BROOKHAVEN BULLETIN
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BROOKHAVEN NATIONAL LABORATORY

BLIP II Ready to Make New Radioisotopes

In the 12-year life of the original Brookhaven Linac Isotope Producer (BLIP), many who leaned over the edge of its 34-foot well made the same wish. As they watched the contents of their shirt pockets sink to the well's bottom, they wished that some other radiation shielding could be used instead of 13,000 gallons of water. Their wish was fulfilled when the BLIP well was recently filled with 1,156 cubic feet of sand.

Filling the containment vessel with 50 tons of sand was one of the technical improvements made in building a new radionuclide research facility. After a year under construction, BLIP II came on-line Monday, June 17, with the usual array of targets in place. The old BLIP made medically useful radionuclides, many of which cannot be made at any other facility in the world. Using BLIP II, the job can be performed more efficiently and safely.

To make radioactive isotopes, different chemical targets are lowered down a shaft to the well's bottom and bombarded by 200 million-electron-volt protons from a beam line of the AGS linac. These radionuclides are incorporated into compounds utilized for diagnosis and therapy in nuclear medicine research. BLIP is operated by the Medical Department's Radionuclide & Radiopharmaceutical Research Division, headed by Suresh Srivastava, who also heads the search for new radioactive drugs. Within this division, Leonard Mausner is in charge of BLIP operations and leads the research for new radioactive isotopes.

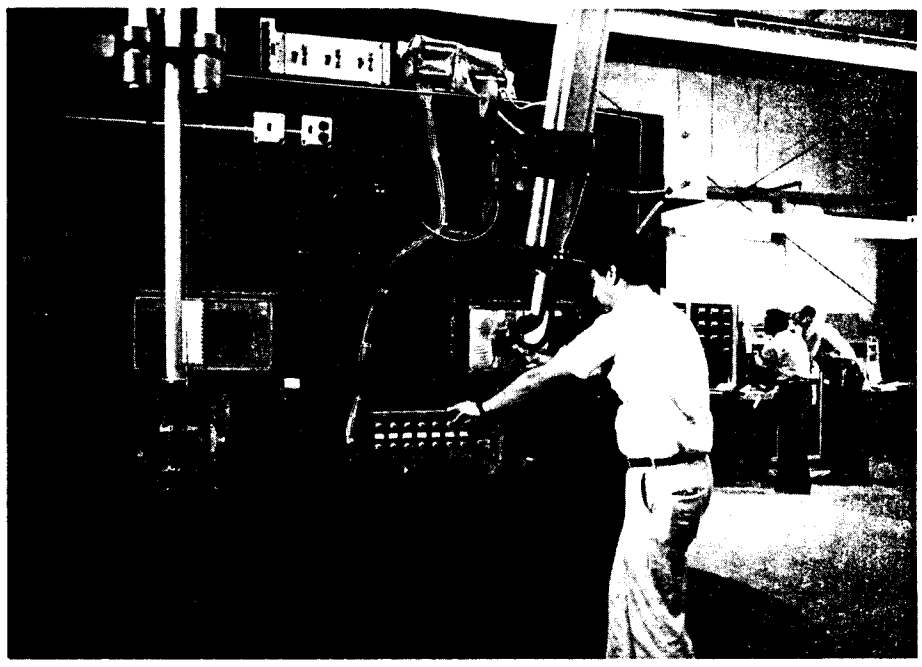
"It didn't make sense to repair the system because it had inherent design limitations," explains Mausner. He and Chief BLIP Operator Henry Schnakenberg conceived most of the new design. The engineering for BLIP II was performed by Stanley Majeski, Reactor; John Bura, Plant Engineering; George Mooney, formerly of the AGS; and George Schoener, S&ES. "We looked for help on this project within the Lab — and found it," explains Srivastava. "For instance, without the cooperation of the AGS Department, we could not have completed the job."

Besides using sand as a radiation shield instead of water, the other major change is an improved target handling system: a mechanically superior apparatus to lower and raise targets in the shaft and a bigger hot cell in which to manipulate targets and radioactive products above the well. The only thing that remained the same is the well.

Water was replaced by sand for shielding to remove the possibility of water leaking into the linac, thereby threatening its operation. The sand came from BNL's backyard, and it rests on a four-foot-tall steel table, so an air space exists between the sand and the well's bottom. Water is still used for cooling and shielding in the target shaft. If the 350 gallons were to leak out, it would pool in the well bottom under the linac beam line, thus never threatening it.

Each target connects with its source of cooling water at the bottom of the shaft, instead of having a water hose attached to it. This design eliminated hoses going up and down with each target and reduced the radiation level in the building.

A straight shaft in which targets are lowered and raised replaced a curved one. In the old BLIP, only four of the original ten target stations worked at the end because targets got stuck around the bend. The new target shaft has room for seven target holders, each having its own motor-driven elevator. The old BLIP had a mechanical dumbwaiter, and it took five minutes for each target to be moved by hand. It now takes only 30 seconds to position a target. Another shaft was installed for inspection and repair.


Mort Rosen

Leonard Mausner (left) is at the new hot cell, directing a target into position in the AGS linac beam by remote control. Suresh Srivastava (background, left) and Henry Schnakenberg stand at the BLIP control panel, monitoring cooling water flow, pressure and temperature readings being made while BLIP is operating.

A larger and better shielded hot cell replaced the old BLIP's lead-brick cave. The new hot cell has interior dimensions of seven feet long by three feet wide by seven feet high -- more room to store targets and equipment. The remote manipulators used to control processes outside the hot cell are also new and improved.

The new BLIP was built with money from the Laboratory's General Plant Project fund and from DOE's Human Health & Assessments Division of the Office of Health & Environmental Research.

While the new facility was being built, the radionuclide and radiopharmaceutical research done by the group did not cease. "Much of the chemistry we develop does not require high levels of radiation, just tracer levels," explains Mausner. While the BLIP was out of commission, research continued using small quantities of radionuclides produced at the High Flux Beam Reactor or purchased commercially.

Work that went on included labeling monoclonal antibodies with iodine-123, iodine-131, indium-111, technetium-99m and ruthenium-97. "With radioactive antibodies, physi-

(Continued on page 2)

Thallium-201: A Diagnostic Tool

Almost 90% of all nuclear medicine procedures use one of the radionuclides developed by the Radionuclide & Radiopharmaceutical Research Division, Medical Depatment. One radioisotope in great demand is thallium-201. It was developed at BNL in the early 70's, and the technology to make it has been transferred to industry. Thallium-201 now has a $30 million market, which is growing by about 10% per year.

