

Health Effects Of Photovoltaic Cells Discussed At Solar Energy Workshop

Solar energy is so "natural" that few laypersons realize that, like all of the other energy technologies, it too may affect the environment and human health if certain problems are not satisfactorily resolved. For example, one of the solar energy technologies presently being developed at a very rapid rate involves photovoltaic (PV) cells. These are the solar cells that have been used in satellites to convert sunlight directly into electricity. They are similar to the semiconductors used in transistors in that they consist of a substrate material like ultra-pure silicon which has been "doped" with very small amounts of other materials like phosphorus or boron to create a small region with electrical properties different from the rest of the material. It is this region, or "junction," that gives rise to the electric current when its electrons are excited by sunlight falling on and being absorbed by the materials.

Innocuous? Yes - so far, and everyone wants to keep it that way. The problem is that in order to improve efficiencies and reduce costs to make this technology competitive with others like oil, various other substrates and a variety of "dopants" are being tried. Some of these, like cadmium and arsenic, are known to cause a variety of toxic effects ranging from interference with nutrition to cancer. And others, like indium and gallium, are simply not sufficiently well characterized to permit one to predict health effects in many cases or even to say to what extent the material might be toxic.

A further problem lies in the fact that whereas the semiconductor industry is tending toward miniaturization and micro-miniaturization involving less and less of these materials, the photovoltaic industry is going to have to be dealing with thousands of acres of solar cells, and the volumes of materials used annually a decade from now is expected to be 10 to 100 times today's annual rate.

To insure getting the PV industry off on the right foot and avoiding future health problems that might require a redirection of effort (or "show-stoppers," as the DOE planners refer to them), the Department of Energy has designated BNL as its "lead laboratory" regarding the environmental, health, and safety aspects of PV technology. In this capacity, BNL will perform both management assistance and research, ad-

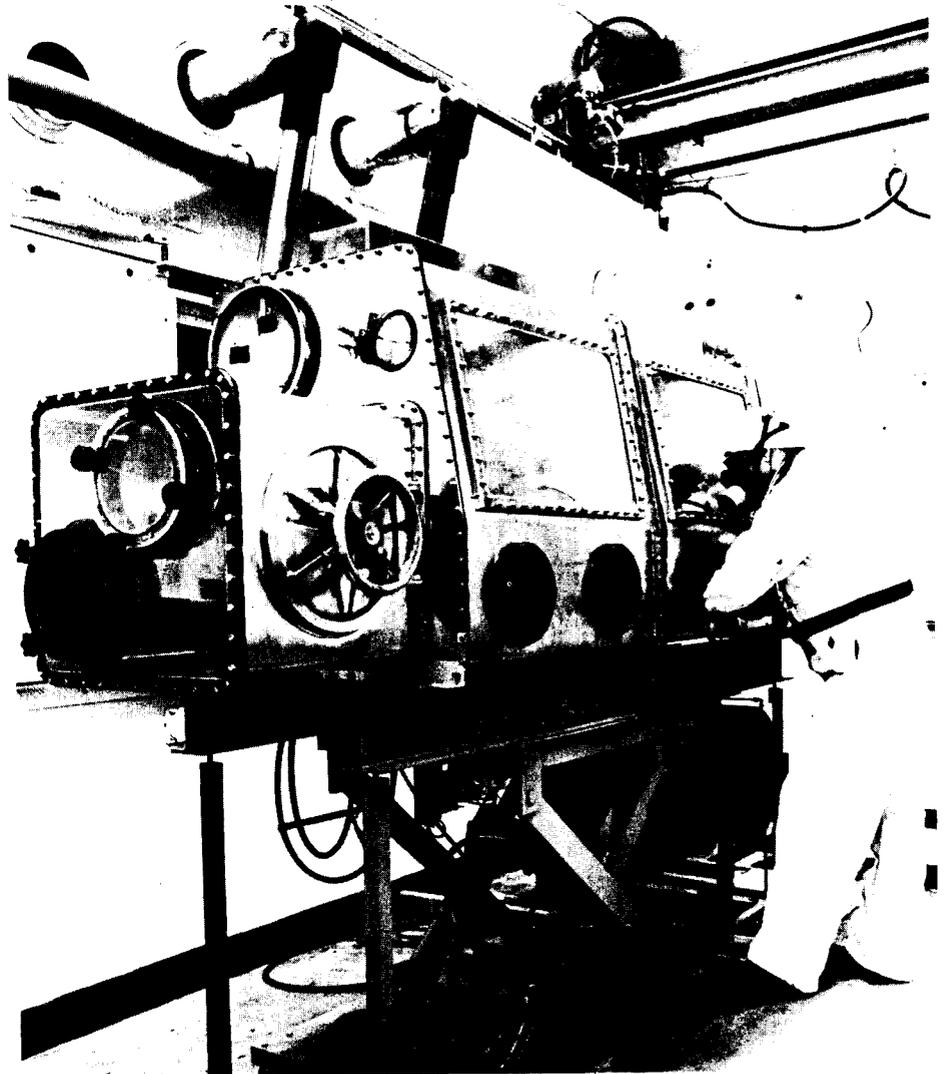
vising DOE of gaps in knowledge and recommending (and, in some cases, carrying out) research programs to fill these gaps. Most of the work is being done in the Medical Department and in the Department of Energy and Environment, but it is expected that others will be involved from time to time from groups like the Biology and Chemistry Departments and the Instrumentation and Safety & Environmental Protection Divisions.

