BROOKHAVEN BULLETIN
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BROOKHAVEN NATIONAL LABORATORY

Corrosion Is Focus of DAS Materials Science Lab

If you live near a seashore, you probably know that the saltwater spray in the air can damage your car's metal parts. It's called corrosion, and it plagues metals exposed to corroding elements such as the chloride ions in saltwater.

But, while metals are susceptible to corrosion, they are guarded from damage by an extremely thin, invisible oxide film that forms on the surface and protects the underlying metal from the effects of corroding agents.

This shield, called a passive-oxide film, forms spontaneously and guards metals in many environments.

For that reason, the Corrosion Group in the Department of Applied Science's Materials Sciences Division is investigating different passive-oxide films formed on metals and alloys down to the atomic level, using techniques especially suited for the job.

"Metals corrode," said Research Associate Carissima Vitus. "Metal car parts, for example, break down and corrode because of the environment they're around — on Long Island, the chloride ions from the ocean and road salt are very aggressive. We're trying to understand aqueous corrosion," or corrosion of objects exposed to saltwater and other corrosion agents.

"We're also trying to understand the causes and chemistries of the breakdown of passive-oxide films," added Metallurgist Hugh Isaacs, Corrosion Group Leader.

The BNL studies of the surfaces, their films and the onset and progression of corrosion are mostly done in electrolytic solutions that emulate real-life environments and vary from pure water to saltwater.

Vitus uses scanning probe microscopy (SPM), a new surface-sensitive technique, to resolve passive-oxide film structures down to the atomic level. Two different instruments allow her to generate topographic images of the arrangement of atoms in the passive-oxide films.

Roger Stoutenburgh

Carissima Vitus (foreground) shows the scanning probe microscopes she uses to map the topography of corroding steel to reporter Kara Villamil, the Bulletin's summer student. On the computer screen at right is a microscope image, which gives clues to the mechanism of corrosion by showing the positions of individual atoms on the passive-oxide film of nickel.

The scanning tunneling microscope (STM) gives atom-level images of conducting surfaces by moving, or rastering, a finely honed tip of platinum/iridium or tungsten back and forth across a centimeter-wide sample. A voltage is applied, causing a tunneling current between the tip and the sample, which is very dependent on the height of the tip above the sample. By varying the height of the tip, the current is maintained at a fixed value as the tip rasters over the sample. These measured height changes yield the topography of the sample.

The atomic force microscope (AFM), on the other hand, can map nonconducting surfaces as well as conducting ones, in much the same manner that a diamond stylus on a phonograph reads a record. The "stylus," made of silicon nitride and mounted on a flat cantilever, presses lightly against the surface and deflects as it rasters across the sample. A laser detects the deflection due to the surface profile.

The goal of the research project is to understand how stainless steels corrode, Vitus explained. The complex behavior of stainless steel is simplified by studying the corrosion of its individual components: iron, chromium and nickel. This involves the study of each element's individual passivity, or ability to form a passive-oxide film.

"Once we understand how the film forms and why it protects, we can then add corrosion species such as chloride ions which induce pitting or other forms of localized corrosion," Vitus commented. She added that understanding the differences between films formed under various circumstances could be valuable in determining the best way to protect surfaces.

According to Isaacs, only three or four other teams worldwide are investigating corrosion using STM and AFM.

Even though the BNL project is still relatively young, each new finding by Vitus is groundbreaking, he said.

Besides looking at single-element crystals and their passive films, the group is also trying to understand how the corrosion-resistances of two or more elements interact in an alloy. "They don't just simply sum up together," Isaacs explained.

For example, Associate Scientist Alison Davenport conducts research at the National Synchrotron Light Source using x-rays to uncover more about the chemistry of the passive-oxide film on stainless steel and its corrosion by chloride ions. Graduate student Anthony Aldykiewicz is using the scanning vibrating probe technique to measure current distributions over corroding surfaces. Another team member, graduate student Michelle Taube, is applying SPM to understand the corrosion behavior of copper.

"Chloride is the main problem, because it has a very detrimental effect on all metals," Isaacs said. "We're trying to understand how chloride ions lead to the breakdown of the passive film."

So, by seeking to understand the mechanism of corrosion by corroding agents such as chloride ions in saltwater, this BNL team is contributing to a bank of knowledge that may one day lead to increased corrosion resistance for metals and their alloys.

— Kara Villamil

Coming Up

Cynthia Friend, a professor in the Chemistry Department of Harvard University, will give a Brookhaven Women in Science Seminar on Thursday, September 30. Her talk on "Structural and Reactive Surface Chemistry," will begin at 11 a.m. in the Hamilton Seminar Room of the Chemistry Department, Bldg. 555.

The AUI Long-Term Care Plan: Facts and Features

As described in previous issues of the Brookhaven Bulletin, the Long-Term Care Plan that Associated Universities, Inc. (AUI), will be offering as of January 1, 1994, covers a wide range of personal care, health care and social services for people who suffer disabling conditions or long-lasting disease. A variety of options helps each participant get the level of coverage that meets his or her individual needs and budget.

These options will be described in an enrollment package to be mailed next week — via Lab mail to all active employees and to the home addresses of retirees. This package will include a comprehensive guide containing premium rates and enrollment forms. Included in the kit is a toll-free number for Aetna's long-term care hotline, available Monday through Friday, 8 a.m. to 5 p.m. to answer questions about the plan or how to enroll.

