BROOKHAVEN BULLETIN
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BROOKHAVEN NATIONAL LABORATORY

The Self-Organized Sandpile: An Avalanche of Model Data

An old riddle asks: *When is a door not a door?* And most old readers, as well as some younger ones, know the answer: *When it is ajar.*

A newer question might be: *When is a sandpile not a sandpile?*

The answer, if it comes from a participant in the July 1988 workshop held in Corsica on "Random Fluctuations and Pattern Growth," might easily be: *When it is a visual model for the systems driving clouds, quasars, earthquakes — and the Dow Jones average.*

This novel way of looking at a sandpile is becoming familiar to a fast-growing group of scientists and economists, all interested in "self-organized criticality" — a new theory of how certain interactive systems work. Included in the group are the economists who participated in a 1987 workshop held at Santa Fe; the readers of an article in the December 1988 *Scientific American*, "Science and Business"; and, most recently, the attendees of a BNL physics colloquium given in mid-January.

At this colloquium, the speaker was Per Bak, an originator of the concept of self-organized criticality.

"Self-organized criticality is the name we gave a general organizing principle we discovered that governs two groups of extended natural systems," said Bak, a senior physicist in the Physics Department. Along with his colleagues Chao Tang and Kurt Wiesenfeld, both formerly in Physics and now at the Institute for Theoretical Physics, Santa Barbara, and the Georgia Institute of Technology, respectively, Bak has been intrigued by two groups of natural phenomena that have no characteristic size or time, yet seem to have some underlying link in the way their systems are driven.

Roger Stoutenburgh

Per Bak

Fractal Structures & Flicker Noise

"If you look at clouds, rocks or mountains, you realize that they come in all sizes," said Bak. "We describe these sets of phenomena as fractal — they have features of all lengths. For example, a coastline has features that vary from a few meters to the size of a continent. If all possible measurements of a mountain range or a coastline are plotted in two graphs, they look very similar.

"Other sets of systems are measured over time, and they have an equally wide variety of scale," continued Bak. "The light from a quasar has fast, slow and intermediate fluctuations, and the flow of the Nile can be swift during a year and slow through the centuries. The Dow Jones average shows the same unpredictability — you get a rapid 'Black Monday,' followed by a year of very slow regrowth."

Bak explained that when the frequencies, called the flicker noise, of these time systems are plotted mathematically in a computer, the general pattern of each graph is similar. The presence of flicker noise is therefore evidence that these dynamical systems have an underlying universal organization.

Stable, Yet Poised to Go

The computations, which can be made on a simple personal computer, show a particularly interesting feature, Bak said, "The dynamical systems evolve *naturally* towards a condition that we call a critical state, which has no characteristic length or time scale: It is scale-invariant."

A system in the critical state appears to be stable, yet it is poised to evolve into another condition. The same state is found in phase transitions — for example, when a solid is about to change to a liquid through a change in temperature.

The critical state of the systems that Bak has been examining, though, does not depend on a particular circumstance, such as a given temperature: It is "self-organized." The fact that there are clouds of all sizes does not rely in a sensitive way on the details of the underlying mechanisms.

The Sandpile Model

"One way to visualize all this," said Bak, "is to imagine building a sandpile by adding sand grains, one by one, at random, to a flat surface. As the pile gets steeper, small landslides and avalanches occur at first, then bigger ones. Eventually, the pile reaches a statistically stationary state, where the amount of sand added equals the amount falling off.

"Then," Bak continued, "the effect of just a little more sand is unpredictable — it can start avalanches of all sizes and of all durations. That is the critical state.'"

From Earthquakes to Economics

Bak, Tang and Wiesenfeld's theory may explain some systems that have not previously been understood. In the case of earthquakes, for example, measurements show that there is no characteristic size. If, as Bak thinks, the crust of the earth is at the point of self-organized criticality, it is in a constant state of being likely to collapse, and earthquakes of unpredictable size and duration result. Scientists from both France and Japan have already written papers in agreement with this idea.

Also, among other papers that have been based on the self-organized criticality concept is one using it to provide a new interpretation of certain experiments in biology.

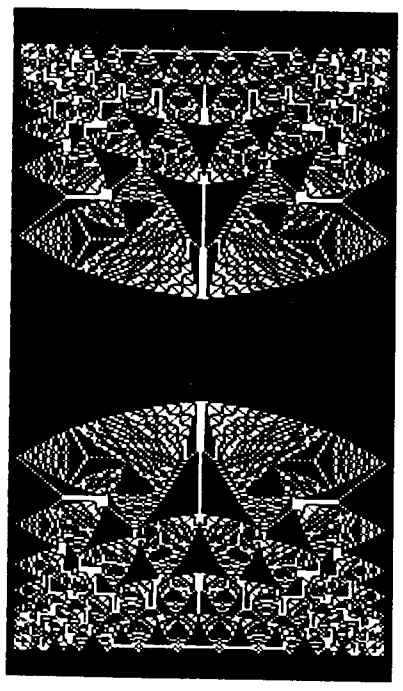
The concept may also be of value to economists. Traditional models of global economy are based on dynamic equilibrium, where it is assumed that when prices rise, demand falls, which lowers prices. But these models have failed to predict some major financial disasters.

Indications that the Dow-Jones average is among the systems driven by self-organized criticality are already being used as a basis for new ways of looking at the economy. At next summer's Santa Fe workshop for economists, Bak will be meeting with Philip Anderson, a Nobel laureate in physics, who was coleader of last year's meeting and has shown great interest in the new theory.

Said Bak, "This field is still at a pioneer stage. We have understood part of how these systems behave, but there is more to learn. It's satisfying work, connecting ideas with the phenomena around us."

— Liz Seubert

Tabletop Sandpile



This computer model of a pile of sand in the critical state is one way to represent self-organized criticality. Michael Creutz, a senior physicist in the Physics Department, made the model on a home computer. To do so, he set up a two-dimensional "table," of 286 x 143 units, on which "sand" could be piled up, giving a slope at each point that could range between zero, the flat table, and seven, the highest point. In the original version, different colors represented the seven degrees of steepness. But here, black represents three and zero, while white is one and two. Whenever the slope was any steeper than three, the sand "fell" in avalanches of different sizes. This picture is a bird's-eye view of the final stable state arrived at from an initial state with all slopes being seven.

