

BNL Researchers Discover New Superconductor

BNL researchers Arnold Moodenbaugh and Masaki Suenaga have announced their discovery of a new superconducting material. The new superconductor was synthesized only two weeks ago in the Metallurgy and Materials Science Division, Department of Applied Science, from a combination of metallic oxides.

Brookhaven's finding adds to a growing body of evidence that there are numerous materials that become superconducting at temperatures in the range of 90 kelvins (K).

A superconductor is able to transmit electrical current with virtually no loss of energy. Superconductors are already used for physics research, medical diagnosis and fusion experiments, and have potential applications in electrical power transmission and mass transit.

Until recently, the most commonly used superconductor has been niobium titanium, a metallic alloy that becomes superconducting when cooled to 9 K (equivalent to -440°F), although some materials were available with superconducting temperatures as high as 23 K.

In October 1986, Swiss scientists announced that they had made a metallic oxide compound that became superconducting at 35 K (-400°F). This finding triggered a number of experiments on metallic oxides by laboratories around the world.

In December 1986, Moodenbaugh and Suenaga, who have both done long-standing work on superconductors, began by seeing if they could duplicate what the Swiss researchers had found. At the same time, they started to experiment with untried metallic oxides.

The Swiss had used a rare earth element and an alkaline earth element, combined with copper and oxygen. One combination the Brookhaven team tried was lutetium (a rare earth element), barium (an alkaline element), copper and oxygen.

Two weeks ago, Moodenbaugh made a sample by first grinding together powders of the particular metallic oxides involved. He says he simply combined them in a certain ratio that "seemed good." The combined powders were fired in a furnace in air once to 1,800°F, then compressed into a pellet and then fired again at 2,000°F. The result was a lump of sandstone-looking material, black in color.

When that sample was first tested last week, it showed clear-cut signs of superconductivity near 90 K (-300°F). "I didn't expect it, because I had seen so many other compounds that didn't become superconducting, even at significantly lower temperatures," recalls Suenaga. "But in light of recent advances, it wasn't as astounding."

To confirm their finding, the two scientists quickly sent part of their sample to Ames Laboratory, Iowa, where the compound also became superconducting at 90 K.

This past Monday, Moodenbaugh and Suenaga submitted a paper on their work to *Physical Review Letters*, "probably setting a record for an experiment from start-up to write-up," notes Suenaga.

The scientists point out that this discovery is not a first, since the Swiss led the way with a particular metallic oxide, and, in the last few weeks, the University of Houston and the University of Alabama in Huntsville have announced success with other

Masaki Suenaga (left) holds in a pair of tweezers a sample of the new superconductor he and Arnold Moodenbaugh (right) synthesized from a combination of metallic oxides.



metallic oxides, at temperatures similar to those attained by BNL. Brookhaven's finding confirms that there are likely to be a number of materials that become superconducting at such high temperatures.

A great advantage of higher temperature superconductors is that liquid nitrogen can be substituted for liquid

helium as the refrigerant required to cool the materials to the point at which they become superconducting. Nitrogen gas liquefies at 77 K and helium liquefies at 4 K. The cost of liquid nitrogen is about a nickel a liter, significantly cheaper than liquid helium at \$2.50 a liter.

Already, superconducting technology is used in magnets for particle accelerators like the proposed Relativistic Heavy Ion Collider (see story, page 1) and the Superconducting Super Collider.

If the cost of superconducting technology were to be greatly reduced, the diversity of applications would mushroom. Already proposed are levitated trains and underground power cables.

Metallic oxide superconductors are still very experimental, say the Brookhaven scientists, and the really hard work has just begun to see if these materials can be made practical. But this is an exciting time, especially since little has happened in the field over the last 15 years.

Moodenbaugh and Suenaga will continue their research, with a focus on identifying the crystal structure and composition of their material. Says Moodenbaugh, "We have a new superconductor that we don't know much about. We want to better characterize this material and look for additional superconductors with even higher critical temperatures."

This work is supported by the Department of Energy's Materials Sciences Division of the Office of Basic Energy Sciences.

— Mona S. Rowe

Super-Successful Test Of Superconducting Magnet

On Thursday, February 26, power surged through the first full-size prototype dipole magnet to be tested for the proposed Relativistic Heavy Ion Collider (RHIC) — with exciting re-

sults. The magnetic field climbed to well above the intended operating level of 3.5 teslas (T).

The 30-foot-long dipole is a prototype for 288 such magnets that would

help guide heavy ions around RHIC in two directions, at energies of 100 billion electron volts per nucleon in each direction. It is a superconducting magnet, which means that when cooled to temperatures close to absolute zero, it loses all its resistance, and the electricity necessary for magnetization can flow through unimpeded.

The tests on Thursday demonstrated that the first "quench," or transition from the superconducting to a normal state, did not occur until about 4 T, giving a margin well above the 3.5 T requirement.

This first dipole was built at BNL in the Magnet Division of the Accelerator Development Department (ADD). Three identical magnets have been built by Brown, Boverie & Cie (BBC) in West Germany and will be tested at BNL over the next few months.

BBC also made four cryogenic enclosures, one for each magnet. Like giant thermos bottles, these cryostats keep the magnets chilled to their operating temperature — 4.3 kelvins (just above absolute zero).

Said Eric Forsyth, Chairman of ADD and Head of the RHIC Division, "This successful test is a major milestone in the R&D program, which will lead to the detailed design for RHIC."

RHIC would make possible heavy ion collisions at ultra-high energies. Using RHIC, physicists could explore nuclear matter at temperatures and densities resembling conditions of the universe just after the Big Bang. If approved, construction of the collider will begin in fiscal year 1989.