Last summer, a 46-year-old Long Island man felt excruciating pain along his right arm while playing a weekend game of golf. Because the pain was localized on the right side, the man's physician assumed he had strained a muscle.

After a week's rest, the golfer was again on the course when he once more experienced agonizing pain, but across his chest. A stress test revealed some changes in his heart, but they were not specific enough to make or rule out a diagnosis of coronary artery disease.

A second stress test was ordered, and the radioactive tracer thallium-201 was injected into the patient's circulatory system so that his heart could be imaged during the test. In the golfer's case, as in 370,000 other cases a year, thallium-201 provided the diagnosis. The first stress test was a false positive: The golfer's heart muscle and coronary arteries were normal.

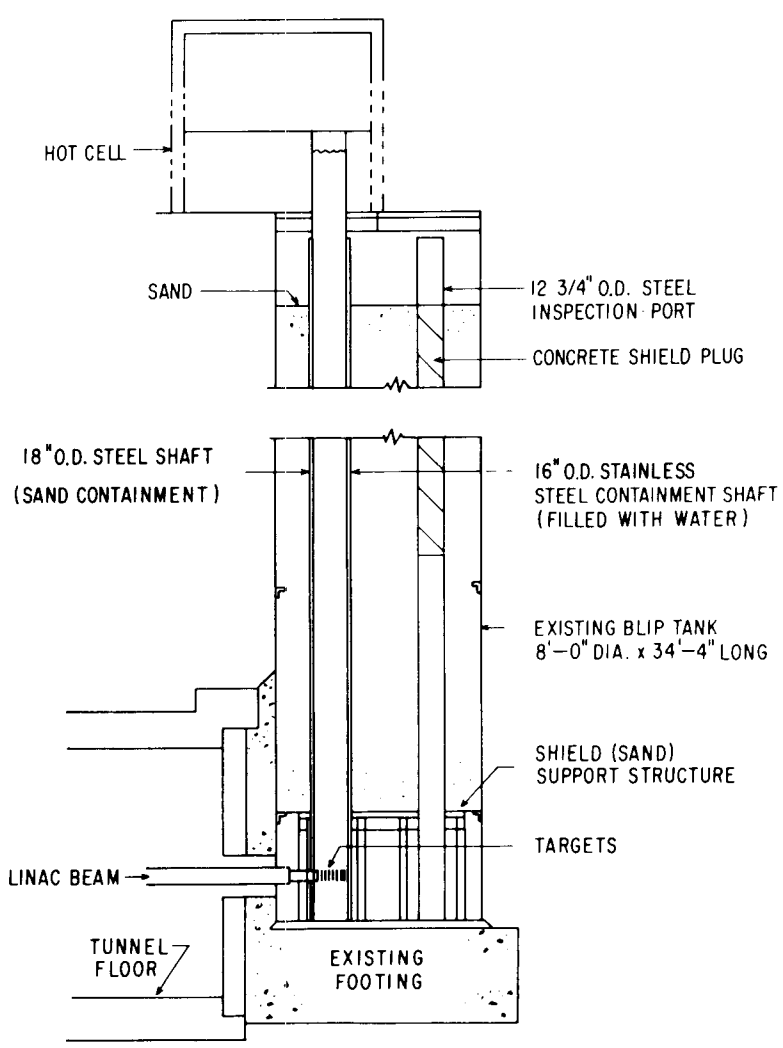
Thallium-201 was found to be useful for heart imaging because its biological behavior is similar to potassium, which naturally accumulates in the heart.

Within five minutes after injection, thallium-201 disappears from the blood and is deposited in the muscles, including normal heart tissue. The parts of the heart that are not getting enough blood because of blocked coronary arteries will not accumulate as much thallium as normal parts of the heart. Areas of the heart that have been severely damaged from a heart attack will not collect any thallium. During a scan, a damaged area will show up as a "cold spot," a dark area in the picture of the heart.

When a thallium uptake confirms a positive stress test, it also tells if the patient is a good candidate for coronary artery bypass surgery. If the scan shows that the heart muscle can accumulate thallium from its blood supply, though the blood vessels may be restricted or partially blocked, bypass surgery may be helpful.

In addition to its clinical use, thallium-201 is used to assess blood flow variations to the heart under experimental conditions. In the Nuclear Medicine Division of the Medical Department, thallium-201 is being used in a study, also involving Oak Ridge National Laboratory and Harvard University, of heart metabolism in hypertensive animals and human beings. — M.B.

BLIP II Schematic



Science Quiz

Do You Have a Fine 14th- or 20th-Century Mind?

(Continued)

13. Helium was first discovered **a)** in mines **b)** in the depths of the ocean **c)** on the moon **d)** on the sun.

14. A planet that is never visible to the naked eye is **a)** Mercury **b)** Venus **c)** Mars **d)** Neptune.

15. The chain reaction that forms the basis of the atomic bomb was first achieved by a group directed by **a)** Albert Einstein **b)** Niels Bohr **c)** Edward Teller **d)** Enrico Fermi.

16. The gravitational force between two spherical objects is known to be inversely proportional to the square of the distance between their centers. If that distance is made three times larger, the gravitational force will be **a)** 1/3 as large **b)** 1/9 as large **c)** half as large **d)** three times larger.

17. Who did not make fundamental contributions to the science of electricity? **a)** Charles Coulomb **b)** Michael Faraday **c)** Benjamin Franklin **d)** Isaac Newton.

18. The Big Bang is related to **a)** the hydrogen bomb **b)** the maximum noise level in an amplifier **c)** a theory of the origin of the universe **d)** supersonic aircraft.

19. Nuclear physics does not deal with **a)** alpha particles **b)** beta rays **c)** deuterons **d)** deoxyribonucleic acid.

20. Identify the incorrect statement. Transmutation of the elements **a)** was a goal of the alchemists **b)** occurs in ordinary chemical reactions **c)** was first achieved by Ernest Rutherford **d)** occurs in some nuclear reactions.

21. Radiocarbon dating is a technique by which **a)** persons who might get along well together are identified by computer **b)** the fading of carbon copies is used to tell the age of documents **c)** the age of art objects is measured **d)** the length of time a patient has had cancer is determined.

22. A laser is not **a)** a source of light that can be focused to a tiny area **b)** a device conceived by Jules Verne for propelling a man to the moon **c)** employed in some delicate eye operations **d)** a device that was used to measure the distance to the moon.

