BROOKHAVEN BULLETIN
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BROOKHAVEN NATIONAL LABORATORY

Phoenix Concept Rising to the Nuclear Waste Challenge

Because nuclear waste can take more than 10,000 years to decay and because it is potentially hazardous to human and environmental health, U.S. public sentiment about underground repositories for long-term storage of nuclear waste has been "Not in my backyard."

But, if more nuclear waste could be recycled or transformed into less hazardous materials that need be stored for no more than 30 years, then the national attitude about the soon-to-be-opened geologic repositories could change.

With the goal of substantially reducing some of the most significant challenges to building and operating geologic repositories, BNL's Gregory Van Tuyle, Hiroshi Takahashi and Michael Todosow of the Department of Nuclear Energy have resurrected the Phoenix Concept.

Based on an idea proposed by Takahashi in the early 1970s, the concept takes its name from the Phoenix, a fabulous bird of ancient myth. According to legend, after the Phoenix flew about the desert for 500 years, it would burn itself to death on a funeral pyre, only to rise again from among the ashes to live another 500 years.

(From left) Michael Todosow, Gregory Van Tuyle and Hiroshi Takahashi of BNL's Department of Nuclear Energy discuss the Phoenix Concept. — Photos on this page by Roger Stoutenburgh

The modern concept of the Phoenix is technical, not mythical, but it too involves burning — in part to resurrect new fuel out of spent nuclear fuel from the 111 light water reactors (LWR) used to generate power in the U.S.

Technically a hybrid linear proton accelerator driving a subcritical target, a Phoenix machine is designed to play a vital role within a waste-reduction plan called the Clean Use of Reactor Energy (CURE), proposed by the Westinghouse Hanford Corporation.

Under CURE, elements called minor actinides and some long-lived fission products would be chemically separated from spent fuel. The remainder could be packaged separately — thus reducing the heat load and increasing the lifespan of U.S. geologic repositories. Such underground storage facilities are currently considered the best method for the long-term disposal of nuclear waste.

Within 30 years, as a result, the remainder of the waste would be less toxic than the uranium ore that occurs in nature.

Some of the long-lived fission products would then be recycled for nuclear power reactor fuel or medical applications. The minor actinides and the rest of the long-lived fission products that are the most difficult to dispose of would be transformed into short-lived radioactive isotopes and nonreactives of different elements within Phoenix.

To determine whether such a machine can be built and operated, Van Tuyle and coworkers have proposed a three-year engineering study of its major components to the U.S. Department of Energy.

(continued on page 2)

Volunteers Needed

Black Women, Bone Mass and the Risk of Osteoporosis

Do black women have more bone mass than white women?

If the answer to that question is yes, then black women are less prone than white women to the symptoms of osteoporosis, a disease that causes the abnormal loss of bone mass.

If the answer is no, then black women would be advised to take the same precautions, including calcium supplements, exercise and post-menopausal hormonal replacement therapy, as white women do who are prone to the disease.

To find the answer, 250 healthy black women between the ages of 20 and 80 are being recruited to participate in one part of a fourproject National Institutes of Health (NIH) study. With half the participants recruited so far, volunteers who are between 65 and 80 years of age are especially needed.

Entitled "Clinical Applications of High-Precision Neutron Activation," the five-year, $8-million multi-institutional NIH grant is called a program-project, and its co-principal investigator is BNL Senior Scientist David Weber, who heads the Nuclear Medicine Research Group in the Medical Department.

Medical's in vivo neutron-activation (IVNA) facility serves as the core facility for the program-project, and BNL Associate Scientist Avraham Dilmanian is the IVNA director and core principal investigator. The facility includes: a delayed-gamma neutron activation system utilizing the 32-detector whole body counter (WBC), and a prompt-gamma and inelastic neutron scattering system.

Under the grant, the IVNA facility has been upgraded to serve the four clinical projects: aging research at the Human Nutrition Research Center on Aging at Tufts University; AIDS studies at St. Luke's and New York Hospitals; obesity research at St. Luke's Hospital; and osteoporosis studies at Winthrop-University Hospital (WUH) in Mineola.

The WUH osteoporosis project is being carried out by two BNL research collaborators: physician Ashok Vaswani, a WUH endocrinol-

(continued on page 2)

As a patient is positioned by Anthony Lo Monte (background), who operates the Whole Body Counter in the Medical Department, Avraham Dilmanian (left) and Ashok Vaswani examine a computer monitor displaying the WBC's gamma-ray spectra.

Three New Members Join ERC

Since it was first formed in 1980, the Employee Relations Committee (ERC) has helped non-bargaining, non-scientific employees solve work-related problems that they were unable to resolve with their supervisors. With each referral, the committee's approach has remained constant: to hear all sides of an issue and resolve it in complete confidentiality.

The mix of BNL employees who serve on the ERC changes every year, as three people complete their three-year terms and Laboratory Director Nicholas Samios appoints three new members to bring the ERC's number back up to eight.

Shown here are: (from left) outgoing member Marguerite Marsch, Department of Applied Science; Susan Foster, Employee Relations Counselor, ex officio; outgoing member Michael Schaeffer, Plant Engineering Division; new member Mary Anne McGrath, Department of Nuclear Energy; Richard Eggert, Contracts & Procurement Division; Veronica Evans, Computing & Communications Division; new member Dennis Klein, National Synchrotron Light Source Department; June Herbert, Alternating Synchrotron Light Source Department; committee chair William Kollmer Jr., Accelerator Development Department; new member Mark Davis, Reactor Division; outgoing member Richard Seebeck, Chemistry Department; and Michelle Cummings, Management Information Systems Division.

To contact the ERC, call its special number, Ext. 4005, or contact an individual member: Cummings, Bldg. 459, Ext. 2077; Davis, Bldg. 750, Ext. 2760; Eggert, Bldg. 355, Ext. 4834; Evans, Bldg. 515, Ext. 2851; Herbert, Bldg. 911B, Ext. 4692; Klein, Bldg. 725A, Ext. 2743; Kollmer, Bldg. 902A, Ext. 4005/4479; and McGrath, Bldg. 197C, Ext. 2815.

Phoenix (cont'd)

"At the end of our proposed study, we would expect to have a viable target design, estimates of waste throughput, expectations of target damage, and a conceptual design for both the accelerator itself and its beam expansion system," explains Van Tuyle.

