



Dr. W. A. Schoen New Member Medical Staff

Dr. Walter A. Schoen, Jr., is the newest member of Sandia Laboratory's Medical Organization 3300. Dr. Schoen joined the company Jan. 2 to head Clinical Medicine Department 3330.

Dr. Schoen came to Sandia after almost eight years as a general practitioner at Lovelace Clinic. His experience includes residency at the Medical College of Virginia in obstetrics and gynecology and two stints as a medical officer in the U.S. Army during the Korean conflict and World War II. In 1949, he held a Cancer Fellowship at New York City Hospital.

He served his internship during 1946-47 at Henry Ford Hospital in Detroit. He graduated from the University of Colorado School of Medicine in 1946. Prior to Medical School, he taught high school physics and chemistry for four years at Ault and Julesburg, Colo.

Dr. Schoen earned his Bachelor's degree in biological science in 1938 from Colorado State College of Education and completed his Master's degree in Physical Sciences in 1942 at the same school. He worked on his MS degree during summers between teaching stints.

"Industrial medicine aims primarily toward the discovery of disease in its early stages—preventive medicine, you might call it," Dr. Schoen says. "The idea is to protect the good health of employees. This fits neatly into my previous practices and beliefs. It is important for everyone to have a complete physical examination annually."

Dr. Schoen is a member of the Colorado State Medical Society, the New Mexico State Medical Society, the Bernalillo County Medical Society, and the American Academy of General Practice. He is on the staff of Bataan Hospital.



SANDIA CORPORATION

PRIME CONTRACTOR TO THE ATOMIC ENERGY COMMISSION

ALBUQUERQUE, NEW MEXICO • LIVERMORE, CALIFORNIA

LAB NEWS

VOL. 16, NO. 3 / JANUARY 31, 1964

Officials Praise Clean Room Standard

Distribution was made early this month of Federal Standard No. 209, "Clean Room and Work Station Requirements, Controlled Environment." The Standard was prepared by Sandia Corporation for the Atomic Energy Commission and accepted by General Services Administration. It will control all government clean room procurement.

J. Gordon King, supervisor of Advanced Manufacturing Development Section II, 2564-2, was chairman of the working group which prepared the standard.

Upon completion of the project last September, K. F. Hertford, manager of the AEC's Albuquerque Operations Office, wrote a congratulatory letter to S. P. Schwartz, Sandia Corporation President. The letter said in part:

"The preparation of this Standard and the completion of all actions relative to Project AEC-63-1, including the effort required in obtaining the concurrence of all other Federal Agencies concerned, within a period of less than six months is considered an outstanding achievement. The promulgation of this standard advances the state of the art in Clean Room techniques by several magnitudes and will result in great saving to the Government in Clean Room construction."

Another letter from John P. Abbadessa, Atomic Energy Commission Controller, said, "... I am sure that all who participated in this undertaking derived a deep sense of satisfaction from having taken part in such a worthwhile project. Please express my personal appreciation to them for their exceptional performance in bringing this project to such an early and successful conclusion."

J. A. Paulhamus (2564-2) was the working group secretary. The standard was based on the laminar air flow concept of clean rooms developed by Willis J. Whitefield (2564-2).



EXAMINING a copy of the new Federal Standard No. 209 which now controls government procurement of clean rooms are, from left, D. W. Ballard, J. Gordon King, and J. A. Paulhamus (all 2564), members of the project group which prepared the Standard for AEC.

New Pressure Chamber Developed For High Pressure Investigations

L. W. Lathrop of Auxiliaries Development Section 1555-1 has designed an oil-filled pressure chamber capable of developing pressures up to 200,000 lbs. per sq. in. The device will be used for high-pressure studies by Component Development Division 1313.

The chamber is one and one-half inches in diameter and three in. long, with a one-half-in. by 25-in. extension. Two electrical pass-throughs allow electrical connections with items within the chamber.

"Pressure in the chamber is hydraulically obtained," Wayne explains. "The chamber was designed for use with the 300-ton Dake press located in Area II, but it can be used with any press having the proper accuracy and pressure capacity."

The chamber's 200,000-psi pressure is obtained by a load of 340,000 lbs. on a piston which extends into the cylinder. Piston stroke is one and three-quarters in.

Wayne worked with John Stohler, a former Sandia employee, in designing the chamber. Design and construction took approximately a year.

"The working chamber of the device called for a very strong material," Wayne continues. The designers worked with Metallurgy Section 1121-3 in choosing a ma-

terial for the working chamber. They settled on maraging steel—a steel of radically new constituency developed originally by International Nickel Company. "Upon cooling from a temperature of approximately 1500°F, the steel transforms to a different crystal structure which, upon heating to 900°F, increases greatly in strength," C. H. Maak, the Section 1121-3 metallurgist who worked with Wayne on design of the cylinder, explains. "The unique characteristic of this steel is its ability to retain far greater toughness at this strength level than has heretofore been possible in steel."

Yield strength of this type of steel, as it is used in the pressure cylinder, is about 275,000 psi. The piston for the device is made of 4340 steel, heat treated to a yield strength of about 220,000 psi.

PISTON of oil-filled pressure chamber, held here by the designer of the chamber, Wayne Lathrop (1555), is made of 4340 high-strength steel. Electrical pass-throughs within the piston allow electrical hook-ups to be made to devices placed within the test chamber. The chamber, in background, is constructed of strong maraging steel.



(Editorial Comment)

Words of Abraham Lincoln

Early in our education we learned that February 12, 1809, was Abraham Lincoln's birthdate. Then most of us learned the words of the stirring "Gettysburg Address." We studied the impact of the Emancipation Proclamation and the trials of Lincoln the President during the war between the states. We sorrowed over our history books with the sordid tale of Ford's theatre. Lincoln stayed with us in our memories.

For most Americans, Lincoln is remembered as a great man who, though suffering through tragic personal problems, "saved the union." Students of Lincoln, and there are many, know him as a man of deep thought, great wit, and lasting statements.

To know Lincoln at all, these students maintain, is to read his words, study his personal trials, and recognize his wisdom which has not been common to many men.

To understand him better, they recommend we recall some of his quotations, savor their meaning, and profit by their lessons. Here are some well-known, and not so well-known, Lincoln observations, the meaning of which time has not dulled.

* * *

"Those who deny freedom to others deserve it not for themselves and under a just God, cannot long retain it."

* * *

"Be sure to put your foot in the right place, then stand firm."

* * *

"I like to see a man proud of the place in which he lives; and so live that the place will be proud of him."

* * *

"Let us have faith that right makes might; and in that faith let us to the end, dare to do our duty as we understand it."

* * *

"I have endured a great deal of ridicule without much malice; and have received a great deal of kindness, not quite free of ridicule."

* * *

"If you once forfeit the confidence of your fellow citizens, you can never regain their respect and esteem. It is true that you may fool all the people some of the time; you can even fool some of the people all of the time; but you can't fool all of the people all of the time."

* * *

"I do not know what my grandfather was; I am more concerned to know what his grandson will be."



Lynn Fairchild (4432-4)

Take a Memo, Please

Using tools improperly is asking for trouble. Safe working practices are only effective if you follow them.

Thanks Given Sandia People for Volunteer Christmas Activities

Certificates of Recognition and letters have been sent by Desi Baca, principal of the Riverview Elementary School, to each of the three unions at Sandia (EBEW #1988, Office Employees #251, and Machinists #1689).

The letters express the deep appreciation of both the community and the school for the contributions made by members of the unions to provide a Christmas party and gifts for the youngsters at Riverview. As Mr. Baca expressed it, "It was a magnificent project!"

Alice Preist (4431-2) has received a letter from the Child Welfare Division, New Mexico Department of Public Welfare, thanking members of her department and other Sandians who gave Christmas gifts to more than 60 children in foster boarding homes.

The letter pointed out "... the state does not provide money for gifts, only for food, clothing, and shelter. We are extremely dependent upon gifts from interested people in order to provide our children with anything approximating a normal Christmas ..."

Sympathy

To Monico Martinez (4574) for the death of his brother Jan. 20 in Albuquerque, his sister in Arizona earlier this month, and the death of his mother in Socorro in mid-December.

To Ray Harrison (7223) for the death of his father on Dec. 27.

To A. M. MacGibbon (4512-2) for the death of his mother-in-law in Iowa on Jan. 23.

Congratulations

Mr. and Mrs. Manuel G. Chavez (4151-1), a son, Manuel Matthew, Dec. 7.

Mr. and Mrs. J. L. Tischhauser (7620), a daughter, Lynette Nicole, Dec. 20.

Mr. and Mrs. R. S. Summers (2441), a son, Gary Mark, Dec. 30.

Mr. and Mrs. James M. Haines (4252), a son, David Craig, Dec. 22.

Mr. and Mrs. L. J. Klamerus (2541), a son, Eric William, Dec. 31.

Mr. and Mrs. Clarence Huddle (5131), a daughter, Connie Lynn, Dec. 12.

Mr. and Mrs. Everett Johnson (7243), a son, Will Leon, Dec. 24.

Mr. and Mrs. Fred Millsap (7241), a son, Kyle Jeffrey, Jan. 17.

Mr. and Mrs. Alvin Brazda (7243), a daughter, Allison Mae, Jan. 18.

Mr. and Mrs. Tom Hoover (1543-2), a son, Kurt Thomas, Jan. 20. Mrs. Hoover was formerly in Section 3131-1.

PAGE TWO

LAB NEWS

JANUARY 31, 1964

Supervisory Appointments

DONALD A. EM-RICK to supervisor of Acceptance Equipment Manuals Division 2322, Technical Manuals Dept.

Don started working for Sandia Corporation in June 1951 as a production control analyst. He joined the Technical Manuals Department in December 1955 as a technical writer, and in 1961 was promoted to section supervisor.

Prior to joining Sandia, Don was doing graduate study at the University of New Mexico. He has a Bachelor's degree in liberal arts from Butler University in Indianapolis.

During World War II, he served three years with an Army anti-aircraft unit.

Don was a newspaper reporter in Wabash, Ind., for two years before the war.



PAUL D. PEWE to supervisor of Wage and Salary Practices Division 3113, Wage and Salary Administration Department.

Paul has worked in the wage and salary practices area since he came to Sandia 12 years ago, and has been a section supervisor since March 1955.

Previously, he did job evaluation work under U.S. Civil Service at the Black Hills Ordnance Depot and the Rock Island Arsenal Ordnance Depot. He also did accounting for three years for a contractor in Rock Island.

Paul attended both the University of Illinois and Augustana College in Rock Island, receiving his Bachelor's degree in accounting from the latter.

During World War II, he served three years in the Air Force.



ALBERT W. "Mickey" MCKINNEY III to supervisor of Numerical Applications Division 8144, Livermore Laboratory.

Mickey joined Sandia at Livermore in June 1960 as a systems analyst in the Preliminary Analysis Division 8141. Since then he has also worked in systems analysis and mathematics for Advanced Systems Studies 9120 and Preliminary Design Division 8142.

