BROOKHAVEN BULLETIN
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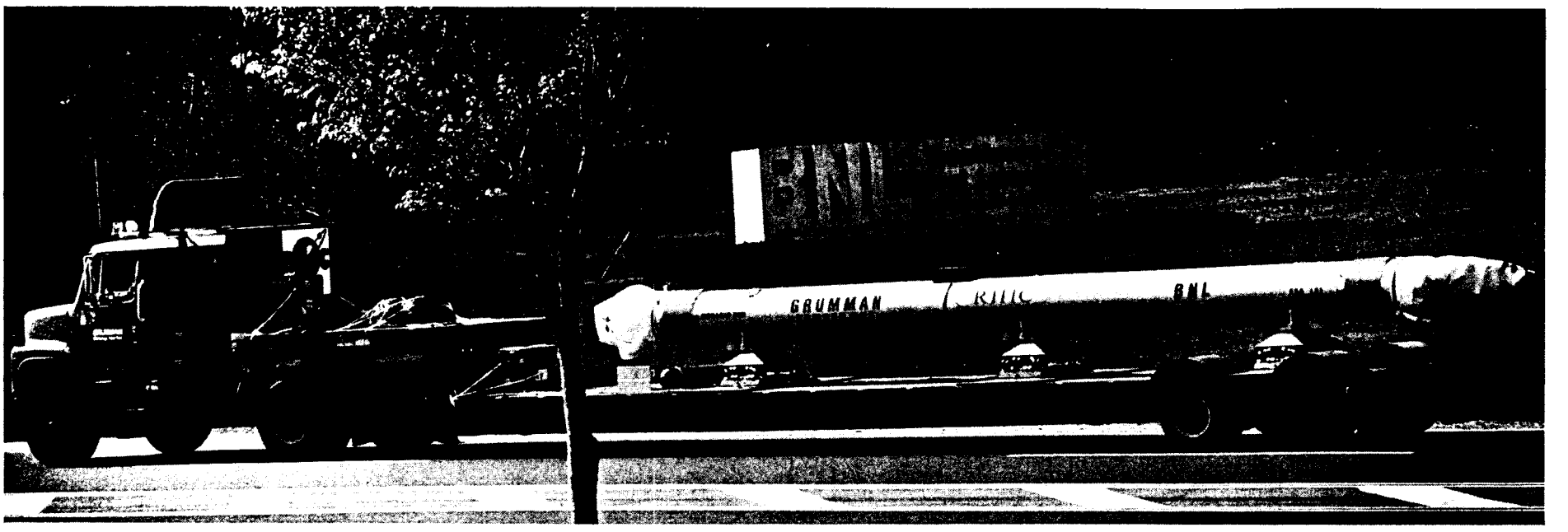
BROOKHAVEN NATIONAL LABORATORY



The first Northrop Grumman dipole magnet for BNL's Relativistic Heavy Ion Collider rolls through the Lab's main gate.

First Grumman-Produced RHIC Dipole Magnet Passes 'Quench' Test With Flying Colors

The first superconducting dipole magnet produced for BNL's Relativistic Heavy Ion Collider (RHIC) by private industry passed its first "quench" test with flying colors: On Monday, May 9, at 2:40 p.m., the magnet achieved a magnetic field of 4.33 teslas and carried 6,685 amperes of current before quenching, or losing its superconductivity and becoming resistant to electricity.

Tested at the RHIC operating temperature of 4.6 kelvins (K), or 4.6 degrees above absolute zero, the dipole exceeded its design requirements of 3.45 teslas and 5,000 amperes by more than 25 percent. Another calculation showed that the magnet carried almost 97 percent of the theoretical maximum current.

The 9.4-meter-long magnet is the first of 373 dipoles to be delivered by Northrop Grumman Corporation's Electronics Systems Division in Bethpage.

The dipoles will bend beams of heavy ions as they circulate in opposite direction around two intersecting rings built in a tunnel 3.8 kilometers in circumference. Traveling at nearly the speed of light, the two beams of heavy ions will be collided at six intersection points in the ring where detectors will be placed, in an attempt to recreate and observe the hot, dense plasma of quarks and gluons believed to have existed in the early universe immediately after the Big Bang.

An electromagnet, the dipole uses a superconducting cable, manufactured by Oxford Superconducting Technology, for its coils. The superconductor allows the magnet to operate at the high magnetic fields required for RHIC and with only the power needed to run the liquid-helium refrigeration. Superconductivity is a property of many metals, alloys and chemicals near absolute zero, at which temperatures these materials conduct electricity without any resistance.

Altogether, RHIC will be made up of 1,700 superconducting electromagnets, including dipoles, quadrupoles, sextupoles and special-purpose magnets. While industry is manufacturing about 1,200 of these based on BNL's designs, the remainder, mostly the special-purpose magnets, will be constructed in house.

The quench-test milestone was reached one week after the dipole was delivered and on the heels of the successful testing of the first RHIC quadrupole, or beam-focusing magnet, also produced by Northrop Grumman. The second dipole is expected to arrive at BNL during the week of May 16, and, at the delivery peak, one will roll in each day from Bethpage beginning at the end of this year until 1996.

Tech Transfer Success

"The success of this magnet lies in its design, as well as its production," comments RHIC Project Head Satoshi Ozaki, "so credit is first due to Erich

(continued on page 2)

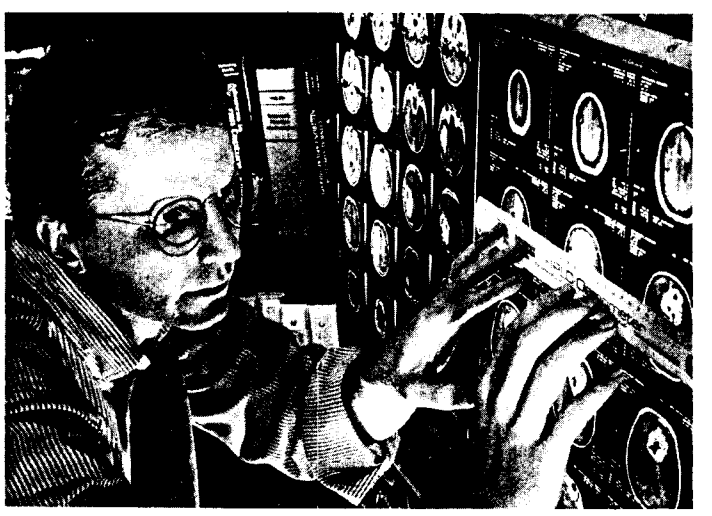
Taking receipt of the first Northrop Grumman dipole are: RHIC Project Engineer Michael Anerella (right, top) and Assistant to the RHIC Project Head for Production Management Douglas Fisher (right, bottom), as Materials Manager John Hulse (left, bottom) and Shop Supervisor Scott Seberg, both of Northrop Grumman, look on.

BNL Lecture: Boron Neutron Capture Therapy: Encouraging Results for Brain Cancer Treatment

Every year, several thousand people in the U.S. develop glioblastoma multiforme — a malignant brain cancer that carries with it an average life expectancy of about one year. At present, a combination of chemotherapy and radiation therapy is only moderately effective in improving this dark picture for some of these patients — less than three percent survive more than five years.