Lectures Ready for Publication

Roger Stoutenburgh

Before delivering the first of three Pegram Lectures last week, Sir Denys Wilkinson (second from left) delivered a completed manuscript of his talks to Edward Lugenbeel (second from right), Executive Editor of Columbia University Press, which has been been the publisher of the Pegram Lectures since the series was initiated in 1959. Also on hand were (left) Betsy Sutherland, Biology Department, who chairs the Lectureship Committee, and David Alburger, Physics Department, who hosted his former colleague during his stay. Over 1,000 people flocked to Berkner Hall over the three-night period from February 21-23, to hear Wilkinson's thought-provoking talks on "Man's Ways of Thought," "The Quantum and Gravity" and "The Cosmos and Man." As a series, the talks were entitled "Man's Universes." They will be the first new Pegram Lectures to be published since 1973.

team safety

Two Plant Engineering (PE) Division teams — the Plumbing Shop and the Refrigeration & Air Conditioning Shop — are the latest two-time winners in the Team Safety Program.

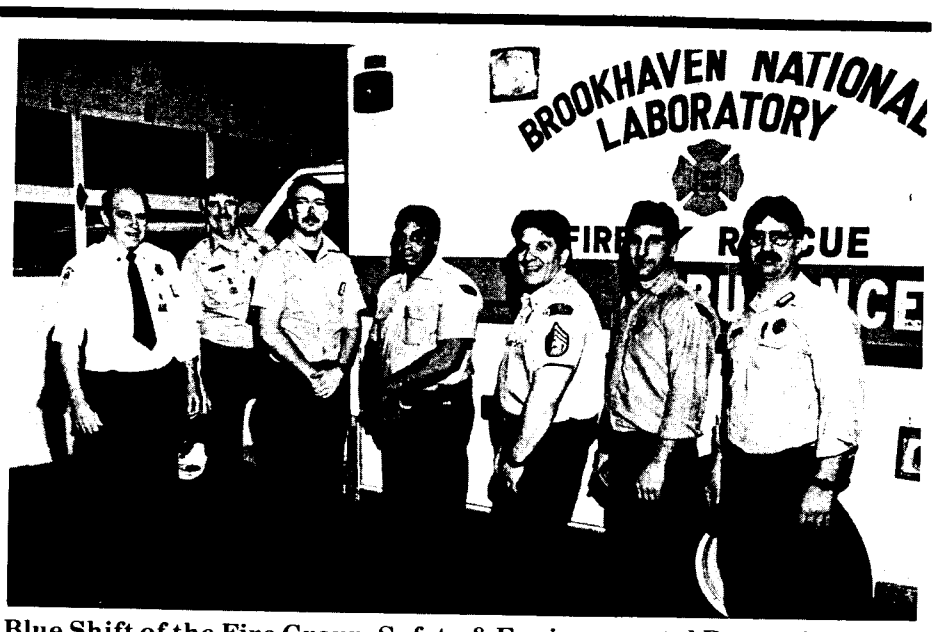
Pictured here are the latest first-time Team Safety winners.

The other teams are on their way towards meeting their goals, with one exception: PE's Facilities Office Assistants Group was sent back to the locker room with a back injury, until May 18.

The commissioner will be back next week with the scoop on Florida. In the meantime: Keep up the safe work.

White Shift of the Fire Group, Safety & Environmental Protection Division: (from left) Chief Frederick Strier, (top row, from left) Firefighters Joseph Gallitelli, Daniel Harrow, Kenneth LiCata; (bottom row, from left) Gary Schaum, James Yerry, Sergeant Antonino Realmuto, Firefighter Kevin Cosgrove and Captain Michael Carroll. Missing: Firefighters Randolph Philips and Richard Richard.

Red Shift of the Fire Group, Safety & Environmental Protection Division: (from left) Firefighters James Forkin, Paul Larsen, John Foley, Allen LiCata, Linda McCarthy, Sergeant William Leigh-Manuell. Missing: Captain Robert Safranek.



Blue Shift of the Fire Group, Safety & Environmental Protection Division: (from left) Captain Raymond Archbold, Firefighters William Strelecki, Timothy Devine, Robert Mosley, Sergeant Charles LaSalla, Firefighters Roy Barone and William Rabatin. Missing: Captain Russell Dunn, Firefighters Frank Palmeri and Cyril Pinto.

Second Platoon of the Police Group, Safeguards & Security Division: (back, from left) Lieutenant Richard Rossetti, Patrol Officers Brian McCarrick, James McCabe, Robert Lombardi, Ralph Vega, Bruce Kavan, Guard Harvey Richardson, Lieutenant Thomas Gilbert; (front, from left) Patrol Officers Michael Johnson, Colleen Magee, Reinaldo Santiago, Richard Domenech and David Peter. Not pictured: Captain Richard Baulch Jr., Lieutenant Thomas DeSimone, Sergeants Sharol Busby, Michael Hurley and Lawrence Musso, Patrol Officers Matthias Harrington, James Johnson, Kathleen McNaught, Mark Opisso and Richard Sanniola, and Guard Roger Kiley.

Though unavailable for a photograph, the Police Group's First Platoon was another Team Safety first-time winner, including: Captain James Goode, Lieutenants Peter Garcia and Gregory Jones, Sergeant Andrew Moran, and Patrol Officers Arthur Bamonte Jr., Eusebio Beniquez, Iris Caceres, Luke Greco, Gerald Griffin, Charles Hayes, Steven McCune, Richard Miraglia, Victor Pineiro Jr., William Staker, Christopher Tersigni, Richard Thorp, Daniel Wilkins, Lawrence Witt and John Yates.

—photos by Roger Stoutenburgh

Patents Awarded

U.S. Patent No. 4,707,322 has been awarded to former BNL employee **Powell Richards**; **Leonard Mausner**, of the Medical Department; and **Thomas Prach**, formerly of Medical and now of the Reactor Division, for inventing a way to develop beryllium-7-labeled carbon particles, which are useful as exceptionally stable, gamma-emitting radiotracers.

The beryllium-7-labeled carbon particles are produced by using protons to irradiate pure carbon black contained in stainless steel disk capsules at the Brookhaven Linac Isotope Producer (BLIP), at energies in excess of 50 million electron volts. Operated by the Medical Department, BLIP uses excess particles from the linear accelerator that injects the Alternating Gradient Synchrotron to produce radioisotopes for medical and industrial use.