23. Light **a)** can travel in a vacuum **b)** can travel at infinite speed **c)** always travels in perfectly straight lines **d)** cannot travel through solid objects.

24. A rocket moves because **a)** its shape permits air to support it **b)** it has exceptionally powerful propellers **c)** it weights less than the air it displaces **d)** there is a reaction to the gases it exhausts.

(Answers next week.)

From 21 ASTOUNDING SCIENCE QUIZZES! by Grace M. Spruch and Larry Spruch. Copyright © 1982 by the authors. Reprinted by permission of Harper & Row, Publishers, Inc.

Security Stepped Up

It seems to be a fact of present-day life that no institution is safe from malicious acts. Recognizing this fact, the prudent take steps to protect the people and property crucial to their institutions.

Brookhaven has a responsibility not only to its own employees, but to the many outside users of its facilities, to see that the research machines are available and operating. To protect employees and the government's investment, and in compliance with the Department of Energy 1984 Order No. 5632, "Physical Protection of Security Interest," the Laboratory has upgraded its security measures.

Some of these measures are apparent to BNL employees who have not been used to this level of security in the last 20 years. And some employees have voiced objection to what they see as an unwarranted nuisance.

No one intends to make Brookhaven into a fortress. The security procedures adopted here are similar to those at other multipurpose laboratories. For instance:

Early last year the traffic light at the entrance gate was put on red and employees were required to display identification in the form of car stickers and/or I.D. cards when entering the site.

Alarm systems have been improved. Intrusion detection and access control systems, closed-circuit TV and other communication devices have given the Lab police a greater ability to assess situations when, say, someone has tripped an alarm. Is it an employee error, or a deliberate move by an intruder?

There are now more stringent pre-employment checks for people who will need clearances and for those who will have access to sensitive data processing information.

Probably the biggest change has been in the type and extent of the training for Lab police. Because of its more active role, the police force has not only increased in number, but requires more education and more training of its members. The force has been trained with the assistance of the Suffolk County Police Emergency Services Division, and BNL police supervisors have gone through training at DOE's Central Training Academy in New Mexico.

In order to deal with a more sophisticated and better trained adversary, our BNL Police have been receiving Special Weapons and Tactics, or SWAT, training to prepare them to respond to and counter threats that may be directed at the Laboratory (or personnel). They use real weapons, but no ammunition in their training sessions, or they carry laser equipped weapons, which emit signals to indicate hits or misses. They must master various techniques, for example, how to search a building without being observed, how to take cover, how to rappel from heights. They learn how to use weapons systems that are of the latest technology.

To keep their skills honed, the Lab police engage in frequent exercises in the evenings and on weekends. People who inadvertently come across these exercises should not be alarmed and should not interfere. They are not in any danger. No live ammunition is used in the drills. Occasionally, the police may be sighted in camouflage clothing, but, generally, they are in dark blue coveralls when drilling.

NNDC Library Dedicated

The library at the National Nuclear Data Center (NNDC), Bldg. 197D, was dedicated to Donald J. Hughes on Wednesday, July 17. The library was recently moved from another wing of the building to a larger, renovated area and houses 10,000 reports, 3,000 journals and 3,000 books on nuclear physics topics. The library's reorganization was coordinated by Senior Physics Associate Vicki McLane and NNDC Librarian Rosemary Cohen.

Hughes, who died in 1960, was a BNL senior physicist in charge of the Pile Neutron Research Group in the Physics Department and an expert on low energy neutron physics. During his ten years at Brookhaven, Hughes developed techniques for studying the motions of atoms in solids by using cold neutrons.

As a result of his neutron studies, he founded BNL's Sigma Center, a group in which neutron cross section data from around the world was collected and evaluated. The Sigma Center was later replaced by the NNDC, which supplies nuclear reaction and structure information used in designing nuclear reactors and in studies in other fields such as medicine and space exploration.

At the dedication, NNDC Director Sol Pearlstein unveiled a plaque in memory of Hughes. The program also included speakers who recalled Hughes life and work and their association with him. The speakers were: Senior Physicist Robert Chrien, who was an associate of Hughes; Department of Nuclear Energy (DNE) Chairman Herbert Kouts; DNE Deputy Chair Walter Kato, who was a graduate student under Hughes; Senior Physicist Leon Perker; and retired Physicist John Stehn. The dedication was attended by 40 NNDC staff members and guests.

Alex Reben

(From left) Walter Kato, Robert Chrien, Vicki McLane, Herbert Kouts and Rosemary Cohen in the Donald J. Hughes Library of the National Nuclear Data Center.

BLIP (Cont'd)

cians can non-invasively locate cancerous tumors, blood clots and various diseases," says Srivastava. To carry lethal radioactivity to tumors, Chemists George Meinken, Saed Mirzadeh, Tom Prach and Bernard Schmall are attaching copper-67 and palladium-109 to monoclonal antibodies. Tin-117m compounds are being developed for bone tumor therapy.

The most widely used radionuclide that came out of this division's research is technetium-99m. Tens of thousands of nuclear medicine procedures a year are performed on patients using a kit developed at BNL for labeling red blood cells using technetium-99m. Last September, a private company began distributing the kits, and within the next year, the technology to make the kit will be transferred to industry. Not resting on the success of this kit, Srivastava, Chemist Rita Straub and a former collaborator John Babich recently developed an improved method to label red blood cells directly in a small blood sample. This method is being clinically evaluated at Stony Brook.

— Marsha Belford

Inside Info

The June 1985 issue of the Bulletin of the American Physical Society (APS) listed the members of the APS Council Committees, as well as those on committees governing the various divisions, forums, sections and topical groups of the APS. The following BNL employees were mentioned:

- **Martin Blume**, Director's Office, is on the APS Council's 1985 Nominating Committee.
- **Victor Emery**, Physics, is a member of the Oliver E. Buckley Prize Committee. The purpose of the $5,000 award is to recognize and encourage outstanding theoretical or experimental contributions to condensed matter physics.
- **Ole Hansen**, Physics, was listed as a member of the Executive Committee for the Division of Nuclear Physics.
- **Robert Palmer**, Director's Office, sits on the Executive Committee of the APS's Division of Particles and Fields.
- **Sathyavathi Ramavataram**, Nuclear Energy, is on the Ramavataram Fund Committee, established by the APS Council in memory of her husband, physicist Kilambi Ramavataram, who died in 1977. Because of K. Ramavataram's special concern about science teaching in India, the monies will be used to enable college and university teachers of physics in India to visit institutions in North America.
- **Mark Sakitt**, Physics, was elected to the Executive Committee of the Forum on Physics & Society. The Forum's objective is the advancement and diffusion of knowledge regarding the interrelation of physics, physicists and society. Among other things, the Forum has sponsored symposia on topics such as Arms Control and Nuclear Power/Energy, and helped develop the Congressional Fellows Program.
- **Myron Strongin**, Physics, was acknowledged as a member of the Executive Committee for the APS's New York Section and for his part on the committee that selects winners of the APS's International Prize for New Materials.
- **George Vineyard**, Physics, was noted as Chairman of the Board of Editors of Physical Review Letters and as a member of the Executive Committee of the Division of Condensed Matter Physics.

