

To: Sandia Corporation
Attn: S. P. Schwartz

On behalf of the Commissioners and the General Manager, I wish to commend you and your staff for outstanding performance in accomplishing Operations Dominic, Nougat, and Storax I and II. We congratulate you on a job well done. The knowledge gained is of extreme importance to national defense.

Glenn T. Seaborg, Chairman
Atomic Energy Commission

Sandia Men Elected Officers of Systems and Procedures Association

The charter for the Albuquerque Area Chapter of the Systems and Procedures Association has been received and several Sandians have been elected to offices in the new professional group.

The officers are: Perry V. Davis (4111-1), president; Edward E. Brass (3451-1), vice president; George E. Wallace (4111-3), secretary-treasurer; and James W. Hook (4110), international director. Committee chairmen are: Terry L. Beckley (4111-2), membership; Dan Clement (4111-1), program; John P. Logan (3451-1), education planning; and Sherrill O. Woodall (3442), publications.

Objectives of the organization are to promote and foster im-

provement of systems and procedures through study, education, research, and the exchange of ideas, and to promote a broader understanding of the value of systems and procedures as a component of effective management.

An early project of the local chapter will be working toward setting up a graduate program in the systems and procedures field.

Anyone engaged in systems and procedures work is eligible for membership.

The next meeting will be held Monday, Jan. 14, at 7:30 p.m. at Albuquerque Federal Savings and Loan Assn., 8321 Menaul NE. Prospective members are invited to attend.

More Christmas Help Projects Reported as Season Comes to End

Sandia Laboratory employees continued their tradition of good works through this year's Christmas season with a number of voluntary support and charity projects.

Tonopah Test Range personnel provided money to be used in assuring a Merry Christmas for a needy family in Tonopah.

As in previous years, employees of System Test Equipment Development Department 2440 delivered a gift of food, clothing and money to the All Faiths Receiving home, located south of Albuquerque.

This year, after talking with the Albuquerque Welfare Department, members of Physical Research Department 5130 elected to help an Albuquerque family of parents and eight children. The father, a former prisoner of war, works in spite of a handicap. Recently, one of the children contracted leukemia. In previous years, Department 5130 contributed to local charitable organizations.

As in the past, personnel of Nuclear Burst Physics Depart-

ment 5310 collected funds to be presented to a local welfare organization. This year's contribution went to the All Faiths Receiving Home.

Members of Mechanical Department 4250 provided help for several local families. Contributions included candy and toys for 53 children, 350 cans of food, and, from a cash contribution, staples and Christmas hams for each family. Remaining cash went to the All Faiths Home. Department 4250 also provided two boxes of clothing for distribution by the governor of Isleta Pueblo.

Sandia Corp. Payroll Reaches \$70.2 Million

Sandia Corporation's payroll for 1962 amounted to approximately \$70.2 million. This figure includes the \$8.8 million payroll at Sandia's Livermore Laboratory in California.

During 1962, the number of persons on roll at Sandia averaged 7,930, including 1,000 at Livermore Laboratory.

Assets of Sandia Corporation as of November 30, 1962, totaled \$127.4 million. At the same date in 1961, total plant assets amounted to \$107.8. These figures represent undepreciated values of buildings and facilities at Sandia Laboratory, the Sandia Livermore Laboratory, and Tonopah Test Range in Nevada.

Network Analysis

Finding A 'Critical Path' Will Become Familiar Undertaking for Sandians

It's unlikely that you'll ever take a walk along a critical path, but you may be called upon to find one. In fact, you may be one of about 3000 Sandians who will be given an opportunity, through network analysis courses, to learn how to find such a path.

Once you learn how to handle network analysis, you could use it to help build or remodel a house, aid in operating a project, or help run a business.

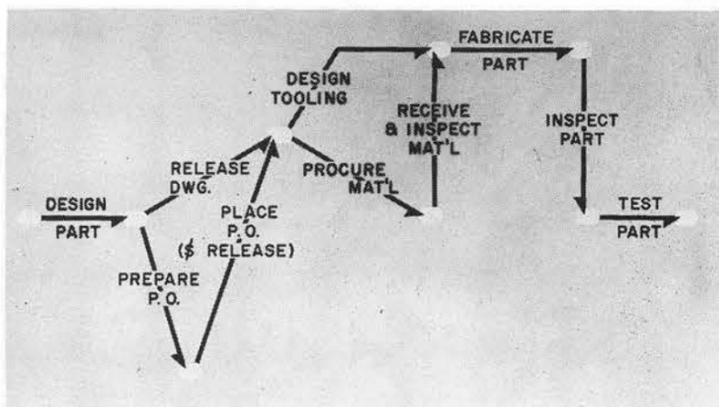
You can use it as a tool to forecast expenditures, foresee trouble spots, and tell when jobs must be started and finished in order to meet a desired completion date.

The beauty of the method is that all this information is spread out in front of you where you can look at the entire project, from beginning to end—before you even pick up a phone for the first order.

There's nothing magical about this. Network analysis isn't a cure-all. But it's a fine, useful device. Sandia used it for logistics planning and control during Dominic, for example. The planners were able to determine ahead of time, and on a continuous basis, the complex air cargo requirements for the tests.

The critical path is simply a series of lines on paper representing the shortest time in which the project can be completed. Paralleling and intersecting the critical path are other lines representing all the jobs necessary for completion of the project. The resulting diagram is the network.

Once the network is built up to show all the activities that must take place before the project is complete, it is possible by analysis to determine who must do what, and when, in order to finish the project in the shortest possible time.



STEPS NECESSARY for completion of a typical project are shown in this simplified version of a network. Before tooling can be designed, drawings must be released and purchase orders placed. Only after tools are designed can the part be fabricated. But while tools are being designed, material for various parts can be procured, received, and inspected.

New to Industry

The use of network analysis as a management control technique is quite new in industry, although its principle—the use of a model to represent something large and complex—has been used in other areas, such as physics, electronics, and mathematics, for some time.

The usefulness of the technique in programming and scheduling can hardly be overemphasized, and it is in this area that Sandia is using network analysis. J. R. Meikle, supervisor of Program Administration Division 2632, states: "Sandia is firmly committed to the network analysis technique. We look upon it as one of the most significant advances in planning and scheduling techniques evolved in the last decade."

The application of network analysis to the problems of programming and scheduling is based on the thesis that only a small percentage of activities control any given schedule for

any project, and that judicious, timely action upon these critical activities results in better use of time, resources, and money.

Network analysis was first used in industry in 1958, although it had been used in the Navy's POLARIS program a year earlier. Since that time the method has come into use in all military services, and in increasingly large areas of industry.

One of the chief advantages of network analysis over earlier methods of program control is that it is the first method which permits an instantaneous view of all the activities making up a project, and which shows their inter-relationship. This makes the network analysis technique especially valuable for the intricate and geographically widespread activities of a research and development program. That's where Sandia Corporation comes in.

First Studies

The first studies of the subject at Sandia were conducted at the request of Systems Programming and Administration Department 2630 (now under R. W. DeVore). As a result of the study,

(Continued on Page Three)

UNM, St. Joseph's Class Schedules Now in Libraries

Class schedules for the University of New Mexico Spring semester (II) are now in all technical libraries, and are available for reference in Bldg. 300, west end.

