

## Metal Buildings: Where Does the Heat Go?

Architecturally, it is nothing to marvel at: four, faded, fatigue-green corrugated metal walls with a color-coordinated, pitched metal roof, sitting on a concrete slab in the northern part of the Lab. Erected in 1980, it is 40 feet by 120 feet, faces east-west, has six windows, two louvers, two outside doors, one overhead door and one door to the collider tunnel.

What you see is Bldg. 1007E, the "W. Ejection P.S. Bldg." as the sign identifies this model. What Walter Loss, a Project Engineer in the Architectural & Building Systems Group of the Department of Applied Science (DAS), saw while jogging around the collider ring one day last fall was a marvelous opportunity to monitor the energy consumption of such a typical metal building.

What Loss saw in his data from the first season of energy monitoring was that metal buildings lose the most heat via the very beams and bolts that hold these structures up and together.

Bldg. 1007E is typical of the approximately 80,000 small commercial and light industrial, prefabricated structures in the U.S. With an average life of 15-20 years, they are used as warehouses and work spaces. Beginning in 1984, more metal buildings than other non-residential structures have been sold each year, and metal building sales reached \$1.4 billion in 1985.

Having an area of 4,800 square feet, Bldg. 1007E is smaller than the average metal building of 15,000 square feet, but comparable. A one-room storage area for the Alternating Gra-

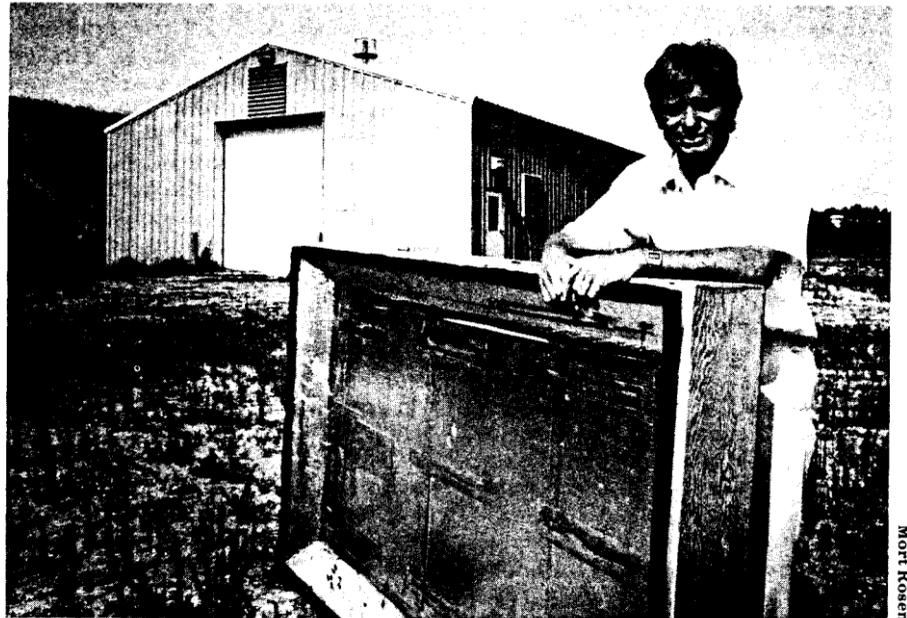
dient Synchrotron Department, which provided Loss with the keys to the building, Bldg. 1007E is entered infrequently. Being undisturbed made Bldg. 1007E ideal for the study of a metal building's intrinsic energy consumption and loss.

"The study," says Walter Loss, "will answer many questions: 'Through which pathways and in what quantities does heat energy leave metal buildings? How much energy from metal buildings is lost nationwide? How can these high losses be controlled?' Given the vast volume of buildings sold, and taking into account their rapidly growing use for offices, agricultural and communal services, this study could revolutionize the metal buildings industry."

Though they are so prevalent, metal buildings are not known either for their architecture or for their energy-conserving design. They are designed for flexible use, and ease and low cost of prefabrication, shipping and assembly.

Therefore, in addition to not being beautiful, metal buildings are neither well insulated nor tightly constructed. In fact, up to about 30% of the existing building stock is estimated to be uninsulated, and the rest is believed to be insulated with resistance values of R-6 to R-10, which are relatively low.

Bldg. 1007E is minimally insulated, with three-inch thick, R-11 fiberglass. However, in being sandwiched between the metal building's interior frame and the exterior wall, the insul-



Walter Loss and one of the two portable calorimeters that made his metal building study possible. Behind him is Bldg. 1007E, the metal building Loss monitored.

ation had to be punctured by the fasteners holding the walls to the frame. As well, the insulation had to be compressed, thus decreasing its effective R-value.

As the frame and fasteners act as thermal bridges and bypasses, Loss expected the wall sections in close contact with the frame to conduct more heat to the outside during the cold months than did other sections of the wall.

He did not expect, however, that the heat loss through the frame and fas-

teners would be so significant: Almost 40% of the heat in Bldg. 1007E escapes through the frame, fasteners and surrounding wall sections — 80% more than through the walls proper, not attached to beams by bolts and with insulation intact.

To uncover the pathways by which heat escaped Bldg. 1007E, Loss used two box-like, portable calorimeters, devices that measure heat loss or gain, which are on loan from the National Bureau of Standards.

Inside the metal building, he attached these devices to the walls and to the concrete slab. The calorimeters were maintained at the same temperature as the building's interior, about 68°F, by electric heat. By knowing that heat flowed in one direction — out — and how much heat went into the calorimeters to keep them at 68°F, Loss knew how much heat they lost to the walls and the slab.

The open wall sections lost only about 10% of Bldg. 1007E's total heat, and approximately 18% of the heat was lost through the slab. Using the perfluorocarbon tracer system developed by Russell Dietz, Head of the Tracer Technology Center, DAS, Loss found that the remaining approximately 33% of the total heat was lost by the infiltration of cold air into the building "through the places in the building where you can see daylight coming in," says Loss.

