

## Seeking an Answer To a Heavy (Water) Question

A drum filled with heavy water looks no different from a drum filled with ordinary light water. The difference between the two liquids is hidden within the nuclei of their atoms. But it is a difference that cannot escape being measured by the ultrasonic transducer developed by Martin Zucker of the Technical Support Organization (TSO), a division of the Department of Nuclear Energy.

Pure heavy water ( $D_2O$ ) is literally heavier than normal water ( $H_2O$ ) because it contains a high proportion of deuterium (D), a hydrogen isotope with both a neutron and a proton in its nucleus. In contrast, an ordinary hydrogen (H) nucleus consists of a single proton. This seemingly-small difference has a large nuclear effect, greatly increasing  $D_2O$ 's efficiency as a moderator (the material used to slow down neutrons in a nuclear reactor), in any fission-causing process.

Due to this efficiency, reactors which use heavy water as a moderator can use natural uranium as a fuel, rather than the enriched uranium re-

quired by most types of nuclear reactors. Since the technically difficult and expensive enrichment process is not needed, relatively underdeveloped countries could find it possible to clandestinely build heavy water reactors, using ordinary unenriched uranium as fuel to produce plutonium, by exposing ordinary uranium to the reactor neutron flux. Then the plutonium could be used to manufacture nuclear weapons. Heavy water, then, has the potential of being an ingredient in the proliferation of nuclear weapons.

For this reason, groups such as the U.S. Arms Control and Disarmament Agency have suggested that the International Atomic Energy Agency (IAEA), which is in charge of the international safeguarding of nuclear materials, should inspect to see that the heavy water used in legitimate heavy water reactors is not diverted to clandestine use in a nuclear reactor producing plutonium from natural uranium. In response to these suggestions, the IAEA began looking for ways to assay concentrations of heavy water, under field conditions. Because field conditions could literally be in a field, or in a warehouse, or some other non-laboratory environment, any device used for this purpose had to be relatively uncomplicated and portable.

There is another problem any such instrument would have to overcome. Heavy water for nuclear reactors is generally stored in 210-liter, sealed, stainless steel drums. Opening the drums for measurement is not desirable because, if the  $D_2O$  is relatively pure, the valuable material — worth about \$50,000 — could become contaminated. And if the  $D_2O$  has been degraded through use in a reactor, it is almost certainly radioactive and could contaminate personnel.

This is essentially the problem that was presented to the TSO a few years ago. A group including Tony Fainberg, Dick Fuller, Jim Lemley, Gene Weinstock and Zucker came up with five ways of measuring heavy water without opening or entering the drums. Four of the methods were

nuclear-based and suffered from a common drawback: the need for bulky radioactive sources and nuclear detection equipment. The fifth proposal was the more portable ultrasonic transducer which used as its principle of operation the speed of sound.

The major component of this method is an off-the-shelf ultrasonic thickness gauge. Typically, such a gauge uses ultrasonic signals outside the range of human hearing to measure the thickness of a material, by measuring the time it takes for an ultrasonic beam to travel through it. "The new idea here," said Zucker, "is using a commercial thickness gauge in such a non-traditional way."

Zucker's device measures the  $D_2O/H_2O$  ratio inside a sealed drum, using the fact that the speed of a sound pulse passing through would depend upon the square root of the ratio of the liquid's compressibility to density, and that this ratio is slightly different for pure  $D_2O$  as compared to  $H_2O$ , with a smooth variation for intermediate compositions.

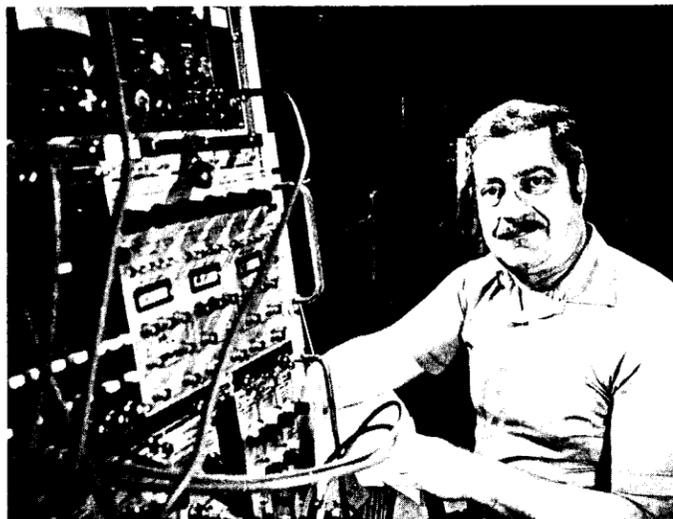
The difference is small — only about 100 meters per second out of about 1400 meters/second. However, a standard commercial ultrasonic (thickness) gauge can very accurately measure the time (t) it takes for an

ultrasonic pulse to traverse the drum diameter (d), which itself can be accurately measured with a machinist's caliper. With accurate measurements on hand for both distance and time, velocity (d/t) can also be measured accurately. The result is that the mole fraction of  $D_2O$  (the relative fraction of  $D_2O$  molecules compared to total  $H_2O$  and  $D_2O$  molecules) can be measured to better than one percent, which is considered sufficient for nuclear safeguards purposes.

The accuracy of the device was verified in May when Zucker demonstrated it for the IAEA in Vienna. Though the IAEA has been eager to test the ultrasonic transducer for some time, the demonstration was delayed for lack of heavy water. A gift of 50 kilograms of extremely pure  $D_2O$  from the Soviet Union made the recent demonstration possible. As Zucker said, "The question of non-proliferation is one area in which the United States and the Soviet Union are in good agreement."

Some of the heavy water was diluted to produce different gradations. The drums containing intermediate mixtures of  $D_2O$  and  $H_2O$  apparently had not been mixed properly, and the initial measurements made on them

(Continued on page 2)



Martin Zucker



At the demonstration in Vienna in May, Martin Zucker photographed these personnel from the International Atomic Energy Agency working with the ultrasonic transducer.