Arrivals & Departures

Arrivals

Eva M. Esposito ..... P&GA
James Gibbs ..... Pl. Eng.
Vladimir Kirzhner ..... Physics
Donna M. LeDoux ..... App. Math.
Judith E. Otto ..... P&GA

Departures

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

Naresh K. Bhagat ..... DAS
Bruno M. Mannarelli ..... Biology
Ann L. Mutschler ..... Medical
Sandra B. Salinas ..... Medical
Manfred Stamm ..... Biology

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Dance Nets Dollars

The Neutron Dance was a smash hit. Last Friday, about 160 people rock 'n rolled in Brookhaven Center past midnight to 50's tunes and contemporary music spun by disc jockey Ed Taylor. More than half the Neutron Dance tickets were sold at the door that night, and ticket sales and donations to the Renate Chasman Scholarship, established by Brookhaven Women in Science, added up to about $700 after expenses.

The money will be added to the $1,700 already contributed to the Chasman Scholarship Fund. WIS hopes to establish a perpetual scholarship in the memory of the late Renate Chasman, a BNL theoretical physicist who designed the storage rings at the National Synchrotron Light Source. The scholarship will be awarded to Long Island women who have returned full-time to college or graduate school to resume their education in the sciences or technical fields.

For those who missed the dance but wish to contribute to the fund, make your checks out to the Chasman Scholarship Fund and mail them to Mary Kinsley or Mary Phillips, DAS, Bldg. 426.

Service Awards

The following employees received service awards during the month of July:

Thirty-Five Years

Herbert Susskind ..... Medical

Thirty Years

Joseph H. Jones .... Photo. & Gr. Arts

Twenty-Five Years

Arnold L. Aronson ... Nuclear Energy
Frank R. Norton ..... Staff Services
Anastasios Soukas ..... AGS
William Stars ..... Accel. Dev. Branch
Frank C. Strelecki ..... Plant Eng.

Twenty Years

Patrick J. Asendorf ..... Biology
Henry W. Danowski ... Supply & Mat.
Robin R. Gianopoulos ..... Reactor
Arthur D.S. Harris .... Applied Math
Anthony Kaczmarczyk .. Cent. Shops
Benedicto J. Scala ..... Biology
Harold W. Siegelman ..... Biology

Ten Years

Michael A. Bender ..... Medical
Alan M. Bieber Jr. .... Nuclear Energy
Robert M. Doty ..... Nuclear Energy
John D. Dunn ..... Light Source
Asher Etkin ..... Physics
Thomas E. Imperial ... Central Shops
Upendra S. Rohatgi .. Nuclear Energy
Roberta C. Saunders ... Staff Services
Prantika Som ..... Medical
Alvin J. Vestal Jr. ..... Supply & Mat.
Joseph J. Vetter ..... Central Shops
Peter J. Wanderer Jr. ..... Accel. Dev.

Workplace and Classroom — a Short Walk Apart

The means to a college education is in your own backyard. Suffolk County Community College has been offering on-site courses right here at Brookhaven since 1980.

For Bob Cooney, it was an opportunity not to be passed up. Currently a custodian at BNL, Cooney received his A.A.S. in Business Administration from Suffolk County Community College (SCCC) in May, doing the majority of his coursework on site.

"It was ideal," he says, "to get finished with my job, go down to the cafeteria and get a bite to eat, and walk to class. When I finished class, I was able to go home relaxed."

Degree in hand, Cooney is confident, but not complacent. He is going to begin working towards his bachelor's degree this fall, taking classes at Empire State College.

He quickly adds that it won't be easy. He knows, because it hasn't been in the past — being married, with young children, and working full-time with occasional part-time work on the side. But for Cooney it's been worth the effort. Already, he has found his business education useful while managing his part-time fender repair business and even while directing the Middle Island Youth Football Association.

An employee close to reaching her goal is Deidre Seymore, an Administrative Services Assistant in the Central Shops Division. Seymore will be receiving her A.A.S. in Business Administration from SCCC next spring. She attends approximately half her classes on site and also considers this convenient and time saving.

Seymore and Cooney are just two employees who have benefited from taking classes on site. There are many others and the list grows with every semester. You can take courses that are job related, or that can be applied towards a degree. Any student without a high school diploma will be granted an equivalency upon completion of 24 credits. Full-time employees are eligible for a tuition refund and may obtain the proper form from Personnel.

Bob Cooney

Deidre Seymour

Registration for the fall semester will be held August 5-16 at Personnel, Bldg. 185. For additional information, contact Pat Knisely, Ext. 7631.

NYC Train Trip

The Hospitality Committee is planning a group railroad trip to New York City on Wednesday, August 7. Departure will be at 7:55 a.m. from the Patchogue LIRR station. Round-trip fare for adults is $5.00; children under five years ride free.

Reserve a ticket by sending your fare through the U.S. mail to BNL, P.O. Box 322, Upton, New York 11973. Please do not send cash. Checks or money orders, payable to BNL, must be received by Friday, August 2. Put the date of the trip, your BNL life number and your phone number on the back of your check or money order. Your tickets will be given to you at the railroad station on the day of the trip. Refunds will be made only if cancellations are received by the Monday morning preceding the trip.