Photos on this page by Mort Rosen

Gathered around the first successfully tested, full-length RHIC dipole magnet prototype are those responsible for its final assembly: (clockwise from bottom left) Technical Supervisors James Briggs, Robert Kehl, Herb Hildebrand, William Carapezza and Chris Harbach, all of the Magnet Division of the Accelerator Development Department.

Memorial Concert

The Stony Brook Trio will perform at a concert in memory of former Laboratory Director George H. Vineyard on Sunday, March 15, at 4:30 p.m. in Berkner Hall. Vineyard, who led BNL from 1973 through 1981, died on February 21, at the age of 66.

They Came, They Cracked, They Crumbled

Two hundred and thirty-four balsa wood bridges built by local high school students cracked, crumbled and collapsed on Saturday, February 28, during BNL's seventh annual Model Bridge Contest.

In the contest, organized each year by the Public Relations (PR) Office to encourage interest in science and engineering, students are required to



Warren Kohm is about to put his bridge in the position reserved for first place in the Model Bridge Contest.

design and build model bridges according to size and weight specifications. The goal is to create the bridge that can support the greatest load per gram of bridge mass. A stress tester located in the Metallurgy and Materials Sciences Division of the Department of Applied Science (DAS) is used to demolish the competing bridges.

This year's winners were: first place — Warren Kohm, a sophomore at Cold Spring Harbor High School; second place — Donald Nostrand, a junior at the PASS Alternative Learn-



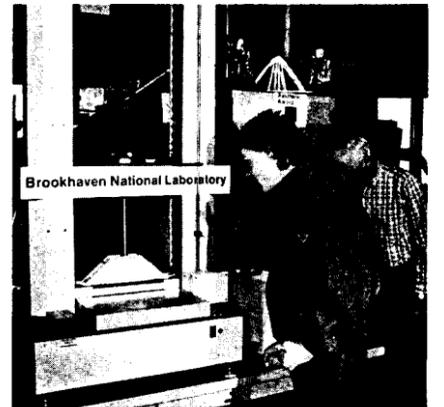
Looking on as Janet Tempel (right) presents Donald Nostrand with his prize for second place are (from left) aesthetic merit winner, Soahn Kuehner; Marty Woodle; John Mulvehill, who placed third; and Warren Kohm, who took first place.

ing Center at the State University of New York at Farmingdale; and third place — John Mulvehill, a junior at Cold Spring Harbor High School. Their bridges, which each weighed less than two-and-a-half ounces, supported loads of 449.4 pounds, 416.6 pounds and 411 pounds, respectively.

An award for aesthetic merit was also given for the bridge judged to be most attractive; the winner was Soahn Kuehner, a sophomore at William Floyd High School and son of Alan Kuehner, Safety & Environmental Protection Division.

The Model Bridge Contest was coordinated by Janet Tempel and Jackie Mirzadeh, PR. Judging, operating the stress tester, and providing engineering and technical expertise were Marty Woodle, National Synchrotron Light Source Department; Bill McGahern, Alternating Gradient Synchrotron Department; Don Horne, DAS; and Carl Klamut, DAS.

—photos by Peter Horton

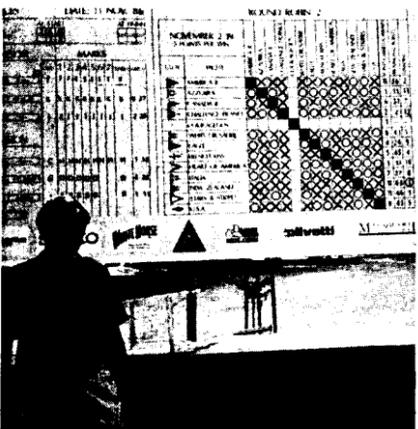


Carl Klamut operates the stress tester as Donald Nostrand watches the bridge he built survive long enough for second place honors.

America's Cup Close-Up

"It all went according to plan. Once we'd set foot in Fremantle, we discovered there were just four tickets left. So we rushed over to the dock — and got two of them!" exclaimed Pat Meehan of the Physics Department.

Just back from Australia, Meehan was describing how she and her husband, Terry, had managed to see the America's Cup final from the deck of the *Tassie Devil*, the 80-passenger catamaran set aside for members of the press. From this magnificent vantage point they witnessed the Ameri-



Vernon Buchanan keeps track of challenger trial results on the scoreboard. In November 1986, *Stars and Stripes* stood third and *Kiwi Magic* of New Zealand, first.

can yacht *Stars and Stripes* beat Australia's *Kookaburra* in four straight races.

"Terry had found out that a few extra seats on the press boat were to be sold to the public, and he was determined to get a pair," Meehan explained. "Only six vessels could fly the privilege flags which allowed them to sail really close — the Aga Kahn's boat, for example, was one, and the press boat was another. All the others had to keep their distance."

Once the Meehans were on the *Tassie Devil*, they found that they had the best possible close-up of the race — and also of some well-known people on board. "The top deck of the boat was reserved for VIPs like Walter Cronkite, who was covering the race for Channel 2, and Tom Blackhaller, skipper of the *U.S.A.*, which was one of the finalists of the five American yachts beaten by Connor and the crew of the *Stars and Stripes* in the challenger trials," said Meehan. "On the other two levels we could wander around, seeing everyone and everything."

The Meehans found the race tremendously exciting, "though more because we were so close, and able to watch from the water, than because of suspense about the result," Meehan recalled. "After the eventfulness of some of the trials — for instance, against New Zealand, when the sail of the *Stars and Stripes* ripped — the final seemed almost plain sailing!"