## The Philadelphia Story

The first hint of rain sends most people looking for cover or scurrying to close windows. Not Aristides Patrinos and his team from the Atmospheric Sciences Division of the Department of Applied Science. These BNL scientists do their best work in the rain.

During the fall of 1983 and spring of 1984, they collected rain samples from 40 sites within a 60 kilometer radius of Philadelphia, Pennsylvania, as part of a National Acid Precipitation Assessment Program study which is funded by the Environmental Protection Agency (EPA). Their goal: to study the extent to which pollution from a large industrial and population center contributes to acid rain.

Philadelphia was a good test location as a reasonably sized city with adequate pollution emission information. It is located in the Northeast, an area where acid rain is considered serious, but is still far enough away from the coast to reduce complications from an ocean atmosphere.

Living up to its reputation as the "City of Brotherly Love," the Philadelphia community lent its support to the project. As Patrinos remarked,

"The response of the citizens and land-owners who allowed us to use their land and electricity was great, just like the Phillies!"

In the two rain storms sampled during the fall of 1983, Patrinos, Robert Brown, John McNeil, Martin Leach and Seymour Fink manually collected rain samples by placing bottle-funnel collectors at the sites prior to the rainfall and then quickly retrieving them when the rain stopped. During the spring of 1984, data was collected at the same sites, from nine rain storms, using electronically-triggered automatic wetfall collectors. In both studies, the samples were brought to a motel room in Mt. Holly, New Jersey, that served as a field laboratory. They were weighed, measured for pH and conductivity, "fixed" chemically to trap pollutants, and then shipped to the analytical chemistry group at BNL for a complete analysis.

So far, preliminary results confirm Patrinos' suspicion that pollution from a large source does have an increased effect downwind. Early data show that, moving away from the source, acid rain increases gradually, with the maximum impact of the city's



Aristides Patrinos holds a rain sample to which tetrachloromercurate (TCM) has been added to trap pollutants.

emissions appearing to be beyond the 60-kilometer boundary set for this study.

These data will be used in collaboration with data collected by researchers across the nation in the same EPA program to set parameters for a computer simulation model. The three-year computer project to incorporate the local information will begin

in October at the National Aeronautics and Space Administration. The model will describe in three-dimensional detail the important physical and chemical steps in the formation and transport of acid rain, which will help scientists more accurately predict and assess the effects of acid rain over distances greater than 100 kilometers.

—Sally Sargent

## Volunteers Wanted

A limited number of healthy men and women of all ages, smokers as well as non-smokers, are wanted to participate in a clinical study which involves the determination of respiratory capacity by spirometry. In addition, the localized distribution and clearance of inhaled aerosol particles in the lungs will be determined with a radioactive tracer. These normal values are required as a standard against which the results from patients with pulmonary disease can be evaluated.

Anyone interested in participating in this study should call the Medical Research Center, 282-3672, for further information.

## Heavy Water

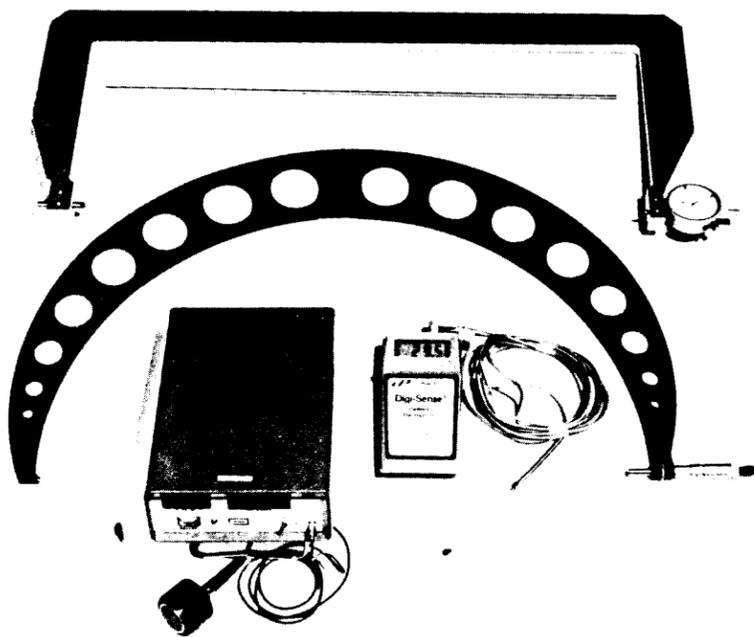
(Cont'd)

by applying the ultrasonic transducer to the drum at first seemed incorrect. In fact, it was possible, using the ultrasonic probe, to pick out layers of different density. After the drum was shaken up, the measurements were in complete agreement with measurements made with this same equipment in 1981, at DOE's Savannah River Plant.

"We demonstrated that we could pick out the effects of imperfect mixing," said Zucker. A similar occurrence had impressed observers at that 1981 demonstration. At Savannah River, used drums of D<sub>2</sub>O are upgraded for further use, but first the initial amount of degradation must be determined. In one barrel, the ultrasound technique pointed out a transcription error in a laboratory measurement; in another case, an error in the laboratory measurement itself was uncovered. "The potential cost of these mistakes was far greater than the total cost of our equipment," Zucker said, adding, "In fact, this has been the history of this technique. While it is designed for field work, it has also proved that it can pick up gross errors in laboratory analysis."

Now the IAEA has borrowed Zucker's device, to use it this month at the inspection of a nuclear reactor in India. And if the ultrasonic transducer continues its fine record, it may become a primary tool for assaying heavy water concentrations in the field.