The first task in this effort was to convene a workshop for "the purpose of providing the basis for deciding on the type and extent of health effects research that will be needed to insure the orderly development and utilization of PV technology with maximum safety for workers and the public." This workshop was held in Berkner Hall from July 31 through August 2.

It brought together a wide variety of top experts - altogether some 50 or so from off-site - including government planners, industrial operators, solid state physicists, environmentalists and ecologists, toxicologists, epidemiologists, nutritionists, biostatisticians, physiologists, biochemists, biophysicists, pharmacologists, pathologists, geneticists, electrical engineers, physical chemists, and industrial hygienists. This was the first time that so divergent a group had been assembled, at least in this research field, and it was not uncommon to hear statements such as "I didn't know that [element] might cause a problem" or "I never thought of it in those terms." Many agreed that the workshop had been both interesting and useful and that this type of broad exchange of information ought to be carried out from time to time.

The keynote speaker, Dr. Joyce Lashof of the Congressional Office of Technology Assessment, summed up the situation rather well when she said: "The hope for solar energy is great, but we must be thorough with our assessment. In determining the health risks of photovoltaic cells, it is important that we neither create problems where there are none nor give the impression that there are only a few insignificant ones where conceivably there might be a horrendous one. We will all best be served by accuracy and honesty. We cannot afford many more surprises. Hopefully, conferences like this one will successfully meet this challenge."

—Lou Stang
Medical Dept.



Walter Becker, a Technical Associate with the Nuclear Waste Management Group, performs leachability tests on TRU contaminated material which has been embedded in an experimental solid matrix material. —photo by Rosen

Studies Continue On Waste Disposal

In the ongoing debates concerning the use of nuclear power, one of the biggest issues is that of nuclear waste disposal. But regardless of the future role of nuclear power in this country, the area of nuclear waste disposal deserves careful attention. Even if the United States were to shut down all of its nuclear power generating facilities (an unlikely possibility in view of the current energy situation), there would still be millions of cubic feet of low level and transuranic waste from defense projects and past power production to deal with.

This is why the work of Peter Colombo's Nuclear Waste Management Group is so important. The group is working on ways to more safely contain the nuclear wastes that are generated while, at the same time, examining the results of some past disposal techniques, to evaluate their effectiveness.

There are basically three categories of nuclear waste, explained Colombo: high level wastes, transuranic (TRU) wastes (these are wastes consisting of radioisotopes with atomic numbers greater than 92), and low level wastes. "Presently," says Colombo, "we are primarily involved with low-level wastes, specifically those from commercial nuclear power plants, and with transuranic contaminated wastes."

Colombo explained the term "transuranic contaminated wastes": "In defense work,

there's a lot of internal contamination of things like clothing, paper and protective booties. About 12 million cubic feet of this TRU contaminated material has accumulated and are presently being stored at various DOE sites." Although it has been proposed that these materials be disposed of in geologic repositories, it is becoming evident that some volume reduction process will be required first. Since these materials, consisting mainly of plastics and papers, are organic, and therefore combustible, incineration has emerged as the primary candidate for TRU contaminated waste volume reduction. Incineration, however, produces an inert ash that is highly dispersible and therefore ill-suited for transport. Thus, the ash must be immobilized in some solidification procedure. "What we're doing," says Colombo, "is looking at solidification media which can be used to immobilize the incinerator ash."