After irradiation, the stainless steel targets are cut open and the carbon, now activated by beryllium-7, is removed and washed, first with hydrochloric acid or ethanol, then with water to remove surface radioactivity. Finally, the cleaned carbon is suspended in a solution of a non-ionic surface-active agent. In the same way, other forms of carbon can be activated, such as fibers, coarse carbon particles or graphite cloth.

This use of high energy protons to create beryllium-7 as a radiotracer of pure carbon materials is a novel discovery based on the inventors' observation that beryllium-7 is created directly in the crystal lattice of carbon by a nuclear reaction and remains firmly trapped in the lattice. Thus it becomes a more stable radiotracer than the typical chemically attached radiolabel.

Beryllium-7's half-life is conveniently long — 53 days — and its gamma rays are sufficiently energetic — 478 thousand electron volts — so that beryllium-7 is well-suited for in vivo animal studies. It has already been used for research on intestinal absorbtion of particles, and, in an aerosol form, as a tracer for particulate matter in air pollution studies.

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U.S. Patent No. 4,729,954 has been granted to **Sanford Lacks**, Biology Department, and **Tanjore Balganesh**, former BNL employee, for inventing a recombinant plasmid, pLS101.

This plasmid is particularly useful for cloning genes and altering the genetic constitution of Gram-positive bacteria, such as *Streptococcus pneumoniae* and *Bacillus subtilis*, some of which cause life-threatening diseases.

The plasmid contains at least four restriction sites where gene sequences can be inserted, thus allowing DNA fragments produced by a variety of restriction enzymes to be cloned.

The inventors also propose new methods of isolating the desired recombinant plasmids containing newly inserted genes. In one method, the action of penicillin on bacterial cells containing unaltered plasmids destroys them, leaving cells containing the desired plasmids. Another method described in the patent provides for the enrichment of recombinant plasmids in Gram-positive bacteria by sequential transformation.

The invention was recently used to clone the *DpnI* restriction endonuclease. This enzyme, discovered at Brookhaven, recognizes methylated DNA sequences. There is considerable commercial interest in this clone because the unusual properties of the *DpnI* enzyme make it useful for mapping and sequencing the human genome.

•

Arokiasamy J. Francis and **Cleveland Dodge**, both of the Department of Applied Science's Environmental Biotechnology Division; **Krishnachetty Chendrayan**, a guest scientist from the Tamil Nadu Agricultural University, India; and **Helen Quinby**, former BNL employee, have been awarded U.S. Patent No. 4,758,345 for inventing a bacterial culture that will dissolve lead oxide found in industrial wastes, before the wastes are dumped into the environment.

The dissolved lead can then be removed from the wastes by chemical separation, or by extending the time that the bacterial culture is in contact with the wastes.

The contamination of ground and surface waters by toxic metals, such as lead, that leach out of energy waste has become of major national concern. Lead oxide, which is insoluble in water, is present in radioactive wastes, coal bottom and fly ash, and it is also released into the atmosphere from automobile emissions. By removing this lead, the invention can contribute significantly to the safety and ecology of terrestrial and aquatic systems.

The bacterial culture, *Clostridium* sp., which operates in the absence of oxygen, has been deposited in the American Type Culture Collection (ATCC) with the designation ATCC No. 53464. The lead is dissolved by the culture due to the metabolites and acidity that are produced in the culture medium. The major metabolites thus obtained are acetic, butyric and lactic acid, the latter in large quantities, due to a shift in the metabolic pathway of the organism. Thus the process can be used not only to clean up waste, but also to produce lactic acid for commercial purposes.

The invention offers another advantage — the possibility of recovering the lead for recycling. After the lead has been absorbed into the biomass, the waste material is separated from the bacterial culture. If required, the bacterial culture can be digested at this point, yielding relatively pure lead for further industrial use.

Note to Employees:

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

Parking Program Expanded

It used to be that Brookhaven Avenue, Center Street and the area around the Cafeteria were often congested with illegally parked cars. The dramatic change in this situation over the past month can be attributed to the new parking enforcement program that went into effect on February 1.

Now, the program has been expanded to include all on-site handicapped parking spaces, regardless of location.

Further, in accordance with the Laboratory's Standard Practice Instuction 5-01, which states that the general rules and regulations of the State of New York apply to private and government vehicles operated on site, the Police Group is applying these rules and regulations with respect to parking within the program's specific "zones of enforcement." Thus, as the principal goal of the program is increased safety, offenders may be ticketed for such violations as parking on the wrong side of the street, double parking and blocking fire lanes or hydrants.

When a car is ticketed under this program, the ticket carries a fixed fine of $50, which is charged against the operating funds of the offender's department or division. As of Friday, February 24, 130 tickets had been issued — 106 to Lab personnel and 24 to non-employees, such as contractors and visitors.

The program "has been very effective," noted Gerald Kinne, Assistant Director for Reactor, Safety and Security, "The congestion and other problems that were occurring . . . are much improved. Most importantly, the areas of enforcement are now much safer, both for drivers and pedestrians."

Kinne also explained that, due to the lack of adequate parking in certain areas, the program's enforcement zones will not be extended to the Lab at large at this time. However, additional parking lots will be added during the next few months and, as those lots are completed, the areas around them will be included in the program.

Pick a Student . . . or a Teacher

Today is the last day to review applications for three summer student programs run by the Office of Educational Programs (OEP). Applications will be in the solarium, Bldg. 490, Medical, until 4:30 p.m. Use the Clinical Research Center entrance and follow the signs.

The three programs are:

• **Summer Students** — Junior and senior-level undergraduates receive ten-week summer research appointments, June 12 to August 18. OEP pays individual stipends of $200/week and round-trip transportation. Sponsoring department pays housing at $72/week.

• **Summer Interns** — Ten-week appointments, June 12 to August 18, for students who participated in prior High School Honors Programs conducted by the Department of Energy. OEP pays all costs — stipend, travel and housing.

• **Teacher Research Associates** — Eight-week summer research appointments, June 26 to August 18, for secondary-school teachers of science, mathematics or technology. OEP pays all costs -- stipend, travel and housing.

For more information, call OEP, Ext. 3054.