At Brookhaven, research has been ongoing for an experimental treatment called boron neutron capture therapy (BNCT), which has proven effective in animals with similar malignant brain tumors. For BNCT, a compound containing the element boron is administered to the brain cancer patient. The compound is selected for its property of accumulating in malignant brain tumors, and so the boron enters the tumor.

The tumor is then irradiated with low-energy neutrons produced at a nuclear reactor. Some of the boron nuclei absorb some of these neutrons and then self-destruct, releasing powerful, but very short-range radiation. Because the boron is mostly concentrated in the tumor cells, the cancer can be destroyed without seriously affecting normal brain cells nearby.



Jeffrey Coderre measures the size and depth of a patient's brain tumor on a magnetic resonance image.

Photos on this page by Roger Stoutenburgh

In BNL's Medical Department, Scientist Jeffrey Coderre participates in the Lab's forefront research on BNCT. He will give the 296th Brookhaven Lecture, "Boron Neutron Capture Therapy: Encouraging Results for Brain Cancer Treatment," to be held on Wednesday, May 18, at 4 p.m. in Berkner Hall. He will be introduced by Medical Department Scientist and BNCT collaborator Daniel Slatkin.

As Coderre will describe, clinical BNCT research was initiated at BNL over four decades ago. The world's first BNCT clinical trials were carried out at the Brookhaven Graphite Research Reactor (BGRR), but, by 1955, it became clear that the best BGRR neutron beam was probably too weak.

Accordingly, the smaller Brookhaven Medical Research Reactor (BMRR) was built, and another clinical trial was carried out there from 1959 to 1961. However, these BNL trials, as well as those done at the Massachusetts Institute of Technology at about the same time, were disappointing. Coderre will explain that the boron compound used then did not selectively accumulate in the tumor. Also, the neutron beam did not penetrate deeply enough into the patient's head to destroy the tumor without harming surrounding healthy tissue. So, the trials were halted.

BNL investigators and outside collaborators, led by the late Ralph Fairchild, continued BNCT research assiduously, using whatever resources were available to improve the boron compounds and the neutron beam. Meanwhile, the BMRR has not stood idle, but has been a valuable facility for other aspects of nuclear medicine research.

In the 1980s, improvements in two key areas allowed researchers to explore anew BNCT's potential to treat glioblastoma patients. First, as Coderre will relate, were his own investigations of a then-obscure compound, p-boronophenylalanine (BPA), which he showed to accumulate in tumors three to four times better than

(continued on page 2)

Sun or Moon? Day or Night?

The crescent moon? No, it's the crescent *sun*, as captured by BNL photographer Roger Stoutenburgh on Tuesday, May 10, near the peak of the solar eclipse, which, for Long Island, meant 84 percent blockage of the sun at 1:36 p.m. The next time our area will experience such an eclipse will be in the year 2017.

Healthline Lecture

The Return of Tuberculosis

For much of recorded history, tuberculosis (TB) has been the most frequent cause of long-lasting illness and the principal cause of death. A chronic infectious disease in humans and animals caused by tubercle bacilli bacterium, TB was once called consumption because its victims wasted away, since the infection spreads via the blood stream from their lungs to other organs and "consumes" the victim. The hallmark consumptive cough is the mechanism by which the bacteria is transmitted to others.

Since the birth of antibiotics in the 1930s, TB was thought to be confined to the sanatoria of history and undeveloped countries. In fact, just ten years ago, the United States had the lowest TB rate in modern history.

What happened since then will be discussed in "Tuberculosis 1994," the next Healthline lecture. Sponsored by the Health Promotion Program (HPP) of the Occupational Medicine Clinic (OMC), the talk will be presented by physician and OMC Head Bryce Breitenstein on Tuesday, May 17, at noon in Berkner Hall. All are invited.

As Breitenstein will discuss, TB returned as a public health threat for several reasons, including overprescription of antibiotics for other diseases, and the development of multiple drug-resistant strains of TB. This has been compounded by the appearance of AIDS, and the problems of poverty and homelessness.

Breitenstein will review TB's symptoms, diagnosis and treatment, and suggest preventive measures.

Breitenstein took his M.D. from the University of Oregon and his M.P.H. from the University of Washington. A professor of Clinical Preventive Medicine at the State University of New York at Stony Brook Medical School, he is certified by the American Board of Preventive Medicine in occupational medicine, the American Board of Internal Medicine and the American Board of Medical Management.

To register for this lecture, return the bottom portion of the Healthline flyer recently sent to all employees to Health Promotion Specialist Mary Wood, Bldg. 490, by Monday, May 16. For more information, call Ext. 5923.

RHIC Dipole (cont'd)

Willen, Gene Kelly and George Ganetis, who led BNL's magnet experts in the research and development work and in building 12 prototypes in our magnet facility.

"The production would not have been possible without the successful transfer of superconducting magnet technology from the Lab to industry," Ozaki continues, "and this was done not only with the skill and commitment critical to U.S. competitiveness in science and technology, but also with the spirit of partnership."

Ozaki concludes, "Finally, I wish to compliment Northrop Grumman on the excellent tooling, manufacturing expertise and superior workmanship demonstrated in the production of this magnet — and congratulate its magnet-building team for scoring another bull's-eye with this dipole, just one month after delivering their first quadrupole, which was also on target."

"We all have been working very hard with Northrop Grumman to make sure that the production was perfect — and our great care has paid off," says RHIC Magnet Division Head Horst Foelsche of the approximately 50 employees within the RHIC Project involved in transferring magnet technology.

The Grumman-BNL dipole collaboration began in June 1992, with the signing of the single largest RHIC-construction contract. After that, Northrop Grumman technicians and engineers came to BNL to work on assembly and testing of the last two preproduction dipoles. Then, BNL's designers, technicians and engineers worked with their counterparts at Northrop Grumman to design the tooling needed to manufacture dipoles. Finally, many within the RHIC Project traveled regularly to Northrop Grumman to be consulted during the assembly process.

After the first dipole arrived on Monday, May 2, Physicist Peter Wanderer and the Magnet Test Group that he leads repeated the checks and room-temperature measurements that were made at Northrop Grumman. Once the magnet was mounted on the test stand, the liquid-helium cool-down to 4.6 K began at noon on Saturday, May 7. Following morning checks of the power system, power was delivered to the magnet beginning Monday, May 9, at 2:15 p.m., and it ran until it quenched at 2:40 p.m.

"We were elated with its performance," states Wanderer. "And, from our past experience with superconducting magnets, we know that, if a magnet survives the electrical processes in the first quench, then it will do well in successive quenches."

According to Wanderer, mechanical, electrical and magnetic-field testing of this first magnet will continue over the next two weeks and will be "more elaborate than what will be done with the magnets delivered in the future because, as we gain confidence in Northrop Grumman's production, we will have to test less."