Another BNL eye-witness had experienced the excitement of the trials. Vernon Buchanan, for 31 years a BNL employee and now a retiree consulting for the Physics Department, had been attending the America's Cup challenger trials for 25 years.

"Only they were always in Newport," said Buchanan, who traveled to Fremantle last November in time for

the second set of trials. "However, it seemed logical to keep up the tradition, even if the journey was a little longer."

The journey was long — 12,000 miles to Australia — but keen sailors like Buchanan and the Meehans found the trip well worth it. "That last day, people were packed on all the watching boats, and on the dockside and even clinging to buoys or pilings in the water," remembered Meehan. "The crowds, the cheers, the flags were fantastic. Right away, we knew we'd have to be there for the next time — wherever and whenever it will be held." — Liz Seubert

BNL's Fabulous Forty

If Gasper Perry had not retired from Instrumentation in 1985, he would be one of the employees celebrating their 40th service anniversary in 1987, BNL's 40th anniversary year. So Perry, who started at the Lab on May 5, 1947, sent this letter to all those who remember BNL's beginnings.

To the Boys of the Back Forty —

No, I don't mean the Ponderosa but the Brookhaven Lab, 40 years back. All boys then.

Forty years — seems like yesterday. Think back — let's recall a few names: Philip Morse, Leland Haworth, Mariette Kuper, Kenneth Koerber, Ed Hunter, J.J. Jones, Bob Brouwer, Joseph Washburne, Robert Patterson, Thomas Johnson, Arnie Benson, Richard Dodson, Tom Sheridan, Bill Brick, Ed Nicolson, Fred Van Dervoort, Walter Becker, Steve Palermo and Phil Borzi.

Now I'll go to my own department (Instrumentation), which was then part of Physics, filled with people with names like Willie Higinbotham, J.B.H. Kuper, Bob Chase, Pete Prentky, Hank Brewer, George DeForrest, Sy Rankowitz, Stan Kramer, Tom Allen, Jack Craig, Jim Hallock, Karl Walters, Bud Lacey, Doug Clareus, Lloyd Davis, Stan MacCormack, Budd Pollack, Irv Meyers, Jerry Constant, Jim Tuffley, Charlie Boulton, Helen



Cooke, Beatrice D'Ambrosio, "Blossom" Lefkowitz, Louis Kudrle, Teddy Korsos, Joe Trebing, Bob Dillingham, Jake Tillinger, Eddie Downs and Clarence Porter.

Remember the visits of some of the celebrities, such as Dr. David Lilienthal, Dr. Edward Teller and General Dwight Eisenhower?

How about the annual dance held by a different department each year, with the big bands entertaining and including some of our own Lab talent?

It wasn't uncommon, as mentioned in a previous Bulletin, to round up a work crew for such things as the completion of the Hank Brewster's house, or to help Freddie Hermsoth finish his house after his accident, or to get a cleanup going after the Kupers had a fire.

Some other old-timers we were able to meet because of the nature of our work included Ray Davis, Julius Hastings, Lester Corliss, "Dutch" Stoenner and Andy Sunyar, to name a few.

So now you're getting to that point where soon you'll be ready to join the rest of us in the "pasture" of the Back Forty.

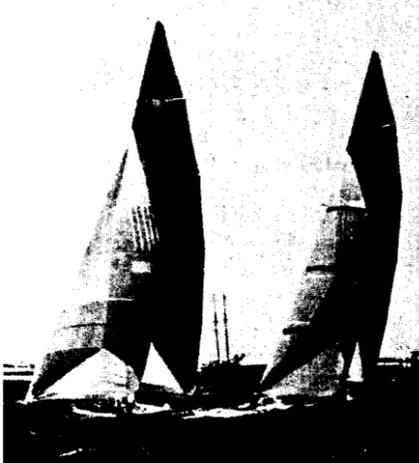
It's a great feeling and it's all served up in one sentence: You do whatever you feel like doing whenever you feel like doing it. And that works out just fine.

So — congratulations, you guys celebrating your 40th, and enjoy the rest of your stay. It's pretty nice out here, but it was great there too.

— Gasper Perry, "831"



Pat Meehan stands beside the America's Cup which was on display in the Royal Perth Yacht Club.



From the deck of the *Tassie Devil*, the Meehans watched the final U.S./Australia America's Cup race between the *Stars and Stripes* (left) and the *Kookaburra*.

Inside Info

The 46th Westinghouse Science Talent Search is over and Daniel Bernstein has taken fifth place with his mathematics project on "New Fast Algorithms for π and e ." For his efforts, the 15-year-old son of Frances Bernstein, Chemistry Department, and Herbert Bernstein, a research collaborator with the Department of Applied Science, won a \$10,000 scholarship. Daniel will make good use of the award next fall when he enters Princeton University as a mathematics major.

The award was one of ten top prizes announced in Washington, D.C., on Monday, March 2. As only the 40 finalists were invited to the awards ceremony and Daniel was busy immediately afterwards answering reporters' questions and being photographed, Frances Bernstein said, "We first heard about it from Newsday, when a reporter called the house. We were thrilled, of course."

Bernstein added that Daniel, who was the youngest student in this year's national competition and one of the youngest winners ever, "did his project entirely by himself. He has submitted the paper to the journal, *Mathematics of Computation*, and is waiting to hear about that. It was a very nice piece of work."

A senior at Bellport High School, Daniel is also one of 30 high school students participating in the Saturday morning Chemistry classes currently being held at BNL.

