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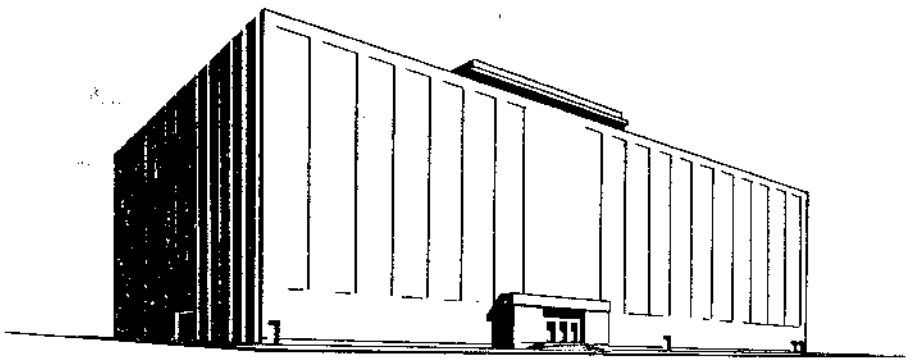

History of U. S. NAVAL RADIOLOGICAL DEFENSE LABORATORY

1959

SAN FRANCISCO CALIFORNIA

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HYDRA I

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A LABORATORY COMES OF AGE -- 1959

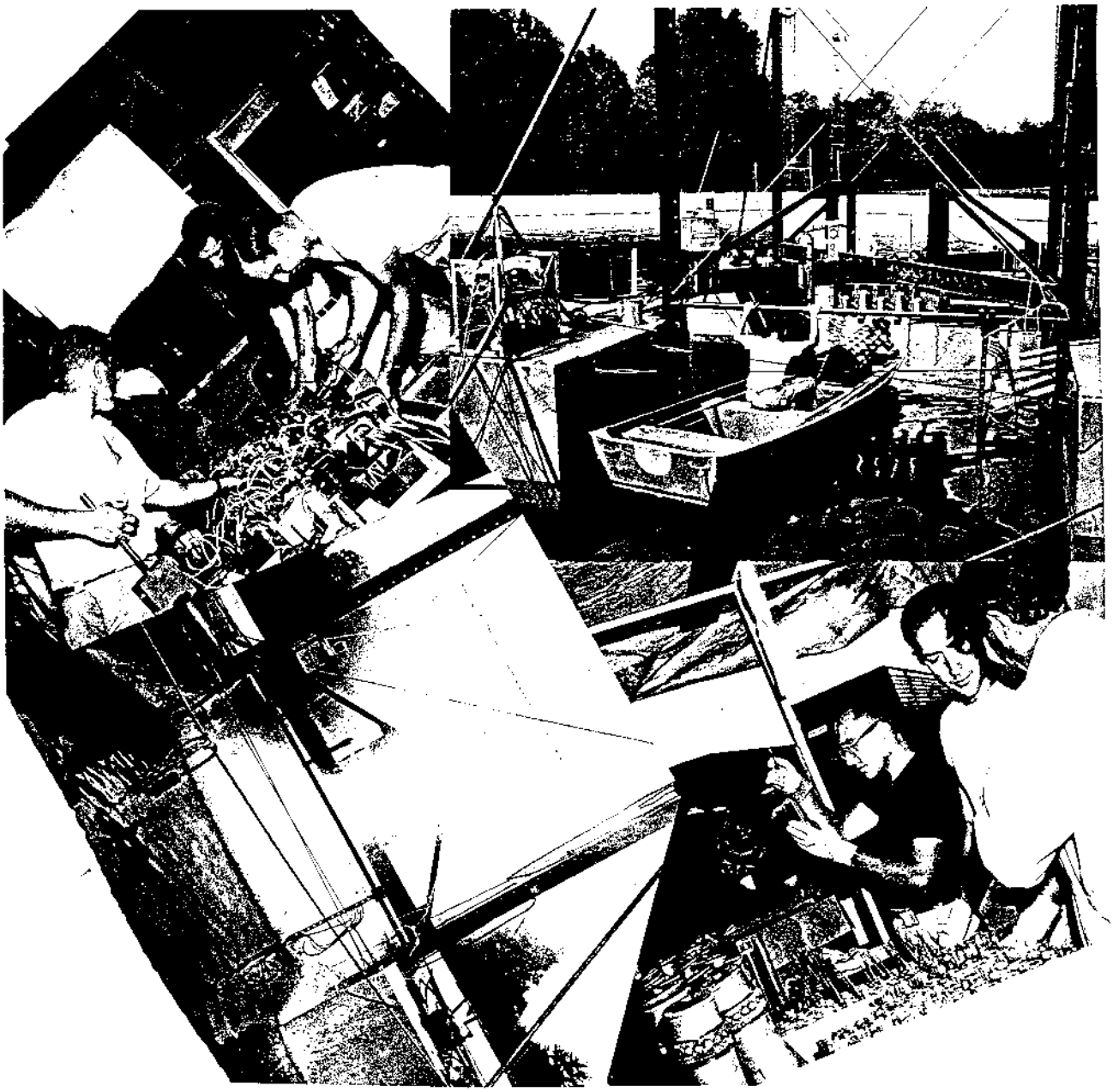
The first installment of the history of the U.S. Naval Radiological Defense Laboratory (1946 - 1958) of necessity began with a detailed account of its early struggles, its organizational problems and administrative decisions, leading gradually to its sine qua non, the Technical Program and the mounting accomplishments in radiological defense. The 1959 installment and subsequent ones, will reverse the procedure and plunge immediately into a description of the challenges faced and how they are being met.

ACHIEVEMENTS OUTSIDE THE LABORATORY

Field Tests

Major projects, conducted largely as field operations, included the HYDRA I, TARGET COMPLEX DECONTAMINATION, and FALLOUT SHELTER Programs.

The HYDRA Program, embracing a long range plan and involving laboratory studies as well as a series of underwater high explosive bursts, was initiated in 1958 when the President invited a ban on full scale nuclear tests. In March 1959, pre-test shots in the program were made in the Bay adjacent to the San Francisco Naval Shipyard to check the development of various instruments to be used in subsequent experiments. The purpose of this program, sponsored by the Bureau of Ships, is to determine the radiological effects of underwater nuclear detonations; this covers many facets of a combined theoretical-experimental program. High explosives with a radioactive tracer are used to simulate the detonation of a nuclear weapon and to follow the path taken by its products. The information sought concerns what takes place both above and beneath the surface of the water when a nuclear weapon, such as an atomic depth charge, is detonated beneath the surface. Ultimately the goal is the determination of the mechanisms of the explosion, the proportion of the



radioactivity produced that is absorbed in the sea, that which is released to the air, and measurement of the activity entering the base surge or remaining aloft in a radioactive cloud, so that equations can be established for predictions of radiological effects over a wide range of yields and depths of burst.