Before coming to Sandia, Mickey worked two years as a mathematician for the General Electric Company at its Vallecitos Atomic Laboratory in Pleasanton, Calif.

Mickey received his BA degree in mathematics from the University of California at Berkeley in 1951, and was awarded his PhD degree in mathematics from the same school in 1958.

He is a member of the American Mathematical Society.



Promotions

John H. Lovelace (1113) to Staff Associate, Technical
Joseph P. Darginis (8115) to Staff Associate, Technical
Dean A. Hitchens (8121) to Staff Associate, Technical
C. E. Cundiff (3113) to Staff Assistant, Administrative
Ella D. Ward (8161) to Staff Assistant, Administrative
Jose A. Gutierrez (4574) to Janitor
Ernest Sanchez (3462) to Reproduction Equipment Operator
William J. Smith (3462) to Reproduction Equipment Operator
Mayme M. Brunacini (4233) to Assembler
Francis L. Montoya (2643) to Teletypewriter Operator
Thomas L. Spindle, Jr. (3413) to Messenger
Viola E. Marsh (4135) to Invoice Clerk
Shirley M. Harper (3126) to Secretarial Steno
Doris W. Price (3126) to Secretarial Steno
Linda M. Burns (3126) to Secretarial Typist
Rose M. Griffin (3126) to Secretarial Typist
Nadine N. Hallick (3126) to Secretarial Typist
Doris L. Mortensen (3126) to Secretarial Typist
Dorothy J. Tolbert (4623) to Record Clerk
Patricia M. Mann (4432) to Reproduction Service Clerk
Trinnia V. Romero (2624) to Service Clerk
Orlinda M. Griffin (3423) to Service Clerk
Charlotte J. Gilmer (4131) to Payroll Clerk
Willa L. Urbanski (4131) to Payroll Clerk
Jose L. Pecos (4135) to Investigator
Clara M. Gearhart (3421) to Librarian
Glory J. Maginnis (4362) to Expediter
Merejildo Gallecos (7241) to Math Analyst
Beverly Paine (8232) to Record Clerk
Barbara A. Farshler (8231) to Keypunch Operator
Nancy A. Imfig (8231) to Keypunch Operator
Harrlett E. Johnson (8231) to Keypunch Operator
Rose M. Lawson (8231) to Keypunch Operator
Jacqueline G. Thornton (8231) to Keypunch Operator
Hazil L. Willard (8231) to Keypunch Operator
Harold B. Thomas (2341) to Staff Assistant, Technical
Jerald W. Long (2563) to Staff Assistant, Technical
Pedro R. Santiago (4575) to Laborer
Ralph K. Wenzelburger (4613) to Laborer
Layout Man
Herman O. Armijo (4511) to Helper-Trades
Samuel M. Bragg, Jr. (4631) to Technician
Jerry G. Campos (4631) to Technician
Elmer R. Pitts, Jr. (4252) to Model and Instrument Maker
Gloria B. Sals (4332) to Steno Clerk
Clara M. Kopp (3126) to Secretarial Typist
Adron B. Pritchard, Jr. (3413) to Message Center Equipment Operator
Lynn M. Fairchild (4431) to Document Clerk
Ted R. Garcia (4432) to Reproduction Service Clerk
Marceline D. Pannell (4431) to Service Clerk
Jeanette B. Passmore (4432) to Editing Clerk
Roseanne Bascom (4516) to Office Service Clerk
Catherine E. Kinzer (8232) to Message Center Equipment Operator
Beatrice E. Pajaro (8232) to Message Center Equipment Operator
E. Fay Taylor (4110) to Secretary
Hugh I. Taylor, Jr. (7325) to Laboratory Assistant
Robert R. Horton (7324) to Laboratory Assistant
Amado S. Ortiz (4153) to Investigator (Plant Property)

Sandia Speakers

Following is a list of speakers, titles, and places of presentation for recent talks by members of Sandia Corporation.

Albert Narath and D. C. Barham (both 5151), "Antiferromagnetism in $\text{CoCl}_2 \cdot 2\text{H}_2\text{O}$ and $\text{MnCl}_2 \cdot 2\text{H}_2\text{O}$," American Physical Society, Jan. 22-25, New York City. Mr. Narath made the presentation.

A. F. Cone (2110), "A Cumulative-Results Plan for Small-Sample Inspection," Baltimore Section, American Society for Quality Control, Nov. 15, 1963, Baltimore, Md.

R. D. Seeley and G. W. Dyckes (1112), "Determination of Effective Crosslink Density in Silicone Rubber," American Chemical Society Southwest Regional Meeting, Dec. 5, 1963, Houston, Tex. Mr. Seeley made the presentation.

L. H. Koopmans (5425) and D. L. Hanson, University of Missouri (formerly of Sandia), "Tolerance Limits for a Class of Distributions," Western Regional Meeting of the Institute of Mathematical Statistics, Jan. 30, Monterey, Calif. Mr. Hanson made the presentation.

E. S. Roth (2564-1), "Don't Reject Those Near Perfect Parts," Standards Engineers Society, Jan. 16, Boston, Mass. On Feb. 4 he will be one of three panel members for the ASQC Minnesota Section Conference on Specification and Acceptance Techniques, to be held in Minneapolis.

D. J. Jenkins (3130), "Moral Decisions in Business and Professional Life," Central Methodist Church, Albuquerque, Jan. 19.

A. Goodman (7434-2), "Some Things the Future May Bring," First Congregational Church, Jan. 19, Albuquerque.

M. A. McCutchan (3132), "Progress in Vocational and Technical Education in New Mexico in 1963," State Board of Education, Jan. 20, Santa Fe.

R. B. Park (4113-3) "Use of Teletype in Sandia Procurement," Data Processing Management Association, Jan. 21, Albuquerque.

M. A. McCutchan (3132), "Vocational and Technical Education and Its Implications for the Navajos," 7th annual Navajo convention, Jan. 22, Flagstaff, Ariz.

SANDIA CORPORATION LAB NEWS



ALBUQUERQUE, NEW MEXICO • LIVERMORE, CALIFORNIA

Editor: Robert S. Gillispie
Sandia Corporation, Albuquerque, New Mexico

Editorial Offices
Sandia Laboratory

Albuquerque, New Mexico

Employee Publications
Bldg. 610

Tel: 264-1053

Livermore Laboratory
Livermore, California

Publications & Public Relations
Bldg. 912

Tel: Hilltop 7-5100, Ext. 2395

Permission to reprint material contained herein for other than governmental use may be obtained from the Editor, Lab News, Sandia Corporation.

7

In 1789, the German chemist M. A. Klaproth, working with pitchblende ores that previously had been thought to contain zinc or iron, found a new, mysterious element not previously known to scientists.

Klaproth isolated from the ores a black, powdery material having strikingly different chemical properties from the properties of any of the then identified elements.

No one was quite sure what the peculiar new powder was, but in honor of the planet Uranus, which had been discovered just eight years before, Klaproth named it uranium.

For more than a century, this strange new substance remained little more than a laboratory curiosity.

Then, in 1896, the French scientist Henri Becquerel made a startling discovery concerning it.

Becquerel was investigating the phenomenon known as phosphorescence, or the ability of some substances to glow after being subjected to strong light. During his experiments, he casually placed some uranium salts on top of photographic plates in a dark desk drawer. Several days later he found—to his astonishment—that the plates had become exposed.

The only possible source of the energy needed to produce such an exposure had to be within the uranium salts. Subsequent experiments proved that this, indeed was the case.

Klaproth's curious material had the almost incredible power of giving off energy without previously having been exposed to any source of energy itself!

This phenomenon is now known as radioactivity and its discovery ranks among the greatest scientific finds of all times.

Little was done with uranium however, for almost another half century after Becquerel's experiments.

The principal use found for the new element was in the making of ceramics, where uranium compounds proved valuable in creating various shades of yellow, orange, brown or dark green in the glazing process. As late as 1939, a paper read at a scientific meeting in New York assured the audience that uranium had no other economic significance.

But by then uranium was beginning to emerge from the obscurity of man's ignorance about it. Scientists of the 1930's were exploring the nature of atoms by bombarding them with high energy subatomic particles produced by various types of laboratory equipment. Late in 1938, a German physicist, Otto Hahn, working with a fellow scientist, Fritz Strassman, succeeded in splitting an atom of uranium by subjecting its center, or nucleus, to a hail of subatomic particles known as neutrons.

It was the first time man had been able to split, or fission, the nucleus of any atom.

Significant Discovery

Scientists working in the realm of nuclear physics realized at once the exciting significance of this discovery. It was obvious that in the fissioning process the enormous energy required to hold the parts of the heavy uranium atom together was released. It might be possible to put this energy to practical use. The only trouble was that tremendous initial energy was needed to split a uranium nucleus in the laboratory. How could these neutrons be obtained and made to split atomic nuclei with less expenditure of energy and at less cost?

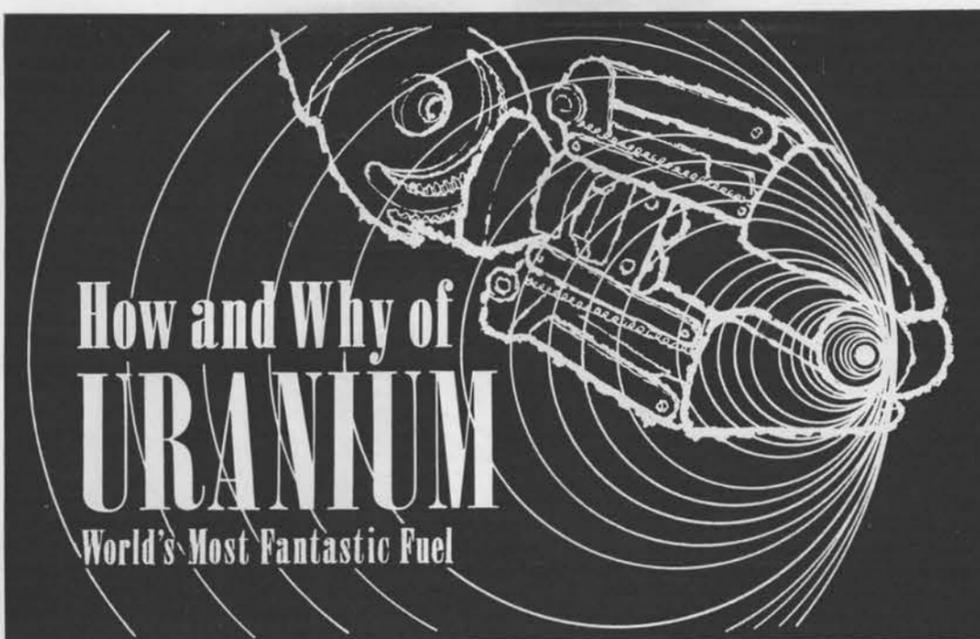
As news of the Hahn-Strassman discovery spread, scientists theorized that not only was energy released when the nucleus of an atom was split by a neutron; it was probable that other neutrons were fired out of a fissioning uranium nucleus as well.