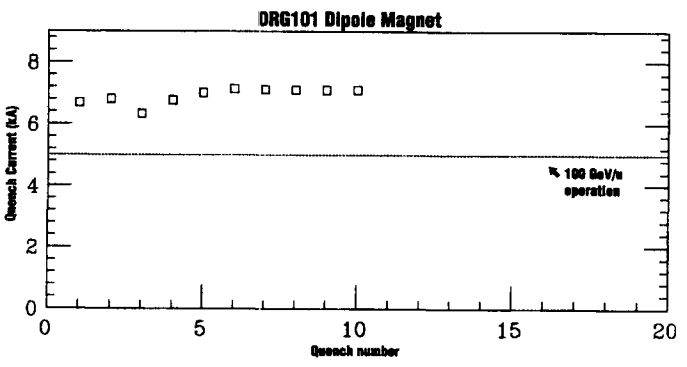
In fact, only the first 30 magnets will be tested at 4.6 K as well as at room temperature. Of the remaining 343, a random 10 percent sampling will be checked out both cold and warm. The rest will be measured only at room temperature due to the expense of cryogenic tests and confidence in the correlation between the results from warm vs. cold testing.

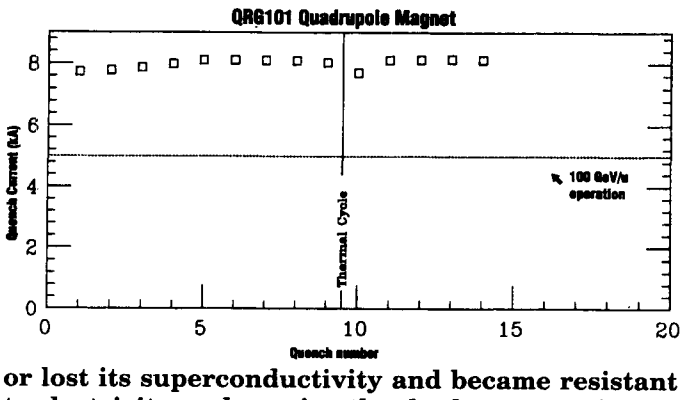
Having passed its tests, this magnet and subsequent ones will be moved to the RHIC tunnel. As with many of today's superconducting accelerator magnets, the design of this dipole can be traced back to one developed in the early 1980s by Brookhaven's Robert Palmer for the Colliding Beam Accelerator. While that collider was not built, its tunnel is now the site of RHIC.

There, starting in 1995, the magnets will be assembled into the collider and, assembled sections, beginning with the first sextant of 32 dipoles plus 36 of the 432 Northrop Grumman-built quadrupoles and 24 of the 300 sextupoles to be built by Everson Electric Company, will be tested.

"Magnet production for RHIC is now fully under way, both in industry and at BNL, and, until the job is done, we intend to maintain the high standards of construction and performance shown by these first magnets," concludes Foelsche.

— Marsha Belford





Plots of the first ten and 14 "quenches," respectively, of the first industry-built RHIC dipole and quadrupole magnets, showing the maximum currents (boxes) reached by each magnet before it quenched, or lost its superconductivity and became resistant to electricity, and proving that both magnets far exceed the current required to operate the Relativistic Heavy Ion Collider (dotted line).

BNL Lecture (cont'd)

in normal brain tissue.

In 1989, Coderre received a nuclear-medicine research grant from the U.S. Department of Energy's Office of Energy Research to test BPA. By 1993, he had become the principal investigator in a Cooperative Research and Development Agreement with Boron Biologicals, Inc., of Raleigh, North Carolina, by then the sole commercial source of boron compounds used for experimental BNCT in the U.S.

The second key area of improvement is the development of the intermediate-energy neutron beam. When developed at BNL in the 1980s, it was the most intense of only three beams in the world suitable for modern BNCT.

This impressive intensity has recently been improved even further by Medical's Hungyuan Liu, who, as Coderre will relate, used sophisticated computer methodology to redesign the beam and increase neutron penetration into the brain while greatly reducing the probability of scalp complications. A further upgrade that Liu has proposed is expected to be completed within about a year and will radically decrease a patient's exposure time — from 30 to 40 minutes down to 2 to 3 minutes.

Coderre will detail how, in tests approved by the BNL Human Studies Review Committee and the U.S. Food and Drug Administration, BPA is being studied in patients who receive BPA intravenously, in a collaborative effort with Beth Israel Medical Center, New York City. If this study continues to be as successful as it has been to date, Coderre will conclude, a therapy trial will start with patients at the BMRR within 12 to 18 months.

Jeffrey Coderre graduated from Southampton College in 1975 with two B.S. degrees, one in marine science and one in chemistry, then spent a year at the University of Iceland on a Fulbright Scholarship. From 1976 to 1981, he was at Yale University, where he received his Ph.D. in chemistry.

After a three-year postdoctoral position at the University of California, San Francisco, Coderre joined the Medical Department as an assistant scientist in July 1984, becoming associate scientist in 1986 and scientist in 1989. In October 1989, he was granted a continuing appointment. In 1987, he won a Southampton College Distinguished Alumnus Award, and, in 1990, was honored with the Award for Excellence in Research by the Sidney Melanoma Foundation, Australia.

After the lecture, all are invited to join the speaker for discussion and refreshments. To accompany him to a dinner at a restaurant off site, call Gloria Ganci, Ext. 3673.

Upton Post Office Appreciates You

If you buy stamps, mail letters and packages, or have a mailbox at the Upton Branch of the U.S. Postal Service (USPS), then you are an Upton P.O. customer — and the Upton P.O. appreciates you.

As part of the USPS Customer Appreciation Week, Upton Postmaster Jeanine Fornsel invites all BNLers to attend its Customer Appreciation Day open house on Wednesday, May 18., from 11:30 a.m. to 1:30 p.m. at the Post Office in Bldg. 179 and to partake in light lunch refreshments.

At that time as well, customers are welcome to express their opinion about postal service and to inquire about any USPS services. For more information, call Ext. 2539.

Play Bridge Tuesdays

The BERA Bridge Club invites players with or without partners to attend its next duplicate contract-bridge games on Tuesdays, May 17 and 31, at 7:30 p.m. in the Brookhaven Center. For more information, call club president Willem van Asselt, Ext. 7778.

Note to Employees

Attendance at lectures, meetings and other special programs held during normal working hours is subject to supervisory concurrence.

Two Art Bus Trips

The BERA Art Society has two bus trips planned, and all are welcome on both. Call Liz Seubert, Ext. 2346, for information and tickets:

Saturday, June 25 — See one of the world's greatest collections of American antiques — furniture, rugs, paintings, china, silver and woodwork — at Winterthur mansion in Delaware's Brandywine Valley. Also, wander through the extensive gardens, taking the garden tram to see more of the 200 acres of naturally landscaped meadow and woodlands. To break the return journey, spend two to three hours on the Pennsylvania side of the Delaware River in New Hope — a picturesque village with antiques shops, cafes and a horse-drawn boat ride on the canal available, as well as great ice cream.

The luxury coach will leave the BNL tennis court parking lot at 6:15 a.m., arriving at Winterthur at 11 a.m. with a coffee stop on the way. At 11:30 a.m., visit the house for one hour, then lunch in the cafeteria or eat sandwiches and tour the garden. At 2:45 p.m., leave for New Hope, arriving at 3:45 and leaving at about 6:30 to return to BNL by 10 p.m.