Voting for BERA Board Begins March 16

Elections for two candidates to serve on the BERA Board, replacing John Connelly and Ed Taylor, will take place during the week of March 16. Eligible voters include employees of BNL, AUI, DOE and permanent on-site employees (Saga Food Service, Barclays Bank and others).

Ballots may be cast as follows:

Date	Time	Place
Monday, 3/16	11:45-1:15	Cafeteria
Tuesday, 3/17	11:45-1:15	Cafeteria
Wednesday, 3/18	11:45-1:15	Cafeteria
Thursday, 3/19	1:00-2:30	Bank
Friday, 3/20	9:00-3:00	Bank

Absentee votes, for employees who will not be on site during voting week because of business trips or other reasons, will be accepted if a signed memo is sent with candidate selections to the Recreation Office, Building 185. Memos must be received no later than 5 p.m., Thursday, March 19.

Board Candidates

Haskell (Skelly) Frei, a Nuclear Reactor Operator in the Reactor Division, has been employed at BNL since 1955. During these thirty-plus years, he has been active in softball, basketball, bowling, golf, football, volleyball and tennis. In the early days of BERA,



Haskell (Skelly) Frei



Jean D. Ramirez



Sharon L. Smith



Edward D. Sperry IV

—photos by Rosen

he was a member of a four-man bridge team representing BNL in an Industrial League East Coast Championship Tournament. If Frei's picture looks familiar, it's because he was on last year's slate of candidates, but lost by a very small margin.

Jean D. Ramirez came to the Lab seven years ago and is presently a Senior Office Services Assistant in the Department of Nuclear Energy. Ramirez is secretary of both the BERA Social Club and the Volleyball League and is very active in softball and bowling.

Sharon L. Smith is a Senior Executive Secretary in the Physics Department and is into her twenty-third year at the Laboratory. Smith's BERA credits include being Softball League Secretary, captain of a bowling team and former co-captain of a softball team. In the past, she has been active in the Aerobic Dance Club and the BNL Theater Group. It isn't unusual to see her as a spectator or worker at BERA concerts, dances and other special events.

Edward D. Sperry IV followed in the footsteps of his grandfather and father as a BNL employee eight years ago. He is a Principal Technician in the Accelerator Development Department and is very active in BERA activities. Sperry is especially interested in bowling, golf, softball and tennis. Two years ago he was elected and is still serving as President of the BNL Bowling League Executive Committee.

Coming Up

Japanese pianist Minoru Nojima, who launched his career with a prize-winning performance at the 1969 Van Cliburn Competition, will perform at Berkner Hall on Monday, March 16, beginning at 8:30 p.m. Tickets will be sold at the door at \$9, general admission; \$6, students and those over 65; \$5, those under 18.

AA Meetings

Alcoholics Anonymous (AA) meetings are being held at the Lab every Tuesday at 5:30 p.m. All employees, others with current BNL identification cards and their spouses are invited to participate. To find out the location of the meetings, call the Employee Assistance Program, Ext. 2733. As participation in AA is confidential, you will not be asked to identify yourself when making the inquiry.

Public Sale Of Motor Vehicles

In March, sixty vehicles, parked by Warehouse T-87, will be available for Public Sale. Inspection will be permitted Monday through Friday, March 9-13, from 9 a.m. to 4 p.m. Bid opening is March 18.

This will be an informal competitive bidding. Bid forms may be obtained at Building T-87. For further information, call Ext. 2302.

Arrivals & Departures

Arrivals

Daniel B. Harrow Plant Eng.
Susana Martinez Biology
Benjamin M. Ocko Physics
William J. Pinto Plant Eng.

Departures

This list includes all employees who have terminated from the Laboratory, including retirees:
Jose F. Cevallos-Candau DAS
Thomas J. Dolan Sfgdrds & Sec.
Hardie A. Fuller Central Shops
Chong-Sa Lim Physics
Joseph W. Schaedler DAS
George W. Speidell AGS
Fred J. Stellabotte MIS

Equipment Demos

Joseph Fisher, founder of Multiflow Computer, Inc., Branford, CT, will present his company's products on Wednesday, March 11, at 2 p.m., in the Hamilton Seminar Room, Chemistry, Bldg. 555. Fisher will discuss Multiflow's technologies and the computing needs of scientific and engineering users.

Multiflow manufactures general-purpose, 64-bit supercomputers that combine two fundamentally new computing technologies to deliver high performance, low cost, ease of use and drop-in compatibility across a broad range of applications. Using conventional hardware, Multiflow systems deliver very high performance from unmodified FORTRAN and C programs.

On Wednesday, March 11, Eastern Computer Graphics will demonstrate several graphics software packages for the IBM-PC computer. At 9:30 a.m. they will present PC and mainframe computer graphics, in particular Tektronix color terminal emulation and graphics output. At 1:30 p.m. a second demonstration will deal with the creation of presentation graphics on the PC. Both presentations will be given in the AMD Seminar Room, Building 515.

Scotch Doubles

The Scotch Doubles Bowling Tournament, open to all, will be held Sunday, March 15, at 1 p.m. at Port Jeff Bowl. This is strictly a fun affair and participants need not be bowlers. The cost has been revised to \$22 per couple, which includes bowling, prizes and buffet. Applications can be obtained at the BERA Sales Office or by calling Maria Apelskog, Ext. 3138.

Swim Club

Intervals and repetitions will be swum during the next practice of the Swim Club on Thursday, March 12, 5:15 p.m. at the BNL pool. Regardless of speed, all those who can swim two laps of the pool without stopping using the crawl stroke are welcome to workout with us. For more information, contact Marsha Belford, Ext. 5053, or Peter Heotis, Ext. 2304.