As part of that study, the Phoenix team would study how to scale up BNL's two-dimensional beam expander, located at the Radiation Effects Facility, and use a beam of 1.6-billion-electron-volt (GeV) protons from BNL's Alternating Gradient Synchrotron Booster to study target damage.

Consuming LWR Waste

Theoretically, one Phoenix could handle the targeted waste from 75 LWRs, while generating enough electricity to run the machine and produce an additional 850 megawatts (MW) of power, which is the output of some nuclear power plants. If one machine based on this concept were to be built by the year 2000, Phoenix could cut the growth of some of the most problem components of spent LWR fuel by 75 percent.

"Since U.S. light-water reactors are currently operating at 65 percent of capacity, one Phoenix machine could process almost all of the current production of minor actinides," says Van Tuyle. "However, if a second unit were started up in the year 2010, all the backlog of minor actinides would be consumed by early 2040."

From 10,000 to 30

By 1995, U.S. LWRs will have produced 30,000 metric tonnes of waste. If left unprocessed, this waste will still be up to three times more toxic than natural uranium ore even after 10,000 years of decay.

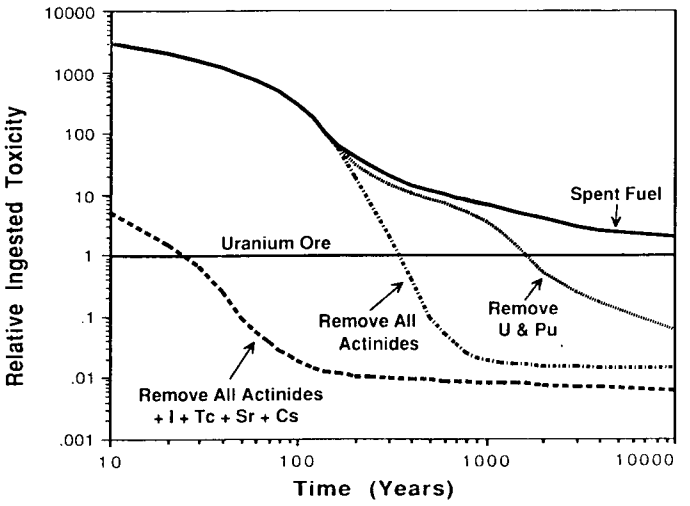
If, however, waste plutonium and uranium are separated out at the start, then the toxicity drops below natural uranium ore after only 1,000 years. Further, by removing the minor actinides, toxicity declines in three to four centuries.

"Because of their long half-lives, plutonium, uranium and the minor actinides would be a concern within a repository, especially in case of human intrusion," explains Van Tuyle.

With those elements gone, four problem isotopes would be left: strontium-90, cesium-137, technetium-99 and iodine-129. With half-lives of only 30 years, the first two are short-lived fission products that produce a lot of heat as they decay. While the second two have long half-lives, they are very water soluble, and hence pose the greatest environmental threat.

"If these four problem isotopes are also removed, then the lowest toxicity curve results and only 30 years would be needed for the toxicity of the remaining waste to fall below that of uranium ore," states Van Tuyle.

While the uranium and plutonium are reprocessed as reactor fuel and the cesium and strontium are stored separately, the actinides, iodine and possibly the technetium would be burned, as it were, within a Phoenix machine to yield stable isotopes, more short-lived radioactive products — and more plutonium for reactor fuel.



A graph showing the impact of the partial processing of the spent fuel from light water reactors after ten years of decay.

Subcritical Is Safer

"While questions remain as to whether the nuclides can be separated cleanly using available processing techniques, recent improvements in linear accelerator technology make the Phoenix machine itself more practical today than when it was originally proposed," comments Van Tuyle.

In one conceptual design that is to be optimized during the study, the Phoenix machine would be a large, linear accelerator, requiring about 400 MW to produce a proton beam with an energy of 1.6 GeV and 104 milliamperes current.

After passing through a beam expander, the protons would hit up to eight target modules. Each target module would contain oxide fuel rods made up of some of the elements in the actinide series of the periodic table — neptunium, americum and curium. Additional targets containing radioiodine and possibly technetium would line the target chamber.

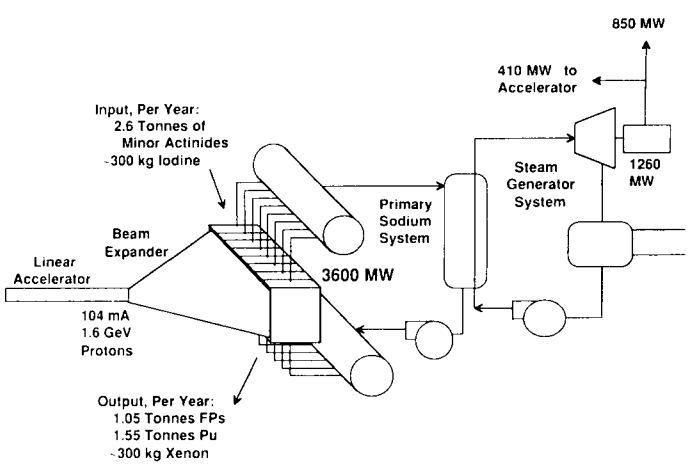
As the proton beam passes through the target, one 1.6-GeV proton would induce a form of high-energy fission called spallation and nuclear evaporation, whereby a short-lived nucleus is created but quickly evaporates off of other particles. In total, each proton would fission up to six minor actinide nuclei and, as a result of evaporation, knock 50 neutrons free. These, in turn, would release another 450 neutrons via fission, transforming an additional 167 nuclei.

Phoenix's neutronic spectrum and the resultant fission products would be similar to those in a comparable fast-spectrum reactor, which has also been proposed for transmuting nuclear waste.

But, while the physics within Phoenix is not much more complicated than within such a reactor, the safety advantage of Phoenix is that, unlike a reactor, it would run subcritical, meaning that a self-supporting chain reaction could not be maintained.

Concludes Van Tuyle, "Because the minor actinides reduce the stability of an operating reactor, the subcriticality of the Phoenix targets is a major safety advantage — especially since a Phoenix machine could be shut off in less than a millisecond."

— Marsha Belford



A schematic of the Phoenix Concept machine, a hybrid linear proton accelerator driving a subcritical target.

Osteoporosis (cont'd)

ogist, and physician John Aloia, who is Chairman of WUH's Department of Medicine.