Coach tickets are $20 each; Winterthur guided visit and garden tram tour is $10. The optional half-hour canal trip costs $6, but if enough people are interested, the group may qualify for a discount.

Tomorrow, May 14 — A few seats remain at $17 each for a bus trip to Brooklyn Botanical Gardens and Art Museum, 9 a.m to 6:30 p.m.

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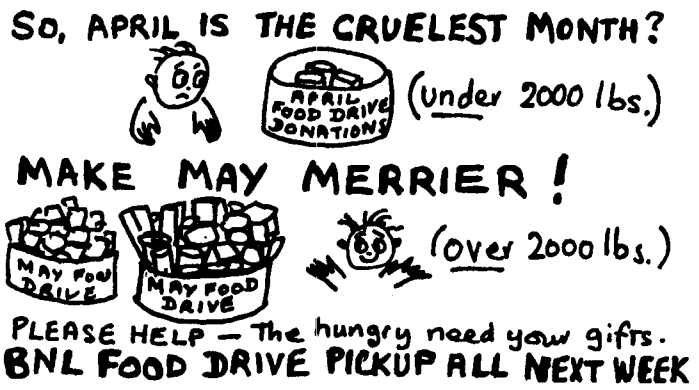
Basketball Champions

Though the Runaways ran away with the regular play by finishing 7-1, Magic, which had completed the season 6-2, worked some of its wizardry during the championship game on April 21, defeating the Runaways 95 to 84. Pictured are the 1994 Basketball League champions: (top, from left) Magic co-captain and forward Terrence Buck, forward Patrick Brown, center Neil Donahue, captain and forward Mitchell Williams; (bottom, from left) forward Raymond Jackson, guard James Garrison, and guard Carlos Victoria. Absent from the picture: guard Derrick Hoggard, guard Troy Mayo and center James Rank. As the game's high scorers, with 34 and 38 points respectively, Terrence Buck and Troy Mayo were named most valuable players.

Roger Stoutenburgh



Equipment Demo

On Thursday, May 19, from 10 a.m. to 2 p.m., Faber Associates will offer an equipment demonstration in Berkner Hall. A distributor of industrial process heaters, controls and high-technology motion and automation equipment, Faber Associates will feature the products of Chromalox, Fenwal and Parker/Daedal, among other manufacturers, including such products as electric process heaters, temperature controls, and servo motors, drives and systems.

Indo-American Group To Present Film

The BERA Indo-American Association will present an Indian feature film entitled *Sholay* on Sunday, May 22, at 2 p.m., in Berkner Hall. The film involves two ex-convicts who help a retired police inspector convince the people of his village to challenge rather than submit to the most feared outlaws of the jungles. There is powerful dialogue with multi-star casting in this popular Hindi-language movie with English subtitles.

Tickets are $1, if reserved by Friday, May 20, or $2 at the door. For reservations and information, call Ramesh Gupta, Ext. 4805; Syed Khalid, Ext. 7597; Anant Moorthy, Ext. 7582; Anand Saxena, Ext. 4844; or Raj Shah, Ext. 3231, during the day; or Gupta, 924-8113, or Khalid, 744-5895, after work.

Handouts Available

If you attended Tuesday's lecture on women and heart disease by physician Lila Wallis, Clinical Professor of Medicine at Cornell University medical College, and did not receive the accompanying handouts, copies are now available at the reception desk of the Clinical Research Center in the Medical Department, Bldg. 490.

In Memoriam

The following retirees passed away recently:

Richard N. Hill, who retired as Procurement Supervisor in the Division of Contracts & Procurement on January 22, 1988, died April 30, at the age of 67. His 40-year career at BNL began on March 10, 1947, when he joined the new Laboratory as a clerk B in the Technical Services Division.

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Thomas Eff, a steamfitter A at the Lab for 15 years, died May 3. He was 69 years old. When he joined BNL on March 19, 1962, he began working in the Plant Maintenance Division; by the time he retired on September 18, 1977, it had become the Plant Engineering Division.

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Edwin Hagelberg, who retired from the Safety & Environmental Protection Division on July 31, 1977, as a technical associate II, died May 4, at 80 years of age. Beginning on March 8, 1948, as a technician A in the Electronics & Instrumentation Division, he spent 28 years at BNL.

Volleyball Party

Celebrate the end of the volleyball season on Friday, May 20, from 5:30 to 11 p.m., in the Recreation Building. The cost of the volleyball party is $15 per person, if paid by Monday, May 16; after May 16, the cost is $18.

Contact Terry Sullivan, Ext. 2840, or Ken Sutter, Ext. 4514, for tickets and information.

Wednesday, May 18
11:30 a.m. to 1:30 p.m.
in the parking lot opposite Berkner Hall

Hospitality News

The Women's Forum, conducted by Marion Davis-Parzen and sponsored by the BNL Hospitality Committee, will meet Tuesday, May 17, from 10 a.m. to noon, in the lounge of the Recreation Building in the apartment area, to discuss problems or concerns facing women. Join the group to share your experiences, whether you are new to the Lab or have lived on site for a while. Wives of Lab employees and guests are welcome.

TGIF Social Next Week

Come to the Brookhaven Center after work on Friday, May 20, to celebrate the end of the work week — at the monthly informal Thank-Goodness-It's-Friday Social, sponsored by the BNL Ballroom, Latin & Swing Dance Club.

From 5:30 to 11 p.m., all are invited to the North Ballroom of the Brookhaven Center to lindy, polka, fox-trot, mambo or just dance the night away to selections from club member Ralph Izzo's CD collection of dance music. Food and beverages are available at the Center Club.

All are invited. The club will use the suggested donation of $1 per person to purchase more dance music. For more information, contact John Millener, social chairman, Ext. 3853.

Bowling

Red/Green League

E. Beadle bowled a 257/221/654 scratch series, H. Arnesen 254/222/666 scratch, A. Warkentien 246/237/201/684 scratch, E. Larsen 242, R. Raynis 237/215/213/665 scratch, R. Mackinnon 235/215/639 scratch, K. Koebel 225, R. Mulderig 224/214/210/648 scratch, M. Palumbo 223/602 scratch, M. Guacci 220, J. Goode 217/205, K. Asselta 216, E. Sperry IV 209, A. Pinelli 208, C. Bohnenblusch 201/201, E. Sperry III 200.

Purple League

Ed Sperry IV bowled a 213/206/613 scratch series, Norman Fewell 212, Kerry Botts 211, Phyliss Fewell 172.

White League

John McCarthy 258, Mike Meier 235, Pat Manzella 213/207/188/608, Jim Goode 206, Jeanne Penoyar 184, Sharon Smith 182, Gerry Riker 170.

Arrivals & Departures

Arrivals

Raymond F. Duffield Jr. ..... MIS
Lisa A. Kelly ..... AUI

Departures

This list includes all employees who have terminated from the Lab, including retirees:

Manuel J. Abad ..... Plant Eng.