The intriguing possibility immediately arose that neutrons from a fissioning uranium nucleus might be used to split other uranium nuclei which then would send out more neutrons to fission other uranium nuclei, etc., etc., in a continuing chain-reaction process that would release great amounts of energy.

If the process could be controlled, a new source of heat and power would be available. If the process were allowed to take place unchecked, a tremendous explosive force might be developed.

Theory Correct

Experiments both in the United States and abroad soon confirmed that the neutron release theory was correct. On the basis of these findings, the first nuclear chain reaction was achieved in a pile of graphite and uranium under the stands of Stagg Field at the University of Chi-



cago on an historic afternoon almost 22 years ago—Dec. 2, 1942.

From this fateful event came the development of the atomic bomb of World War II and the development of peaceful uses of atomic energy which was to follow after the war under the direction of the Atomic Energy Commission.

Despite the bomb, uranium had to wait until after the war to make its greatest imprint on the public mind. Then a widespread search for domestic sources of it began. The United States was almost entirely dependent on foreign sources of supply—the Congo and Canada.

Now, inspired by Atomic Energy Commission bonuses for the discovery of high-grade uranium ores, prospectors began roaming the western plains and mountains of this country, hoping for a strike. Dreams of riches spurred them on. Overnight, uranium became a household word.

It is doubtful, however, whether public understanding of uranium progressed much beyond a vague awareness that it somehow was intimately associated with the Nation's embryo atomic energy program.

Even today—two decades after achievement of the first nuclear chain reaction—few non-scientists are able to answer three basic questions about uranium:

What is it? Why should it be uranium that is used to produce atomic energy? How does it do so?

Uranium Is A Metal

Uranium is, first of all, a metal just as iron, tin, gold, and similar substances are metals. The black powdery material originally found by Klaproth happened to be an oxide of uranium—a form of the metal in combination with oxygen just as rust is an oxide or form of iron in combination with oxygen. Scientists later developed pure metal from Klaproth's discovery.

In a freshly milled and polished state, uranium has a high silvery luster, but this attractive appearance does not last long. Polished uranium oxidizes within a few hours and turns black.

Uranium is one of the world's heaviest metals—80 per cent heavier than lead. A piece only five inches long and two inches in diameter weighs 10½ lbs.

Although uranium is scattered widely over the face of the earth it is not often found in large concentrations which can be economically mined. This is because of the readiness with which the metal reacts with other substances to form oxides, sulfates, phosphates and other chemical compounds.

Yet, uranium is more abundant than gold, platinum or silver. It is slightly less abundant than cobalt, one-fifth as abundant as lead, one-tenth as abundant as zinc, and one-thirtieth as abundant as copper. It is about equal in abundance to tin.

Annual Production Up

Some 300 uranium mines are operating in the United States today, and domestic ore production which was less than 50,000 tons a year in 1948, when the Atomic Energy Commission's program of exploration began, has reached an annual figure of about eight million tons.

Principal sources of foreign uranium in non-Communist countries are Canada's Lake Athabasca and Blind River regions, the Republic of South Africa, and Australia. Because of increased domestic supplies and expiration of long-term foreign contracts however, imports currently supply only 40 per cent of U. S. uranium concentrate purchases.

Early intensive U.S. exploration for uranium was concentrated largely in a 100 mile-square area in the vast Colorado Plateau, and most ore production came from this region for a number of years.

Two of the largest and most significant sources of ore now are near Grants, N. Mex., on the southern fringes of the Plateau and in the Gas Hills and Shirley Basin sections of Wyoming.

More than 20 uranium mills are located in Wyoming, Colorado, South Dakota, Texas, Utah, Arizona, Washington, and New Mexico. The mills turn the ore from the mines into feed materials for the atomic energy program.

How Uranium Works

The importance of uranium in atomic energy harkens back to the discovery by Hahn and Strassman that it has atoms whose nuclei are readily fissionable by neutrons. It is the only naturally-occurring substance which has this power and that is why it is the basis of the atomic energy program.

The particular type, or isotope, of uranium that most easily can be split, or fissioned, is uranium 235. The designation 235 simply means that in the nucleus of an atom of uranium 235—or U-235, as it usually is written—there are 143 neutrons and 92 protons for a total of 235 of these subatomic particles.

When a U-235 nucleus is split in an atomic reactor, or furnace, by being struck by a neutron from outside its nucleus, the nucleus falls apart, usually in two major pieces.

These fragments travel at terrific speed. They go only a short distance, however, before they collide with the nuclei of other uranium atoms. The energy of movement of the flying fragments is transformed into the energy of heat by the tremendous impact of the collision.

The collision of these flying fragments with other uranium atoms accounts for about 90 per cent of the heat produced by the fission process. The remaining ten per cent is generated by the production of gamma rays, beta rays and neutrons during the fissioning process and by radiation from the flying fragments. Meanwhile, neutrons released from the splitting nucleus of a U-235 atom are keeping up the chain reaction process by finding and splitting other U-235 nuclei.

Water Cooled

The heat produced within a reactor by the fissioning process is extracted from the core, or heart, of the reactor by pumping water or some other coolant through it. In some reactors the coolant is piped to a heat exchanger where the heat which it has picked up from the hot reactor core is used to turn water in a secondary system to steam.

The steam can then be used to turn turbines for the production of electricity, as in the case of a power reactor, or for propulsion purposes as, for example, in the case of nuclear-powered ships and submarines.

Unfortunately, the production of useful heat in a reactor through the fissioning of uranium fuel is not quite so simple as a brief description of the process makes it sound.

One reason is the fact that the nucleus of U-235, the readily fissionable isotope of uranium, is easily fissionable only by "slow" neutrons, sometimes called thermal neutrons.

(Slow neutrons actually are not very slow. They travel, on the average, at nearly 7220 ft., or well over one and one-

third miles, per second. Fast neutrons, however, are faster yet and these are the neutrons released by U-235 nuclei when fission takes place.)

Since fast neutrons do not react readily with U-235 nuclei, they must have their speed slowed down, or moderated, by collision with other atoms either in the uranium fuel or in other material placed in the reactor for this purpose.

Graphite As Moderator

The moderator in a typical power reactor in the U. S. is likely to be some substance such as graphite which is placed about the uranium fuel, or the water which may be used as the reactor coolant. In any event, the fast neutrons have both their velocity and direction changed after repeated collision with atoms of the moderator so that they eventually reach the speed of slow neutrons and split the nuclei of U-235 atoms.

Reflectors are frequently employed in reactors to help bounce fast neutrons back into the reactor core where they can be used in the chain reaction process. Materials such as beryllium often are placed about the reactor core to serve as reflectors.

Another major problem in the fissioning process is caused by the fact that only seven-tenths of one per cent of natural uranium is U-235—the easily fissionable kind.

The great bulk of uranium is composed of atoms of uranium designated as U-238—because they have 92 protons and 146 neutrons in their nuclei, or a total of 238 of these subatomic particles. In its natural state almost 99.3 per cent of uranium occurs as U-238. Trace amounts of a type of uranium called U-234 are also found.

Because of the scarcity of U-235 atoms in natural uranium, most reactors in this country are fueled with "enriched" uranium.

Enriched uranium is simply natural uranium that has more than a normal amount of U-235 atoms in it.

Natural uranium is enriched by a long and costly process at huge Atomic Energy Commission gaseous diffusion plants in Oak Ridge, Tenn., Portsmouth, O., and Paducah, Ky.

There, uranium hexafluoride, which is a gaseous compound of uranium, is put through a series of porous barriers so constructed that at each succeeding barrier more of the lighter and faster U-235 atoms get through into the next chamber than do the heavier and slower U-238 atoms that make up the bulk of natural uranium.

The gas can be drawn off along the line at almost any degree of enrichment in U-235 that is desired and transformed back into uranium metal or oxide. The metal or oxide then has the same degree of enrichment in U-235 as the gas from which it was made.

Uranium's Fantastic Power

There is, of course, a wide variety of reactors in use and under investigation both in this country and abroad. Some reactors use natural uranium, rather than enriched uranium. Some reactors run on fast neutrons, rather than on slow ones. Some reactors—known as breeder reactors—actually have the ability to produce more fuel than they consume.

Considerable research is underway throughout the world to determine the best type of reactor systems for the various applications which are being considered.

Uranium's great advantages as a fuel have to do with the enormous amount of energy it stores in a comparatively little space.

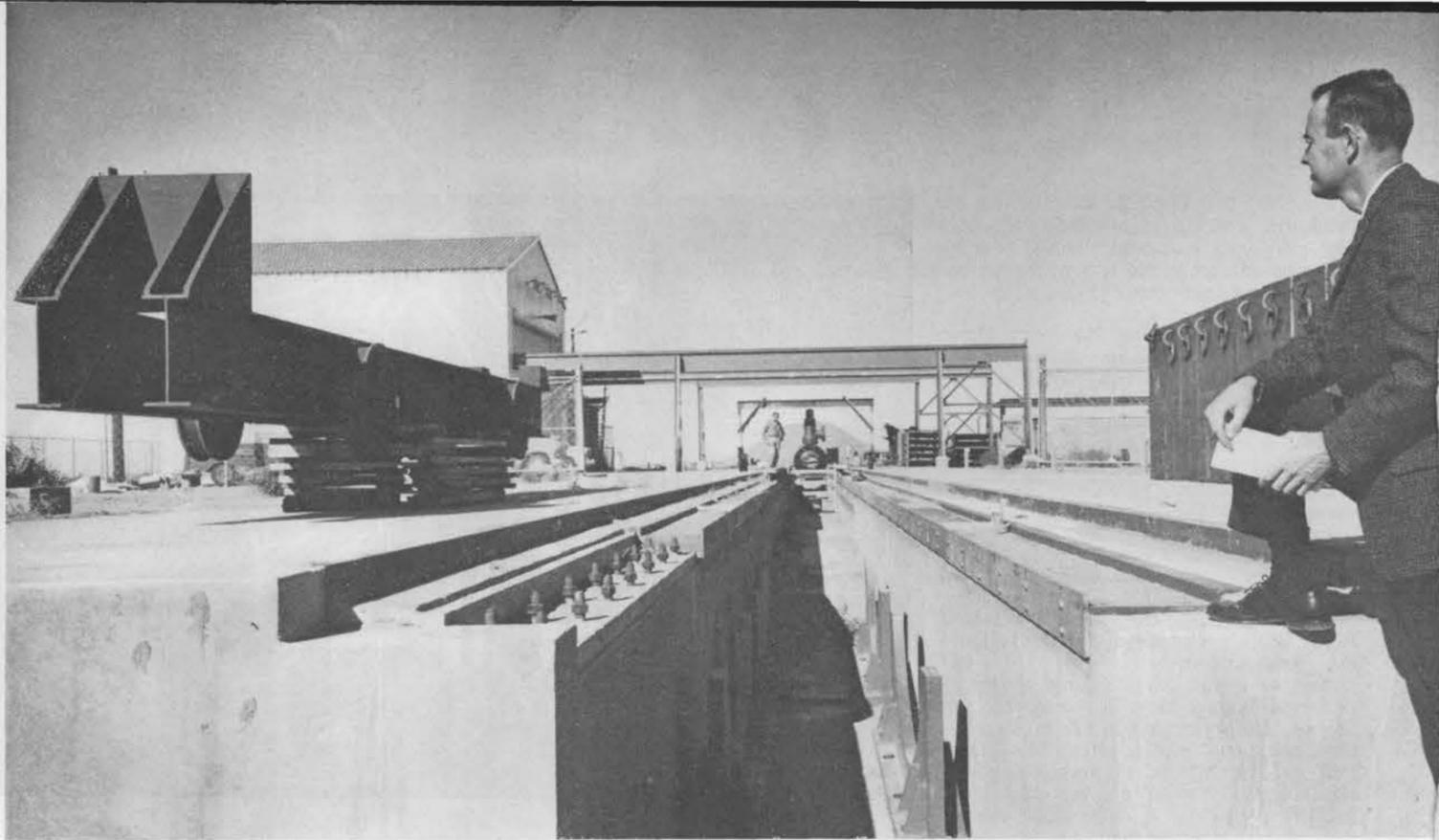
The potential energy contained in one pound of uranium—the size of a golf ball—is equal to that in approximately three million pounds of coal or to the energy in enough TNT to fill Yankee Stadium! This is an almost incredible power-to-weight ratio. It is obvious that such a compact source of energy can have many advantages.