As well, the infiltration tests revealed that Bldg. 1007E undergoes about 0.5 air changes per hour, which (Continued on page 2)

## DOE Students Shine at Light Source

The blue bicycles and their riders are back.

This year's crop of 57 High School Honors Research Program students arrived at BNL Wednesday, July 29. The students, selected by the governors of their respective states as outstanding achievers in science, represent all fifty states. In addition, there are participants from the District of Columbia, Puerto Rico, Canada, Japan, Italy and Mexico.

This is the second year that BNL has hosted the high school scholars in the Department of Energy's three-year-old program.

"This program gives high school students the opportunity to observe big science as it involves the National Synchrotron Light Source. The stu-

dents also have the opportunity to visit different departments," said Donald Metz, who, as head of the Office of Educational Programs, is coordinator of the High School Honors Research Program.

During the high schoolers' two-week stay here, they are not only observing but are also partaking in three experiments at the NSLS. Once the experiments are completed at the NSLS, students will write and distribute reports to their advisors and among themselves. Then they will deliver their papers to the assembled group this coming Monday. Some practiced this during this past week, by presenting papers about experiments they had conducted in their home states.

As well as experimenting, the stu-

dents are touring BNL departments. Both are very popular with the students because their activities carry them into new territory. Said Roger Price of Nebraska, "I didn't expect such a wide range of experiments." Juan Carlos Cevallos, from Toluca, the capital of Mexico State, Mexico, agreed. Despite having some difficulty adapting to a new language, he is pleased to be here because it keeps him moving ahead, expanding his horizons.

To facilitate experimenting and touring BNL, the students have been divided into groups of five or six, which rotate to new experiments or tours several times each day.

The first day of student experiments at the NSLS was Monday. Amid the pipes, pumps and computers of beam line U9A at the vacuum ultraviolet ring, Chemist Jack Preses talked a group of six students through an experiment analyzing energy transfer in the hydrocarbon cyclohexane. As Preses explained, "We pump energy into cyclohexane and watch it rattle around."

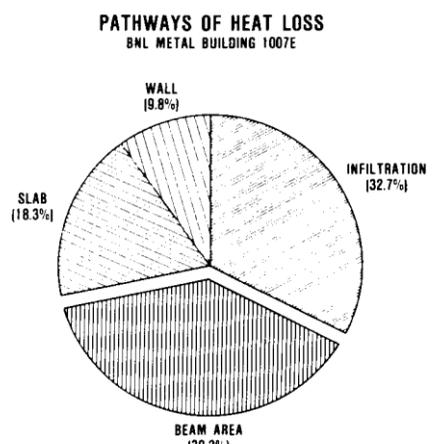
With Preses coaching them through unfamiliar computer commands, several students took turns selecting the frequency of synchrotron light with which to zap cyclohexane. The experimenters then gathered the spectrum of radiation emitted by the excited molecule, and then analyzed the spectrum.

Even though it was their first try, the students achieved good results. Pleased that the experiment went well, Ian Sobieski, a Virginian who was a top 40 Westinghouse scholar this year, said, "This is the the most expensive stuff I've ever messed around with."

The value of the experience at BNL is greater than a particular experiment's results. "It is important for the students to see what is really going on (Continued on page 2)



Antionette Joseph (third from right), Director, Office of Field Operations Management, Department of Energy (DOE), traveled from Washington, D.C., to BNL on July 30 to deliver opening remarks to this year's DOE High School Honors Research Program students. Pictured with Joseph are: (from left) Lawrence Haman, a program advisor and South Manor School District science teacher; Heather Clague, a graduated senior from Spring Brook High School, Maryland; Akira Sekiyama, a student from Musashi High School, Tokyo; BNL Director Nicholas Samios; and Donald Metz, Head of the Office of Educational Programs.



This pie chart illustrates the significance of the heat loss through the beams and bolts holding metal buildings up and together. The second largest pathway of heat loss, infiltration, was discovered using the BNL Air Infiltration Measurement System (AIMS).

## Health Physics Trainees Simulated Accident, Real Response

Smoke rose from the peak of the Large Animal Facility as Kim Walker stood nearby, looking wide-eyed through her air mask. The fire chief had given her and her partner, George MacDurmon, a rundown of the situation: fire, radioactive spill and an unknown number of injured inside.

It was Walker and MacDurmon's job to locate and remove any potential victims. Because they were to be the first rescue workers inside, it was probable they would receive a dose of radiation higher than their fellow rescue workers.

As Walker and MacDurmon knew, this was only a simulated radiological accident, part of the Health Physics Training Program they are participating in this summer at BNL. Last Friday, the smoke was generated by smoke bombs, the victim was a 180-pound mannequin and the radioactive contaminants had short half-lives, but the trainees' adrenaline-fueled tension was real.

Clad in white coveralls, Walker and MacDurmon moved toward the building, each clutching a variety of survey instruments: an ion chamber capable of detecting beta and gamma rays (known at BNL as a cutie pie), a Geiger counter and a long pole called a teletector.

Tentatively moving around the perimeter, Walker and MacDurmon tried several doors, all of them locked. Eventually, the pair found an unlocked door leading into a trailer connected to the facility. Opening the trailer door, MacDurmon and Walker entered the smoky building and disappeared from view.

"The best way to learn it is to do it," said Frank Marotta, watching his class of twelve students perform. Marotta heads the Health Physics

Training Program in the Safety and Environmental Protection Division.

Marotta's ten-week program, which concludes today, brings to BNL students who have just completed or are working towards their masters in health physics and expands upon their course work. Their graduate education prepares them for careers overseeing radioactive materials encountered in reactors, laboratories and hospitals.

At BNL, the training program, which Marotta likens more to an internship, is divided into three segments. In phase one, the health physics trainees are introduced to BNL and receive lectures covering health physics issues at each facility on site. During phases two and three, the trainees, assigned to BNL staffers, undertake experiments and give lectures in health physics.

