

## Technetium-99m: BNL's Biggest Tech Transfer

Undoubtedly the biggest technology transfer to come out of BNL is one of the Lab's least publicized projects — the long-standing work on technetium-99m.

This radionuclide is the one most used in clinical nuclear medicine today. Over 12 million nuclear medicine procedures are carried out annually in the U.S., and over 85 percent of these involve technetium-99m.

Powell (Jim) Richards, head of the Medical Department's radionuclide and radiopharmaceutical program, is the BNL scientist longest in continuous association with this project. According to Richards, the production and distribution of technetium-99m generators and related equipment are estimated to have had a commercial market value of over one billion dollars in the last ten years, in the U.S. alone. He adds that besides the generator, a large share of this market has resulted from chemical studies leading to the availability of labeled compounds and radiopharmaceuticals, and developments in related instrumentation.

Technetium-99m can be used to image just about any organ in the body. It is commonly used for locating brain tumors, and for imaging the blood pool, thyroid, liver, spleen, heart, lungs, kidney and bone marrow. Doctors can tell if an organ is the proper size and shape, or if there are any anatomical abnormalities.

Dynamic studies can be done. For example, the pumping action of the

heart can be evaluated by sequential imaging of the heart during its cycles of contraction and expansion.

Another big plus for technetium-99m is that it has a half-life of only six hours. A short half-life means reduced radiation exposure for patients.

On the other hand, a short half-life can limit the usefulness of a radionuclide if a source of production is not located nearby. Technetium-99m has become so widely used because it can be made on location with a device called a radionuclide generator.

The first generator came out of work done in the mid-50's, in BNL's Department of Nuclear Engineering, on a tellurium-132/iodine-132 generator, based on a concept suggested by Warren Winsche. During this work in the radioisotope development group, headed by Walter Tucker and part of the Hot Laboratory Division under Lou Stang, a trace contaminant was detected in the product iodine-132. It proved to be technetium-99m. Similarities in the chemical behavior of parent/daughter pairs of tellurium-132/iodine-132 and molybdenum-99/technetium-99m led to the development of the technetium-99m generator by Tucker and Margaret Greene.

This is how the generator works. It contains molybdenum-99 adsorbed on a small column of powdered aluminum oxide, mounted within a lead shield. A premeasured volume of saline solution is fed to the generator, and the technetium-99m that has resulted



Walter Tucker (left) and Powell Richards, two of the scientists involved in the earliest development of technetium-99m.

from the decay of molybdenum-99 is washed through the column, leaving the molybdenum-99 behind on the column. The operation can be repeated after allowing fresh technetium-99m to generate.

In 1960, Richards was placed in charge of radioisotope production. "It turned out that most of the radionuclides we developed had medical applications," he remembers. "We would go to nuclear medicine meetings and learn about the problems faced by medical doctors."

"The tracer concept was developed in the 1930s. It gained wide popularity because it sounded like it could be very useful for studying problems in science and medicine. By putting a tag on a biological molecule, you could learn something about a process in the body by following that tagged molecule around. But to follow the tracer, we needed measurement devices. It just happened that along with technetium came the development of a way of externally mapping the distribution of a radionuclide in the body — the Anger camera. They were ideally matched for each other."

The usefulness of technetium-99m, however, was not recognized early on. In fact, in 1958 the Atomic Energy Commission, which then funded BNL, decided against preparing a patent application on the technetium-99m separation process. A private patent management organization acting for Associated Universities, Inc. came to the same conclusion, stating, "We are not aware of a potential market for technetium-99m great enough to encourage one to undertake the risk of patenting in hopes of successful and rewarding licensing."

At first, they were right. Richards remembers three long years during which there was little interest in technetium-99m.

The first medical researcher to use it was Claire Shellabarger at BNL in 1960. He was using various radionuclides to study thyroid physiology. But when he left the Lab temporarily, his work was not continued.

That same year, while flying to an international symposium in Rome, Richards met Paul Harper of the Argonne Cancer Research Hospital and told him about technetium-99m. At the symposium, Richards presented the first published paper suggesting the use of technetium-99m as a medical tracer. Again, nothing.

Then in 1961 Harper at Argonne Hospital ordered the first technetium-99m generator, for blood flow tracer studies. Over the next several years, Argonne ordered 30 more generators. The technetium boom was finally under way, as other institutions sent in their orders: the French Atomic Energy Commission, Oak Ridge Institute for Nuclear Studies, the University of California at Berkeley and Johns Hopkins, to name a few.

For five years, BNL shipped technetium generators all over the U.S. and to many countries around the world. In 1966 the Lab withdrew from generator production and distribution in favor of commercial distributors.

Technetium can be incorporated into a variety of radiopharmaceuticals, and this versatility has provided great impetus to its widespread clinical use. Instant labeling kits (see box on one kind of kit), developed at Brookhaven by Richards and William Eckelman, have been a major contributor in this regard. Such kits, many of them now available commercially, make possible the instant preparation of technetium-99m radiopharmaceuticals.

New and improved technetium-labeled compounds and techniques for their use are still developed by the radiopharmaceutical research group, headed by Suresh Srivastava. Co-workers past and present who have worked on technetium include William Eckelman, Terry Smith, Allan Packard, Ed Deutsch, George Meinken and the late Jim Baranosky.

The story of technetium-99m began 30 years ago. Even now, the full potential of technetium-99m in nuclear medicine is far from being completely realized.

—Mona S. Rowe

### Shake and Bake

Technetium-99m can be used to label red blood cells with the help of what Powell Richards calls a "shake and bake" instant kit. It's a little tube containing all the necessary ingredients that make possible a number of complex reactions that ordinarily would require a chemistry lab and some highly trained professionals.

The kit is easy to use. Extract a teaspoon of blood, add it to the kit, mix gently for about five minutes, centrifuge upside down for another five minutes, transfer the red blood cells to another vial containing the technetium-99m, mix for five minutes, and reinject the labeled blood into the body. The entire process takes about 20 minutes.