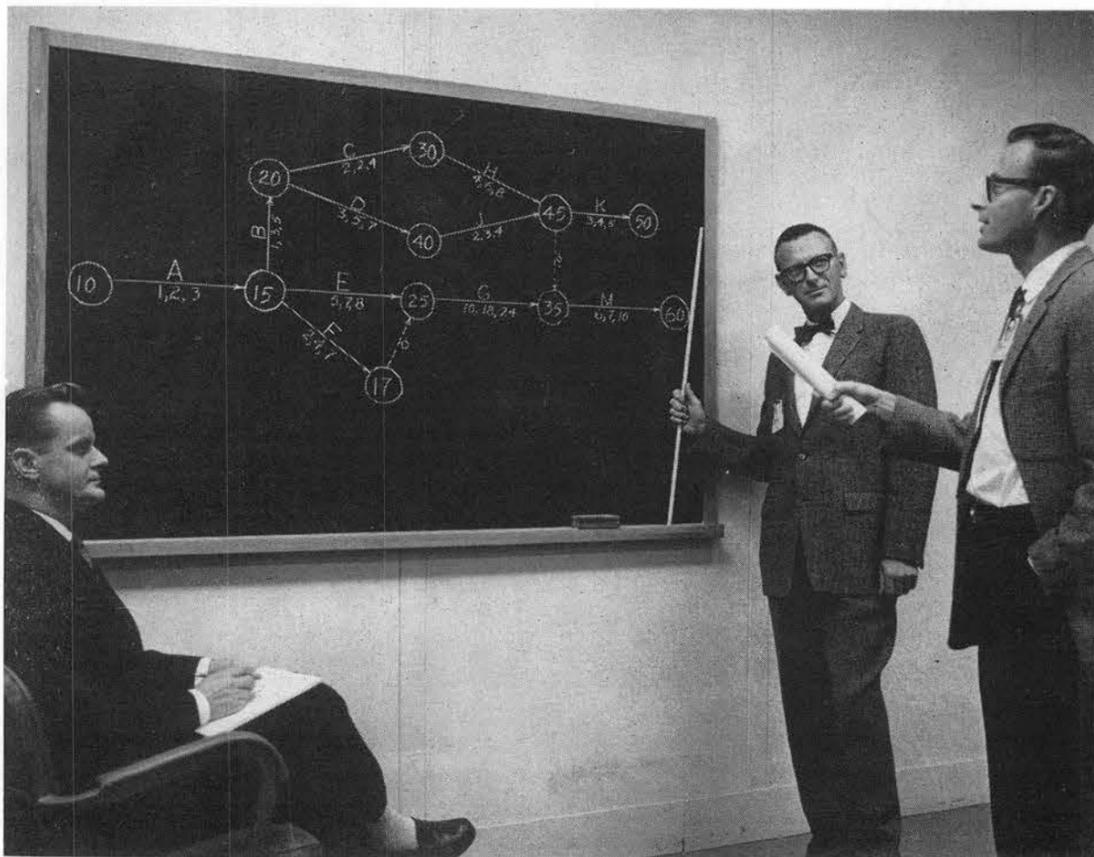
Class schedules for College of St. Joseph will be available about the middle of January.

Application forms for the Educational Aids Program must be received by Section 3131-2 before Feb. 3, 1963, for work at UNM, and before Jan. 18 for courses offered at the College of St. Joseph. Registration dates are: College of St. Joseph, Jan. 25; UNM, Feb. 11 and 12.

Other information notices from University Education and Liaison Section 3131-2:

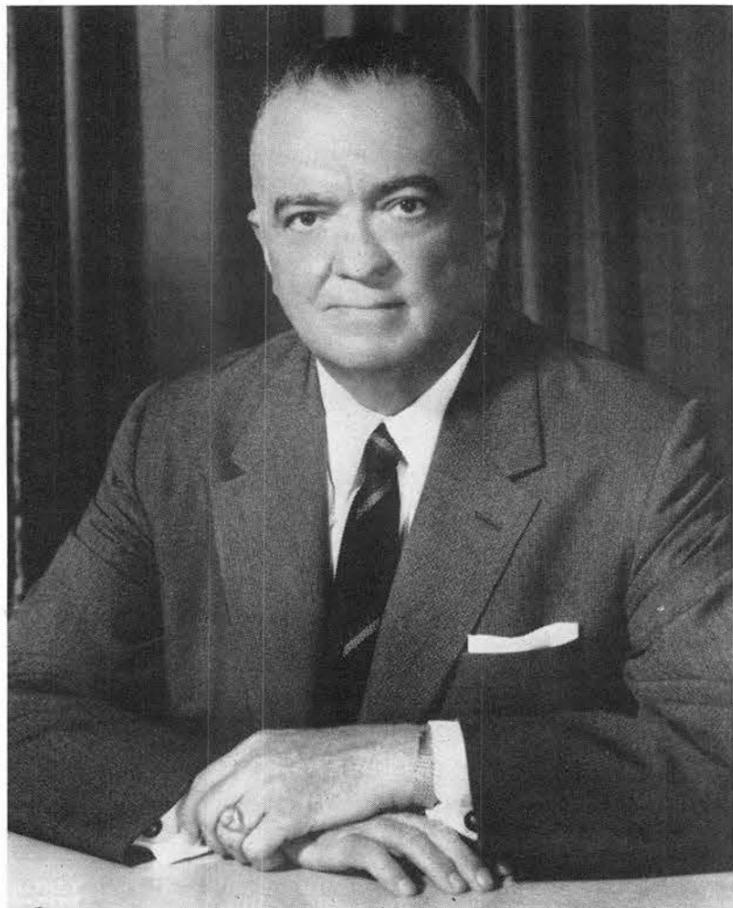
Deadline for new applications for degree status at College of St. Joseph is Jan. 23.

Physics 60 will be offered spring semester at UNM from 6:30-7:45 p.m., with Physics 61 scheduled as an evening course fall semester 1963.



NETWORK ANALYSIS diagram on blackboard is discussed by, from left, Craig Summers, Jim Meikle, and Art Ahr of Program Administration Division 2632. Circles containing numbers represent events in a develop-

ment program, lines with arrows indicate work flow and relationships, and the three numbers between circles represent minimum, most likely, and maximum times for completion of activities between events.



Espionage and Our Nation's Security

By J. Edgar Hoover

—Director of the Federal Bureau of Investigation—

Washington 25, D. C.
December 11, 1962

TO THE EMPLOYEES OF SANDIA CORPORATION:

To many people the word "espionage" means intrigue and high adventure in faraway places. The thought of real-life spies pursuing their mission of cunning within our very midst seems almost incredible.

Yet, it is an inescapable fact that espionage today poses a very real and present danger to our Nation's security. The Soviets and their satellites consider spying operations a most effective weapon in penetrating our society. According to a Soviet defector, some 70 to 80 per cent of Russian officials stationed in the United States have some type of intelligence assignment.

Make no mistake! These agents are not novices in the art of espionage — they are highly trained and experienced masters of cunning and deceit. Their activities are largely directed toward obtaining information vital to our industrial and military strength. Data on missiles, aircraft, electronic devices and technological procedures rank high on the list of Soviet and satellite objectives.

How do they go about attempting to obtain such data? First of all, the espionage agent seeks out ways in which he can make contacts among industrial representatives. Social functions, industrial conventions, cocktail lounges, hobby clubs — all provide excellent opportunities to meet persons who might have access to wanted data.

The spy, of course, is most subtle in his approach. He may casually question a potential contact about his hobbies — perhaps both of them share an interest in art or photography or fishing. Then comes the seemingly nonchalant inquiry about his work. If the Soviet feels by now that he has a possible source of information, he will make an effort to arrange further meetings. In attempting to secure the contact's cooperation the espionage agent may offer money, extravagant gifts or even toys for the children. Oftentimes he will conceal his official status — in one instance a Russian diplomat told an aircraft employee he needed data for a friend who was preparing a research paper.

Another way in which the spy hopes to obtain information is through carelessness of industrial employees in discussing confidential aspects of their work. Incautious remarks about a research program or loose talk regarding a new technique or product may provide an eager espionage agent with vital information.