Early in April a dozen scientists from the Laboratory set up equipment for the first phase experiment (called HYDRA I) at the David Taylor Model Basin near Washington D. C. One-pound charges, some with and others without a radioactive tracer, were employed. Photographs were taken simultaneously of surface and sub-surface phenomena. To avoid any possible hazard connected with shots containing the radioactive tracer, radiological safety measures were set up to completely control possible contamination and radiation exposures.

After thirteen weeks, the field phase of HYDRA I was successfully completed, with a total of 197 shots fired in depths ranging from one foot five inches to eight feet, and some 50,000 feet of motion picture film developed. Work is continuing on data reduction and various analyses preparatory to publication of a technical report of the operation and the data obtained.

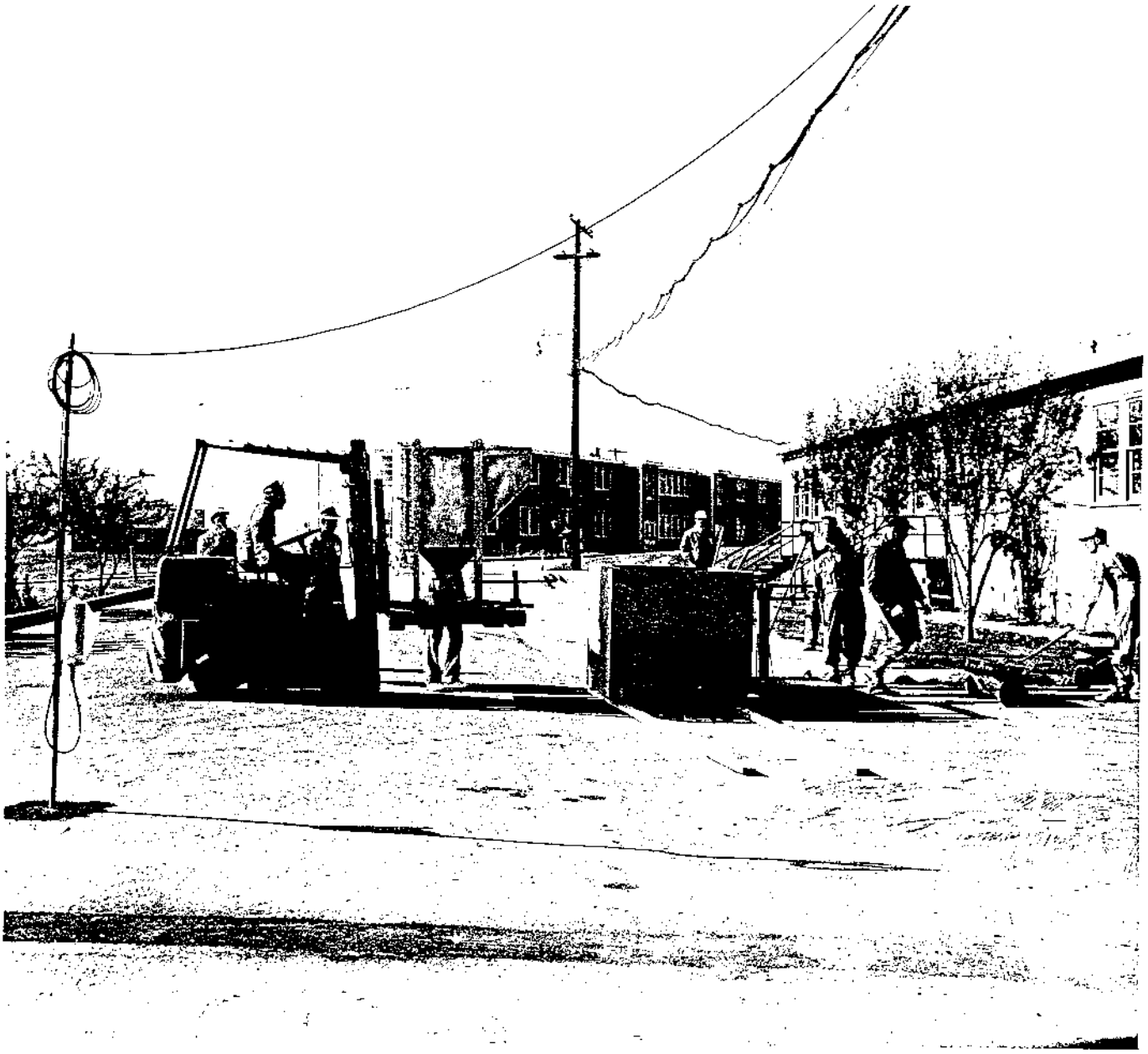
Experiments in Decontamination

In November the "Target Complex Decontamination Experiment," sponsored by the Office of Civil and Defense Mobilization (OCDM), was conducted at the Laboratory's Field Test Station at Camp Parks, an Army Base near Pleasanton, California. This test, an outgrowth of earlier versions performed in 1956 and 1958 at Camp Stoneman before that base was vacated by the Army, involved the spreading of radioisotope-tagged sand on four acres of a simulated village consisting of six buildings, streets, lawns, trees and shrubbery. The sand represented fallout that would be deposited if a one-megaton bomb had been detonated forty miles upwind in Marin County.