Daffodils on Sale

Today is the last day to order a bunch of daffodils through the BERA-sponsored Daffodil Sale. Paid orders will be taken at the BERA Sales Office in Berkner Hall from 9 a.m. to 2 p.m. Daffodils are $4 per bunch of 10 and will be available on Monday, March 20. Your purchase will benefit the American Cancer Society.

Hospitality News

Master gardener Nancy Kuehner will speak on "Vegetable Gardening" at the Hospitality Committee's next morning coffee, on Tuesday, March 7, at 9:30 a.m., at the Brookhaven Center. She will also answer questions about starting and maintaining a garden.

After the presentation, those interested can sign up for their own on-site gardens. The garden plots are located in the apartment area and are available to on-site residents.

Please join us for this interesting presentation, to get together with old friends and meet new ones. Spouses of employees and guests are welcome. Please come and bring the children. Babysitting will be provided free of charge. Coffee, tea and danish will be served, with juice and cookies for the children.

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Service Awards

The following employees celebrated their service anniversaries with the Laboratory during the month of February 1989:

Forty Years

Richard L. Fuka ..... Photo.& G. Arts
Raymond J. Heus ..... App. Science
Raymond W. Stoenner ..... Chemistry

Thirty-Five Years

John W. Bittner ..... NSLS
John J. Grisoli ..... AGS

Thirty Years

Leonard S. Bacelli ..... Plant Eng.
Donald P. Brown ..... Accel. Dev.
John Connelly ..... Plant Eng.
Jean C. Lauer ..... MIS

Twenty-Five Years

Carolyn F. Albert ..... Physics
Vincent J. Bilms ..... Fiscal
Frank L. De Rosa ..... Plant Eng.
Robert E. Lockey ..... AGS
Clifford H. Scarlett ..... Reactor

Twenty Years

Franklin H. Federmann ..... AUI
Hugh S. Isaacs ..... App. Science

Ten Years

Beth P. Blevins ..... Dir. Off.
Marie DeAngelis ..... Nuc. Energy
Sidney Fiarman ..... Nuc. Energy
Conrad L. Foerster ..... NSLS
Enrique S. Garcia .... Comp. & Comm.
Nicholas A. Guglielmino ..... NSLS
August E. Hoffmann ..... Physics
William C. Horak ..... Nuc. Energy
Slawko O. Kurczak ..... Medical
Thomas W. Lambertson .. Cent. Shops
Hai-Dee Lee ..... Medical
Yin-Nan Lee ..... App. Science
Frederick W. Lipfert ..... App. Science
Alfredo U. Luccio ..... Accel. Dev.
Louis Mazarakis ..... AGS
Carole A. McNulty ..... Sup.& Mat'l.
Frank J. Palmeri Jr. ..... S&EP
Stefan Palo Jr. ..... NSLS
Susila Ramamoorthy ..... NSLS
Leo M. Sadinsky ..... AGS
George F. Sintchak ..... Accel. Dev.
Lorraine P. Titus ..... Fiscal
Jiunn-Ming Wang ..... NSLS

Computer Demo

On Wednesday, March 8, at 1:30 p.m. in the CCD Seminar Room, Bldg. 515, John Harvey of Digital Equipment Corporation (DEC) will present DEC's approach to networking of PCs, including a link to VAX mainframes.

Software Demo

An overview of the data-base management program dBASEIV for the personal computer will be presented by Michael O'Reilly, Management Information Systems Division, on Friday, March 10, at 10 a.m., in the Personnel Training Room, Bldg. 459. If you plan to attend, please register with Helen Jones, Ext. 7791.

To Your Health

free•dom the power to make one's own choices or decisions without constraint from within or without; autonomy; self-determination.

If your smoking is constraining your life and if you are determined to quit, then sign up for the next "Freedom From Smoking" clinic. It is being offered on site by the American Lung Association of Nassau/Suffolk and sponsored by BNL's Health Promotion Program.

The four-week clinic will be held on Tuesdays, March 14, 21, 28 and April 4, from 5:15-6:45 p.m. in the North Room, Brookhaven Center.

To register, send a note with your name, extension and building number, and a check for $25, made payable to the American Lung Association of Nassau/Suffolk, to Health Promotion Specialist Elaine Friedman, Bldg. 490. The sign-up deadline is Thursday, March 9, and registration is limited to the first 25 people.

BWIS Meeting

Diane Mirvis, Head of the Technical Information Division, will be the guest speaker at the next luncheon meeting of Brookhaven Women in Science (BWIS). Her talk on "Expanding Horizons — Info at BNL" will begin at noon on Thursday, March 9, in Room A, Berkner Hall. All are invited; bring your lunch.

Mirvis obtained her undergraduate degree in anthropology at the University of Michigan. She then received an M.S. in library science from Wayne State University, where she became interested in integrating libraries and computers through information-science course work.

After working as a librarian at the Detroit Free Press, the first newspaper to have an automated, full-text news library, she returned to Wayne State. There, as an assistant professor of library science, she specialized in computerized information systems. Before coming to BNL, Mirvis was the Information Services Manager at Newhouse papers in Syracuse.

ANS Meeting

"Radon in American Homes" will be discussed by Bernard Cohen, University of Pittsburgh, at the next dinner meeting of the Long Island Section of the American Nuclear Society (ANS). He will speak on Wednesday, March 8, at 8 p.m., at the Bavarian Inn in Lake Ronkonkoma, after cocktails, a buffet dinner and an introduction by Andrew Hull, of BNL's Safety & Environmental Protection Division.

For more information or to make reservations, call Lydia Ryan, Ext. 2380, by Monday, March 6.

Film badges will be changed tomorrow. Please place your badge in its assigned rack space before leaving work today.

Tennis News

Tennis Party

There are still a few openings for the Tennis Party at Miller Place Racquet Club on Saturday, March 4. Call Steve Shapiro, Ext. 3822, if you are interested.

Bus Trip to U.S. Open

The Tennis Committee announces that a repeat of its highly successful bus trip to the U.S. Open is scheduled for Tuesday, September 5. Tickets have already been ordered through the group-sale option prior to their being sold to the general public. This advance purchase was made possible because of a loan from the BERA Board, which must be repaid in April. Consequently, sign-up will begin at the BERA Sales Office on Monday, March 6.