Every employee of industry should be constantly alert to the possibility of espionage activities. You should take utmost care in handling data and materials vital to our national security. Confidential aspects of your job should never be discussed except in the line of duty.

If you should receive any indication of espionage or other subversive activities, make sure that the matter is promptly reported to the FBI. Under law we are charged with investigating threats to the internal security of the United States. Private investigation should never be conducted — such matters require handling by professionally trained investigators.

As employees of an essential industry you share a deep responsibility in building the industrial and military strength of our Nation. Through your alertness and cooperation you can contribute much toward protecting our society from those who seek to destroy us.

Supervisory Appointments

THOMAS H. MARTIN to supervisor of Advanced Development Section I, 1322-1, Electromechanical Development Department I.



Tom has worked in electromechanical development since he was hired in September 1956, however, since that time he also served two and a half years in the Air Force. He was stationed mainly at Eglin AFB, Fla.

Prior to coming to Sandia, Tom was at Purdue University where he received his BS degree in electrical engineering in 1956 and his Master's in 1958.

He is a member of Eta Kappa Nu and Tau Beta Pi, honorary societies.

WILBERT A. JONES to supervisor of Design Definition Section A III, 4411-3.



"Wil" has only been at Sandia Laboratory for 18 months; however, he has worked in the field of architectural engineering drafting since 1933.

He was with Carbide and Carbon Chemical Company in South Charleston, W. Va., for 13 years, and was chief draftsman for the Rural Electrification Administration in Tucson, Ariz., for five years. In 1952 Wil joined Hughes Aircraft and was senior mechanical engineering designer for test equipment in Tucson, and later Fullerton, Calif., and then transferred to Culver City, Calif., as assistant chief checker of the Infra-Red Labs.

Wil studied architectural engineering at Kanawhia College (W. Va.) and drafting at Chicago Technical College.



Norma Chadwick (5414)

Take a Memo, Please

Alertness in seemingly harmless operations is a necessity when it comes to preventing accidents. In any circumstance, it's better to think about safety and prevent accidents.



CHRISTMAS BASKETS for Sandia Laboratory employees who were ill during the holidays are displayed by Roseanne Bascom of Benefits and Services Division 3122. Fifty-four baskets were distributed.

Service Awards

15 Year Pins



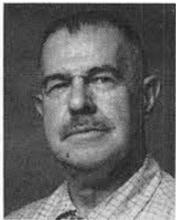
Charles E. Garcia
4573
Jan. 5, 1948



Hugh L. O'Dell
8122
Jan. 5, 1948



George M. Austin
4513
Jan. 12, 1948



David B. Miller
4622
Jan. 14, 1948



Robert L. Thomas
2544
Jan. 14, 1948



John A. Christopher
4622
Jan. 16, 1948



Elmo J. Whitmore
4575
Dec. 30, 1947

10 Year Pins
Jan. 5-18

Robert M. Betz 6010, John A. Garcia 4224, James M. Kelly 2632, Harry C. Olson, Jr. 2531, William R. Atkins 2541, Bernadeen S. Cervantes 3423.

Wilber D. Connelley 2544, Bernice T. Umland 3423, T. E. Neubauer 4251, John C. Weydert 7133, Walter H. Barbier 2542, Lewis M. Larsen 2344, Dorris M. Hankins 5412, W. B. Pepper, Jr. 7134, and Mary E. Flanagan 7242.

Bill Pumphrey Becomes Turtle Club Member Following Head Thump

Membership in the exclusive Turtle Club has come to H. W. "Bill" Pumphrey (7133). He qualified a year ago when a 25-lb. trolley mechanism slipped off a rocket launcher and landed on the hard hat he was wearing. The accident occurred at Tonopah Test Range. The hat probably saved his life. That's the qualification for Turtle Club membership. As a member, Bill will "conscientiously endeavor to encourage others to wear safety head protection."

Bill was presented with a new hard hat, a Turtle Club membership certificate, and a lapel pin by E. F. Armbrust of Safety Engineering Division 3211.

Teletyped 'Works of Art' Received by Sandia Forecast Service

Sandia Lab's Forecast Service (7243-1) customarily receives elaborate Christmas greetings on its Teletype machines when there is open time, but this year's efforts outdid all previous years.

The biggest attraction—all 18 inches of it—was a kangaroo transmitted from Woomera, South Australia, the same place that shot off flares during the orbital flight of our last astronaut.

Another elaborate "X-ed" work of art was the tower of London, complete with clockface, which originated in London, of course!

Elected Lodge Officer

Thomas N. Earp (7246) was elected Worshipful Master of Tonopah Lodge No. 28, A.F. and A.M. as the annual election of officers was held Dec. 14 at the Masonic Temple.

He succeeds Arthur H. Sorenson of Tonopah to the post.

Sympathy

To C. C. Hunt (4333) for the death of his father in Littleton, Colo., Dec. 16.

To Richard T. Meyer (5153) for the death of his wife, Shirley, on Dec. 22.



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Many Become Familiar with 'Critical Path'

the company decided to try a modification of the system used by the Navy on the POLARIS program. Sandia's first practical application was made by Livermore Laboratory in support of Operation Dominic. Under the direction of J. F. Jones and R. H. Johnson (both 8161), about 20 separate networks were developed, most of them dealing with the design, procurement, assembly, testing, shipment, and use of equipment needed for the test program.

Mr. Jones attested to the success of the trial in these words:

"Network analysis resulted in finer detailed planning and a more logical order of activities than has been produced by previous approaches. It helped the project engineer make early decisions and provided a means of scheduling logistic flow. For example, network analysis enabled the Dominic planners to determine exact air cargo requirements for any given time during the tests."

Building a network is a relatively simple procedure.

Each activity or job in a project is represented by a line with an arrowhead pointing in the direction of work flow (usually to the right). The arrows are arranged in parallel if possible, in series if necessary, so that in the resulting network diagram, all activities are interconnected, just as they are in the actual project. The interconnecting points are called "events."

Estimates are made on the number of days or weeks that each job will take, and that number

is assigned to the proper arrow. Computations are then made which show the earliest and latest times each job can be started and finished, commensurate with a desired project completion time.

Calendar dates are now substituted for the various starts and finishes throughout the network, with project completion naturally pegged on a directive schedule date.

In most activities, there is a certain amount of "slack," or "float," time. In other words, the job can be started or finished a little later than shown on the network, without affecting project completion time.

But in every network there is one or more series of activities in which there is no float. This series is the critical path. All the activities in this path must be started and finished on schedule, or the project completion date will be delayed.

Critical Path

The critical path is necessarily the longest time path through the network, because basically it governs project completion time. Paradoxically, it also represents the shortest time in which the project can be completed, because the true critical path can only be found when all possible measures have been taken to assure that the project will be finished as quickly as possible.

A. J. Ahr (2632-1), who prepared one of the Sandia Network Analysis manuals, describes a network this way: "It closely resembles the wiring diagram for a radio receiver, which shows how

the signal is picked up by the antenna, traverses through the various sections of the receiver, and is finally emitted from the speaker. The course followed by the signal is comparable to the critical path."

A network may be drawn in any level of detail needed to permit management control over a program.

The network is kept current in a central location through reports received from all departments or agencies that will have a part in the project. On some programs, for example, Sandia maintains the summary network for several agencies of the AEC complex. Each time a set of reports comes in, the information is fed to computers which determine the effects of changes on the original schedule. Sections of this summary network showing the changes are then sent out to the AEC area offices and the participating departments and agencies. In this fashion, all participants are kept abreast of project status, and of where each contributor stands in relation to the project.

It is easy to see how, with such a network in front of them, the project managers can spot trouble and can take steps to prevent it.