The patent for the first red blood cell kit was awarded in 1976 to Richards and Terry Smith, who is no longer at Brookhaven. A number of people, including Suresh Srivastava, George Meinken, Eric Klug and Rita Straub, have worked on it through the years, resulting in the simple-to-use kit it is today.



Blood sample being drawn out of an instant kit for labeling red blood cells.

Richards says 95% of the kits are used for heart studies, such as assessing damage to the heart from heart attacks. A hospital in Los Angeles and another in Washington, D.C. each use as many as ten kits a day for this purpose. Others use the kits for measuring red cell mass, for spleen visualization and for detecting gastrointestinal tract (GI) bleeding.

For example, physicians Harold Atkins and Zvi Oster at the Stony Brook Health Sciences Center School of Medicine's Department of Radiology are clinically evaluating a method, previously developed at BNL, for a safer, more effective way to detect bleeding in the lower GI tract (intestines and colon). Such bleeding might be caused by a number of different conditions, including a tumor, an ulcer, diverticulosis or angiodysplasia.

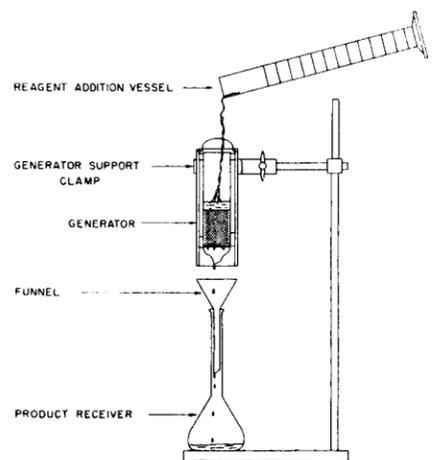
Atkins and Oster draw a small blood sample from a patient, add it to the kit to label the red cells with the radioactive technetium-99m, heat the blood so the cells become damaged, then reinject the blood and watch the distribution of the labeled cells with an instrument called a gamma camera.

As the labeled cells circulate through the bloodstream to the GI tract, the camera picks up those cells that leak into the tract, pinpointing where the leak occurs. Labeled cells not leaking into the tract are removed by the spleen, which routinely removes old and damaged red blood cells.

Medical institutions all over the country are supplied instant red blood cell kits by BNL. Last year, about 20,000 were distributed, and Richards expects the number will increase. Until the kits become commercially available, BNL will continue their manufacture.

An improved version of the kit is being developed by Srivastava, Richards and John Babich, now with NASA. The new kit further simplifies the labeling operation and improves the incorporation of technetium-99m into the red blood cells.

— M.S.R.



Original technetium-99m generator, shown without shielding, 1958.



Mort Kosen

Among the attendees at the conference on Education and Technology on Long Island, May 20-21 were, from left, Robert Sigda, National Science Teachers Association; Richard Opsahl, Grumman Aerospace Corporation; Cecily Selby, National Science Board Commission; Donald Metz, BNL; and John Truxal, SUNY at Stony Brook. Sponsored by the Laboratory and the Long Island Forum for Technology, the conference brought together about 125 educators and business people at Berkner Hall to address mutual concerns: how to encourage students to pursue careers in science and engineering; how to improve the general literacy in math, science and technology among pre-college students; and how to increase the public's appreciation of the value of these subjects in pre-college level education. Says Don Metz, "By the end of the two days, many suggestions had been made of things to be done, and more than 50 people volunteered to see that they get done."

## Dental Deadline Extended

To give employees more time to investigate the recently announced Dental Assistance Plan, Personnel has extended the deadline for initial enrollment to June 10.

As previously explained, the plan will be effective June 1, 1983 and is available to all regular Laboratory employees who work 20 or more hours per week. (In accordance with the Laboratory's Collective Bargaining Contract, IBEW members voted on the plan yesterday, and the results were not known before press time. If the plan was accepted it will be made available to Union employees.)

Those who opt for the Plan will have coverage for three principal categories of dental service.

- **Prevention and Diagnosis** — For these Class I services, benefits are provided from the first dollar spent to the maximum indicated in the payment schedule.
- **Basic and Major Restorative** — Scheduled Class II benefits are provided after a participant pays a \$25 annual deductible amount.
- **Children's Orthodontia** — Fifty percent of reasonable and customary

charges are paid up to a lifetime maximum of \$1,000 per child. In response to a number of questions concerning children whose orthodontia treatment began prior to June 1, 1983, Personnel says that coverage will be limited to services performed on or after that date.

In order to offer this new benefit and control escalating benefit costs, BNL has asked that employees share the cost of the Plan by paying a modest premium and by increasing their group major medical plan deductible to \$200 per individual (\$500 per family). Employees who do not enroll in the Plan will maintain their present major medical deductible of \$100 per individual (\$300 per family).

Employees who join before June 10 will be in the Plan through December 31, 1984. Present eligible employees not electing coverage at this time must wait until January 1, 1985 to participate.

Any questions on the Dental Assistance Plan should be directed to Personnel Services, Ext. 2877 or Ext. 7516.

## Bethe Lecture

Hans Bethe, Nobel laureate, will speak on "Nuclear Weapons and Disarmament" at Berkner Hall, Tuesday, May 31, at 8 p.m. The lecture is open to the public.

## Discussion Group On Nuclear Arms

The next meeting of the Discussion Group will be held on May 31 at noon in Room B, Berkner Hall. Willy Higinbotham, Senior Physicist in the Department of Nuclear Energy, will talk to the group on "Arms Control Negotiations, 1945-1983, or Who's to Blame for the Arms Race." All interested employees are welcome to attend.

Willy Higinbotham was in Los Alamos during World War II and was the first chairman of the Association of Los Alamos Scientists. He was instrumental in forming of the Federation of American Scientists and was its first chairman in 1946. Since then, he has been involved with numerous other groups that have attempted to influence U.S. arms control policies.