The $28 per person cost of the trip includes the ticket, transportation and bus-driver gratuity. Only paid reservations will be accepted. The bus will depart from the Lab at 8:30 a.m. and make one or two pickups at Park & Rides along the Long Island Expressway. Return from the National Tennis Center will be at 7 p.m.

Sign up now; don't miss your chance.

Volleyball

Standings — Week of February 20

League I		League II	
Upfagrabs	39-6	Fossils	36-9
Dinkers	30-15	Set Ups	35-10
Xrayted	28-17	Krush	30-15
Cannonballs	24-21	Nuts & Bolts	26-19
Phoubars	11-34	Ziegfield Vollies	18-27
Netminders	3-42	Slammers	14-31
		Chunga's Revenge	11-34
		Upton-Ups	10-35
League III		**Open League**	
Frazzled	45-6	Meriem's Team	38-7
High Volly'em	32-19	Dig Your Lips	37-11
MISfits	31-20	Phoenix	34-11
Printouts	29-22	Tom's Mutants	29-16
Sourcerers	27-24	Magnum	24-21
Spikes	18-33	Vollies	18-30
Good Timers	11-40	Rowdy Radicals	13-32
Renegades	11-40	PiChu	11-34
		Constables	0-42

Bowling

Pink League

Donna Cunningham bowled a 189. Sandy Asselta 178.

White League

Dan Harrow had a 202, Al Pinelli 202, Joe Ferrante 201, Sharon Smith 191, Pat Manzella 189/189.

Purple League

Jim Vogel rolled a 227, Rob Simes 210, Ed MacDougall 201, Craig Diaz 201, Joe Mayeski 200, Marsha Kipperman 194, Betty Jellett converted the 6/7/10.

Red/Green League

A. Warkentien had a 232, J. Morris 225/222/609 scratch, F. Hohmann 223, G. Meinken 218, R. Mulderig 213, J. Ferrante 209, C. Scarlett 209.

Basketball

Week of February 20

First Game

Knicks	72	Penetrators	58
L. Walcott	21	R. Domenech	17
W. Cummings	16	K. Jackson	12
G. Thompson	15	F. Ligon	12
T. Mendez	10	R. Tatum	10
F. Thompson	6	T. Abbott	4
B. Turner	2	G. Smith	3
T. McGill	2		

Three-point shots: Domenech (3), G. Thompson, Walcott (5)

Second Game

Celtics	69	Light Source	63
D. Hoggard	34	E. Hobson	23
M. Colon	9	M. Fulkerson	10
P. Browne	9	P. Dull	9
C. Edwards	7	K. D'Amico	6
J. Gaeta	5	P. Ratzke	5
N. Schowski	2	J. Garrison	5
M. Barrett	2	B. Brown	4
M. White	1	J. Flannigan	1

Three-point shots: Hoggard (3)

Longshots	71	Runaways	51
T. Mayo	27	J. Desmond	11
R. Bersak	18	P. Johnson	10
S. Alonzo	16	B. Doty	10
G. Mack	8	R. Moran	9
S. Springston	2	S. Gilbert	5
		G. Shepherd	4
		A. Stillman	2

Three-point shots: Mayo

Arrivals & Departures

Arrivals

James T. Biancarosa ..... Physics
Yuchen L. Kuo ..... Medical
Richard W. Neill ..... Accel. Dev.
Michael A. Verderosa ..... Reactor

Departures

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

Al P. LaPlaca ..... Physics
Jonathan J. Lee ..... Physics
Bernard F. McLaughlin .... Accel. Dev.
Kurt V. Mikkelsen ..... Chemistry
Curtis Scott Reeve ..... Accel. Dev.
Guo-Qin Xu ..... Chemistry

Cafeteria Menu

Week of March 6

Luncheons

Monday, March 6

Soup: Potato bacon chowder	(cup)	.75
	(bowl)	.95
Green pepper steak over rice		3.10
Mushroom & cheese omelet w/veg.		2.95
Lite-line: Salad plate		2.15
Hot deli: Turkey		2.85

Tuesday, March 7

Soup: Cream of tomato	(cup)	.75
	(bowl)	.95
BBQ chicken w/veg.		3.10
Beef burgundy over rice		3.10
Lite-line: Broiled chicken w/veg.		3.00
Hot deli: Pastrami		2.85

Wednesday, March 8

Soup: Cheddar broccoli chowder	(cup)	.75
	(bowl)	.95
Baked stuffed pork chop w/veg.		3.10
Manicotti w/sauce & garlic bread		3.10
Lite-line: Broiled pork chop w/veg.		3.00
Hot deli: Grilled Reuben		2.85

Thursday, March 9

Soup: Lentil	(cup)	.75
	(bowl)	.95
Meat loaf & gravy w/veg.		3.10
Turkey tetrazzini w/veg.		3.10
Lite-line: Broiled turkey w/veg.		3.00
Hot deli: Ham & cheese croissant		2.85

Friday, March 10

Soup: Pepper pot	(cup)	.75
	(bowl)	.95
Spanish macaroni w/veg.		3.10
Seafood platter w/ french fries		3.10
Lite-line: Broiled fish w/veg.		3.00
Hot deli: Roast beef		2.85

Breakfast specials

Monday:	Two eggs w/ bacon & toast	1.20
Tuesday:	Sausage & egg on roll	1.50
Wednesday:	Pancakes & sausage patty	1.10
Thursday:	Western omelet & toast	1.45
Friday:	French toast & bacon	1.00

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.

SCIENTIFIC RECRUITMENT - Candidates may apply directly to the department representative named, or through the Office of Scientific Personnel, Ext. 7813.

POSTDOCTORAL RESEARCH ASSOCIATE - to study metal surfaces in electrolyte solutions. This project will primarily involve surface x-ray diffraction techniques at the National Synchrotron Light Source. Contact: Benjamin Ocko, X-Ray Scattering Group, Physics Department, Bldg. 510B.

LABORATORY RECRUITMENT - Opportunities for Laboratory employees only.

3090. SECRETARIAL POSITION - Requires AAS in secretarial science or equivalent. Micom word processing essential. IBM/PC experience and shorthand desired. Duties will include entering purchase orders and contracts into IPAP system, processing quotes, answering busy telephone and filing. Contracts and Procurement Division.

OPEN RECRUITMENT - Opportunities for Laboratory employees and outside applicants.