L. J. Heilman, Director of Programming 2600, says: "Perhaps the most important contribution of these network analysis techniques is that the kind of planwork provides the thorough program definition necessary for successful control of a complex pro-

ject. Effective use of the systematic method of updating and immediate analysis permits pinpointing and control of problem areas through review and action by the responsible managers.

"Sandia Corporation will use the network analysis technique in planning and controlling future weapon program efforts."

Major Programs

According to Mr. Meikle, the network technique is now being used on the number of major programs.

"It may take two or three years before all weapon programs are planned and administered by network analysis," he said. "When we reach this point, we will be able to evaluate Sandia's overall resources and manpower. Then it should be easier to make estimates of overall workload and determine our ability to assume and assign additional weapon programs."

Mr. Meikle, Mr. Ahr, and Craig Summers (2632-1), all members of the original Sandia study team, have conducted several training courses in the techniques for about 170 Sandia engineers and 30 engineers from other AEC agencies. The training program has now been turned over to Technical and Trades Training Division 3132.

In Livermore, Mr. Johnson and Jack Lyon (8213) have instructed about 50 employees in network analysis.

It is estimated that about 3000 Sandians eventually will require some degree of formal instruction in network analysis in order to be prepared for its wider use in years to come.

Three Speakers to Be Presented at January Research Colloquium

Three speakers are scheduled for the Research Colloquium series during January.

On Jan. 7, Prof. H. G. Drickamer of the University of Illinois will speak on "The Effect of Very High Pressure on the Electronic Structure of Solids."

Dr. P. G. Klements of Westinghouse Research Laboratory is scheduled to talk Jan. 16 on "Lattice Thermal Conductivity." A citizen of Australia, he is an authority on transport phenomena.

The speaker for Jan. 30 will be Creighton Burk of the National Academy of Science, who will discuss the American Miscellaneous Society's "Mohole Project." A movie will be shown depicting drilling in the ocean floor off Guadalupe Island in early 1961 to study the crust of the earth.

Further information on the January speakers will be listed on the regular Colloquium bulletins.

Handicapped Employee Needs Ride to Work

A new employee, who is physically handicapped, needs a ride from 1100 Wilmoore Dr. SE (near Yale) to the vicinity of Bldg. 800. If you can help him, please call Gary Montague at CH 2-5153.

Special Training Undertaken to Meet Purchasing Demands



K. S. SPOON, Sandia Corporation Purchasing Agent 4300, right, conducted introductory session of a recent Purchasing Orientation course. Twenty-three 4300 personnel completed the concentrated eight-day course.



WORKSHOP SESSIONS were a large part of a recent Purchasing Orientation course. Participants solved simulated problems in supplier evaluation, contract negotiations, and other Purchasing activities. From left above are Kent McIntire (4335-2), Paul Becht (4315-1), Ray Coffey (4332-2), Ralph Davies (4332-2), Guy Welsh (4332-2), Monte McDonald (4332-2), and David Ratliff (4342-1). Training program includes two more phases.

Purchasing responsibilities at Sandia Corporation are more demanding than in most private industry, says Sandia's Purchasing Agent K. S. Spoon. As a result of these demands, purchasing people are busy brushing-up on techniques of the trade—Sandia style.

Phase I of a three-part training program designed for staff development in Purchasing ended last week. This marked the first time that an in-hours training program at Sandia Laboratory had been aimed at staff development for a single organization.

The course was attended by 23 members of the 4300 organization. In addition, two men from the Atomic Energy Commission and two from Livermore Laboratory attended the eight-day training sessions.

Purchasing Orientation was developed and conducted by Ken Krogh of Staff and Management Development Section 3131-1 and Ralph R. Davies, supervisor of Purchasing Practices Section 4332-2. It was a concentrated presentation of Sandia's Purchasing activities. Included were studies of AEC and other government regulations governing Sandia's buying.

"Sandia purchasing work requires a staff with broader knowledge and higher capabilities than is required in most private industry," K. S. Spoon, Purchasing Agent 4300, said in an introductory session. "A man who reaches full stature in Purchasing must possess a wide variety of knowledge and experience; must have the highest personal integrity; must excel in diplomacy; and must have the flexibility and vision to continually seek out, evaluate, and apply new ways and means to improve his work and profession."

"Sandia Purchasing operates within the influence of Western Electric Company and AEC procurement regulations which are constantly undergoing change," Mr. Spoon said. "This, coupled with the complexity of the procurement of a product which is at or beyond the state of the art, presents a tremendous communication responsibility. Adding to

this 'keeping up to date' task is the fact that 4300 recently established a new Sub-Contract Department 4370. As a result, there have been inter-department transfers and the addition of new Purchasing personnel. This, with the present employee rotation program, presents the Purchasing supervisors with a very heavy on-the-job training responsibility."

The recently completed first phase of the training program was presented to all members of the Purchasing staff who had been in the organization less than a year and one half. It was a series of lectures by representatives from Purchasing, Engineering, Legal, Finance, Accounting, Security, Reliability, Quality Assurance, and Inspection organizations, and the AEC.

Included were workshop exercises simulating selection and evaluation of suppliers, contract negotiations, request for quotations, evaluation of quotations, and approval of purchases.

The second phase, which will be presented to Purchasing personnel from staff assistant through department manager level, will begin about March 1963. A third phase will be a continuation of training activities in specific subject areas as the need arises.

Welcome Newcomers

Dec. 17-28

Albuquerque	
Robert J. Chavez	4574
Marilyn T. Culver	3446
George W. Dwyer	4543
Donna L. Gardner	3126
Sandra J. Harris	4212
Charlotte W. Heidrich	3126
Jean E. Ison	4333
Harland S. Laycock	2544
Arnold M. Jenkins	4413
Gary T. Montague	3132
Juanita Ratchner	3126
Manuel R. Sanchez	4574
Theresa C. Tefoya	3151

New York	
James A. Lentz, Buffalo	1111

Washington	
John L. Bjorkstam, Seattle	5151

Returned from Leave	
Jocelyn L. Fuller	4411

* Denotes rehired

Lamar Treadwell Cheerfully Accepts Supervision of 60 Junior Marksmen

"We assume that kids will come into contact with firearms some time in their lives," Lamar Treadwell (2532-3) said. "And we feel that proper education about firearms provides them with a maximum of safety."

Lamar is supervisor of the Sandia Base Junior Gun Club, a group of sons and daughters of Sandia Corporation, Sandia Base, and Kirtland AFB personnel; Girl Scouts; and Boy Scouts interested in passing merit tests in marksmanship. The club is affiliated with the National Rifle Association, and is sponsored by the Sandia Dads Club and the Sandia Gun Club. It was founded in 1954, and Lamar has been with it since 1957.

"My oldest boy became interested, and before I knew it, I was in the thick of things," he explained. Lamar, Jr. went on to become the 4th ranking junior marksman in the nation, and Lamar, Sr. inherited the position of club supervisor.

"Target shooting, as a pastime or a competitive sport, is great," he continued. "It's one of those things you can enjoy until you're 90, if you want to. And if it's practiced according to the rules, it increases your awareness of the need for safety and respect of firearms."

The primary purpose of the club is to provide young people with practical experience in basic firearms safety. To accomplish this, it trains from 200 to 250 students each year in a combined basic safety and hunting safety course. Club membership ranges from 60-90 each year.

"The first requirement for club membership is successful completion of the safety course," Lamar continued. "But you aren't required to join the club to take the course. The six-week class is open to youngsters from nine to 19, and adults may enroll. All club members must pass the course."

Instructors for the club include W. H. Blair (2413); Mr. and Mrs. F. C. Dain (4211-1); J. C. Mashburn (2564-2); Mr. and Mrs. Tom Starr (2444); M. D. Roepke, AEC; J. C. Harris, Dave Janes, and Mrs. R. P. George.