Active and retired employees and their spouses can learn more about the AUI Long-Term Care Plan by attending one of four meetings to be conducted by representatives of the Aetna Life Insurance Company, which is underwriting the plan. The meetings in Berkner Hall are scheduled for 1:30 p.m. and 6 p.m. on Thursday, September 30, and 10 a.m. and 1:30 p.m. on Friday, October 1. To avoid undue disruption of work activities, employees who wish to attend a meeting during work hours should obtain prior approval from their supervisors.

Key elements of the plan include the following:

- **Those eligible** — active employees and their spouses, parents and in-laws of employees, retirees and their spouses, and surviving spouses of retirees.
- **Applying for coverage** — During the initial enrollment period, active employees are guaranteed entry into the plan. Their spouses, parents and in-laws, and retirees and their spouses and surviving spouses must complete a medical questionnaire and be approved by Aetna.
- **Benefit options** — For nursing facility care, $75, $100, $125 or $150 a day; half the daily amount for other kinds of care, such as home care, adult day care, assisted living, etc.
- **Waiting period** — 60 days, starting on the day the insured person suffers a qualified functional loss.
- **Premium waiver** — Once the waiting period has been satisfied, premium payments are not required until the individual is free of a functional loss for 90 consecutive days.
- **Receiving benefits** — Insured persons must require ongoing human assistance with at least two of the following activities of daily living: eating, walking or using a wheelchair, transferring from a bed to a chair or wheelchair, dressing and using the toilet. Alzheimer's disease is covered, and coverage is restricted for preexisting conditions.
- **Lifetime maximum** — Applicants select one of two lifetime maximums: With a five-year plan, the lifetime maximum equals 1,825 days (365 days x 5 years) times the benefit option selected; with a three-year plan, it equals 1,095 days (365 days x 3 years) times the selected benefit option. For example, with the $150 benefit option, the five-year lifetime maximum benefit of $273,750 (1,825 x $150) would provide five years of care received exclusively in a nursing facility, or ten years of care received exclusively in a home or adult day-care setting.
- **Enrollment** — October 1-29, for active employees and their spouses; October 1-November 30, for employees' parents and in-laws and for retirees, their spouses and surviving spouses.
- **Effective date** — For employees, January 1, 1994. For employees' parents and in-laws and for retirees, their spouses and surviving spouses, the first of the month following approval, providing approval is before the 15th of the month; if not, the first of the second month following approval, but, in either event, not before January 1, 1994.
- **Premium payment** — For active employees and spouses, via payroll deduction; for employees' parents and in-laws and for retirees, their spouses and surviving spouses, via direct billing by Aetna to their home address or via electronic fund transfer from their checking accounts.
- **Inflation protection** — Beginning in 1996 and every two years thereafter, plan enrollees who are not in a benefit period can increase coverage by a specified amount on a guaranteed-issue basis; in other years, they can increase to any available benefit option, subject to medical underwriting.
- **Portability** — Coverage is guaranteed renewable and cannot be canceled unless premium payments are not made.
- **Nonforfeiture** — Provides an extended term of insurance or a reduced paid-up benefit for life if an insured elects to discontinue premium contributions.

In Memoriam

Memorial services were held on Friday, September 3, for **Marcie Liebler**, who had been an architect in the Plant Engineering Division until her tragic disappearance and death in February 1988. She was discovered on August 18, 1993, almost 5½ years later.

After starting at BNL on January 1, 1981, as a staff engineer, Marcie Liebler was promoted to project engineer II in October 1987. In Plant Engineering (PE), her close friends and coworkers remember her with great fondness and recall her considerable talent.

"Marcie was a bright young architect," said PE Manager Bruce Medaris. "As a woman working in a previously male-dominated field at BNL, she was breaking new ground with every project she completed. Her cheerful acceptance of the challenge, together with a good prespective of the kind of work we do at BNL, made it possible for her to contribute new ideas to the design process. She is dearly missed."

Marcie Liebler is survived by her parents, Edna and Leonard Du Brul, and two sisters, Karen Du Brul and Holly Du Brul Cato.

Contributions in Marcie Liebler's memory may be sent to the Coalition Against Domestic Violence Inc., 250 Fulton Avenue, Hempstead, NY 11550; or to a charity of the donor's choice.

NSLS Has More Control

Roger Stoutenburgh

Within the control room of the National Synchrotron Light Source, the new computer control system is being put through its paces by: (standing, from left) Susila Ramamoorthy and Yong Tang of the Computer Systems Group, who were respectively responsible for the microsystems and workstation systems upgrades; NSLS Operations Manager Richard Heese, and (seated, from left) NSLS operators Edward Zeitler and Antonio Rodrigues.

When the operation of two synchrotrons is limited by the computer system used to operate them, then the only way out of this predicament is to replace the computer system.

Which is just what the National Synchrotron Light Source did in July: Dating from 1978, two old Data General (DG) Eclipse 250 computers and their associated terminals were taken out the door — leaving a 40-foot-wide empty room. This symbolic eviction, however, did not take place until the new control system had proven itself.

More important, the transition from old to new hardware and software was not noticed by any of the NSLS' 2,400 users.

While there had been several modifications over the years to the first control system, its architecture had basically been the same since the NSLS began operations with the vacuum ultraviolet (VUV) ring in March 1979. Beside the Eclipses, the mix of hardware included DG Nova computers, a VAX computer, 15 Apollo workstations plus other associated hardware and software.