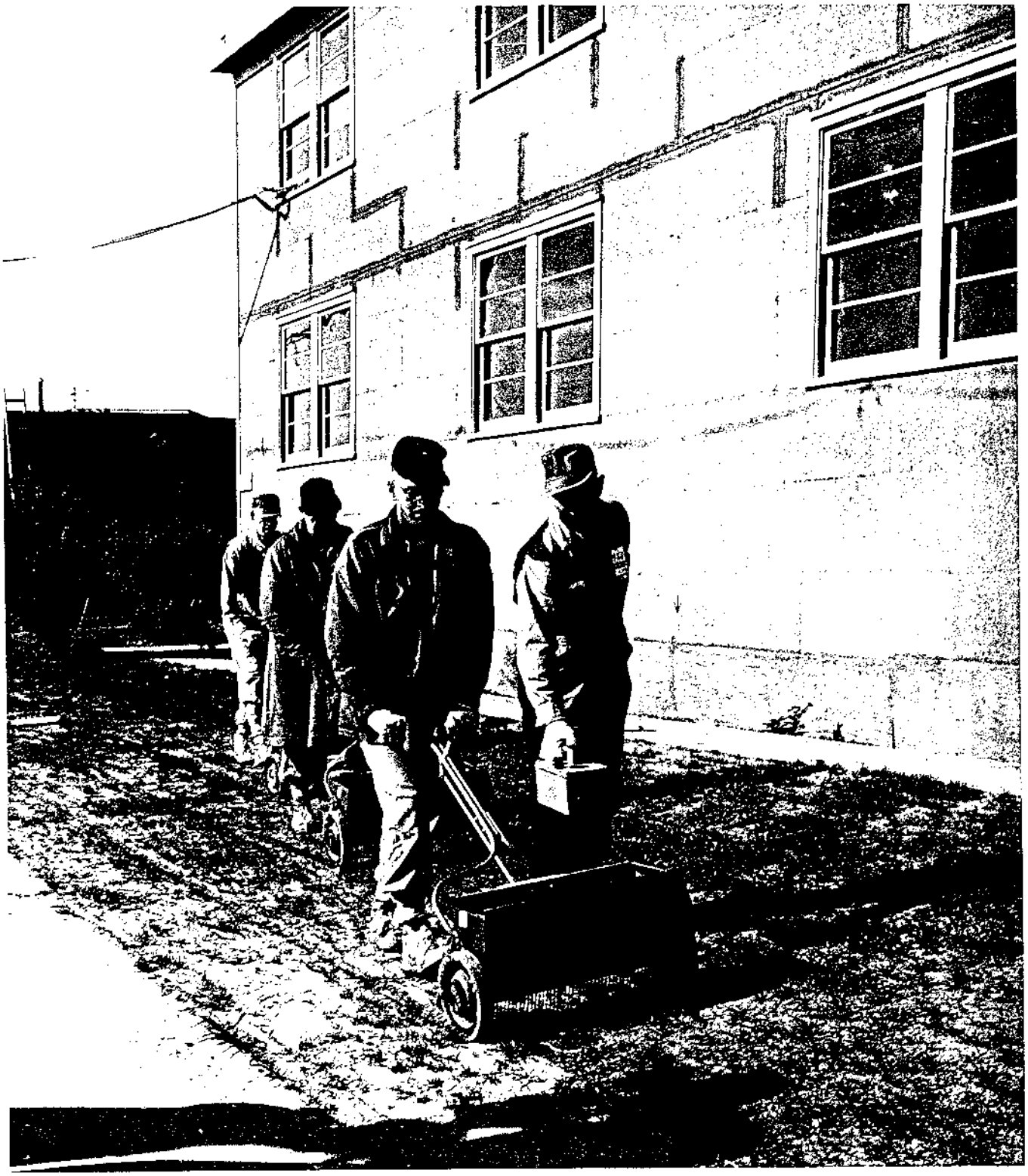
The area was left thus contaminated for ten days to equal the delay that would be required were it covered with real fallout, to observe the movement of particles by wind and possible rain, and to measure the resulting redistribution. "Decon" crews then entered the area to remove the contamination with various types of equipment such as vacuum sweepers, street flushers, fire hoses, plows, bulldozers, scrapers, etc., the selection of which depended upon the type of surface to be cleaned. Other data obtained concerned the degree of decontamination effectiveness of the various items of equipment, and the manpower, equipment and material required to accomplish the task at hand.

TARGET COMPLEX DECONTAMINATION TEST

The contamination team places the contaminant bearing hopper on the platform where the spreaders will be loaded from the hopper for dispersal on to the lawns, sidewalks, etc.



Sand contaminant being spread on a lawn by manually operated dispersers. The operator must walk at a constant speed to obtain uniform spreading. A radiological safety monitor is measuring radiation exposure rates in the vicinity of the dispersing personnel.



Press and television representatives were invited to both the contamination and decontamination events and a briefing was held to explain the interrelationship between the time to emerge from a shelter after an atomic attack to begin clean-up operations and the intensity of radiation in the surrounding area. Both phases of the experiment received wide publicity, with feature articles, pictures and considerable telecast time. Some thirty members of the Laboratory participated in the field aspect of the project. Reports are being written and preparations are being made for additional tests of this type early in 1960.

Community Fallout Shelter Tests

In the course of studies of weapons effects on military installations in the past several years, the Laboratory has devoted increased effort to the study of the effects of a nuclear attack on the Nation. One aspect of this continuing program, which also includes the decontamination experiment just described, is a study of community fallout shelters. Under the sponsorhip of OCDM, such a shelter was designed and developed by the Laboratory. A series of tests was planned, utilizing the shelter. The first of these simulated occupancy of the shelter by the use of heat and vapor sources representing people to determine the resulting temperature, heat and humidity conditions.

On 23 November, a preliminary occupancy test was conducted using seventeen staff members of the Laboratory and OCDM. These personnel remained in the shelter for three days to test organizational arrangements, food preparation, shelter habit patterns, etc., in anticipation of a full scale run.

The experimental shelter is similar to a Quonset hut; it is 25 feet by 48 feet in area; is buried 15 feet below the earth's surface and covered with three more feet of earth. Entrance is through an inclined tube. The shelter is equipped with forced ventilation, a self-contained gasoline-powered generator for power, sanitary facilities, bunks (4 deep) and tables to feed 50 people at a time. It is designed to house 100 persons for a period of two weeks.

A full scale test began on 3 December and lasted for exactly fourteen days. A total of 100 men, composed of 92 prisoners from the nearby Santa Rita Rehabilitation Center (on Alameda County prison farm), five guards from the Center and three members of the Laboratory (the Shelter Commander, his Deputy and a medical doctor) filed down the ladder and the steel door was dogged shut. All were volunteers, privileged to withdraw any time they desired. Not one left by choice, though four had to leave just before the end of the project, two because of illness, and two because of unavoidable and unscheduled court appearances!

End of the full-scale Fallout Shelter Test. The Laboratory Commanding Officer and Director, Captain J. H. McQuilkin opens the door for the bearded Shelter Commander, Mr. Walmer E. Strope. Members of the Laboratory in the background

Shelterees proudly exhibit their Certificates of Appreciation just prior to exodus from "Mole Hole"

During the entire operation the shelter was kept under constant surveillance by a psychologist and a sociologist by means of closed circuit television. Stationed in a nearby trailer equippped with a 24-inch TV monitor, they were able to observe everything that happened in the shelter and to note the shelterees' reactions to the confinement and boredom of a rather uncomfortable existence. One of the principal goals of the test was to ascertain preferences and feasibility of four different diets. These consisted of (1) peanut bars; (2) a liquid composed of powdered milk, water, dextrose-maltose and corn oil; (3) boiled wheat augmented by spaghetti sauce or chili, cheese and peanut butter crackers, fig newtons; (4) the standard Army "C" rations, a meal of 3,500 calories with two meats, fruit, crackers, powdered drinks, jam and candy.