Cooking Exchange

The next meeting of the International Cooking Exchange will be held on Wednesday, March 11. The theme will be Middle Eastern Specialties, including recipes for hummus, mous-saka and stuffed vegetables.

The Cooking Exchange meets at the Recreation Building at 12:30 p.m. on the 2nd and 4th Wednesdays of each month. A charge of \$1.50 per person includes a sampling of foods that have been prepared and coffee or tea. Babysitting is provided for 50¢ per child. The Cooking Exchange is open to all members of the Laboratory community. For further information please call Tina Sferlazzo, 286-9420.

Loan Rates Down

Effective immediately, interest on new car loans has been reduced at the Upton Branch of Barclays Bank. Borrowers will now pay interest of 8.25% on new car loans, which can be paid back in from 12 to 60 months. These loans require 10% down. Rates will remain in effect until further notice. Any Lab employee is eligible to apply for the loans. For information on other reduced loan rates, call Ext. 2895.

Bowling

Red/Green League

High games were bowled by K. Riker 226, C. Bohnenblusch 223, T. Prach 221/204/601 scratch, R. Adams 221, L. Jacobson 217, J. Medaris 215, K. Asselta 213, J. Morris 206/600 scratch, N. Combatti 203.

Pink League

Maryann Reynolds had a 184, Kathy Folkers 183.

White League

Ed Sperry IV rolled a 233, Skelly Frei 219, Rick Jackimowicz 214, Carl Murray 204, Al Pinelli 204, Sharon Smith 198, Mary Picinich 181.

Basketball

All Star Game

BNL All Stars	110—	Hurricanes	90
Wayne Cummings	22	Art Mullin	27
Ed Meier Jr.	16	Don Winters	19
John Cyr	15	Bob Raab	12
Ralph Garapolo	15	Joe Caneli	9
Rick Moran	15	Mike Holland	7
Jim Desmond	13	Mike Gallo	6
Leroy James	6	Rich Raab	6
Bill Gunther	4	Anthony Gallo	2
Greg Mack	4	Ray Hampel	2

Volleyball

Standings — Week of February 23

League I

Dinkers	30-6
Upfagrabs	28-5
Xrayted	17-16
Phoubars	12-21
Bumpers	9-24
Net Results	6-30

League II

Cannonballs	24-9
Nuts & Bolts	21-9
TNT	20-7
Fossils	17-13
Chunga's Revenge	12-18
Upton Ups	5-22
Misfits	3-27

League III

Floater	29-10
Printouts	26-13
Foul Ups	25-14
Screwballs	20-19
Sourcerers	14-22
Not Yets	13-26
Odd Couples	8-31

Open League

Phoenix	42-3
Dakota	38-7
Odds & Sods	25-20
Target	22-23
Rowdy Radicals	21-24
Court Jesters	20-25
Duituits	7-38
Out of Control	5-40

BROOKHAVEN BULLETIN

Published weekly for the employees of BROOKHAVEN NATIONAL LABORATORY

ANITA COHEN, Editor
MARSHA BELFORD, Senior Reporter
LIZ SEUBERT, Reporter

35 BROOKHAVEN AVE., UPTON, N.Y. 11973
Telephone (516)282-2345

Cafeteria Menu

Week of March 9

Monday, March 9

T.J. miracle soup	(cup)	.75
	(bowl)	.95
Sliced London broil w/1 veg.		2.95
Chicken croquette w/1 veg.		2.75
Egg salad & cottage cheese plate (lite-weight)		2.25
Hot deli: Ham & mozzarella melt		2.55

Tuesday, March 10

U.S. Senate bean soup	(cup)	.75
	(bowl)	.95
Pot roast of beef w/1 veg.		2.85
Scalloped ham & potatoes w/1 veg.		2.75
Quiche Lorraine w/1 veg. (lite-weight)		2.75
Hot deli: Grilled Reuben		2.65

Wednesday, March 11

Turkey rice soup	(cup)	.75
	(bowl)	.95
Pepper steak w/1 veg.		2.75
Pork & cabbage crisp		2.65
Chicken salad plate (lite-weight)		2.20
Hot deli: Turkey garden club		2.85

Thursday, March 12

Garden vegetable soup	(cup)	.75
	(bowl)	.95
All-you-can-eat special (no take-outs):		
Spaghetti & meatballs w/garlic bread		3.25
Shrimp & broccoli stir-fry (lite-weight)		2.95
Cold vegetable & dip plate (lite-weight)		2.20
Hot deli: BBQ chicken patty	(bread)	2.45
	(roll)	2.60
	(hero)	2.65

Friday, March 13

New England clam chowder	(cup)	.75
	(bowl)	.95
Broiled fish w/1 veg.		2.95
Macaroni & cheese w/1 veg.		2.65
Hot deli: Pastrami	(bread)	2.45
	(roll)	2.60
	(hero)	2.65

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 and/or appropriate bargaining unit, 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 Employment Manager, Ext. 2882.

LABORATORY RECRUITMENT - Opportunities for Laboratory employees only.

2562. LABORER - Plant Engineering Division.

2563. LAMP CLEANER - Plant Engineering Division.

OPEN RECRUITMENT - Opportunities for Laboratory employees and outside applicants.

2564. ENGINEERING POSITION - Requires BSEE, or advanced degree, and a minimum of three years' experience in one of more of the following: logic design, (CMOS, TTL, NMOS, PLA); microprocessor-based equipment design (hardware and software) and local area networks. Experience in analog circuit control systems or computer workstations highly desirable. Alternating Gradient Synchrotron Department.