With the addition of features to the synchrotrons that were not specified in the original design, the VUV and x-ray rings became more complex over the years — and, as a result, so did their operations. But, when the control system began limiting the operation of the upgraded machines, costing too much to maintain and being a source of unscheduled down time — it was time for it to be replaced.

The Computer Systems Group, headed by John Keane, had to do this job while keeping the synchrotrons up and running. So, in a process that began last year, they replaced the DG and VAX computers with 12 Hewlett Packard workstations and associated software, changed the standard for mircrocomputer communications from multibus to VME, and replaced serial communications lines with real-time Ethernet connections.

With DG Eclipses out the door, all that remains of the old system is one VAX, which is to be phased out by the end of the year.

According to NSLS Deputy Chairman Samuel Krinsky, the computer upgrade has reduced the downtime attributable to the control system, allows the operators to respond rapidly to real-time conditions within the rings, and given the Computer Systems Group the flexibility they need to upgrade the control system continuously.

— Marsha Belford

To Boldly Go Where No Van Has Gone Before

Reporter's Log, Labdate 082093 — While scanning the LIE quadrant near the Brookhaven sector, our sensors picked up a large silver-gray craft traveling at Warp 1, bearing toward the starbase known as Brookhaven National Laboratory.

Closer inspection revealed approximately twelve humanoid crew members, all resting comfortably in a climate-controlled, smoke-free atmosphere. Only the helmsman had to contend with asteroids and hostile life forms.

Once the vessel reached BNL at 0830 hours, each of its crew members was beamed down to various points on the starbase. At approximately 1700 hours, the crew was beamed up again, and the vessel returned through the asteroid belt to its point of origin in the Western Nassau sector.

Captain Kirk wouldn't have known what to make of them.

They're the twelve BNL employees who travel from Brooklyn and Nassau County to the Lab each day aboard a silver-gray van known as the "Starship Enterprice."

Yes, that's "price," as in saving the price of gas.

After all, this is the only BNL van pool remaining of the several launched in the late 1970s to save money, gas and effort for employees with a long commute.

But why the *Star Trek* theme? "Captain" Ken Kim, of the Plant Engineering Division's Project Management Group, the van pool's manager, explains it this way: "When we touch down here, it's a different world from the metropolitan New York area. It's outer space," he said.

"Lift off" is around 7:20 a.m. for Kim and his crew, who assemble at Exit 20 of the Southern State Parkway for the trip to BNL with Sam Mason at the helm. In the afternoon, one of the other van poolers drives as part of a rotating schedule, while the others read, sleep or chat. Each member pays around $100 per month for gas, repayment and upkeep on the 1993 Ford van.

Roger Stoutenburgh

Members of the crew of the Starship Enterprice prepare to beam down to work: (back, from left) Greg Bagley, RHIC Project, now retired; Norman Young, Plant Engineering (PE) Division; Ron Reyer, Reactor Division; Vincent Harris, RHIC Project; Marvin Shear, Director's Office; Sam Mason, RHIC; (front, from left) Roger Bailey, PE; Aron Korostyshevsky, Physics Department; Tom Tsang, Instrumentation Division; and Ken Kim, PE. Missing: Jim Cammarata, RHIC, and Manny Garber, Physics.

The present vehicle is the fourth bought by Associated Universities, Inc. since 1979 for this group to maintain. The van pool began, along with two others which have since ceased running, after a Brookhaven Bulletin article appeared advertising AUI's interest in starting van pools during the nation's energy crunch.

"Gas prices were rising, and people were looking for ways to save commuter costs," said Greg Bagley. A charter member of the original Queens van pool, Bagley was in the van pool until his retirement from BNL and the RHIC Project at the end of August. He added that the arrangement still works today. "It's still cheaper than driving and cheaper than car pooling," he said.

Jim Cammarata, RHIC Project, agrees. He lives in Nassau County, 50 miles from the Lab. Before joining the crew of the Starship Enterprice four years ago, Cammarata said he was racking up the miles on cars and spending on gas alone the $100 he now spends to be driven to work.

These days, he said, he saves the miles on his car and avoids the hassles of commuting. "If you've had a tough day, it's good," he said. "Some days I just pass out and before I know it, it's 50 miles later and I'm home."

Now that Bagley has retired, and other van poolers are often absent due to vacations and other reasons, new temporary riders can join the Enterprice crew and perhaps eventually become permanent riders when space becomes available.

"If people need a ride, space is available," Kim said, adding that at least one or two standby riders can be accommodated for most mornings, for the price of $5 per round trip. Call Kim, Ext. 5296, for more information.

Fiscal Officer Mark Israel, who coordinates the purchase and maintenance of vans for the van pool program, said it is still possible for groups of permanent employees to form a van pool; a representative of an interested group of nine or ten may contact Israel, Ext. 2494.

A member of the Lab's Traffic Safety Committee, Kim emphasized the safety of van pooling, as well as the environmental and economic benefits — and the tremendous camaraderie. "These people wouldn't have met otherwise," he said, listing the many BNL departments and countries of origin, including Russia, China and Jamaica of the van poolers. "We're a very cosmopolitan group," he said.

Cammarata agreed, saying there is only one condition for new members. Referring to the van's casual language lessons, he said, "You must be willing to learn Russian." — Kara Villamil

Softball Champs

The competition packs it in when the Six Paks come out on the field — League 1 champs this year are: (front, from left) Beau Yatauro, Jim Meier, Frank Gaetan, Jerry Gaeta; (center, from left) Co-captain Jim Leskowicz, Mark McNeill, Pat Browne, Joe DeCicco, Lou Nieves; (back, from left) Co-captain Tirre Farmer, Fred Rodriguez, Emil Varrichio, Tony Mendez, Walter Reams. Missing are: Tim Costanzo, Bob Meier, Rich Meier.