While thought to be rare in women of other races, osteoporosis affects one out of four white women. The bone-mass loss caused by the disease results in many fractures of the hip, wrist, spine, pelvis and ribs each year. One in five women with hip fractures, for instance, dies of complications, making osteoporosis the leading cause of death among older women in the U.S. The medical cost of osteoporosis is roughly $10 billion per year.

The question about comparative bone density arose initially because the rate of osteoporosis in black women was first shown to be lower than in white women in studies done at BNL in the 1970s. Since then, however, this research has been disputed — leading researchers to question whether or not black women have had inherent or cultural protection against the disease.

"We suspect the difference has been cultural," states Vaswani. "As African Americans are becoming more affluent and less active, and have a longer life expectancy, the rate of osteoporosis in black women has been increasing."

Once a volunteer becomes part of the study, she will have her medical history taken and a physical exam done at WUH. In addition, the bone density of her spine, hip, wrist and other regions of her body will be measured using a dual energy x-ray absorptiometer. After she ingests a radioactive isotope drink, blood will be drawn so that her ability to absorb calcium can be measured.

Then at BNL, the three neutron-activation techniques will be employed to measure total body calcium, carbon, chlorine, nitrogen, phosphorus, potassium and sodium. Each subject's total body water will be measured, and these results, along with those of the IVNA measurements, will be used to carry out a complete compartmental body analysis, which will yield measurements of her total body bone, muscle, fat, cell mass, and inter- and extracellular water.

Each study subject will have the bone-density and other measurements repeated annually, for up to four years. Each time, the total radiation dose from these tests to each volunteer will be approximately 350 millirems.

With the study under way, about 100 white women will be recruited to match the population of black women in the study, so comparative data may be gathered.

"As Americans in general become more affluent, we believe we'll be seeing more osteoporosis in women," concludes Vaswani. "So this study is important for the entire population of American women, be they black, white, Asian, Hispanic or another background."

If you, your spouse, friends or relations who meet the study's criteria wish to participate, contact Vaswani at WUH, 663-2135, or call Betty Roche, Ext. 3672. — Marsha Belford

AUI Auctioning Two Vehicles

For the first time ever, used vehicles owned by Associated Universities, Inc. (AUI) are being offered for auction to current AUI/BNL employees or retirees, permanent contractor employees with guest numbers or on-site personnel of the U.S. Department of Energy (DOE).

As opposed to vehicles owned by DOE that have been offered for auction by the Supply & Materiel Division, the AUI vehicles tend to be passenger vehicles with far lower mileage. They have been used in the Transportation Pool operated by the Staff Services Division (SSD).

In the past, these vehicles have been traded in after about five years. But as SSD Assistant Manager Dennis Joyce explained, "This year, we decided to offer two of these vehicles at auction as an employee service. And we intend to auction one or two vehicles each year at this time."

The two vehicles being auctioned off are:

- **1985 Ford Crown Victoria station wagon** — vehicle ID: 2FABP44F8FX237569; mileage: 43,782; minimum bid: $2,150.
- **1986 Dodge 12-passenger window van** — vehicle ID: 2B5W-B31T9GK571258; mileage: 61, 856; minimum bid: $4,625.

The auction rules are as follows:

- **The vehicles may be inspected** in the parking lot on the northeast corner of Brookhaven Avenue and Center Street, next Monday to Friday, January 13-17, from 8:30 a.m. to 5 p.m.

  While both vehicles are in running condition, bidders will not be able to start or drive them. However, complete maintenance records are available for inspection in the Transportation Office across the street from the parking lot, in Bldg. 179B.

  The vehicles are being sold without expressed or implied warranty as to their mechanical condition or suitability for safe operation. There are no warranties of mechantability or fitness for a particular purpose.
- **Bidding forms are available in the Transportation Office,** Bldg. 179B. Only sealed bids that are submitted on a completed official form or a photocopy of the form will be considered. Separate forms must be submitted for each vehicle. Bids that do not conform to these requirements will be disqualified.
- **Bids must be submitted** to the BNL Cashier, Bldg. 134, no later than the close of business on Friday, January 17.
- **Successful bidders will be the high bidders,** and they will be notified by Friday, January 24. They must remit payment in full to the BNL Cashier within 48 hours of notification and prior to title transfer by AUI. Then, they must remove the vehicles from BNL property within 48 hours of receiving transfer documentation.
- **In the event of tie bids,** high bidders will be asked to submit a re-bid on an official form within 48 hours of notification, subject to minimum bid requirements. AUI's inability to contact bidders will not result in a delay in the acceptance of re-bids or award of the subject vehicle(s).
- **AUI reserves the right** to operate vehicles until the transfer of ownership is completed, and resolution of any disputes arising from this auction will be at the sole discretion of AUI.
- **For more information,** call the Transportation Office, Ext. 2535.

Two BNLers to the Rescue

As demonstrated by two BNL employees, Martin Montag of the Safeguards & Security Division and Franklin Snell of the Plant Engineering Division, being a volunteer fireman can develop skills that save lives and property in unexpected situations. Recently, Montag and Snell were each involved in circumstances where quick thinking and knowledge of the procedures that they had learned as firemen averted possible tragedy.

In Montag's case, as a Riverhead Town volunteer fireman, he was manning the Fire Department booth at the Riverhead Country Fair. Suddenly, a choking woman, Nancy Hughes of Riverhead, rushed up and tried to catch his attention.

Montag realized what was happening. He quickly used the Heimlich maneuver — applying abdominal thrusts to the person choking — and dislodged the piece of meat that was stuck in Hughes' throat. "He was very efficient," Hughes was quoted as saying in a Suffolk Life news report on the event.

"I learned the maneuver at the cardiopulmonary resuscitation courses, usually known as CPR courses, I have taken," said Montag. "These courses are usually available for firemen as well as other people. They certainly came in useful."

In another unusual off-site occurrence when a BNLer "saved the day," Snell was working at his part-time second job as security guard at the Selden Middle School when he became aware that the roof was on fire.

Roger Stoutenburgh

BNL heroes: Martin Montag (left), Franklin Snell.

"The tar was still fresh from repairs done that day, and it was ablaze," recalled Snell. "Later, it was thought that some kids had set it alight with firecrackers. Luckily, I used to be a volunteer fireman with the Gordon Heights Fire Department. So I knew what to do and I managed to put it out."