Note to Diners

On Saturday, May 14, diners will be served at the Brookhaven Center, rather than the Cafeteria, from 9 a.m. to 2 p.m., because Berkner Hall will be devoted that day to the annual Elementary School Science Fair.

Cafeteria Menu

Monday, May 16	
Soup: Beef barley	.80/1.10
A la Carte: Kielbasa w/warm potato salad	3.65
Fitness: Vegetarian lasagna	3.35
Deli: Pastrami sandwich	2.95
Grill: Philly cheesesteak	2.95
Tuesday, May 17	
Soup: Chicken noodle	.80/1.10
A la Carte: Sausage & peppers calzone	3.35
Fitness: Macaroni & cheese	3.45
Deli: Virginia ham	2.95
Grill: Denver omelet	2.95
Wednesday, May 18	
Soup: Gazpacho	.80/1.10
A la Carte: Beef & bean burritos	3.25
Fitness: Enchiladas verdes	3.85
Deli: Roast beef	2.95
Grill: Reuben	2.95
Thursday, May 19	
Soup: Senate bean	.80/1.10
A la Carte: Bonnie's chicken	3.65
Fitness: Eggplant parmesan	3.65
Deli: Corned beef	2.95
Grill: Ham & cheese	2.95
Friday, May 20	
Soup: New England clam	.80/1.10
Display cooking: Caesar chicken	4.65
Fitness: Pasta primavera	3.45
Deli: Hot roast turkey	2.95
Grill: Tuna melt	2.95

Classified Advertisements

Placement Notices

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

Each week, the Personnel Division lists new placement notices. The purpose of these listings is, first, to give employees an opportunity to request consideration for themselves through Personnel, and second, for general recruiting under open recruitment. Because of the priority policy stated above, each listing does not necessarily represent an opportunity for all people.

Except when operational needs require otherwise, positions will be open for one week after publication.

For more information, contact the Employment Manager, Ext. 2882, or call the JOBLINE, Ext. 7744 (282-7744), for a complete listing of all openings.

LABORATORY RECRUITMENT - Opportunities for Laboratory employees.

DD 0195. BIOLOGY ASSOCIATE - Requires BS in physics or engineering and a knowledge of instrument design. Computing experience is desirable. Will oversee the daily operation of the High Flux Beam Reactor biological neutron-diffraction facilities and act as biology safety officer. Familiarity with fabrication techniques and cryogenic systems is also highly desirable. Biology Department.

OPEN RECRUITMENT - Opportunities for Laboratory employees and outside candidates.

NS 0531. ENGINEERING POSITION - (term appointment) Requires BSEE or equivalent and experience in digital signal processing, with emphasis in digital control systems and a working knowledge of the TI 320C30 processor and its assembly language. Experience with PLDs, the AMID MACH series, complex PLDs, and the PALASM PLD programming language is also required. Responsibilities will include programming DSP algorithms in assembly and C for a digital control system, as well as designing digital interfaces for power supplies. RHIC Project.

NS 2769. CONSTRUCTION SUPPORT SUPERVISOR - Requires prior experience and knowledge within construction trades, with an emphasis on architectural and asbestos abatement preferred, a working knowledge of general construction practices and formal OSHA training. Will be responsible for assisting in the control and administration of contract labor, task order and lump sum in a variety of construction trades that support construction, improvements and modifications to buildings and grounds. Will determine work schedules/distribution, staffing requirements, and maintain time records for contract-labor and task-order personnel. Plant Engineering Division.

Motor Vehicles & Supplies

93 HYUNDAI SONATA - black, V-6, anti-lock brakes, p/sunroof, anti-theft stereo, tinted windows. Ext. 2459 or 287-3262 after 5 p.m.

91 VW JETTA GL - Calypso green, 5-spd., extras, excel. cond., best offer. 874-2953, leave message.

90 ACURA INTEGRA LS - ac, stereo, a/t, sunroof, anti-lock brakes, new radials, alarm, 2-dr., immac., $8,500. 289-8105.

89 FORD PROBE - 6-cyl., 5-spd., ac, sunroof, am/fm cass. stereo, hood lock, red, gray int., $5,400 neg. Chris, 765-4983 after 6 p.m.

89 HYUNDAI EXCEL GLS - 5-spd., 4-dr., ac, am/fm cass., 55k mi., mint cond., $2,500. Ext. 5881, leave message.

88 ISUZU TROOPER - 5-spd., 4wd, 69k mi., stereo cass., mint cond., $6,700. Donna, 924-5062.

87 KAWASAKI KZ305B2 MOTORCYCLE - 13k mi., new rear tire, recent tune-up, excel. cond., $800. John, 367-6684.

87 TOYOTA SUPRA - loaded, excel. cond., best offer. Ext. 3695, leave message.

87 CHEVY CAPRICE CLASSIC - 116k mi., needs some work, asking $1,750. Billy, 874-3804.

86 CHEVY MONTE CARLO - Super Sport, T-top, new brakes & tires, asking $5,000. Pete, Ext. 5105, or John, 737-9614 after 6 p.m.

85 PORSCHE 911 CARRERA - conv., white, black top, leather int., ac, p/b, p/s, new brakes & sensors, Yoko-ZR-16 tires, 36k mi., $26,000. Jim, 289-0876.

85 FORD LTD WAGON - p/s, p/b, ac, am/fm cass., a/t, 109k mi., looks good, runs well. Betty, 758-2653.

85 HONDA ACCORD - maroon h/b, 85k mi., loaded, no rust, runs well, all maint. records, cream puff. Harriet, Ext. 3484 or 331-7917.

84 BUICK SKYHAWK - a/t, ac, rebuilt tran., good cond., $1,000; '82 Chevy Celebrity, 62k mi, 4-dr., runs well, $1,500. Jane, Ext. 4909.

81 FIAT SPIDER - convertible, red, runs, needs transmission, engine good, $2,000 neg. 929-4850.

81 GMC CIERA TRUCK - 4wd, 350, mint, must see, $4,000. Kris, 581-8438.

80 CORVETTE - tan, a/t, p/s, p/b, p/w, p/l, ac, tilt, cruise, glass T-top, Rally rims, am/fm cass., $7,300 neg. Phil, Ext. 4030 or 732-8124.

77 SHASTA TRAILER- 19', self-contained, single axle, sleeps 4-6, v.g. cond., asking $2,000. Dan, 698-7322.

73 CHRYSLER IMPERIAL - 440 ci, 727 torque right, leather int., $1,200. Ext. 7908.

RIMS - '90 Toyota 4wd truck, Style steel rims, 4 ea. w/ lugs, locks, caps & 31x10.50R15 Bridgestone tires, best offer. Larry, Ext. 3506 or 281-2002.

WHEEL COVERS - 15", wire, new, $268. Cheryl, Ext. 5562.

TIRES - 2, P225x75R14, excel., $35 ea. 698-9274.

Boats & Marine Supplies

25' COLUMBIA II - 1991 Northsider, dinette, galley, V-berths, head, depth recorder, fish finder, cockpit liner, mint, many extras, $33,000. Sue, Ext. 4931.