The Club's safety record is enviable; in eight years they haven't had an accident. And their marksmanship is amazing. They've held the New Mexico State Indoor Team Championship for five consecutive



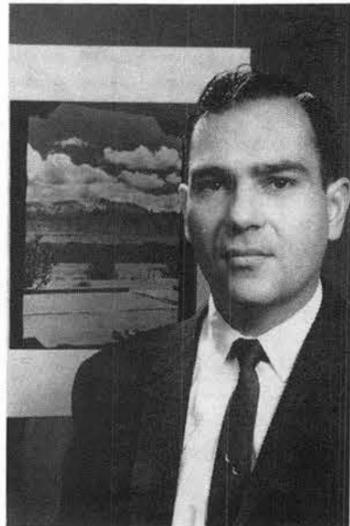
INSTRUCTORS of Sandia Junior Gun Club examine chart showing correct marksman positions. Clockwise from left: F. C. Dain (4211-1), W. H. Blair (2413-3), Tom Starr (2444-3), and L. D. Treadwell (2532-3). Other instructors not pictured include J. C. Mashburn (2564-2), M. D. Roepke, AEC. Club provides gun safety training to some 200 youngsters yearly.

years, the State Outdoor Team Championship for five consecutive years, and, currently, the Class "B" and "C" Indoor and Outdoor Championships.

In individual shooting, club members include the State Indoor Champ and Runner-up; the Individual High Scorer (he's held the position for three consecutive years); the State Class "B" Champion (she's also high-girl trophy holder for outdoor shooting); the Class "C" Champion—both indoors and outdoors—and the Class "D" Champion, indoors and outdoors.

Members also include the State Outdoor Runner-up, the Class "A" Outdoor Champion, and the Class

"A" Indoor Runner-up. The club also holds the Winter League Championship at the Sandia Base Range.



Richard H. Berg
—Prize-Winning Photographer—

Sandia Engineer Proves Capable Camera Fan

Dick Berg (1423-2) is an electrical engineer with an eye for composition. This, combined with photographic ability, enabled him to win first prize in the recent Turquoise Trail Photo Contest, sponsored by the Greater Albuquerque Chamber of Commerce.

His winning photo was a scene of the Sandias taken from the portal of the Coronado Monument administration building, near Bernalillo. Dick also entered two photographs of mountain sheep on Sandia Crest.

The prize was \$25 in cash, use of a rental car for a day to drive around the Turquoise Trail, and dinner for two in Old Town.

With an interest in photography dating back 15 years, Dick has won first prize ribbons for four consecutive years at the New Mexico State Fair international photo salon. He is currently vice-president of the Enchanted Lens Camera Club.



CORRALES COMMUNITY COUNCIL will be headed for the coming year by Paul J. Krogdahl (7532), left, with Glenn R. Elliott (2452) serving as treasurer. Both the volunteer fire department and public library are managed by the council, which holds public meetings each month.

Community Responsibilities Assumed By Civic Minded Sandia Employees

Mention Corrales and Albuquerqueans envision a Rio Grande village where apple orchards alternate with old adobes, peopled by "artists."

Paul J. Krogdahl (7532) and Glenn R. Elliott (2452) have visions of another village. Mention Corrales and they think of comfortable homes, their own, and community problems, also their own.

Paul has taken over the duties of chairman of the Corrales Community Council. He succeeds another Sandian, Rudy Sadler (1432-4). Glenn is the new treasurer.

Located just north of Albuquerque, on the west side of the Rio Grande, Corrales is within easy commuting distance of its much larger neighbor, and its grade school is part of the Albuquerque School System. But the ties between the two communities end about there. Corrales straddles the Bernalillo-Sandoval county line.

The Community Council came into being the same time the Corrales Fire District was established in 1953—the first such volunteer group in the Albuquerque area. The Corrales Public Library was started then, also. Both are operated by the Council and are located in a one-story building next to the grade school. The Council holds its public meetings there once a month, and elects its four officers yearly.

"The boundary of the fire district is also considered the true boundary of our community," Glenn explained. The fire district employs a full-time fire chief, but the rest of the help is volunteer. Several of the volunteers are professional firemen; they work for the Albuquerque Fire Department but live in Corrales.

The fire district receives some state funds, but the majority of its operating monies comes from profits from the annual Firemen's Ball, which last year attracted some 2000 persons. Glenn will be keeping track of these funds. His wife, Rita, is chairman of the Ladies' Auxiliary for the fire department.

Paul is already well-acquainted with operation of the Corrales Public Library. His wife, Norma, is the "head librarian," but she explained her duties mainly involve keeping track of the volunteer help. This is the only public library in Sandoval County, and is believed to be the only library in the state community-operated entirely with a volunteer staff.

For the past year, Council officers have been on the lookout for a new location for the firehouse. A second fire truck cannot be purchased until more space is available. By the same token, the library cannot expand until the fire

department vacates its space in the library building.

On the positive side, a year and a half ago the Council initiated action for flood control measures before start of new residential construction on a bluff to the west. The government has now made the funds available to construct diversion ditches to prevent flooding.

Corrales is an old community, but newcomers have an equal opportunity to participate in civic activities: the Krogdahls have lived there four years, and the Elliotts built their own home there a little over two years ago.

TTR Personnel Holiday Party Held Dec. 15

Tonopah Test Range, Nev., held its annual Christmas dinner dance Dec. 15.

Some 125 Sandia Corporation, Federal Services, Inc., and Reynolds Electric personnel attended.

A bomb is made . . .

Hanford Laboratory Stepped Up Plutonium Production One Billion Times in 1943

Part II

The "Fermi Pile" at the University of Chicago achieved a sustained nuclear reaction Dec. 2, 1942. This was only the beginning of the massive effort which continues today. This article covers the period of 1942-1945, in which a bomb was made.

Confident of success, Fermi and his colleagues were designing reactors to make plutonium even before their first "pile" went critical. Problems of a moderator to slow down the neutrons so they would split U-238 atoms and of a coolant to control the tremendous heat of nuclear reaction were tackled. On Dec. 23, 1942, President Franklin D. Roosevelt approved plans to scale up a laboratory operation to a vast industrial complex in an incredibly short time.

It was too hazardous to continue work in the improvised laboratory at the University of Chicago. The historic first reactor was dismantled, modified, and by March 1943 had been rebuilt in the Argonne Forest Preserve, near the present Argonne National Laboratory. Later, a second reactor using heavy water as a coolant and moderator was built at this location.

By February 1943, design was underway for a semi-works comprising an air-cooled reactor and a chemical separation plant to be built at Oak Ridge, Tenn., the first of the large MED bomb project

installations. This reactor went critical at dawn on Nov. 4, 1943, with Fermi and others from the Chicago group present. Known as "X-10," it was to become famous as the world's first "wholesale" producer of radioisotopes. It still is an important source of radioisotope supply.

Continuing difficulties in separating U-235 and the time required to build X-10 led to an historic decision in April 1943. Without waiting for results of the pilot operation at Oak Ridge, it was decided to scale up the laboratory production of plutonium one billion times in the form of three huge water-cooled reactors and three chemical separation plants to be built in the 400,000-acre desert area being acquired at Hanford, Wash.

Site work on the first Hanford reactor began late in August 1943. Thirteen months later, "B Pile" was in operation. Fermi had inserted the first uranium fuel slug on Sept. 13, 1944.

In January 1945, early operating

troubles with the plutonium reactors had been solved. The complex chemical separation of plutonium from other products of the fission process and from the unburned uranium was successful. Plutonium was being produced on an industrial basis. Six months later, plutonium made at Hanford was the material used in the world's first atomic bomb detonated July 16, 1945, in the desert at Alamogordo, New Mexico.