The trainees also study public policy and issues. One of the many daily seminar topics evaluated the effectiveness of evacuation zones around nuclear power plants. Marotta expects the trainees to devote at least 400 hours to their projects.

For her experiment, Walker contributed data to an ongoing study of the Peconic River. She is looking for radionuclides in the ecosystem of the river. Her data, collected from marine life, sediment and vegetation, will be added to information about fish and shellfish that was collected by the New York State Department of Environmental Conservation. The combined data will be evaluated and added to the existing body of dose assessment estimates for the general public.

Other projects concern more technical matters in health physics: Trainees have rewritten computer

programs and calibrated detectors. Within the program's curriculum, the paperwork side of health physics is augmented by hands-on experience, the highlight of which is the simulated radiological accident. The experience offered by the simulation is unavailable elsewhere, say the trainees.

Walker and MacDurmon reemerged from the building dragging the lead-weighted mannequin. A second team moved into the contaminated zone to

assist them. With the victim removed from the area, the trainees began decontamination.

The exercise lasted several more hours as the trainees located and isolated radioactive sources. Before they were done, one rescue worker was declared "dead" by the referee team because he was exposed to mock hazardous chemical containers, which rescue workers had not noticed. But fortunately for all involved, this was only a test.

— Ric Lewit



Photo  
by  
Peter  
Horton

### Metal Building (Cont'd)

is about five times the natural air exchange rate of the Danish House, for example.

As Loss estimates that the yearly cost nationwide to heat existing metal buildings ranges from \$200-400 million, he feels that significant fuel and money could be saved by such a simple step as installing redesigned insulation between the frame and the wall. Explains Loss, "Using contoured insulation fitted to the beams and made of inexpensive material such as Styrofoam could significantly decrease the heat loss."

If most of the existing, uninsulated metal buildings were retrofitted with

insulation so that the effective R-values were R-6 in the walls and R-10 in the ceiling, Loss estimates that the yearly maximum savings could be \$100-300 million nationwide. Additional increases to R-10 in the wall and R-19 in the ceiling could save another \$20 million maximum.

To reach designers of metal buildings, Loss plans to issue a "Low Energy Design Handbook for Metal Buildings," which will contain the findings from this study. As he explains, "It will include a cost/benefit analysis for several design options, so that initial costs can be balanced against energy savings over the life span of these buildings."

— Marsha Belford

### DOE Students (Cont'd)

in science," said Preses. Don Metz agreed, saying that the program may help high schoolers choose career paths through their college and graduate years.

At beam line U9A there was a case in point, "I wasn't sure what I would major in at college [Harvard]," said Erin Sullivan of Connecticut, as she watched her colleagues. "Now I know I will major in science."

The students are "quiet, normal teenagers," according to Clayton Hudson, a program advisor. Hudson and five other Long Island high school science teachers are the group's advisors, providing guidance and supervision. As a high school teacher, Hudson sees the group as "57 stars in one place" and, as a class, a "teacher's dream."

Hudson also emphasized that this educational experience goes beyond the lab, "We are trying for an even balance between fun and academics." The student's program includes barbecues, beach trips and, last Saturday, a trip to New York City.

For many of the students, the program provides their first encounter with an ocean beach or New York City. But many take the experience in stride. As Anne Nofziger, from Indiana, simply said, "I really enjoy being around so many intelligent people."

With their crowded schedule, the high school students appear to be too busy to get homesick. There are few complaints. Thinking about his home in Hawaii, Wah Wai Sze said, "I miss food and computer or card games."

"I miss my car," added Roger Price.

The blue bikes are partial substitute for cars, said Metz, "I knew I had to get the students around the laboratory site, and I knew I had to provide them with some kind of recreation. I added up prices and found that buying bikes would cost the same as hiring buses for two weeks, and I still would have had to provide recreation. So I put the two together and simply bought bikes. The students can transport themselves and have fun with them. All in all, it has worked very well."

— Ric Lewit  
[Lewit is a summer student in the Public Affairs Office.]

### Inside Info

Physics Department Chairman Peter Bond announced last week that Sam Aronson has been appointed Associate Chairman in the Physics Department, joining Myron Strongin, who has served in that capacity for the last two years.

Aronson, a Physicist, joined the Accelerator Department in 1978. He moved to the Physics Department in 1982 and was deputy group leader of the Omega Group from 1984-85. Since 1986, he has been the coordinator of the Central Calorimeter Group for the D-zero experiment, on which BNL is collaborating at Fermi National Accelerator Laboratory.

During a recent sabbatical at CERN, Aronson worked on pulse propagation for advanced accelerator design. He also was a coordinator for both workshops on the proposed Relativistic Heavy Ion Collider.

In January 1986, Aronson and Ephraim Fischbach, Purdue University, published results of their investigations on the consequences of a fifth force, prompting several experi-

ments intended to confirm or deny such a force's existence.

At commencement exercises at the C.W. Post campus of Long Island University (LIU), Leo Sadinsky, a Design Engineer in the Alternating Gradient Synchrotron Department, was awarded a long overdue Associate of Arts degree on May 17.

Sadinsky had begun studying for a degree in industrial management in 1962, but abandoned his studies in the early 70's to pursue his career and to have more time with his family. Graduated from college and pursuing careers of their own, Sadinsky's two daughters and his son decided that their father should be graduated too. So without his knowledge, they researched his academic record.

According to the LIU registrar's records, Sadinsky had enough credits for an A.A. degree, excluding six required Fine Arts credits. The university waved the requirement, so Sadinsky was graduated with the class of 1987.

### WIS Meeting

Eena-Mai Franz, Associate Chemist in the Low-Level Waste Research Group of the Department of Nuclear Energy, will be the speaker at the next Women In Science (WIS) luncheon meeting, on August 11, from noon to 1 p.m., in Room B, Berkner Hall. Franz's topic will be "Introduction to Low-Level Radioactive Waste Management and Research."

Everyone is welcome. Coffee and cookies will be served; please bring your lunch.