— Anita Cohen



Assembled here are the components of Martin Zucker's ultrasonic transducer for assaying heavy water concentrations in stainless steel drums. At top is a gauge for finding the diametrically opposite points in a drum. Below that, the curved device is an oversized micrometer caliper which fits around the drum to measure the distance between the two points. (Zucker's next step is to combine the two devices into one instrument with a digital readout.) Below the caliper, to the left, the rectangular box is an ultrasonic thickness gauge, which sends a narrow beam ultrasonic wave through the drum via the transducer, the small cylinder attached to the gauge by a thin coaxial cable. When held against the drum, the transducer sends acoustic power through it. The glycerine in the small bottle (lower left) is used to couple the acoustic signal to the drum. The final component, a hand-held digital thermometer, is pressed against the drum at the same point that the speed of sound was measured, to monitor temperature. Since the speed of sound is a sensitive function of temperature, the circuit reading has to be corrected. In future models of this device, the circuit will automatically make this correction.

## Employee Seminar

Last year, over 25,000 people across the country were killed by drunk drivers. In Suffolk County, better than 50% of the 213 traffic fatalities were attributed to drunk drivers. Drunk driving is now considered a major crime of violence and is being addressed through such measures as increased and stricter legislation, a raise in the drinking age, and improved media coverage. Bumperstickers and posters proclaim "Suffolk is Tough on Drunk Drivers." As part of the campaign to bring this problem under control, the Town of Brookhaven has instituted a STOP DWI (Driving While Intoxicated) Program for the purpose of community education.

On August 22 at noon in Berkner Hall, Gus Sarro, Community Service Representative of the Town of Brookhaven's STOP DWI Program, will present the next Employee Health Seminar. Sarro will show a film entitled "Drugs, Drinking and Driving," and will outline how the average citizen can help in the fight to reduce the number of alcohol-related traffic deaths. In addition, he will explain the current laws and discuss the relationship between DWI arrests and traffic fatalities. Sarro will also answer questions from the audience.

## Arrivals & Departures

### Arrivals

Rulon R. Mayer ..... Physics  
John J. Popielaski ..... Plant Eng.  
Peter M. Ratzke ..... Reactor  
Larisa Rudenko ..... Biology

### Departures

This list includes all employees who have terminated from the Laboratory, including retirees:  
William C. Barthold ..... Plant Eng.  
Donna E. Haughland ..... Supply & Mat.  
Diane K. McCarron ..... Applied Math.  
Mikko E. Sainio ..... Physics

## Register Next Week

Registrations will be accepted for fall on-site Suffolk County Community College courses from August 13-24 at Personnel (Bldg. 185). For information, call Pat Knisely, Ext. 4262.



It's lunchtime, and the catering truck is here...Fred Maffia (right) makes one of his 18 stops at the Lab, in front of Bldg. 134.

Peter Horton

## The Man Behind the Vending Machines

As the van nears the post office, a small gathering awaits the driver.

"How are you today?" a man asks him as he jumps out.

"Oh, not bad, and yourself?"

"Good, good...you have anything good today?..."

It's lunchtime, and Fred Maffia is driving the catering truck on his daily route around the Laboratory. He figures to take in about \$100 from 10:00 to 1:00 daily, and this is one of his best stops.

A familiar face on site, Maffia has been on the job for the past 27 years. He is employed by Saga Foods Corp., and his duties include loading the 52 vending machines that serve the Lab and driving the catering truck, which has adopted a host of nicknames from employees: the "lunch truck," "coffee truck," or "sandwich truck man."

The original catering van was a walk-in model which began operation in the mid-1950's. Although it wasn't pretty, customers were kept warm in winter. In 1969 a Chevy van replaced it and remained in operation until this past fall, when the current catering truck was purchased.

Maffia's wares include some of the essentials — coffee, sandwiches, yogurt, pastries, cakes, fruits, daily newspapers, rolls (the truck's current bestseller) and sodas. In 1978 when the Environmental Protection Agency recommended that beverages be sold in paper cups or return-for-deposit containers, soda sales were discontinued on the truck. The move, which was designed to conserve energy and reduce litter, meant that soda could only be vended in paper-cup machines, which are quite expensive. When the 5¢ deposit law came into effect this past fall, canned soda reappeared on the truck.

He begins each day by loading the vending machines at the AGS vending service area, which is complete with a kitchen and tables and chairs for employees. Here he loads the machines with many of the same items that are sold on the truck, along with cigarettes and ice cream. Customer favorites include Marlboro cigarettes and Hershey and Kit-Kat chocolate bars, over an assortment of other candies. Maffia laments the fact that distributors no longer deliver such chocolates as Nestle's Crunch, Oh Henry, and Baby Ruth to the Lab unless ordered in larger quantities. "Those used to be the good candies," he says.

Maffia's patrons, about 150 regulars at his 18 stops, not only appreciate his service, but enjoy taking up light banter with him. "I like the people and they're really friendly," he says, and as a result, "the day goes by a lot faster." Some of his more profitable stops include the post office, AGS, and building 134.

Maffia has run into many interesting people. About fourteen years ago, he recalls, one employee had him load up a candy machine with pickles while displaying the usual candy bar in front. "A lot of people were surprised that day," he said, grinning, "and I had to give a lot of refunds."

Every season brings with it a different form of excitement or disappointment to Maffia. In winter, "your fingers crack open from the cold," in summer there are melting chocolate bars to contend with, and in fall squirrels can be found helping themselves to candy from the machines. In a recent year, after it had finished all the candy, one of the perpetrators was caught chewing on the plastic that holds the candy in place.

Maffia grew up in New York City and left for the Navy when he was 18 years old, serving on an aircraft carrier until 1956. A year later he came to the Laboratory and has "been at it ever since." He and his wife live in Selden and his two married daughters also live locally.

Maffia's job is made easier by the fact that he enjoys such a good rapport with many of his customers. While many of them buy the rolls ("because they're the cheapest item"), others will occasionally sample a sandwich. "How much salt is in this one?" asks one man at the Machine Shop, motioning toward the row of sandwiches. "I'll tell you what," jokes Maffia, "if it's too salty, you can bring it back and get half a refund."

— Maurice A. DuBois

## Missing

The following volumes are missing from the Research Library's reference collection. Will the borrowers please return:

QC61 Landolt-Bornstein. New Series. Group I, vol. 4. Numerical tables for beta-decay and electron capture. 1969.  
L271  
Q141 McGraw Hill. Modern Scientists and Engineers. Vol 1. 1980 A-G.