As a result, Snell was honored with a framed commendation from the school's Board of Education and Superintendent for saving the district money and property through his quick and decisive action. — Liz Seubert

Microcomputer Club

The next meeting of the Microcomputer Club will be held on Thursday, January 16, at noon in the CCD conference room, Bldg. 515. Mike Borowski, of BNL's Macintosh Center, will demonstrate the new Macintosh Notebook laptop computer, which combines the Mac user-friendly interface and the convenience of portability.

All are welcome to attend this meeting; bring your lunch. For further details, call Irv Montanez, Ext. 2540, or Mike Borowski, Ext. 3895.

Equipment Demo

A Nikon Scientific Exhibition featuring applications in confocal microscopy will be presented on Tuesday, January 14, from 9 a.m. to 5 p.m. in Berkner Hall. The Stangert Corporation, in conjunction with Nikon Inc., will demonstrate both laser-based and real-time white-light confocal microscope systems with computer-image reconstruction. New research microscopes with integrated RS232 will also be shown. Attendees are encouraged to bring their own specimens to examine.

ANS Meeting

Leslie Hill Jr., Resident Site Manager at the Shoreham Nuclear Power Plant, and W. Norman Nilsen Jr., Decommissioning Department Manager of the Long Island Power Authority/New York Power Authority, will speak on "The Shoreham Decommissioning Project" at the next meeting of the Long Island Section of the American Nuclear Society (LIANS), at 8 p.m. on Wednesday, January 15, at the Three Village Inn at Stony Brook.

Following cocktails at 6 p.m. and dinner at 7 p.m., the speakers will be introduced by LIANS president Peter Kroeger, of BNL's Department of Nuclear Energy. To make reservations, call Kathy Ratto, Ext. 7250.

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

35 Brookhaven Ave., Upton, N.Y. 11973
(516) 282-2345

Social Club

Openings are still available for Social Club trips announced in the Bulletin of January 3, including the following January and February activities. For more information and reservations, call Doris Terry, Ext. 7610.

- **Stratton, VT** — Jan. 31-Feb. 2; $279 ea. 2/room, $269 ea. 3/room, $259 ea. 4/room ; call for detailed flyer.
- **Gore Mountain, NY** — Jan. 31-Feb. 2; $191 ea. 2/room, $181 ea. 3/room, $164 ea. 4/room; call for detailed flyer.
- **Ice Capades** — Sat., Feb. 8, 7:30 p.m., $16.50 ea., Nassau Coliseum; money due by Jan. 10 for good seats.
- **Wrestling** — Fri., Feb. 14, 8 p.m., $18 ea., Nassau Coliseum; reservations and money due by Jan. 17.
- **Killington, VT** — Feb. 21-23; slopeside condos; 4 or 6/condo $160 ea., 3/condo $194 ea.; call for detailed flyer.

A Deer Sight

Last summer, Bob Temmallo, who works on site with Federal Business Systems, and his wife Kathy Temmallo, who is with Personnel's clerical pool, were driving up Brookhaven Avenue, just past the ballfields, when they saw these two fawns in the woods. With the mother deer standing watchfully nearby, Bob Temmallo snapped this charming photo of the two young ones.

As the cold weather sets in, the deer come out of the woods, onto the grass at the side of the roads and, occasionally, onto the roads.

Deer do not watch out for traffic, so drivers must watch out for them. Be prepared to stop quickly should a deer bolt in front of your car, and, since deer travel in herds, don't start up again until you are sure that all the deer have passed.

Bowling

White League

Dick Adams had a 228, Ed Sperry IV 225, John McCarthy 213, Gerri Riker 203, Denise Miesell 186.

Purple League

Jim Goode had a 225, Sam Logan 200, Randy Church converted the 6/7 split.

Cafeteria Menu

Luncheons

Monday, January 13	
Soup: Cream of celery	.80/1.10
Entree: Honey-dipped chicken	3.20
Entree: Chili macaroni	3.20
Entree: Knockwurst & sauerkraut	3.20
Carvery: Hot pastrami sandwich	2.95
Grill: 3-D burger w/fries	2.85
Tuesday, January 14	
Soup: Chicken rice	.80/1.10
Entree: Barbecued spareribs	3.20
Entree: Spaghetti & meatballs	3.00
Entree: Eggplant Parmesan	3.20
Carvery: Hot roast beef sandwich	2.95
Grill: Monte Cristo	2.85
Wednesday, January 15	
Soup: Vegetable	.80/1.10
Entree: Yankee pot roast	3.20
Entree: Veal Parmesan	3.20
Entree: Chef's choice	3.20
Carvery: Baked Virginia ham	2.95
Grill: Reuben	2.85
Thursday, January 16	
Soup: Cream of broccoli	.80/1.10
Entree: Taco bar	(each) .90
Entree: Fried liver & onions	3.20
Entree: Pollo de pesto	3.20
Carvery: Hot corned beef sandwich	2.95
Grill: BBQ pork sandwich	2.85
Friday, January 17	
Soup: New England clam chowder	.80/1.10
Entree: Chicken oregano	3.20
Entree: Tuna noodle casserole	3.20
Entree: Chef's choice	3.20
Carvery: Hot turkey sandwich	2.95
Grill: Fried clams w/French fries	2.85
Breakfast w/coffee & small juice	2.75

Mon.: 2 eggs, bacon, pancake, home fries
Tue.: Western omelet, home fries, toast
Wed.: Spanish omelet, home fries, toast
Thu.: 2 eggs, bacon, cheese on croissant, fries
Fri.: French toast, 2 eggs, bacon, home fries

To Your Health

The Health Promotion Program of the Occupational Medicine Clinic announces three offerings for the New Year. For more information, contact Health Promotion Specialist Mary Wood, Ext. 5923, Bldg. 490.

Weight Watchers

If your New Year's resolution is to take off those pounds that you put on over the holidays, take notice: Two on-site Weight Watchers (WW) groups are now being formed, once again to be based on WW's Personal Choice Program. Over eight consecutive lunchtimes, noon to 1 p.m., one group will meet on Mondays, while the other will group on Wednesdays.

Registration will take place in the dining room of the Brookhaven Center on Monday, January 13, for the Monday group; and on Wednesday, January 15, for the Wednesday class.

The first meeting of the Monday group will take place on Tuesday, January 21, due to the Monday holiday on January 20. The Wednesday group will first meet on Wednesday, January 22.