The problem of what to do with low level wastes has acquired greater urgency as more and more avenues of disposal have been closed off. Low level wastes have been disposed of at shallow land burial sites. While there were originally six commercial sites, three of them have recently closed, leaving the site at Barnwell, South Carolina, as the only shallow land burial site on the

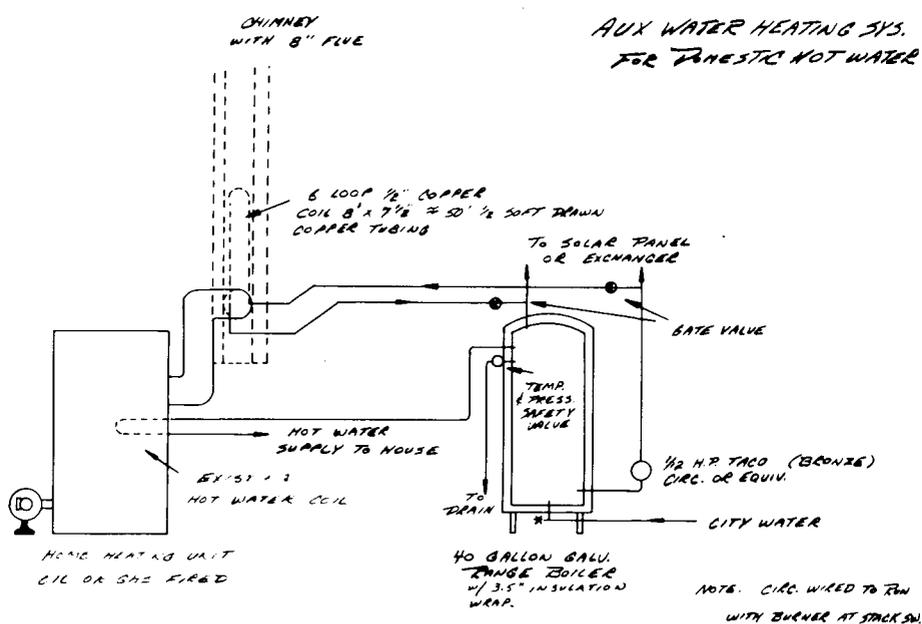
(Continued on page 2)

Tour Features Residential Solar Technology

This weekend's mini tour will feature BNL's Solar Technology Group. Visitors will first be shown a variety of commercially available liquid and air solar collectors. Then, Brookhaven scientists will show and explain their own designs. One of the more unusual is a "trickle solar collector," which has been installed on a rooftop for a working demonstration. Requiring only common materials and minimal skills for installation, the trickle solar collector is the first generation of a low-cost, do-it-yourself design. Another Brookhaven project, a solar assisted heat pump designed for heating and cooling a home, will also be displayed, along with solar absorption cooling units designed for residential use.

In addition to this weekend's mini tour, visitors will view the 15-minute slide show entitled "Brookhaven's Quest" at Berkner Hall, take a guided bus tour of the Lab, and visit the Exhibit Center.

Points EEST:



Hot Water Heating Using Waste Flue Gases

The system I built in 1976 using waste flue gases for heating domestic water has functioned well for three years with minimal modification or maintenance. Construction is basic and none of the plumbing or equipment placement is critical. The system offers several advantages: more domestic hot water available during peak usage periods, no waiting time for domestic hot water when returning to a cool house with a high heating demand, and, most important, the system saves money by saving fuel. The total system costs under \$150.

The hot flue gases pass over the copper coil, which acts as a heat exchanger; this preheats the city water which has been returned to the storage tank. Then the preheated water passes through the domestic coil in the boiler and, only if necessary, is brought up to a higher temperature.

An economy 1/2 h.p. brass circulator, running only when the burner runs, keeps the 40-gallon hot water reserve tank between 130-150° F, with higher temperatures expected during the colder winter months.

The tempering action of the storage tank offers added economy during the warmer months, when system usage is low (water enters the system at 57°).

The original placement of the coil in the flue duct led to condensation buildup and corrosion of the flue pipe. Lowering the coil into the base of the chimney has solved this problem. However, a small drip pan could be fabricated to collect the condensate and the higher flue temperatures could be of more value. The flue pipe at the boiler exit runs at about 600°-700° F.

An addition to the original system was the installation of pipes and valves connecting the tank and circulator to a home-built solar collector. This is to be used in the summer months. —Ron Dobert

(“Points EEST,” – Employees’ Energy Saving Tips – contains employee-suggested conservation ideas, and will be printed periodically in the Bulletin. Contact Lew Jacobson, Ext. 2462 or Sherry Ince, Ext. 7992 to share your idea.)

Arrivals & Departures

Arrivals

Donald P. Becker.....Nuclear Energy
Nicole M. Bernholc.....Safety & Env. Prot.
Stephen P.A. Brown.....Energy & Env.
Paul C.C. Wang.....Applied Math.