The 17,000 lbs. of enriched uranium fuel in the N. S. Savannah, the world's first nuclear-powered cargo-passenger ship, for example, are capable of supplying enough energy to operate the vessel for over 300,000 miles, or 3½ years, without refueling.

Uranium also has the ability to "burn" without the use of oxygen. This unique characteristic—plus its compactness—gives uranium unchallenged first place in many specialized uses such as supplying

(Continued on page five)

H. E. CHESEBROUGH, Vice President and Director of Quality and Reliability, Chrysler Corporation, (right) visited Sandia Laboratory recently. R. A. Bice, Vice President, Engineering for Manufacture, 2000, discussed Sandia Corporation's mission with the visitor, who later toured Area III. Mr. Chesebrough also spoke at a joint meeting of Albuquerque Chapters of ASQC and ASME.



UNDER CONSTRUCTION in Area III is a water jet catapult, new environmental testing facility. Hydraulic pressure will be released suddenly to propel a sled down this track to impact against a 20,000-lb. steel and lead block (shown at left but not installed). A 3000-lb. loaded sled can be accelerated to about 500 mph in 100 ft. Ward Hunnicutt, supervisor of Inspection Section 4542-1, checks construction progress. Completion of the facility is expected this spring.

Seen on the Sandia Scene



ONE OF THE FEW WOMEN contestants in the current Laboratory-wide table tennis tournament is Kaihy Morgan (4413-3 assigned to 5330). Women compete on an equal basis with men in this contest. So far, Kaihy is still in the running in the 5300 tourney. All employees are eligible to compete. To enter, telephone ext. 264-2757.



People, places, things—

and the rapid

passing of time—

all help make

the Sandia story

F. F. EICHERT, manager of Design Definition Department 4410, addresses a group of Sandia Laboratory suppliers during an orientation session on True Position Dimensioning System. A group of suppliers, who handle Development Shops sub-contract work, received an introduction to Sandia's new method of dimensioning drawings. Arrangements were made for additional supplier training, to start Feb. 5, sponsored by Technical and Trades Training Division 3132 in cooperation with the Albuquerque Public Schools. The orientation session was arranged by F. A. Bentz, Senior Buyer 4443.



MURDER provides the drama and mystery in a new production by the Sandia Players. Ed Reilly (3462) portrays an English guest house manager where the action takes place. Performances of "The Mouse Trap" by Agatha Christie are scheduled at the ANAF Service Club Feb. 14 and at the Coronado Club later in the month, free to members.

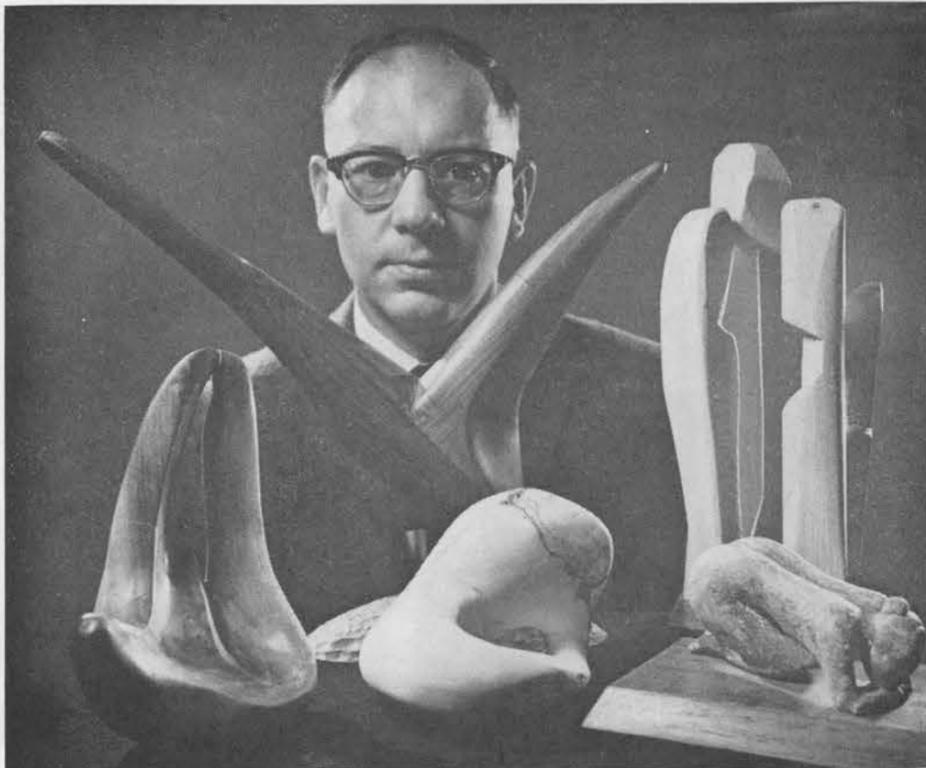


INSPECTING breakdown pattern in sample of dielectric resin used for "potting" electronic components, Osborne Milton, supervisor of Dielectric Materials Properties Section 1112-2, uses binocular microscope. The "tree" pattern visible in the center of the sample block grows from the tip of an electrode embedded in resin as high-voltage electrical current is pulsed through it.

PAGE FOUR

LAB NEWS

JANUARY 31, 1964



Jim Hesse Creates Sculpture to Relax

Latest interest of Jim Hesse (5135), who enjoys a reputation for creating wild, abstract paintings, is sculpture. Colorful, with strong design and third dimensional appendages, the paintings have decorated the Materials Research Division laboratory walls in Bldg. 824 for several years.

"After you hang a three-inch wooden eyeball out of the surface of a painting," Jim says, "sculpture seems like the next logical step. Anyway, it's a pleasurable pursuit. There's nothing like whacking away at a good piece of stone outdoors on a bright Saturday afternoon."

Jim's current work includes pieces in smooth, highly-polished alabaster, small terra-cotta works, and woodcarvings. They range from soaring "wing" shapes, through lop-sided doughnuts, to realistic nudes.

JIM HESSE displays samples of his latest sculpturing efforts. "There's nothing like whacking away at a good piece of stone outdoors on a bright Saturday afternoon," Jim says in support of his new activity.

In the accompanying picture, Jim's head is right above a piece called "Extension I." This piece took about 20 hours to carve. It is made from small teak pieces clamped and glued together, leftovers from a teak coffee table Jim designed and built.

"The table project also helped steer me into sculpture," Jim says. "It has sculpted legs with flowing lines that arc into the level surface of the table top."

"After finishing the table, I decided to get some instruction, so I enrolled in a sculpture class taught by Paul Morris Wright in the University of New Mexico Community College. I enjoyed it so much that I signed up for a second time."

Jim strives to create visual excitement in his sculpture but he is also concerned with the polished or textured finish of his pieces. "Sculpture must be felt to be entirely appreciated," he says.

To achieve the highly-polished finish on an alabaster piece, Jim carefully roughs it into shape with chisels and an electric drill. After getting it shaped to about 1/8th of an inch of finished form, he starts working the surface with files and then progressively finer-grained garnet paper. Final polishing is done with 8/0 garnet paper.

"Normally, you don't think of a chemist as an artist," Jim says, "but, in my case, working with my hands and concentrating occasionally on non-technical problems is relaxing. To me, this is the value of a hobby activity."

Government Patent Issued in Name of Sandia Employee

A patent for a bomb stabilizing structure has been assigned to the AEC in the names of Charles E. Runyan (4220) and J. L. Kelley, formerly of the University of California, Berkeley.

The invention relates to improving the aerodynamic performance of bombs or other equivalent missiles particularly in connection with bombs dropped from relatively high altitudes and under varying conditions.

The patent specification states: "The invention has found particular application in bombs having a low 'fineness ratio,' i.e., length to diameter ratio of less than 5 to 1. This particular characteristic exists in atomic bombs and this invention has found very useful adaptation in this type of bomb."

The patent application was filed May 16, 1951, and was held in secrecy until a few months ago, at which time the secrecy order was removed.

Service Awards

15
Year
Pins



James Leonard
4622
Feb. 1, 1949



Einar H. Morterud
4611
Feb. 7, 1949



Laurence J. Chavez
2643
Feb. 9, 1949



Arthur E. Jones
3428
Feb. 9, 1949



William O. Bramlett
3242
Feb. 10, 1949

10 Year Pins

Feb. 1-28

Roger P. Anderson 4411, Jessie L. Hodges 6021, John M. Bodene 7418, Thomas E. Stone 2543, Henry F. Ward, Jr. 1331, Earle A. Paxton, Jr. 8232, Bobby O. Allen 2442, James L. Foreman 2641, Mary D. McClure 3421, Donald F. Wilkes 1322, Harold G. Joblick 2341, Powell M. Henderson 3242, Willard I. Nense 4412, Ernest W. Hall 4413, William S. Brady 4431, K. E. Helmsbacher 8166, Charles R. Freund 2643, Robert L. Boyles 3242, Lewis C. Pearl 3242, Johnnie P. Harlow 3242, James C. Farmer 4513, George W. Revels 4631, P. L. Vandellinder 5426, Wilson M. Payne 7325, and Melquiades Sanchez 4623.

PAGE FIVE

LAB NEWS

JANUARY 31, 1964

Underground Test Site Being Developed

Take Note

Styron Construction Company of Albuquerque is apparent low bidder for construction of an addition to Bldg. 6584, Area III's central control building, the Atomic Energy Commission announces. Styron's bid of \$31,372 was the lowest of 10 received. The project was set aside for small business firms only.

