TS 62-168

BASIC INFORMATION

ABOUT NOTS

Revised July 1962

U. S. NAVAL ORDNANCE TEST STATION
China Lake and Pasadena, California

TS/62-168

FOREWORD

Compressed into this informal publication is an abundance of information of general interest about the U. S. Naval Ordnance Test Station, China Lake and Pasadena, California. The information was originally compiled by E. E. Kirkbride, Presentations Division, Technical Information Department, in June 1956. Since that time, the book has undergone several revisions, of which this is the fifth.

Primarily, the book is intended as a handy listing of background information and pertinent points in regard to the Station's operation. As such, it is a valuable aid to persons who must write or speak in general terms about the Station.

Because the book is revised often, suggestions for changes or additions will be appreciated. Suggestions should be addressed to Commander, U. S. Naval Ordnance Test Station, Code 7511, China Lake, California. Requests for additional copies should be addressed to Code 7522.

C. E. Van Hagan
Head, Publishing Division
Technical Information Department

Reviewed and approved by
F. F. RECK, Capt., USN
Executive Officer (Actg.), NOTS
21 September 1962

Revised and published by the Publishing Division, Technical Information Department.

CONTENTS

INTRODUCTION

The U. S. Naval Ordnance Test Station (NOTS) is the Navy's largest and most complete ordnance research and development center. Work at this permanent field station of the Bureau of Naval Weapons provides the Navy and other fighting forces of this country with superior weapons.

Typical NOTS products are guided missiles, rockets, torpedoes, and aircraft fire-control systems. These weapons and weapon systems are introduced into the Fleet after being conceived and perfected by a well-integrated team of 1,000 scientists and engineers, 3,600 other civilians, and approximately 1,300 Navy and Marine Corps personnel. This civilian–military partnership makes it possible for NOTS to keep its weapon development work practical. Civilian scientists and engineers conceive ideas for new weapons and carry these ideas to the final stage: weapons ready for mass production. Military personnel provide operational experience and bring to the attention of the Station the needs of the Fleet. They also aid in getting new weapons accepted and introduced into the Fleet. The NOTS civilian–military team is concerned not only with immediate weapon requirements, but also with weapon systems that will be required five and ten years from now.

NOTS has a number of different physical locations. The main facility, covering approximately 1,200 square miles, is 155 miles northeast of Los Angeles in the northwestern part of the Mojave Desert. Some of the more important Station resources at this location are the following:

Facilities for conducting research in physics, chemistry, mathematics, and aerodynamics as related to guided missiles, space vehicles, rockets, ballistics, aircraft fire control, warheads, high explosives, and propellants.

Facilities for development of rockets and guided missiles.

Facilities for development and pilot production of solid, liquid, and hybrid propellants.

Facilities for the development and evaluation of aircraft fire-control systems.

Extensive ranges and tracks with networks of intricate and precise data-gathering instrumentation.

Data-assessment laboratories.

A laboratory for providing aeroballistics data on gun-launched rocket models.

A large-scale computing installation for involved computations in ballistics and chemistry and for statistical studies.

Engineering facilities and machine shops.

An environmental evaluation chamber for testing ordnance items under controlled conditions of temperature, humidity, and simulated altitude.

A materials-testing laboratory.

A major air facility for providing aircraft services for development and evaluation testing.

A few miles southeast of the main Station area there is a 796-square-mile tract that includes the Mojave B Range, used for special aircraft-rocket and gunnery firings, and the Randsburg Wash Test Activities, used for rocket- and projectile-fuze tests.

In the vicinity of Pasadena, California, there are several NOTS facilities known collectively as the Pasadena Annex. The Pasadena Annex is the operations center for NOTS in underwater ordnance work and is a convenient liaison point between NOTS and industrial and scientific concerns in the greater Los Angeles area. Major parts of the Annex include the Foothill Plant in Pasadena, headquarters and main working area for the Annex; the Morris Dam Test Range near Azusa, which is used for torpedo water-entry and underwater-trajectory studies; and specialized facilities at Long Beach and San Clemente Island for sea-range tests.

MILESTONES

1943 Station established by order of Secretary of the Navy Frank Knox.

Operations begun at C-range on air-to-ground firings.

1944 Opening of temporary G-1 and G-2 ranges.

Construction begun on permanent Station facilities.

Opening of B-1 and B-2 ranges for air-to-ground firings.

Operations begun at China Lake Pilot Plant.

1945 Opening of K-2 range used in rocket terminal-ballistics studies.

Transfer of operations from California Institute of Technology to Station personnel.

Opening of LB range for high-altitude bomb tests.

Work on explosives begun at Salt Wells Pilot Plant.

1946 Dedication of Armitage Field at the Naval Air Facility.

1947 Opening of B-4 range for air-to-ground firings against moving targets.

1948 Dedication of Michelson Laboratory as the new center for research and development at NOTS.

Dedication of the Variable-Angle Launcher used for testing underwater ordnance items at Morris Dam.

Activation of Station Advisory Board.

1950 First antitank aircraft rockets of project RAM shipped to Korea.

1951 Opening of T-range for rocket proof firing.

Opening of K-3 range for crosswind firing of rockets.

1952 Aircraft Fire-Control System Mk 16 released to the Fleet.

Opening of Randsburg Wash Test Activities for fuze-testing.

The 2.75-inch FFAR (Mighty Mouse) declared operational.

1953 Opening of Supersonic Naval Ordnance Research Track (SNORT) for captive testing of ordnance items.

1954 Opening of G-4 range for high-speed terminal-ballistics studies.

1955 Opening of permanent G-1 range for guided-missile free-flight testing.

Opening of permanent G-2 range for rocket free-flight testing.

1956 The Sidewinder guided-missile system declared operational.

1957 Development completed of the Zuni 5.0-inch rocket.

Dedication of the Station's new All Faith Chapel.

1958 The RAT antisubmarine weapon system declared operational.

1959 Development completed of the variable-thrust rocket engine.

The Skyline facility, for testing large solid-propellant motors, completed at China Lake Propulsion Laboratory.

Development completed of the Terasca high-altitude research probe.

Zuni rocket put into mass production.

Polaris static-test facility, Skytop, completed at China Lake Propulsion Laboratory.

RAPEC (rocket-assisted personnel-ejection catapult) released to the Fleet.

Management control and direction of the Station transferred from the Bureau of Ordnance to the newly established Bureau of Naval Weapons.

1960 Hangar No. 3 completed at the Naval Air Facility.

BuWeps and OpTEvFor evaluations of the ASROC anti-submarine weapon system successfully completed, and four ships equipped with the system introduced into Fleet service.

First successful Polaris firing after underwater launching.

1961 The Propulsion Applied Research Laboratory, first of its type in the nation, established.

Administrative command of San Clemente Island assumed.

Sixteen Cyclops silver iodide generators dropped into Hurricane Esther, destroying one-third of the cloud wall.

Dedication of Skytop II, one of the Navy's largest vertical nozzle-down facilities.

