

Outside SystemSECRET/SENSITIVE

April 3, 1975

MEMORANDUM FOR DAVID ELLIOTT

FROM: Mr. Clift

SUBJECT: Ultra-large Floating Platforms

During the course of current attention to the Azores, I have had occasion to think back to research projects being carried out by the Advance Research Projects Agency (ARPA) on large ultra-stable floating platforms for military advanced support. The National Council on Marine Resources and Engineering Development used to include brief references to this work in the Council's annual reports to the Congress. I attach relevant pages from the 1969-70 and '71 reports.

It would seem to me very useful if you and Gordon Moe were to determine the current status of this research, to consider whether a detailed NSC study on such platforms might be appropriate and, in this connection, whether you might wish to establish a specific NSC contract group for this purpose.

Attention being given to civil uses of such platforms -- e.g., for off-shore jet airfields and nuclear power plants -- is increasing. Technology for such platforms is, at the same time, advanced. With this the case, I think a fresh look at possible national security applications is warranted.

If, following your consideration, it is decided to proceed with such a study I would commend to your attention Dr. John Craven, former Chief Scientist of the Navy's Special Projects Office (The Polaris Program). Craven is presently Dean of Maritime Programs at the University of Hawaii, Chief Marine Advisor to the Governor of Hawaii and very active on the private sector floating platform front.

cc: General Scowcroft

OSD REVIEWED 22-Mar-2011: NO OBJECTION TO DECLASSIFICATION

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SECRET/SENSITIVE (XGDS)

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Marine Science Affairs

use of the prototype Navy Mark I and Mark II Deep Dive
designed for 1000 feet;

tion of an experimental model communication system that
own superior intelligibility to the 600 feet depth with the micro-
and electronics contained in the facemask; and

tion of studies suggesting that (a) in the United States satu-
ration diving may account for 50 percent of all military diving in

(b) divers will have adequate natural visual perception only
percent of the time, (c) self-contained communication equipment

of 90 percent intelligibility within a range of 2,000 yards at
depths of 1,500 feet is capable of meeting most diver portable

communications requirements, and (d) compact underwater heaters
required to protect divers from environmental cooling.

is constructing a nuclear powered research and ocean engi-
mersible (NR-1) which combines the long endurance of a nuclear

with the control and instrumentation developed for the DSRV
mersible. Carrying a crew of five plus two observers, the NR-1 will

be the technical basis for future development of nuclear-powered,
research and survey submersibles to operate at even greater

depth. Current scheduling calls for sea trials and operations in

Research and Development

biomedical activities of the Navy Bureau of Medicine and
developing criteria for life support, health maintenance,

mental control at 1,000 feet underwater equivalent pressure.

-Duke University saturation dive to a simulated depth of
completed in December 1968. During the 77 hours and 30

at saturation depth, the divers performed extensive physical
tasks in a normal manner. All observations indicated that

form well under these conditions if life support systems main-
support equivalent to that at the surface. The detailed medical

dive, to be published in the near future, will make available
information in such areas as heart rate, respiration frequency,

oxygen consumption, carbon dioxide elimination, partial pressure in arterial
blood, and carbon dioxide, central nervous system function under

stress, and human performance and reaction response at deep

dives. In FY 1970 will be given to (a) calculation and evaluation of
decompression schedules for use in four different fleet systems,

Military Programs

1969

(b) physiological studies in deep chamber dives, (c) helium speech transla-
tion techniques, (d) acquisition and installation of research equipment at
both in-house and civilian laboratories, and (e) preparation of a long-range
development plan.

Activities of the Advanced Research Projects Agency

To improve our ability to detect, locate, and identify underground and
underwater nuclear explosions, the Advanced Research Projects Agency
(ARPA) has for a number of years conducted a project called VELA. Some
of ARPA's significant marine science efforts during the past year included:

- a seismic calibration experiment off Amchitka Island involving deto-
nation of a 250-ton slurry charge at a depth of 3,000 feet;
- experiments to evaluate the influence of turbulent diffusion and cur-
rents of large subsurface bodies of contaminated water by tagging
subsurface, open-ocean waters with fluorescent dye and following the
resulting pool for five days;
- design, fabrication, and testing of equipment for detonation of
10- to 1,000-ton underwater chemical explosions; and
- collection and analysis of sea water samples to determine back-
ground levels of radionuclides in selected areas of the Arctic Ocean.