## Postscript

BNL photographer Mort Rosen has surfaced again. This week, John McTague, deputy director of the Office of Science and Technology Policy, and former chairman of the NSLS Department, sent the photographer a letter thanking him for the "superb job you did" with some official portraits taken a few months ago. Also enclosed was another portrait, with a note attached. It read: "To Mort Rosen, with best wishes. —Ronald Reagan."

# BROOKHAVEN BULLETIN

Published weekly for the employees of BROOKHAVEN NATIONAL LABORATORY

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## More Addled Addresses

Here are some more addresses collected over the years by Henry Bornbush, Plant Engineering.

Brookhaven National Lab  
or current resident  
Brookhaven Vacational Lab  
Brickhaven National Labs  
Brackhamer National Lab.  
Director of Facility Operations  
Associate Universities  
Private Road  
Upton, NY 11973

Bwolshaven National Lab  
Brooklawn National Lab  
Brookhaven National Library  
Brook David Labratory  
Brookhaven Lab  
Uptown, N.Y. 11973

Brookhaven Atomic Energy Labs.  
Upton, New Jersey  
Broolhaven Nat. Lab

— and finally a man from England, who wanted information on Upton, sent his letter to:

Mayor of Upton, New York  
or  
Sheriff of Upton, New York  
or

Someone who knows history of Upton, New York

**Note:** Have you had any addled addresses sent to you? If so, send them to the Bulletin for possible future publication.

## Chair Wear

Most of us don't pay much attention to it, but chairs wear out just like anything else. Safety & Environmental Protection advises that defective chairs have caused serious injuries in the past. They suggest that you turn your chair upside down now and then and inspect it for loose or missing nuts, bolts and springs. If anything is amiss, get it repaired as soon as possible.

## MICOM Meeting

The next meeting of the MICOM Users' Group will be on Wednesday, August 15 at 2 p.m. in the conference room of Bldg. 179A (DAS). MICOM representative Ruth Stannish will be present, and merging will be discussed. The meeting is for new users but all are encouraged to attend. For further details, call Isabelle Harrity, Ext. 3727, or June Martino, Ext. 2933.

## Drivers Note

If you rent cars for official or personal use and don't recognize this

A/A 298900		AVIS	
EUROPE	ASIA	LATNAM	CANADA
AFR/ME	PACIFIC	CARIB	U.S.
15	15	15	C1
RESERVE AVIS 800-331-1212		AS PER AID #	

you are missing out. Check with the Travel Office for more information.

## WIS Meeting

The August lunch meeting of BNL Women in Science will take place on Wednesday, August 15 at noon, in Room A, Berkner Hall. The speaker is Joyce Tichler of the Department of Applied Science, who will describe "How Computers are Used in the Atmospheric Sciences Division."

Tichler who received her B.A. in mathematics from Barnard College and her M.A. in mathematics from Columbia University, has been with the Atmospheric Sciences Division of DAS since 1972. She is responsible for computer processing of data collected as part of various research programs of the Atmospheric Sciences and Environmental Chemistry Divisions, and acts as staff consultant on computer-related and statistical problems.

## Cafeteria Menu

Week Ending August 17

<b>Monday, August 13</b>	
Chicken rice soup	(cup) .65 (bowl) .85
Beef teriyaki & 1 veg.	2.20
Quiche Lorraine & 1 veg.	1.90
Hot Deli — Knockwurst & kraut	(bread) 1.85 (roll) 2.00
<b>Tuesday, August 14</b>	
Lentil soup	(cup) .65 (bowl) .85
Polish style stuffed cabbage & 1 veg.	1.90
Veal Madeline & 1 veg.	2.10
Hot Deli — Sloppy Joe	2.00
<b>Wednesday, August 15</b>	
Beef noodle soup	(cup) .65 (bowl) .85
Pasta seafood paella & 1 veg.	2.10
Turkey á la king on rice	1.95
Hot Deli — Baked ham club	(bread) 1.90 (roll) 2.05
<b>Thursday, August 16</b>	
Split pea soup	(cup) .65 (bowl) .85
Cantonese style pork /rice pilaf	1.85
BBQ spare ribs	1.95
Hot Deli — French dip	(bread) 1.95 (roll) 2.10
<b>French fried Veggie Bar</b>	
Fried cauliflower, zucchini, broccoli, mushrooms, green pepper rings, onion rings, egg plant: w/horseradish & mustard sauce, sweet & sour sauce	
3 for .75	each extra .25
<b>Friday, August 17</b>	
Fish chowder	(cup) .65 (bowl) .85
Sea food platter	2.15
Salisbury steak & 1 veg.	1.95
Hot Deli — Veal patty Parmesan	(bread) 1.95 (roll) 2.10

## BERA News

### Auditions

All you talented BNL performers are reminded that auditions for this year's BERA Vaudeville Show will be held in the auditorium of Berkner Hall at 7:30 p.m. on Monday, August 13 and Wednesday, August 15. Beatz, our professional piano accompanist, will be there on August 15 only.

We are interested in short acts (up to 5 minutes) of all kinds — comedy, magic, juggling, singing, dancing, musicians.... You will be asked to "work" for one dress rehearsal (on August 23) and two performances (August 24 & 25). The shows, which are suitable for a family audience, are presented in a cabaret setting — probably in the cafeteria, as the Center renovations are behind schedule.

For further information, call the director Jane Love at 286-1136, or Penny Baggett, Ext. 5154.

### BERA Store

**Location:** Berkner Hall  
**Hours:** 9:00 a.m. to 1:00 p.m.  
**Telephone Extension:** 3347

**Services:**  
Film Processing — color, black/white, slides, movies.  
Redemption Center for BERA participation awards.  
Roster signup for seasonal activities.