1962 Five hundred Capehart housing units completed.

First successful flight test of a hybrid propulsion system in this country.

HISTORY

The Station at China Lake, which covers 1,198 square miles, is situated in the Indian Wells Valley. The valley gets its name from water holes in the Sierra Nevada foothills that were once the camp sites of migrating Indian tribes. A history of the Indian Wells Valley would be richly picturesque. Stagecoaches, freighting wagons, miners, explorers, and prospectors have, at one time or another, made their way across the valley.

In 1776, Padre Garces probably crossed the valley when he explored northward along the Sierra Nevada. In 1834, Joseph R. Walker, while exploring the massive east wall of the Sierra Nevada, discovered the southern pass that now bears his name. The famous John C. Fremont crossed the valley in a course approximated by modern U. S. Highway 6. And in 1849, members of the Death Valley Party, setting out to search for gold west of the Sierra Nevada, crossed Indian Wells Valley after an arduous journey through Death Valley.

In the late 1870s, the silver mines at Cerro Gordo and Panamint City brought scores of miners to the area around Indian Wells Valley, Owens Valley, and Panamint Valley. About this great influx of miners, Remi Nadeau wrote in City Makers, ". . . a traveler moving against the tide was always in sight of another silver seeker."

Finally, the Indians' contribution to the history of the valley should be noted. The valley retains unmistakable signs of their long occupancy. Large areas of sand in the Sierra Nevada foothills glisten with chips of obsidian, remnants of Indian arrowheads. Former campfire sites in Grapevine Canyon have yielded many bird points, knives, and arrowheads; and permanent camp sites, established in the Coso Mountains at the north side of the valley, reveal well-preserved petroglyphs in the lava-walled canyons.

The topography of the Indian Wells Valley is imposing and as picturesque as its history. The Sierra Nevada forms an impenetrable wall on the west. On the north, a jagged line of cliffs, formed by lava flows from the volcano and cinder cones of the Cosos, rises from the desert floor. To the northeast loom the buff and brown peaks of the Argus Range. The El Paso Mountains close in the south edge of the valley. In these majestic surroundings, Indian Wells remains a typical desert valley, relieved by spots of green that mark the towns of China Lake, Ridgecrest, and Inyokern.

The topography and climate of the Indian Wells Valley contributed in no small measure to its selection as the site for NOTS. The valley met basic requirements of airborne ordnance testing that were not met satisfactorily at sites previously used by the California Institute of Technology (CIT), which was doing wartime rocket development work for the Office of Scientific Research and Development. The valley presented enough uninhabited space for firing experimental weapons,

and had good visibility to facilitate photographing rockets in flight. Ideal flying conditions promised few interruptions to test schedules. The availability of good water sources, reasonable proximity to Los Angeles, and several good highways were further favorable points.

Consequently, the Station was established by Secretary of the Navy Frank Knox in an order dated 8 November 1943. Until April 1945, its primary function was to provide facilities and services to CIT.

In 1943, with the assistance of CIT personnel, the Bureau of Ordnance began construction of the Station. Although the immediate objective was to support the wartime rocket work of CIT, the long-range objective was to equip the Station as a permanent center for rocket ordnance research, development, and testing. So, along with construction of the technical facilities, it was necessary to build housing and community facilities for Station personnel.

By the end of 1943, aircraft at NOTS were test-firing rockets. By 1944, construction began of permanent headquarters, an air facility, a pilot plant for development and experimental production of rocket propellants and high explosives, and Michelson Laboratory, one of the most complete ordnance research and development laboratories in the nation.

Late in the summer of 1944, the first civilian personnel began to arrive on the Station. In April 1945, the Bureau of Ordnance took over the area as a permanent research and development center for rockets and other missiles. By the end of World War II, the final transfer of responsibility for technical operations from CIT to the Station staff had been completed.

From 1945 to 1948, the General Tire and Rubber Company of California operated the Foothill Plant at Pasadena under a Bureau of Ordnance contract. The Company provided NOTS with manufacturing, engineering, and procurement services. New laboratory and test facilities at Pasadena and Morris Dam were built, and range activities were extended to Long Beach and San Clemente Island. The Pasadena Annex has since gained nationwide recognition in the field of underwater ordnance.

In December 1959, management control and direction of the Station was transferred from the Bureau of Ordnance to the newly established Bureau of Naval Weapons.

Since 1945, there has been continuing emphasis on conducting a fully integrated weapon-development program, utilizing the best tools and the most competent engineering and scientific personnel available. Because of this emphasis, NOTS has been able to make significant contributions to the nation's defense arsenal and to prepare itself to undertake increasingly complex weapon-development tasks.

The Station has had the following Commanding Officers:

Capt. S. E. Burroughs	Dec. 1943–Aug. 1945
Capt. J. B. Sykes	Aug. 1945–Nov. 1947
RAdm. W. G. Switzer	Nov. 1947–Sept. 1949
Capt. W. V. R. Vieweg	Sept. 1949–Oct. 1952
Capt. P. D. Stroop	Oct. 1952–Aug. 1953
Capt. D. B. Young	Sept. 1953–July 1955
Capt. R. F. Sellars	July 1955–Aug. 1955
Capt. F. L. Ashworth	Aug. 1955–Sept. 1957
Capt. W. W. Hollister	Sept. 1957–June 1961
Capt. C. Blenman, Jr.	June 1961 to present

and the following Technical Directors:

Dr. L. T. E. Thompson	Oct. 1945–Oct. 1951
Dr. F. W. Brown	Oct. 1951–Apr. 1954
Dr. Wm. B. McLean	Apr. 1954 to present

STATION MISSION AND MAJOR TASKS

The mission of the U. S. Naval Ordnance Test Station is to conduct research, design, development, limited production, test, and technical evaluation of complete weapons systems, their components and assemblies, principally in the fields of rockets, guided missiles, underwater weapons, and aircraft fire control.

The following are the major tasks of the Station as directed by the Bureau of Naval Weapons:

1. Plan and conduct foundational and applied research in aeroballistics, hydroballistics, acoustics, electronics, propellants, explosives, and associated fields of physics, chemistry, and mathematics.

2. Conduct feasibility studies of new and improved weapons or weapon systems as a basis for sound recommendations on future development.

3. Design, develop, test, and evaluate weapons and weapon systems, devices, components, processes, and assemblies; provide technical consulting services for ordnance establishments, contractors of the Bureau of Naval Weapons, the Department of Defense, and agencies of the U. S. Government. Production is limited to experimental, prototype, and pilot production required to complete an assigned design and development project.

4. Provide research, development, and test services for other agencies in and outside the Department of Defense, including contractors.

5. Prepare design disclosures for items of ordnance designed and developed at NOTS.

6. Provide administration and technical direction of contracts of the Bureau of Naval Weapons and other government agencies.

7. Support the Fleet by providing training in the maintenance and use of new ordnance equipment.

8. Support assigned attached activities.

9. Maintain under proper surveillance the ammunition and explosives in store.

10. Dispose of unserviceable and dangerous ammunition and explosives from whatever sources received in accordance with current directives.