## Help in Basic Math

The basic mathematics tutorial sessions are being continued through August 1983. This program is offered for the benefit of employees who intend to begin college technical mathematics and need a refresher course in basic arithmetic, algebra or geometry. The classes are held Monday through Thursday from 11:30 a.m. to 1 p.m. If you are interested, call June Herbert on Ext. 7631.

## It's Termite Time

Eastern subterranean termites have started swarming on Long Island and this should continue for about a month. In buildings, winged adults may try to fly towards windows and doors, seeking a way outside. Sometimes all one finds is a pile of wings. As opposed to ants, termites do not have elbowed antennae, both pairs of wings are similar in size and shape and the middle part of the body is not distinctly narrowed into a thin waist.

If you suspect termites, insect specimens or wood samples can be submitted to the Cooperative Extension Association of Suffolk County, 246 Griffing Ave., Riverhead (727-7850).

## Losing Weight for Science

Two years ago, a group of volunteers went on a diet in the interest of science. They took part in a Medical Department study on weight loss.

Says Ashok Vaswani, head of the diet program, "Everybody got what they wanted. The volunteers were happy to lose weight, and I was interested in seeing if the pounds came off in fat, protein or water."

An endocrinologist who specializes in clinical nutrition, Vaswani says the medical journals are full of reports on short term diets of a few weeks. But not much is known about long term dieting and body composition.

The volunteers were put on a diet of 800 calories a day, pretty spartan when compared to the normal adult intake of 1800-2200 calories. To test the effect of carbohydrates on weight loss, half of the group was allowed to have more carbohydrates than the other.

Except for the drastic caloric reduction and the differences in carbohydrates, the diet was not unusual — no drugs, no super servings of protein, no large quantities of liquid. Vaswani did prescribe multivitamins and extra minerals for everyone because he wanted to standardize the group, and no one is sure what is depleted during weight reduction.

All the volunteers spent their first week of dieting in the BNL hospital. Within the first three days, everyone had a loss of appetite, which is normal, according to Vaswani.

Then they were sent home to continue the diet on their own. They had regular appointments every two weeks to check their health and take lab tests.

After three months, everyone returned to the hospital for another week, and their caloric intake was gradually increased to 1200 calories. To complete the program, they were required to stay at that level for another three months.

Vaswani reports that everyone lost a lot of weight. On the average, each person lost about two pounds a week in the first half of the diet, and some of them successfully kept the weight off in the second half.

In collaboration with Stanton Cohn, David Vartsky, Kenneth Ellis and Seiichi Yasumura, various techniques were used to determine total body water, potassium, nitrogen, and total body fat for each volunteer at the beginning of the study and again at the end of the 800-calorie phase. The changes in these measurements revealed that the weight loss was two-thirds fat; the rest in water and lean tissue.

Vaswani says the composition of weight loss was the same for the group on low carbohydrates as for the group having more carbohydrates. The only difference, which he is quick to say is a subjective observation, is that the group with more carbohydrates seemed to have fewer complaints. A few people experienced dizziness, fatigue, dry skin and other minor problems, which were treated as they occurred.

Police Captain Patricia Cahill was one who had some dizziness at first. Extra salt was prescribed, and the problem cleared up. Cahill says she had tried other diets before, but had always gained back the weight. "This time it was different," she says. "Dr. Vaswani used to kid me about being able to check on my progress when he saw me on traffic duty." Two years after she began the diet, Cahill still looks trim.

Like Cahill, Steve Minton is another volunteer who kept his weight down after the program was ended. He credits his success to being part of the Medical Department team that ran tests on all the volunteers. Also, the

diet made him aware of how each calorie adds up. "I settled into a routine of eating less," he says.

As successful as Cahill and Minton were, Vaswani says the diet is not to be tried without supervision. Even the original volunteers were advised not to resume the diet because their bodies may handle the weight loss differently and important bodily substances may be compromised.

More weight loss studies are planned for the future, and Vaswani will be again looking for volunteers. "I have some basic questions to answer," he says, "and I know there are overweight people eager to lose some pounds."

— Mona S. Rowe



Mort Kosen

Ashok Vaswani

## Cannibal Stars

Astronomers have obtained observational evidence that stars can literally swallow other stars. Reported recently by the National Science Foundation, this "stellar cannibalism" leads to the ejection of stellar material into space and the formation of extremely close pairs of stars.

Direct evidence of this phenomenon came from the discovery that two stars, revolving around each other in only a few hours, are at the center of some planetary nebulae (disk-shaped clouds of gas that vaguely resemble planets viewed through a small telescope, but are actually far outside our solar system.)

Dr. Albert D. Grauer (University of Arkansas) and Dr. Howard E. Bond (Louisiana State University) were studying the central stars of planetary nebulae when they found that several were in fact very close stellar pairs. Until now, it was thought that central stars were single stars that expelled the gas cloud as they neared the end of their lives.

These discoveries support theoretical predictions that when stars exhaust the hydrogen fuel in their interior, they expand dramatically in size, becoming huge, cool stars called red giants. If a red giant happens to have a second star orbiting it (as at least half of all stars do), the companion star may suddenly find itself inside the outer layers of the red giant. The swallowed star would then begin a gradual inward spiral inside the extended atmosphere of the red giant, gradually speeding up the rotation of the outer layers of the red giant. This process continues until enough energy is transferred to the outer layers to cause them to be expelled, leaving a close pair of orbiting stars surrounded by a nebula gas cloud.

# BROOKHAVEN BULLETIN

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## Tour Program to Open On Historical Note



Three hundred years ago, with the flourish of a signature, the eastern half of Long Island became Suffolk County. When the "Great Charter of Liberties and Privileges" was signed in the name of James, Duke of York, on November 1, 1683, most of the newborn county was uninhabited and untouched.