2565. OFFICE SERVICES/ACCOUNTING POSITION - Requires AAS degree in accounting or equivalent knowledge and experience, and a minimum of two years' experience with accounting reports. Knowledge in the use of spread sheets and data bases on a personal computer is necessary. Duties include maintaining capital and sensitive property records; review of inventory withdrawal charges; summarization of costs; involvement in IPAP, JCARS, etc. Plant Engineering Division.

2566. TECHNICAL POSITION - Requires an AAS in electro-mechanical technology or equivalent experience. Must be familiar with high voltage systems and electrical hardware as well as ultrahigh vacuum techniques. Experience with radio-frequency systems is desirable. National Synchrotron Light Source Department.

2567. TECHNICAL POSITION - Requires AAS degree in electronic technology or equivalent experience. Background in pulse and analog circuitry is essential, and knowledge of high voltage and radio-frequency systems is desirable. National Synchrotron Light Source Department.

2568. PROGRAMMING/ANALYST POSITION (2 openings) - Requires an AAS degree in data processing and experience in COBOL programming. Required experience includes programming on-line data base, ability to code, test, flow chart, document and install into production, programs/modules/routines for business applications. Exposure to an HP environment helpful. Management Information Systems Division.

Autos & Auto Supplies

81 PLYMOUTH CHAMP - a/t, 64k mi., \$1,800; 78 Oldsmobile Cutlass Salon, good cond., \$900. K.C. Wu, Ext. 2344 or 751-4254 after 6 p.m.

CAMPER TRAILER - 1970 Tagalong, 14', many extras, fully self-contained, excel. cond., \$2,000. Pete, 399-2813.

1980 TOYOTA - station wagon, 5 spd., p/s, p/b, am/fm, excel. cond. John, 981-6172 after 7 p.m.

72 PLYMOUTH - full-size wagon, excel. running cond., best offer. Ext. 2022 or 744-8386.

80 VOLVO - stand., 2 dr., DL, gray, 4 cyl., very good cond., \$4,500. 929-6442.

76 CHEVY IMPALA - excel. cond., 4 dr., a/c, am/fm, a/t, brakes, trans., & starter replaced. 475-2075.

TIRES - (4) Firestone 721, white letters, radials, 205-70-14. Jerry, 281-5667.

74 DATSUN - pickup, parting out, L18 engine needs head work, whole \$75. Mike, Ext. 3988 or 231-8889.

83 LYNX - 4 dr., htchbk., a/t, a/c, p/s, p/b, cass. stereo, excel., \$3,200. Tony, Ext. 2462 or 269-9510.

MANUALS - 1978 Jeep, Volume 1 and Volume 3, \$15. Ext. 4251.

78 TOYOTA CELICA - 100k mi., new battery, 5 spd., \$900. Tom, Ext. 5350.

75 PEUGEOT - station wagon, a/t, a/c, am/fm, 18-20 mpg., \$650. Ed, Ext. 2007, or 751-1474 or 689-6131.

TRUCK TIRES - (4), Takeoffs, size LT215/85-16C, w/rims, \$300. Ext. 4312.

76 DATSUN 280Z - 2x2, 4 spd., runs, needs welding, \$500 or best offer. Ext. 3675 or 924-3528.

68 VW - good engine, needs work, rusty, \$100. Seyma, Ext. 3293 or 286-0925, eves.

83 TOYOTA SR-5 - pickup, 4WD, full gauges, sunroof, 5 spd., mint cond., \$7,400. Jeff, 575-5554 or 584-7970, eves.

84 MERCURY COUGAR - V6, tinted windows, maroon, p/s, p/b, excel. cond. in & out, \$7,100. 737-6697, eves.

74 FORD MUSTANG II - p/s, p/b, a/c, r/h, good cond., asking \$1,200. Dan, 277-1284.

79 MONZA - V6, 4 spd., 2 dr., htchbk, hi mi., runs well, asking \$1,000. Toru, Ext. 3148 or 3230.

79 CAMARO - good running cond., eye-catcher, a/c, cruise, sunroof, new tires, \$2,500 neg. Jackie, 732-4224.

82 PLYMOUTH CHAMP - 48k mi., new tires, brakes, battery, 4 spd., sunroof, excel. in & out, \$2,500. 363-7032.

79 PONTIAC SUNBIRD - 4 cyl., 4 spd., many new parts; 73 Capri, stand., decor group, many new parts. 689-9234 or 744-0725.

78 DODGE OMNI - 4 dr., p/s, p/b, asking \$550. Steve, 653-8703.

84 PONTIAC FIERO - SE, red, low mi., a/t, a/c, p/windows, am/fm cass., sunroof, tilt wheel, \$7,000. 288-6375.

75 FORD GRANADA - good body, good for parts, \$125. Gene, Ext. 3080.

80 AMC SPIRIT - 2 dr., am/fm stereo, new tires, \$500. Sandy, 325-0708.

80 ELDORADO - 2 dr., landau, all power, new trans., 87k mi., excel. cond. 747-7314 after 6 p.m.

77 CHEVY CAMARO - blue, 8 cyl., a/t, a/c, am/fm cass., excel. tires, new paint, \$2,500. Melanie, Ext. 5141.

77 DODGE - window van, p/s, p/b, a/c, smoked windows, excel. cond., \$3,000 neg. 884-2868.

86 CHEVROLET BLAZER - 4WD, 2-tone grey and silver, sunroof, a/c, tilt wheel, power everything. 878-1640.

80 CHEVETTE - 4 dr., htchbk., good cond. Dave, Ext. 7921.

80 CITATION - V6, p/s, a/t, am/fm cass., silver/black, excel. cond., \$2,200. 475-3415 after 6 p.m.

74 YAMAHA 400MX - nearly rebuilt, runs well, many extras, \$300. Jim G. Ext. 4986.

83 YAMAHA VIRAGO - 750, black, \$2,000; 80 Honda CX500, low mi., \$1,000; both mint cond., garaged. Charles, Ext. 7749 or 789-1744.