Research and development on detecting, locating, and identifying nuclear
explosions in the ocean has been successful, and this part of the project
VELA is now being phased out with virtually all work directly concerned
with ocean properties to be completed in FY 1969. Other parts of the
VELA project are continuing, including seismic calibration experiments
in the oceans intended to provide information on the earth's crust and
upper mantle.

ARPA will be engaged in advanced marine science and technology as
part of the Agency's mission to demonstrate the feasibility of emerging
technologies for possible military application. ARPA is particularly inter-
ested in technologies which could drastically change our defense posture in
such critical areas as anti-submarine warfare (ASW), forward basing, and
control and use of the sea surface. ARPA will be working closely with the
Navy, although projects of interest tend to have a multiservice applicability.

Two \$8 million projects are under serious consideration at this time:

- demonstration of the feasibility of a cost effective, large, ultra-stable
floating platform with potential for advance support; and
- demonstration of the feasibility of very high speed surface effect
vehicles with potential for ASW and convoy protection, and for opera-
tions over shallow water, in certain coastal areas, and over ice.

1970

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present capability for locating and photographing underwater nuclear explosions during a record 1500 operating hours.

The Navy's new oceanographic survey ships, the USNS *Keller*, the USNS *Chauvenet* is soon to be delivered, the USNS *Harkness* and USNS *Wright*, the USNS *Walker*, will be delivered. The USNS *Walker* is one oceanographic and four hydrographic survey ships from service. Though the total number of survey ships is less in fiscal year 1971 than in fiscal year 1970, the efficiency achieved by the new platforms is a significant survey capability.

The Navy's new oceanographic survey acquisitions, in fiscal year 1970 two new oceanographic research ships supporting on-going Navy programs, the USNS *DeSteiguer* and USNS *Barillet*, became operational. They replaced two older research ships which have been temporarily placed in reduced readiness status. A new design oceanographic research ship, the USNS *Metsite*, was delivered to Scripps Institution of Oceanography, and a sister ship will be delivered to Woods Hole Oceanographic Institution by the end of fiscal year 1970. The new catamaran-hulled research ship which will support Navy's on-going underwater acoustic program is scheduled for delivery in fiscal year 1971.

The fiscal year 1971 budget includes funds for two ships of a new, small class (under 300 gross tons) to provide an economical, versatile platform for the shorter cruises which make up a large proportion of oceanographic ship research schedules. These vessels will replace ships of World War II and older vintage now used by universities in carrying out Navy's programs.

The Advanced Research Projects Agency

To improve the ability to detect, locate, and identify underground and underwater nuclear explosions, the Advanced Research Projects Agency (ARPA) of the Department of Defense has for several years conducted Project VELA. The portion of this research and development program involving detection, location and identification of explosions in the ocean was successful and has been discontinued.

Related study of the properties of the ocean that are relevant to onsite inspection techniques for underwater nuclear explosions will be completed by the end of fiscal year 1970. As part of the study a computer program has been developed to simulate and predict the oceanographic evolution of deep subsurface pools of contaminated water which might follow an underwater nuclear explosion. A 250-ton detonation off the Aleutians on September 6, 1970, concluded development effort on a prototype vessel for large cargoes, and provided additional guidelines for the application of calibration explosions to improve our ability to locate events taking place in island arc structures.

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Ten ocean-bottom-seismographs were deployed off the Aleutians to monitor local seismic activity before and after the MILROW nuclear experiment of October 1969, and to determine the extent of possible earthquake activity induced by large-yield underground nuclear explosions. Eight of the units were successfully recovered after the event, and data are being analyzed.