The 5,265 acres now called Brookhaven National Laboratory were typical of the forests that covered the county. But their fate was atypical. In 1917, while most of Suffolk was evolving into farmlands and small communities, the Lab site became a World War I army training camp — Camp Upton.

To celebrate both the Suffolk Tercentenary and the site's 66 years since the 77th Division first trained at Camp Upton, the 1983 BNL Summer Tour Season will open on Sunday, June 12 with a History Festival.

As an official Suffolk County Tercentenary event, the History Festival will be somewhat different from the other Lab tours scheduled this summer. Because this first tour emphasizes history rather than science, tours of the Exhibit Center will be limited to the first floor. On that floor are both the Camp Upton Historical Museum and the south face of the Brookhaven

Graphite Research Reactor, BNL's first major research facility and the first reactor ever built to study the peaceful uses of atomic energy.

The History Festival, for which there is no admission charge, will begin on June 12 at 10 a.m. and continue until 5 p.m. Here are a few of the other things that will be going on at BNL that day:

- Slide/Sound Shows — "Basic Training to Basic Research" and "Brookhaven's Quest"
- Film — "Echoes of LI Past," a film by LILCO about Suffolk crafters in the 1800's
- Exhibits — from the Suffolk County Historical Society and the Suffolk County Farm (including live animals)
- Antique automobiles
- Demonstrations — by the Huntington Militia and colonial craftsmen (spinner, weaver, potter, blacksmith, quilter, wood carver, caner)
- Dancing — by Order of the Arrow, an Indian dance troupe; a square dance group; a Polish dance troupe
- Food & Drink — available from an international booth area, including pizza, calzone, kielbasi, gyros
- Goat and pony cart rides
- Farmers' market with fresh, local produce

## Film Preview

Brookhaven Women in Science will be previewing a 30-minute Walt Disney production entitled "The Atom - A Closer Look" on Thursday, June 2 in the Berkner auditorium at noon. This educational film, with live action sequences and Disney animation, introduces the basic physics of the atom, presents the history of atomic research, explains the basic structure of nuclear power plants, and examines some of the risks and benefits associated with atomic energy. The showing is open to all who are interested.

## PSI News

The Upton Chapter of Professional Secretaries International recently elected officers for the 1983-84 year. Patricia Durcan (American Institute of Physics) was elected president; Mary Cooper (Applied Math), vice-president; Jayne Cutt (Medical), corresponding secretary; Gerry Callister (Medical), recording secretary; and Nedy Santiago (Reactor), treasurer.

The next meeting of the chapter will be on June 20 when the new officers will be installed and plans outlined for the coming year. Guest speaker will be Mary Fallon, Deputy Commissioner of Consumer Affairs for Suffolk County.

## Diners Note

The Center Club will be closed Sunday, May 29, the day preceding Memorial Day, but will be open on Monday evening, May 30.

The Cafeteria will be open from 9 a.m. until 2 p.m. on Saturday, Sunday and Monday, May 28, 29 and 30.

The Vended Food Service in Bldg. 912 will be in continuous operation.

## Polish Your Act

Trained dog acts, soft-shoe routines, jugglers, magicians, ventriloquists, stand-up comics...we need 'em all. Vaudeville is coming! The ever popular summer entertainment and talent showcase sponsored by the BNL Theater Group returns to the Brookhaven Center on August 5 and 6. So get your act together and be ready for the auditions in July. Exact dates will be announced later.

## Theater Group

The Theater Group will meet at 8 p.m. on Friday, June 10, in the Physics Department lounge. The main item of business will be the election of officers for the next year. The slate of candidates is:

- President — Karl Swyler  
Vice President/Treasurer — Lori Eagle  
Secretary — Bob Kinsey  
House Committee Chairman — Rita Straub  
Program Committee Chairman — Bill Love  
Advisory Committee Chairman — Kurt Fuchel  
Publicity Committee Chairman — Penny Baggett

Nominations will also be accepted from the floor. All members are urged to attend.

## Arrivals & Departures

### Arrivals

- Nick J. Acampora ..... Accelerator  
Soliman A. Bakr ..... Biology  
Joseph Barba, Jr. .... Accelerator  
Steven J. Bubka ..... Accelerator  
Paul Callegari ..... Accelerator  
James Della Sala ..... Applied Math  
Gerald L. Greenidge ... Central Shops  
Theodore Kijowski ..... Accelerator  
William R. Laws ..... Biology  
Bent Nielsen ..... Physics  
Joseph W. Sanfilippo .... Accelerator  
Francesco Sette ..... NSLS  
Michael R. Sullivan ..... Accelerator

### Departures

- This list includes all employees who have terminated from the Laboratory, including retirees:  
Marilyn E. Miller ..... Medical

## Volleyball

A last reminder that the volleyball awards party will be held on June 3 in the Brookhaven Center. Tickets, at \$3 each, are available from Lois Marascia, Ext. 4904, Bldg. 197C. Come and join us for a good time as well as a hot and cold buffet and open bar.

## Cafeteria Menu

### Week Ending June 3, 1983

<b>Monday, May 30</b>	
Snack Bar Service — 9 a.m. to 2 p.m.	
<b>Tuesday, May 31</b>	
Lentil soup	(cup) .65 (bowl) .75
Broiled chicken livers & 1 veg.	1.80
Beef stroganoff on egg noodles	1.95
Hot Deli: Sausage & pepper hero	1.95
<b>Wednesday, June 1</b>	
French onion soup	(cup) .65 (bowl) .75
Salisbury steak & 1 veg.	1.85
Roasted turkey & stuffing	1.90
Hot Deli: Sandwich steak w/ pepper & onions	(bread) 1.95 (roll) 1.85
<b>Thursday, June 2</b>	
Split pea soup	(cup) .65 (bowl) .75
Breaded shrimp & fries & cole slaw	2.10
Yankee pot roast & rice pilau	2.00
Hot Deli: Swiss & sour chicken cutlet hero	2.15
<b>Friday, June 3</b>	
Fish chowder	(cup) .65 (bowl) .75
Beef hash & 1 veg.	1.85
Barbeque fresh ham & 1 veg.	1.95
Hot Deli: Monte Cristo	1.90