The fee, payable at registration, is only $70, as the Lab is paying $10 of the $80 total cost per person. To preregister, contact Mary Wood.

Stop Smoking

If your New Year's resolution is to stop smoking, you've made the first step. Now sign up for the smoking cessation workshop, to be conducted after work on site again by the American Cancer Society (ACS).

During the four-session workshop, smokers will learn how to unlearn their smoking habit and to substitute healthy alternatives. Participants will be expected to quit by the third session, so the final session will focus on staying off cigarettes.

To be held in the dining room of the Brookhaven Center from 5 to 6 p.m., the classes will start on Tuesday, January 21, and continue on Mondays, January 27 and February 3 and 10.

The fee for new quitters is $10, but there is no charge for those who have tried the ACS program before. To register, send name and, if applicable, check, payable to the American Cancer Society, to Mary Wood.

Walk, Don't Run

The BNL Walking Club will hold its first meeting of the New Year on Tuesday, January 28, from noon to 1 p.m. in Room B, Berkner Hall. Exercise walkers and social strollers are invited to join this free and fun activity. To indicate your interest, contact Mary Wood.

At the BERA Store

The Bera Sales Office in Berkner Hall is open weekdays, 9 a.m. to 2 p.m. Stop in to shop for:

- **NY Islander Tickets** — Seats are still available for the 1992 hockey season:

Date	Opponent	No. of Seats
Sat., 1/11	St. Louis	4
Tue., 1/14	Detroit	2
Thu., 1/16	Philadelphia	2
Thu., 1/23	Toronto	2
Sat., 2/15	Vancouver	2
Mon., 2/17	Winnipeg	4
Sun., 2/23	Washington	2
Tue., 3/10	Philadelphia	2
Thu., 3/26	San Jose	4

- **Discount Books** — featuring 50 percent off on dining, movies, sports, theater, travel, hotels and more.
- **Participation Awards** — Since participation cards have a five-year redemption period, those issued in 1986 will expire by the end of January. Come in and redeem them, and take a look at our clearance items at 50 percent off.

Intro to UNIX

The Computing & Communications Division (CCD) has scheduled another introductory course for the UNIX operating system.

Offering a thorough overview of the UNIX system, the course will be offered from 10 to 11:30 a.m. on six Tuesdays and Thursdays: January 14, 16, 21, 23, 28 and 30. Led by Michael O'Connor, CCD, the sessions will be held in the CCD seminar room, second floor, Bldg. 515.

No prior knowledge of UNIX is required to take the course, but supervisory approval is a must. To register, call Ron Wittlock, Ext. 4112 or send labmail to wittlock@bnl.gov.

Arrivals & Departures

Arrivals

Robert R. Foukal ..... Accel. Dev.
Szu-Cherng Kuo ..... App. Science
Xiaoou Li ..... Instrum.
Seth Nemesure ..... App. Science
John H. Raynis ..... Physics
Bo Yu ..... Instrum.

Departures

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

George A. Schoener .... Sfgrds. & Sec.
Alice H. Shih ..... Biology
Georgia P. Schwender ..... P&GA

Classified Advertisements

Placement Notices

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

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

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

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

LABORATORY RECRUITMENT - Opportunities for Laboratory employees only.

MK 8059. ADMINISTRATIVE POSITION - Requires a bachelor's degree in a relevant field, technical background, experience in setting up and managing databases, and excellent oral and written communication skills. Will assist in administering the user program in the Department at the NSLS and HFBR and in tracking safety, environmental, training, and QA issues. Will interact with and assist departmental staff and facility users involved in these activities. Biology Department.

OPEN RECRUITMENT - Opportunities for Laboratory employees and outside candidates.

NS 6117. ENGINEERING POSITION - Requires BS degree in mechanical, marine or electrical engineering, or equivalent, and three years' experience in plant or liaison engineering. Duties include project evaluation and coordination of a variety of technical functions associated with water and electrical power distribution systems, electromagnets, radiation shielding and other equipment used to support the 33 GeV particle accelerator research program. Alternating Gradient Synchrotron Department.

NS 0650. TECHNICAL POSITION - Requires AAS in a technical field and previous relevant experience. Will prepare samples for neutron irradiation, charge and discharge samples from reactors, assist with setup of experiments and operate beam shutters at the HFBR and Medical Research Reactor. Ability to obtain DOE clearance mandatory. (Reposting). Reactor Division.

DD 8998. DESIGNER POSITION - Requires AAS or equivalent and a minimum 10 years' experience in the design and drafting of machinery and mechanical equipment. Knowledge of dimensioning and tolerancing, machining and fabrication procedures, materials application and strength of materials also required, as is AutoCAD. Physics Department.

DD 8999. DRAFTING POSITION - Requires AAS or equivalent and a minimum 5 years' experience in the design and drafting of machinery and mechanical equipment. Knowledge of dimensioning and tolerancing, machining and fabrication procedures, materials application and strength of materials also required, as is AutoCAD. Physics Department.

DD 6123. TECHNICAL POSITION - Requires AAS in electronic technology or equivalent and experience with electronic test instruments, high voltage and/or high-current power supplies and computer operations. Will work from electronic schematics, verbal instructions and rough sketches. Knowledge of electronic test instruments and hand tools desirable. Alternating Gradient Synchrotron Department.

LF 0140. DRAFTING POSITION - Requires substantial drafting experience in the HVAC and plumbing fields, and working knowledge of engineering fundamentals and construction practices. Responsibilities include working under the technical direction of a mechanical engineer to develop and complete layout and contract drawings for construction projects. Work includes HVAC, toxic exhaust, plumbing, fire protection, process cooling, utility services, asbestos abatement, energy management and environmental remediation projects. Plant Engineering Division.

LF 6122. COMPUTING POSITION - Requires BS or equivalent (MS desirable) in computer science or related field, with a minimum of 4 to 6 years' programming experience. Fluency in C and good working knowledge of UNIX system calls required. Experience with accelerator-control systems, X, C++, sockets and writing codes for networked computers is highly desirable. Responsibilities will include developing and maintaining tools and applications for accelerator controls. Alternating Gradient Synchrotron Department.

LF 8114. ENGINEERING POSITION - (part-time) Requires a BS degree in electrical or mechanical engineering as well as experience and skills in electrical safety. Knowledge of National Electric and OSHA Codes and the ability to review engineering drawings are required. General knowledge in the fields of occupational safety, industrial hygiene and hazardous waste disposal is desirable. Good oral and written communication skills are highly desirable. Safety and Environmental Protection Division.