ORGANIZATION

The organization of NOTS (shown on p. 10) is based on the philosophy that efficiency in ordnance development is materially enhanced when research, development, developmental testing, production engineering, and pilot production are bound together in one closely integrated establishment. The efficiency achieved from such unity of operation and the mutual stimulation generated among technical personnel lead to improved working relationships and ultimately to better weapons.

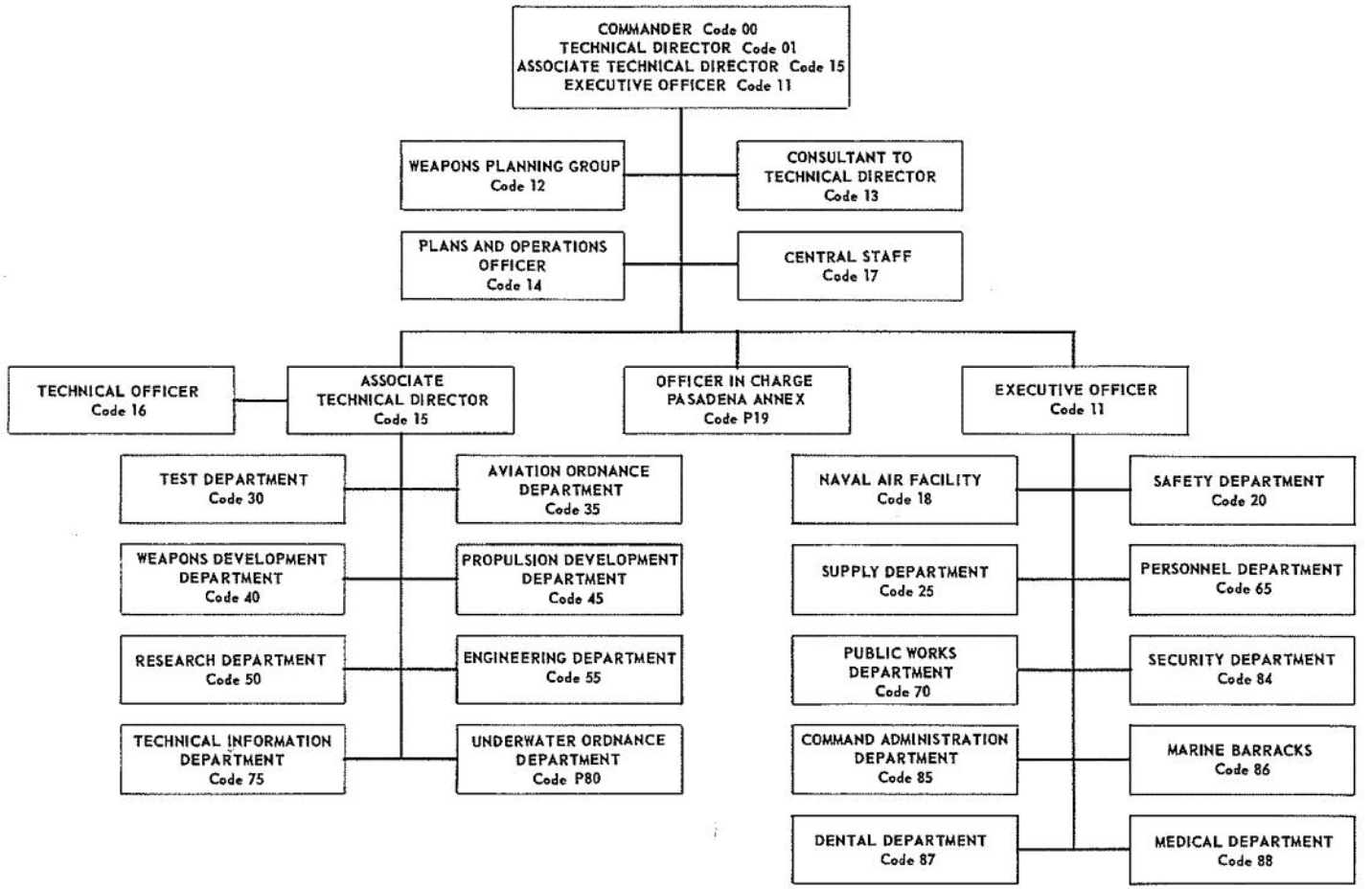
The Station operates under the management and technical control of the Bureau of Naval Weapons and under the military control of the Commandant, Eleventh Naval District.

The Commander of NOTS, a senior naval officer, is responsible to the Chief of the Bureau of Naval Weapons for the Station's operation. A civilian Technical Director is responsible for the technical work of the Station.

Technical programs at NOTS are conducted by eight technical departments and several technical staff groups. The technical departments are Test, Aviation Ordnance, Weapons Development, Propulsion Development, Research, Engineering, Technical Information, and Underwater Ordnance. There are a number of service and staff organizations providing support to the technical programs, and attached to the Station are some military units whose work ties in closely with that of the ordnance mission of the Station. Also, liaison officers for other military and ordnance establishments are stationed at NOTS.

An advisory group composed of outstanding scientists, industrialists, educators, and administrators meets at least once a year and reviews the Station's work. It makes recommendations on how the Station can more effectively and efficiently serve the nation's defense needs.

BASIC STRUCTURAL CHART OF THE U. S. NAVAL ORDNANCE TEST STATION



MAJOR TECHNICAL FACILITIES

The completeness of its physical facilities is one of the outstanding reasons NOTS is able to develop weapon systems of major importance to the nation's security. There are complete facilities for basic and applied research in chemistry, physics, ballistics, aerodynamics, propulsion, propellants, explosives, pyrotechnics, and other related fields. NOTS has the equipment for development of entire weapon systems—airframes, propellants, explosives, guidance devices, and launchers. There are facilities for complete testing during all stages of the development of a weapon, and for producing experimental quantities of new weapons. Altogether, the physical plant and equipment at NOTS is valued at $300,000,000, the greater portion of which is invested in the facilities at China Lake.

CHINA LAKE

MICHELSON LABORATORY

Michelson Laboratory is named in honor of Albert Abraham Michelson (1852–1931), a graduate of the U. S. Naval Academy and America's first recipient of the Nobel Prize for Physics (1907). (Dr. Michelson received the award for his experiments in measuring the speed of light.) The Laboratory is one of the world's most complete research and development centers. Its 10.3 acres of floor area are used for offices, shops, and laboratories. It houses laboratories for weapon development and for basic and applied research in chemistry and physics; a technical library; a large machine shop; a heat-treating shop; an electroplating shop; an environmental test chamber where conditions of climate and altitude may be simulated by varying temperature, humidity, and pressure; three X-ray machines, one with a capacity of a million volts, capable of detecting flaws in 5-inch steel; and computing equipment, including an IBM 709 digital computer. The Laboratory building complex consists of a two-story main section 762 feet long, eight one-story wings, and a three-story machine shop.