23' PUMA SAILBOAT - all fg, sleeps 4, galley, fixed keel, mooring, dinghy, motor, sails good shape, extra sail, $2,950 neg. Mike, Ext. 7861 or 698-3967 eves.

19' FIBERFORM - 1976, V-8 Mercruiser i/o, V-bunk, DF, VHF radio, needs work, neg. Bob, Ext. 5286 or 298-9594.

19' 4 WINNS - 1987, cuddy, canvas, 190-h.p. FWC Merc. i/o, no trailer, $6,000 or best offer. Michael, Ext. 2081 or 878-9384.

19' CHAPARRAL 198XL - 1988, 165-h.p. Mercruiser i/o, 1993 EZ-Load Rite trailer w/power winch, am/fm stereo, mint cond., $10,500. Ext. 3376.

19½' SEA SPRITE - 1989, cuddy cabin, low hr., 130-h.p. Merc. i/o, Shoreline trailer, DF, SS radio, excel. cond., $8,300 neg. Phil, Ext. 4030 or 732-8124.

18' COBIA HOLIDAY - 1978, 115-h.p. Merc., good running cond., $1,800. Roger, Ext. 7518 or 878-8847.

JET SKI - Kawasaki, 1987, 650SX, w/trailer, minifold, dual carbs., water box, cavitation plate, very fast, $1,950. Matt, 744-0251.

MOTOR - 7-h.p. Mercury ob., like new, 289-5134.

WINDSURFER - complete beginner/int. rig, excel. cond., $150. Gwyn, Ext. 7529.

Furnishings & Appliances

BEDS - queen, futon, $75; queen platform, teak, 10' headboard, attached night stands, $250. 474-8715.

BED - king-size, frame, mattress. Wolfgang, Ext. 4795.

BEDROOM - bookcase headboard, chest, dresser w/ mirror, 2 night tables, new full mattress, boxspring, $300. Frank, Ext. 2314 or 567-6419.

BEDROOM SET - girl's, white, desk w/hutch, chair, dresser w/mirror, headboard, $150. Doug, Ext. 4661.

BEDROOM SET - girl's, 5-piece, $100; custom twin water bed w/drawers, $200; large maple corner TV cabinet, $25. 289-8212.

BEDROOM SET - dresser, w/2 mirrors, chest of drawers, headboard, cherry wood, asking $150; table w/4 chairs, good cond., $100. Bill, 331-6617.

CHEST OF DRAWERS - $50; vacuum, $20; desk, $50; painted country basket, $10; TV stand, $10. Kathy, 744-2203.

COMPUTER DESK - $55; swivel chair, $20; dining table & 4 chairs, solid wood, $50; iron & ironing board, $10; lamps, telephones, etc. Ext. 4331.

DEHUMIDIFIER - Sears Kenmore, 20 pts., auto, model #5320, $100. Norman, 821-2619.

DRAFTING TABLE - 6', $30. Terry, 499-8377.

Tools, House & Garden

EVERGREENS - globes, medium size, excel. for border, $10-$15/ea. Cora, Ext. 7681.

FIREPLACE DOORS - glass & screen, 39"x28", polished brass, brand-new, in box, $75. Ext. 3884.

LAWN EQUIPMENT - rear bag, auto. drive lawn mower, gas blower, gas weed whacker, like new. 289-8105.

LAWN MOWER - Craftsman, 22" cut, self drive, side bag, $50. Dan, 698-7322.

LAWN MOWER - Black & Decker, elec., 18" push mower, good cond., asking $50. Don, Ext. 7237 or 744-2921 after 5:30 p.m.

PATIO SET - glass table w/umbrella, 4 chairs w/ cushions. Yan, Ext. 5753 or 345-9046 eves.

POOL - 15' round, needs new liner, you take down & remove, $175. Sue, Ext. 2483.

RADIAL ARM SAW - Sears, $200; Sears wood lathe, w/accessories, $175. Ext. 5316.

TRAILER LAWN SWEEPER - leaf raker, Sears, 30", $25; hockey sticks, $2/ea.; tetherball, $10. 473-6546.

TREES - Japanese maples, $10-$45+. Mauro, 265-6542.

Sports, Hobbies & Pets

BICYCLE - Motobecane, 18-spd., 23" frame, good cond., $100. Viorel, Ext. 7104.

LACROSSE GLOVES - Brine L-35, floating cuff system. Frank, Ext. 2314.

SEWING MACHINE - Kenmore, w/cabinet, works, recently serviced, $5. Victor, Ext. 2395.

PING-PONG TABLE - w/paddles, $30. Lloyd, Ext. 5225.

TENNIS BALLS - 1 dozen, $3. Ext. 7505.

BIKES - several, children's, $15-$25. Sue, Ext. 2483.

DOG CAGE - medium size, w/sheet metal bottom, heavy gauge wire, collapsible. Artie, Ext. 5029.

FERRET - sable, 1½ yrs. old, very friendly. John, Ext. 3675 or 924-3528.

FISH TANK - new, 10 gallon, w/filter system, heater, neon lamp, top, decorative rocks & plants, asking $50. Ray, Ext. 3680.

GO-CART - 5-h.p., excel. cond., $400. Roy, 727-6714.

GYM - Marcy EM1, freestanding, 200 lbs., bench, lats, curls, leg stations, sit-up bench, accessories, excel. cond., $400. Bill, 331-6617 after 6 p.m.

KNITTING MACHINE - Big Phil, $100; yarn stand, $65; yarn cones, knitting magazines, 50¢; pattern books, $1. Sally, 821-1726.

ROWING MACHINE - West Bend 5100, excel. cond., $50. Zhongwei, Ext. 4331 or 924-5181.

STAMPS - U.S. collection, several old & rare postage stamps. Greg, Ext. 7960.

TENNIS RACQUET - Wilson Sting II, recently restrung, mint cond., $50. Lenny, Ext. 4467.

Audio, Video & Computer

COMPUTER - IBM compat., WordPerfect, dot matrix printer, excel. cond., best offer. Dorry, Ext. 2078.

COMPUTER - Commodore 128, 1541 II disk drive, MPS 1,000 printer, Thomson color mon., manuals, joysticks, 75+ programs. Rich, Ext. 7013.

COMPUTER - Apple IIC, mon., ImageWriter printer, programs, $200. Terry, 499-8377.

CD PLAYER - Yamaha CDX-450, broken, almost new, worth repairing, $20 neg.; 286 motherboard, w/10 MHz CPU, $45. John, Ext. 4877.

SUPER NINTENDO GAMES - $25/ea.; 19" color TV, not cable-ready, works well, $45. Ext. 7505.

PROJECTOR - for slides, GAF-2680, works, $50 neg. Ext. 2683 or 751-2469.

VCR - Fisher, boxed, $225; 19" RCA color TV, w/cable converter box, $150; computer table, $50. 289-8212.

The Brookhaven Bulletin is printed on paper containing at least 50 percent recycled materials, with 10 percent post-consumer waste.

SPEAKERS - AR-10 TT, rebuilt, sound great, good cond., asking $75/pair. Don, Ext. 7237 or 744-2921 after 5:30 p.m.