Departures

Constance B. Flaherty.....Adm. S. & D.P.
Ann B. Herriott-Immermann.....Energy & Env.
Robert Krasny.....Nuclear Energy
Stephen P. Risotto.....Energy & Env.

Selected Reading

Atom 272, June 1979

25 years of nuclear power. 146-8

Energy saving: An urgent need. 150-1

New Sci. 82, May 31, 1979

I sing therefore I am. J. Cherfas. 716-8

Open University: Birth of a dream. H. Wilson. 722-4

Open University: Bringing up baby. S. Rose. 724-6

Some links in the chain. L. Szilard. 738-40

New Sci. 83, July 19, 1979

The Los Alamos experience. O. Frisch. 186-8

Twenty-five years of atomic energy. C. Sutton. 196-7

DOE Bars

“Gas Clubs”

During Prohibition there were bottle clubs and speakeasies. And so what should spring up in these days of gasoline crises, but “gas clubs.” In one such case, an outfit in Kansas City, Missouri, was allegedly selling memberships at \$200 each, which would entitle members to unlimited gasoline at two cents over the firm’s cost. DOE promptly told them to cease and desist, as DOE regulations prohibit practices, such as special fees, which would constitute a means of charging a higher price for gasoline than normally allowed. In addition, DOE says such a practice would be a violation of the discrimination provisions of the regulations.

Nursery School

A few places are left in the four-year-old classes of the Upton Nursery School. Both two-day and three-day sessions are open. For information, call the enrollment chairperson, Kassie Ruth, 744-2444.

A Puzzler:

I Would If I Could

“I would if I could, but I’m sorry I can’t.” I felt that I had to say this to my Aunt, She seemed to expect me to lend her some cash.

And, knowing my Aunt, that would surely be rash.

I happen to know what her overdraft is; My Uncle’s is large, hers is much more than his.

Her husband, my Uncle, in fact owed the bank

A number of pounds that was, let’s be frank, Sixty-three more than my overdraft then.

Auntie’s and mine are two hundred and ten—

Between them, I mean – and I’d like you to see,

When I say “much,” Aunt’s is Uncle’s times three—

Or as near to three as it can be, Bearing in mind this vital fact:

The pounds we owe are all exact.

What are the overdrafts of my Aunt, my Uncle, and myself?

The solution will be found elsewhere in this issue. If you need to know how it was arrived at, a copy of the explanation can be had by calling Ext. 2345.

—from *A Diversity of Puzzles* by E.R. Emmet.
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Waste Disposal

(Cont’d)

eastern seaboard. This site has a monthly quota on the amount of wastes it will accept. Since 90% of all low level wastes are produced on the eastern seaboard, says Colombo, this one site is inadequate, and some waste has had to be shipped all the way to Beatty, Nevada, the next closest burial site.

As more and more states have closed their doors to nuclear waste burial facilities, there has been renewed interest in a form of low level waste disposal which was once practiced but has been out of use for almost a decade: ocean disposal. The BNL team’s interest in ocean disposal is compatible with the above-mentioned search for a superior solid matrix material and containers; both the incinerator ash technique and ocean disposal require such a material.

“In the United States, waste was disposed of in the oceans beginning about 1946. By around 1962, waste processors had begun to turn to shallow land burial, and the practice of ocean disposal was completely phased out by 1970,” said Colombo. Because of the renewed interest in ocean dumping as a waste management alternative, the Environmental Protection Agency was designated to investigate past practices and to develop controls for possible future use. As a first step, EPA asked Brookhaven to assist in the retrieval of radioactive waste barrels from the oceans, to evaluate how well they had withstood their environment over the past decades. Since 1976, three barrels have since been retrieved, two from the Atlantic site and one from the Pacific. They were brought back to Brookhaven for analysis.

The wastes contained in these barrels, explained Colombo, were “low level wastes which were mixed with and incorporated into concrete. The concrete was poured into the barrels, allowed to set, and they were disposed of in designated ocean disposal sites. Concrete was used almost exclusively as the matrix material simply because it offered sufficient density to assure that the barrels would sink to the ocean floor.”

The retrieved barrels were analyzed for

In Memoriam

John W. Cross, Transportation Coordinator, died August 9, 1979, of a stroke, at Brookhaven Memorial Hospital. Cross, who was 58 years old, had been employed at the Laboratory since March 24, 1947. He started as a chauffeur in the motor pool, became an administrative aide in 1957 and was made Transportation Coordinator in 1958. He was a familiar figure to the BNL staff and to the hundreds of visitors for whom he had arranged safe and efficient transportation over the years. Cross is survived by a son, John M. of Eastport and three grandchildren. He was a resident of East Patchogue.