## Softball

### Scores for Week of May 16

- League I**  
Six Pax 8 - Ice Pops 7  
Ed Meier went 4 for 4, scored 3 runs, and had two assists from the outfield. Ralph Brown drove in three runs, including the game-winner.  
Moles 12 - Blue Jays 9  
Ravens 22 - Big Sticks 15  
For the Ravens, Leon Lawrence and Mac Thomas were 4 for 4. Ed Taylor had a home run; LeRoy James and Herbie Harris each had two doubles.  
Phoubars 17 - AMD 5  
Jack Brennan led the Phoubars with fine pitching and a home run.
- League II**  
Roga 10 - Lights Out 7  
Magnuts 14 - Medical 6  
Dirty Sox 29 - Random Errors 4  
Titans 9 - Light Source 5
- League III**  
Nads 7 - No Names 2  
E-Z Riders vs. TNT  
Game rained out  
Mole-Esters vs. Survivors  
Game postponed
- League IV**  
Random Sample vs. Who Cares  
Game rained out  
Underalls 14 - Spacekadets 8  
Game postponed  
Turkeys 12 - Mudville Sluggers 8  
Jim Curto hit a home run. Good backup by the women.  
No Feedback (won) - Who's on First (forfeit)

## Bowling

### 1983 Championships

- White League**  
The Pinsplitters bowling team of Marge Stoeckel (Captain), Elaine Zukowski, Joe Ferrante and Gene Fales won the White League Bowling Championship. High games were J. Ferrante 213-600 scratch, G. Fales 202, E. Zukowski 170.
- Purple League**  
The Drafts, Ed Sperry (Captain), Irene Sperry, Joyce Pinelli and Al Pinelli, won the Purple League Championship.
- Pink League**  
The Apple Blossoms, Maria Apelskog (Captain), Renie Rosati, Carol Beckner, Kathy Kissel and Marie Grahn, won the Pink League Championship.
- Red/Green League**  
The Designers, Ed Sperry (Captain), Ed Sperry IV, Joe Ferrante, Ralph Helmig, Charlie Tomesch, Al Pinelli won the Red/Green League championship. High games were E. Sperry IV 200 and 204, J. Ferrante 221.



Mort Rosen

Giving gentle support to a frightened and frustrated feline is Ed Sujeski of Plant Engineering's Site Maintenance Division. Sujeski and his colleagues Tage Carlsson and Clarence Hicks responded to a call for help from the BNL Fire Department, after personnel there spotted the pussycat in this precarious position about 12 feet up a tree across from the firehouse. The clamor of the rescue effort did the trick. As Carlsson held the captive cat, and Hicks and Sujeski prepared to cut it loose, it popped free — none the worse for the experience.

## Classified Advertisements

### Placement Notices

The Laboratory's placement policy is to select the best-qualified candidate for an available position, with consideration given to candidates in the following order of priority: (1) present employees within the department, with preference to those within the immediate work group; (2) present employees within the Laboratory as a whole; and (3) outside applicants. In keeping with the Affirmative Action plan, selection decisions are made without regard to age, race, color, religion, national origin, sex, handicap or veteran status.

Each week, the Personnel Office lists new personnel placement requisitions. The purpose of these listings is, first, to provide open placement information on all non-scientific staff positions; second, to give employees an opportunity to request consideration for themselves through Personnel; and, finally, for general recruiting purposes. Because of the priority preference policy stated above, each listing does not necessarily represent an opportunity for all candidates. As a guide to readers, the listings are grouped according to the anticipated area of recruitment.

Except when operational needs require otherwise, positions will remain open for one week following publication date.

For further information regarding a placement listing, contact the Personnel Placement Supervisor, Ext. 2882.

**OPEN RECRUITMENT:** Opportunities for present Laboratory employees and outside applicants.

**1879. SENIOR STATIONARY ENGINEER** - (Temporary Openings) - Requires demonstrated experience in the maintenance, repair and operation of high pressure boilers firing #6 fuel oil. Current stationary or marine engineer license is highly desirable. Plant Engineering Division.

**1880. BUYER** - Requires experience in subcontracting machine shop, mechanical and electro-mechanical fabrication. Must be knowledgeable of government procurement regulations. Applicants must have a BA degree in business administration or related experience, as well as a minimum of 3 years' experience in all phases of procurement (with emphasis on contract preparation and administration) and excellent verbal and written communications skills. Contracts and Procurement Division.

**1881. ASSISTANT CONTRACTS SPECIALIST** - Requires experience in drafting RFP's contract modifications and special provisions, evaluation of proposals, analysis of cost and man-hour estimates, and knowledge of FPR. Applicants must have a BA in business administration or related experience, as well as 3 years' experience in all phases of procurement with emphasis on contract preparation and administration. Contracts and Procurement Division.

**1882. SENIOR CONTRACTS SPECIALIST** - Requires experience in advertised bid or negotiated procurement, drafting of RFP's, contract modifications and special provisions. Must have a thorough knowledge of the various contract types, F/P, F/P with economic adjustment, cost, CPFF, T&M, etc. and the parameters for selection of contract type. Applicants must have the ability to analyze cost and man-hour estimates and to negotiate terms and conditions. In addition applicants must be thoroughly knowledgeable of FPR's, DOEPR's, and government rules and regulations. Candidates must have a BA degree and at least 5 years' experience in all phases of procurement. Contracts and Procurement Division.