3091. TECHNICAL POSITION - Requires AAS in electronic technology or computer science and 2-3 years' experience, preferably accelerator related, as well as ability to assist with application program software, data manipulation and control system fault-finding. Responsibilities will include Radiation Effects Facility and Neutral Beam Test Facility operation, setup of beam transport lines using computer codes and access, security and radiation control of the facility. Will install and maintain beam-line facility components and systems, and assist with construction and implementation of new components and systems. Will develop operational computer-control software. Involves some shift work. Reposting of Job #2942. Department of Nuclear Energy.

3092. TECHNICAL POSITION - (1-year term) Requires an AAS degree in electronic technology, a BSET in electronic engineering technology or the equivalent experience. Will be responsible for the NSLS experimental area safety operations. Duties will include safety system checkouts, interfacing between control room and experimenters with respect to user safety and enabling of beam lines for experimental use. Shift work required. National Synchrotron Light Source Department.

3093. SCIENTIFIC ASSOCIATE POSITION - Requires BS in physics, electrical engineering or equivalent. Familiarity with computer hardware and software is required. Some knowledge of VAX-VMS and/or Motorola 68000 helpful. Background in electronics with experience in analog and digital circuits desirable. Will be involved in maintenance of spectrometers at the HFBR and NSLS, including testing of two-dimensional detectors, on-line motor control circuits and graphics. Will assist external users in setting up and running experiments. Biology Department.

3094. ENGINEERING POSITION - Requires BS in mechanical/electrical engineering. Will be liaison between BNL and outside architectural and engineering firms in the development of conceptual designs for ongoing and proposed construction projects. Familiarity with methods, costs and materials is required. Will review and approve the mechanical and electrical portions of conventional construction contracts, including field inspection, shop-drawing submissions, recordkeeping, etc. Some design drawing will be required. Strong mechanical and electrical background is essential. Plant Engineering Division.

3095. CARPENTER (temporary) - Under minimum supervision lays out, constructs, modifies and maintains buildings and component parts from construction drawings, rough sketches or verbal instruction. Works with wood, wood substitutes and combination materials, and flooring, roofing and wall materials. Plant Engineering Division.

Motor Vehicles & Supplies

87 CHEVY CAMARO - a/c, p/s, p/b, am/fm cass., low mi., mint cond., $8,500 firm. John, Ext. 3277 or 588-9363.

86 HONDA CIVIC SI - hatchback, 5-spd., 50k mi., sunroof, am/fm cass., new tires, muffler, clean in/out, asking $5,200. Chris, Ext. 2022.

86 HYUNDAI EXCEL GL - 4-dr., white, 36k mi., power sunroof, am/fm cass., 5-spd., excel. gas mileage, $4,000 or best offer. 395-6235.

86 RENAULT ENCORE - sporty, 17k mi., 4-spd., stripes, sunroof, am/fm cass., 4 speaker, mint cond., $3,750. 689-7559 after 5 p.m.

85 OLDS CUSTOM CRUISER - wagon, p/s, p/b, power windows & seats, a/c, am/fm cass., $4,500. Dino, Ext. 5508 or 334-6950.

84 LTD. CROWN VICTORIA - station wagon, a/t, p/s, p/b, a/c, am/fm, excel. cond. 744-5422.

84 MONTE CARLO - two-tone, fully loaded, negotiable. 369-9419.

83 SUBARU STATION WAGON - low mi., excel. cond., $2,250; 82 VW Rabbit, 4-dr., digital am/fm cass., very good cond., $950. Ext. 5345 or 3102.

83 DATSUN NISSAN STANZA - 5-dr. hatchback, 5-spd., 60k mi., sunroof, a/c, am/fm cass., clean, asking $3,800. Lou, Ext. 5454 or 928-7042.

82 HONDA ACCORD - 90k mi., runs well, new muffler, rings & valve job, $1,500. Bill, Ext. 4087.

82 CADILLAC COUPE DEVILLE - leather int., 82k mi., full power, excel. in/out. $4,800. Fred, Ext. 4407/4435 or 499-1214 after 6 p.m.

82 YAMAHA MAXIM MOTORCYCLE - 1100cc, 32k mi., custom paint, good cond., clean, $1,100. Fred, Ext. 4407/4435 or 499-1214 after 6 p.m.

80 CUTLASS SUPREME - am/fm, high mileage, $1,500. 874-3796.

79 CHEVY CAPRICE - a/t, p/s, p/b, a/c, 82k mi., good cond. Henry, Ext. 2668.

78 CHEVY MALIBU - station wagon, V8, p/s, a/c, am/fm, 100k mi., good cond., $450 or best offer. Ext. 3606.

77 OLDS DELTA 88 - 4-dr. sedan, orig. owner, garaged, excel. in/out, no rust, $800. 744-9429.

74 FORD F250 PICKUP - 4x4, cap, complete drivetrain, rebuilt a/t, 7" lift, alum. wheels, 38" tires, asking $3,500. 474-5715.

72 CHEVY VAN CAMPER - 74 Camaro. Bill, Ext. 4988 or 698-4882, leave message.

67 CHEVY 427 ENGINE - rebuilt 30 over 4-bolt main, complete. 475-9452 after 5:30 p.m.

RIMS - 14", 4-lug; 14", 5-lug; two 15", 5.60-16. Ext. 2950.

TIRE - new, 721 Firestone, 235/75R15, Eldo rim, $60. Ernie, 588-4987.

TIRE - 185/170, SR14 copper radial steel belt, $35. Ken, 281-8458/2214.

TIRES - four, Sears Road Handler G.T., 225x70x15, w.w., good cond., best offer. Larry, Ext. 4821.

TIRES - Toyota 4x4 tires & rims, brand-new, $200. Billy, 289-7902, leave message.

Boats & Marine Supplies

17' M.F.G. - 55 h.p. Johnson, navy top, good cond., extras. 878-1805.

17' SPORTCRAFT BOWRIDER - 1981, Deep V, 470 h.p. Mercruiser i/o, full canvas, trailer, excel. cond., $5,000. Rod, 878-1580 after 6 p.m.

MERCURY OUTBOARD MOTOR - 1985, w/controls and cables, 5 months left on warranty, excel. cond., $2,100. Ken, 281-8458.

Furnishings & Appliances

DINING ROOM SET - table w/3 leaves, 6 chairs, china closet, Comtemporary, excel. cond., $850. 924-2184.