### Arrivals & Departures

#### Arrivals

Vito Graziano ..... Biology  
Mariusz M. Kozik ..... Chemistry  
Larry J. Runge ..... Sfgds. & Sec.  
Margaret H. Thompson ..... Medical  
Jeffery J. Vitkun ..... Accel. Dev.

#### Departures

This list includes all employees who have terminated from the Laboratory, including retirees:  
Carl Cantera ..... Physics  
Eugene M. Ferreri ..... DAS  
Michael C. Meyer ..... DAS  
Jose A. Pires ..... DNE  
Frank J. Rumph ..... Physics  
Barbara I. Still ..... Physics  
Samuel J. Strelecki ..... Plant Eng.

# BNL's Fabulous Forty

In its 40 years of existence, BNL has accumulated a significant list of scientific achievements. Behind each achievement is a significant pile of paperwork ranging from the scientific notebooks and reports documenting the event to the administrative memos and reports documenting the Laboratory history surrounding the achievement.

Preserving the Lab's history for future reference is a fine concept. Yet it's impossible to keep all reference material close at hand. It is possible, however, to keep vital paperwork accessible.

At BNL, scientific records are kept largely by the Technical Information Division. A complete set of every technical report written at the Lab is, of course, kept available at the Research Library. The library also maintains other documents, such as conference proceedings in which BNL was involved.

Also, appropriately housed in a disused area of the old reactor building, are thirty boxes of scientific archives — internal correspondence, working memos and notes on key research that took place at Brookhaven. Some other historical materials are filed in the Physics and Alternating Gradient Synchrotron Departments, and the Reactor Division. Again, the contents of these boxes and files are thoroughly documented.

In 1977 and 1980, the American Institute of Physics sponsored a project to catalogue all BNL's scientific papers and make recommendations for an archival program. Though funding is still needed to complete the original plans, the records have been used, for example, by visiting scientists from CERN, the European high energy physics laboratory, who were researching for a volume of their laboratory's history. A project to index the Lab's records of Camp Upton and make them available at the Research Library is also being planned.

As for other scientific and administrative records, "For anything that should be preserved, but is not expected to be referred to very often, the answer is to use the Records Holding Area," said Garfield Hawthorne, a Staff Services Assistant in the Staff Services Division. "That's always been Lab procedure."

Hawthorne is in charge of the contents of rooms filled with boxes and



There are more than one-half million negatives on file in the Photography & Graphic Arts Division, and this photo was printed from the first one ever taken, number 1-1. The picture documents the barracks of Camp Upton, looking south from Headquarters Hill (now the Exhibit Center), which shortly thereafter became the site of the Brookhaven Graphite Research Reactor (BGRR).

Photo above by John Garfield.  
Photo below by Peter Horton.

files, some of which have been in the archives, or Central Records, since the early days of Lab history. At present, 1,845 cubic feet of records are held in Bldg. 97, 68 Bell Street, with another 23,412 cubic feet in different buildings elsewhere on site.

Hawthorne has been at Bell Street since September 1981. But the Records Center has been there since 1960, when about 3,295 cubic feet of files and boxes were moved in from their previous quarters in the present bank building, Bldg. 193, on Technology Street.

"The present building was suitable because of its size — over 40,000 cubic feet — and the concrete floor that can carry great weight," said Hawthorne. "Also, there is a series of small rooms rather than one big area. This could help in preventing damage in case of fire."

Most people associate stored files and boxes with dust, haphazard arrangement — and maybe some unknown treasure. But that's not the case in Hawthorne's domain. "Nothing here is unknown," he said. "It's very carefully organized. Each item is listed and arranged by date from the

back to the front of the box. When it's all packed in the same way, retrieving a particular item is easier and quicker."

As time goes on and the rooms fill up, only material complying with regulations on packaging and identification can be accepted. Then in most cases, after a specified time that varies according to subject matter to conform with Department of Energy regulations, the owners of a file must decide: Do we still need this?

If the answer is yes, another choice follows. The material can be returned to the department. Alternatively, if it is still within the retention period stipulated by regulations, it is packed to codified specifications and shipped to the federal government archives in New Jersey — the most modern federal "attic." Before Hawthorne's time, federal archives were stored in New York City.

The rest, paperwork that is no longer required, is recycled or shredded.

But there are some boxes that have been piling up from the beginning of Lab history. Early records from the Director's Office and Associated Universities, Inc., are kept on site. And the Photography Department has over half a million negatives filed, so when a print of a 40-year-old event is needed, it is available.

— Liz Seubert



After 40 years, few traces of Camp Upton's barracks remain on site, but the water tank, built in 1941, is still in use and provided a focal point for this photo, taken last year from the same vantage point as the Lab's first picture. The view is dominated by the Physics Building. At far right is the Chemistry Building; the stairs on the slope of the hill lead to the Tandem Van de Graaff Accelerator facility. And not only has Headquarters Hill been cleared of its trees, but it was also lowered during construction of the BGRR.

## AACC Invites All To 7th Annual Picnic

Everyone is invited to a fun-filled family gathering sponsored by the Afro-American Culture Club. There will be contests, games, prizes, good food and drink, dancing and music by E.T. It all happens on Saturday, August 15, from noon to 6 p.m., at the BNL Recreation Field.

Tickets can be purchased in advance at \$5 for adults and \$2 for children under 12. For information and tickets, contact either April Donegan, Ext. 2459; Frances Ligon, Ext. 3709; Bruce Penn, Ext. 7213; or Barbara Simpson, Ext. 3217.

## Golf

The third, occasional, four-man scramble will be held at the West Sayville County Golf Course on Monday, August 24. The teams will consist of players from the A, B, C and D flights (E is combined with D). Rosters of flighted players and other pertinent information, i.e., rules for legal foursomes, will be mailed to BGA members. Non-members wishing a copy can contact starters Joe Carbonaro, Ext. 5139, Bldg. 130, or See-Meng Wong, Ext. 2111, Bldg. 130.