Cafeteria Menu

Week of July 29

Monday, July 29		
Beef barley soup	(cup)	.65
	(bowl)	.85
Marinated teriyaki chicken breast & 1 veg.		2.30
Beef liver & onions w/1 veg.		2.10
Hot Deli: Baked ham	(bread)	2.00
	(roll)	2.20
Tuesday, July 30		
Chicken noodle soup	(cup)	.65
	(bowl)	.85
Beef & broccoli stir fry & 1 veg.		2.20
Chili relleno casserole & 1 veg.		2.15
Hot Deli: Grilled Reuben		2.05
Wednesday, July 31		
Garden vegetable soup	(cup)	.65
	(bowl)	.85
Prime rib special w/choice of 2 vegetables		3.50
Hot Deli: Italian meatball hero		2.25
Thursday, August 1		
Minestrone soup	(cup)	.65
	(bowl)	.85
Breaded pork chop w/cauliflower au gratin		2.20
Beef Stroganoff on egg noodles		2.20
Deli Special: Cold submarine made to order		2.75
Friday, August 2		
Fish chowder	(cup)	.65
	(bowl)	.85
Baked lasagne & 1 veg. w/garlic bread		2.20
Ham & noodle au gratin & 1 veg.		2.15
Hot Deli: Breaded fish fillet	(bread)	2.00
	(roll)	2.20

Stockroom Closing

Buildings T-206 and T-210 will be closed for inventory today and on July 29. Emergency requirements can be processed by John Scharpeger, Ext. 2974.

-BERA News-

Picnic

The Afro-American Culture Club cordially invites all BNL employees, friends and guests to attend its Fifth Annual Picnic on Saturday, August 17, from noon to 6 p.m. In the event of rain, the picnic will be held Sunday, August 18.

The picnic site will be located in the recreation area next to ball field number 5. Tickets are $4 for adults and $2 for children under 12. All tickets must be purchased in advance. Music, food, refreshments and games will be provided.

This year a special attraction will be the national award-winning double-dutch group Without Warning. They will conduct a jump rope exhibition and a workshop for those who would like to learn the art of double dutch. Without Warning will be accompanied by the Bellport double-dutch team.

Tickets can be purchased from any of the following before August 15: Renee Flack, Ext. 3316; Robert Mosley, Ext. 2358; Fred Nesbitt, Ext. 4001; Bruce Penn, Ext. 7213; Cosmore Sylvester, Ext. 2253.

Aviation Club

Aviation Club is planning a group flight to Fisher's Island on Wednesday, August 7, with a rain date of Wednesday, August 14. Plans are being made to depart from Brookhaven Airport at noon. A tour of the Fisher's Island Museum has been arranged at 2 p.m., and there are many trails for nature walks.

Non-members are invited to join the group. Seats will be assigned first-come-first-served. Costs are shared by participants. If you would like to fly with the Club, please call Audrey Karzenski, Ext. 3962.

Vaudeville News

Tryouts for Vaudeville '85 are scheduled for Wednesday, July 31, and Thursday, August 8, at 8 p.m. in Berkner Hall. All acts requiring musical accompaniment should come to the tryout on August 8. For further information, call Jane Love, 286-1136.

Softball

Games week of July 15

League I

Phoubars 9 - Scram 1
Blue Jays 8 - Moles 5
Cool 'N Gang 15 - Six Pax 11

League II

AMD 18 - Medical 5
Magnuts 8 - Lights Out 7

Makeup game from June 5:
Lights Out 18 - Dirty Sox 4

League III

No Names 6 - Nads 5

League IV

Kidz-R-Us 9 - Turkeys 3
September 9 - Farm Busters 4

League V

Simply Awesome 29 - Underalls 24
Foul-Ups 14 - Spacekadets 7

Makeup game from June 24:
Simply Awesome 12 - No Feedback 10

Hospitality News

Just a reminder that the Hospitality Committee's next get-together will be held Tuesday, July 30, at Gillian Love's home in Mount Sinai Harbor.

We will meet at the Brookhaven Center at 9:30 a.m. Transportation to and from Mrs. Love's house will be available. If it rains that day, we will stay at the Center.

Answers to Last Week's Quiz

1. b

2. b

3. a. A lunar eclipse is an eclipse *of* the moon.

4. c

5. c. Fusion is the process whereby light atomic nuclei combine. Thermonuclear energy is derived from fusion. For alpha decay, see the answer to question 11.

6. a

7. b. The word *month* comes from the length of time it takes the *moon* to orbit Earth.

8. a

9. b

10. c

11. a. Radioactivity consists primarily of alpha decay (the emission of an alpha particle, the nucleus of the helium atom), beta decay (the emission of a beta particle, an electron) and gamma emission (emission of an energetic electromagnetic "particle," or photon). The terms alpha (α), beta (β), gamma (γ), the first three letters of the Greek alphabet, were introduced before the nature of the radiations was understood.

12. a. The Earth is believed to be about four and one-half billion years old; dinosaurs were around one hundred to two hundred million years ago, and man has been on Earth a few million years.

Classified Advertisements

Placement Notices

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

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

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

For further information regarding a placement listing, contact the Employment Manager, Ext. 2882.

LABORATORY RECRUITMENT - Opportunities for Laboratory employees.

2294. ADMINISTRATIVE POSITION - Office of the Laboratory Director. Must have extensive knowledge of Laboratory policies and procedures in addition to a high level of administrative experience. Responsibilities will include a wide range of administrative and secretarial duties such as composing nontechnical letters and memoranda for the Director's signature; arranging Directorate meetings and serving as recording secretary for such meetings; maintaining the Director's daily calendar; and making extensive domestic and foreign travel arrangments. Position requires excellent oral and written communciation skills, and maturity and discretion in handling administratively private matters. Interested applicants should contact Marsha Kipperman, Personnel Division, extension 2871.

OPEN RECRUITMENT - Opportunities for Laboratory employees and outside applicants.

2295. BIOLOGY ASSOCIATE - Requires a BS in microbiology, genetics, biochemistry or molecular biology or equivalent experience. Must have experience with biochemical and microbial laboratory work. Inside laboratory responsibilities will be conducted in winter and most of spring. Extensive field work will be conducted in the summer and fall. One year appointment. Biology Department.

Autos & Auto Supplies

70 DODGE SWINGER - slant 6, new radial tires, alternator, starter, trans., etc., 125k mi., $600. Chyng, Ext. 4391/4396/4563 or 751-8224.

77 CAMARO LT - p/s, 3 spd., am/fm cassette stereo, new paint/tires, must see. Ext. 5163 or 475-6964.

TIRES - (1) ER78-14, (1) G78-14, $ ea.; (2) rims for G78-14, $3 ea., $10 takes all. Ext. 7505.

RADIAL TIRES - (2) unmounted, excel. cond., 78GR15. Ext. 3312.

TOYO TIRES - (4) all season, P-205-75R14, w/w, 10k mi. on ea., $30 ea. 283-1752.

