Lewis A. Rupp became chairman of the Naval Architecture Panel, as Saunders had died on Nov. 11.

- Late in 1961: According to Hedberg (in a later letter), NSF took over responsibility for carrying out the project (before Hedberg had become chairman of the committee); NSF, said Hedberg, did agree that the AMSOC Committee should continue to provide guidance.
- Dec. 21, 1961: NSF notified SIO that its proposal was not among those being considered.
- Jan. 4, 1962: The Naval Architecture Panel recommended the Cl-M-AV1 as an intermediate vessel.
- Jan. 5, 1962: Spiess indicated to NSF and to Aerojet-General Corporation the willingness of SIO to act as subcontractor for the scientific program.
- Feb., 1962: Cesare Emiliani, Univ. of Miami, proposed that a drilling vessel be employed to core continuously through deep-sea sediments in the western Atlantic and the Caribbean. This project was baptized LOCO, for LOng COres. Riedel replied (on Mar. 30) that he felt that half of the holes should be in the Pacific. Some time before June, 1962, Emiliani became a member of the AMSOC Committee.
- Feb. 19, 1962: Bascom and several others of the technical staff of AMSOC incorporated as Ocean Science and Engineering, Inc.
- Feb. 28, 1962: NSF announced that Brown and Root, Inc. of Houston would be the prime contractor. Hedberg (in later letters) said that NSF chose Brown & Root without any advice from AMSOC and gave Brown & Root a part in the scientific aspects and scientific planning of the project. Brown & Root hired Ocean Science and Engineering for a 60-day subcontract, terminated them in June. NSF then hired six employees of OSE, not including Bascom, for one year.
- Mar. 19, 1962: Lill was reappointed to the AMSOC Committee (Hedberg continued as chairman).
- Mar. 26, 1962: Munk resigned from the AMSOC Committee, ~~but~~ was asked to reconsider and stayed on at least until the following spring.
- May 14, 1962: Creighton Burk was selected as AMSOC Scientific Officer, to commence August 1. The AMSOC Executive Committee took note of the LOCO project.
- June 10, 1962: The first meeting of the LOCO Committee took place; it included two scientists from each of the following: Institute of Marine Sciences of Univ. of Miami (Emiliani and Koczy); Lamont (Maurice Ewing and Bruce Heezen); Princeton (Hedberg and Hess); Woods Hole (Hersey and K. O. Emery); SIO (Shor and Riedel). Guests were present, including Ladd and Tracey to represent AMSOC. According to Emiliani, all those present recommended that the LOCO Committee should be independent of AMSOC and the LOCO project should be independent of the Mohole. Ewing was not there that day, but on previous day had urged that LOCO be placed under AMSOC. [It appears as if Hedberg was also not there that day, but agreed with Ewing later.] Seitz (in a later letter to Waterman) said that during this summer LOCO rejected an offer by AMSOC to combine their objectives with the intermediate stage of the Mohole so that one ship, a Cl-M-AV1 could be used for both projects.

- Sept. 13, 1962: At the second LOCO meeting the suggestion by John Lyman was adopted, that a non-profit corporation should be set up among the LOCO Committee members, to operate a drilling vessel.
- Sept. 26, 1962: The AMSOC Committee set up an Oceanic Sediments Drilling Panel, with M. Ewing as chairman. Within the next few months Hersey, Ladd, and Revelle were appointed members.
- Oct. 9 - Nov. 4, 1962: A test hole, under AMSOC sponsorship, near Mayaguez, Puerto Rico, was drilled to 1000 feet.
- Oct. 24 - Nov. 21, 1962: The articles of incorporation of Associated Oceanographic Institutions, Inc. were signed by eight people: Maurice Ewing and Bruce Heezen of Lamont; Fritz Koczy, Cesare Emiliani, and F. G. Walton-Smith for Univ. of Miami; William Riedel, George Shor, and Fred Spiess (acting director) for SIO. The three participants from Woods Hole (K. O. Emery, J. B. Hersey, and Paul Fye) did not sign this document. Fye recommended instead a corporation of the institutions, not individuals.
- Nov. 8, 1962: Revelle recommended to Spiess (acting director) that SIO should get started on ship conversion and agree to turn over the project to a group when it was fully organized. He felt that SIO could undertake the drilling of deep-sea sediments alone.
- Jan. 14, 1963: At an informal LOCO meeting, Fye suggested that SIO could be the interim grantee and administrator of LOCO funds, until a formal group got organized.
- Jan. 19, 1963: The AMSOC Committee recommended the drilling of a number of shallow to moderate depth holes widely distributed, using a ship of shallow to moderate depth capacity. It urged that work on that ship be started immediately and work on the ultimate ship as rapidly as essential experimental data became available. The Executive Group rejected the idea of a "single hole at a specific spot."
- Feb. 2 and 7, 1963: The articles of incorporation of Consortium for Oceanic Research and Exploration, Inc. -- CORE -- were signed by Maurice Ewing, Brackett Hersey, and Roger Revelle.
- Feb. 8, 1963: CORE submitted a proposal to NSF to build and operate an "intermediate-depth oceanic drilling vessel." They noted that they expected the Univ. of Miami to participate. They stated their intent to carry out the objectives of the AMSOC Committee, as part of Project Mohole.
- Feb. 18, 1963: The LOCO Committee, at its third meeting, agreed to use the intermediate vessel of the Mohole Project, voted that a corporation of the four institutions should be set up, endorsed CORE as an intermediate corporation if Koczy were elected to its board and if the Univ. of Miami were added to the by-laws, recommended that CORE be dissolved if an institutional corporation were set up, and requested that LOCO be adopted by CORE and that AMSOC become a committee of CORE. (In a later summary Emiliani said that CORE did not agree to these requirements.)