The men were organized into ten groups of ten, each with a leader who represented them in meetings with the Shelter Commander. All were given free rein to suggest changes in the daily routine. Each man wore a jacket with a large number and letter on it for designation of his section and himself. These symbols facilitated identification of individuals by the command cadre, the observers and the shelterees themselves.

Water consumption was limited, with none available for bathing or shaving, and a careful check was kept on the amount of liquid drunk and eliminated. Other measurements were regularly made on individual weight, body temperature, general health, and on the carbon dioxide, carbon monoxide and noise level in the shelter.

Both of these occupancy experiments stirred enthusiastic interest in the Press, and received extensive newspaper, radio and television coverage throughout the country. Daily bulletins were released by the Shelter Commander with comments by the observers on the hour-to-hour activity, reactions to shelter life, and other pertinent information. Upon completion of the test, Certificates of Appreciation were presented to the shelter occupants by the Laboratory Commanding Officer.

Much valuable information was gleaned from the experiment, including how to build and outfit a shelter at low cost; necessary changes in detail construction; what food was preferred; what supplies were necessary and in what quantities. Most unexpected was the discovery that the experiment could probably have been extended in the number of persons accommodated and the length of stay without serious discomfort.

Plans are underway for the next phase, a firestorm over the shelter, which will take place early in 1960.

Congressional Hearings

Laboratory personnel, headed by the Scientific Director, Dr. Paul C. Tompkins, participated in two series of hearings of the Subcommittee on Radiation of the Joint Congressional Committee on Atomic Energy. In

May the subject was "Fallout from Nuclear Weapons Tests." The June hearings were on "The Biological and Environmental Effects of Nuclear War." The official summary of these hearings gave considerable credit to the Laboratory for the basic data presented and the contribution of staff personnel.

ACHIEVEMENTS IN THE LABORATORY

Ship Shielding Experiments

Experiments in shielding were completed aboard the USS COWPENS (CVL-25) and the USS HOWORTH (DD-592) to measure the modifications of gamma radiation fields from selected sources incident to ship structure. Purpose of the project was to determine potential personnel radiation hazards at stations within the ships for radiation field configurations due to nuclear weapons detonations, and to seek prediction methods for the shielding effectiveness of complex structures. The experiments have obtained the shielding effectiveness factors for the ship against gamma radiation sources of different energies and distribution in space. Two technical reports have been written and others are in preparation.

Bio-Medical Accomplishments

In addition to continuing study in various facets of research in radiation injury, the year of 1959 produced the following new data:

Establishment of a potency of neutrons relative to gamma rays (i. e., relative biological efficiency) for death of large animals at less than half of the previous value provides a sound basis for the hazard evaluation of neutron effects in man.

The study of LD_{50} for a number of large animal species has developed a consistant pattern for large animal lethality which may well be applicable to human populations.

A method has been developed for measurement of bi-directional transport of ions in in vivo gastrointestinal tract segments. This system has been used to measure specific organ response to a number of radiation types.

A long-term study of physiological function after acute and subacute radiation exposure is producing important data on late effects of ionizing radiation. Alterations of cardio-vascular function which are usually characteristic of radiation have been shown at an accelerated rate in irradiated animals.

A combination of special observation chambers, modified anesthesia procedures, and micromanipulator techniques has permitted for the first time the guided insertion of micro-needles into minute blood vessels of the liver.

The Specific-Pathogen Free Rat Colony which was in the stage of development during the past three years, is now fully established and providing animals of this species for all Laboratory work.

Radiological Control Team

During the year the NRDL Plutonium Control (PLUCON) Team was redesignated the Radiological Control (RADCON) Team. This group, first organized in 1957, was originally assigned the task of assisting in the monitoring and recovery operations subsequent to accidents with plutonium bearing weapons. This change not only resulted in a new name but also broadened the scope of the team's mission to include all accidents and incidents involving nuclear weapons, reactors, and fissionable or radioactive materials. Sufficient qualified Laboratory military and civilian personnel were assigned on an additional duty basis to maintain three complete RADCON Teams, with definite responsibilities laid down for both Team and individual members. These include: assistance in radiological monitoring; contamination and waste control; decontamination; information and advice for area commanders regarding recovery of contaminated areas, cost of recovery in terms of time, manpower, money, and anticipated effectiveness; and information to local medical authorities in establishing clinical procedures and in assessment of safe and hazardous areas. The Team must, if previously alerted, be capable of deployment anywhere with equipment within two hours. In an emergency without prior alert, it must be capable of deployment within four hours.

A RADCON Team consists of an Officer-in-Charge and five qualified technical assistants, including specialists in radiological safety, recovery, instruments; a medical officer and a hospital corpsman. Each of these has special duties to perform.

Twice during 1959 the NRDL Team rendered advisory services in solving radiation contamination problems in the West.

Instruments

A field RADIAC developed at NRDL for monitoring alpha radioactivity appears to be the only reliable militarized field instrument for this purpose. It is now in the initial stages of procurement by the Bureau of Ships.

Detailed studies have indicated the feasibility of a tactical simulator that will permit rapid assessment of involvement in a radiological situation. Design contracts were let during this year and construction is planned for 1960.

Great interest has been expressed in the NRDL "Dynamic Fallout Model." A visit by the Army's Command and General Staff College concerned use of information from the model for studies of tactical requirements for and utilization of fallout information. Data computed from this model will also be used as input into the tactical simulator mentioned above.

PUBLICATIONS

Reports and Memoranda

Total number of NRDL reports for 1959 were:

U.S. Naval Radiological Defense Laboratory Reports (Formal)	2
Technical Reports (USNRDL-TR)	84
Technical Memoranda (TM)	17
Progress Reports (P)	6
Instrument Evaluation Reports (IER)	9
Evaluation Reports (ER)	2
Reviews and Lectures (R and L)	20
Total	140

In addition to the NRDL reports, material was supplied for eight technical reports published by the Defense Atomic Support Agency.

Manuals -- Analyses -- Tables

A number of manuals and other publications were completed during 1959. These include two for the Bureau of Ships:

1. "Principles of Radiation and Contamination Control" (PORACC), a 3-volume manual, was completed and submitted to the Bureau for review and for final publication by the Government Printing Office. This publication provides information in three general areas. Volume I, designed principally for the lay audience, deals with a general introduction to the physics of radiation and its biological effects which can endanger health. Techniques are described for measuring radiation and minimizing the chances of personal injury. Volume II is a discussion for those with special responsibility concerning radiation, particularly radiological monitors. Volume III, for technical personnel, provides data needed to conduct training courses.