The project will include the addition of a bay, a reinforced concrete frame, built-up roofing on a steel deck, asphalt tile and concrete floors, and extension of existing heating, electrical, and sprinkler systems.

John C. Snowden (4543-3) is the Plant Engineering Department project engineer.

Organizational meeting for the 1964 season will be held by the Sandia Laboratory Women's Golf Association Wednesday, Feb. 5, in the Bldg. 301 classroom. The meeting will begin at 1:30 p.m. All former members and prospective members of the SLWGA are invited to attend.

The Albuquerque Community Concert Association will hold its annual membership campaign Feb. 3-8, with tickets for six concerts during the 1964-65 season available for \$7 for adults and \$3.50 for students.

Next season's offerings will include the Roland Petit Ballet de Paris, the Roger Wagner Chorale, and Soviet violinist Leonid Kogan.

For additional information and tickets call Mrs. J. E. Gross, base chairman, tel. 255-7327; Mrs. R. W. Crain, tel. 299-1509; Mrs. Martin Grothe, tel. 299-4395; Mrs. Nate Wineberg, tel. 243-1062; Mrs. Don Wortman, tel. 264-5297; or Mrs. H. C. Wright, tel. 255-6006.

On Friday, Feb. 7, the Coronado Club will waive its guest fees and will invite members and non-members alike to attend an informal get-together at Social Hour. Purpose of the occasion is to acquaint individuals eligible to join the Club with some of the Club's activities and facilities.

Tonight, a Roast Beef buffet will be featured following Social Hour.

(Continued from Page 3)

How, Why of Uranium - -

power for submarines, where oxygen is always at a premium.

Interplanetary Travel

Many scientists declare that nuclear power developed from atoms of uranium actually will be the key to interplanetary travel because of the high ratio of power that can be developed per pound of fuel.

Finally, uranium is becoming increasingly important as a source of fuel for the production of electric power. More and more nuclear reactors are supplying significant amounts of electricity to homes, businesses and industry throughout the country as the nation's atomic power program continues to develop.

In this connection, uranium is expected to become increasingly important as a supplement to conventional fuels — coal, gas, and oil.

"It is clear that the supply of these fuels is limited and that a new source of energy will be needed in the foreseeable future," declares Dr. Glenn T. Seaborg, Chairman of the Atomic Energy Commission.

"On the basis of our present knowledge, it is apparent that this new source of energy can be provided only by nuclear fission.

"Moreover, sound management would seem to require that we begin planning our uses of national fuel resources so as to conserve these fossil fuels for their many applications in which nuclear power cannot be used.

"Oil, for instance, will continue to have

The Nevada Operations Office of the Atomic Energy Commission has begun development work in the Pahute Mesa area at the northwestern corner of the Nevada Test Site to provide facilities for future underground nuclear testing.

Part of the Pahute Mesa area lies within the present boundary of the Test Site, but approximately 170 sq. miles of it is outside the boundary, within the Nellis Air Force Range.

The Nevada Operations Office, with Air Force permission, has been exploring the underground geology of the Pahute Mesa for several months to determine whether it would provide increased safety factors for larger yield underground nuclear detonations. Safety factors studied include principally those related to transmission of earth shock and to containment of radioactivity within the earth. Studies to date indicate that underground formations in this area would tend to transmit earth shock at the distance of off-site communities less readily than would formations in Yucca Flat, the scene of most past underground testing at the Test Site.

Underground testing at the higher elevation of the Pahute Mesa would place detonation points farther above a dense layer of sedimentary rock (Paleozoic sedimentary deposit) which underlies the mesa at a greater depth from the surface than it underlies the surface at Yucca Flat. The dense layer of sedimentary rock is believed to more readily transmit earth shock over longer distances than other underground formations do. Firing at a greater distance above the layer, it is believed, will result in less shock reaching the layer for transmission. To verify the depth of the sedimentary layer and to obtain information on underground water, a 7500-ft. deep test hole has been drilled into the mesa for the U. S. Geological Survey.

Part of the Pahute Mesa lies within the northwest corner of the existing Test Site. The center of the mesa area lies approximately 50 air miles from Mercury, the Test Site base camp, and some 25 to 35 miles from Yucca Flat underground test areas. This test area is in a rugged, remote area difficult of access, and will require considerable construction of roads and facilities before it will be available for use. The AEC will build access roads to the area, and intends extending electrical power lines there. The present Area 12 camp near Rainier Mesa will be used at least for the time being to house those working in the area.

It is anticipated that because of necessary construction work, the earliest use of the Pahute Mesa area for underground testing will be in the late spring or early summer of 1964.

a considerable use in furnishing mobile power in this country, particularly in automobiles. Coal has many extensive uses in the production of chemicals, metallurgical reduction processes and other important tasks."

Supplement Other Fuels

"Nuclear power must begin to supplement the energy derived from fossil fuels in the coming years at a pace determined by sound national administration of all our national resources."

Uranium, incidentally, is also playing a unique role in the production of radioisotopes, which are radioactive forms of various elements such as barium, cesium, cobalt, etc.

These handy isotopic tools are finding ever new uses in industry, medicine, and agriculture where sources of radioactivity are needed for a job or can do a job better than some other method previously employed.

Some of these isotopes are obtained directly from the fission products created by the fissioning of uranium fuel in a reactor. Others are created by inserting elements into a reactor and subjecting them to intense radiation.

From all developments to date, it seems clear that uranium, the once little known and little understood element that formerly had few practical uses, is here to stay.

It looks as if it will play an increasingly important part in man's activities in the swiftly nearing future.



NEW CONTRACT between Sandia Corporation and the Office Employees International Union, Local 251, AFL-CIO, was signed last week. From left are Arthur C. Finlayson (2624), Union negotiating committee member; D. S. Tarbox (3200); Betty F. McKinstry (3462), Union negotiating committee member; W. L. Martin (3221), standing; E. C. Peterson (3220); and Paul J. Cruz (4151), Local 251 President. New Contract will be in effect through July 6, 1965.



REPRESENTATIVES of Sandia Corporation and the International Guards Union of America, Local 27, discuss new contract. From left are Carl R. King, Local 27 Vice President; Robert L. Stewart, President; Verne C. Honeyfield, Business Agent; and E. C. Peterson, manager of Labor Relations Department 3220. New contract will be in effect until Oct. 1, 1965.

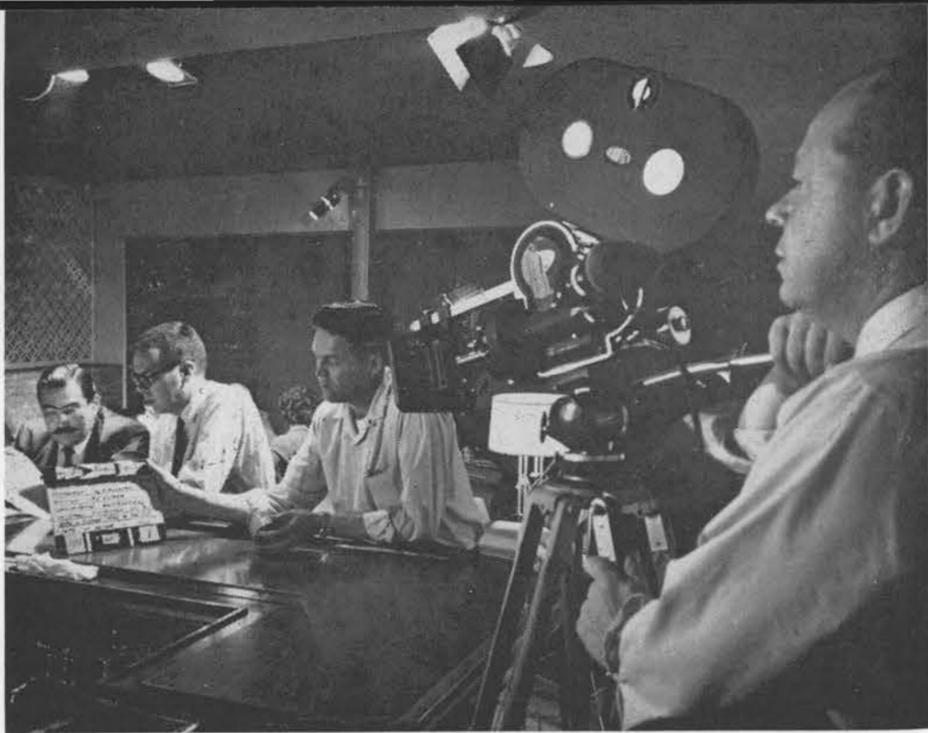
TWO UNIONS at Livermore Laboratory reached agreement on terms of new 26-month contracts recently. Below, the contract with the International Association of Machinists, District Lodge 115, is discussed. Left to right: E. J. Corwin, Wage Administration and Labor Relations, Section 8212-4; J. A. Lopez, IAM business representative; G. W. Dawson (8223-1), steward; W. Stadnisky, IAM senior business representative; C. H. DeSelm, director of Staff Services 8200, and D. D. Wagner, supervisor, Section 8212-4. Below right, Mr. DeSelm signs the contract with the International Union of Operating Engineers, Stationary Local 39. Left to right: S. P. Timmings (8222-1), shop steward; E. C. Wittebort (8222-2), chief steward; W. LeFevre, IUOE business representative; Mr. Corwin; Mr. DeSelm; Mr. Wagner; and W. B. Williams (8222-1), shop steward.



Corporation And Unions Sign Labor Agreements

SIGN CONTRACT — Henry R. Welch (4512-2), President of the Atomic Projects and Production Workers, Metal Trades Council, AFL-CIO, right, signs new contract with Sandia Corporation representatives. From left are D. S. Tarbox, Director of Security and Industrial Relations 3200; Leland L. Pierce (4224-1), Metal Trades Council Vice President; Joseph A. Maldonado (4624-2), Metal Trades Council Secretary-Treasurer; W. L. Martin (3221), standing; E. C. Peterson (3220), and Mr. Welch. The new contract will continue through July 6, 1965.





'Man on the Go' Filmed At Sandia Will Have Security Message

For the past two weeks, a handful of Sandians have doubled for a few minutes now and then as actors and actresses. Industrial Photographics Division 3465 is filming a short security film dealing with the problems of attending classified technical meetings out of town.

With a working title of "Man On The Go," the film portrays various devices and methods agents might employ to obtain classified information.

Charles L. Hines (3244) portrays the traveling "hero" type. Enemy agent roles

FILMING "Man on the Go" for Sandia's security education program are, from left, Elliot Harris, portraying an enemy agent; R. C. Colgan, writer-producer; Wayne Hancock, assistant cameraman; and Bill Mahafey, photography director. All are members of Industrial Photographics Division 3465.

are filled by Elliot W. Harris (3465) and Howard E. Frankel (3131). Other Sandians are filling "extra" roles.