**Sales:**  
Film, flash bulbs, batteries, photo albums, small picture frames, cameras (by order), greeting cards, Cooking Exchange cookbooks.

**Tickets:**  
Magic Kingdom membership cards — given free to all Lab employees.  
United Artists Theaters VIP tickets — \$2.50 each.  
Great Adventure combination tickets — \$13.00 each.  
Tickets for the 1984-85 season of the Metropolitan Opera and New York Islanders will go on sale sometime in September. Watch the *Bulletin* for details.

### Motorcycle Club

A meeting will be held on Monday, August 13 at 5:15 p.m. at the Recreation Bldg. Included on the agenda is a discussion of the ride planned for Saturday, August 18.

### Golf

The fifth tournament of the BGA season will be held on Friday, August 17 at the Middle Island Country Club. Tee times may be obtained by contacting John Connelly, Ext. 4639 (Bldg. 452). There is a \$1 entry fee for BGA members and a \$2 fee for non-members.

Thirty-five golfers braved the wind and the rain to play in the fourth tournament held in Riverhead. Tournament winners were: low gross for 18 holes, Flight A - Bill Laws, Flight B - Art Dick, and Flight C - S. Kagami; low net for 18 holes, Flight A - John Elzinga, Flight B - George Speidell, and Flight C - Bob Ritter. Joe Tomasi won the longest drive contest and Richard Hildenbrand won the closest to the pin contest.

### Swimming Pool Races

Wet but happy winners of last Friday's pool special were:

- Ages 4 & 5**  
1st Kristin Losquardo  
2nd Liron Ilberg  
3rd Lydia Vignola, Micki Bebon
- Ages 6 & 7**  
1st Carolyn Galayda  
2nd Kerry Parsons  
3rd Cindy Lin
- Ages 8 & 9**  
1st Judith Mathewson  
2nd Jessica Poggi  
3rd Jeannette Galayda
- Ages 10 and over**  
1st Amit Ilberg  
2nd Kevin Crowley  
3rd Constantine Glaros

**Coming Events:**  
Today — Balloon Races  
Next Friday — Straw and Birdie Races  
Activities begin at 3:30 and are open to children of all on-site employees.

### Picnic Reminder

On August 18, members of the Afro-American Culture Club cordially invite you to attend their 4th Annual Picnic and Jazz Show for a day of fun and relaxation.

### Softball

Games for week of July 30

- League I**  
Ravens 12 — Moles 7  
Blue Jays 10 — Big Sticks 6  
Phoubars 7 — Six Pax 1  
Ice Pops vs. Renames  
Score not reported
- League II**  
Medical 17 — Lights Out 3  
Dirty Sox 20 — Faze II 8  
Scram 10 — Magnuts 4  
Random Errors vs. Titans  
No score reported
- League III**  
The Source 10 — Farm Team 8  
Nads 10 — E-Z Riders 0  
Survivors vs. No Names  
No score reported
- League IV**  
Kidz-R-Us 21 — Underalls 17  
TNT 20 — Turkeys 13  
Mole-Esters 11 — Septembers 10  
Playoff game:  
TNT 10 — Turkeys 0  
TNT are the first half winners in League IV.
- League V**  
Mudville Sluggers 9 — Space Kadets 5  
No Feedback 28 — Who Cares 3  
Foul-Ups vs. Erasers  
No score reported

### Attention!

Anyone who bought a money order at the on-site Post Office on Tuesday, August 7, should call Postmaster Jeanine Rebecca on Ext. 2539.



# Classified Advertisements

## Placement Notices

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

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

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

For further information regarding a placement listing, contact the Personnel Placement Supervisor, Ext. 2882.

## LABORATORY RECRUITMENT - Opportunities for laboratory employees.

2096. SENIOR AUDITOR - Requires BA degree in accounting and a minimum of 3-5 years' relevant experience. Will be responsible for the completion, with minimum supervision, of financial, subcontract and management systems audits as assigned in accordance with prescribed standards. Will prepare written reports and review the audit work with the organizational unit concerned. Will develop and execute satisfactory audit and systems programs, coordinate the work with other areas of the Associated Universities, Inc. organization and render assistance in financial and administrative matters as requested. Associated Universities, Inc.

## Autos & Auto Supplies

74 FORD TORINO WAGON - a/c, p/s, p/b, low orig. miles, very good cond., \$1,500. 744-4611 after 6 p.m.

75 MGB CONV. - am/fm, 8 track, 81,000 mi., good cond., \$2,600. John, Ext. 7671.

79 SAAB 900 EMS - sunroof, am/fm cassette, velour int., excel. cond., reg. gas, very pretty. Donna, Ext. 5138 or 473-5095.

75 HONDA MOTORCYCLE - CB200T, excel. cond., hardly used, good gas, \$400. 286-2964 eves.

63 CHEVY IMPALA - 2 dr, 6 cyl., great gas mil., new parts, 90K orig. miles, \$399. Mark, 286-4150.

75 MALIBU - V8, interior immac., engine quiet, needs new vinyl roof, ideal for student, \$400. Ext. 7544.

SNOW TIRES - C78-13, good cond., \$40/pair. Susan, Ext. 4267.

BIKE RACK - for VW bug, \$15. 689-7388 eves.

72 DUSTER - manual, runs well, 2 new tires, brakes, battery, stereo, \$400 or nearest offer. Greg, Ext. 5508 or 744-1793.

TIRES - ER-70-14, good for spares, 3 for \$10; Volkswagon Beetle trailer hitch, \$10; Volkswagon Beetle shocks, new, 2 for \$12. 363-9527.

VW BUG - less than 10,000 mi. on new engine, new tires, etc., stereo cassette, \$3,000. Karen, Ext. 3850.