PROPULSION APPLIED RESEARCH LABORATORY

The newly established Propulsion Applied Research Laboratory, first of its type in the nation, houses three firing bays, a preparation room, a darkroom, and an instrumentation room. Its 4,000 square feet of floor space are used by the Aerothermochemistry Group of the Research Department for such research activities as the simulation of live-firing conditions by high-pressure air flow, the study and evaluation of the characteristics of propellants, component evaluation, and the study and evaluation of the performance characteristics of certain missiles.

PROPULSION LABORATORIES

The China Lake Propulsion Laboratories are the center for research, development, test, and experimental production of advanced solid, liquid, and hybrid rocket propellants. The Laboratories' 150 buildings are spread over a 32-square-mile area and have facilities for safely mixing, casting or extruding, curing, machining, inhibiting, and testing the high-energy propellants that power missiles and space vehicles. Outstanding individual facilities include a vacuum chamber where medium-size rocket motors may be tested under conditions such as those existing outside the earth's atmosphere; a complete plant for research, development, loading, and testing of new high explosives; and the Skytop complex.

SKYTOP

Skytop, the Navy's largest and most completely instrumented complex of rocket-testing facilities, is now being used for the static testing of motors for Polaris, the Navy's submarine-launched Fleet ballistic missile. The first stand in the Skytop complex (Skytop I) provides for static-test firing in the horizontal position; Skytop II, for static-test firing in either the vertical or horizontal position; Skytop III handles large motors known or suspected of being defective. Skytop's data-acquisition system is capable of gathering 200 channels of information and can be switched quickly from one bay to another.

TEST TRACKS

NOTS has three well-instrumented test tracks used to simulate aircraft or shipboard launchings for preaccelerating rockets and guided missiles, to captive-test ordnance items, and to conduct terminal-ballistics studies. One of the three tracks, the 4.1-mile Supersonic Naval Ordnance Research Track (SNORT), is designed to make possible sustained runs with heavy carriage weights at velocities up to 3,700 feet per second. In connection with these tracks, extensive electronic and photographic instrument systems make possible the collection of data required for the development and testing of ordnance items.

GROUND RANGES

There are five major ground ranges at NOTS. These ranges, considered as a group, represent the nation's most complete test facilities for gathering data on the entire flight of short-distance rockets and guided missiles, and for obtaining data on the events occurring at launching and during the first part of the trajectory of long-distance rockets and guided missiles. These ranges have a wide variety of photographic and electronic instruments for obtaining the data required to analyze the performance of rockets and missiles under development.

AIRCRAFT RANGES

The two major aircraft ranges at NOTS—the high-altitude bombing range and the special test range—are used for (1) testing aircraft bomb directors and fire-control systems and air-to-ground weapons, (2) developing tactics for aircraft delivery of nuclear weapons, (3) training of Fleet pilots in weapon delivery, (4) calibration of aircraft radar and angle of attack, and (5) test of other items such as mines, missile-guidance systems, fuzes, and flares. Supporting these ranges is the boresight facility, used for accurately aligning aircraft cameras, radars, gyroscopes, guns, gunsights, and rocket launchers. The aircraft ranges differ chiefly in the design of their instrumentation. The special test range is a versatile facility equipped to provide accurate data immediately upon completion of a test. Because of this, the range is especially well suited to carrying out its major mission of training Fleet pilots and evaluating weapon-delivery tactics. In the design of the instrumentation on the high-altitude range, emphasis is on precision. This precision makes the range particularly well suited to the accurate evaluation and calibration of aircraft weapon-delivery systems under development.

AIR FACILITY

The Naval Air Facility (NAF) at NOTS provides aviation support for the Station's research, development, test, and evaluation projects in connection with guided missiles, aircraft rockets, rocket launchers, underwater ordnance, and fire-control systems. It has three runways—one is 10,000 feet long—and extensive aircraft maintenance facilities. Air traffic reached an all-time high in Fiscal Year 1961 when over 15,800 flights were made from NAF.

RANDSBURG WASH TEST ACTIVITIES

The four permanent ranges of the Randsburg Wash Test Activities at NOTS have the most complete facilities in the United States for accurate fuze testing under simulated tactical conditions. It is the only place in the United States where full-size aircraft as large as B-29 bombers may be suspended as high as 250 feet above the ground for use as targets in fuze tests. These test ranges are in an isolated valley, 15 miles long, about 23 miles from Michelson Laboratory and the Station's Administration Building.

PASADENA

Research, development, and testing of underwater ordnance items are conducted at the NOTS Pasadena Annex. The Pasadena Annex includes a plant at 3202 E. Foothill Blvd., Pasadena; test ranges at the Morris Dam Reservoir in San Gabriel Canyon, 6 miles from Azusa;

Long Beach sea range; and San Clemente Island sea range, 60 miles off the California coast between Long Beach and San Diego.

FOOTHILL PLANT

Some of the important facilities at the Foothill plant are the hydrodynamic simulator, a unique installation that permits underwater weapons to experience the same dynamic conditions caused by pitch, yaw, and roll as in the water; a pneumostatic tank that will accommodate test specimens 18 feet long and up to 2.5 feet in diameter under air pressure up to 1,500 psi and water pressure up to 3,000 psi; a model laboratory with two variable-atmosphere tanks for water-entry, water-exit, and missile-launcher studies; and experimental shop facilities that include a foundry, a pattern shop, a precision machine shop, and a sheet metal shop.

MORRIS DAM FACILITIES

Major facilities at the Morris Dam test ranges include the Variable-Angle Launcher, which is adjustable vertically between 0 and 40 degrees and has launcher tubes 22.5 and 32 inches in diameter that are used to simulate aerial launchings of missiles at speeds up to 1,000 feet per second; an underwater rocket launcher that enables trajectory and velocity data to be obtained on rockets launched underwater; a barge-mounted rail launcher for free-launching torpedoes, for control studies, or for impact against plates for exploder evaluation; the propulsion laboratory, used for experimenting with new chemical fuels, high-energy batteries, prime movers, and thrust-producing mechanisms; an underwater cableway for captive testing of torpedoes or similar test vehicles in an underwater range 2,500 feet long; a barge-mounted variable-angle launcher, used for high-velocity launching of models and projectiles up to 8 inches in diameter; a vertical-drop launcher for dropping missiles or other equipment weighing up to 2,000 pounds from any height up to 160 feet; a slingshot facility attached to the vertical-drop cable to provide greater velocity for structural tests of torpedoes entering the water between 60 and 90 degrees; and a sonic barge for measuring the sound produced by torpedoes.

LONG BEACH SEA RANGE FACILITIES

The Long Beach sea range covers 476 square miles of sea area and two acres of land. It is used for tests involving air drops and surface launchings under tactical conditions and for studying underwater acoustics. An LCU has been modified to incorporate an 8- by 36-foot well down which an instrumented platform may be lowered to 600 feet. Transducers installed on a three-axis mount on the platform can be trained to provide controlled data on ocean acoustics and target signatures.