Metomorphosing into the lead in League 2 are the members of Cocoon: (front, from left) Clarence Wilkins, Coach Bob DiLello, Lewis Jackson, Artie Harris, Captain Jerry Quigley; (back, from left) Rich Chorzempa, Al Boener, Chris Stelmach, Ken Koebel, Darren Harris, Mike Guacci, Eric Seebeck, Ed Sembler, Dave Comstock. Missing are: Ron Mulderig, John Quigley.

Having a wonderful time as champs of League 5 are the Goodtimers: (front from left) Carlos Victoria, Claudia Jones, Kerri Bonti, Terri Lacker, Maryann Reynolds, Captain Peter Bonti; (back from left) Alan Jones, Chris Saxon, Jennifer Schwarz, Mike O'Connor, Pete La Salla, Larry Musso. Missing are: Luke Greco, Ann Hassig, Barbara McCarrick, Brian McCarrick. —Photos by Roger Stoutenburgh

Certain of victory in League 3 were the Sure Fires: (front, from left) Chris Hanley, Al Liotta, Arthur Veprovsky, Gerry Magee, Jim Lacy, Phil Pizzo; (center, from left) Greg Tomasello, John Bruce, Danny Carneiro, Steve Thomson, Mark Sabat; Steve Eckhoff; (back, from left) John Giarratano, Mitch Sussman, Captain Wally Hughes, Bud Baumbach, John Berry, John Willi. Missing is Jesus Marte.

With an electric surge to the top of League 4 came the Stingrays: (front, from left) Barbara Royce, Pat Medina, Bob Medina, Anette Meier, Captain Jim Garrison; (back, from left) Leroy James, Letesha Smith, Sydell Lamb, Barbara Langhorne, Brian Hobson, Bob Brown. Missing are: Angela Johnson-Shaw, Junior Santiago, Ken Sutter, Mitch Williams, Tomara Woodson.

Teller on Tape

The Physics Department will be showing a videotape of physicist Edward Teller's "100th Anniversary Talk," given at Los Alamos National Laboratory's 50th anniversary celebration earlier this year. Tea will precede the presentation on Tuesday, September 21, at 3:30 p.m., in the Physics seminar room, Bldg. 510. All are invited.

Inside Info

Caroline Kramer, a community health associate in the Department of Advanced Technology's Injury Prevention and Analysis Group, has won one of three awards in the 1992 national competition for best student paper on injury, sponsored by the Southern California Injury Prevention Research Center in Los Angeles. The honor brings with it a $150 prize.

Kramer wrote "Adequacy of Death Certificate and Hospital Discharge Summary Information for Determining Trauma Mortality/Morbidity Pattern," during the 1992-93 academic year, while completing her master's of science degree at the State University of New York at Stony Brook. She will present the paper at the American Public Health Association meeting in San Francisco on October 27.

P.O. Expands Window Hours

To serve its customers' needs better, the Upton Branch of the U.S. Postal Service has recently expanded its window hours. Weekdays, the window now opens at 8 a.m., half an hour earlier, and continues to remain open until 4:45 p.m. In addition to post office box deliveries, window service is now also available on Saturdays, from 8 a.m. to noon.

For more information about postal service at the Upton Post Office, call Ext. 2539.

PSI Meeting

Judy Hason, a facilitator with the Northport Lyme Disease Support Group, will discuss "Lyme Disease Education" at the next meeting of the Upton Chapter of Professional Secretaries International (PSI), on Wednesday, September 22, at 6 p.m., in the south dining room of the Brookhaven Center.

A board member of the Long Island Arthritis Foundation and chair of the Education Committee for the New York State Lyme Disease Coalition, Hason will review the history of Lyme disease, as well as symptoms, prevention, controversies, chronic Lyme disease and support groups.

For more information, call Susan Carlsen, Ext. 7647, or Sharon Jones, Ext. 2493.

Reports Available

The following reports are available to Laboratory staff and affiliates of DOE, AUI and NRC. Others may purchase the reports from the National Technical Information Service, U.S. Department of Commerce, 5285 Port Royal Road, Springfield, VA 22161. Staff members should call the designated contact.

BNL-NUREG-52367
Contact: A. Fort, Ext. 2114
High-Pressure Coolant Injection (HPCI) System Risk-Based Inspection Guide — Hatch Nuclear Power Station. A.M. DiBiasio

BNL-NUREG-52368
Contact: J. Hodgkinson, Ext. 4909
Implementation of Seismic Stops in Piping Systems. P. Bezler, N. Simos, Y.K. Wang

BNL-NUREG-52370
Contact: A. Fort, Ext. 2114
High-Pressure Coolant Injection (HPCI) System Risk-Based Inspection Guide — Browns Ferry Nuclear Power Station. S. Wong, A. DiBiasio, W. Gunther

BNL-52371
Contact: L. Lever, Ext. 4746
National Synchrotron Light Source Annual Report 1992. S.L. Hulbert, N.M. Lazarz

BNL-52372
Contact: M. Chaloupka, Ext. 2746
Dynamic Soil Pressures on Rigid Cylindrical Vaults. A.S. Veletsos, A. H. Younan

BNL-52378
Contact: M. Chaloupka, Ext. 2746
Sloshing Response of Layered Liquids in Rigid Tanks. A.S. Veletsos, P. Shivakumar

BNL-52379
Contact: K. Tuohy, Ext. 3845
Accelerator Physics and Modeling. Z. Parsa

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

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UNIX Training

The Computing & Communication Division (CCD) will sponsor two free, three-hour seminars on the UNIX "make" facility, on Monday and Wednesday, September 20 and 22, from 5 to 8 p.m., in the CCD seminar room, Bldg. 515.