There will be a shotgun start at approximately 1 p.m. All golfers are requested to arrive at least one-half hour prior to tee-off to settle fees and obtain starting hole assignments.

Contact Carbonaro or Wong to give them the names of your four-man team. Due to the difficulty in matching players with partial teams, priority will be given to complete teams. In addition, a limited number of holes are available to the BGA, so call as soon as possible.

Greens fees are: \$8 for Suffolk residents; \$14, nonresidents; and \$4, senior citizens. Entry fees are: \$1 for BGA members and \$2 for non-members.

## Theater Group

The Theater Group will meet in Berkner Hall on Tuesday, August 11. Socializing will begin at 7:30 p.m. Then a business meeting and election of officers will start at 8 p.m. This will be followed by readings from plays, including Hugh Whitmore's "Breaking the Code," based on "Alan Turing — The Enigma," by Andrew Hodges. All are welcome to attend.

## Softball

### League I

Week of July 20  
Phoubars 16 — Cool 'n Gang 7  
Ravens 15 — Magnuts 4  
Blue Jays 15 — BNL Bandits 3

Week of July 27  
Ravens 16 — Sudden Impact 12  
Blue Jays 11 — Phoubars 10

Makeup games from July 14  
BNL Bandits 12 — Magnuts 7

Double-headers:  
Sudden Impact 11 — SMF 9  
SMF 4 — Sudden Impact 2  
Ravens 6 — Cool 'n Gang 5  
(Only one game of double-header reported)

### League II

Week of July 20  
Titans 17 — AMD 13  
Medical 15 — Phase II 14  
Scrambled Legs 4 — Lights Out 2

## Classes in English As a Second Language

English as a Second Language classes are available for Laboratory employees, spouses, their children age 12 years or older and guests. A class for beginners is held every Tuesday evening, from 7 p.m. to 9:30 p.m. Classes are free of charge and are conducted in the Personnel training room, Bldg. 459. For additional information, call Pat Knisely, Ext. 7631.

### Week of July 27

Binary Bombers 11 — Medical 9  
Dirty Sox 18 — Lights Out 4

### League III

Week of July 20  
Farm Team 6 — Snakebites 5  
Kidz-R-Us 18 — Septembers 6

Week of July 27  
Snakebites 8 — Foul Ups 7  
Septembers 20 — Mole-esters 6  
Farm Team 13 — Source 2

### Make-up games from June 22

Survivors 10 — Farm Team 2  
Snakebites 12 — Mole-esters 2

### League IV

Week of July 20  
Simply Awesome 15 — Hit 'n Run 6  
Who Cares 10 — Underalls 9

Spacekadets 7 — Turkeys 5  
Mudville Sluggers 16 — No Feedback 7

Week of July 27  
Simply Awesome 14 — Who Cares 7  
Sandboxers 10 — Spacekadets 3  
Underalls 12 — Mudville Sluggers 8

## BROOKHAVEN BULLETIN

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## Summer Sundays Are Summer Tour Days

If you're looking for something to do this Sunday, or any Sunday through August 30, why not come to the Lab and enjoy one of the tours being given at BNL this summer? The public is invited to arrive at the Lab any time between 10 a.m. and 3 p.m. to participate in the Tour Program, which includes:

- "Quest!" — an audiovisual presentation telling the story of Brookhaven.
- A guided walking tour of the three-story science museum known as the Exhibit Center.
- The Camp Upton Historical Collection at the Exhibit Center.
- Optional tours of the energy-efficient, prefabricated Danish House.

The complete program takes about 2½ hours. For more information, call the Tour Program Office, Ext. 4049.

## Note to Visitors

Many of BNL's summer visitors bring their families to stay at the Lab, and the children find the Lab's road network ideal for biking. Like any community, however, BNL has its traffic, which is particularly heavy in the mornings, from about 7:30 to 8:30 a.m.; during lunch breaks, from about 11:30 a.m. to 1 p.m.; and in the afternoons, from about 4:30 to 5:30 p.m.

Not only should children be cautious about traffic, they should also remember that their summer playground is a working laboratory. They should enter only those areas where they are expected and visitors are welcome.

## Classified Advertisements

### Placement Notices

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

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

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

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

**LABORATORY RECRUITMENT** - Opportunities for Laboratory employees only.

2641. MATERIAL HANDLER - Supply & Materiel Division.

2642. HELPER A - Under general supervision performs a variety of tasks in Central Shops. Requires knowledge in that trade, although not that of a craft person. Duties will include handling minor assignments and assisting craft people in more complex assignments. A valid driver's license is required. Central Shops Division.

2643. FIREFIGHTER/EMT - Previous substantial firefighter experience is required. Completion of New York State EMT course and possession of training certificate is highly desirable; if not, completion of course within one year is required. Must be willing to work shifts at the completion of a thirteen-week training period. Safety & Environmental Protection Division.

**OPEN RECRUITMENT** - Opportunities for Laboratory employees and outside applicants.

2644. SR STATIONARY ENGINEER - Requires demonstrated experience in the maintenance, repair and operation of high pressure boilers firing #6 fuel oil. Current stationary or marine engineer's license highly desirable. Plant Engineering Division.

2645. NUCLEAR REACTOR OPERATOR TRAINEE - Requires AAS or equivalent experience in reactor operations. Must have good mechanical ability and aptitude and be able to work rotating shifts. Prior Naval experience desirable. Ability to obtain "Q" clearance mandatory. Reactor Division.

2646. TECHNICAL POSITION - Requires AAS in electronics technology or equivalent and 1-2 years experience in telecommunications systems

and/or digital circuitry. Networks, Engineering and Telecommunications Division. Applied Mathematics Department.

2647. LABORATORY ASSISTANT (Temporary Position) - Requires familiarity with microbiological techniques. Duties will include large scale growth of algae, continuous-flow harvesting, autoclaving and preparing of media. Biology Department.

2648. RESEARCH SERVICES ASSISTANT - Responsibilities will include the production, testing and shipment of special strains of rats. Knowledge of laboratory animal science helpful. One year term appointment. Medical Department.