In concert with the Navy program, ARPA is also engaged in other advanced marine science military applications. Areas of particular interest which will be investigated relate to (1) new technology for floating bases, and (2) the attainment of Arctic mobility over the ice pack and adjacent shores. Projects include—

(1) The development of an Arctic surface effect vehicle (SEV). The Arctic has been picked for attention because of its significance to national security. The polar region will be studied as an operating environment for the SEV and key Arctic technologies will be developed. Conceptual design studies for mission-oriented vehicles will then be initiated; and

(2) Design and technology studies for floating bases will continue; some 1/100 scale model testing will be carried out with more promising concepts to be tested further at larger scales.

The United States earnestly hopes for and works toward resolution of the international conflicts which may make defense measures necessary. Until such efforts succeed there is no prudent alternative to the maintenance of adequate protective forces and systems, and ocean science and engineering are essential to enhance the effectiveness of these forces. The military oceanography programs are tailored to support particular systems, in geographical areas and on specific time schedules. The challenge to scientists and engineers is to satisfy these overriding primary needs, to insure that the knowledge is advanced and, to the maximum extent feasible, to use the data, technology and research results available from other economic and scientific fields.

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1971

Oceanographic Ship Program

During the period 1960-1971 the Navy has funded for the construction of 22 oceanographic ships specifically designed and configured for research or surveying. The Navy's newest oceanographic ship, the 245 foot, 2,100 ton R/V *Knorr* (AGOR-15) has been delivered to the Woods Hole Oceanographic Institution. The *Knorr* represents the second in a new generation of research vessels. The first, R/V *Melville* (AGOR-14), commenced a one year world cruise for the Scripps Institution of Oceanography in June 1970.

The Navy in collaboration with the National Science Foundation, has reassigned the *Gilliss* (AGOR-4), to the University of Miami where it will replace the World War II conversion R/V *Pillsbury*. A second AGOR, the *Davis*, has been leased to the New Zealand Navy for underwater acoustics research, as part of a closely coupled cooperative program underway between the United States and New Zealand.

The new large coastal survey ships *Chauvenet* and *Harkness* are scheduled to commence shakedown during the last half of Fiscal Year 1971. The Navy research submersible *Alvin* is presently being rebuilt at the Woods Hole Oceanographic Institution following its recovery from a depth of over 5,000 feet in the North Atlantic in August 1969. The bathyscaph *Trieste II* has been submerged to 13,200 feet after an overhaul following the search for the submarine *Scorpion* in 1969. The Nuclear Research Vehicle (NR-1) completed a successful post-delivery shakedown cruise in early 1970 during which she collected data on ocean currents and bathymetry. The deep diving submarine *Dolphin* has joined Submarine Development Group One in San Diego to begin work on acoustic experiments, having completed a series of engineering design experiments. Submarine Development Group One also has custody of the recently delivered deep submersibles *Sea Cliff* and *Turtle*.

In Fiscal Year 1972, the USNS *Hayes* (T-AGOR 16), a ship with major equipment handling capability, will join the fleet. The *Hayes* is the Navy's first catamaran-hull oceanographic research ship. The USNS *Wilkes* (T-AGS 33) will also be delivered in FY 72 as will USNS *Wyman* (T-AGS 34). The *Wilkes* is configured for conducting oceanographic surveys, while the *Wyman* is designed to support coastal hydrographic survey operations. The *Wyman* is equipped with 36-foot hydrographic survey launches and an automated hydrographic data acquisition system integrated with a new modern navigation system and also has the capability for acquiring gravity information and conducting meteorological and oceanographic projects.

Advanced Research Projects

The Advanced Research Projects Agency (ARPA) sponsors several projects which are segments of the national marine science program, including research on stable floating platforms, surface effects vehicles, and marine and arctic technology.

The objective of ARPA's Stable Floating Program is to overcome cost, mobility and technology barriers that are prohibiting the use of such platforms for various military missions. The stable floating platform might

be used, for instance applications, to support aircraft and missile logistics bases.

ARPA sponsors the cause of the unique tundra. The objective of night and all-weather segments of the program. Comprehensive development system technology, SEV testbed and the SK-5 will be used for arctic operating engineering data.

The objective of the program is to improve understanding of military operations and intelligence, and technology programs suitable for the arctic. Concepts for critical technology being conducted in the arctic are being conducted in the arctic wake analysis. This