SAN CLEMENTE ISLAND AND SEA RANGE FACILITIES

San Clemente Island, 18 miles long and 1 to 3 miles wide, lies 60 miles off the southern California coast. Early in the summer of 1961, the Chief of Naval Operations assigned the administrative command of San Clemente Island to NOTS. This island with its calm, deep, clear offshore waters, varied terrain, high cliffs, gently sloping coastline, and good security conditions provides a valuable range area for Station programs. Facilities available on the island for support of research, development, and test programs conducted at the adjacent sea ranges include a 9,350-foot airstrip; two piers; radio, telephone, and teletype communications; surfaced or graded roads to all major island areas and to all camera and instrumentation locations; power lines to most major stations; dormitories to accommodate 200 persons; mess facilities; administration building; and storage and general shop buildings, including an instrument repair and checkout shop, a photographic darkroom, a machine shop, and public works shops. There are three underwater launching facilities: a launcher pad, missile recovery net, Fishhook recovery boom, and launcher, all for underwater vertical launching of full-scale dummy missiles; an underwater tube launcher that is lowered through a well in a modified LCU; and an underwater warshot cableway to test exploders and warheads. Two trainable launchers on shore provide for missile firings to obtain trajectory and water-entry information. From one of these launchers, missiles can be fired into shallow water to permit missile recovery by divers. There are both deep- and shallow-water ranges for controlled drops of missiles from aircraft. Adjunctive facilities include four missile assembly and storage buildings, two fire-control buildings, a telemetry building, a divers' building with two decompression chambers, nine explosives magazines, a widespread network of camera-timing and radar stations, a missile-staging vessel, a 60-ton crane barge, an instrumented monitor barge, and miscellaneous small surface craft. A specially instrumented platform on a high cliff overlooking water deep enough for submarine maneuvers simulates altitude and look angles of aircraft instrumentation. Other specialized instrumentation includes control stations for submarine location by triangulation and a three-dimensional underwater tracking range that supplies accurate underwater position data via cables from arrays anchored in the ocean.

SCOPE OF OPERATIONS

The primary activity at NOTS is the development of new weapon systems in the fields of rockets, guided missiles, antisubmarine weapons, and aircraft fire-control systems. However, development of ordnance, though the heart of operations, could not continue without research, test, evaluation, and engineering for production. These operations, discussed below, are conducted within a framework of overall long-range planning, which is based on studies of naval weapon requirements and calculations on the combat effectiveness of future weapons.

RESEARCH

New weapons depend on new ideas. The main source of these new ideas at NOTS is basic research in physics, chemistry, mathematics, ballistics, metallurgy, and other ordnance-related sciences. In addition, there are applied research programs aimed at adapting scientific knowledge to specific weapon problems, such as the improvement of the destructive power of missile warheads and of the underwater ballistics of torpedoes.

NOTS chemists are interested in understanding and improving the chemical and physical properties of solid, liquid, and hybrid propellants, hydropropellants, and high explosives; and in improving new ordnance materials and methods of analysis for their control. Typical subjects of study by NOTS physicists are heat-transfer problems, characteristics of radiation emitted by various sources, the ballistics of ultraspeed projectiles, and the properties of photoconductors and optics as related to ordnance. Mathematicians investigate heat-flow problems, statistical analyses, servomechanism theory, and computing techniques. Ballisticians study the exterior ballistics of missiles, aerodynamic design of rockets and guided missiles, hydrodynamic design of torpedoes, and the ballistics of rockets launched from maneuvering aircraft. All of these activities are aimed at providing the ideas that will lead to improved weapon systems.

DEVELOPMENT

New developments result when NOTS personnel analyze military needs and determine what can be done with modern research and development tools to meet these needs. Here is where the ideas that are born in research lead the way to new naval weapons.

Some of the weapon developments of the Station that have been publicly announced are the Sidewinder air-to-air guided-missile system, the RAT antisubmarine weapon, the 5-inch Zuni rocket, and the 2.75-inch folding-fin aircraft rocket known as Mighty Mouse, which is only now being replaced by guided missiles on Navy and Air Force aircraft.

SAN CLEMENTE ISLAND AND SEA RANGE FACILITIES

San Clemente Island, 18 miles long and 1 to 3 miles wide, lies 60 miles off the southern California coast. Early in the summer of 1961, the Chief of Naval Operations assigned the administrative command of San Clemente Island to NOTS. This island with its calm, deep, clear offshore waters, varied terrain, high cliffs, gently sloping coastline, and good security conditions provides a valuable range area for Station programs. Facilities available on the island for support of research, development, and test programs conducted at the adjacent sea ranges include a 9,350-foot airstrip; two piers; radio, telephone, and teletype communications; surfaced or graded roads to all major island areas and to all camera and instrumentation locations; power lines to most major stations; dormitories to accommodate 200 persons; mess facilities; administration building; and storage and general shop buildings, including an instrument repair and checkout shop, a photographic darkroom, a machine shop, and public works shops. There are three underwater launching facilities: a launcher pad, missile recovery net, Fishhook recovery boom, and launcher, all for underwater vertical launching of full-scale dummy missiles; an underwater tube launcher that is lowered through a well in a modified LCU; and an underwater warshot cableway to test exploders and warheads. Two trainable launchers on shore provide for missile firings to obtain trajectory and water-entry information. From one of these launchers, missiles can be fired into shallow water to permit missile recovery by divers. There are both deep- and shallow-water ranges for controlled drops of missiles from aircraft. Adjunctive facilities include four missile assembly and storage buildings, two fire-control buildings, a telemetry building, a divers' building with two decompression chambers, nine explosives magazines, a widespread network of camera-timing and radar stations, a missile-staging vessel, a 60-ton crane barge, an instrumented monitor barge, and miscellaneous small surface craft. A specially instrumented platform on a high cliff overlooking water deep enough for submarine maneuvers simulates altitude and look angles of aircraft instrumentation. Other specialized instrumentation includes control stations for submarine location by triangulation and a three-dimensional underwater tracking range that supplies accurate underwater position data via cables from arrays anchored in the ocean.

SCOPE OF OPERATIONS

The primary activity at NOTS is the development of new weapon systems in the fields of rockets, guided missiles, antisubmarine weapons, and aircraft fire-control systems. However, development of ordnance, though the heart of operations, could not continue without research, test, evaluation, and engineering for production. These operations, discussed below, are conducted within a framework of overall long-range planning, which is based on studies of naval weapon requirements and calculations on the combat effectiveness of future weapons.

RESEARCH

New weapons depend on new ideas. The main source of these new ideas at NOTS is basic research in physics, chemistry, mathematics, ballistics, metallurgy, and other ordnance-related sciences. In addition, there are applied research programs aimed at adapting scientific knowledge to specific weapon problems, such as the improvement of the destructive power of missile warheads and of the underwater ballistics of torpedoes.