Attendees should have some experience with UNIX and Shell programming.

Space is limited; if interested, call Maria Gatz, Ext. 5196.

ANS Meeting

American Nuclear Society (ANS) President Edward Fuller will speak on "Nuclear Power and the Global Environment," at a dinner meeting of the ANS's Long Island Section, on Wednesday, September 22, at the Radisson Hotel in Islandia. The speaker will be introduced by Robert Bari, Deputy Chairman of BNL's Department of Advanced Technology. For times and reservations, call Julie Tuber, Ext. 2513, by September 20.

Amateur Radio Club

The next meeting of the BERA Amateur Radio Club will be on Thursday, September 23, at noon, in Berkner Hall, Room D. All Lab employees, guests and licensed amateur radio operators may attend. For more information, call Chris Neuberger, Ext. 4150, or Nick Franco, Ext. 5467.

Arrivals & Departures

Arrivals

Larraine M. Caprioglio ..... Director's Off.
Dennis J. Ryan ..... Saf. & Env. Prot.
John J. Schnell ..... Staff Services

Departures

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

Anthony DiSena ..... Central Shops

Art and Leaves: Bus Trip up Hudson

On Saturday, October 30, take the BERA Art Society bus trip up the Hudson Valley. Leave BNL at 7:30 a.m. for Purchase, to see American, European and African art at the Neuberger Museum and a fine sculpture garden funded by Pepsico. Then, after bus riding up the river to lunch, glorious views and falling leaves (if any!), return to explore the antique and gift shops at picturesque Nyack, perched on the west bank of the Hudson. There, you can visit the Edward Hopper House, where Hopper was born and grew up, and then have a snack supper before the bus leaves to get back to BNL by about 8:30 p.m.

The trip will cost $18 for the bus, and $4 ($2 for seniors) for the Neuberger Museum. Call Liz Seubert, Ext. 2346 or 286-8563, for tickets or information.

Weight Watchers

Registration for the next sessions of the Weight Watchers at Work program will be on Wednesday, September 22, from noon to 1 p.m., in the Brookhaven Center dining room. For the 12-session program, which will meet at noon on Wednesdays starting on September 29, the fee for BNL employees is $90, with BNL paying $10 for each participant. Spouses may also attend. For more information, call Mary Wood, Ext. 5923 or 4567.

Aerobic Dance Club

Openings are still available for the fall program of stretch and aerobic dance classes sponsored by the Aerobic Dance Club and led by instructor Pat Flood. Anyone wishing to sign up should attend the next classes.

Aerobic dance classes meet on Tuesdays and Thursdays in the Recreation Building; stretch classes meet on Mondays, in the Physics Department lobby, Bldg. 510. All classes run from 5:15 to 6:15 p.m., and participants may sign up for any or all of them. Mats are recommended for floor exercises.

Classes will not meet next week, but aerobic dance will resume on Tuesday, September 28, and Thursday, September 30, while stretch classes will resume on Monday, October 4. The $30 fee for each ten-week session (M, T or Th) is payable at the first class. For more information, call Flood, Ext. 5070, or Janet Sillas, Ext. 2345.

Leagues Need Substitute Bowlers

Both the Tuesday night Men's League in Port Jefferson and the Thursday night Mixed League in Shirley need substitute bowlers to be on call when regular bowlers cannot attend. When called, substitutes may accept or not, according to their schedule. Anyone interested should contact Charlie Bohnenblusch, Ext. 4785, or Debbie Keating, Ext. 7218.

Bowling

Red/Green League
H. Arnesen bowled a 233/226/649 scratch, R. McKinnon 225, R. Raynis 224, T. Prach 208, B. Erickson 203, K. Koebel 201, F. Griswold 200, R. Prwivo 200.

Purple League
Tom Fleming bowled a 235, Ed Sperry III 233, Ray Raynis 206/198, Ed Sperry IV 203, Debbie Keating 203, Pat Bounauito 186/170, Manny Didor 185, Pat Moylan 182, Maria Yanez 176.

White League
Sharon Smith 190, Nancy Erickson 180/171, Pat Manzella 189/171, John Niemczyk 191, Elaine Zukowski 172, Tom Romano 205, Joe Mayeski 201, Lorraine Roecklein 170/183.

Service Station Offers Inspections

The on-site Gulf service station is now performing New York State motor vehicle inspections. To make an appointment, call Ext. 4034.