By this time, sufficient uranium 235 had been made at Oak Ridge to make a bomb and the device exploded over Hiroshima on Aug. 6, 1945, used this material. The bomb dropped two days later on Nagasaki was a plutonium device. The war ended Aug. 14.

The success at Stagg Field on Dec. 2, 1942, had proved vital to the development of nuclear weapons. The Free World was to rely principally on the U. S. supply of such weapons to keep the peace and maintain superiority in this field after the Soviet Union achieved nuclear weapon capability in August 1949.

Sandia Lab Figure Skaters Serious About Their Hobby

"While figure skating is healthful exercise and great fun, it's also subject to more stringent rules than almost any other sport," Frank Norris (4541), president of the Albuquerque Figure Skating Club, commented. "The reason isn't hard to understand; at contests, amateurs are judged by rules entirely different from those of professionals, and the conditions under which they compete are carefully spelled out."

The Albuquerque club was organized in 1949 with 25 charter members, including C. E. Runyan (4220), who was the first treasurer. "From 1954 to 1956, it was the largest figure skating group in the United States," Frank recalled. "Our membership was close to 500, and we attained full membership in the United States Figure Skating Association."

From its beginning to the present, the club has presented numerous skating exhibitions and ice revues. Several former members have gained professional status. Last summer, Linda Baltzley joined "Holiday on Ice," and is skating professionally with the group in Mexico.

Present officers include Frank; Bill Stoppkotte (1424), vice president; Dora Jo Courtenay, AEC, secretary; and Irene McLaughlin,

treasurer. Other Sandians active in the club include C. E. Runyan (4220); Ken Kerns (3428); and Norm Smith (3451-2), a past president.

Several local skaters are working to attain Olympic standing. "Figure skating requires hours of practice," Frank continued, "and the requirements for Olympic skaters are very high." The club will also send three skaters to Dallas, Tex., in December to participate in U.S. Figure Skating Association regional competition.

Other members are working to become figure judges. There are few judges in national amateur figure skating, and their services are badly needed. The club's only dance figure judge at present is Irene McLaughlin.

"We meet on Sunday evenings, weekly. Skaters arrange practice sessions on an individual basis," Frank concluded. Sandians interested in joining the club should contact Frank by telephone: AL 5-6926.

Nancy Bercaw Died Dec. 19

Nancy Bercaw, a Sandia employee for more than eight years, died Dec. 19 following a long illness. She was 41.

Miss Bercaw was a staff member in Review and Reports Division 7513, Quality Assurance. She had resided in Albuquerque 17 years, previously serving in the WAVES as a Lieutenant.

Survivors include her father, and two brothers, who live in Illinois and California. Burial was in Wilmette, Ill.



WINNERS of awards for technical art presented during a seminar of the Society of Technical Writers and Publishers at Huntsville, Ala., Nov. 8 are (l to r) J. B. Walston (3463-3), R. H. McHarney (3463-3), W. R. Entwisle (3463-1), L. P. Ortiz (3463-2), and R. K. Strome

(3463-2). Paul C. House (3463-1) attended the seminar and accepted the awards, which included first place awards in technical illustration line drawing and continuous-tone airbrush, and second place awards in color cutaway and promotional literature and brochures.

Sports Films, Free Snacks at Club Men's Smoker Jan. 26

The Coronado Club has scheduled its First Men's Smoker for Jan. 26. Featured guests will be Pete McDavid, UNM athletic director, and Bob King, UNM basketball coach. The smoker, which starts at 7:30 p.m., will also include free snacks, sports films, and game facilities.

Registration for pre-teen and teenage dance classes will be held Jan. 5, from 1-2 p.m. (pre-teens) and 2-3 p.m. (teenagers). Classes, to be taught by Cissy King and staff, also begin Jan. 5. Price for the ten-week course is \$10.

Adult dance instruction begins Jan. 8. The Balistreres will teach Latin dances, and the Wards, the American steps. Registration will be Jan. 8, with a cost of \$6 per person for the course.

Retired Employee Helen Lautner Died December 21

A retired Sandia employee, Mrs. Helen Lautner, died Dec. 21 after a lengthy illness. She was 71.

Mrs. Lautner had resided in Albuquerque for 41 years. She first came to Sandia Base in 1943 as a Civil Service employee. At the time of her retirement in December 1959, she had nearly 12 years' service with Sandia Corporation—most of it in Cost and Accounting Department 4150.

Mrs. Lautner is survived by her brother, Robert Thorne (3455).



A. J. Arenholz Awarded Scholarship at UNM

Arthur J. Arenholz (2563) was recently awarded a \$400 scholarship by Southern Union Gas Company. Pursuing a degree in Accounting, Art is a senior this semester, maintaining a 3.92 grade point average at the University of New Mexico.

"I should graduate in 1964," Art says, "if things go well. With four children, a full-time job, and a load of 12 hours this semester, anything could happen. It keeps me busy. I've got term papers to write and finals next month."

Art is a staff assistant in Quality Control Division II. He has been at Sandia since January 1960.



Jolene Koger Reports for 2450 Past Three Years

Jolene Koger has been assigned to Product Tester Division 2451 since she came to Sandia four years ago and she has been Lab News volunteer reporter for Department 2450 for three years.

A native of Hurley, N. M., Jolene has lived in Albuquerque eight years.

She enjoys traveling and rates Colorado and California as her favorite vacation spots. She also likes to dance, hike, and in quiet moments, to read.

coronado club



Jan. 4-Jan. 19

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
6	7	8	9	10	11	12
	Duplicate Bridge 7:30 p.m.	Adult Dance Instruction Basic 7 p.m. Advanced 8:30 p.m.			Social Hour 5:15 T. Kelly Buffet 6:30-8 p.m.	Youngsters Dance Class 1-3 p.m.
13	14	15	16	17	18	19
	Duplicate Bridge 7:30 p.m.	Adult Dance Instruction Basic 7 p.m. Advanced 8:30 p.m.	Ladies Bridge 1:15 p.m. Game Night 8 p.m.		Social Hour 5:15 Sol Chavez Buffet 6:30-8 p.m.	Youngsters Dance Class 1-3 p.m. ACF Union Dance Local 1689

EVENTS

SHOPPING CENTER ● SHOPPING CENTER ● SHOPPING CENTER ● SHOPPING CENTER ● 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
 KENMORE automatic washer, 1955 model single cycle w/adjustable water temperature, \$35. Diebold, AX 9-6772.
 '49 PONTIAC, 8 cylinder, 2-dr. sedan, \$75. Faw, AX 9-7360.
 GARAGE DOOR 8 x 7 roll-up type, complete, \$40. Sanchez, AX 9-8722.
 COLLECTION OF old daggers; antique, large Navajo rug, \$35; travel alarm clock, \$4. Trade for old musket. Smitha, AX 9-1096.

4-BDR, large den, all brick, carpet, drapes, near Sandia High School, 2725 Tennessee NE, \$25,500. Syme, AX 9-4100.
 MAYTAG IRONER, floor model, \$35; Amana, 25 cu. ft. upright freezer, \$150. Martin, 255-8030.
 '51 3/4 TON GMC utility truck; complete interior for 1949-50 4-dr. Plymouth. Heckler, AL 6-7192.
 GARAGE DOOR, hardware, complete, for overhead type, \$5; mahogany cabinet for small record player or amplifier, new, \$5. Williams, 255-4109.
 KENMORE combination washer-dryer, \$75. Karo, AL 6-7253 after 6 p.m.
 '60 RAMBLER 4-dr. sedan, 6-cyl., automatic transmission; crib mattress; baby car bed; ski boots. Spray, AX 9-0412.
 '57 DESOTO Firedome 2-dr. HT, R&H, automatic transmission, PB, PS, recent tires, brakes, and major tune, \$695. Leamon, 865-9360 Los Lunas.
 LA DOLomite ski boots, size 12, used 10 times, \$14. Taylor, AL 6-3774.
 TIRE CHAINS, will fit sizes 8.00-14, 7.00-15, or 7.60-16, \$5. Vivian, AX 9-1785.
 '58 EAGLE SCOOTER, \$175; Multimeter w/leather case, instruction book, \$25; Miscellaneous mechanics tools for sale or trade. Reed, 298-2852.
 PLATINUM DIAMOND RING, 26 single cut diamonds 2MM dia, appraised \$225. Milligan, 243-2429.