72 OLDS 98 - high mi., runs well, 4 new tires, new exhaust, asking \$520. Marian, Ext. 3999 or 3129 eves.

78 FORD PINTO - good cond., avail. Aug. 24, \$2,000. Ext. 4846 or 363-6940 after 5 p.m.

76 VOLARE - wagon, excel. transportation, avail. end of Aug., must sell, \$850. Tom, Ext. 3128 or 928-7344 eves.

76 TOYOTA CELICA GT - 5 spd., 2 dr. sedan, excel. motor, good body, \$1,800. 331-4768.

77 TRANS AM - orig. owner, 44,000 mi., brown/saddle, T-top, mint cond., \$5,000; 1978 Cadillac, 4 dr. sedan, D'Elegance model, 66,000 mi., excel. cond., full power, cruise control. Ext. 3319 or 924-7677 or 744-9802.

HONDA MOTORCYCLE - 200cc, windshield, fairing; Yamaha, 360cc, windshield, sissy bar, new tires. 744-6287 after 7 p.m.

76 HONDA MOTORCYCLE CB500T - red, good cond., 4 spd., \$350 as is. Ext. 2957.

79 BUICK REGAL - V6, auto./console, a/c, p/s, p/b, am/fm stereo, chrome wheels, very sharp, \$3,950. Dave, Ext. 3867.

75 FORD GRANADA - p/s, p/b, a/c, new tires & muffler system, 36,000 orig. mi., very good cond., asking \$2,100. 728-1036 or 728-1867.

77 CHEVROLET CAPRICE CLASSIC - 350 V8, 4 dr. sedan, Jensen stereo & tape deck, \$2,900. 744-2783 a.m.

75 VW BEETLE - runs, new tires & heat exchange, \$500. Chris, 821-1558.

83 CHEVROLET CAVALIER - 2-tone, a/c, p/b, p/s, sunroof, 10,000 mi., excel. cond., best offer. Ext. 2959 or 751-0023.

71 CHEVY IMPALA - V8, p/s, p/b, a/c, 4 dr., good cond., \$1,500. Ext. 2673 or 744-8632 after 6 p.m.

77 VW RABBIT - auto., am/fm, new battery, good cond., 2nd owner, \$1,500. Ext. 3191.

78 MOTORCYCLE KZ400 - lo mi., dealer maint., many recent parts & tune-up, saddle seat, roll bars & rack, \$850. Ext. 7148 noon.

77 KAWASAKI 650 - new tires, kerkers, good cond., sacrifice, \$500. 281-7200.

69 GMC SUBURBAN - 1974 350 cu. in. eng., runs great, new brakes; 1968 Rover, excel. cond. mech. & body, must be seen. Ext. 7148 or 363-2522 after 6 p.m.

81 KAWASAKI MOTORCYCLE - 440LTD, black, low mi., must sell, \$1,000. Greg, 289-6519.

80 KAWASAKI MOTORCYCLE - 440LTD, runs well, rooster, fairing, stereo, new tire, sprockets, chain, \$600. 399-0168.

80 CHEVETTE - excel. cond., new tires, am/fm stereo cassette, a/c, \$2,600. Ext. 3798 or 744-6148.

72 CHRYSLER NEWPORT - reliable, \$250. Carl, Ext. 4420.

77 CHEVY MONZA - sports car, 58,000 mi., very good cond., \$1,700. 281-2002.

78 NOMAD TRAVEL TRAILER - 24', completely self-contained, sleeps 6, used very little, excel. cond. Ext. 4459 or 751-2095.

77 DODGE COLT WAGON - very good cond., red, runs well, asking \$1,000. Fred, Ext. 4261.

66 FORD FAIRLANE - G.T.A., rebuilt 390, C-6, auto., new tires, paint, interior excel. cond. 924-5079.

81 DATSUN - 200SX, mint, 30,000 mi., luxury package, SR, 5 spd., \$5,900. 744-0903.

## Boats & Marine Supplies

MERC. O.B. - 1982, 90 HP, purchased new on 7/21/83, only 20 hrs., mint, \$2,800. 286-1358.

20' FRIENDSHIP SLOOP - new staysail and jib, radio, \$10,000. 929-6748 eves.

1973 LARSON - 1975 Mercury 115, trailer, new controls, good shape, \$3,600. Tony, Ext. 4605.

CONVERTER - 12 volts D.C. to 115 volts A.C., 300 watts, will operate t.v., elec. tools, etc. Nick, 878-0885.

18' GLASPAR - cabin cruiser, w/trailer, 85 HP Evinrude, power winch, ski equip., extras, \$2,000. 265-7806 after 7 p.m.

BOAT LOUNGE SEAT - 67" open length, \$55; boat cockpit ladder, 3 steps, \$15. Tony, Ext. 2957.

25' WINNER - 1973, flybridge, Merc. I/O, C/B, VHF, D/F, porta potti, stove, sink, icebox, sleeps 4, C/G equipped, \$8,500. Bob, Ext. 4100.

34' CHRIS CRAFT - 1955, twin screw, double planked. 281-8313.

SAILBOAT - Sunfish, \$175. Ext. 7727 or 929-4631.

BOAT LADDER - mahogany, new; propane boat/camper stove, used one season, \$20/ea. Kathy, Ext. 7665.

21' T-CROFT - 1972, w/trailer, VHF, porta-potti, 307 Chevy OMC I/O, canvas, excel. cond. 744-9802 after 6 p.m.

28' OWENS - very good cond., new canvas & hard top, stand-up head, stove, sink, ice box, sleeps 4, equipped, asking \$2,800. Ext. 7148 noon.

MERCURY OUTBOARD - 1974, elec. start, in storage the past 5 yrs., \$1,500. Larry, Ext. 4364 or 286-1709.

23' O'DAY - sailboat, keel, centerboard, pop-top cabin, very good cond., \$8,500. 288-3138.

## Miscellaneous

BARCODE READER - for HP41, new, \$70. Ext. 7144.

FEDDER AIR COND. - 7,000 BTU, excel. working cond., sacrifice, \$475; pool filter, s.s., 6 function, w/1 HP motor, excel. cond. 475-6938.

HANDBOOK - for the Technical and Scientific Secretary, \$4. Susan, Ext. 4267.