New York Train Trip

The Hospitality Committee is planning a group railroad trip to the city on Wednesday, August 29. Departure will be at 7:55 a.m. from the Patchogue LIRR station. Round-trip fare for adults is \$2.45, children under six years ride free.

Reserve a ticket by sending your fare through the U.S. mail to P.O. Box 322, Upton, New York 11973, no later than Thursday, August 23. Make checks payable to “Brookhaven National Laboratory.” Your tickets will be given to you on the train. Refunds will be made only if cancellations are received by the Friday preceding the scheduled trip.

corrosion rates, while the cement matrix material was examined for deterioration. “We are looking at the leachability of the radionuclides from the matrix material to attempt a determination of the amount of radionuclides that possibly leaked out of the package,” Colombo explained.

And how did the concrete matrix stand up to 30 years of seawater? “Well, it stood up very well,” said Colombo. “We found that there was little or no loss of strength of the concrete, which means that there was very little attack on the concrete and thus very little deterioration. Concrete has a long cure period,” he explained, “and it cures stronger in a water environment than it does in air.”

Both the incinerator ash project and the ocean disposal project depend on an improved solidification matrix material, and this is the main goal of BNL’s Nuclear Waste Management group. Concrete, as mentioned, is quite durable, but Colombo’s group is searching for materials that will also provide increased retention of radionuclides, that is, lower leachability. Leach rate testing is therefore an important activity of the group. The waste sample, having been embedded in the matrix material being tested, is submersed in a solution which is periodically changed and examined for radionuclides. The amount of radionuclides released as a function of time is what determines the leach rate of a material. The BNL group has been experimenting with different additives which can be incorporated into the matrix material to inhibit the release of these radionuclides. In particular, clays, zeolites and other minerals have been “very effective,” says Colombo.

In discussing his work, Colombo says: “There are, I think, many misunderstandings regarding the radioactive waste situation. There are many people who feel that it’s not a safe operation, people who feel that we don’t have the technology yet for disposing of these wastes safely. I don’t think people have all the facts at this point to make a real evaluation. I think people go more by hearsay at this time and unfortunately, this has hampered the efficiency of our current waste disposal system.”

—Bradley Stolzer

BROOKHAVEN BULLETIN

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CREF Values

August	\$42.17	September	\$41.86
October	38.18	November	38.80
December	39.44	January	40.90
February	39.47	March	41.60
April	41.61	May	40.58
June	42.12		
July		\$42.57	

IBEW Meeting

Local 2230, I.B.E.W. will hold its regular monthly meeting on August 23, 1979, at 8:00 p.m. in the Knights of Columbus Hall, Railroad Ave., Patchogue. There will also be an afternoon meeting at 2:00 p.m. for shift workers in the Union office at 31 Oak Street, Patchogue. On the agenda will be regular business, committee reports and the President's report.

Bicycle Race

The Brookhaven National Laboratory Fall Open Bicycle Race is scheduled for Sunday, Sept. 9 at 9 a.m. with registration from 8:30. In addition to the 2 lap, 32 mile bunch start event introduced last fall, there will be a single-lap, predicted time event. In this race, all entrants have an equal chance, regardless of their athletic prowess, provided they have practiced enough to make a good prediction of their times and to complete the course within 90 minutes. During the event, entrants will not be allowed to carry a watch or other timing device, and speedometers must be covered. One trick is to learn to count your cadence or pedaling speed. Another possibility is just to go as fast as you can and hope your performance is repeatable. A time greater than 90 minutes is disqualifying.

As usual, the race is on public roads encircling the Lab, starting and ending on Wm. Floyd Parkway at the North Gate and including Middle Country Rd., Wading River Rd., Weeks Ave. (also known as North Rd.), Long Island (or South St), Moriches-Yaphank Rd. and Wm. Floyd. The distance is thought to be just under 16 miles. Protective headgear is required of all entrants and an entry fee of \$1.50 is charged.

Medallions mounted on marble plaques will be awarded for the top three times in the 32 mile event, and also for best lap time. In the predicted time event, medallions will be awarded for the three closest predictions and also one medallion for the person who has the fastest lap and predicts his or her time to within 30 seconds.

Solution To Puzzle
Auntie's overraft = pound 205.
Uncle's overraft = pound 68.
My overraft = pound 3.