2. The final draft of "Radiological Recovery of Ships," a chapter of the Bureau's Technical Manual assigned to NRDL, was also completed and submitted for Bureau approval.

A comprehensive analysis of weapons test thermal data was prepared and submitted for pre-publication review by the Defense Atomic Support Agency. This was in compliance with a request by DASA for a collection in one publication of data including all parameters of thermal radiation measured by NRDL from nuclear detonations dating back to 1950.

Composite casualty and damage assessment tables, which for the first time provide a realistic basis for umpiring naval war games involving the effects of nuclear weapons, were prepared. Interim procedures for umpiring single-weapon nuclear attack on naval ships enable assessment of ship damage from air-blast and underwater-shock effects and the assessment of personnel casualties from air-blast, thermal and initial-gamma radiation effects. A tabular format (series of 210 tables) was developed allowing the umpire to directly assess ship damage and combat ineffectives from air and surface bursts and ship damage from underwater bursts. This was a short-term study of limited scope. A current Casualty Assessment Problem extends the scope of the interim study to include all significant operational factors including the non-circular effects of transit and deposit ionizing radiation.

The Scientific Director wrote the Chapter on "Surface Contamination and Decontamination" for the HANDBOOK ON RADIATION HYGIENE, published by McGraw-Hill.

Miscellaneous Publication

Other Laboratory publications issued during 1959 include:

1. An internal instruction on radiological safety in the Laboratory's work operation.

2. A revised budgeting and cost reporting plan.

3. A combined personnel handbook and document kit for Laboratory personnel.

4. Cost accounting and procurement services manuals.

5. The twelve-year (1946 - 1958) Command History of NRDL.

Publication in the Open Literature

Scientists of NRDL have had 52 papers and articles published in such journals as: Radiology, Analytical Chemistry, American Journal of Physiology, Radiation Research, Mechanical Engineering, Physical Review, Science, American Journal of Roentgenology, Nature, American Journal of Industrial Hygiene, Journal of Chemical Physics, British Journal of Radiology, Yale University Press, American Medical Association Journal, Federation of American Societies for Experimental Biology Proceedings, Transplantation Bulletin, Nuclear Instruments, Archives of Biochemistry and Biophysics, Nuclear Physics, Inorganic and Nuclear Chemistry, Journal of Chromatography, Journal of Nuclear Science and Engineering, Annals of the New York Academy of Science, International Journal of Applied Radiation and Isotopes, Human Biology, Journal of Immunology, Journal of Biological Chemistry, American Geophysical Institute, Bureau of Ships Journal, Journal of Optical Society and Journal of the National Cancer Institute.

Patents

Two patents were issued to NRDL scientists, one for a method and apparatus to control the wear of brick linings in steel melting furnaces; the other for a device to transmit the output from a capacitative transducer to a remote location where the output is recorded by conventional means.

ORGANIZATION

With a few exceptions, the internal organization of NRDL remained unchanged. Three branches in the Scientific Department were created to replace three others which were disestablished. The Radiation Characteristics and Effects Branch and the Radiological Physics Branch resulted from the amalgamation of the Nuclear Radiation and Thermal Radiation Branches of the Nucelonics Division. In the Chemical Technology Division, the Radiation Chemistry Branch developed from the group formerly termed the Applied Research Branch. A bio-assay program was also inaugurated within the Radiological Health Division, the personnel being drawn from the Chemical Technology Division.

Personnel changes in key positions were also limited. CAPT Albert R. Behnke (MC) USN retired from the Navy. He was relieved as Radiological Medical Director by CAPT Harry S. Etter (MC) USN. CDR Robert J. Connolly relieved CDR Jack A. LaSpada (who also retired from the Navy) as Technical Services Director. CDR Randolph W. King relieved CDR Donald C. Campbell as Senior Program Officer. The new Radiological Health Officer is LT David Katz, relieving LT Walter L. Taylor who is devoting his time to investigations in the Biological and Medical Sciences Division. LT Robert E. Thompson relieved LCDR Joseph S. Kelly as Head, Military Personnel Division. The only changes in the roster of key civilians were the appointment of Dr. Edward L. Alpen as Head, Biological and Medical Sciences Division, and the resignation of Miss Marion Sandomire as Statistical Consultant to the Scientific Director, which position is not as yet filled.

FACILITIES AND EQUIPMENT ACQUIRED

Settling tanks to hold Laboratory liquid waste pending monitoring were completed.

A low background room was designed and construction started. This room will have 6-inch thick walls, floor and ceiling, and will be used to study and detect low level radiations.

Design for the tactical events simulator was begun. This will be a 20 foot by 60 foot model wherein simulated nuclear weapons effects as functions of time and space can be dynamically superimposed on mobile targets.

A Shielding Studies Range was developed for the measurement of gamma radiation field modification by structures of simple geometries. The range consists of a semi-circular flat area 300 feet in diameter on which radioactive sources can be distributed to simulate a fallout radiation field. Other source distributions can be used to insulate the initial or transit radiation field.

The use of certain buildings and land areas at Camp Parks in Alameda County was obtained as a Field Test Station which provides facilities, such as fallout dispersers, for various experiments, and grazing area for the larger Laboratory animals. A village for the decontamination studies and an experimental shelter were constructed for experiments already discussed.

Major research equipment acquired in 1959 includes: One shock test machine; one 256-channel pulse height analyzer; one 256-channel pulse height analyzer (transistorized); one 128-channel pulse height analyzer (transistorized); and one neutron generator; as well as many smaller items such as counting equipment, amplifiers, electronic test equipment, thermal sources, and gas chromatography equipment.

TRAINING

During 1959 Laboratory personnel participated in 112 training courses, with strong emphasis placed on professional development. A number of members are attending university classes sponsored by the Laboratory. One scientist received his doctorate under this plan of combined work and study; another his first degree to which he plans to add others. Two courses in Management, sponsored by the Army, were highly praised by Laboratory members who attended. One, a Top Management Seminar, was held in Riverside, California, and featured experts from industry, universities and Government who spoke on all aspects of management. The other, a Personnel Management for Executives Conference, was presented in Berkeley and was considered so beneficial that additional such conferences are being held throughout the country. Among the other courses attended by members of NRDL were: Operations Research, Neutron Instrumentation, Electronic Fundamentals, Cryogenic Engineering, and Medical Training for Corpsmen.

As in other preceding years, Co-Op student trainees, part-time students and summer employees were on hand to work and learn of NRDL's program. In addition to the 14 returnees in the Co-Op program, six new ones were added. Three part-time student employees were increased to six.