MINOLTA CAMERA - SRT201, 35mm SLR, w/50mm lens and case, hardly used, \$90. Tony, Ext. 3194.

BARBER CHAIR - early 1900's, white w/green upholstery, great conversation piece, must see, \$100. 422-1846.

STORM DOORS - 30" and 36", \$10 each; 2 sliding closet doors, \$10 each; 24" interior door, \$5. 924-0277.

SINGLE BED - frame and headboard, \$10; bathroom sink and faucet, porcelain, \$5. Joe, Ext. 7961 or 369-0432 eves.

AIR DUCTS - galvanized, various lengths and widths, \$50; book shelf unit, fully adjustable, all wood, \$50; bedroom dressers, good cond., (2) for \$50. 924-8224.

FISH TANK - 20 gal., complete w/all access. Tom, Ext. 3128 or 928-7344 eves.

ROD STEWART TICKETS - (3), at Jones Beach on 9/2/84, \$17.50 ea. Toni, Ext. 5257 or 821-0379 eves.

WINDOWS - double hung, 36"x54", w/storms and screens, used, \$15 ea. 744-5096.

REFRIGERATOR/FREEZER - large upright, still runs, you take, great for ice and beer storage, \$50. Ext. 2198.

KEROSENE HEATER - Kero-Sun Radiant 36, \$90; double dresser, Broyhill "Palm Court", \$150; wing chair, \$90. 286-9389.

PRESSURE COOKER/CANNER - 16 qt., \$25; metal utility cabinet, 72"x18", \$10; hand push lawnmower, \$10. 878-6637.

BABY'S BASSINET - complete, used 2 months, new, \$80, sell for \$40; Timberline wood burning stove, heat entire home, \$200. 929-4840.

GIRL'S BICYCLE - for age 6-10, red, two-wheeler, good cond., \$30. 929-6442.

WOMAN'S BICYCLE - Ross, 3 spd., 26", touring, very good cond., \$40. Ernie, Ext. 2957 or 281-7873.

CAMPING EQUIPMENT - baby things; lamps; boy's bike, girl's bike; sewing machine; desk; coffee table; console stereo; kerosene heater, red-wood table w/4 benches. Gail, 979-9318.

COFFEE TABLE - air conditioner; table lamp; tricycle; bed rail; high chair; bedroom curtains; bedspread. 698-3856.

ORGAN BONTEMPI - elec., single keyboard w/bench & music, \$115; chair, maple, colonial, \$13; bookcase, 48Hx48L, \$22; dresser, vanity & night table, \$130/all; dining room table w/leaves & pads, \$100; lamps, \$30/pair. 286-8517.

MINOLTA LENS - 24mm F 2.8 & Minolta macro extension 100 mm F 3.5, \$90 for both. Ext. 3492 or 727-1412.

MASTER BEDROOM - triple dresser, mirror, night stand, like new, \$300. 563-2847.

WURLITZER CLARINET - w/case, needs corking, otherwise o.k., \$50. Marian, Ext. 3552 or 744-8639 eves.

MOTOCROSS BOOTS - Scott, like new, still in box, water/shock proof, fits size 9-13, cost \$130 sell for \$60. Andy, Ext. 2907 or 929-4850.

BEDROOM SET - men's/women's dresser, w/mirror, headboard, bed frame, mattress & box spring, 2 end tables, \$250. Bill, 928-8379 eves.

EUREKA VACUUM CLEANER - \$20; Wilson T2000 tennis racket, \$15; 6' wide window shades, \$24/pair. 689-7388 eves.

BEDS - double, \$25; single, \$15; both w/boxspring and mattress; redwood lawn furniture, \$50/set; fish tank, 20 gal., access., \$30; boy's bike, \$25. Tom, Ext. 3128 or 928-7344 eves.

DINETTE SET - walnut Formica, 8 cushioned chairs, 2 extension leaves, excel. cond., \$200. Ext. 2476.

SOFA - 90", blue, \$75; beige loveseat, \$100; floral print rocker, \$50; all good cond. Joe, Ext. 5131.

SOFA - modern, 90", 4 seat, Kroehler, yellow floral design, excel., \$150. 363-2070 eves.

MINI BIKE - Briggs & Stratton engine, runs well, \$90. Ext. 4486 or 878-0480 eves.

END TABLE - approx. 21" high, fruitwood, \$35. Ext. 4231.

TV - 6" projection, 2 piece Advent, like new, \$1,100; National Geographic, 1962-1984, any offer; king size headboard, like new, any offer; best oxygen machine, lightest, like new, cost \$3,000 sell for \$500. 929-4701 or 929-8105.

BABY STROLLER - \$20; various speed Revers ceiling fan, \$75; humidifier, never used. Ext. 2410.

SOFA - good quality, colonial style, recently reupholstered, have picture, \$250; good quality 10x11 brown carpet, \$40. Dave, Ext. 4254.

STORAGE SHED - 12'x7'x6-1/2' high, wood frame, metal sides, needs roofing materials replaced, now on trailer for local delivery, \$150. Tom, Ext. 4084 or 878-1060.

POPCORN POPPER - Presto hot air popper, 1 mo. old, \$15. Sally, Ext. 2346.

COLD SPOT ELECT. CHEST FREEZER - old but works well. 475-6938.

MINIBIKE - 3.5 HP, B&S, needs minor work, \$100; go-kart, trike tires, 5 HP, B&S, disc brakes, asking \$450; (2) colonial loveseats & chair, \$300; colonial sofa, chair, ottoman, \$250. 475-1388 weeknights.

ADMIRAL UPRIGHT FREEZER - frostless, 16 cu. ft., excel. cond., \$150. 929-8179.

CALORIC GAS WALL OVEN - very good, best offer, burner top free. 475-2679.

PAINTED DESK - \$20; 8 light crystal chandelier, \$50. Ext. 2977 or 289-4325.

COLOR TV - 19", Hitachi, \$200; Moulinex, food processor, \$40; girl's bike, 3 spd., \$20. Ext. 3525 or 3210.