78 TOYOTA COROLLA - a/c, am/fm, runs well, very reliable, must sell, \$1,500 neg. Ext. 3701.

75 DODGE DART - 4 dr., a/t, p/s, p/b, am/fm tape, 6 cyl., excel. cond., 84k mi., \$825. 862-7821.

80 DATSUN 510 - htchbk, a/t, good transp., \$900. 928-8522.

79 DODGE COLT - runs well, \$400 or best offer. Alan, Ext. 4714 or 744-5093.

79 DASHER WAGON - new tires, muffler, brakes, low miles, a/c, roof rack, 4 spd., excel., \$1,800. 924-8870.

75 FORD LTD PARTS - nose and 235-75R tires w/rims, very good cond., 929-3209 after 5 p.m.

79 CHEVY PICKUP - 6 1/2' bed, 6 cyl., 3 spd., 10x15 LT front, 11-15 LT, Tru-Tracs rear, stereo, many extras, asking \$2,100. Ray, Ext. 3536 or 289-7615.

81 ELDORADO - low mi., full power, electric sunroof, new tires, \$7,500. 758-5592 after 6 p.m.

81 DATSUN 280ZX - all options, T-tops, must sell, 63k mi., has warranty, price only \$4,800. 698-0152.

79 MUSTANG II - hi mi., good rubber, good body, new exhaust, engine OK, asking \$990. Loretta, 929-8287.

71 CHEVY MALIBU - 2 dr., 307 engine, a/t, p/s, orig. owner, \$550. Gordon, Ext. 3216.

80 FORD FIESTA - 48k mi., stand. trans., good cond., \$1,800; 78 Moped, Honda Express, windscreen, 3 baskets, 630 miles, \$250. 286-8448.

77 MERCURY COUGAR XR7 - good cond., runs, \$600 as is. John, Ext. 3292 or 286-1348.

83 FORD RANGER XLT - blue, 4 cyl., 48k mi., CB, radio, excel. shape, asking \$3,500. 878-9430.

50 CHEVY PICKUP - 7 window, rare, good for parts or restoration, no motor or trans., best offer. 744-4386.

85 DODGE DAYTONA - 23k mi., red, 5 spd., sunroof, stereo, \$6,500. 758-4820, eves.

86 GMC PICKUP - loaded, 13k mi., hi-rise cap, must sell, \$12,500; 78 Cougar XR-7, 351, excel. cond., \$1,500. Bert, Ext. 2050 or 273-4359.

Boats & Marine Supplies

16' GALAXY - Bowrider, 1973, 85 h.p. Merc, trailer, canvas, new lower unit. 878-1315, eves.

MAKO - 1983, 254, T-150's, new power head, all the toys, very clean, asking \$24,000. 472-4133.

KENYON MARINE STOVE - and oven, all stainless, kerosene burning, \$100. 475-8710.

26' SAILBOAT - fiberglass, 10 h.p. Volvo diesel, fully equipped, best offer. 589-0559.

28' OWENS - 1965, wood hull, fiberglass flying bridge, motor not running, asking \$700. Ray, Ext. 3536 or 289-7615.

22' SEARAY - 1977, cuddy, 198 Merc. I/O, VHF, CB, dual batteries, trim tabs, depth finder, full galley, more, excel. cond., \$7,000. firm. 286-1358.

Miscellaneous

CARPET - gold sculptured, 12'x18' and 12'x11', good cond., make offer. Karen, Ext. 4262.

IRON - Westbend, cordless, new, \$15; Hamilton Beach food processor, excel. cond., \$15. Ellen, 399-2813 after 6 p.m.

BICYCLE - 16", Schwinn, \$25. Ext. 5400 or 874-3447.

CHINA CABINET - corner, w/glass doors, \$60; AT&T modular rotary-type wall phone, beige, \$15. 924-2726.

FURNITURE - glass & chrome. 2 shelf units, rolling bar, cocktail table, end table, magazine rack, rocking chair. Marion, 281-5667.

FIREHOSES - (2) 50', clean cond., only used to pump out water, \$25 ea. 727-5455.

DINETTE - Early American table, 4 chairs, \$110; Mink stole, natural pastel, excel., \$250. 289-0413.

DISHWASHER - G.E., portable, automatic, top loader, \$50. Bob, Ext. 4483.

REFRIGERATOR - G.E., 2 dr., 19 cu. ft., white, \$75. Toru, Ext. 3230.

FRANKLIN STOVE - 744-0725, eves and wknds.

CERAMIC EARRINGS - light-weight, hand-crafted, original designs, hypo-allergenic posts & wires. Gene, Ext. 3080.

SKIS - Rossignol 4-S, 200 cm., Solomon bindings, Dynafit boots, size 11, all used once. 288-4447.

REFRIGERATOR - double door, 22 cu. ft., yellow, \$125; Spanish-style stereo console, \$75. Ray, 289-0883.

GRANDFATHER CLOCK - 2 yrs. old, cost \$550, sell \$350; baby coach, converts to stroller, \$55. 289-1585.

AMARYLLIS BULBS - potted & budded, \$3.95 ea. 727-8631.

COMPUTER - Compaq Portable, 2 drives, 640k RAM, color/graph. card, AST 6-Pak, port. printer, wp, db, comm. sw. Alan, Ext. 2928 or 821-1389.