SEMINARS -- SYMPOSIA -- CONFERENCES

Meetings at NRDL

In addition to several Scientific Director's Colloquia, regular seminars were held by individual branches in all of the Scientific Department divisions. Monthly meetings of all NRDL officers were continued with members of the Laboratory staff giving talks on various facets of Laboratory work. Some of those talks were: "Shipboard Radiological Decision Procedure," "Standards of Radioactivity," "Laboratory's HYDRA Program," "Solar Eclipse Expedition to Puka-Puka," "Naval Research," "Radiation Effects in Materials," and "Radioactive Bio-Assay."

On three occasions, the Laboratory hosted large groups of medical officers from all over the country for special sessions of the Atomic Biological, Chemical Defense Course, in addition to providing personnel for other lectures at the Treasure Island sessions. Post-graduate student officers and Naval Reserve Officers were given orientation. Other organizations holding meetings at the Laboratory were: the Pacific Fleet Maintenance Conference; Interlaboratory Committee on Facilities; Editing and Publishing Sub-Committee of the Interlaboratory Committee; a Naval Reserve Company; and the Institute of Radio Engineers.

Meetings Elsewhere

Members of NRDL have participated in many technical society meetings at home and abroad, presenting papers on most occasions. Two papers on gamma-ray penetration were published by NRDL for binding in the Proceedings of Aircraft Nuclear Propulsion Symposia at Cincinnati and Fort Worth. Various papers were presented by NRDL personnel at the Congressional Fallout Hearings.

A cross-section of professional meetings at which NRDL members were in attendance includes:

American Physical Society; American Statistical Association; Symposium on Modern Methods of Analytical Chemistry; Conference on Cyclotron; Panel on Radiological Instruments; Operations Research; Instrument Society of America; Western Joint Computer Conference; Navy Science Symposium; American Chemical Society; Federation of American Societies for Experimental Biology; Institute of Radio Engineers; Safety Workshop; Symposium on the Arts of Scientific Glassblowing; Federal Personnel; Industrial Hygiene Association; Armed Forces Medical Symposium, Radiation Research Society; Symposium on Gas Chromotography; International Congress of the Physiological Sciences (Buenos Aires, Argentina); Symposium on Analytical Chemistry; International Congress in

Radiology (Munich, Germany); American Institute of Biological Sciences; Western Industrial Health Conference; Biological Photographic Association (Canada); International Symposium on High Temperature; Aircraft Nuclear Propulsion Shielding Meeting; Subcommittee on Shielding, Advisory Committee on Civil Defense, National Research Council; Animal Care Panel; Conference on Radioisotopes in the Biosphere; American Society of Mechanical Engineers; Conferences on Analytical Chemistry in Reactor Technology; and Optical Society of America.

Laboratory personnel also spoke publicly on 60 separate occasions in the San Francisco Bay Area to such organizations as: schools, PTA meetings, churches, Rotary Clubs, Engineers' Week student counseling, Naval Reserve Units, Kiwanis Clubs, Institute for Youth, Forums, Public Health meetings, Business and Professional Women's Clubs, etc.

Some of the subjects covered were: "Mission and Organization of the NRDL"; "Can We Learn to Live with the Atom?"; "Common Sense Attitude Toward Radiation"; "Radiation and Cancer"; "Work at NRDL of Interest to Physicians"; "Some Peacetime Uses of Nuclear Detonations"; "Do It Yourself Civil Defense" (Panel discussion); "Radiation Injuries and Radiation Hazard"; "The Nuclear Arms Race and Human Survival" (Panel discussion); "The Scientist -- Human or Humanoid"; "Safety Problems in Handling Radioactive Materials"; "Radioactive Fallout and Our Food and Water Supply"; "Elementary Radioactivity"; "Airborne Radioactivity in the Bay Area" (Panel discussion); "Are We 'On the Beach'?"; "The Atom in Peace and War"; "Contamination Control, Procedures and Special Weapons Accidents"; "Employment Opportunities and Duties as a Mechnical Engineer with the Federal Government" (Panel discussion); "Thermal Sources and High-Temperature Sensors"; "The Atom and its Uses".

AWARDS -- COMMENDATIONS -- HONORS

Superior Accomplishment cash awards were presented to 25 civilians, including four who received the "Outstanding" performance rating for the year. The Merit Promotion Program advanced thirty members of different Laboratory units to higher grades, while promotions from re-description of duties were received by sixty-two. One earned a 30-year service pin; ten received 20-year service pins, and five retired--three civilians and two military, the Radiological Medical Director and the Technical Services Director. Two members of Transportation Branch earned special Safe-driving pins for nine years of accident-free driving. The Laboratory won the Secretary of the Navy's Certificate of Achievement in Safety for both industrial and vehicular low accident frequency

Captain Albert R. Behnke (MC) USN, (center) receives the Navy and Marine Corps Medal from Rear Admiral George L. Russell, Commandant, Twelfth Naval District, for rescue of skin diver James French (at the right).

rate. The Chairman of the NRDL United Crusade and the Laboratory BULLETIN received Awards of Merit for participation in the annual charity drive.

"Campaign 40", aimed at improved operations through employee suggestions, stimulated thought along this line, resulting in submission of 147 suggestions, 43 of which were adopted and monetarily rewarded. For five consecutive months the Laboratory bettered the Campaign goal of 40 per cent participation.

Mr. Harry Zagorites, Head of the Laboratory Engineering Program, Nucleonics Division, received a Meritorious Civilian Service Award from the Commanding Officer and Director for his contributions as a key member of the NRDL group that developed the Gamma Intensity Time Recorder and for his contributions to the success of various projects of Operation HARDTACK.

Special Awards and honors from outside the Laboratory were presented as follows:

The Navy and Marine Corps Medal was presented to Captain A. R. Behnke, former Radiological Medical Director, for heroic conduct displayed in February 1959 when he treated a young skin diver for an acute and potentially fatal case of decompression sickness. Captain Behnke voluntarily remained in a pressure chamber, kneeling in the cramped quarters for a period of 48 hours to constantly administer therapy to the patient until he was able to be moved. The entire Laboratory military complement stood at attention as the presentation of the medal was made by the Commandant of the Twelfth Naval District.

Mr. Michael M. Bigger, of Technical Developments Branch, Chemical Technology Division, received a Certificate of Achievement from the Commander of Task Group-7 of Joint Task Force-7 for meritorious service in Operation HARDTACK during 1957 - 1958. Mr. Bigger was commended for his exceptional ability as Project Officer in planning and supervising two projects connected with underwater bursts. Presentation was made by Dr. Eugene P. Cooper, as Director of Field Operations.