Cafeteria Menu

Monday, September 20

Soup: Homemade chicken noodle	.80/1.10
Entree: Chicken fajitas	3.45
Fitness Fare: Pasta w/marinara sauce	3.20
Carvery: Pastrami sandwich	2.95
Grill: Reuben platter	2.95
Fitness Salad: Pineapple boat	

Tuesday, September 21

Soup: Cream of mushroom	.80/1.10
Entree: Spaghetti w/meatballs	3.45
Fitness Fare: Fish w/lemon & tomato	3.55
Carvery: Hot roast beef sandwich au jus	2.95
Grill: Western omelet w/fries	2.35
Fitness Salad: Chef's seafood bowl	

Wednesday, September 22

Soup: Bavarian lentil	.80/1.10
Entree: Boiled knockwurst & sauerkraut	3.55
Fitness Fare: Tomato & broccoli casserole	3.25
Carvery: Baked Virginia ham sandwich	2.95
Grill: Italian cheese steak w/fries	2.95
Fitness Salad: Fresh fruit entree	

Thursday, September 23

Soup: Cream of spinach	.80/1.10
Entree: Italian steak pizziola	3.75
Fitness Fare: Tarragon lime chicken	3.50
Carvery: Corned beef sandwich	2.95
Grill: Ham & broccoli cheese melt	2.75
Fitness Salad: Cantaloupe bowl	

Friday, September 24

Soup: New England clam chowder	.80/1.10
Entree: New Orleans Cajun catfish	3.65
Fitness Fare: Display cooking special entree	
Carvery: Hot turkey sandwich w/gravy	2.95
Grill: Fried shrimp boat	3.25
Fitness Salad: Chef's salad	

Burger, Deli & Taster's Bar specials daily.

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.

SCIENTIFIC RECRUITMENT - Candidates may apply directly to the department representative named.

ASSOCIATE DIRECTOR FOR BASIC ENERGY SCIENCES - To oversee and plan for a) the BNL research programs supported by the DOE Office of Basic Energy Sciences and carried out within the departments of Applied Science, Chemistry and Physics; and b) the research conducted at the NSLS and the HFBR. Requires an international reputation in one or more of the relevant fields of research and substantial experience in administrating research programs. Contact: Victor Emery, Physics Department

SCIENTIST - Experienced in silicon position-sensitive detectors and the physics of semiconductor devices, to coordinate the development of silicon drift detectors for the vertex tracking system (SVT) for the RHIC STAR collaboration and prototype production. Contact: Hobart Kraner, Instrumentation Division, or Edward Platner, Physics Department

SCIENTIST - Trained in electrical engineering or computer science, with experience in pattern recognition and knowledge of neural network architecture for microprocessors, to develop a pattern-recognition program for chemical identification of unknown chemical mixtures by Raman spectral fingerprint. A mobile Raman chemical sensor for field test of the physical principle will be built. Ability to obtain and hold Q access authorization required. Contact: Carl Chen or Joseph Indusi, Department of Advanced Technology.

POSTDOCTORAL RESEARCH ASSOCIATE - Trained in biochemistry, with experience in protein crystallography, to conduct research to determine structures of outer surface proteins (OspA, OspB) of the tick-borne Lyme disease spirochete, *Borrelia* bergdorferi, by x-ray crystallography. Contact: Catherine Lawson, Biology Department.

OPEN RECRUITMENT - Opportunities for Laboratory employees and outside candidates.

NS 0519. ENGINEERING POSITION - (term appointment) Requires BSEE and knowledge of analog and digital design. Experience with PLC and PLA programming design for high-reliability safety systems a plus. RHIC Project.

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

Motor Vehicles & Supplies

92 TOYOTA TERCEL - 4-dr., green/ a/t, am/fm cass., alarm, 30k mi., excel., $7,200 neg. Hong-Ji, Ext. 7290.

91 HARLEY SPORSTER DELUXE 883 MOTORCYCLE - candy red, w/$1,000 in extras, 3k orig. mi., Lloyd, Ext. 5225.

91 MERCURY TRACER LTS - 12k mi., 4-dr., a/t, ac, *1991 Road & Track* 10 best, excel. cond., $8,775. Eric, Ext. 5875.

90 TIOGA MOTOR HOME - 23', loaded, 8k mi., mint cond., $20,000. Pat, Ext. 7705.

90 MITSUBISHI PICKUP - 5-spd., cap, ac, garaged, $3,500 neg. 368-0934.

90 TOYOTA COROLLA DX - 4-dr., 5-spd., white, ac, cass. stereo, new tires, $6,700; '84 Delta 88 Olds, V-8, a/t, ac, 2-dr., all power, more, $1,485. Tom, 744-8338.

89 DODGE DAKOTA SPORT PICKUP - 4wd, a/t, ac, every option, immac. cond. Bob, 929-8467.

88 ISUZU TROOPER - 4wd, 4-dr., ac, new tires, low mi., excel. cond., $7,500. 325-8116.

87 NISSAN SENTRA - 4-dr., a/t, p/s, ac, stereo, 84k mi., new tires/brakes, excel., $3,300. Joe, 286-1479.

86 LE BARON GTS - h/b, 4-dr. Sport Turbo Premium, all option, int. leather, new tires & brakes, low mi., excel. cond., $5,500. Ann, Ext. 5740 or 744-8386.

84 VOLVO 240 WAGON - diesel, brand-new eng., mint cond. in & out, safe, reliable, economical trans. Tony, 281-2513.

85 ALLIANCE - 2-dr., a/t, am/fm cass., 57k mi., orig. owner, excel. int., good body, runs well, asking $900. Bob H., Ext. 4446 or 654-3989.

85 NISSAN 200SX - 5-spd., ac, am/fm, perfect cond., $2,700 neg. Vasilis, Ext. 2830.

85 RENAULT ENCORE - white, new tires, 140k mi., $600. Neva, 728-5136.

84 VOLVO - 4-dr., 4-spd., o.d., black leather int., loaded, p/w, moonroof, etc., good cond., runs well, asking $3,500. Amy or George, 734-5819.