KITCHEN SETS - round woodgrain formica w/4 leather swivel chairs, $50; retangular formica w/4 chairs, $20. John, Ext. 3675 or 924-3528.

SOFA & LOVE SEAT - early American, good cond., $200. Vita, 277-0464.

SECTIONAL SOFA SET - beige, w/throw pillows, 4 years old, $75. 472-0392 or 472-6922 after 5 p.m.

WICKER COUCH - 84", 54" love seat, natural, matching cushions, $150 both; wing chair, green, $25. 472-4520.

WATER BED - super twin w/6 drawers, uses full size sheets, $250. Jerry, Ext. 7427.

TABLE STAND - wrought iron, 4 chairs, kitchen or patio, leaf pattern, needs work, $45. Dick, 8781580.

TABLE LAMPS - 2, 36", $15/each; chair, $20; antique oval table, much more. 744-2203.

COFFEE MAKER - Toshiba, grinds & brews, digital clock, auto brew, never used, $75. 585-6518, 8 a.m.-5 p.m.

Tools, House & Garden

WOOD STOVE - Vermont castings, Vigilant, w/chimney pipe, triple wall pipe, cap, etc., $700. 722-4821.

COAL STOVE - Surdiac, Southport model, 38k Btu rated, heats 11k cu. ft., w/accessories, best offer. Joe, Ext. 5139.

GENERATOR - Homelite, 2550 W, 115/230. 334-6950 after 6 p.m.

GENERATOR - portable, on dolly, Niagara, 4000 W, never used, $425. Bill, Ext. 3579 or 878-6639.

TUNE-UP CENTER - Snap-on, 3 meters, $280; Snap-on brake bleeder, $125; 20-ton, air-powered hydraulic jack, $250, must sell. 474-5715.

METAL LATHE - works well, without bench, $50. Frank, Ext. 2795.

HUMIDIFIER - wood-grain cabinet, fill gauge, 27"w x 12"d x 25"h, excel. cond., asking $40. Dan, Ext. 4987 nights, or 698-7322 days.

WATER CONDITIONER - Super Gard Automatic, w/acid neutralizer & 412 Softner Gard, $1,065. Mary Sowiak, Ext. 2313.

TOPSOIL - delivered, $19/yard, also sand and gravel delivered. 924-9427.

Sports, Hobbies & Pets

SKIS - man's, Lange, 170cm, Solomon bindings, size 12 boots, $150. Ken, 281-8458 or 281-2214.

SKI BOOTS - man's size 9, Kastinger; Morsan metal 100 skis, excel. cond., both for $35. 363-6049 after 6 p.m.

BMX BIKE - Predator, chrome, excel. cond., asking $115. Ext. 3256 or 473-8762 after 6 p.m.

GO-CART - 1988, live axle, mint cond., best offer. 281-1464 eves.

PIANO - Lester Betsy Ross spinet, light wood, includes bench, $700. Tony, Ext. 3658 or 3637.

ORGAN - Conn, double keyboard w/strummer & bench, excel. cond., $450. Penny, Ext. 2625.

TAP SHOES - Capezio, girl's, toddler size 7, used only once, $12. Ady, ext. 4521 or 331-3785.

BUNNIES - dwarf, raised outdoors, $6. John, Ext. 3675 or 924-3528.

AIRLINE DOG CARRIER - for large dog, used once, $20. Frank, Ext. 2795.

Audio, Video & Computer

PC JR - expanded, 640k dual drive, internal modem, printer, mouse, joystick, misc. programs, $1,000 neg. Ext. 7198.

PC COMPATIBLE - 256k CGA monitor, par/ser., DOS, Basic, Wordstar, comm., software, 2 FFD & spare, $500. 473-3604.

OLD RADIO TUBE TESTERS - $8/each; 386 records, LPs and 45s $50/all; 300 piano sheets & books, 1940's +, $125/all.

AUDIO TAPES - 8-track, w/2 rotating storage racks, $15. Tony, Ext. 2050.

Miscellaneous

FIREWOOD - seasoned oak, delivered, $130/full cord. 732-2849.

SKI JACKET - goose down, red, woman's size small, good cond., $25. Ext. 2733 or 878-8491.

AIRLINE TICKETS - 2, TWA round-trip, LaGuardia to Sarasota, departs 3/24, returns 3/28, orig. $300/each, sell for $250/each. Bob, Ext. 5314.

TICKETS - for 50's dance, live band, Elks in Pt. Jefferson, for benefit of travel soccer team, 3/10. George, Ext. 4453.

CRIB - w/mattress, up-down side fence, $40; baby swing, like new, $35; Aoki, Ext. 3748 or 345-3271.

SWEATERS - hand-made, mohair & wool, 50% off original price, many colors, imported. Ext. 3102.

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

CENTER MORICHES - 3-bdrm. ranch, bay front, l/r, d/r, kitchen, family rm., $900/mo. or for sale. Ext. 5277 or 549-5802.

ISLIP TERRACE - 3-room apt., bath, fully carpeted, screened-in terrace, priv. ent., 2nd floor, private home, $575/mo., all util., 1 mo. sec. 581-8317 after 5:30 p.m.

MASTIC BEACH - 3-room apt., bdrm., kitchen, l/r, bath. 10 min to Lab, priv. ent., $600/mo. incl. util., city water. 281-8357 after 4 p.m.

MIDDLE ISLAND - studio apt., kitchen, bath, priv. ent., no pets, $450/mo. all, 1 mo. sec. Ann or Adam, 732-5943.

MILLER PLACE - 2-bdrm. apt., full bath, kitchen, l/r, no pets, basic cable incl., $750/mo. all, 1 mo. sec., 1 year lease. Mike, Ext. 3981 or 732-9324.

ROCKY POINT - 1-bdrm. apt., large l/r, kitchen, dining area, enclosed porch, near town & beach, ideal for couple, $550/mo. all. Joan, Ext. 4697.

SELDEN - 2-bdrm. house, large kitchen, l/r, bath, full bsmt., 2-car garage, no pets, $750/mo. + util., 1 mo. sec., by April 1. 698-5701 after 6 p.m.

HILTON HEAD, S.C. - 3-bdrm. condo, 2 baths, sleeps 8, tennis, in/outdoor pools, jacuzzi, steam room, ocean & golf view, $500/week. 929-8912.

