SEALAB II scheduled to begin

June 25, 1965

FACT SHEET

SEALAB II

PROGRAM: SEALAB II, the second phase of the Navy's "Man-in-the-sea" program, is scheduled to begin in the middle of August. Working in the area around their undersea quarters, situated on the ocean bottom at a depth of 210 feet, one-half mile off La Jolla, California, the aquanauts will carry out experimental salvage techniques, engage in oceanographic and marine biological research, and undergo a series of physiological and human performance tests.

The undersea experiment will be conducted by the Office of Naval Research (ONR) in collaboration with the Navy's Special Projects Office as part of the Deep Submergence Systems Program. SEALAB-I was conducted last year by ONR 30 miles off Bermuda when four Navy divers lived and work comfortably and safely at a depth of 193 feet for a period of 11 days.

PERSONNEL: Two diving teams of ten men each, including civilian scientists as well as Navy divers, will occupy the 57-foot undersea habitat alternately during the 30 day experiment. Two of the men are scheduled to stay down for the entire 30 days. It is anticipated that Commander M. Scott Carpenter will be the leader of the first team. The astronaut, on loan from NASA, is presently directing the training of aquanaut candidates at the U.S. Navy Mine Defense Laboratory, Panama City, Florida. The teams will be named at a later date.

EXPERIMENTS: An experimental salvage procedure will be used in the recovery of a Navy fighter aircraft to be sunk for this purpose. The aquanauts will use a new plastic foaming technique to attempt to float the aircraft to the surface. The procedure has been successful in the laboratory and in limited sea tests but has not yet undergone full-scale application testing at sea. Other salvage work which may be undertaken includes an attempt to use standard stud guns to attach lifting pad eyes to a piece of steel hull simulating a submarine and also to patch holes in the hull. The divers will attach experimental rubberized flotation bags to serve as pontoons to raise the hull. Other tasks under consideration are ore mining and construction of the underwater portion of an offshore oil drilling rig.

Marine biologists will work with marine life in a ten-foot square fish cage that will be placed on the ocean floor to provide an at-depth undersea "aquarium." A census of marine life in the area will be made and large fish will be given special physiological tests, including the taking of internal, gas samples. Bioluminescence and biofluorescence of marine life will be studied, and plankton sampled.

Geologists will study the composition of the ocean bottom, especially the sediment. The scouring effect of sediment on mine cases will be observed and dyed sand will be used to trace the transport of sediment along the ocean bottom.

PERSONNEL TESTS: Two new systems for taking electrocardiograms of men swimming and working under water will be tested. Using acoustic biotelemetry, the data will be transmitted to physiologists in the surface control station. Brief experimental (bounce) dives are planned to a depth of about 350 feet.

A special feature of the SEALAB II operation will be a newly designed undersea telemetry station contained in a concrete beehive structure about six feet in diameter and located about 100 feet from the habitat. Known as a Benthic Laboratory, it will serve as the "central switchboard" for communications and data sampling channels. It will provide four television channels which will make possible constant monitoring on shore of the aquanauts' activities both inside and outside their undersea house, 20 channels for audio communications and 120 data channels. The aquanauts will connect the Benthic Laboratory to the SEALAB habitat and perform initial check-out tests.

The Benthic Laboratory, designed and built by the Scripps Institution if Oceanography, will contain special manipulator arms for making its own repairs. If a component should become defective, the arms, operated by remote control from shore, will remove the component and replace it with a stowed spare part.

The aquanauts will also operate an undersea "weather station" to collect such data as the velocity of currents at the bottom, near the bottom and 30 feet from the bottom, temperature fluctuations in a 30-foot vertical line from the bottom, and variations in pressure caused by undersea waves and swells. The Benthic Laboratory and the weather station will remain in operation after completion of the SEALAB II program.

One of the major problems of the aquanauts while working in water with an average temperature of 50 degrees F. will be keeping warm. Although a few experimental thermally heated suits will be tested, the divers will generally wear the standard diving wet suits. It is planned to install near the working area a small emergency way station equipped with an isotope-radiation heating unit provided by the Atomic Energy Commission. The station, which will contain emergency breathing gas as well as the heater, will be large enough for one man.

The cold water as well as the increased pressure and saturated diving condition limit the effectiveness with which men can perform various jobs in the undersea environment. Special human engineering tests have been devised for the aquanauts to test their capabilities under such conditions. Among the motor skills to be tested are strength capabilities, manipulative abilities, two-hand coordination and tactile sensitivity. Arithmetical performance and speech intelligibility tests will be conducted along with hearing and vision studies. Visibility in the area is expected to vary from zero to 60 feet.

HABITAT: The SEALAB II undersea unit is essentially a, non-propelled sea-going craft designed as a pressure vessel. It has positive surface and subsurface stability. Water ballast tanks are used to control positive and negative buoyancy. The SEALAB habitat is now being completed at the San Francisco Naval Shipyard and will be barged to the Long Beach Naval Shipyard at the end of this month for final outfitting.

The living compartment, a 57-foot long cylinder 12 feet in diameter, is divided into a laboratory, galley and bunkroom. Eleven viewing ports are provided in the hull. Embedded in the surface of the solid concrete deck is radiant heating cable which will maintain the interior temperature at 80-90 degrees F. Air conditioning equipment will maintain the humidity at 60 per cent. The 80 per cent helium atmosphere of SEALAB is a high conductor of heat with consequent high body heat loss. Four per cent oxygen and sixteen per cent nitrogen are the other gas components making up the atmosphere and gas mixture to be breathed by the aquanauts. Hot, fresh water showers and special heaters will be available to enable divers returning from the ocean to regain normal body temperatures.

The undersea habitat will be self-contained with respect to food and breathing gas for at least six weeks. Electric power and water will be provided by lines from shore. An emergency breathing gas supply and emergency electric power will be provided by an umbilical cable from the special catamaran surface support vessel. The cable will also contain a sampling hose to permit analysis of the habitat gas to be accomplished on the surface vessel. The catamaran will have administrative, laboratory, control and berthing space for project personnel and will be the staging vessel for the surface support diving team.

ACCESS AND DECOMPRESSION: A special system for transporting the aquanauts between the surface and the SEALAB habitat has been devised. A personnel transport capsule (PTC), designed and built by the Dixie Manufacturing Co., Baltimore, Maryland, and also a standard diving bell will be used by the aquanauts to descend

to the bottom. They will then swim about ten yards to the SEALAB and enter the habitat through an anti-shark cage and the access hatch on the bottom of SEALAB.

The aquanauts will return to the surface in the PTC under pressure. The PTC has special fittings so it can be mated to a large double-lock deck decompression chamber (DDC) installed on the surface vessel. They will be transferred to the DDC through the mating hatch under pressure and then begin their period of decompression, which is expected to take about 35 hours. This experimental technique of personnel transfer is expected to contribute to the ongoing Deep Submergence program of developing salvage and submarine rescue facilities.