### Autos & Auto Supplies

80 CHEVETTE - asking \$2,800. Jerry, Ext. 2539.

81 CHEVY MALIBU CLASSIC - \$6,200. Ext. 5294.

80 MAZDA GLC - make offer. Ganu, Ext. 3373 or 924-5942.

76 CAMARO - \$2,000. 286-8041 or 286-1378 after 5 p.m.

77 HONDA 750F - Jim, Ext. 4095.

81 VOLVO - 878-0717.

79 FORD WINDOW VAN - \$4,900. 363-6845.

PICK-UP CAMPER - \$1,750. Ext. 3278 or 281-6365 after 6 p.m.

1957 FORD WAGON - \$2,000. Roger, Ext. 2012 or 878-8847.

75 TOYOTA CORONA - \$1,050. 924-5100 or 878-8144 eves.

73 FORD GRAN TORINO - asking \$750. Ext. 3359.

78 CHEVY MALIBU WAGON - Fred, Ext. 289-1085.

77 CHEVY NOVA - \$2,800. Dan, Ext. 7145 or 475-7241.

80 KAWASAKI - Bob Johnson, Ext. 3354 or 475-2305.

72 PONTIAC GRANDVILLE - best offer. 399-2802.

80 HONDA HAWK - \$895. 286-8814 after 5:30 p.m.

78 HONDA - \$1,700. 289-1122 after 6 p.m.

74 CHEVY CAMARO - \$2,400. 924-6895.

74 TRIUMPH SPITFIRE - \$1,500. 821-0850.

TIRES & RIMS - F78-14 for Chevrolet. Ext. 3392 or 475-8330.

78 HONDA 750F - \$1,650. Steve, 289-3484 eves.

70 VW BUG - \$625. 543-4531.

80 FIAT - \$2,500. Ext. 2231.

CADILLAC RIMS - 15", 2/\$15. 929-8105.

70 MONTE CARLO - good for parts, \$300. 475-1469.

76 KAWASAKI - KZ900, \$1,600. Carl, 399-2646.

76 AMC PACER - \$1,300. Chup, Ext. 4360.

74 2002 BMW - \$3,000 neg. Donna, Ext. 5138 or 473-5095 after 6 p.m.

73 FORD GALAXIE 500 - \$875. Ext. 4532.

CHEVY WHEELS - \$10 ea. Paul, 727-4859.

78 HONDA MOTORCYCLE - 400 cc, Hondamatic, \$900. Ext. 2172 or 744-4386.

CHROME BUMPER GUARDS - Chevy, '73-'80 truck, \$20/set. Paul, 727-4859.

77 SAAB - 99EME, Sport Coupe. Jim, 667-3909.

67 DODGE DART - \$200 firm. Ext. 3042.

77 TOYOTA PICK-UP - \$3,200. 929-3393 after 5 p.m.

65 CHEVY SUBURBAN - \$400. 924-6895.

VW AUTOMATIC TRANSMISSION - complete, \$100. Toni, Ext. 2907 or 289-4211 eves.

72 HONDA MOTORCYCLE FRAME - asking \$350. 654-2076 eves.

77 CHEVY CAMARO - \$3,300. Ext. 7125.

79 HONDA MOTORCYCLE - CM400T, \$1,000. Ext. 7125.

81 DATSUN 210 - \$3,400. Ext. 4395 or 653-4195.

71 CADDY - \$500. Mike, 269-9125.

69 OLDS NINETY-EIGHT - asking \$600. Steve, 929-6877.

67 GMC TRUCK - Marc, 924-7069 after 6 p.m.

74 MAVERICK - \$1,400. Lee, Ext. 7738 or 3015.

TIRES - (2) Dunlop, 950x16.5, 8 ply, mud & snow tires, \$5/ea.; Goodyear, 800x16.5, 8 ply, \$10/ea. Ext. 2898 or 363-7620.

SPARK PLUGS - 1 set (8), RF 9Y resistor, \$7. Irv Meyer, 929-4326.

80 HONDA - 750K, \$2,200. 333-5238 after 6:30 p.m.

73 FORD LTD - \$400. Ext. 5175.

75 CHEVY NOVA - \$1,495. Hugh, Ext. 4424 or 924-3293.

77 SAAB 99EME - sport coupe. Jim, 667-3909.

75 KAWASAKI - \$700. Jim, 475-7199 after 6 p.m.

78 HONDA MOTORCYCLE - \$1,100. 472-0499.

81 HONDA 185XLS - \$650. J.T., 653-5688.

77 CADILLAC - Coupe DeVille. Gary, Ext. 2350 or 567-9617.

81 CHEVY CITATION - \$4,800. 589-4111.

75 TOYOTA COROLLA \$1,000. June, Ext. 7631 or 878-2040 after 6 p.m.

CAP - 8 ft., \$250. Ext. 4439.

77 CHEVY BEAUVILLE VAN - Ext. 3499 or 325-9580 after 6 p.m.

75 CHEVY CAPRICE - Estate Wagon, \$1,850. Fred, Ext. 3259 or 473-8622.

75 PLYMOUTH VALIANT - \$1,200. Rich, Ext. 4134.

75 VEGA - \$1,200. Whitey, Ext. 2913 or Ramona, 928-3088.

### Boats & Marine Supplies

SKI BELTS - \$5; foul weather suit, \$50. Joe, Ext. 7961 or 878-2655 eves.

24' SAILBOAT - racing sloop, 3 sails w/trailer, excel. cond., extras, \$1,600; also, styrofoam sloop, needs work, \$60. Jerry, Ext. 2934 or 744-2816.

27' OWENS - head, sink, stove, sleeps 4, flying bridge, x-large cabin, good running cond., asking \$1,500. 281-2251.

15' FIBERGLASS BOAT - '81, 65 HP outboard, dock space avail., asking \$2,600. 399-4122.

17' BOSTON WHALER - 70 HP Evinrude, Teene trailer-T., winter cover, center console, R.F.W., \$3,500 firm. 475-2679 eves.