Golf

The Brookhaven Golf Association's fifth 1979 golf tournament will be held at the Suffolk County Golf Course in West Sayville on Monday August 27, from 11:30 to 1:00 p.m. Tee-off times will be assigned, so all entries must be sent to John Usher in Bldg. 129 by August 24. This tournament is open to BNL employees, their spouses, and retired BNL employees.

Summer Rec Program

On-Site Program

Festivities for last Friday's Halloween Party began with an elaborate display of costumes on parade. This was followed by enthusiastic dunking for peaches (a mouth-watering switch), eating marshmallows from a string, and playing "pin the wart on the witch."

The children were further entertained by a trip through the spookhouse - complete with ghosts, spider webs, and mummies; an experience not easily forgotten.

Costume contest winners were: Scariest - Jessie Holseium, Trachi Sharfman, Ronan Arbel; Best - Jimmy Kirsch, Frank Sculli, Paul Kinsillam; Prettiest - Mina Inone, Ellen Rothman, Lisa Kantor; Most Original - Akiko Aihara, Isabelle Schouler, Stephen Monna.

Coming Events:

This week - Carnival Day
Next week - Monster Day (including a spectacular movie)

Swimming Pool Program

"Put a cup on your head and swim across the pool." Those were the instructions given by the lifeguards to the 4 through 9 year olds at the pool last Friday. As the group attempted this precarious feat in the shallow end, the older children were racing against each other in the deep end while balancing a birdie on the end of a spoon held between clenched teeth. Dexterity was the word of the day as only those with a steady head and nerves of steel came out victorious. Winners were:

4-6 year olds	
1st - Vijay Kale	
2nd - Amir Scharfman	
3rd - Jimmy Kantor	
7-9 year olds	
1st - Megan Holden	
2nd - Lisa Kantor	
3rd - Alyse Holden	
10 year olds and over	
1st - Kristen Holden	
2nd - Ronan Arbel	
3rd - Maurissa Holden	

Coming Events:

This week - balloon race
Next week - Thursday at 7:00 p.m. water carnival.

Softball

League I

Blue Jays 23 - Old Timers 4
Sweathogs 15 - Strikers 11
Phoubars 18 - Ravens 5
Six Pax 7 - Source I 6

League II

DEEgenerates 6 - Charlie Browns 5
Cardinals 12 - Source II 11
Titans 16 - Roga 11

League III

Big Sticks 8 - Binary Bombers 6
Moles 15 - Ice Pops 10

Mixed League

Oh Kays 23 - Who's on First 10
Nads 17 - Confoozed 12

Book Giveaway

The Research Library has three shelves full of books to be given away. They are in the room behind the blue wall and are available now.

Microprocessors

An engineer from Motorola will be here Tuesday, August 28, to give an in-depth talk on the 6800 and 6809 microprocessors from 9-12 in the Hamilton Seminar Room, Chemistry Bldg. (555). An afternoon talk (1:30-5:00) will cover the 6800. Any one interested is welcome to attend. Due to this talk, the usual microprocessor club meeting will not be held.

Attention Bowlers

Due to the success of the Mixed League, the Bowling Board has secured lanes in several bowling establishments. Representatives for registered teams and interested parties should attend the meeting being held on Tuesday, August 21, in Room A, Berkner Hall at 12:00 noon. There is still room in the men's and women's leagues. For additional information call: Dick Larsen - Ext. 3464, Betty Jellett - 3639, Helen Keeley - 4649.

Tennis Courts

All tennis players are reminded that the annual BNL tennis tournament will commence Saturday, August 18. Tournament play has been scheduled for the weekends of August 18 and August 25. Final matches will be played during the week of August 27. Throughout the tournament all six tennis courts will be available for general play only on second priority.

Cafeteria Menu

Week Ending August 24, 1979

Monday, August 20

Beef barley soup	(cup)	.30
	(bowl)	.40
Batter fried steak w/1 veg.		1.45
Franks and beans		1.15
Hot Deli - Pastrami	(on bread)	1.30
	(on roll)	1.40

Tuesday, August 21

Cheese chowder	(cup)	.40
	(bowl)	.50
Chopped steak and 1 veg.		1.25
Turkey tetrazini		1.30
Hot Deli - Grilled Reuben		1.35

Wednesday, August 22

Minestrone soup	(cup)	.40
	(bowl)	.50
Saga's homemade lasagna and 1 veg.		1.40
Fried rice and pork and Chinese noodles		1.40
Hot Deli - Italian sausage and peppers hero		1.30

Thursday, August 23

Chicken rice soup	(cup)	.30
	(bowl)	.40
Chicken pattie parmesan w/1 veg.		1.45
Beef liver and onions w/1 veg.		1.20
Hot Deli - Barbequed beef	(on bread)	1.30
	(on roll)	1.40

Friday, August 24

Clam and celery soup	(cup)	.40
	(bowl)	.50
Pot roast and 1 veg.		1.45
Fish cakes and spaghetti		1.10
Hot Deli - Smoked tongue	(on bread)	1.30
	(on roll)	1.40

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.