HILTON HEAD, S.C. - 2-bdrm. condo, sleeps 6, tennis, golf, beach, pool, last month of special rate, March $325/week. 585-9149. Guy, Ext. 3147.

For Sale

CORAM - 4-bdrms., 2½ baths, family rm., f/p, eik, d/r, l/r, in-ground pool, sprinklers, 2-car garage, $195,000. Ext. 2303 or 732-3902 after 5 p.m.

EAST SETAUKET - 4-bdrms., 2½ baths, eik, l/r, d/r, family rm., f/p, screened porch, bsmt., 2-car garage, 0.52 acre, new vinyl siding. Shiue, Ext. 4395/3372 or 751-8224.

EAST SETAUKET - 4-bdrm. ranch, 2 baths, eik, l/r, d/r, finished bsmt., ⅓ fenced acre, 3-Village schools, excel. cond., $144,900. 473-4338 eves.

MIDDLE ISLAND - 2-bdrm. condo, l/r, d/r, w/w carpet, all appliances, 5 min to Lab, $110,000. 924-2184.

PORT JEFFERSON STATION - 5-bdrm. hi-ranch, m/d, 3 baths, 2 kit., garage, vinyl siding, fenced yard, ¼ acre, $174,990. 331-1523 eves.

RIDGE - 3-bdrm. Colonial, fenced yard, city water & sewage, 5 min to Lab, reduced closing costs w/assume mortgage, $132,000. Mike, Ext. 7865.

SETAUKET - 3-bdrms., 2 baths, eik, l/r, d/r, rec. rm., wood floors, patio, full bsmt., 2-car garage, c a/c, ⅓ acre, 3-Village schools, $220,000. Thomas Nolan, Ext. 5265 or 584-8339 after 6 p.m.

STONY BROOK - 4-bdrm. Colonial, 2½ baths, d/r, family rm., eik, 2-car garage, ½ acre, new siding, windows & doors, immac., asking $199,000. 689-8605.

WADING RIVER - 4-bdrm. large cape, ½+ acre, 2 baths, d/r, l/r, family rm. w/fp, full fin. bsmt., SWR schools, $230,000. 929-6748.

WADING RIVER - 3-bdrm. ranch, 2 baths, l/r w/fp, den, formal d/r, full bsmt., 0.62 acre, landscaped yard, priv. beach, $158,000. Nick, 929-4901 after 5 p.m.

WADING RIVER - 3-bdrm. ranch, eik, l/r, d/r, solar, circ. drive, new bath w/skylight, extras, $130,000 neg. Kathy, Ext. 7105 or 929-3207 after 5 p.m.

HOLIDAY, FL - Sandpiper, 3 bdrms., 2 baths, 1½-car garage, corner lot, sprinklers, cathedral ceilings, club house facilities, w/time share in Maderia Beach, $75,900 firm. 474-5715.

MADERIA BEACH, FL - one week time share, Commodore Beach Club, on Gulf, sleeps 4 adults, must sell, asking $5,000. 474-5715.

PALM COAST, FL - ¼ acre lot, 80'x125', 5 miles to Atlantic ocean, 24 miles north of Daytona beach, water drainage & sewage, util. incl., $11,995 or $1,995 & assume loan. Thomas Nolan, Ext. 5265.

FLORIDA - time shares, very reasonable, on the ocean, Pompano beach, Hollywood beach, on the Gulf, Fisherman's village & Punta Gorda. Ron, Ext. 4702 or 289-1003.

Free

COUCH - Colonial, you pick-up, good cond. 399-3910 after 5 p.m.

Wanted

DAYCARE - for 8-year-old boy, during July & August, on-site preferred. Tom, Ext. 4642.

REPAIR MAN - for cuckoo clock. Ext. 2500.

Services

Services are listed in the first ***Bulletin*** *of every month as a courtesy to BNL employees. They are neither screened nor recommended by the Bulletin. Services forms are available in the Bulletin lobby, Bldg. 134.*

TAX PREPARATION - BNL discount. Bob, 689-7963.

TAX PREPARATION - and consulting lowest prices. Ext. 4555 or 821-2395.

TAX CONSULTANT - income tax returns prepared, your home or mine. Maurice, Ext. 2487 or 928-6930.

TAXES - done by tax consultant, your home or mine. John, 732-2472.

TAXES - tax returns professionally prepared, your home. 929-6744 eves.

HOME IMPROVEMENTS - extensions, renovations, decks, windows/skylights, all general contracting, licensed & insured. Brian, 744-3068.

CARPENTER/CONTRACTOR - conversions, extensions, dormers, fin. bsmts., docks, garages, free est., licensed & insured. J. Salvato, 698-2501.

HOME IMPROVEMENTS - specializing in renovation, no job too small, reasonable prices. Russ, 369-2838.

HOME IMPROVEMENTS - extensions, dormers, roofing, siding, replacement windows & skylights, custom designs, plans & permits. 475-6981.

HANDYMAN - from new bathrooms to blacktop driveways, free est., Ted, 281-6375.

SHEETROCKING & SPACKLING - free estimate. Kevin, 563-9855.

PAINTING - interior/exterior, book now for spring, references, reasonable prices. Pete, 475-8406 after 5 p.m.

PAINTING - interior/exterior, commercial/residential, free est., reasonable rates, senior citizen discount. Ron, 585-1486.

BRICK WORK - patios, walks, swimming pools, retaining walls, landscaping ties, Belgian block, 20 years exper., Lab discount. Tony, 698-9274.

LOCKSMITH - full service, 10% BNL discount. Pete, Ext. 5109 or 399-2813 after 5 p.m.

LAND CLEARING - using excel rake on JD 450 truck loader, $60 an hour w/operator. Tom, Ext. 4084 or 878-1060.

YARD CLEAN-UP - lawn maintenance, tree removal, in Wading River, Shoreham, Baiting Hollow, low rates. 929-8876.

AUTOMATIC LAWN SPRINKLERS - installations & repairs, spring start-up & fall winterizing services avail., free est. & appraisals. Lou, 928-7042.

PHOTOGRAPHY - head shots for models, actors & children, photographer from NYC, studio in Wading River. 929-3910.

BARTENDING - for all occasions, complete professional service, portable bar. Bob, 874-2131.

RUG SHAMPOOING - very reasonable, Lab discount. 924-6019, leave message.

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