### Autos & Auto Supplies

84 FORD ESCORT - and 1979 Chevet. Piero, 286-9420.

83 YAMAHA VIRAGO 750 - black, mint cond., garaged, asking \$2,000. Charles, Ext. 7749.

WESTERN WHEELS - 4, cast aluminum, Cyclone II, 15x7, w/all parts, incl. locks, 4 lug, were on 1978 Datsun 280Z, \$175. Sue, Ext. 4931.

80 CHEVROLET CITATION - a/t, 4 drs., 4 cyl., runs well, good cond., \$850. 395-1651 after 6 p.m.

85 SUZUKI GS550L MOTORCYCLE - red, incl. helmet, Tracy fairing, & cover, excel. cond., \$2,000. 727-5194.

75 ELDORADO - 75k mi., excel. running cond., exterior & interior fair, \$900. Rob, 924-4262.

78 MOTOR HOME - Ford Casual, 351 engine, a/t, Honda generator, 3-way refrig., sleeps 7, 6 new tires. 878-8528.

84 FORD TEMPO GL - a/t, 4 dr., 47k mi., excel. cond., \$3,500. 589-7429.

86 TOYOTA TERCEL - station wagon, a/t, a/c, p/s, am/fm stereo cass., 16k mi., like new cond., asking \$7,800. Ext. 4153 or 732-5829.

77 CAMARO - black w/camel int., V8, a/t, 79k mi., well maint., very good cond., must sell. 744-0725.

69 CHRYSLER NEWPORT - good body & engine, hitch, needs alternator, make offer. Paul, Ext. 2017 or 744-7708.

80 CAMARO - 3 spd., p/s, p/b, new tires, a/c, T-tops, black. 282-2621 or 281-0360 eves.

83 CAMARO Z28 - 43k mi., a/t, a/c, power everything, fully loaded, excel. cond. in & out, \$8,000. Joan, Ext. 2922 or 395-1588 eves.

74 BRAVO POP-UP - sleeps 8, sink, 3-burner stove, 3-way refrig., gas heat, 2 gas tanks, tandem axle, portable poity, \$1,600. 924-0539.

86 GMC PICKUP - 20k mi., hi-rise cap, running boards, must sell, \$10,000. Bert, Ext. 2050.

77 FORD PINTO - good station car, \$200. 281-2257.

77 PLYMOUTH ARROW - 2000cc, moon roof, a/t, recent brake job, eng. good, as is, \$400. Ext. 2011 or 281-2159.

75 PLYMOUTH VALIANT - 4 dr., a/t, r/h, \$750; 1979 Chrysler LeBaron, 4 dr., 318 eng., a/t, p/s, p/b, r/h, a/c, good body & eng., \$1,750. 277-4091.

74 DODGE DART - for parts, \$30. Monika, 821-3243.

82 TOYOTA STARLET - 2 dr., loaded, needs minor work, \$1,000. 395-4737.

76 PLYMOUTH VOLARE - 6 cyl., 4 dr., a/c, p/s, p/b, \$500. 821-2548.

79 T-BIRD - 351 cu.in., p/b, p/s, p/seat, a/t, 90k mi. F. Merkert, Ext. 4566 or 732-3003.

77 AUDI FOX - a/c, radials, 85k mi., excel. running cond., \$1,500. Al, Ext. 4442 or 929-8411.

84 SUBARU - 4 cyl., 5 spd., am/fm cass., a/c, excel. cond., \$5,200. JoAnn, Ext. 4120 or 588-8492.

78 MERCURY COUGAR - a/t, p/b, p/s, am/fm cass., must sell, \$1,395. Ext. 3090 or 4393.

76 PONTIAC FIREBIRD - red, 350, p/s, p/b, good cond., \$2,300 neg. Robin, 581-7733 days, or 475-5591 eves.

79 T-BIRD - black, p/s, p/b, a/c, am/fm cass., excel. cond., \$1,800. Jerry, Ext. 7727 or 475-5591 after 5 p.m.

80 MUSTANG - 6 cyl., black, great body & engine, \$2,000. 288-2440, leave message.

72 PLYMOUTH - full-size station wagon, excel. running cond., \$400 or best offer. Ext. 2022 or 744-8386.

STEEL RADIALS - Pirelli & Michelin, 13" on mag rims, \$25/ea. Ext. 5288 or 878-8177.

73 MERCEDES BENZ 280 - 4 dr., white, dark green int., \$4,300. Ext. 4099 or 689-9214.

77 ASPEN - 4 dr. sedan, yellow, 80k mi., new exhaust, rebuilt trans., reliable, orig. owner. Ext. 3375 or 751-6139.

77 FORD MUSTANG - new w/p timing belt & clutch, 58k mi., very good cond., \$1,200. 758-5592 eves.

80 CHEVROLET CHEVETTE - hatchback, 4 dr., fair cond., \$999. 924-0848.

83 MUSTANG GT - 302, 5 spd., 33 mpg, Alpine stereo, T-tops, loaded, Ext. 4986 or 884-7879.

78 VW RABBIT - 91k mi., excel. cond., orig. owner, \$1,000. John, Ext. 3821 or 473-6624 after 6 p.m.

76 BUICK REGAL - good body, new trans., needs motor, asking \$800. Louis, 286-2426.

TRAVEL TRAILER - 24', sleeps 6, fully self-contained, stereo, new refrig., excel. cond., powered by batt., propane, or elect., \$3,950. 744-5069.

### Boats & Marine Supplies

14' STARCRAFT - alum. boat, good cond., \$400. Ext. 4312.

15' NEWPORT SAILBOAT - new jib, cover, \$900. Andy, 286-8698.

16' STARCRAFT - 1978, V-bow, 65 h.p., w/trailer, new battery & cb, excel. cond., \$3,600 or best offer. 585-8591.

22' SEARAY - 1974, hardtop, new canvas, trailer, extras, excel. cond., \$8,000 firm. 369-2838 after 4:30 p.m.