Produced for Security Standards and Operations Department 3240, the movie script was written by Robert C. Colgan (3465) from an idea suggested by Alfred H. Miller, Information Security Branch AEC/ALO. Mr. Colgan is in charge of production, and Director of Photography is William P. Mahafey. Assisting is M. Wayne Hancock (both 3465).

TV's 'Science All Stars' Features Young Experts' Accomplishments

The premiere showing of a coast-to-coast television show featuring winners of the 1963 National Science Fair-International was presented Jan. 12. The show—"Science All Stars"—is aired in Albuquerque over KOAT-TV at 2:30 p.m., Sundays.

Each week, the program presents four science-minded young people, aged 11-16, who demonstrate and discuss their science projects. Also appearing on each show are adult guests who are noteworthy in science, education, government, and the military. Guests at the Jan. 12 program were Dr. Glenn T. Seaborg, Chairman of the Atomic Energy Commission, and Col. Charles Yaeger, Commandant of the Aerospace Research Pilot School.

The first show included presentations of a television camera built by 16-year-old Norman Ahlquist of Seattle, Wash. The

\$40 camera, which compared favorably with \$35,000 TV cameras, was used to televise part of the show. Michael Schatzlein, a 13-year-old from Knightstown, Ind., demonstrated the technical sophistication of a two-way radio he built by carrying on a radio conversation with an Air Force pilot as the pilot broke the sound barrier in an F-101 jet.

Antoinette Lasavio, an 11-year-old from Brooklyn, N. Y., explained and demonstrated the principles of electromagnetism, and the subject was expanded by Marc Berman, a 13-year-old from Chicago, who demonstrated the workings of a robot he created using electromagnetic solenoids.

PAGE SEVEN

LAB NEWS

JANUARY 31, 1964

AEC Seeks Bids to Improve Reactor Site

The Atomic Energy Commission will issue invitations to contractors soon for a grading and improvement project at the reactor site in Area V. Bids will be invited about Feb. 5 and are scheduled to be opened about Feb. 25.

Construction will consist of general grading, subgrade preparation and six-in. stabilized aggregate base course construction. The project includes sidewalks and curb and gutter construction, gravel surfacing, and water line, storm sewer, trailer dock and ramp construction.

Work is to be completed within 80 days after the contractor is asked to proceed.

R. G. Piper (4543-3) is the Plant Engineering Department project engineer.

Round Dancers Seeking Couples to Join in Fun

The "Rio Rounders Dance Club" invites interested couples to join a beginning class in "rounded dancing."

Round dancing is similar to ballroom dancing in most ways. The one difference is that all couples are dancing the same step or dance pattern to the music.

Classes will be held each Tuesday evening for 20 weeks beginning Feb. 11. The dances are held from 7 to 9 p.m. at 2410 Washington NE. For more details contact David Barham (5151), tel. 298-2553.

SHOPPING CENTER

CLASSIFIED ADVERTISING

Deadline: Friday noon prior to week of publication unless changed by holiday.

RULES

1. Limit: 20 words
2. One ad per issue per person
3. Must be submitted in writing
4. Use home telephone numbers
5. For Sandia Corporation and AEC employees only
6. No commercial ads, please
7. Include name and organization

FOR SALE

- ORGAN, full spinet and chord, pay \$300 of equity and assume payment of \$21.50 per month. McCormick, 242-5854.
- HAWTHORNE TENT CAMPING TRAILER, sleeps 6, storage space, can be pulled by small auto, \$275. Carroll, AX 9-5358.
- MUSICAL BABY BED and mattress, \$20; high chair, chrome, \$2; baby carrier, \$2; walker, \$2. Watt, 298-0595.
- SHOTGUN, Winchester, Model 12, 20 gauge pump w/modified choke and recoil pad, w/case and shells, \$60. Lisotta, 298-6211.
- FENDER STEEL GUITAR, complete w/case and amplifier, less than half price, \$70. Gustafson, AX 9-3270.
- 1928 MODEL-A Ford. Monroe, 9722 Salem NE, 299-3041.
- TYPEWRITER, IBM electric, gothic like type, grey, color, \$75. Risse, AX 9-5002.
- '63 17' ARISTOCRAT TRAILER, self-contained w/equalizer hitch, '64 plates, \$2400, will consider 15' trailer in trade; 15" Ford wheel and tire, \$5. Asturias, 299-4173.
- SLIDE PROJECTOR, 35 mm or 2x2, Bell & Howell TDC 500, w/case and 19 slide trays, \$25. Hamlet, 299-5124.
- ELECTRIC RANGE, \$100; brown carpet, 9x16, \$25, stroller, \$5; playpen, \$2; training chair, \$1. Glenn, 2832 Dakota NE, AM 5-0647.
- ANTIQUA REVOLVER, \$6; Civil War sword, \$18; .32 revolver, \$16.50; Luger, \$65; want to buy Flintlock pistol. Smitha, 299-1096.
- GARAGE DOOR, steel, 7'x8' w/hardware. Danilovic, AX 5-4927.
- 1928 MODEL A FORD 2-dr. sedan in running condition, best reasonable offer will take. Wood, 299-7455.
- WHITE MOTHER OF PEARL set of drums, \$200 cash. Smythe, 242-1503 after 6 p.m.
- REMINGTON .22 cal. single shot, new, \$15; Winchester .92 cal. 25.20 carbine, \$300, will trade. Zaluga, 344-1564.
- GARMISCH DOUBLE SKI BOOTS, size 10 1/2, used 2 1/2 seasons, \$12.50; ski poles, metal, 54" long, \$3. Taylor, 256-3774.
- '49 MOTORSCOOTER, recently tuned up. Bolles, 299-6892 between 5-6:30 p.m.
- '60 SIMCA 4-dr. sedan (Aronde), \$250. Bolek, 298-1566.
- '61 VOLKSWAGEN MICROBUS, 24,000 mi., original owner, \$1395. Class, 255-4952.

NEXT

DEADLINE

FOR SHOPPING CENTER ADS
Friday Noon, Feb. 7

- 3-YR.-OLD ROBERSON 3-bdr., den, service room, 13 1/4 bath, carpet, drapes, GE oven-range, pitched roof, covered patio, landscaped \$18,500, \$3100 down. May, 3200 Betts, 298-2509.
- '55 1/2-ton PICKUP, 4-speed, \$450. Baca, AL 5-8452.
- TWO 1/2-ACRE LOTS in Tres Pistoles canyon, \$2000 ea. cash, some terms; Torreon land, \$150/acre. Weir, AX 9-1160.
- 2-PIECE SECTIONAL, \$35, table lamps, \$10; Reynolds silver flute w/case and music stand, \$50. Brown, AL 5-0566 evenings, 243-7948 days.
- ALFALFA HAY, heavy bales, \$1.25 bale. Renfro, 865-9371.
- OSCILLOSCOPE, Knight wideband w/external trigger circuit, D.C. power supply and frequency standard; low capacitance and demodulation probes, \$50. Mattox, 268-5554.
- HI-FI CHASSIS, FM-AM tuner, 12-watt stereo amplifier, BSR stereo record changer, 2 12" speakers and 2 tweeters, no cabinet, \$55. Suttman, AX 9-6754.
- SKI BOOTS, French "Valdur," size 6 1/2 worn twice, \$20. Jackson, AL 6-1672.
- SLEEPING BAGS, used 3 times, one Ward's 60C9449M, 3 1/2 lb. dacron, \$12; 2 Ward's 60C9441M, 3 lb. dacron, \$10 ea. Allen, 243-7085.
- SECTIONAL, \$45; washing machine, \$40; end tables, \$5; chest, \$4; bookcase, \$3. McFall, AX 8-1552.
- WHEELS for 3/4 ton Ford, Chevrolet or GMC, eight hole 17.5 tubeless, \$5 ea. Souder, BU 2-3121.
- 3-BDR. HOUSE, 1 1/4 bath, a/c, built-in kitchen, carpet, drapes, 1 yr. old. Thorp, 298-6030.
- '42" GAS RANGE, electric refrigerator; garden tools; reel mower; Honeywell day-nite furnace thermostat; car top camping box. Letbetter, 256-1242.
- THREE USED 7.50x14 tires, \$15. Klemm, 299-0183 after 5 p.m.
- KENMORE automatic washer, \$75. Hook, 255-1897.
- MAGNAVOX television, 21" screen, table model w/legs, \$25. Miller, 255-6838.
- '62 FORD 1/2-ton, 3-speed, 6-cyl., long, wide box, \$1250. '55 Rambler \$250. Justice, 877-3504.
- '59 FORD RANCH WAGON, 4-dr., R&H, V8. Luna, 299-2458.
- COLT GOLDEN ANNIVERSARY .22 cal. sin-le action, serial number 27; German WWII medals and helmets; twin lens reflex camera. Laskar, 299-1024.
- '51 DESOTO, 4-dr., new battery; Underwood typewriter, \$10. Newman, AX 9-2729.
- '52 CHEVROLET De Luxe 2-dr., 6-cyl., \$150. Vixen, 299-3635.
- SAKO VIXEN .222 varmint, adjustable trigger, custom stock, sako scope mounts, detachable swivels, extra magazine, 130 rounds brass and loaded ammo., \$100. Grace, AL 5-4009.
- '54 FORD 3/4-ton pickup, heavy duty wrap around bumper w/or wo camper. Robinson, AL 6-7326.
- '55 CHEVROLET, Bel Air V8, \$150. Buckley, 255-2790.
- '63 PARILLA WILDCAT CYCLE, 12 hp, cast over \$500, sell for \$350 or best offer. Etherton, 298-5155.
- LINED DRAPES in a modern pattern, in one panel 90" wide, 84" high, made for sliding glass door, make offer. Wycoff, 299-1833.

- FOUR HILLS COUNTRY CLUB membership at 30% discount to qualified applicant. Converse, 242-4969.
- GAS FURNACE, 100,000 BTU w/blower, motor and controls, \$45, boxing gloves, full padded, \$2.95; Silhouette exerciser, \$30. Welker, 299-1179.
- SKI BOOTS, size 10, \$10. Fulcher, AX 9-8888.
- CLOTHES LINE POLES, T-type w/wire, 4-line capacity, original cost, \$12.95, sell for \$7.50. Banos, 256-6613.
- DINING TABLE, 6 chairs, hutch, mahogany, \$60, dresser w/mirror, blond, \$25. Schultheis, 247-2812.
- '59 PONTIAC Catalina station wagon, \$900. Price, 299-6265.
- PARROT, CAGE, \$45; '58 Chevrolet Bel Air, automatic transmission, PS, PB, factory air, all new tires, original seat-covers, \$750. Matlack, 256-7371, evenings.
- '64 RAMBLER station wagon, R&H, a/c, ivory w/gold interior, 2090 miles, cost \$4064 new, make offer. McCormick, AL 6-3645.
- '61 CHEVROLET 1/2-ton pickup, Fleet Side, 4-speed, HD equipment including positive traction and radio, 24,000 actual miles. Reese, 255-4288.
- BEDROOM SET, Birdseye maple, includes vanity dresser, mirror, bench, nite chest, 4-drawer chest, double bed, mattress, box springs, \$70 or best offer. Barham, 298-2553.
- '61 CORVAIR MCNZA, R&H. 4 new tires, 4-speed stick shift. \$1200. Hiltunen, 6500 Cochiti Rd. SE.
- STOVING 36" range hood, \$25, copper-tone finish w/filter, light, vent and fan, new, never used. Moody, 282-3466.
- '58 FORD WAGON, white, 4-dr., automatic transmission, Thunderbird engine, \$400. Graving, 2044 Moon NE, AX 9-0117.