The determination of the best-qualified candidate for available positions will be based upon education, experience and other job-related criteria. Such factors will be evaluated and measured against the demonstrable requirements of the available vacancy, as well as the Laboratory's Affirmative Action objectives.

The Laboratory is committed to a policy of Equal Opportunity in its selection and placement of personnel. Its objective is equality of opportunity in employment, training, and promotion without regard to race, color, religion, national origin, sex, age or handicap.

Each week, the Personnel Office lists new personnel placement requisitions. The purpose of these listings is, first, to provide open placement information on all nonscientific 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, as indicated below. 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.

POSITIONS OPEN: Scientific. The following staff positions are open. Candidates may apply directly to the department representative named, or through the Office of Scientific Personnel, Ext. 3338.

BIOPHYSICIST/BIOCHEMIST - The Biology Department has postdoctoral positions open in programs of bioconversion of solar energy aimed at developing: Solar hydrogen-producing vesicle. Contact Dr. J. Olson. Solar desalination membrane. Contact: Dr. G. Hind.

LABORATORY RECRUITMENT: Opportunity for present Laboratory employees.

1063. **SECRETARY** - Requires AAS in secretarial science or equivalent experience performing diverse secretarial duties and coordinating office procedures. Excellent organizational and communication skills are necessary. Working knowledge of Laboratory policies is highly desirable. Will have responsibility for administrative and general secretarial activities in divisional office. Department of Energy and Environment.

1064. **DRIVER** (three positions) - Supply and Materiel Division.

1065. **MATERIAL HANDLER** (two positions) - Supply and Materiel Division.

1066. **GENERAL CLERK** - Supply and Materiel Division.

OPEN RECRUITMENT: Opportunity for present Laboratory employees and outside applicants.

1067. **SENIOR MECHANICAL DESIGNER** - Requires AAS degree or equivalent and extensive background in mechanical design. Experienced in shop practices and general machine design. Working background in vacuum systems and structures desirable. Accelerator Department.

1068. **TECHNICIAN** (weekly or monthly) - Requires surveyor's license or equivalent education/experience to qualify for and obtain a license within one year. Will assist in-house architectural/engineering staff with determining and delineating topographic and utility maps and profiles. Plant Engineering Division.

1069. **TECHNICIAN** - Requires AAS in mechanical technology or equivalent ability to work with machine and hand tools for mechanical properties testing. Will perform fatigue and creep testing on various metals for high temperature gas cooled reactor safety division. Department of Nuclear Energy.

1070. **PATROL OFFICER** - Requires AAS in criminal justice or equivalent experience performing diverse security duties for a large organization. Will participate in comprehensive training program in order to become knowledgeable of site and police procedures. Excellent communication skills are necessary as well as being able to work shifts. Safety and Environmental Protection Division.

(Continued)

1071. HEAVY EQUIPMENT MECHANIC OPERATOR - Requires ability to maintain, operate, and repair all material handling, earth moving, road and ground maintenance and related equipment. Plant Engineering Division.

1072. EXPERIMENTAL MACHINIST - Experienced all-round machinist for non-production work in research and development shop. Project assignments from raw material to final assembly, with demonstrated ability and imagination in all phases of machine shop work. Experience in job print interpretation, layout and machine set up required. Central Shops Division.

Autos & Auto Supplies

78 CHEVY CAMARO - a/t, ps/pb, AM/FM tape, a/c, tilt steering wheel, Rusty Jones undercoating, very low mileage. 981-5993 after 6.

64 CADDI - has oil leak. \$300. Pete, Ext. 3515.

65 CHEVY SS - 283, good running cond. \$200. Frank, Ext. 2332.

75 HONDA CB500T - 9000 mi, 2 helmets, excel cond. 281-5710 after 4.

67 IMPALA WGN - V8, a/t, p/s, cruise control, radials. \$550. Susan, 924-9117.

TRANSMISSION FLUID - Valvoline #341 Type FA for Fords, 4 qts. \$2.50. Joe, Ext. 4212.