NOTS chemists are interested in understanding and improving the chemical and physical properties of solid, liquid, and hybrid propellants, hydropropellants, and high explosives; and in improving new ordnance materials and methods of analysis for their control. Typical subjects of study by NOTS physicists are heat-transfer problems, characteristics of radiation emitted by various sources, the ballistics of ultraspeed projectiles, and the properties of photoconductors and optics as related to ordnance. Mathematicians investigate heat-flow problems, statistical analyses, servomechanism theory, and computing techniques. Ballisticians study the exterior ballistics of missiles, aerodynamic design of rockets and guided missiles, hydrodynamic design of torpedoes, and the ballistics of rockets launched from maneuvering aircraft. All of these activities are aimed at providing the ideas that will lead to improved weapon systems.

DEVELOPMENT

New developments result when NOTS personnel analyze military needs and determine what can be done with modern research and development tools to meet these needs. Here is where the ideas that are born in research lead the way to new naval weapons.

Some of the weapon developments of the Station that have been publicly announced are the Sidewinder air-to-air guided-missile system, the RAT antisubmarine weapon, the 5-inch Zuni rocket, and the 2.75-inch folding-fin aircraft rocket known as Mighty Mouse, which is only now being replaced by guided missiles on Navy and Air Force aircraft.

A typical NOTS development is the Sidewinder, one of the simplest, cheapest, and most effective guided missiles in use today. The idea for the missile was conceived at NOTS and investigated under the Station's exploratory and foundational research program. When the feasibility of the idea was adequately proved, the Station went about developing the system. The parts for the missile—propellant, airframe, guidance and control system, warhead, launcher, fire-control system, and even the test sets for prefiring checkout—were designed, experimentally produced, and tested at NOTS. Throughout the development, the civilian-military team at NOTS kept in mind the stringent requirements for operational usefulness of a missile: the final product must be a weapon that is reliable under combat conditions and capable of being used by people without extensive technical training. Early in the development of Sidewinder, a large industrial organization was brought in to work with Station engineers in designing the components of the system so that they could be cheaply and easily produced in quantity.

As with other weapons, the development work on Sidewinder will be continued until it is supplanted by more effective air-to-air missiles. NOTS will continue to improve the missile's performance and will follow closely its use by operating forces. By observing a weapon's use in service, NOTS engineers learn what is necessary to make it more effective, and on the basis of this information the Station provides service modifications, operational manuals, and any other assistance that will improve the usefulness of the weapon. Moreover, by following a weapon into service use, NOTS learns lessons that it can apply in developing new weapons.

TESTING AND EVALUATION

Test facilities at NOTS, which support Station as well as service-wide development programs, run the gamut from underwater ranges at San Clemente Island and Morris Dam to high-altitude bombing ranges at China Lake. These ranges are outdoor laboratories equipped with precision cameras and electronic devices to observe the flight and record the behavior of rockets, bombs, torpedoes, and guided missiles under simulated tactical conditions. There are more than a score of separate ranges for dropping torpedoes from aircraft into the water, for firing rockets from the ground or air, for testing the accuracy of bombsights, for testing fuzes, for testing warhead explosive power, and for numerous other uses. For example, there is SNORT, the 4.1-mile precision railroad track on which speeds of more than 3,700 feet per second have been attained. There is a guided-missile range, where the Terrier missile is fired under simulated tactical conditions and where Sidewinder guided missiles are fired against drone targets in development and evaluation tests of missile effectiveness. These ranges and tracks, with their extensive instrumentation, represent one of the nation's most complete and versatile facilities for testing modern weapon systems and their components through early design and development.

A typical test results in magnetic-tape records and hundreds of feet of film from cinetheodolite cameras and high-speed tracking cameras. NOTS has a photographic laboratory for processing this film, both black-and-white and color, and the latest equipment for assessing film and magnetic-tape records. NOTS is developing equipment to record and assess the data more effectively. All of this is done with the objective of telling the ordnance designer whether the ordnance item works, and if so, how well, how accurately, and how effectively. And if it does not work, the records help determine by how much, where, and why it failed.

Finally, these precision outdoor laboratories are put to work on evaluating the end product. After development and engineering for production, the weapon turned out by the experimental-production lines in industrial plants must be tested to determine whether or not industry is capable of mass producing it. Only then can it be determined if the weapon is ready for release to the Fleet.

ENGINEERING FOR PRODUCTION

To be of value, modern weapons must be producible in large quantities. The producibility factor is provided for at NOTS by what is termed engineering for production. This covers (1) engineering to ensure that the end product will be producible and reliable; (2) development of processes and materials for doing a better job at a lower cost; (3) testing of materials, shipping containers, weapons, and final components under simulated tactical conditions; (4) experimental manufacture of weapons and components in order to provide practical answers to production problems; and (5) quality-control studies during experimental production.

To perform engineering for production, NOTS operates shops where experimental-production runs of hardware can be made. Along this same line, experimental production of solid propellants is carried out at the Station's propulsion laboratories. In addition to its own facilities, NOTS, through procurement contracts, uses the facilities of many industrial plants to carry out its experimental production.

Engineering for production improves producibility, reduces production costs, and facilitates the shipping and handling of weapons. When the engineering work is completed, the Station is able to help industry turn out weapons on a mass-production basis.

LIAISON WITH OTHER UNITS

There is a free flow of information between NOTS and its parent organization, the Bureau of Naval Weapons; its ultimate customer, the Fleet; and its sister organizations, other research and development establishments. The special liaison services described below have been set up to aid the necessary flow of information.

BUREAU OF NAVAL WEAPONS LIAISON

The Station maintains a full-time liaison office at the Bureau of Naval Weapons in Washington, D. C. Besides providing administrative services to the Station, this office makes possible a distinct channel of informal communication between the Station and the Bureau on matters concerning the technical programs. This function is also conducted to a lesser extent between NOTS and other activities in the Washington area concerned with NOTS operations. By rotating the duty of the NOTS representative at this office, key men in the Station's structure are given an opportunity to acquaint themselves with the workings of the Bureau and at the same time to provide a valuable service.

The Bureau of Naval Weapons has a technical liaison officer at the Pasadena Annex whose function is to keep the Bureau informed on guided-missile activity among contractors in southern California.

FLEET LIAISON

Experimental officers with recent operating experience in Fleet units are assigned to the Station to serve as technical advisors to the Technical Director and to act as liaison officers between the Fleet and the Station technical departments. They communicate Fleet needs and operating restrictions, and, in turn, assist in introducing new weapons and weapon systems into the Fleet.

An indirect system of Fleet contact is provided through Fleet units that come aboard the Station to use the aircraft and ground ranges for development of special-weapon tactics as well as for air-to-air gunnery. Daily, four to ten aircraft from squadrons of the Pacific Fleet are at the Station for these purposes.

INTER-LABORATORY COMMITTEE ON FACILITIES

Informal collaboration with other West Coast naval establishments is maintained through the Inter-Laboratory Committee on Facilities, in which NOTS has participated since October 1949. This organization was established to gather and disseminate among the several naval establishments in southern California information concerning the facilities and potentialities of each; to promote and expedite cooperative use of these facilities; and to guard against duplication of effort and equipment.