LF 0908. PROGRAMMING POSITION - (part-time) Requires BS degree or equivalent experience. Must have knowledge of programming business applications on Hewlett Packard equipment as well as experience developing and supporting PC applications. Management Information Systems Division.

Motor Vehicles & Supplies

90 MITSUBISHI ECLIPSE - black/white, ac, p/s, p/b, a/t, 35k mi., mint cond., $9,950. 878-0480.

90 GEO STORM - white, a/t, ac, am/fm cass., ext. warr. coverage transferable, excel. cond., $9,000. Armand, Ext. 2456.

89 FORD CROWN VICTORIA - 4-dr., p/w, p/l, p/m, cruise, new brakes, tires, $7,950; '64 Chevy Biscayne, 2-dr., many new parts, runs. Dan, Ext. 7271.

89 SUBARU JUSTY - ac, a/t, 34k mi., showroom cond., $4,400. 475-3507.

89 NISSAN SENTRA - 4-spd., 2-dr., sunroof, white, am/fm cass., excel. cond. Georgia, Ext. 2384 or 929-8185 after 6 p.m.

88 NISSAN MAXIMA SE - sport pkg., 5-spd., white, p/w, p/seat, p/l, ac, cruise, sunroof, tilt, am/fm cass., orig. owner, $8,700. Chris, 286-1348.

87 NISSAN PULSAR - ac, T-top, black, new tires, exhaust system, warranty transfer till Aug., asking $4,900. 474-3080.

87 HONDA ACCORD LX - 4-dr., 5-spd., am/fm cass., ac, p/s, p/b, p/w, p/l, cruise, excel. cond., $5,800. Paul, Ext. 7644 or 929-4295.

86 PLYMOUTH VOYAGER - 2.6 liter, a/t, am/fm stereo, ac, new tires, 68k mi., v.g. cond., asking $5,500. 744-9027.

86 DODGE D50 RAM PICKUP - w/cap, seat w/belts in rear, new tires, exhaust, etc., 60k mi., excel. cond., $3,500. Jim, Ext. 4696.

86 TOYOTA CAMRY - ac, am/fm, cruise, 5-spd., p/s, p/b, excel. cond, $4,775. Ext. 7788 or 369-5091.

86 PONTIAC SUNBIRD - turbo, h/b, 83k mi., ac, am/fm cass., excel. cond, ask. $2,700. Andrea, Ext. 3090.

85 PLYMOUTH VOYAGER LE - a/t, p/s, p/b, cruise, tinted windows, roof rack, stereo, seats 7, asking $4,500. 968-8171.

84 OLDS DELTA 88 - white w/black hardtop, am/fm cass., ac, excel. cond., 96k mi., $2,100. Ext. 2769.

82 CHEVY MALIBU WAGON - 6-cyl., a/t, p/s, p/b, ac, am/fm, great transportation, $1,500 neg. Ext. 4695/4447 or 744-1917 eves.

82 PONTIAC 6000 LE - 4-dr., 4 new tires, new radiator, ac, am/fm, p/s, p/b, tilt, no rust, good cond., $1,300 neg. Eugene, Ext. 7113.

82 CHEVY CHEVETTE - 4-spd., am/fm cass., new starter, battery, clutch, brakes, tires, exhaust system, asking $500. Ext. 2851 or 289-0532.

81 OLDS CUTLASS SUPREME - good cond., $1,500. Ext. 4953 or 588-2477.

81 GRAND PRIX - good cond., reliable, $550. 821-3306 or 473-9180, leave message.

78 MALIBU - 2-dr., high mi., runs well, maintained well, $750; '84 Luxury Chevy van, 86k mi., $4,250. Roy, Ext. 7357.

76 CHEVY SUBURBAN - 6-cyl., 250 cu. in. eng., a/t, p/b, p/s, new battery & tires, runs well, $500. Frank, Ext. 7519, or Vita, 277-0464.

76 AMC HORNET 200 - needs starter, $200. Kathy, 744-2203.

76 CADILLAC DEVILLE - orig. owner, v.g. cond. in & out, 100+k mi., no rust, asking $750. George, Ext. 2296.

73 MAZDA WAGON - rotary engine, white, runs well, $500 firm. Margaret, Ext. 3644.

69 CAMARO RALLY SPORT - $2,200; Toyota rims, 4-lug, $5 ea. Jim, Ext. 3372 or 821-0250.

TIRES - GR78-14, mud/snow, brand-new, on Olds rims, $40. Ray, Ext. 4428 or 467-8297.

TIRES - 3, used, good tread, 195-70R13, $10 ea. R. Meier, Ext. 4629.

CASSETTE CAR STEREO - Pioneer, underdash, auto reverse, loudness button, all parts incl., hardly used, $50. Sue, Ext. 4931.

SNOW PLOW - Western, 8' blade, $500. Joanne, 929-6235.

Boats & Marine Supplies

23½' AQUASPORT - 1987, 200-h.p. Merc., 9.5 Yamaha kicker, Loran, radios, excel. cond., make offer. 878-0480.

17' BOAT - f/g, full canvas, new int., windshield, all access., galv. trailer, excel. cond., 60-h.p. Evin. needs work, $1,000. 878-1617 after 6 p.m.

Furnishings & Appliances

COUCH - Ethan Allen, 7', excel. cond. 325-0447.

DINING ROOM SET - antique; upright freezer; shopping cart, all reasonable. 363-7032.

Tools, House & Garden

BENCH LATHE - South Bend, 10" swing, 42" bed; Millrite milling machine, 8'x36" power table; Brown & Sharp surface grinder. Ext. 4048.

COAL STOVE - Surdiac, Southport model, approx. 30,000 Btus, excel. cond., black porcelain finish, $200 neg. Joe, Ext. 5139.

FIREWOOD - seasoned, hardwood, split, delivered locally, half cords avail., $125/cord. Glenn, 924-2035.

FIREWOOD - hardwood, split, seasoned, $50/half cord, $90/full cord. Tom, Ext. 4507 or 878-1060.

WOOD STOVE - Vermont Castings Vigilante, w/triple-wall chimney, cap, 2 cords of wood, $1,000. Steve, Ext. 4669 or 722-4821.

WOOD STOVE - Hearth Mate HM 2400, rated for coal or wood, 10 yr. old, 20"x26"x34", good cond., heats whole house, $115. Greg, Ext. 3263.