Miscellaneous

SNOW SKIS - $45; kitchen cupboard, $100; wicker letter holder, $15; vacuum, $20; plant stand, $10; spotlight, $15. Kathy, 744-2203.

BOOTS - men's western, leather, Justin Roper's, 7½D, black; Acme, 10½D, black w/red stitching, almost new. Pat, Ext. 5406 or 744-8512 eves.

CAR SEAT - Fisher Price, for infants to 40 lbs., excel. cond., $25. Kathleen, Ext. 5868.

PLAYHOUSE - Little Tykes, like new, $65; Fisher Price car seat, $35. Wayne, Ext. 4010.

PROM DRESS - Gunne Sax, peach satin, strapless, lace trim, size 11, perfect cond., $50. 473-6546.

RING - women's, 14 kt. gold, 2 carat total diamond weight, cocktail, w/$3,195 appraisal, size 10, $700. Ruth, Ext. 3305.

TICKETS - bus trip to Atlantic City, 6/4, Trump Plaza, $25, $5/return, pickup at exit 63 or TJ Maxx, Riverhead. Kiesha or Rosemary, Ext. 3319 or Ext. 5036.

Lost & Found

LOST - earring, diamond stud, 1/4 ct., near Bldg. 475 on 5/6. Ext. 2774 or 924-3476.

Free

KITTENS - for adoption, 3 black females, 7 weeks old. 567-5334 after 8 p.m.

PIANO - upright, Baldwin, school-type, plays well, looks OK, you move. Greg, Ext. 2575 or 399-1258.

SOFA BED - Castro, 6' long, dark brown, you pick up, like new. Nick, Ext. 7307.

THUNDERBIRD - 23', f.g. hull, excel. cond., cuddy cabin, no motor, no trailer, you haul. 281-1832, eves.

Yard & Garage Sales

ROCKY POINT - Upton Nursery School benefit, children's toys and clothing, Sat. 5/14, 8 Brightview Dr., items accepted for sale. Cindy, 744-1090.

SHOREHAM - multifamily, 5/14, raindate 5/15, 10 a.m.-4 p.m., Bradley to Otis to 3 Vega Dr.

Real Estate

Real Estate advertised for sale or rent is available without regard for the race, color, creed, sex or national origin of the applicant.

For Rent

BAITING HOLLOW - beach cottage, sleeps 4, l/r, eik, full bath, deck, priv. beach, laundry, rec. hall, near farms, Splish Splash, wineries, $400/wk., multi-week discount. Mike, Ext. 7861 or 698-3967 eves.

CENTER MORICHES - waterfront house to share, lg. bdrm., priv. bath, lg. yard, dock in back yard. Skip, Ext. 3806.

CENTEREACH - sunny, 1-bdrm. bsmt. apt., sep. ent., $575/mo. + 1 mo. sec., nonsmoker, single, pet possible. 467-4649.

FARMINGVILLE - legal, lg. studio apt., 1-2 nonsmokers, no pets, $550/mo. incl. util. & cable. Bea, Ext. 3642 or 732-2472.

JAMESPORT - apt. to share in large, sunny, 2-story house, bdrm., l/r, eik, d/r, porch, deck, cable, $400/all. 473-1658.

MANORVILLE - new home, avail. 6/1, 2 bdrm. + 1 spare room, d/r, l/r, kit., laundry rm., d/w, lg. backyard, quiet area, no pets, $900/mo. Joe, 878-1602.

MIDDLE ISLAND - Artist Lake, 1 bdrm., l/r, d/r, working kit., plenty of closets, 5 min. from Lab, w/d, ask. $750/mo. + elec. & 1 mo. sec., avail 6/1. 744-8002.

MILLER PLACE N. - 2-bdrm. cottage, l/r, eik, deck, porch, lg. yard, close to schools, beach, pond, $750/mo. 928-1435.

NORTH SHIRLEY - room avail. in shared ranch, quiet neighborhood, lg. yard, bsmt. storage, friendly dog, 5 min. to Lab. 281-0839.

PATCHOGUE VILLAGE - sunny, 1-bdrm. apt., ground floor, walk to town, 15 min. to Lab, furn. or unfurn. 289-8105.

RIDGE - Strathmore, 2-bdrm. condo, appliances, $675/mo. + util. 474-0503 eves.

SHIRLEY - 3 bdrm., l/r, d/r, eik, laundry rm., new w/w, oil/hot water, fenced-in yard, 1 mi. to Smith Point Bridge, $900/mo. + util. 744-5448

SOUND BEACH - 1-bdrm. apt., l/r, eik, full bath, spacious, priv. driveway, cable, 15 min. to Lab, 1 mi. to beach, single, nonsmoker, no pets, $500/all. Ext. 7918 or 744-7007.

EASTHAM, CAPE COD - 4-bdrm. home, completely furn., 2 baths, w/d, d/w, deck, short walk to beaches, weeks open July/Aug. Stan, Ext. 2384.

POCONOS - Shawnee, Memorial Day getaway, 5/22-29, townhouse, sleeps 8, Jacuzzi, in/outdoor activities, $400/neg. Charles, Ext. 5214 or 321-6674 eves.

KEY WEST, FL - 1-bdrm. oceanfront timeshare, Coconut Beach Resort, sleeps 4, full kit., ac, TV deck, pool, Jacuzzi, fish, swim, nightlife, $1,050/wk. of July 23-30. Pat, Ext. 2539 or 929-3586.

KEY WEST, FL - oceanfront studio timeshare, Coconut Beach Resort, sleeps 2, refrig., microwave, ac, TV, deck, pool, Jacuzzi, fish, swim, nightlife, $700/wk. of July 23-30. Ralph, Ext. 2539 or 929-3586.

MT. DESERT ISLAND, MAINE - lakefront, full furn. 1 rm. cottage w/sleeping loft, kitchenette, bath, fp, deck on Echo Lake, Acadia Nat. Park, 6/25-10/15, $450/wk. Bob, Ext. 2514.

HILTON HEAD ISLAND, SC - 2-bdrm. condo, sleeps 6, fully furn., 2 baths, pool, beach, golf nearby, April-Sept., $450/wk. for BNL employees and family members. Guy, Ext. 3147 or 689-5378.

For Sale

CENTER MORICHES - 3-bdrm., possible M/D, l/r, d/r, fam. rm., deck, fenced yard, new siding, rugs, kit., boat ramp 30 yds. away, park area, move right in, ask. $136,000. 878-3376.

CENTER MORICHES - 4-bdrm. Cape, 2 baths, full bsmt., city water, igp, cabana, shed, 2 park-like acres, $199,900. 878-1529.

CENTER MORICHES - 4-bdrm. Colonial, l/r w/fp, d/r, eik, full bsmt., TV/laundry rm., 1.5 baths, oil heat, att. gar., town water, near all, 10 mi. to Lab, $165,000. Marilyn, Ext. 2259 or 878-0939.

HOLBROOK - Woodgate Village, 2-bdrm,. condo, cac, 1½ baths, new appl./HW heater, attic, wood stove, clubhouse, pool, tennis, $96,000. JoAnn, 472-6742.

CALVERTON - 2-bdrm. condo, 5 appliances, patio, upper deck, ac. Ext. 7595.