84 HONDA - 5-spd., new brakes, clutch, tires, recently tuned, v.g. cond., in & out, $1,700 neg. Tammy, Ext. 7258.

84 OLDSMOBILE CUTLASS SUPREME - 33.5k mi., v.g. cond., $3,500. Mary, 727-2871.

83 DODGE ARIES - a/t, ac, 95k mi., runs well, $300. Frank, Ext. 7899/2567 eves.

83 HONDA CB1100F MOTORCYCLE - Sport Touring, red, white, black, 12k mi., new battery, nylon cover, excel. cond., $1,800. Ron, Ext. 4144.

83 PLYMOUTH RELIANT - good body, runs, any reasonable price, make offer, must go. Andrei, Ext. 3831 or 341-1076

80 BLAZER KS - 250, 6-cyl., p/s, p/b, CB, stereo radio/cass., p/booster, body excel. cond., runs well, $2,700 or best offer. Ext. 2384 or 924-8558.

78 PONTIAC FIREBIRD - 231, V-6, good, body fair, needs clutch work, $300. Bill, Ext. 4988.

75 FORD VAN - straight 6, runs well, v.g. tires, must sell, $300 or best offer. Vinny, 582-6241.

66 FORD GALAXY - conv. int., also steering wheel, etc., conv. boot, chrome body, wire hub caps. Dan, Ext. 2012.

MOTOR - Ford 351 Windor 30 overbalanced & blueprinted by Lawrence racing engines, all paper work, will demo. Wayne, Ext. 3082.

RIMS - 4, gold plated, 14", 4-lug, locks, center cap, 2 tires, $100. Dan, Ext. 4605.

Boats & Marine Supplies

19½' CAPRI CUDDY BAYLINER - 3.0 liter, OMC i/o, dual batt., DF, VHF, compass, potty, canvas, extras, $3,800. Dave, 567-6764.

Furnishings & Appliances

BED - king box mattress, $150; like new, handmade, Behr's comfort set, $150. Tom, 744-8338.

BEDROOM DRESSER SET - triple dresser, mirror, matching chest, very sturdy; 2 sets of bunk beds, full bedspread. Ext. 4432 or 473-9678.

BEDROOM SET - black triple dresser, mirror, 2 night tables, $300 neg; 2 hanging lamps, 6 bulbs, $50/ea.; l/r lamps, $25/ea.; wall paintings. 585-8816.

CABINET - wooden, $15. Ext. 5534.

CHAIRS - 4 cane & chrome, $35; computer desk, $50; infant's walker, $5; brass floor lamp, $25. Bob H., Ext. 4446 or 654-3989.

CHAIR & LOVE SEAT - gray, excel. cond., $200. Penny, Ext. 2625.

DINETTE SET - wrought iron, black top, 36"x48"x60", $300. 286-2265 after 7 p.m.

FREEZER - 16 cu. ft., Frigidaire, upright, 5 shelves, white, excel. cond., $250. 286-0904.

FOOD FREEZER - GE, 18 cu. ft., white, w/built-in lock, excel,. cond., $350. Ann, Ext. 5740 or 744-8386.

LIVING ROOM SETS - both 3-piece, pastels, 1 w/sofa bed, good cond., Vinny, 582-6241.

SOFA - love seat, wall unit, 2 mirrors, coffee table, floor lamp, $800 or will separate. Mike, Ext. 3639.

Tools, House & Garden

FILTER - Hayward DE, 1-h.p., 2 spare pumps, $150/all or make offer. 821-1525.

LAWN MOWER - Toro, 21" cut, runs well, asking $60; Bob, Ext. 4260 or 821-5263.

LAWN MOWER - Black & Decker, elec., double insulated, 18" blade, $100; riding lawn tractor, 11 h.p., 36", elec. start, $500. Ext. 8302 or 878-1617.

LAWN MOWER - Sears, 26", riding, needs trans., excel. cond., $50. Rich, Ext. 4986 or 589-9103.

SCREW MACHINE - A10, Bechler automatic Swiss, excel. cond., $2,000; Yamaha 125 trike, good cond, $350. Dave or Teri, 289-2925.

STAIR-O-LATOR - ⅓ h.p., 115 Vac, chair lift, fits on side of existing stairs, best offer. Ray, Ext. 3695.

TABLE SAW - Delta contractors' model, 10", w/stand, extra blade, like new, $250. Peter, 821-9513.

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

TREES - Japanese red maples, $5-$10. Bob, Ext. 5439 or 744-3224.

BAMBOO PLANTS - locally grown, 4-6' high, $35-$50. Anne, 361-6835.

CABINETS - white, Formica/oak, 17 pc., lazy Susan, 2 pantries, wine rack, mail organiz., microwave shelf, orig. $7,200, now $1,500. Dick, (203) 431-6769.

COAL STOVE - Franco Belge & piping, $250. John, 981-6172 after 7 p.m.

DROP SPREADER - Ortho, $25; portable kerosene heater, Toyokuni & 5-gallon can, $55; Kolcraft stroller, $40; Little Tykes sled, $25. Pat, 924-3307.

LAWN MOWER PARTS - Tech., Briggs & Stratton, Craftsman, Lawnboy, Snapper, bags, etc., Dan, Ext. 2012.

SNOW BLOWER - Sears/Craftsman, 5 h.p., 23", 8-spd., used twice, make offer. Doug, Ext. 5649.

WATER COOLER - bottled water, Oasis White, cold only, w/cup dispenser, $95. Craig, 471-3482.