Sports, Hobbies & Pets

CAMERA - Mamaya ZE-2, 35mm SLR, auto exposure, 55mm 1:1.7 lens, flash, filters, close-up lens, $60. Don or Sue, 473-6570 after 7 p.m.

EXERCISE BIKE - Tunturi E504, recumbent cycle, like new, orig. $400, asking $150. Brian, Ext. 7519 or 234-9487.

FIGURE SKATES - man's size 8, leather shoes, $10; roller skates, leather shoes, man's size 8, $15. Irv Meyer, Ext. 4309.

POSTER - 25th year Super Bowl Commemorative collector's item, $9. Pete, Ext. 2498.

WALKER/EXERCISER - folding, $30; rower, $20; weight lift bench w/leg exerciser, $50; weights, 110 lbs., w/bar, $20. Victor, Ext. 2395.

Audio, Video & Computer

COMPUTER - Leading Edge XT Clone, 640k memory, 20 meg hard disk, Hercules graphics, $500. Dave, Ext. 2292.

COMPUTER - two Commodore 64s; 2 power supplies; color monitor; floppy joysticks; extras, $250. Pat, Ext. 2836.

HARD DRIVE - 40 mb Seagate ST-251-1 & control card for PC-AT, low time, installed Feb. 1990, new low-level format, $180. Joe, Ext. 4859.

COMPUTER - IBM/compat. 386-25 2 mb ram, 2 floppies, 1.2 & 1.44 40 mb hard drive, VGA card, color mon., $1,200. Al, Ext. 3992 or 331-1003 eves.

CONTROLLER CARD - JDR, 4 disc, like new, $30. Jim, Ext. 4584.

HEADPHONES - perfect cond., $10. Pete, Ext. 2498.

TURNTABLE - Gerrard, $10; stereo, Centrex 8 track, am/fm compact system, Pioneer, $50; Pioneer stereo cass. deck, $20. Pete, Ext. 4581.

Miscellaneous

COAT - Persian lamb, woman's, gray, size 10/12, full length, good cond., asking $95. Ext. 4341 or 475-4005.

COAT - burgundy, wool, 4/6, $55; gray tweed suit, 6, $45; 2 pr. boots, leather, 6, $40/ea; all women's; Olivetti man. typewriter, $45. Eugene, Ext. 7113.

ATTACHE CASE - black leather, excel. cond., thin, $40. Mike, Ext. 7941.

SUITS - Willie Wear, new, 100% silk, cognac brown, jacket sizes med. & large, $20/ea.; 29" & 32" pants, $15/ea. Ext. 3426.

STROLLER - folding baby stroller w/hood, fair cond., $10; folding playpen, good cond., $20. Victor, Ext. 2395.

WEDDING GOWN - silk organza, new, size 10, cost $600, sell for $350. 878-1617 afterr 6 p.m.

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 - south, 3½-rm. apt., full bath, lg. kitchen, carpet, refrig., no children or pets, $675/mo. includes all, immediate. 878-0480

EAST PATCHOGUE - 1-bdrm. apt., kit., l/r, bath, sep. ent., mature single person, nonsmoker, no children, 1 mo. sec., refs., $500/mo. includes all. Marylin, 286-3508 after 6 p.m.

FARMINGVILLE - l/r-bdrm. combo, full kit., priv. driveway & ent., furn., cable, 10 min. from Lab., $550/mo. all. Rosalie, Ext. 3160 or 289-5704.

MIDDLE ISLAND - share condo, master bdrm., walk-in closet, pool, tennis, cable, furnished, $450/mo. all. Rosalie, Ext. 3160 or 289-5704.

MILLER PLACE - 1-bdrm. apt., furn., bath, l/r-kit., priv. ent., avail. 2/15. 473-1658 after 6 p.m.

MOUNT SINAI - 1-bdrm. apt., waterview, priv. entrance & deck, avail. Feb. 1 for 1 yr., $800/mo. incl. all. 473-1761.

NORTH SHIRLEY - 1-bdrm. apt., full bath, large kitchen, large l/r, priv. ent., 1st floor in new hi-ranch, $650/mo. includes all. 399-3950.

NORTH SHIRLEY - rooms in mint house, 5 min. from Lab, $80/wk. + 1 week sec. Bob, 281-7432.

RIDGE - furn. studio apt., private, fenced-in yard, kitchen, bath, 5 min. to Lab., $490/mo. 744-8632.

ROCKY POINT - lg. 2-bdrm. apt., garden, $750/mo., heat incl. Hugh, Ext. 4516 or 744-8901 eves.

SELDEN - 1-bdrm. apt., kitchen-l/r combo, sep. bdrm., priv. ent., driveway, deck, single only, $575/mo. incl all. 696-6148.

S. JAMESPORT - 1-bdrm. cottage, l/r, eik, bath, porch, near beach, partial furn., 25 min. to Lab, no pets/children, $400/mo. + util. Walt, Ext. 2907/2241 or 698-0576 eves. & wknds.

WADING RIVER - 2-bdrm. apt., full bath, l/r, kit., fp, priv. ent. & drive, no pets, no smokers, $650/mo. incl. all. John B., Ext. 4028 or 929-1029.

WESTHAMPTON - 1-bdrm. condo, all appl., nice location, 20 min. to Lab, $625/mo. + util. Dick, Ext. 4313.

YAPHANK - room in Colonial Woods condo, 5 min. to Lab. Arlene, Ext. 2387.

KEY WEST, FL - avail. April 18-25, condo, sleeps 2, on water, kitchenette, pool, private beach, gym, marina, water/sport rentals, walk to town, Tiki bar, fishing, snorkeling, $800. 929-8741.

CLAREMONT, NH - 2-bdrm. condo, furn., kitchenware, VCR, phone, skiing, 25 mi. to Okemo, 8 mi. to Ascutney and Sunappee, $300/wk., $225/4-day wknd. Frank, Ext. 7749.

CATSKILLS, NY - 3-bdrm. chalet w/sleeping loft, fully furn., near Hunter & Windham Mts., great for skiing, hiking, etc. Kay, Ext. 4501, or Bea, Ext. 3642.

SALEM, NY - 3-bdrm. ski-get-away house, 2 baths, sleeps 6, near Stratton, Bromley, Mt. Snow, factory outlets, $250/Fri-Sun. Willy, 924-6724.