79 RENEGADE JEEP CJ7 - 304, a/t, p/s, p/b, a/c, sunroof, excel. cond., $6,000. 286-3865.

78 CHEVY CORDOBA - a/c, p/s, p/b, am/fm, excel. cond., $2,100. 563-2847 after 5 p.m.

84 PLYMOUTH TURISMO - still under warranty, like new, $5,100. 563-2847.

72 DODGE DART - a/t, a/c, am/fm stereo, good cond. Sandy, Ext. 3369 or 286-1022.

MICHELIN TIRES - (4), 165/14", brand-new, asking $100. 286-0939.

80 SUZUKI GS1000S - clean, new tire chain & sprocket, $1,500. Ext. 3357 or 325-9580 after 6 p.m.

74 CHEVY BLAZER - $2,000. 289-8253.

82 CHRYSLER LEBARON - excel. cond., stereo w/equalizer, p/s, p/b, must see, $4,500. John R., Ext. 3397 or 732-2702.

76 COUGAR XR7 - p/s, p/b, p/w, a/c, CB, $900. Dan, Ext. 4987 or 698-7322.

72 MOBIL TRAILER - sleeps six, duel wheels, good cond., extras, $2,100, neg. 588-1464.

77 AMC WAGON - p/s, a/t, am/fm, just inspected, high mi., good mech., clean, good trans., $900. Bob, 878-0835.

72 VOLKSWAGON 411 - s/w, a/c, good int., ext., needs eng. work; 73 Olds 88, good trans. & eng., needs body work. 360-7841, 6:30 Mon., Wed., or Fri.

72 PONTIAC LEMANS - good mech. cond., reliable trans., $650. 727-4859.

78 CHEVY PICKUP - very good cond., cap, 6 cyl., a/t, p/s, p/b, $3,000. Rick, Ext. 2396 or 472-1275.

76 BUICK REGAL - V8, p/s, p/b, a/c, a/t, 85k mi., $1,800; auto. trans. for Volvo 1800ES, 3 spd., $125. Ext. 4167.

72 MERCEDES BENZ 250 - 4 dr., tan int., very good cond., $2,300. John, Ext. 3292 or Chris, 286-1348.

SNOW TIRES - (2), $12; 16.5 spoke rims for Ford 3/4 ton truck, $100. Dick, Ext. 3498 or 589-9103.

74 FORD PICKUP - F250, 28,300 mi., a/t, 4 WD, camper top, excel. cond., $3,500. 732-8229.

TRUCK CAP - for 6-1/2' bed, stepside, paneled, good cond., $350. Steve, Ext. 5163.

80 DATSUN 310 - hatchback, new brakes, tires, muffler system, good cond., $2,600. 286-9606.

TIRES - (2) Uniroyal, P175/75R14, steel belted radials, good cond., $10 each. Bob, Ext. 4824/4561 or 744-5098.

76 MERCURY COUGAR - p/s, p/b, p/w, stereo, CB, must sell, $900; camper or trailer add-a-room, 8' x 12', canvas type, with windows, $50. Dan, Ext. 4677 or 698-7322.

77 VW RABBIT - new tires and clutch, good cond., $1,400, neg. Harvey, Ext. 3758 or Sally, 821-1726.

79 FORD PINTO - 4 spd., runs and looks great, red, $1,000. Ext. 4605 or 281-5456.

72 DODGE DART - a/t, a/c, am/fm stereo, 20 mpg., good cond. Sandy, Ext. 3369 or 286-1022.

74 VW BUG - 4 spd., orange, good cond., best offer. Al, Ext. 3404 or 744-9866.

71 VW BEETLE - 4 spd., handyman's special, still runs, needs work. Ext. 3670 or 744-1760 eves.

80 CHEVY - stick shift, 30-35 mpg., excel. cond., $2,500. 281-5532.

80 RENAULT LE CAR - 47k mi., very good cond., $1,600. Jerry, Ext. 5506 or 732-4701.

76 OLDS - 4 dr., 4 spd., a/c, p/s, p/b, low mi., asking $1,500. Kevin, 563-1189.

77 CAMARO LT - 3 spd., p/s, am/fm cassette stereo, excel. cond., must see. Steve, Ext. 5763 or 475-6964.

CAP - fiberglass, for 8' bed, sliding front window, 2 roof vents, excel. cond. 325-0447 after 6 p.m.

72 BUICK - new trans., new brakes, $500 or best offer. 654-8379 after 5 p.m.

78 HONDA MOTORCYCLE 550 CB - 4 cyl., 5 spd., low mi., garaged, excel. cond., $735. 467-8563.

73 PONTIAC CATALINA - 350 V8, 4 dr. sedan, p/s, p/b, a/t, 76k mi., $700. Bill, Ext. 4774.

70 NOVA - runs well, new parts, good engine & trans., $550, neg. Walt, Ext. 2907 or 698-0576.

72 FIAT 850 - convertible, 4 spd., very good cond., $750. Al, Ext. 5128 or 298-4475.

71 PLYMOUTH VALIANT - 4 dr., runs, but needs work, (6) good tires, make offer. 929-8443.

74 VW SUPER BEETLE - 4 spd., excel. cond., well maintained, asking $2,100. 758-7083 eves.

70 DODGE VAN - 318, a/t, trailer hitch, $700; (4) Crager rims, 3 usable rubber, 1 blowout, $60 or best offer. Ray, Ext. 3536 or 289-7615.

72 CHEVY - 3/4 ton truck, new paint and tires, rebuilt engine, excel. cond., $3,750. Miriam, 473-5060 eves.

70 OLDSMOBILE 88 - 4 dr., runs well, $300. Ext. 7742 or 281-7568.

77 MERCURY COUGAR XR7 - V8, a/t, a/c, p/s, p/b, high mi., runs well, needs minor work, $900. John, Ext. 3292 or 286-1348.

Boats & Marine Supplies

30' CATALINA SLOOP - tall rig, instruments, furling, wheel, diesel, dodger, many extras. Ext. 2015 or 269-2974.

BOAT TRAILER - dilly for up to 15', good cond. 732-7695 after 6 p.m.

24' CHRYSLER - w/115 HP Evinrude, pwr. trim & tilt, cabin, sleeps 2, new rug, good condition, $1,600. Jim, Ext. 7772.

O.M.C. MOTOR - cable, controls, brand new, $25. Ext. 4312.

JOHNSON MOTOR - 1971, 55 HP, elec. start, w/controls. 878-8484.

23' F/G SLOOP - European crafted, sleeps 4, 3 sails, head & galley, dinghy & many extras, mooring, asking $7,500. Ext. 4605 or 938-8353.