25' LANCER - sloop, shoal keel, new 9.9 h.p. Evinrude, stereo, many extras, make offer. 289-8693.

15' AQUAGLASS - 1971, hull design similar to Boston Whaler, 1976, 85 h.p. elec. start Mercury OB, 1976 Highlander trailer, \$2,500. 286-1709.

WINDSURFER - excel. beginner board, ready to sail, Chris, Ext. 3145.

19' COBIA BOWRIDER - 120 h.p., I/O, full canvas, Shoreline trailer, \$4,500. Bob, Ext. 4672 or 929-4753.

27' SILVERTON - 225 fwc Chrysler, flying bridge, trim tabs, very clean, in water, \$900. 325-0681.

19' SPORT CRAFT - 1969, \$800; 1979 90 h.p. Merc. OB, \$1,300; trailer tongue, \$25; fenders, \$5; galv., alcohol stove, \$15. Ext. 5288 or 878-8177.

### Miscellaneous

ELECTRIC OVEN - rotisserie, broil, bake, grill, 21"x17"x14", good cond., \$15. Betty, Ext. 3382 or 472-1601.

PIANO - maple, spinet, excel. cond., \$800. 821-0250.

DESK - w/chair, 8-drawer; Soundesign 8-track stereo; Welbuilt electric stove, best offer. 289-1439 eves.

GIRL'S BIKE - 20", \$10; 1930's kitchen table, enamel top, slide-in leaves, w/4 chairs, \$60. 878-6637.

CHILDREN'S CLOTHES - designer, selling out stock, sizes 4 to 6x. Carol, 727-7227.

AIR CONDITIONER - Norge, 24,000 Btu, 2 units, best offer over \$50/each. 475-8640.

SEWING MACHINE - Domestic, console w/attachments, \$65; lamps & chandeliers, \$10-\$50. 277-4091.

CAMERA - Miranda Sensomat, lenses, 50mm/f1.8, 28mm/f2.8, 105mm/f2.8, 2x extender, case, package only, \$198. 928-0281.

AIR CONDITIONER - dehumidifier, garden tools, etc., best offer. Ext. 7108.

POOL TABLE - Royal Billiard, 5'x9', majestic, ball return, w/accessories, 9 months old, \$1,500. 874-8981.

FOLDING STROLLER - Aprica, ideal for travel, excel. cond., \$50. Ady, Ext. 4531 or 331-3785.

MET OPERA TICKETS - 4, Elisir D'Amore, Oct. 2, balcony, \$23/each; 2 Manon tickets, Nov. 6. Dave, Ext. 2694 or 941-9022.

OAK DESK - \$50; folding dining table, \$40; chairs, \$15; floor lamp, \$15. Jerry, Ext. 5506.

ENTERTAINMENT CENTER - oak w/glass doors, new, excel. cond., asking \$90. 924-5419.

POOL TABLE - slate bed, 3'x5', \$50; maple hutch, Colonial, 54", \$250; couch, 3-piece, good cond. Dick, Ext. 4313 or 722-4094.

AUDIO CABINET - glass door & lid, like new, \$50. Sue, Ext. 7235 or 395-3529 after 6 p.m.

CAMERA - Keystone AF2, auto focus, auto wind, built-in flash, \$50 new, sell for \$40. Rick, Ext. 3932.

STAINLESS SINK - 21"x24", w/Delta faucet, \$30; windows, double hung, wood, w/storms, \$5/each. Victor, Ext. 2395.

COLOR TV - Motorola, 25", console, \$75; coffee table, \$40; Exercycle, \$65; sewing machine, \$65. 277-4091.

GAS RANGE - Caloric Heritage, 24", gourmet model, like new, perfect for small kitchen. 928-8709.

RUG - grass square, 8'x10', good cond., \$35. Ext. 7112 or 286-9725 after 6 p.m.

WALLPAPER - 5 rolls, beige pattern, \$20; IBM typewriter, new, \$150; short-sleeve shirts. Susan, Ext. 4267.

BARBEQUE - w/smoke hood, wheels, charcoal pail & electric starter, good cond., \$15. Mike, Ext. 2705.

OAK TABLE - oval, w/4 chairs, corner hutch, two leaves, blue rug, \$1,500. 298-4398.

SHAMPOO/POLISHER - Hoover, model F9143, brand new, \$50. Ext. 4727.

MOVIE CAMERA - Bell & Howell Super 8, power zoom, excel. cond., \$50. Sal, Ext. 2460 or 924-2726.

MASTER BEDROOM - oak, queen-size w/headboard, triple dresser, 2 mirrors, armoire, 2 night tables, excel. cond., \$900. 938-7018.

RADIO CONTROL CAR - Turbo Panther, like new, \$38; boy's bike, Huffy 20", \$20. 473-6546.

REDWOOD FURNITURE - w/cushions, \$75; antique walnut table, round, w/2 leaves, \$495. 878-4214.

DINING ROOM SET - teak, 7-pieces, tiled buffet, rolling bar, like new, asking \$1,950. Al, Ext. 4442 or 929-8411.

TOPSOIL - delivered, 5 yards minimum, \$15/yard. 924-7746/924-9427 after 7 p.m.

WOOD BURNING STOVE - free standing, cast iron, flue pipe, carriers, screen, tools, \$250. 758-5592.

MAPLE DRESSER - & hutch, \$100; white headboard & canopy, \$50; white & yellow dresser w/mirror. \$75. 289-8212.

FISH TANKS - various sizes, some stands. Annamarie, Ext. 2352 or 473-9016.

PLOW - 3 pt. hitch, 2 bottom, 12" Ford, new set of landsides, w/accessories, good cond., \$350. Tom, Ext. 4084 or 878-1060.

FURNITURE - Colonial bedroom set & dining room set, must sell, 2 years old. Angela, 758-4684.

MOVING SALE - maple dining table, oak headboard, 4 chairs, 2 beds, & more. 744-1750.