- 3-BDR. HOME, sell, rent, or lease: built-in oven, hw/floors, walled yard, landscaped on cul-de-sac near school, shopping, bases. Patterson, 299-6590.
- HEAT-KITS AM-FM TUNERS, \$10 ea.: 2" w/amplifier, \$15; H-Kardon stereo converter AMP-pre amp, \$20; or all for \$70. Earl, 298-3954.
- PUREBRED GERMAN shepherd pups. Passmore, CH 2-5178 evenings.
- 5-BDR., DR. den, 1 1/4 bath, 2 fireplaces, garage, Fratema school area, \$16,500. Thompson, AL 5-5282.
- .264 WINCHESTER Mag. model 70, 2 1/2 x 7x scope, Buehler mount, 142 case, complete set of dies, \$150. Miller, 298-2850 after 6 p.m.
- '59 RAMBLER American 2-dr., auto. trans. Continental kit, \$525. Fortenbury, 299-8134 after 6 p.m.
- ROBERSON 4-br., LR, den, library, separate dining rm, kitchen built-ins, 2 1/2 baths, 2200 sq. ft. area, Paradise Hills. Kintzinger, 898-2934.
- BOOKCASE STYLE grey walnut wood double bed. Nix, 298-6068.

- RELOADING PRESS, H-type w/two priming punches and mounting bases, \$15. Westfahl, 298-4716.
- DINING ROOM SUITE, blond oak, Duncan Phyfe drop-leaf table, buffet w/hutch, 6 chairs, \$135. McDonald, AX 8-2909.
- '59 FORD Custom 300, 4-dr., AT, V-8. Kociscin, 298-5618.
- '60 RAMBLER Custom station wagon, 4-dr., 6-cyl., R&H, a/c, stick shift, \$1000. Bush, 268-8120.
- GARRARD RC-80 record changer, no cartridge, w/base, \$25; Keystone K-28 movie camera f1.8 lens, fixed focus, \$20. Erickson, 255-1182.
- 3-BDR, den, all elec. kitchen, carpeting, drapes, patio, landscaped, in Ashcraft addition. Rolloson, 7505 Summer Ave., 256-1259.
- TOBOGGAN, 6' Lund; car bed, converts to car seat. Brooks, 299-1884.
- POODLE, black, miniature, male, 7 weeks, purebred, no papers, \$40. Eversgerd, 256-6345.
- CHAIR, swivel rocker, \$15; drum table, lined oak, \$25; suction luggage rack, \$10; large wooden outdoor sign, \$10. Avallone, AX 6-0403.
- 19" TV, radio, record player, mahogany console, new picture tube, \$100. Merrill, 299-0348.
- MARBERRY HOME, 3-bdr, den, 3/4 ceramic tile baths, large kitchen, 1 yr. fireplace, 8' gate in back yard, extras. Stuart, 299-9190.
- AKC registered Boston Terrier puppies, 7 weeks old, black and white. White, CH 2-3519.
- WING BACK SOFA BED, brown tweed, \$70. Lambert, 344-9012.
- BOLEX H8 movie camera, complete w/turret and 3 lenses. Wangerin, 298-6351.
- 65.000 BTU Day & Nite forced air panel ray heater w/vent and thermostat, \$80. Hurt, AX 9-7263.
- '53 STUDEBAKER, 2-dr, V-8, auto. trans., \$325. Chandler, 298-5069.
- '62 PHILCO 30" electric pushbutton range, \$125. Smith, 256-0375.
- 8-PC WALNUT DINING ROOM SUITE, 40" china cabinet, drop-leaf table, 3 extension leaves, 1 arm chair, 5 side chairs, upholstered seats and backs. Brooks, 298-5133.
- PATIO FURNITURE, wrought iron glass top table, 4 chairs, new \$110, sell for \$40; used Thermador 4-burner table top stove, \$25. Muzzey, 268-0914.
- LIVING ROOM SUITE, 1 large sofa, 1 matching chair w/ottoman, 1 contrasting chair, 1 coffee table, \$50. Carlton, 299-6041.
- 12 GA. PUMP SHOTGUN; 22 ball-action rifle; fibreglas bow; slide projector; cornet; trumpet, sell or trade. Schowers, 255-9279.
- KELVINATOR Foodora refrigerator freezer, Zeiss Contax IIA sonnar f1.2 lens speeds to 1/1250 second. Libby, 299-5948.
- DELUX MODEL HOTPOINT electric range, 2 ovens, deep well cooker, calrod unit for deep frying, 10 yrs. old, \$75. Ream, 299-2076.

WANTED

- TRADE single shot .22 rifle for .22 automatic pistol, pay difference, Chavez, AL 5-5461.
- TRAILER for boat, 16', 1000 lb. capacity minimum. Geibel, 299-0275 after 6 p.m.

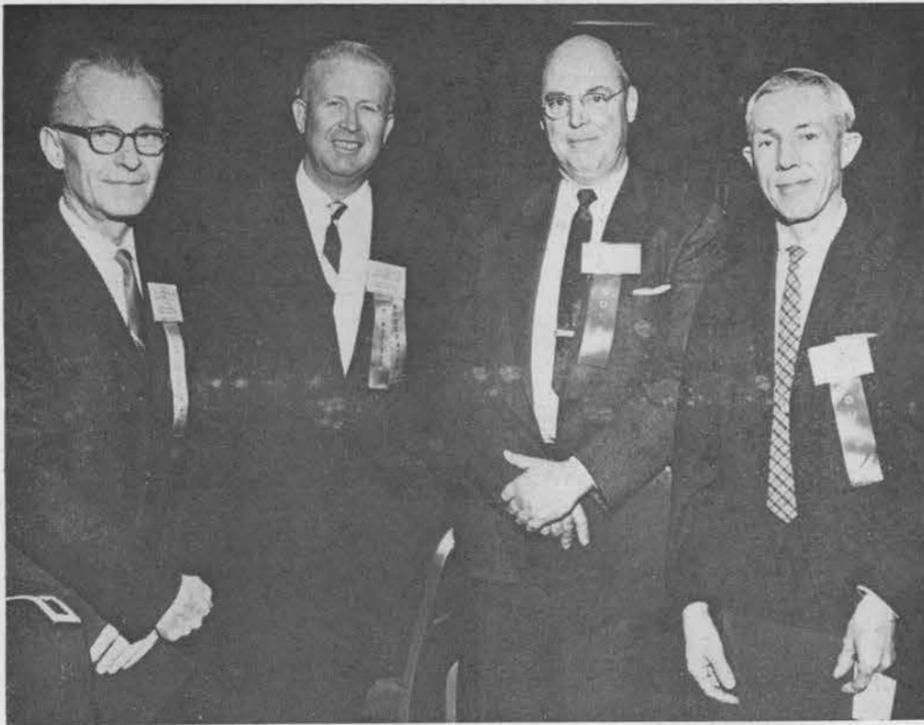
- RESPONSIBLE PARTY to drive late model car from the vicinity of Atlanta, Georgia to Albuquerque sometime after Feb. 1. Everett, 298-3994.
- RIDE from 313 Mesilla NE to bldg. 887 or vicinity. Keller, AL 5-9805 evenings.
- ELECTRIC RANGE and .38 snubnose; '50 Stude. conv. or '44 mag. single action. Pritchard, 268-9618.
- SOMEONE to care for 2 children in our home, 5 half-days per week, no housework involved. Walker, 298-2157.
- PERMANENT RIDE from 2615 Sierra NE (one house off Menaul) to bldg. 880. Hodges, 256-6875.
- WATER SKIS for child, and ski rope. Windham, 256-9455.
- 13' CAMP TRAILER, 1960 or later model, will pay cash. Coffman, 299-1767 after 5 p.m.
- TO JOIN OR FORM CAR POOL from vicinity of Eubank and Indian School Rd. to gate 9 parking lot. Nevin, 298-0383.
- OAK SWIVEL CHAIR. Stephenson, AX 9-3914.
- LADDER, extendable, 14-20 ft., mortar boat, small. Collins, 268-3612.
- TO JOIN OR START CAR POOL from vicinity Adobe Acres SW to vicinity bldg. 805-06. Looby, 877-2742.
- A FOUR OR FIVE HP gasoline engine. Henneke, 298-4232.

FOR RENT

- APARTMENTS: new, 301-305 Tennessee SE near base, 1 and 2 bdr., furnished or unfurnished, w/w carpets, private patio, built-ins. Miller, DI 4-8253 after 5:30 p.m.
- QUIET, comfortable sleeping room for one or two men, bath w/shower, near Sandia Base. Roberts, 299-7407 after 4 p.m.
- AVAILABLE FEB. 1, nicely furnished 1-bdr. apt., electric kitchen, carpeted, private patio, adults only, \$85. Sutherland, 200C Grove NE, 268-1318.
- FURNISHED 1-bdr. apt., all electric kitchen, forced air heat, a/c, immediate occupancy. Scott, 310 La Veta NE.
- RENT OR LEASE, unfurnished 3-bdr. house, 1 1/4 bath, built-in range, oven, garbage disposal, carpeted LR w/fireplace, NE Heights. Available middle Feb. Peterson, 299-4714.
- 1-BDR. HOUSE, furnished, newly redecorated, \$90, utilities paid. Hackard, 298-4613 after 5 p.m.

LOST AND FOUND

- LOST—Black and silver oriental design tie clasp, N. Mex. license plate 2-82754, black lined leather billfold, Oldsmobile car keys in red buckskin case, right hand fur lined leather glove, left hand unlined leather glove, silver roadrunner pin w/turquoise inset; pocket knife w/yellow handle, income tax worksheets, black Papermate pen, bolo type 10 yr. tie pin, lady's pearl ring. LOST AND FOUND, ext. 264-2757.
- FOUND—Jade earring, Chev. ignition key, Parker fineline fountain pen, car key on wire circle, ladies red wool gloves w/leather palms, car keys in leather case, lady's black scarf, men's black fur lined leather gloves, Parker ball-point pen, Zippo "Tapco Group" cigarette lighter. LOST AND FOUND, ext. 264-2757.