MEDFORD - Blue Ridge Country Club, 2-bdrm. condo, 1½ baths, incl. golf, tennis, billiards, in/out pools, whirlpool, sauna, clubhouse, restaurant, 15 min. to Lab, $79,990. 736-8742.

MEDFORD - 1-bdrm. condo, all appl., cac, lg. deck, in/outdoor pools, golf, tennis and more, priv. security, $72,500. 758-6197.

MIDDLE ISLAND - 4-bdrm. Colonial, new kit., hardwood floors, cac, den, eik, 2½ baths, ½ acre, walk to Spring Lake Golf Course, 10 min. to lab, 2-car gar., $154,850. Dick, 345-5090.

MIDDLE ISLAND - 2-3 bdrm. ranch, 1½ baths, deck off lg. d/r, gar., bsmt., shed, laundry rm., mint cond., $103,800. 924-2839.

NORTH SHIRLEY - custom-built, 4-bdrm. Colonial, ½ acre, 1½ baths, fenced, sliding door from kit. to 12'x10' deck, gar., $129,900. Julian, 924-0960.

PORT JEFFERSON - custom-built on steel beam, 8 room, 2½ baths, daylight bsmt., 2-car gar., wooded setting, village eligibility for golf, beach and tennis. 331-4768.

PORT JEFFERSON VILLAGE - 5 bdrm., wooded 0.5+ acre, cac, 2-car gar., beach, country club, walk to village, harbor, $262,000, avail. 7/1. 331-3846 eves.

QUOGUE - 3-bdrm. condo, 1½ baths, town beach rights, under $200,000. Tom, 653-4079.

RIDGE - new 3-bdrm., 2 full baths, full bsmt., vaulted l/r & kit., w/w, lake rights, OHWH, 10 min. from Lab, $109,000. 582-4514, leave message.

RIDGE - 3-4 bdrm. condo, 2 baths, full bsmt., fp, oil heat, eik, oak floors, deck, skylights, rental cottage, 3 mi. to BNL, $178,000. Casper, 345-5325.

RIDGE - 3-bdrm. ranch, l/r, den, eik, gar., vinyl siding, lg. fenced yard w/igs, cul-de-sac, $118,500. 924-2298, leave message, eves. & wknds.

RIDGE - 3-bdrm. townhouse, 1.5 baths, cac, w/w, all appl., new w/d, HW heater, attic, patio, storage rm., 5 min. to BNL, move-in cond., $63,000. Mary, 924-4328.

ROCKY POINT - 2-bdrm. ranch, l/r, d/r, full bsmt., woodstove, fenced yard, new kit., move right in, ask. $89,000. 744-7549, leave message.

RONKONKOMA- Lake Hills, 3-bdrm. ranch, eik, d/r, l/r, lg. fin. bsmt., new appl., low taxes, $138,000. Ext. 2466 or 981-2086.

SHOREHAM - 2-3 bdrm. split, 2 baths, Jacuzzi, skylight, den, hardwood floors, ac w/cleaner, lg. heater rock pool, perennial garden, lg. sprinkler, $159,000. Nancy, 744-5255 after 5:30 p.m.

SHOREHAM - 4-bdrm. Cape, wooded setting, cul-de-sac, beach access, 2 new baths, fp, hardwood floors, ask. $170,000. Harvey, 821-1726.

SHOREHAM VILLAGE - 3+ bdrm., 2½ baths, skylights, cath. ceiling, Jacuzzi, steam bath, decks, igs, walk to priv. beach, tennis courts and country club, $269,000. 744-9718.

SOUND BEACH - newly remodeled, bright, 4-bdrm. Cape, 2 baths, l/r, d/r, eik, new appl., cedar deck, fin. bsmt., potential apt., MPSD, ask. $129,000. Matt, 744-0251.

SPEONK - 2-story, 2-bdrm. condo, 1½ baths, all appl., sunny, freshly painted, pool, Southampton beaches, $74,900. 325-8116.

WADING RIVER - 3-bdrm. Colonial, 2½ baths, 2-car gar., custom kit., Jennair, gazebo, shed, igs, igp, deck, steam bath, satellite dish, SWRSD, 1.1 acre, $229,000. 929-8323.

WADING RIVER - 3-4 bdrm. custom ranch, 2 baths, eik, d/r, l/r w/fp, laundry, very lg. rec. rm., oversize 2-car gar., full acre, SWRSD, $183,000. Ext. 4475 or 929-3251.

PORT CHARLOTTE, FL - ¼-acre bldg. lot, developed neighborhood, ready to build, $10,900. 929-8323.

TAMPA, FL - lake view, 2 story, 3 bdrm., 2 baths, 24'x11' screen porch, ⅓ acre w/fruit trees, near Busch Gardens, USF, U-Mall, $65,000. Julian, 924-0960.

NORTH CAROLINA - 1.13 wooded acres, waterfront community, pool, clubhouse, 35' boat slip on Pamlico River, $38,000. Ken, 281-5565.

Wanted

BOAT - f.g., 16-18' w/motor in excel. cond.; pop-up camper, to sleep 4-6, in excel. cond. Sue, Ext. 2888.

BOAT TRAILER - 14-16', decent cond. Ed, Ext. 5529.

CAR - '85 Buick Century, for parts. Artie, Ext. 5029.

CAT SITTER - dorm-bound summer student needs temp. home for friendly, out/inside fixed male, 6/11-8/19, all exp. pd. Georgia, (706) 543-2655 collect.

GUITAR CASE - need old case; life preservers, need 3. Dave, Ext. 5460.

HOMES - apt., condos, rooms for rent, houses to share, short-term rentals for BNL guests. Marie, Ext. 4489.

HOUSE - 3-4 bdrm. Ramesh, Ext. 4805 or 924-8113.

HOUSE/APT. - to rent or housesit, for mature couple, 1 month around August, north shore area, refs. Linda, Ext. 5763.

KITTEN - black & white female. Ove, Ext. 5297.

LAWN MOWERS/TRACTORS - old, complete only please. Dan, 698-7322.

MOTORCYCLES - 1900-1975, foreign or domestic, antiques, motorized bicycles. 467-1343.

MOTORCYCLES - bent or broken, any age or cond. Kevin, 281-8031.

PEOPLE TO JOIN GROUP - French culture, meetings last Mon. of month. Joe, Ext. 2212 or 878-2236.

PORCH SWING - bench-like, chain-suspended, for 2 or 3 people. John, Ext. 7671.

REMINISCENCES - written for 70th birthday, surprise album for E. Parke Rohrer. Mail to R. Harnish, 117 W. Willow Rd., Willow St. PA 17584 by 6/15.

SWIMMING POOL SLIDE - good cond. Bill, 567-5631.

TURNTABLE - reasonably priced. Bob, Ext. 7257.

In Appreciation

Thank you for my retirement celebration. I will joyfully remember my friends, co-workers and my life at BNL.
— Marty Heine

Our deepest thanks to our BNL friends for all their support upon the death of our daughter, Catherine.
— Peter & Patricia Fish

Ads left out of this issue due to lack of space need not be resubmitted to appear in the next issue.