The Scientific Director, Dr. Paul C. Tompkins, was commended in a letter from the Honorable Chet Holifield, Chairman of the Radiation Sub-Committee of the Joint Congressional Committee on Atomic Energy, for his services as consultant at the 1959 hearings on fallout from nuclear weapons tests and the effects of nuclear war. The letter stated that "Dr. Tompkins made an invaluable contribution to the hearings as he did in 1957; ... his able assistance, firm command of his subject and friendly patience were major factors in the success of the hearings."

Michael M. Bigger (center), Technical Developments Branch, with CAPT John H. McQuilkin, Commanding Officer and Director and Dr. Eugene P. Cooper, Associate Scientific Director, following presentation of a Certificate of Achievement to Mr. Bigger for his contributions to Operation HARDTACK

Dr. Nathan E. Ballou, Head, Nuclear and Physical Chemistry Branch, Chemical Technology Division, was invited to Mol-Donk, Belgium to head for a year the Chemistry Division of the Centre de' Etude de L'Energie Nucleaire, which corresponds to our Atomic Energy Commission. He was given a year's leave of absence to accept this honor.

Dr. William H. Goldwater, of Biochemistry Branch, Biological and Medical Sciences Divisionwasmade a Fellow of the American Association for the Advancement of Science in recognition of his standing as a scientist.

Alfred Kielwasser, HM1, Radiological Safety Branch, Health Physics Division, was presented a Presidential Unit Citation by Captain J. H. McQuilkin, Commanding Officer and Director. The Citation was given to members of the First Marine Division for action in Korea in 1950.

Mrs. Cecile Kinney, Head, Photographic Branch, Technical Information Division,won a Charles S. Foster Memorial Citation for her Photomicrograph "Cadmium Sulphide Showing Hole in Crystal" shown at the Biological Photographic Association in Montreal, Canada.

Gaynor L. Abbott, a part-time electronic technician with Radiation Characteristics and Effects Branch, Nucleonics Division, graduated with highest honors from City College of San Francisco, receiving the President's Cup and a gold pin. He was in the top 3 per cent of 2,000 who took the upper division engineering examination for entrance to the University of California where he will major in physics, at the same time continuing his work at NRDL.

VISITORS

In 1959 the number of visitors decreased to 8,157. Some of the distinguished guests were:

Joint Advance Study Group of Joint Chiefs of Staff; Col. R. E. Kirtly, USAF, Col. H. I. Stern, USA, Col. L. A. Ennis, USMC, CAPT. M. O. Lowe, USN and CDR J. J. Mitchell, USN.; Col. J. P. Stapp (MC) USAF, Director, Aero-Medical Research Laboratory, Wright Air Development Center, Dayton, Ohio; Shielding Sub-Committee of Advisory Committee on Civil Defense (Dr. L. V. Spencer, Bureau of Standards, Chairman); Major General James P. Berkeley, USMC, Commanding General, Department of the Pacific; RAD Juan A. Pizarro, Commandant of Navy of Columbia, and Staff; Major General H. Paige, USMC and Staff; Brigadier General C. R. E. Shell, USMC; Members of Technical Research

VADM Ruthven E. Libby, Commander First Fleet, flanked by Dr. Paul C. Tompkins, Scientific Director and CDR Robert J. Connolly, Technical Services Director, hears an explanation of NRDL monitoring instruments by Mr. Kenneth F. Sinclair, Head of Instruments Branch.

Dr. Georges Mathé (center) internationally-known pioneer clinician in bone marrow therapy, is hosted by Dr. Robert R. Newell (left) Medical Consultant, and Mr. Leonard J. Cole, Head of Experimental Pathology Branch for his lecture at the Laboratory on the 1958 Jugoslav reactor accident.

Institute, Japanese Defense Agency; Dr. Georges Mathè, Professor of Carcinology, University of Paris, France; Office of Civil and Defense Mobilization Program Advisory Committee (Chairman, Edwin B. George); Hon. Cecil P. Milne, Assistant Secretary of the Navy (Material); RADM J. L. Chew, CNO, Op-44; Dr. Harry F. Harlow, Head, Psychology Dept., University of Wisconsin; Dr. Lloyd A. Stocken, Professor of Biochemistry, Oxford University, England; Hon. Richard Jackson, Assistant Secretary of the Navy (Personnel and Reserve Forces) and Staff; LtGen. Arthur G. Trudeau, Chief, Research and Development, Department of the Army,and Staff; Mr. Keith McHugh, Chairman, Governor Rockefeller's Committee on Fallout Protection Shelters; Dr. Barbara Holmes, Dept. of Radiotherapeutics, Cambridge University, England; Dr. D. W. van Bekkum, Medical Defense Radiobiology Laboratory, Rijswijk, Netherlands; VADM R. E. Libby, USN, Commander First Fleet and Staff; Professor Fritz Strassmann and Dr. C. Herrmann, Johannes Gutenberg Universitat, Mainz, Germany; Navy League Reserve Officers' Association; Mayor Adiel Stewart and Bishop Rudd, Salt Lake City; Col. R. D. Wolfe, USA, Director Nuclear Weapons, Army Command and General Staff College, Ft. Leavenworth, Kansas (former Deputy Director to NRDL); Dr. S. H. Cohn, Brookhaven Laboratory (former Head of Internal Toxicity Branch, NRDL); Dr. Roger G. Preston, Lawrence Radiation Laboratory, Livermore (first Officer-in-Charge, NRDL).

PUBLICITY

The Daily Press

The accompanying two-page montage of newspaper headlines bears testimony to the publicity received by the Camp Parks decontamination and shelter experiments late in 1959. These stories were contained in newspapers from many distant locations.

They were rivalled early in the year by the space devoted to the dramatic episode of the skin diver whose life was saved by the Laboratory's Radiological Medical Director.

In between were articles of NRDL's Co-Op student trainees; Dr. N. E. Ballou's appointment to do research in Belgium; Dr. E. L. Alpen's return from a year's fellowship at Oxford, England; awards presented members of the Laboratory; retirement ceremonies of Captain A. R. Behnke and CDR J. A. LaSpada; the research support given Dr. R. W. Brauer by the San Mateo County Heart Association; distinguished visitors to NRDL; participation of Laboratory members in meetings, and many others.

Television

The Commanding Officer and Director appeared twice on television. The first time he was a panelist on the "Great Decisions" Program of the Foreign Policy Association that discussed "The New Technology -- for Destruction or Plenty?" which posed such questions as Where is science leading us? and Can nations work together through science? Purpose of this program was to stimulate formation of small discussion groups by offering up-to-date facts in different areas of world politics. Questions telephoned in by discussion groups indicated the ability of ordinary citizens to understand modern technology and the need for making more information available to the general public.