DWYER SINK - 2 burners, sink, small refrig., storage under unit, \$300. 472-0706.

KITCHEN CABINETS - almost new, modern wood & almond formica, L-shaped breakfast counter, very reasonable. Ext. 5277.

COUCH - Castro Convertible, white vinyl, good cond., \$25. Ralph, Ext. 2591.

TENNIS RACKET - Wilson, like new, \$15; baby toys, clothes, hi-chair, artificial palm tree, Bon-tempi organ, plant hangers. Chris, 732-5047.

WASHING MACHINE - Whirlpool, "Imperial Seventy," almond, brand-new, never used, \$325. C. Barrett, Ext. 4558 or 325-0013.

TELEVISION - b&w, excel. cond., 12", portable, \$40. Ext. 3701.

MEN'S BICYCLE - Ross, 21" frame, 27" wheels, 12 spd., extras, used 2 months, excel. cond. Ext. 2022 or 744-8386.

GRINDER - drill bit, \$150; cut-off abrasive saw, table model, both new, \$200; 4 good, old, d/r chairs, \$50. 878-6637.

FIESTAWARE - original, (2) 12 1/2" platters, (1) 12" round, (1) 10 1/2"x5" oblong, \$10 ea., 744-6292.

DINING ROOM SET - Danish modern, china cupboard, buffet, formica top table, w/leaves, 4 chairs, A-1, \$400. 669-4479.

PINBALL MACHINE - Williams, good working cond., Rich, Ext. 3499 or 435-4316.

PUPPIES - Lhasa Apso, AKC registered, 2 male, 2 female, shots, 589-6518.

ELECTRIC STOVE - white, excel. cond., asking \$100. Mike, 821-9709.

KITCHEN SINK - white, cast iron, 22"x24" w/rim, \$25; F&W pump, 3 stage, deepwell, 1 h.p. motor, w/80 gal. glass-lined tank, \$150. Ext. 2705.

MOVING SALE - dining room set, bed and dresser, seed spreader and misc. items and more. 273-5574.

FURNITURE - 7' solid pine wood, excel. cond., \$150; cherry china, Bassett, excel. cond., \$350. 924-0960.

Car Pools

PLAINVIEW AREA - seeking 4th member, non-smoker. Howard, Ext. 3766.

EASTPORT - Speonk, Westhampton area, car pool needed. Ext. 7921.

LIE EXIT 54 - Wicks Rd, driver needed, for 4-man carpool, 8:30 to 5:00. Mike, Ext. 2705.

OAKDALE - Bohemia area, would like to form car pool. Frank, Ext. 2314.

Free

CAT - 1 yr. old, neutered male cat, black, beautiful, other cats in home won't accept. Ext. 3320 or 3372.

COLOR TV - Sylvania 19", Solid State 100, needs picture tube. John, Ext. 4101 or 286-1401, eves.

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

HILTON HEAD, SC - 2 bdrm. condo, sleeps 6, beach, tennis & golf, many extras. \$300/wk., before April, \$400/wk after April. 585-9149.

LAKE RONKONKOMA - bsmt. apt., 2 bdrms, kit., dining area, l/r, inc. all util., \$800 + 1 month's security. 981-8108.

SOUND BEACH - charming 5-room home, unfurn., partial waterfront, lg. deck, bsmt., new stove, washer & dryer, \$575 + low util. 821-2163.

MATTITUCK - near Sound and Bay beaches, 3 bdrm., 2 baths, avail. June 1st, for 3 + months. \$1,200/mo. Ext. 2527.

For Sale

PORT JEFFERSON - 3V school district, split level, 4 bdrms., 2 1/2 baths, den, gar., deck, lg. bsmt., wooded 1/3 acre. \$210,000. 928-0281, leave message.

PATCHOGUE - cape, 2 bdrm., bdrm./den, l/r, d/r, eik, new bath, 1 1/2 car gar., bsmt., unfinished 2nd floor, porch, many extras, taxes \$1,000, 1/4 acre, \$123,000. 654-5049.

E. SETAUKET - 3V school district, mint, move in cond., 4 bdrm, center hall Colonial, 2 car., bsmt., custom fp, den, eik, owner, \$169,900. 473-6429.

CAPE CORAL, FL - spacious 3 bdrm. ranch, 2 baths, l/r, d/r, f/r, 2-car garage, asking \$68,000. Dan, Ext. 4605.

MOUNT SINAI - ranch, 3 bdrm., 2 bath, 1/2 acre +, full finished basement, w/bar, pool table, large redwood deck, 6' fence, a/c, w/w carpet, all appl., burglar alarm, fp, \$164,900. 928-5737.

Wanted

CAMPBELL'S SOUP LABELS - for church youth group. Paul, Ext. 2350 or mail to Bldg. 599.

SHOP MANUALS - 1978 AMC, 1977 Ford Maverick, 1972 Chevrolet van. Ed, Ext. 4035 or 727-3608 after 5 p.m.

MEN COOKS - who would like to demonstrate their favorite dishes at the Cooking Exchange. Judith, 924-6129.

3-MONTH-OLD INFANTS - for Ph.D. study of infant memory, involves pleasant play task in the home. 929-6945.

CORVETTE OWNERS - interested in joining active area sports car club. Steve, Ext. 4336 or 929-3611.

SKIS - approx. 110-120 cm, boots, poles approx. 28", for 7 yr. old. 929-3209 after 5 p.m. or wknds.

TRAINS - Lionel, American Flyer, accessories, any cond. brings good price. Carole, Ext. 3352 or 924-4097, eves.

ROOMATE - Yaphank, 8 min. from Lab, \$250 mon