67 EVINRUDE - 100 HP, excel. cond., \$225. 298-9581.

18' LARSON - '72, V-hull, '75 135 HP rebuilt Johnson, Teleflex trailer, \$2,200 neg. 475-3415 after 6:30 p.m.

OUTBOARD MOTOR - Johnson, 2 HP, excel. cond., will demonstrate, \$185. 265-5218 eves.

MARINE ENGINE PARTS - new, used, reconditioned, large inventory, Johnson, Evinrude, OMC, Stern Drive. 265-5218 eves.

21' RENKEN CUDDY - 1981, 120 Volvo Penta engine, I/O, many extras, full canvas, compass, 50 hrs. use, excel., \$7,000. 981-0989.

18' SPEEDBOAT - 1969 Chris Craft, mahogany, 283 ci, collector's item, mint cond., \$4,000. Mike, 289-0602 eves.

35' PEMBROKE - F/B sedan, T/Chry. V-8's, sleeps 7, fully equipped, luxury live aboard. 475-8740.

20' OWENS WOOD BOAT - w/cabin, good cond., \$250. Ext. 2733 or 878-8491.

### Miscellaneous

FLOOR WAXER/SCRUBBER - Kenmore 14", 2 spd. w/attach.; vacuum cleaner, Hoover upright. Ext. 3392 or 475-8330.

CAMERA - Minolta XG7 - 50 mm 1.7, 85-205 mm 3.8, 28 mm 2.8, 3x converter, auto 25 flash, case, perfect cond.; am/fm walkman-like radio, \$15. Giovanni, Ext. 3406 or 3245.

MOVIE OUTFIT - 8mm projector camera, screen, floodlights, editor, \$15. 698-3822 eves.

COLONIAL SOFA - loveseat, chair, ottoman, \$700; king size mattress, box spring, frame, Simmons, \$300. 732-3951 after 6 p.m.

CHAIN HOIST - 1 ton, new, \$125. 289-0413.

CARPET - blue, 10' x 11'; Bassett square sofa table; 6' decorator wall units w/bar, drawer & sliding doors. Ext. 3565 or 924-8594.

WETSUIT - overalls, man's, small, \$75. Jay, 286-3679.

GOWN - size 10, new, short sleeve, blue flowered, \$10. 744-5871.

KITCHEN TABLE - formica & chrome, 3 padded chairs, excel. cond., \$75. 878-0175.

DINING ROOM SET - table & buffet, cherry mahogany, 2 leaves, 6 chairs, \$150. 878-0175.

LOVESEAT - country style, beige, brown, blues, excel. cond., \$100. Joe, Ext. 7961 or 878-2655 eves.

BOWLING BALL - 12 lbs, Brunswick w/deluxe bag, very good cond., \$15; rug, 12 x 15, sculptured, fringed, Karastan, excel. cond., \$130 incl. pad. Kathy, Ext. 3652 or 744-5866 after 6 p.m.

PUPPIES - English Cocker Spanies - all shots, 3 black males, reasonable. Liz, 286-1662.

CANOPY BED - white, twin size w/mattress & box spring, excel. cond., asking \$150. 654-0810.

TENNIS RACQUETS - Wilson Break Point 4-5/8 It, Wilson Pro Staff 4-5/8 It, Wilson T-2000 4-5/8 med., all in good cond. Joe, Ext. 4477.

ELECTRIC LAWNMOWER - Sunbeam w/bag, \$45. 473-6546.

BUTCHER BLOCK TABLE - round kitchen table, 42" dia. w/3 real leather swivel chairs, \$200. 363-6121.

CANOPY BED - white, good cond., \$50. Ext. 2964.

CALCULATORS - credit card size, Enterprex complete w/case & directions, new, \$8 ea. Pete, Ext. 3516 or 399-2813.

MULTIVOX SYNTHESIZER - MX2000, excel. cond., \$400. 363-2614 after 6 p.m.

FREEZER - Frigidaire, upright, 19.7 cu. ft., excel. cond., \$200. 363-6121.

COOLBOX - cool date, 15 qt., \$10; kitchen machine, Oster, like new, \$80; slow cooker, \$10; office desk, 60"x30", mint, \$150. Ext. 3890 or 924-4250.

BABY GRAND PIANO - moving, must sell; love seat w/matching armchair. 477-0828 days or 765-5431 eves.

VENETIAN BLINDS - white, (1) 33 1/2" x 341, 2" slats, \$3; (1) 46" x 341, 1" slats, \$4; (2) 57-3/8" x 341, 2" slats, \$5 ea. Gene, Ext. 3354.

21" LAWN MOWER - Toro Whirlwind, self propel, needs tune-up, no reasonable offer refused. Ext. 4192.

ATARI 2600 - game system, joysticks, paddles, basic prog. control, 2 storage containers, all excel. cond., \$95 takes all; game cartridges, Starmaster, Packman, Adventure, many others, \$10-15 ea. Kevin, Ext. 4261 or 654-8553 eves.

FIREPLACE WATER HEATING GRATE - Hydroharthe for hot water heating systems, good cond., \$60. Victor, Ext. 2395.

WALKWAY GATE - 5' chain link, self closing, incl. all hardware, \$40. Victor, Ext. 2395.

DRAPES - burnt orange, 120" w x 84" l w/traverse; white shear w/orange floral pattern curtains, 120" x 84", both \$50. 281-0360.

CASEMENT WINDOWS - heavy duty aluminum screens, storms incl., various sizes, \$20 ea. Niels, Ext. 4124.

FLASH-UNITS - Honeywell Strobolar w/charger & manual, Honeywell Tilt-A-Mite, Minicam Speedlight 100 w/manual. Frank, Ext. 3120.

CHAIN SAW - 16" skill commercial, extra new chain, excel. cond., \$125; small metal lathe, \$125. Dick, Ext. 3499 or 589-9103.

POOL DECK - side mount ladder & seat at top, deck measures 3'x3' for 4' deep pool, \$25. Ext. 4456 or 281-0360.