Captain McQuilkin's second television appearance was on a news program when he was interviewed on the subject of the shelter experiment with questions on diet and the reactions of the men.

Dr. R. R. Newell appeared on "Doctors' News Conference" to discuss "The Truth about Strontium-90" with other Bay area physicians and press representatives.

Captain A. R. Behnke took the lead in a panel on "Doctors' News Conference" in a program entitled "Sharks, Bends and Skin Divers," to emphasize certain important facts about skin diving. These included safe depth limits, the need for being qualified ocean swimmers, for going in pairs and for training in all aspects of diving. The panelists expressed a hope that, diving licenses would be required the same as driving licenses.

Motion Pictures

At midyear fifteen members of the four scientific divisions took part in production of a motion picture entitled "The Atom and the Navy" made by a professional crew for the Navy Department. The scenes shot were: ion exchange and gas chromotographic columns; Mitchell carbon arc source; gamma ray spectrometer measuring gamma radiation through shielding materials; X-ray room; Van deGraaff accelerator; and a conference of NRDL scientists.

Exclusive 'ATOMIC DUST' TEST IN THE EAST BAY

S.F. News-Call Bulletin, Fri., Nov. 20, 1959

Navy Scientists Begin Atomic Tests at Air Base

San Francisco Examiner

E. Bay Base to Sizzle 8 Days in Fallout Te

Fallout Carpet Rolled Back In H-Bomb Cleanup Exercis

AIR BREATHER—One of a group of ... used in monitoring ... fallout material ... Parks experiments is checked by ... general project engineer ...

SWEEPDOWN ...

San Francisco Chronicle
THE VOICE OF THE WEST

FRIDAY, NOVEMBER 13, 1959

Navy Will Test Atomic Fallout At East Bay Site

By Jack Foisie

The Navy is planning large-scale experiments with manufactured radioactive fallout at Camp Parks near Pleasanton, Alameda county, The Chronicle learned yesterday.

A four-acre area of the camp will be contaminated with 10 tons of radioactive "dust" next Tuesday and left "hot" for eight days before being decontaminated.

Also planned soon ... first test of a 100-man ... ground fallout shelter at Parks as a possible ... type for nationwide ...

Oakland Tribune
OAKLAND, CALIFORNIA, TUESDAY, DECEMBER 1, 1959

Test Rolls Back Carpet Of Radiation

Pleasanton Study Shows Problems of H-Bomb Cleanups

By TOM ...

PLEASANTON ...

HOT SPOT—Dr. Carl F. Miller, head of the NRDL's ... Development Branch, measures the ... level of ... grassy area ... decontamination ... at Camp Parks. ... 1,000 hours ...

PAGE 30 SAN FRANCISCO SUNDAY CHRONICLE Nov. 22, 1959

'Prototype of Disaster'

Radioactivity Test Waits 2nd Phase

By David Perlman

RECORDER—Philip Coney, electronics ... Navy Radiological Defense Laboratory ... recordings of radiation levels at Camp Parks ...

The radiation counter checks levels of ... town has sand in East Bay "no-man's land" of atomic age

A safety monitor checked with an ion chamber counter as Navy men spread "hot sands" in an experiment to test decontamination procedures

DIARY OF TEST TOMB GUINEA PIG

Oakland Tribune
ASSOCIATED PRESS . . . WIREPHOTO . . . UNITED PRESS INTERNATIONAL . . . CHICAGO DAILY NEWS FOREIGN SERVICE
OAKLAND, CALIFORNIA, FRIDAY, DECEMBER 18, 1959

Daily Life in Test 'Tomb'

By JAY KELLER
Navy Shelter Volunteer

What is it like to live for two weeks with 96 men confined in a "tomb" 20 feet underground? The Navy wanted to know in order to make plans for the Nation's civilian defense. Jay Keller, 34, of 2825 Minna St., Oakland was one of those volunteers for the Navy experiment.

Here is his day-by-day account and personal sketches of the ordeal.

Thursday, Dec. 3

The door of the experimental bomb shelter closed and, here we were, 96 men in a confined space of 1250 square feet.

Dr. Strope immediately rushed into action. We were now in Condition One. ...

The men were divided into individual groups of 10 ... Group No. 1's dinner consisted of two peanut candy bars ...

Friday, Dec. 4

The first night's sleep went fairly well. ...

'Tomb' Volunteers Endure Diet, Dirt

Oakland Tribune
Sunday, Dec. 20, 1959

Atomic Attack Might Force People to Become 'Moles'

San Francisco Examiner

The World in Photos

Sec. II THURSDAY, NOV. 26.

PAGE 4 SAN FRANCISCO CHRONICLE Friday, Nov. 27, 1959

17 Men End Three-Day Test In Fallout Shelter

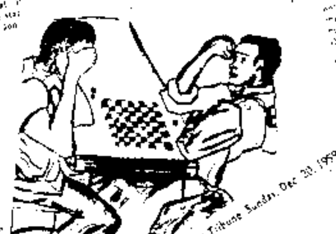
Endurance Trial At Camp Parks

By Jack Fobes

Navy Captain John McQu...

CHECKERS HELPED PASS TIME

Sheltered



Oakland Tribune Sunday, Dec. 20, 1959

PASSING THE TIME—Two ... ground shelter experiment ... ber-like sandals watch ...

16 'MOLES' Big Coming Out 'Party' for Men In Shelter Test

VOLUNTEER—Jay Keller, 34, of Oakland ...

Volunteer 'Guinea Pig' Sketches Life in Shelter

MUSICAL INTERLUDE—Jay Keller, one of the volunteers who was confined in an underground shelter for two weeks in a Navy experiment, sketched these pictures ...

APPROACH TO THE NEW YEAR

NRDL faces 1960 with energetic confidence. Emphasis will be placed on continuation of research in established projects, as well as investigation in new areas. Negotiations are under way to explore the possibility of an organization change that might enable the Laboratory to better serve the entire Department of Defense.

In the face of a continuing nuclear test ban, the use of non-nuclear field testing and nuclear event simulation will be extended. To carry out a more effective program of this type, it is hoped that the cyclotron, and other high level radiation sources so necessary to it, will be obtained.

Also because of the ban, a new series of underwater tests, HYDRA II, will be initiated, employing existing Navy facilities at San Clemente Islands, and a new test pond at Camp Parks. A range area, also at Camp Parks, will be used to test military radiacs under natural field conditions.

All in all, prospects for building an accelerated program for 1960 in this Laboratory to help solve the world's problems of radiological defense seem encouraging.