GIRL'S BIKE - Huffy, 3 spd., \$15; riding hat, various toys; IBS computer, 640k, 2 floppy disks, printer, monitor, \$1,100. Ext. 3723/3125.

### Yard Sale

PORT JEFFERSON STATION - Aug. 8 & 9, 27 Poplar St., antiques, assorted furniture, books, appliances.

### Lost & Found

LOST - baseball glove, Rawling Dale Murphy, field 1 or 4, early July. Ext. 2621 or 281-0360 eves.

### Real Estate

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

### For Rent

PORT JEFFERSON - Harbor Hills, 3 bdms., l/r, d/r, eik, 2 baths, washer/dryer, dishwasher, beach & country club rights. 473-4717 after 7 p.m.

BELLPORT - Beach Estates, prof. male seeks roommate to share house, 1 bdrm. & bath avail., share eik, l/r, d/r, den, f/p, w/w, near village, golf, tennis, Great S. Bay, \$575/mo. + util. 286-2007/698-0576 after 12 p.m.

ROCKY POINT - 2 bdrm. apartment, \$600/mo. Ext. 2050.

NORTH BABYLON - apartment to sublet from Sept. to Dec. or take over lease from Sept. 242-9386.

BELLPORT - 3 bdrm. house, avail. Aug. 23-Sept. 10, no children or pets. Ext. 7112 or 286-9725 after 6 p.m.

CAPE MAY, NJ - 2 bdrm. new vacation house, 5 min. to shore, off-season rentals. 427-8850 eves.

CENTER MORICHES - 3 bdrm. ranch, attached gar., oil, hot water, South Montauk, \$800/mo. + util. Ext. 5288 or 878-8177.

HILTON HEAD, SC - 2 bdrm. condo, sleeps 6, beach, pool, tennis, golf, openings Aug. 15-29, \$400/wk. 585-9149.

CATSKILLS - 3 bdrm., sleeping loft, full furn., near Hunter Mt. music festivals, golfing, fishing, rafting, hiking, game farm, rent for fall foliage, by day, wk. or mo. Judy or Kay, Ext. 3595 or Bea, Ext. 3642.

MIDDLE ISLAND - Artist Lake condo, 1 bdrm., l/r, kit., full bath, a/c, new w/w, dishwasher, redecorated, pool, heat incl., 5 min. to Lab., avail. Sept. 1, \$650. Ext. 3144 or 698-5046 eves.

### For Sale

SETAUKET - 3 village schools, 4 bdrm. split level, 2½ baths, family rm., deck, sunny garden, wooded backyard, ½ acre, \$210,000. 928-0281.

MASTIC - Manor Park area, 3 bdrm. ranch, eik, d/r, large corner property, South Manor school district, 10 min. to Lab, asking \$109,000, or for rent. 281-1893.

SHOREHAM - 4 bdrm. Colonial, 2½ baths, family rm., formal d/r, 2-car gar., basement, patio, fenced. 744-1750.

SHIRLEY - building lot, 100'x100', in Tangiers, city water, Board of Health, Planning Board approved with variances, surveys, \$43,000. Ext. 3145.

EAST YAPHANK/N. SHIRLEY - 4 bdrm. Colonial, 1½ baths, eik, d/r, l/r, den w/coal stove, parquet floors, carpeting, full basement, gar., landscaped, pool w/deck, secluded fenced acre, \$175,000. 281-1972.

FORT MYERS, FL - approx. ½ acre, access to Orange River, 5 min. to I-75, close to SW Florida Regional Airport, shopping, golf & beaches, \$18,500. Ext. 4482.

OAKBORO, NC - fully furn., 24x45 modular home on 3½ acres, 3 bdrm, 1½ bath f/p, l/r, a/c, elec. heat, more, taxes \$200 per yr., asking \$50,000. Sheila, Ext. 3325 or 369-2404 after 6 p.m.

STRATHMORE RIDGE CONDOMINIUM - 2 bdrm. ranch, central a/c, w/w carpeting, 4 appli., low maintenance fees, 5 min. from Lab, asking \$95,000. 202-462-1676, Mon.-Fri., 9 a.m.-5 p.m.

HILTON HEAD, SC - 3 bdrm. condo, 8 appliances, 2 baths, near Palmetto Dunes golf course, ocean, tennis, 3 pools, asking \$89,000 assumable mortgage; also for rent at reas. rates. 929-8912.

MILLER PLACE - Scotts Beach Club, priv. L.I. Sound community, 4 bdrm. ranch set on ½ acre, 1½ baths, atrium room, many extras, \$250,000. 744-2069.

### Wanted

PICNIC TABLE - w/chairs or bench. Ext. 2917 or 821-0691.

TICKETS - U.S. Tennis Open, any seat. Joy, 924-7658 after 6 p.m.

EXTENSION LADDER - to rent or borrow for one day. Sandi, Ext. 7159 or 744-0485.

CHILD CARE - for 2 school-age children, on-site or Ridge area. Doreen, 924-7723 eves.

LEFT-HANDED GOLF CLUBS - for beginner. Dan, Ext. 2319.

PARTICIPANTS - for informal aerobics class, MWF, 2:00, kids/beginners welcome. Elaine, Ext. 3188.

VENDORS - needed for craft show, Bellport Fire Dept., Sept. 19. Dorothy, 286-1572.

SWR PARENTS - interested in district sponsored after-school child care program. 744-7708.

OLD LAWN MOWERS - gas-type, will buy if complete. Dan, 698-7322 days or Ext. 4987 eves.

HOUSEMATE - to share large house in Setauket, 2 blocks from SUNY, \$400+. 689-3055 eves.

### On-Site Services

FRIENDLY BROOKHAVEN GULF SERVICE - weekly special: rotate and balance 4 tires, \$19.95. Ext. 4034.

### Services

RUG SHAMPOOING - very reasonable, Lab discount. 924-9637, leave message.

MAGICIAN - balloon sculpture, professional magician, will make child's party special, Lab discount, ask for brochure. 395-3963.