The establishments represented on this committee in addition to NOTS are the U. S. Naval Missile Center at Point Mugu, the Naval Civil Engineering Laboratory at Port Hueneme, the Navy Electronics Laboratory at San Diego, the Naval Ordnance Laboratory at Corona, the Naval Radiological Defense Laboratory at San Francisco, and the U. S. Naval Postgraduate School at Monterey.

COOPERATION WITH OTHER MILITARY SERVICES

NOTS developments in the weapons field are available to all the military services. For example, the NOTS 2.75-inch folding-fin aircraft rocket Mighty Mouse, described in a previous section, was for years the primary air-to-air defense weapon in use by the Air Force. Similarly, the guided missile Sidewinder is being manufactured for use by both the Navy and the Air Force.

The NOTS test ranges, with their networks of instrumentation and associated data-assessment facilities, are used by all branches of the military service and their contractors. In 1961, for example, the Station's test facilities were used by the Army, Air Force, Atomic Energy Commission, Marine Corps, several universities, and other government contractors.

Information on NOTS research and development programs is made available to other defense activities by means of technical reports and technical conferences in which NOTS personnel participate.

The Station acts as host to about 5,000 official visitors each year. These visitors, representing the various services and their contractors, obtain technical assistance in practically every phase of ordnance design, development, evaluation, and production. Special tours of the Station's facilities made by visiting groups cover major areas of the Station's technical activities.

Full-time liaison activities are maintained at NOTS with both the Army and the Air Force. To this end, officers from the Air Force Research and Development Command and from the Army Ordnance Corps are permanently assigned duty on the Station to maintain liaison on all technical developments in ordnance.

L. T. E. THOMPSON AWARDS

The highest recognition for outstanding individual achievement that the Naval Ordnance Test Station bestows on any of its present or former employees is the L. T. E. Thompson Award. The award—a medal and a certificate—is given to both civilian and military personnel "for outstanding contribution to the advancement of ordnance toward the fulfillment of the mission of the U. S. Naval Ordnance Test Station and thus of the forces of the United States Navy." It may be given for a single outstanding achievement or for continued excellence of performance.

The directive that established the award further states:

"In establishing this award, the Station pays tribute to the accomplishments of its first Technical Director. By his leadership, vision, and persistent effort, Dr. Thompson gathered at this Station a strong complement of outstanding men and women. The success of the Station in the field of ordnance has been in great part due to the initial guidance of Dr. Thompson and to his skill in integrating military and civilian personnel into an enthusiastic, effective group."

Those who have received the L. T. E. Thompson Award are the following:

1956

Dr. Louis Ten Eyck Thompson, Consultant, Bureau of Naval Weapons, and Associated with Norden Laboratories, United Aircraft Corp.

Dr. Thompson was Technical Director of the Station from October 1945 to October 1951. He received the award for "his major role in the establishment and development of the U. S. Naval Ordnance Test Station. Through his vision, new concepts and objectives for an ordnance research and development organization were accepted and grew into reality. His contagious enthusiasm, vigorous drive, and unfaltering leadership have established the Station as one of the outstanding research and development organizations of the Department of Defense."

Dr. William Burdette McLean, Technical Director, NOTS.

Dr. McLean has been Technical Director of the Station since April 1954, and has been a Station employee since December 1945. He received the award for "his extraordinary contribution to the defense of the nation by executing the key role in the development of the SIDEWINDER guided-missile weapon system. His inspiring leadership, his matchless original conception, his persevering development resulted in a simple, economical, reliable, and effective system which pioneered current and future guided-missile development."

1957

Dr. Bruce Hornbrook Sage, NOTS Consultant and Professor of Chemical Engineering, California Institute of Technology.

Dr. Sage was Head of the Explosives Department from December 1945 to January 1949, Associate Director for Engineering from January 1949 to July 1950, and since 1950 he has been Consultant to the Office of the Technical Director. He received the award for "his able direction, dynamic enthusiasm, and far-sighted tenacity in creating and constructing the China Lake and Salt Wells Pilot Plants at a critical time in the nation's defense. With great technical acumen, and without compromise of engineering principles, production standards, or safety, he erected and operated these important facilities of the Navy and the Atomic Energy Commission for the development and processing of solid propellants and high explosives."

Dr. Gilbert Brown Lorenzo Smith, deceased.

Dr. Smith concurrently held the positions of Associate Head of the Research Department (for chemistry) and Head of the Chemistry Division, and was a Station employee from July 1946 to December 1952. He posthumously received the award for "building one of the most outstanding research groups in the government, providing technical leadership, and assembling a staff with unusual capabilities, who have consistently worked at the frontiers of chemistry and applied the knowledge thus acquired to naval ordnance problems with vigor and foresight."

Commander John O'Donnel Richmond, USN (Retired).

Commander Richmond was Executive Officer of the Station from April 1944 to June 1946 and Community Manager from July 1946 to June 1954. He received the award for "outstanding service as the Station's first Executive Officer and later Community Manager who, by his enthusiasm and dedication to the best interests of the Navy and the Station, was greatly responsible for the development of the community of China Lake. His efforts were of outstanding assistance in promoting, improving, and maintaining the well-being, morale, and efficiency of the personnel necessary to the accomplishment of the Station's mission."

Rear Admiral Sherman Everett Burroughs, Jr., USN (Retired), Assistant to President, Librascope.

Rear Admiral Burroughs was Commanding Officer of NOTS from December 1943 to August 1945. He received the award for "his application of the concept of a government laboratory for ordnance research and development work. His inspirational leadership, dedication to and enthusiasm for his work established an atmosphere for a

successful civilian–military team approach and laid the groundwork for developing a facility of great importance to the Navy, the Department of Defense, and the nation."

Rear Admiral Levering Smith, USN, Director of Technical Division, Special Projects Office, Bureau of Naval Weapons.

Rear Admiral Smith was Deputy Head and Head of the Rockets and Explosives Department from October 1947 to July 1949 and Associate Technical Director from November 1951 to May 1954. He received the award for "extraordinary technical competence and executive ability as Head of the Rockets and Explosives Department and as Associate Technical Director. He not only contributed significantly to the advancement of solid propellants and high explosives, particularly in the emergency completion of the 2.75-inch aircraft rocket, but also filled these key positions with such perceptiveness, understanding, wisdom, diplomacy, and personal integrity as to win the full confidence and respect of his colleagues and superiors."

Mr. Haskell George Wilson, Associate Technical Director, NOTS.

Mr. Wilson has been Associate Technical Director since January 1955 and a Station employee since June 1950. He received the award for "exceptional effectiveness in fostering understanding and cooperation between the civilian and military components of the Station's research and development organization. Through sound leadership, wise delegation of authority, and skillful cultivation of managerial talents in others, he has, as Associate Technical Director and former Head of Central Staff, demonstrated outstanding technical and administrative ability in advancing the weapons programs of the United States Navy."