NEXT DEADLINE
FOR SHOPPING CENTER ADS
Friday Noon, Jan. 11

NORGE electric stove, double oven, \$85. Seebald, AX 9-1534.
 ELECTRIC SOCKS, medium to X-large, w/original container and instructions, uses 2 6-volt lantern batteries carried in belt carrier. Kerr, 299-7527.
 TR3 Shop repair manual and set of wind wings, both new. Davis, 2607 Stevens Dr., AX 9-4971.
 TWO full-size beds, blond veneer, \$15 ea; 1 set springs and mattress, \$10; Kenmore portable washer, \$10. Rauch, 268-0232.
 10 VOLUME SET Junior Classics, \$25. Southerland, AM 8-1318.
 '62 RAMBLER station wagon, OD, reclining seats, twin-grip differential, \$2295. Massey, 298-4650.
 HOTPOINT DISHWASHER, needs some work, \$25; golf set, 3 woods, 6 irons, putter, bag, cart, \$60; interior mahogany doors, \$5 for two. Copeland, AL 5-4688.

'57 FORD V-8, stick, 4-dr. sedan, R&H, w/w, \$550. Henley, 265-1161.
 '60 1/2-TON FORD pickup, 4-speed, will consider trade. Pyetzki, AL 5-4124.
 '53 OLDSMOBILE, R&H, hydromatic. Perusich, 298-4870.
 CAMERA, Nikon S-2, F1.4 lens, skylight filter, shade, flashgun, meter, 500-watt projector in carrying case, all for \$200. Vandi, AL 5-0685.
 '51 FORD V-8 2-dr., \$125. Bauder, AX 9-7322.
 '58 OLDSMOBILE, 4-dr., PS, PB, air ride, hydromatic, w/w tires. Newton, 265-1042.
 CORNER LOT, R-1, 60'x150', all paving paid, Columbia and Thaxton SE, might trade. Burns, CH 2-2407 evenings.
 MUST SELL tame rabbits, one buck, three does, plus 15 seven-week-old rabbits. Burtneft, 298-4291 after 5:30 p.m.
 1 SHOTGUN; 5 handguns; 3 rifles; fully enclosed all metal 1-wheel trailer; 20-watt Hi-Fi amp, pre-amp, speaker. Ernst, 268-9414.
 BOY'S 24-inch bicycle, \$20. Martin, 256-6785.

FOR RENT
 2-BDR house, furnished plus washer, garage, \$85/mo; 1-bdr, partly furnished, \$50, both near Candelaria, Edith NE. Brown, DI 4-6831.
 UNFURNISHED 4-bdr. house \$95/mo, 2604 Maple SE, lease desired. Fuentes. CH 3-0757.
 NEW UNFURNISHED APT, 2-bdr, stove, reffrig, air cond., carpet, 5 min. to West gate. Ross, 601 Valencia SE, AL 5-0486.
 3-ROOM AND BATH, single person preferred, close to base, \$70. Millard, AX 9-2039.

LOST AND FOUND
 LOST—Lady's Bulova watch, Tissot silver watch w/2nd hand, billfold with ID of Minus Phillip, letter in plain white envelope, Plymouth auto key, black leather key case, gray glass case, gray leather gloves, house key, 3 keys on ring, keys with SC family day tag, man's green sweater. LOST AND FOUND, ext. 29157.
 FOUND—Round slide rule found in reserve parking 800, brown glass case, cigarette lighter, flower shape earring, round gold cuff link w/brown stone, picture of baby in chair, man's fur lined glove. LOST AND FOUND, ext. 29157.

WANTED
 ALTO SAXOPHONE. Vandi, AL 5-0685.

1962 in Retrospect... Crowded, Momentous... And Now It's History

The year 1962 is now history, but the significant (and some not so significant) events are still fresh in minds of Sandia Corporation employees.

Resumption of nuclear testing with Sandia personnel participating in Operation Dominic, increased interest in radiation studies, and additional responsibilities assigned the company by the AEC, combined for an active 1962.

Here is a resume of activities at Sandia and Livermore Laboratories as reported in the LAB NEWS in recent months.

January

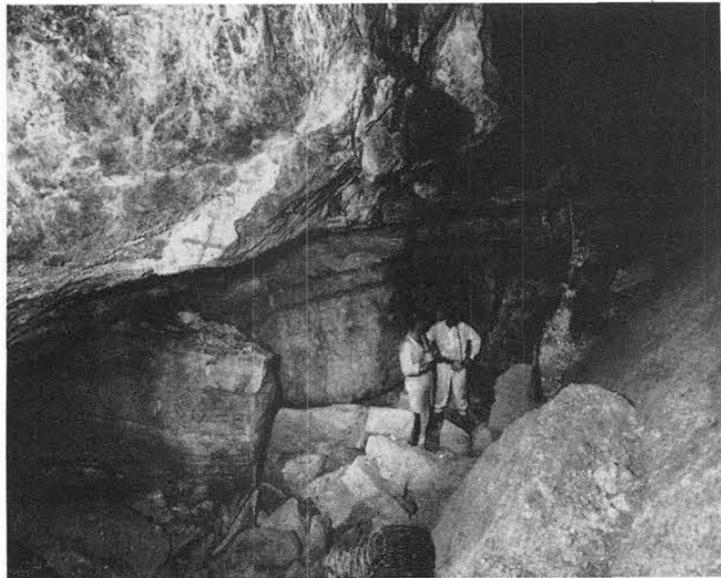
The ultra-clean room, designed by W. J. Whitfield of Advanced Manufacturing Development Di-



Field Test Gets Ready for Operation Dominic in the Pacific



Victory Salute for Livermore's \$14,300 United Crusade Drive Gift



Project Gnome Cavity Re-entered

vision 2564, proved itself cleaner than cleanest and received nationwide attention.

Fallout shelter areas were designated in eight Sandia Laboratory buildings. The Emergency Planning Section provided employees with emergency instruction folders.

J. W. Easley was appointed Director of Radiation Physics 5300.

Technical orientation was given 150 Sandia Laboratory employees. The three-day program included talks by technical supervisors, and tours of a weapons display and wind tunnel facilities.

February

A new airstrip, close to the command post, was opened at Tonopah (Nev.) Test Range to eliminate the uncomfortable 30-minute ride from the former airstrip.

Sandia activities at the site of Project Gnome, near Carlsbad, N. M., were completed; however, reduction of data obtained during the detonation continues along with interpretation.

A contract was let for construction of an assembly building at Area 8, Livermore Laboratory.

Livermore Laboratory was awarded seventh place in the 1961 fire prevention contest conducted by the National Fire Protection Association.

The Sandia Pulsed Reactor Facility (SPRF), which went into full operation in June 1961, has already created more than 450 intense bursts of fast neutrons and gamma rays. Facility continues to be used by Sandia Corporation and Department of Defense laboratories and their contractors.

March

The Board of Directors held its spring meeting at Sandia Laboratory.

Sandia's programmed self-instruction method, used for Russian language and algebra out-of-hours courses, received wide attention in national newsletters.

Twenty-two Sandia Lab scientists and engineers lectured before high school science classes while the regular teachers attended a Science Seminar at Sandia.