RELIABILITY AWARD WINNERS — L. J. Paddison (2400), second from left, chairman of the IEEE Professional-Technical Group for Reliability, presented the 1963 Annual Award for Achievement in Reliability to three Bell Telephone Laboratories representatives, responsible for underseas telephone cable reliability. From left are E. A. Veazie, Mr. Paddison, E. T. Mottram, and M. C. Wooley. Award was at Symposium on Reliability and Quality Control.

Great Decisions Meetings To Be Held in Albuquerque During February, March

Great Decisions groups are now organizing throughout Albuquerque for the annual discussion of U. S. foreign policy. Meetings will be held during February and March.

The Sandia Laboratory Technical Library in Bldg. 804 is again making available Great Decisions Fact Kits at \$1.50 per set.

R. C. Colgan (3465) will moderate a Great Decisions panel discussion series on KNME-TV beginning at 7:30 p.m., Feb. 6. The panel show will be televised by Channel 5 at this time on Thursdays for eight weeks and repeated by KNME-TV at 2 p.m. on Fridays, by KGGM-TV at 3 p.m. on Saturdays, and 12:30 p.m., Sundays by KOB-TV.

Max K. Linn, Director of Technical Information and Publications 3400, will be a member of the first TV panel show discussing "World Communism." Mr. Linn, a past chairman of the Albuquerque Great Decisions Committee, serves as a committee member.

Welcome Newcomers

Dec. 16-Jan. 24

| | |
|----------------------------------|------|
| Albuquerque | |
| *Marguerite H. Ames | 3421 |
| *Aurora B. Baca | 3126 |
| Hermenes J. Baca | 4574 |
| Susan F. Burgess | 3126 |
| Hildegard Connerly | 4361 |
| Rosalie Cook | 4371 |
| Tom O. Cordova | 3413 |
| *Mary Lee Cunningham | 4211 |
| Bonnie Lou Dana | 3126 |
| Marveta R. Davis | 4623 |
| James L. Durand | 3413 |
| Zora A. Freman | 2624 |
| Frank Fuentes | 4574 |
| Mildred E. Garber | 3411 |
| Traber Gatewood | 4574 |
| Keith E. Gawith | 4574 |
| Margaret B. Harfield | 4212 |
| Carl J. Hullinger | 4574 |
| J. Marlene Hurst | 4135 |
| *Charlene M. Malvern | 3126 |
| F. Edward Martinez | 3413 |
| Patricia A. Meyer | 4361 |
| Thomas C. Morgan | 3122 |
| Phyllis L. Nagel | 3126 |
| Lloyd S. Nelson | 5414 |
| Lorraine V. Newman | 3126 |
| *James T. Quint | 7213 |
| L. Arlene Roberson | 3126 |
| James P. Romero | 3413 |
| Ruth P. Saffle | 4135 |
| Walter A. Schoen | 3330 |
| Robert V. Scipes | 4123 |
| Barbara C. Southard | 4314 |
| Juavana Thomas | 3126 |
| *Consuelo P. Trujillo | 4432 |
| John J. Wackly, Jr. | 2341 |
| Helen T. Watkins | 4330 |
| Elsie D. Wilkins | 4372 |
| Margaret M. Woodward | 3126 |
| Connecticut | |
| George R. Wenz, Middletown | 3311 |
| Delaware | |
| R. Glen Kepler, Claymont | 5323 |
| District of Columbia | |
| James M. Eller, Washington | 7245 |
| Georgia | |
| Henry K. Street, Marietta | 4211 |
| Iowa | |
| Robert C. Prew, Cherokee | 2342 |
| Missouri | |
| Constantine Jenkins, Kansas City | 5312 |
| New York | |
| Robert T. Griffin, Latham | 5135 |
| Ohio | |
| Donald L. Bonk, Kenton | 5135 |
| Wilson E. Lehman, Mt. Sterling | 1411 |
| Everett L. Shaffstall, Marion | 1414 |
| Joseph V. Williams, Kettering | 5136 |
| Pennsylvania | |
| *Joseph B. Rivard, Mount Lebanon | 5332 |
| Thomas A. Tassia, York | 5413 |
| Washington | |
| Curtis L. Greer, Seattle | 5321 |

Sandia Authors

Current or forthcoming articles by Sandia authors in technical journals include the following:

D. F. Palmer (7331), "Accelerometer Shock Calibration," October 1963, *The Journal of Environmental Sciences*.

P. E. Waltman (5421), "An Extension of a Theorem of A. Winter," December 1963, *Proceedings of the American Mathematical Society*.

R. F. Dasher (5411), "Some Extensions of the Born Approximation for Phase Shifts," November 1963, *Il Nuovo Cimento*.

L. H. Koopmans (5425), J. R. Blum of the University of New Mexico (Sandia consultant), and D. L. Hanson of the University of Missouri (former Sandian), "On the Strong Law of Large Numbers for a Class of Stochastic Processes," October 1963, *Zeitschrift für Wahrscheinlichkeitstheorie und Verwandte Gebiete*.

R. A. Lefever (5135), "Luminescent Behavior of the Rare Earths in Yttrium Oxide and Related Hosts," January issue, *Journal of the Electrochemical Society*. Co-author is K. A. Wickersheim of the Departments of Materials Science and Electrical Engineering, Stanford University.

G. J. Simmons (9101), "Application of an Associatively Addressed Distributed Memory," Ninth Proceedings of the 1964 Spring Joint Computer Conference, American Federation of Information Processings Societies.

E. L. Hansen (7253), "A Self-Supporting High-Temperature Heater," Feb. 4 issue, *Review of Scientific Instruments*.

R. O. Brooks (7325), "The Use of Graphical Techniques to Analyze Shock Motion of Lightly Damped Linear Spring Mass Systems," 33rd Shock and Vibration and Associated Environmental Bulletin.

Students from Eight Communities to Visit Sandia on Edison Day

About 150 outstanding students from secondary schools in New Mexico will take part in the eighth annual "Edison Day" tour of Sandia Laboratory facilities on Tuesday, Feb. 11.

The "Science Youth Day" marks the observance of Thomas A. Edison's birthday.

The touring group will consist of students from Albuquerque, Jemez Springs, Cuba, Moriarty, Estancia, Mountainair, Los Lunas, and Belen. They will first be taken to Bldg. 815 where D. E. Irvin (3143) will welcome them and introduce R. S. Claassen, Director of Physical Research, 5100, who will speak on "The Research Problems Today's High School Student Will Be Asked to Solve."

Afterwards, the group will visit the centrifuge, drop towers, and sled track in Technical Area III, tour the Sphere of Science and Whitfield Clean Chamber, and view "The Sandia Story." Tour coordinator will be George C. Wayland (3143).

1963 IEEE Reliability Award Is Presented to Bell Laboratories

The 1963 Annual Award for Achievement in Reliability went to three representatives of the Bell Telephone Laboratories, responsible for significant contributions to the reliability of the underseas telephone cable system.

The award was presented by L. J. Paddison (2400), Chairman of the IEEE Professional-Technical Group for Reliability, during the recent Tenth National Symposium on Reliability and Quality Control.

The award was shared by E. T. Mottram, project director, for his contributions in engineering management; M. C. Wooley, for his contributions toward the development of reliable capacitors and resistors; and by E. A. Veazie, for his contributions to the engineering of the repeater amplifier tubes.

A remarkable record of reliability has been accumulated by the deep sea cables to date. As of Jan. 1, 1964, more than 25,000 miles of repeatered submarine cable were in service. The cables have had no electronic failures since being placed in service. More than 800 underwater repeaters have been in service for up to 13 years; more than 3000 electron tubes have accumulated 83 million tube-hours; and 84,400 components in undersea service have accumulated 1.766 billion component hours, all without a single failure.

In accepting the awards, Mr. Mottram, speaking for the group, said that credit for the success of the project must be shared by a very large number of people in the Bell System — each having an influence that maintained the strength in each link of the chain.

Educators From Throughout World Seek Sandia Technical Information

Technical Information Section 3411-1 might be considered a stamp collector's paradise due to extensive incoming mail from foreign countries.

During 1963, the section received 3456 requests for technical information from U.S. and foreign sources. The list of foreign countries increased during the past few months with letters from Algeria, Formosa, Jordan, Northern Ireland, Rhodesia, Sierra Leon, and Uruguay.

Each letter receives an answer and all reasonable requests are filled when copies of appropriate reports are available. If it is not practicable to fill requests directly, commercial firms are referred to the office of Technical Services, Department of Commerce, Washington, D.C., where reproductions may be purchased, and Department of Defense agencies and other government agencies are directed to the Division of Technical Information Extension at Oak Ridge, where free copies are available for official use. Many requests are filled from Sandia Corporation's reprint and monograph series.

"Our greatest number of foreign requests are from England, France, and Belgium," said Louise D. Patterson, supervisor of the section. "Requestors include professors at the Sorbonne, scientists at Cambridge University's Cavendish Laboratory, and several theoretical physicists at Oxford University."

Last fall the title list of Sandia's reprint series was sent to 257 professors, heads of departments, and others at schools that Sandia recruiters visit. Replies were received from 140 persons, and more than 3000 SCRs were requested. A representative of the University of Kentucky asked that the title list be sent to the Kentucky Contract Team in Bandung, Indonesia (sponsored by the Agency of International Development). The team requested 71 reprints.

Drawings of Sandia-developed designs, first made available in 1958 under an AEC sponsored program, are also extremely popular. There are now about 50 titles in this series.

731 Papers Sent To AEC Information Branch at Oak Ridge

During the fourth quarter of 1963, 183 technical papers by Sandia Corporation employees were sent to the AEC's Division of Technical Information Extension at Oak Ridge, Tenn., for the Civilian Application Program.

The total for the year was 731. In addition, three sets of engineering drawings were released for civilian application.

During the same three months, six technical papers were given standard distribution, making them available to the public through the AEC's Depository Libraries and the Office of Technical Services, Department of Commerce, Washington, D.C. Thirty-six titles were added to Sandia's Reprint and Monograph Series.

The details of such activities are handled by Technical Information Section 3411-1.

Safety Record Topples After Reaching 41 Days With No Lost Time

Sandia Laboratory's safety record tumbled last week when an employee suffered a lost-time accident in Area III. On Monday, Jan. 20, a utility operator was helping unload a flatbed truck. As he picked up what he thought was a single piece of metal hardware, the top part fell off. The aluminum fixture weighed about 25 lbs. and struck his left shin and foot. He suffered abrasion and contusion of the left shin and received severe contusions on his left toes.

He was taken immediately to the Medical Station in Area III and then to Industrial Medicine Department 3320 for treatment. The employee has since recovered and returned to work.

At the time of the accident, Sandia employees had worked 41 days or 1,435,000 employee-hours, without a disabling injury.

PAGE EIGHT

LAB NEWS

JANUARY 31, 1964

Sandia's Safety Record

Sandia Laboratory
HAS WORKED
280,000 MAN HOURS
OR 8 DAYS
WITHOUT A
DISABLING INJURY

Livermore Laboratory
HAS WORKED
87,800 MAN HOURS
OR 7 DAYS
WITHOUT A
DISABLING INJURY