HONDA V-65 MAGNA - 1983, mint cond., 2,400 mi., best offer. Chris, 928-7139.

FIBERFORM 2375 SUN BLAZER - 1981, 200 HP Volvo, f/w cooling, sleeps 5, head, galley, refrig., shore power, trim, tabs, swim platform, plus many extras, 105 hrs., mint cond. 654-5888.

BOAT TRAILER WINCHES - (2) manual, $4 each. Bill S., Ext. 3848 or 281-6498.

16' FIBERGLASS BOAT - 1971, 50 HP Johnson, trailer, $1,000. Ext. 4846 or 363-6940 after 5 p.m.

18' MARK TWAIN - 1968, 1969 65 HP Mercury, new lower unit, runs well, $1,250. Ext. 4752 or 669-0549.

14' CHRIS CRAFT - 1955, 40 HP Johnson outboard, trailer, navy top cover, skiis, many extras, $2,200. Ext. 4631.

28' OWENS - 1966, sleeps 4, head, galley, extras. Don, Ext. 5329 or 878-2215 eves.

Miscellaneous

BUTCHER BLOCK TABLE - $25; white mini blinds, assorted sizes. 928-6921.

CANON A1 CAMERA - w/extra Canon lenses, mint cond., extras, $525, neg. 286-2265 after 7 p.m.

77 YAMAHA GT/MXC - dirt bike, good cond., $300; Colecovision, plus (2) cartridges, used only a few times, excel. cond., $75. 878-0480.

PENTAX CAMERA - 35mm, program plus model, new cond., w/Vivitar flash, access., carrying case. Mike, Ext. 2238 or 331-5042.

WOOD LATHE - 4' bed, no motor, 3 cutting tools, never used, $45. Bob, Ext. 3145.

TRACTOR - Gravely, snow blow, sickle bar, grass cutter, good cond., $600. 732-7695 after 6 p.m.

CAMERA - Kodak Disc 4000, with additional carrying case, used once, $40. Sharon, Ext. 3995.

WASHER & DRYER - heavy duty, large capacity, $75 & $100; channel master, UHF-VHF-FM antenna, $75. 928-6921.

DINING ROOM TABLE - 1 leaf, (4) chairs, hardwood, $50. 744-5871.

AIR CONDITIONER - 6000 BTU, hardly used, $100; G.E. washer & dryer, large capacity, hardly used, $150 ea. or $250 both. Bob, Ext. 3145.

CYCLONE GATE - 4' high, good cond., $20. Dan, Ext. 4987.

YASHICA ELECTRO 35 CAMERA - 35mm, GSN rangefinder, F1.7 lens, good cond. Ext. 4153 or 732-5829.

CLOSED CAPTION TV CONVERTER - for hearing impaired, new factory guarantee, $180. 727-4859.

CAR ALARM - brand new, manuf. Wolo., retail $40.95, selling for $25. JoAnn, Ext. 4120 or 588-8492.

FREEZER - Sears, 17 cu. ft., upright, excel. cond., $125. Ext. 4312.

BIKE - Shogun, 10 spd., grey, used once, $100; Admiral freezer, upright, 13.2 cu. ft., $100. 744-4133 between 5-7 p.m.

BAKER-BROILER - large, Rotisseri, used once, $40; dresser, heavy, $20; oak desk chair, $10; lawnspreader, $10. 878-6637.

WHEEL BARROW - construction type, $40. Ext. 2575.

120 BASS ACCORDIAN - $100; Sears white bedroom twin bed, single dresser, $75; Bundy coronet, $100. 475-2998.

CASSETTE PLAYER - Lafayette, with speakers, $75; sofa bed, $200. Ext. 4548 or 289-0967 after 5:30 p.m.

ROSS BICYCLE - 20', boy/girl, new frame, $40; Toaster-oven, you fix doorlatch, $9.95. Ext. 4118 or 928-5714.

HOT WHEELS BIKE - Tonka, Masters of the Universe, $12.50. Joe, Ext. 4212.

BABY FURNITURE - Childcraft crib, honey oak, $100; crib mattress, $50; car seat; high chair; stroller; swing; excel. cond. 499-0637.

FURNITURE - antique claw feet oak dining room set, table, (6) chairs, beveled china closet, needs to be refinished, asking $700. Linda, Ext. 7745 or 878-2844.

CYCLONE GATE - 4' high, $30. Dan, Ext. 4677 or 698-7322.

DINING ROOM SET - table, leaf, (4) chairs, buffet, china closet, good cond., must sell, $275. Ext. 7732.

FOOD PROCESSOR - 550W, many access., big bowl (holds 8 lbs.), blender (1-1/2 qts.), slicer, shredder. Monica, Ext. 3117.

VACUUM - Sears Power Mate, works well, 4 pile adj., $50. Frank, Ext. 3531.

EXERCISE GYM - universal type (Marcy Mach 1), excel. cond., $1,500. John, Ext. 3292 or 475-4370.

TENNIS RACKET - women's, Donnay Bjorn Borg model, excel. cond., $15. Nakai, Ext. 2186 or 3076.

BEDROOM SET - Colonial, double dresser, mirrored hutch, headboard, (2) night stands, 2 yrs. old, $400. Ann, Ext. 4078.

AIR CONDITIONER - G.E., small, 4,000 btu, $50. Raul, Ext. 4331 or 924-1421.

G.E. REFRIGERATOR - 13 cu. ft., good cond., $60; (2) card tables, $15 each. 744-9832.

G.E. REFRIGERATOR - side-by-side, 19 cu. ft., gold, good cond., $100. Jim, Ext. 2432.

CHESS GAME - voice sensory, electronic, model VSC, with instr., $100. Sal, Ext. 2460.

POOL - alum., 15' x 30', incl. through wall skimmer, filter, motor/pump, vacuum & hoses, chemicals, etc., needs liner, $350. Walt, Ext. 2907 or 698-0576.

DINETTE TABLE - wooden with laminated top, (4) matching cane-back chairs, ivory, $100. Peter, Ext. 3535.

HOME WATER DISTILLER - new, $195. 363-7032.

LIVING ROOM SET - Colonial, sofa, loveseat, chair, excel. cond., asking $800; Colonial dining room set, oval table, (6) chairs, pine, excel. cond., asking $300. Linda, Ext. 2439 or 289-5060 after 6 p.m.

AQUARIUS COMPUTER - games, almost new, very good for kids, $50. Elizabeth, Ext. 3419 or 3110 eves.