April

D. B. Shuster was named to

head Sandia's test unit, part of Joint Task Force 8, for Operation Dominic full-scale tests in the Pacific. Livermore's L. E. Hollingsworth (8120) served as Deputy Director of the unit. Sandia's responsibilities were in the fields of fuzing and firing systems, telemetry instrumentation, meteorology and microbarograph studies, and tracking cameras and radar.

The AEC assigned to Sandia responsibility for safety aspects of aero-space nuclear systems.

A contract was let for the construction of two facilities in Area 8 at Livermore Laboratory. The facilities will be used for handling conventional high explosives.

New film badges were issued at Sandia Lab. They indicate average energy of X- or gamma-radiation as well as beta and thermal neutron exposure. Information is automatically punched on IBM cards as employees' lifetime radiation exposure records.

The go-ahead was given for a shock testing facility to be used to impact large units and for construction of a building in Area Y for antenna design and testing.

May

Announcement was made that F. C. Cheston, Jr., will become General Attorney, Secretary and Treasurer, upon the departure of F. Carter Childs. The latter accepted a similar position with Bellcomm Inc., a new jointly-owned Western Electric-American Telephone and Telegraph subsidiary.

Top high school science students from Northern California toured technical facilities at Livermore Laboratory while attending the Central Region Conference of the California Scholarship Federation in Livermore.

June

The Albuquerque-Los Alamos Section of the Institute of Radio Engineers elected A. B. Church (1431-1) chairman.

T. B. Cook was appointed Director of Nuclear Burst Physics and Mathematical Research.

More than 100 Sandians were assisting with test projects and continuing activities at Nevada Test Site.

Four employees received the first Master's degrees under the Educational Aids Program at Livermore Laboratory.

A filmbank system for engineering drawings was adopted and was expected to save time, money and to sharply cut production time.

A five-day environmental testing seminar was held for representatives of Sandia suppliers.

July

A. E. Bentz was named chairman of the National Telemetering Conference to be held in Albuquerque in May 1963. Other Sandians were included in his working committee.

New one-year wage agreements were signed with the Metal Trades Council and the Office Employees International Union.

After 13 years, Sandia Corporation relinquished all responsibility for Salton Sea Test Base. Sandia had maintained caretaker functions there for the past year.

August

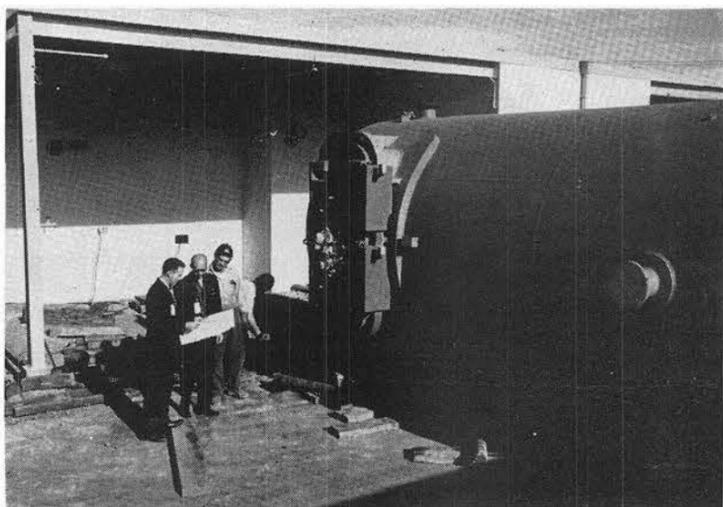
A contract was let for a water jet catapult, 180-ft. sled track environmental testing facility in Area III.

Time marches on: the average Sandia Corporation employee is 38 years, seven months old, and has worked here for seven years.

Look magazine included a full page color photo of the centrifuge in Area III and mention of Sandia Corporation in a lead story on AT&T.

September

About 150 representatives of contractors in the AEC weapons



Second Firing Chamber for Livermore's Area 8

complex attended the annual meeting of the Interagency Mechanical Operations Group at Sandia Lab.

October

The first self-sustained chain reaction was achieved in Sandia's engineering reactor (SERF) after a series of lower power experiments.

At the request of the Bernalillo County Medical Association, Sabin oral polio vaccine was given 596 Sandia Lab employees at the company medical stations.

Livermore Laboratory's record-breaking United Crusade campaign netted more than \$14,300.

A new building was completed at Livermore Laboratory for storage of small quantities of radioactive and toxic materials.

The Solid State Sciences Advisory Panel visited Sandia Lab to review progress in research. Thirteen individual technical talks and a tour of several labs comprised the program.

The hypersonic wind tunnel was ready for regular use after successful completion of stability test of a model rocket at Mach 7.5. Interchangeable nozzles for achieving different hypersonic speeds will be available later.

November

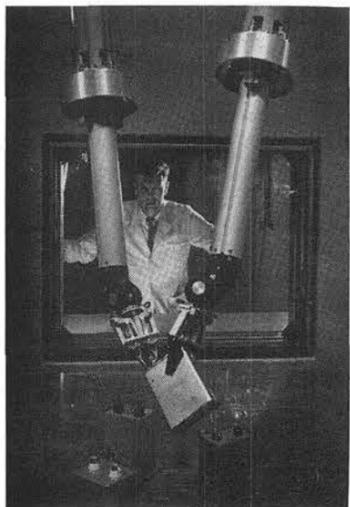
The 1962 ECP fund drive totaled \$183,253—an increase of \$25,669 over last year.

Sandia Corporation's technical participation was spelled out for the proposed underground nuclear detonation (Project Shoal) at Sand Springs Range, Nev.

December

High point of the year was President Kennedy's visit to Sandia Laboratory and his briefing by S. P. Schwartz. Employees lined the streets of the Tech Area to greet the President. Washington officials, and members of New Mexico's congressional delegation accompanied the President.

A series of environmental tests began for a re-entry vehicle and telemetry package, designed at Sandia to study the safety features of nuclear power sources for the aerospace program.



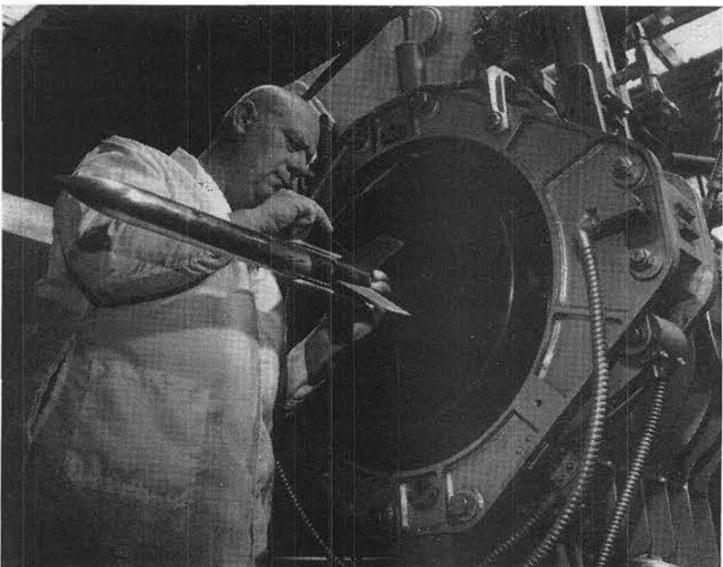
Radiation Studies Using SERF



SNAP Re-entry Vehicle Tested



New Principle in Clean Rooms



Model Readied for New Supersonic Wind Tunnel

Sandia's Safety Record

Sandia Laboratory HAS WORKED 3,380,000 MAN HOURS OR 94 DAYS WITHOUT A DISABLING INJURY

Livermore Laboratory HAS WORKED 628,000 MAN HOURS OR 122 DAYS WITHOUT A DISABLING INJURY