1958

Rear Admiral F. L. Ashworth, USN, Assistant Chief for Research, Development, Test, and Evaluation, Bureau of Naval Weapons.

Rear Admiral Ashworth was Commanding Officer of NOTS from August 1955 to September 1957. He received the award for "integrating the technical, administrative, and support groups into a team dedicated to fulfilling the Station's mission and, during his tenure as the Station's seventh Commanding Officer, creating widespread interest in the potential of this research and development activity, thereby brilliantly advancing the Station's prestige and upholding its mission."

Dr. Howard A. Wilcox, Director of Defense, Systems Division of General Motors Corporation.

From April 1958 to March 1959, Dr. Wilcox was Assistant Technical Director for Research and Head, Research Department; from October 1955 to April 1958 he was Head, Weapons Development Department. He received the award for "his signal enthusiasm, his diversified scientific skills, his original interdisciplinary thinking, and his ability to elicit the best from others, whereby he has overcome a series of formidable technical and administrative problems in the Station's research and development work."

Rear Admiral John C. Hayward, USN, Commander Carrier Division 3.

Rear Admiral Hayward was Experimental Officer from 1944 to 1947. He received the award for "his outstanding leadership and guidance as the Station's Experimental Officer in increasing the sensitivity of the Station to the needs of the Fleet, thereby successfully integrating operational considerations and original research, and for advancing the Station through his interest in and enthusiasm for community affairs."

1959

No awards were given this year.

1960

Dr. Ronald A. Henry, Head, Organic Chemistry Branch, NOTS.

Dr. Henry has been in the Chemistry Division of the Research Department since becoming a Station employee in February 1947. He received the award "for his creative achievements in synthetic organic chemistry relating to solid propellants, for his contribution to the fund of knowledge of nitrogen chemistry, and for his pioneering work in high-energy monomers and polymers."

Edward W. Price, Head, Aerothermochemistry Group, NOTS, and Technical Coordinator, Bureau of Weapons Ignition Program.

Mr. Price has been Head, Aerothermochemistry Group, Research Department, since 1957 and has been associated with the Station since its inception, and before that, with the California Institute of Technology. He received the award "for his outstanding research in internal ballistics, for his contribution to the understanding of the fundamental design parameters of rocket motors, and for his timely research in combustion instability."

1961

Leonard Theodore Jagiello, Senior Systems Engineer, Weapons Development Department, NOTS.

Mr. Jagiello has been Senior Systems Engineer, Weapons Development Department, since December 1960. Except for six months in 1951, he has been employed at NOTS since June 1946. He received the award "for his intuitive grasp of complex aerodynamic problems involved in the torque-balance canard control system, which has resulted in the successful design of a functioning Sidewinder airframe operating with constant gain over the full range of dynamic pressures."

Franklin Henry Knemeyer, Assistant Technical Director for Development (Weapons Systems) and Head, Weapons Development Department, NOTS.

Mr. Knemeyer has been Head, Weapons Development Department, since September 1960 and a Station employee since 1948. He received the award "for his significant technical contributions, leadership, and guidance on weapon-system development and his contribution to the formulation and implementation of the Free-Fall conventional ordnance program."

Dr. William Shelley McEwan, Head, Chemistry Division, NOTS.

Dr. McEwan has been Head, Chemistry Division, Research Department, since June 1954, except from October 1958 to August 1960 when he was concurrently Associate Technical Director for Research and Department Head (Acting). He has been a Station employee since June 1947. He received the award "for his outstanding role in organizing the Station's program in chemical research, his maintenance of top-level productivity within that organization, and his directing of that research toward the Station's mission in regard to propellant systems for missiles. In addition, his publications in thermochemistry have brought him and the Station world recognition and have contributed to the advanced knowledge of chemistry."

Lawrence Wilson Nichols, Head, Development Division No. 2 (Research), NOTS.

Mr. Nichols, Head, Development Division No. 2 (Research), Aviation Ordnance Department, now on assignment in England, has been a Station employee since 1946. He received the award "for his singular achievements, extensive investigations, and precise analyses in the field of infrared research, specifically his investigations relative to IR radiations of targets and IR missile guidance systems."

Dr. Frank Edgar Bothwell, Chief Scientist, Center of Naval Analysis, Franklin Institute, Washington, D. C.

Dr. Bothwell was Consultant for Office of Technical Director, NOTS, from 1951 to 1954 and Head, Weapons Planning Group, from 1954 to 1959. He has served as a consultant to the Station since 1959. He received the award "for his vital contributions to the currently accepted concepts of a submarine-launched ballistic missile system. His work as Head, Weapons Planning Group, at Naval Ordnance Test Station was eminently instrumental in emphasizing the Polaris concept, including a great amount of detail on warhead and weapon requirements for strategic targeting."

Francis Marvin Fulton, Director, Applied Sciences Division, Hycon Manufacturing Co.

Mr. Fulton was Head, Propulsion Development Department, from 1959 to 1961. He was employed at NOTS from 1948 to 1961. He received the award "for outstanding leadership in directing Naval Ordnance Test Station efforts to new areas of propulsion applied research and his initiative in exploring potentials in the field of limited warfare weaponry."

Douglas John Wilcox, Assistant Technical Director for Development (Weapons Systems) and Head, Underwater Ordnance Department, NOTS.

Mr. Wilcox has been Head, Underwater Ordnance Department, since 1956 and a Station employee since 1948. He received the award "for his leadership and technical contributions to the field of underwater weapon systems and especially for the ability displayed in the integration of a Navy-wide and industrial team for the successful accomplishment of the ASROC program."

CHINA LAKE COMMUNITY

The community of China Lake takes its name from an adjacent dry lake, which was the site of a small borax mining operation conducted in the 1870s with Chinese labor. Because of the lack of housing and community facilities in the area, the community and the Station were developed concurrently.

Today, the unincorporated community of China Lake—the only completely Navy-owned city in the continental United States—is a modern community with a population of 12,000. To house this population, there are over 3,000 housing units, 500 of which are newly built Capeharts. Civilian and military personnel and their dependents living on Station have available the services of a Commissary, Navy Exchange, church, bank, post office, pharmacy, barber and beauty shop, laundry and dry cleaning establishment, theater, and many other recreational facilities. Schooling from kindergarten through junior college is conducted on Station and university extension courses at both the undergraduate and graduate level are offered.

Station residents have a voice in the operation of the community through the Community Council. The Council is an independent incorporated body of about twenty elected representatives.

Additional services are provided to Station residents by business establishments in the neighboring community of Ridgecrest, which, in the 19 years of the Station's existence, has grown from a hamlet to a town with a population of 6,000.

Each year on Armed Forces Day, the Navy holds open house at China Lake. Tours are given the public through the housing areas, Michelson Laboratory, the Naval Air Facility, and SNORT. An air show featuring live firing of rockets is a main attraction for visitors as well as residents.

NOTS CL 471 (10-62) SC