MATTRESSES - \$25/ea.; table & chairs, \$60; sofa, \$50; crib, \$30; 3 rugs, \$25/ea. Ext. 3525 or 3107.

FIREPLACE SCREEN - \$5; Sears sewing machine & cabinet, \$10. Victor, Ext. 2395.

COLONIAL SECTIONAL - 4 pieces, sturdy, 2 couch cushions need covers, only \$50. 281-7720.

POCONOS COMPLIMENTARY - 2 days, 1 night, dinner, cocktail party, master bedroom, triple dresser, chest and night stand, \$300. 563-2847.

FIREWOOD - full cord, split & delivered, \$135. 399-0168.

STEREO FREQUENCY EQUALIZER - ADC, 5 band/channel, 60, 240, 1,000, 3,500, 10,000 Hz, tape monitor, \$30. 924-0813.

GUITAR AMPLIFIER - (2), Guild model, (2) 10-1/2" speakers, hardly used, \$150. Ext. 7112 or 472-1922.

BRITISH RALEIGH - men's 3 spd., 25" frame, excel. cond., \$140. Ray, Ext. 7509.

ORGAN - Esty, 24-chord, 37 full size keys, Reeds, lifetime warranty; single box spring & mattress, very good cond. 281-2002.

DINING ROOM - dark pine, hutch 80"x70" w, 72" trestle table w/2 leaves, 5 captains chairs, \$950. 981-3750.

DINING TABLE - 2 leaves, 4 chairs, \$125; small refrig., 20"x18", \$30. 744-0903.

ELECTRIC TYPEWRITER - Smith Corona, script letters, like new; ITT touch tone trim line phone, brown; Petite curie phone, ivory. 751-6418.

BIRD CAGE - antique child's blackboard, old wallpaper roller, assorted pieces of furniture. Janet, 929-8152.

## Free

TEDDY BEAR HAMSTERS - (4) young ones, (1) adult. Ext. 4270 or 924-6809.

COLOR TV - Sylvania 23" console, works but needs slight repairs. Ext. 3803.

## Yard Sales

SOUND BEACH - 39 Cove Dr., children's stuff, furniture, something for everyone, Sat., Aug. 11.

## Real Estate

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

## For Sale

MILLER PLACE - 4 bdrms., colonial, formal l/r, d/r, country kitchen, family rm., w/brick fireplace, .9 acre, \$158,000. 331-1718.

RIDGE - 7 rm. ranch, l/r, dinette, kitchen, den or 4 bdrms., basement, stiplone appl. cathedral ceiling, lovely landscaped on acre-plus, owner, \$82,000. 924-0767.

PATCHOGUE VILLAGE - 4 bdrms., 2 baths, family room, l/r, country kitchen, screened porch, 2 car garage, walk to stores, \$83,990. 475-3238.

## For Rent

BERKSHIRES CHALET - 3 hrs. from NYC, 3 bdrm., 2 baths, fully equipped kitchen, elec. heat, deck with spectacular view, near lake, hiking trails, avail. weekends or weekly. 929-6946 after 6 p.m.

NORTH PATCHOGUE - one bdrm. apt., kitchen, l/r, bath, private entrance, w/w, cable hookup, no children or pets, \$425. Carol, 289-3917.

PORT JEFFERSON VILLAGE - 2 bdrm. house, front and back porches, new EIK, all appliances, walk to everywhere, \$1,000. Ext. 4853 after 1 p.m. or 473-4948 after 6 p.m.

HAMPTON BAYS - winter rental, waterfront, Oct. 1 - May 1, '85, furnished house, 2 bdrms., no pets, \$300/mo. + util. 728-2104 eves & weekends.

HAMPTON BAYS - vacation rental, waterfront, 1 acre, secluded, sailboats, 2 bdrm. house. 728-2104 eves & weekends.

EAST PATCHOGUE - 2 bdrms., eik, l/r, bath, 10 mi. from Lab, avail. Sept. 1, \$400/mo. + util., no pets. Walt, Ext. 2907 10 a.m. - 3 p.m. or 698-0576 eves.

SHOREHAM - master bedroom & private bath, kitchen privileges, \$50/week. 744-6287 after 7 p.m.

EAST PATCHOGUE - 1 bdrm., separate entrance, all util. incl., near beach, marina, swimming pool & tennis courts, \$450/mo. 289-9724.

VERMONT HOUSE - reasonable fall or winter vacation, 3 bdrms., 2 baths, l/p, beautiful view, foliage, apple picking, woodland trails, x-country & downhill skiing, family oriented, avail. weekly or weekends. 732-6499 after 6 p.m.

## Car Pools

SETAUKET - paying rider avail. Dave, Ext. 4254.

## Wanted

ACTS - for Aug. 24-25 vaudeville show, auditions, 7:30 p.m., Aug. 13 & 15 in Berkner Hall. Ext. 5154.

ROOMMATE - to share condo., Calverton Hills, female, \$295 incl. all. Sandy 369-0433.

HOLIDAY HOME - for couple, 2 weeks, Sept. 15-Sept. 29, preferably close to Atlantic and w/kitchenette. Marc, Ext. 5186 or 2520 eves.

GOOD HOME - for male neutered cat, loveable, affectionate, well trained. Liz, 286-0913.

HOUSEMATE - share 4 bdrm. 3 bath house, 20 min. to Lab, washer/dryer, dishwasher, sundeck, \$233/mo. + 1/3 util. Ext. 2521 or 928-8379.

TRAINS - Lionel, American Flyer, access., any cond. brings good price. Carol, Ext. 3362 or 924-4097 eves.

## In Appreciation

May I express my most sincere thanks to everyone who so kindly expressed their sympathy upon the loss of my wife. I wish she could have known you all. I am so proud to be a member of such a wonderful group. John G. Keohane

## Classified Ad Policy

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

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

- For Sale: Autos & Auto Supplies     For Sale: Miscellaneous     Lost & Found     Free  
 For Sale: Boats & Marine Supplies