REFRIGERATOR - 16 cu. ft., good cond., \$100. Roger, Ext. 2012 or 878-8847.

SPECTRA AMP - #225 w/2 12" speakers + foot pedal, univox elec. guitar, \$475. Den, 289-0753.

VACUUM CLEANER - Electrolux, used, motor weak otherwise excel. cond., \$50. Chris, Ext. 2907.

BABY ITEMS - high chair, play pen, walker, etc. Eva, 744-4838.

DESK - chest, \$30; typing table, \$10; typewriter, \$25; fishtank, \$20; bookcase, \$10; mahogany night table, \$10. Ext. 7646 or 286-8229 after 5 p.m.

CHANDELIER - 4 light, heavy, old, \$75, flex. 286-3847.

KEROSENE HEATER - Sears, 9300 BTU, used only 1 season, \$90; pool table, AMF Grand Prix, 9', slate top, automatic ball return, excel. cond., all accessories, \$995. Linda, Ext. 2733 or 878-8491.

BOY'S SUIT - 3 pc., Botany, navy, size 14, \$25. Sue, Ext. 7235 or 399-1736 after 5 p.m.

SOLID OAK DESK - roll-top, \$500; 19" color TV, GE, remote control, \$425. 981-9584 eves.

POOL - 24'x4', filter pump & paraphernalia, \$250. Dave, Ext. 4148.

FREEZER - Gibson, 14 cu. ft., very good cond., moving must sell, \$125. Terry, 289-0358 after 5 p.m.

19" COLOR TV - \$50; couch, \$75; weight bench, \$10. 744-1845.

LAWN MOWER - 21", self-propel, needs tuning, no reasonable offer refused. Morris, Ext. 4192.

PING PONG TABLE - folding type, good cond., paddles, balls, \$50. Ext. 3457.

DRESSER OR BUFFET - Danish modern, 5' long, 18" w x 30" h, walnut wood, \$95; many chandeliers; headboards. Ext. 4532.

BIKES - men's and women's, 3 spd., 26", Sears, \$40 ea. 981-4419.

CASEMENT WINDOWS - heavy duty, aluminum, screens, storms incl., various sizes, \$20 ea. Niels, Ext. 4124.

RECLINER CHAIRS - Herculon, matching pair, button-back, nuggit & gold plaid, fine cond., 2 yrs. old, cost \$500, both for \$195. 654-5888 after 5 p.m.

ADULT TRICYCLE - excel. cond., \$100. Betty, 727-9016.

TRAILER HITCH - Class III, 10K lbs. carrier & head, \$75. 732-5004.

CHINA CLOSET - old, painted black, rounded glass, \$65. GR5-4199.

PANELLING - 10 sheets, used, excel. cond., name your price. Marlene, 744-5801.

FISHING RODS - fresh water, fiberglass, spinning, 6'6", new w/reel, Ted Williams package in cases, \$60; Harnell spinner, 6'6", \$35; T.V. Fisherman fly rod, fiberglass, 9', new, \$45; Bamboo rod by Heddon Fly, 5 1/2 oz., 2 tips, \$35; and much more, all fly rods in fly cases; rod caddy, opens to 65", \$8. 289-6490.

GALVANIZED TANK - John Wood, extra heavy, 30 gals, 106-1/4 lbs, working press, 250 lbs, test 12"x60" long, \$45. Ext. 3457.

REFRIGERATORS - (1) Frigidaire, \$75; (1) Hot Point, \$80; upright, white, very good cond. 289-3848.

GOLF CLUBS - women's, wood 1&3, irons 3,5,7,9, putter, very good cond., \$50. Karen, Ext. 2950.

STAINLESS SINK TOP - w/back splash, large basin & faucets, new, 5 ft., \$90; drill press, variable high speed, 1/4" capacity, table model, \$95. 475-0831.

TICKETS - (2) for Merlin on Broadway, Sunday, June 19, 2 p.m., orchestra, row N, center, \$40/ea. Tim, Ext. 2238 or 821-0137.

COUCH - & club chair, excel. cond., \$100. 862-7986 after 7 p.m.

GAS DRYER - Whirlpool, 3 temperatures, custom dry control, perm. press, \$150; Whirlpool washer, super capacity, 2 spd., 4 cycle, perm. press, \$125. Gary, Ext. 2350 or 567-9617.

## Notice

After the issue of June 3, the Bulletin will cease to carry ads for services. So please clip out the column which will appear next week and save it for reference. After June 3, employees may post notice of services on the bulletin board at the BERA Sales Office.

REDWOOD PATIO DINING SET - 54" round table, (4) 48" curved bench seats, excel. cond., \$125. Ext. 3254 or 277-2112.

PUPPIES - West Highland Terrier, AKC reg., all shots, 7 wks. old, champ. lines. Richie, Ext. 2175 or 734-7342.

POOL PUMP - for in-ground pool, \$25. Ext. 2898 or 363-7620.

SCHOOL DESK - w/attached chair, antique, \$25; storm door, 36" white, aluminum, \$45. Ext. 4395 or 653-4195.

BATHROOM SINK - light grey, vitreous china, excel. cond., \$30. Irv Meyer, 929-4326.

SAND FILTER - 1 HP SS; pool slide, new, above-ground, excel. cond. 325-0447 after 6 p.m.

WOMAN'S BICYCLE - Ross 10 spd., extras, asking \$100. 331-5172.

BEE HIVES - with bees & queen, produce your own honey, \$125/ea. Hugh, Ext. 4424 or 924-3293.

DOBERMAN PUPS - AKC, (4) males, (5) females, blacks, redds. 281-0170.

LAWN MOWER - Sears, 20 in., excel. cond., rear bagger, \$95. 878-0771.

ORIENTAL RUG - hand woven, 9x12, quite worn, \$25; Braun kitchen center, blender, mixer, dough-hook