WELL PUMP - 1 h.p., 2 stage, 2 yrs. old, great for faucet pressure, glass-lined tank, $175. 924-8558.

Sports, Hobbies & Pets

BIKE - Schwinn Prelude, 14-spd., 19" frame, 27" wheel, toe clips, water bottle cage, orig. $375, asking $175. Debbie, 286-2959.

COMPOUND BOW - P.S.E., 30"-60, camo., like new, arrows, etc., $100; Camo clothing available, left hand; fishing waders, new, size 10, rubber, $40. 757-3178.

GO CART - metal frame, good shape, motor needs carb., $75. Dan, Ext. 4605.

GUITAR AMP - GK250RL, $200. wireless system, Nady201, $225. Doug, Ext. 4661 or 434-7812

MODEL KITS - plastic, new & collectibles, planes, boats, cars, figures, selling out collection. 744-5278.

ORGAN - Wurlitzer, 2 tiers of keys, foot pedals, bench, good cond., $125. 821-2289.

ORGAN - Kawai, roll-top cover, 6 years old, excel. cond., cushioned bench, price neg. Carol, 475-7318.

SKIS - Head Express, poles, $60; Raichle ski boots, woman's 7½, $30. Debbie, 286-2959.

VIOLIN - Suzuki Nagoya, ½ size, excel. cond., $140. Steve, Ext. 4475.

WEIGHT-LIFTING BENCH - DP, excel. cond., $75. 924-2298 eves. & wknds.

Audio, Video & Computer

COMPUTER - IBM PC Jr., color mon., software, 640k memory, printer, surge protector, excel. cond., best offer over $300. Nancy, Ext. 4530 or 821-4174.

DIGITIZER - video scanner for Macintosh, high resolution camera, $400/all. Ext. 7699 or 821-1435.

SPEAKER - EAW 18-ply Baltic birch, tuned, ducted port cabinet, w/two 15" JBLs, steel kick plates, wheels. Steve, Ext. 2897.

KEYBOARD - Yamaha PSR-41, case, stand, 120V or batteries, 32 fm presets, 80 rhythms, orig. $500, sell for $250. 821-1525.

COMPUTER - Commodore 64, Star NX-10, printer, 1541 drive, color monitor, joysticks, software, games, $300 or best offer. Bob H., Ext. 4446 or 654-3989.

COMPUTER - PC-XT, w/Hitachi mono. monitor, $250. Ext. 5534.

COMPUTERS - 486 DX 33, 170 MB HD, 3½, 5¼ floppies, 4 meg RAM, 101 keyboard, .28 SVGA, 1 yr. warranty, $1,300. Vinny, 582-6241.

DISK DRIVE - 1541A, Commodore, $25. Pat, 924-3307.

TV - 46", color, picture great, problem w/volume control, easy to fix, $350 firm. 653-8966.

Miscellaneous

AIRLINE TICKET - AA, Miami to Islip, 9/26, best offer. John, Ext. 4632 or 298-4608.

BOOKCASE - $20; kid's roller skates, $10; toy box, $10 ; beige footstool, $10. Kathy, 744-2203.

BABY'S ITEMS - playpen, porta-a-crib, walker, swing, all like new, in orig. boxes. Laura Sabatini, 289-9533.

BABY'S ITEMS - changing table, $8; playpen, $5; swing, $10; more. Lucy, 929-0480.

CAR SEAT - Fisher Price, $15; Little Tykes treehouse, $20; Today's Kid activity rocker, $15; more. Rose, 234-7732.

CRIB - white/brass, drawer on bottom, excel. cond., $125. Ann, 395-3914.

HIGH CHAIR - hardly used, $40. Ext. 5534.

CAR SEAT - Evenflo Joyride, $25; Graco Disney Babies playpen, new, $45; Fisher Price bathtub, $8; Sesame Street playgym, $8. Chris, 744-6874.

TAPES - Jenny Craig Diet, entire set, $25. 924-8558.

Free

CLOSET DOORS - sliding, 6' wide by 8' high, white w/gold trim. Rich, Ext. 2386.

DOG - purebred Labrador retriever, male, 1½ years old, field championship lines, friendly. 878-2577.

Yard & Garage Sales

PATCHOGUE - 9/18-19, 15-family sale to benefit boys' travel soccer team, 85 Buckley Rd.

Lost & Found

LOST - cart, 2,500-lb. capacity, hardwood top, blue steel frame, 12" tires, steerable, 24x48x17, Hercules, call or return, TVDG, Bldg., 901A. Ext. 4584.

Wanted

BICYCLE - adult 3-wheel, good cond. 589-6803.

GENERATOR - 2500kW minimum, must run and be in good cond. Vinny, 582-6241, leave message.

LAWN MOWERS - and lawn tractors, used, complete; farm tractor, small, capable of cutting tall grass, etc., reasonable, if needs repair OK. Dan, Ext. 2012.

MARINE FISH - looking for healthy, inexpensive, tropical, saltwater fish. Jim, Ext. 4617.

PERSON TO CARE FOR ELDERLY DOG - while we are away for one week in Oct., your house or mine, will pay well, or watch your pet in exchange. 289-9533.

SOLO FLEX - good cond., complete w/leg butterfly extension, will pick up. Ext. 4030.

TRAILER - utility, to carry two dirt bikes, good shape, reasonable price. Dan, Ext. 4605.

Classified Ad deadline is 4:30 p.m. Friday for publication Friday of the next week.