- Mar. 18, 1963: Waterman of NSF issued a new agreement on AMSOC-NSF relationship, with assistance from NAS. This reaffirmed NSF's intent to attain the objectives conceived by the AMSOC Committee and that AMSOC was to provide guidance on the scientific objectives.
- Apr. 18, 1963: At its fourth meeting, the Loco Committee discussed Emiliani's new proposal to NSF, failed to endorse it, voted to replace Shor with Revelle, and then voted to dissolve.
- May 3, 1963: The Institute of Marine Sciences, Univ. of Miami, submitted a proposal alone to NSF for a drilling program. The proposal called for building a specially designed vessel, not using a converted Cl-M-AV1. (The Univ. of Miami continued to use the term LOCO on proposals and projects after the committee had been dissolved on Apr. 18.)
- May 11, 1963: The AMSOC Executive Committee recommended an intermediate drilling program with an intermediate ship; they also recommended that NSF consider obtaining another contractor for the intermediate program, and that Brown & Root proceed with the design and engineering of the ultimate vessel.
- June 1, 1963: Ocean Science & Engineering, Inc. reviewed Brown & Root's "Engineering Plan Report" for Mohole; among their comments was that it was "neither a clear plan nor a sound basis for proceeding."
- June 20, 1963: Brown & Root took exception to the AMSOC Committee's recommendations of a vessel of intermediate size.
- July 1, 1963: Leland J. Haworth became director of NSF.
- Sept. 28, 1963: Haworth addressed the AMSOC Committee, said that he and Wiesner believed that "we probably will have to think of ocean drilling as two programs" -- deep drilling and shallower drilling. He felt that the Mohole Project should have a central operating laboratory or unit, which could be an outgrowth of CORE.
- Oct. 7, 1963: Revelle sent to Lamont, Woods Hole, and Miami a proposed mechanism for setting up an institutional corporation to carry out an oceanic drilling program through NSF. He suggested that one member be designated to contract with NSF as an agent of the corporation.
- Oct. 25, 1963: Fye replied to Revelle, recommending that the four institutions agree on one of them to prepare a proposal for the design, conversion or construction of a vessel, and two years of operating an intermediate drilling program. He said that the other three could endorse the proposal to NSF. Fye felt that SIO was a logical choice as operator. He thought that the intermediate program and the Mohole Project should be separated.
- Nov. 5, 1963: Koczy replied to Revelle that one institution should submit the proposal and that Miami would like to do it.
- Nov. 8, 1963: Hedberg resigned as AMSOC chairman (on Oct. 8 Seitz had warned him against speaking out on the Mohole without clearing it through NAS).

- Jan. 18, 1964: At Haworth's request, Gordon Lill agreed to direct Project Mohole for NSF, to begin Feb. 10.
- Jan. 18, 1964: The AMSOC Committee voted that it and its panels be discharged, and that new committees for the scientific aspects of ocean drilling be established through NAS. Their suggested name was NAS Committee on Oceanic Drilling (NASCOD). [This was apparently done.]
- Jan. 21, 1964: NSF announced its intent to design and construct an ultimate vessel (a large drilling platform), which would be equipped initially with drilling equipment for intermediate depths.
- Jan. 22, 1964: Creighton Burk resigned as scientific officer (he was in favor of an intermediate vessel).
- Feb. 10, 1964: Emiliani proposed to Ewing, Fye, and Revelle that another proposal be submitted to NSF, with Miami as the contractor.
- Mar. 19, 1964: Lill addressed Richard Bader, William Benson, Maurice Ewing, Paul Fye, Fritz Koczy, John Lyman, and Roger Revelle. He said that the four institutions should underwrite an agreement to combine their efforts in large drilling projects. Lill would continue to pursue the Mohole Project for NSF and to control the Brown & Root contract.
- May 10, 1964: A Memorandum of Agreement was signed for Joint Oceanographic Institutions Deep Earth Sampling (JOIDES).
- Oct. 5, 1964: NSF awarded a two-year contract to the Univ. of Miami for "Support of the Planning of" JOIDES.
- Jan. 27, 1965: The selection of the Mohole site north of Maui was announced.
- Mar. 9, 1965: NSF granted Brown & Root permission to seek bids on the construction of a Mohole drilling platform. Eleven firms were solicited.
- Apr.-May, 1965: The first JOIDES project took place -- drilling on the Blake Plateau off southeastern U.S. on borrowed ship Caldrill, by Lamont.
- July 12, 1965: Brown & Root received four responsive bids for construction of a drilling platform, of which National Steel & Shipbuilding's was the lowest.
- July 23, 1965: NSF representatives met with Brown & Root to discuss the bids, which were higher than anticipated.
- Aug. 4, 1965: The Executive Committee of the National Science Board adopted a resolution in favor of continuing the Mohole Project, in spite of its increased costs. (Several other endorsements from various scientific groups were given during the next month.)
- Sept. 28, 1965: The contract for the Mohole drilling platform was awarded to National Steel & Shipbuilding.

May 6, 1966: The House of Representatives appropriations committee denied funds for Mohole. (During July and August the Senate was unable to restore the funds.)

June 24, 1966: The prime contract between NSF and SIO was approved, for SIO to become the operating institution for the Deep Sea Drilling Project.

Oct. 18, 1967: The keel of the Glomar Challenger was laid.

Nov. 14, 1967: A subcontract from SIO to Global Marine to carry out the drilling project was signed.

Mar. 23, 1968: The Glomar Challenger was launched.

Aug. 11, 1968: The acceptance trials of the Glomar Challenger were completed, and the first drilling began, under an 18-month contract.