HILTON HEAD, SC - 2-bdrm. condo, sleeps 6, fully furn., 2 baths, tennis, beach, golf nearby, Jan.-March, $300. Guy, Ext. 3147 or 689-5378.

For Sale

BROOKHAVEN HAMLET - 1738 restored Eng. cottage, hand-hewn beams, 2 bdrm., 2 baths, d/r w/fp, greenhouse, country setting, $225,000. Susan, Ext. 2888 or 286-0422 after 6 p.m.

CENTER MORICHES - 3-bdrm. ranch, full bsmt., gar., ⅓ acre, excel. location, minutes from village, churches & RR, $110,000, neg. 878-4825.

CORAM - Tanglewood Hills, 4-bdrm. contemporary ranch, 2 baths, cathedral l/r, large 2-car gar., huge attic, fenced corner lot, red. to $113,000. Ext. 3791 or 473-7496.

EAST MARION - 1-acre bldg. lot adjacent to Greenbelt, walk to Sound. 325-0447.

MANOR PARK - 3-bdrm. Colonial, 1½ baths, att. gar., den, formal d/r, new carpet throughout & oil burner, shed, ½ acre, fenced, $118,900. Marie, Ext. 2950 or 399-3401.

MANORVILLE - older, remodeled house, on 2½ acres, two 2-car gar., patio, new 24'x30' carport, other bldgs., lg. rooms, storms & screens, good neighborhood, $175,000, terms. 878-6637.

MIDDLE ISLAND - Coventry Manor, 3-bdrm. townhouse, 2 baths, kit., l/r, d/r, laun. rm., cac, 5 appl., encl. patio, pool, new carpets, ask. $99,000. Rosalie, Ext. 3160 or 289-5704 after 5 p.m.

MONTAUK - Gurney's Inn, time-share duplex, ocean view, priv., sleeps 6, week #43, must sell, price neg. Theresa, Ext. 2907.

N. SHOREHAM - 3-bdrm. L-shaped ranch, d/r, sunken l/r, eik, oak floors, fin. bsmt., workroom, 2-car gar., ½ acre, igs, deeded beach rights, $179,900. Mike, Ext. 5972 or 744-4579.

PATCHOGUE - large 4-bdrm. Victorian, mint cond., parlor, l/r, d/r, eik, sunroom, 1½ baths, fp, new roof & cesspools, updated elec., plumbing, heating, ½ acre, $179,900. Tom, Ext. 4030.

RIDGE - 2-bdrm. ranch, great room, kitchen, gas heat, priv. lake, low taxes, $90,000, $47,000 assum. mortgage. Bill, Ext. 4048, or 929-4663 eves.

ROCKY POINT - 2 bdrm., eik, 2-zone oil heat, new roof, shed, low maint., walk to Sound, low taxes, $1,205, $95,000. Bill, Ext. 4048 or 929-4663 eves.

ROCKY POINT - Culross private community, 3 bdrm., lg. l/r, fp, d/r, approx. 1 acre, priv. beach, 2-car detached gar., more. 744-1958.

SELDEN - 4-bdrm. splanch Colonial, 1½ baths, energy eff. windows, fenced-in yard, extended driveway, fin. bsmt., excel. cond., $132,500. Frank, 732-1389, any time.

SHOREHAM - 3-bdrm. ranch, SWRSD, taxes $2,300, 2 baths, ½ acre, large eik, d/r, l/r, den, fp, storage rm., cac, gas heat, all appl., igs, prof. landscaping, $145,000. Ext. 2833 or 744-7172.

SHOREHAM - Jomar Colonial, 4 bdrm., 2½ baths, l/r, formal d/r, eik, lg. fam. rm., encl. porch, 2-car gar., bsmt., N25A, SWR SD, low taxes & heat bills, fenced ⅓ acre, $165,000. Barbara, 744-0960.

SOUND BEACH - 3-bdrm. ranch, 2 baths, l/r, eik, d/r, gar., cedar deck, agp, fenced yard, rental income, Miller Place schools, $130,000. 821-1271.

SPEONK/WESTHAMPTON - 1989 Liberty mobile home, w/d, 10'x'10' shed, family park, bay window in l/r, $37,000. Dave, Ext. 5460.

WADING RIVER - 4-bdrm. contemp., den, 2½ baths, fin. bsmt., 7 skylights, balcony, ¾ acre, 2-car gar., taxes $2,000, Shoreham schools, fp, Andersen windows, $235,000. John, 929-8142.

WESTHAMPTON - 1-bdrm. condo, nice location, 20 min. to Lab, reasonable. Dick, Ext. 4313.

KISSIMMEE, FL - time-share, 10 min. from Disney, prime week #35, sacrifice at $5,000. Jerry, Ext. 2621.

DURHAM, NC - 2-bdrm. condo, 2 baths, top floor, close to Duke, RTP, NCCU, airport, w/d, many extras, $62,000, rent for $650/mo. Roy or Nadia, Ext. 7357 or 878-5886.

GILBERTSVILLE, NY - 37+ acres, priv. road, wooded, great view, electric nearby, excel. hunting deer & small game, ideal for cabin, only $29,990. Walter, Ext. 3848 or 281-9299 after 6 p.m.

HUBBARDTON, VT - 38 deeded acres on town-main. road, power, phone, largely wooded, views of Lake Bomoseen, ask, $32,500 neg., terms avail. Tom, Ext. 2823.

Wanted

BNL EMPLOYEE NAMED GABY - who is expecting material from Delta t Limited. It was delivered to me. Ext. 5135.

CADILLAC - 85-87, Fleetwood 4-dr., Brougham/D'Elegance, good cond., low miles. John, Ext. 3292 or 286-1348.

COMPUTER - Apple IIC, w/cables, working or not, also monitor. Cadwell, Ext. 2934.

HOUSEMATE - share house, 1-2 bdrm. avail., cable/HBO, phone, w/w, fenced yard, util. incl., reasonable, 10 min. to Lab. Sue, 399-3087.

SKIERS - to ski Windham, 1/22, $36, send payment to Augie Hoffman, Bldg. 510C, next trip 2/5, Hunter Mt.

TUBED AUDIO COMPONENTS - working or not, by Marantz, Macintosh, Eico, Heath, Radford, Leak, Collins, Dynakit, Quad, etc. Jim, Ext. 4584.

CATALOG - Walnut Acres. 874-2614.

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