ATARI 600XL - 410 recorder, Pacman, Missile Command and Assembler cartridges, best offer. Flint, 744-0485.

INGROUND POOL LADDER - stainless steel, 2 step, good cond., $25. 286-9390.

DEEP WELL PUMP - new, 3/4 HP, 120/240V Burkes, $280. Ext. 7742 or 281-7568.

PUPPIES - Doberman, males, champ. lines, show, obedience potential, going fast, $300. 669-1431.

FURNITURE - bar set; dining room set; large window air conditioners. Ady, Ext. 4531 or 331-3785.

PHONE ANSWERING MACHINE - in box, never used, $60. Jim, Ext. 4040 or 289-0876.

MOVING SALE - kitchen items; toys; ages 1-5, household articles and many others. Ext. 3177 eves. & weekends.

Free

WASHER AND DRYER - old, but reliable. Jay, Ext. 4994.

KITTENS - male and female, 8 wks. old., cute, healthy, trained. Elke, Ext. 3125.

PUPPIES - gorgeous and healthy, 8 males, part shepherd, 7 wks. old. Ext. 5231/4081 or 369-2338 after 6 p.m.

Yard Sales

SETAUKET - 3 Jeffrey Lane, (off of Main St.), Chinese items, unused 12 piece china set, furniture, July 27-28, raindate Aug. 3-4.

BROOKHAVEN - 15 Fire Place Neck Rd., 200' S. of Cannon Brookhaven Hamlet, huge, July 27, starts 9 a.m.

Car Pools

MATTITUCK - driver to fill four person carpool. Ext. 3992 or 298-4172.

COMMACK - 8:00 a.m. - 4:30 p.m. Don, Ext. 2043.

BELLPORT - need member for existing carpool. Stew, Ext. 4510.

COMMACK - need 4th person for on time pool, 8:30 a.m. - 5:00 p.m., door to door. Bonnie, Ext. 2876.

NORTH BELLPORT - needs ride, will share gas. 286-2640.

Real Estate

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

For Rent

WHITE MOUNTAINS, NEW HAMPSHIRE - 3 bdrms., 2 baths, new riverfront condo., f/p, heated pool, clubhouse, Jacuzzi, tennis, hiking, golf nearby, lovely area attract., scenic fall foliage, 3 nights, $240, weekly, $375. 914-232-4039.

SETAUKET - 4 bdrms., 2 baths, m/d setting on cul-de-sac, nice neighborhood, 3 Village School Dist., immed. occup., $950/mo., plus util. Ext. 2611 or 751-4095 after 5 p.m.

MASTIC - 2 blocks from water, 2 bdrm. apt., garage, eik, private ent., $625/mo., incl. heat; large 1 bdrm. apt., full bath, d/r, private ent., $525/mo., incl. heat. Jim, 281-2849.

SETAUKET - large 1 bdrm. apt., full bath, full kitchen, private ent., near SUNY, $450 plus util. Ext. 4783 or 689-3055.

For Sale

CORAM - Strathmore East, W section, 10 rm. ranch, 4 bdrms., 3 full baths, M/D, fireplace, nicely landscaped, quiet, move-in condition. 928-8071.

MANORVILLE - English Tudor, 5 yrs. old, 10 rms., 4 bdrms., 2-1/2 baths, fireplace, playroom, f/r, d/r, l/r, 2 car garage, full deck w/pool, wooded acre, $171,500. Ext. 4934 or 878-0984.

COOPERSTOWN - 180 acres, adjacent state land, deep well, bldgs., $425 per acre. 363-7032.

BAYPORT - S. of Middle Rd., 700' from bay, 4 bdrms, 1-1/2 baths, new kitchen, wood floors, den, sunroom, 20 x 40 inground pool, 3/4 acre, mint, $186,900. 472-1182.

Wanted

MUSIC TEACHER - 1 day a week for beginner on electric guitar, reasonable. Ext. 4486 or 878-0480, eves.

TURKISH TRANSLATOR - to translate two short letters. Elise, 286-9257.

HOME FOR DOG - lovable, part shepherd, loves outdoors, cannot keep in apartment. 981-5993 after 6 p.m.

FLUTE - for beginner, must be in good cond. Joe Bush, Ext. 4638.

BICYCLE - 10 spd., racing model, must be in good cond.; barbell weights, steel plates, reasonable prices. John, Ext. 3292 or Chris 286-1348.

HOUSEMATE - Mastic Beach, waterfront, own bedroom, $300 plus 1/3 util., prefer non-smoking male. 281-8625 after 6 p.m.

HOUSE TO RENT - family of four, for one year starting late Aug., Per Spanne, Radiation Physics Dept., The Medical School, 581 85 Linköping, Sweden.

WAGON WHEELS - 3' diameter, good cond. Pat, Ext. 4255.

HOUSE TO SIT - caring, responsible, experienced, free any period, Aug. 1 to Sept. 15. J. Allentuck, Ext. 2412.

FISHING POLE - good cond. Richard Jones, Ext. 3316 days or Ext. 2516 eves.

BABYSITTER - for 8 and 10 yr. old, must be avail. for some overnight stays. Harvey, Ext. 3758 or Sally, 821-1726.

JAPANESE TUTOR - to review Japanese with college student. Ken, Ext. 3564 or 929-6744.

FULLER BRUSH REP. - on site. Bobbi, Ext. 7288.

Classified Ad Policy

Deadline is 4:30 p.m. Friday for publication Friday of the following week.

1. The Brookhaven Bulletin's classified section may be used only by active and retired Laboratory employees.
2. All items for sale or rent must be the advertiser's property.
3. Ads for material acquired for resale in association with a full or part-time business cannot be accepted.
4. Ads for the sale or trade of firearms will not be accepted.
5. Ads not carried because of space restrictions will be held for publication in the next issue.
6. Ads are run only once and must be resubmitted if they are to be repeated. One ad per person per week.
7. **Property for sale or rent cannot be accepted on this form. Special Real Estate Ad Forms are available at the office of the Brookhaven Bulletin, Building 134.**

☐ For Sale: Autos & Auto Supplies ☐ For Sale: Boats & Marine Supplies ☐ For Sale: Miscellaneous ☐ Car Pools ☐ Lost & Found ☐ Wanted ☐ Free ☐ _____

Please print your ad below in 15 words or less using one word per block. Include name and phone number to call.

Note: The following must be completed for your ad to appear.

NAME (Please Print) .....

Employee's Signature ..... Life No. ..... Ext. .....

Send to: Brookhaven Bulletin, Building 134 (Ext. 2345).