69 FORD VAN - 302 eng, a/t, a/c, radio, 8 trk stereo, new paint job, excel cond. Fred, 289-1085.

73 HORNET SPORTABOUT - high mileage, a/c, a/t, reg gas, good tires. \$750. 286-8517 after 5:15.

70 PLYMOUTH DUSTER - as is or any parts, name price. Frank, Ext. 3898.

62 TR4 - fiber fab Jamaican body, competition eng, mech sound, needs completion. \$825. 363-7032.

75 DODGE DART - ps/pb, a/c, 225 eng, a/t, rear defroster, excel cond. \$2100. Ext. 7654, 732-0917.

72 VW BEETLE - compl rebuilt eng, new paint, immac cond. \$2100. 589-5490 eves.

67 MERCEDES BENZ 250S - 4 spd, 92,000 mi. Asking \$1800. Gail, Ext. 3592, 878-4664 after 5.

71 PLYMOUTH FURY III - 360-V8, Edelbrock head, 4 bbl Holley carb, had accident, drivable, good for parts. \$125. Ext. 3404, 981-1195.

CAP - for Ford pickup truck, sliding front glass windows, 8' bed, good cond. Phillips, Ext. 4235.

70 PONTIAC VENTURA - orig owner, 307, ps/pb, a/c, well maintained, very good cond. \$1225. Larry, Ext. 7979, 261-5030 after 6.

4 TIRES - HR78-15 mounted on 76 Ford van rims, good cond. \$65. Don, Ext. 3384.

77 GRAN PRIX - sm 8, 22 mpg hwy, a/t, a/c, ps/pb, AM/FM tape, new radials, shocks. \$4500. Don, Ext. 7658.

70 MAVERICK - a/t, 6 cyl, runs well 19-23 mpg. \$250. Tom, 286-1899.

HOODS - to fit 71-72 Chevy Vega, \$20; 70-73 Camaro, \$40; orig owners manuals for 50 Ford & 65 Chevy, \$5 ea. Sue, Ext. 2050.

VW GEN - 6 volt, fully chrome incl fan assembly, \$50; 1 pr blk VW seats, high backs, excel cond, \$50. Lee, Ext. 4447.

SNOW TIRES - w/rims, 6.5x14, fit VW bug or similar. \$20/pr. Bill, Ext. 4100.

SNOW TIRES - H78-14, mounted 72 Torino rims. \$10 ea w/old tires mounted. Jerry, Ext. 7611.

71 FIAT 850 SPIDER - recently rebuilt eng, good tires, extra parts, broken axle. \$175. Jerry, Ext. 2898.

70 BUICK LE SABRE - good running cond. \$550. 732-0622 after 6.

TIRES - (2) 195-14 Mich-radial tires, very good cond, plenty of rubber. \$40 takes both. Bob, Ext. 2964.

75 PINTO - 4 spd, new radials, brakes, batt, muff, good cond. \$1800. Pete, 325-1545.

68 BONNEVILLE - ps/pb, a/c, new exhaust, batt, good running cond. Asking \$550. Gary, 288-9792.

TIRES - (2) G70-14, mounted on Chevy rims, good rubber, \$20; 1970 Honda 450CB, 10K mi, excel cond, \$650. Ext. 4316, 924-3783.

Boats & Marine Supplies

11' MOTH CLASS SAILBOAT - wood covered fiberglass, 1 main. Asking \$225. 289-0925.

16' BOAT TRAILER - 1976 Highlander, 1200 lb cap tilt-bed, galvanized, good cond. \$200. Ext. 4661, 363-6406.

18' FIBERGLASS RUNABOUT - w/50 hp Mercury & EZ Load trailer. \$1700 compl. Les, Ext. 4074.

16' MFG - 1974 trihull, 120 Merc IO, excel cond. \$3500. Jerry, 661-3658.

HYDROPLANES & MOTORS - Best offer. 286-9197.

28' PACEMAKER - Sport Fisherman, F/B, DF, outriggers, good cond, in water, ready to go. Dick, 363-8981.

18' WINNER BARONET - F/G, w/trailer, sleeps 2, good cond. Joe, 286-9260 eves.

19½' THUNDERBIRD - fiberglass tri-hull, 1974, 115 hp Merc, low hrs, full canvas, trailer, Port Jeff slip. \$3400. Susan, 981-1195.

12' ALUM SEARS BOAT - \$125. Ext. 3654.

24' WINNER 1978 - 198 I/O Mercruiser cuddy, compass, CB, must sell. Asking \$11,250. Pat, 589-0421.

SERVICE MANUAL - Mercury outboard, up to & incl 1974, all models. \$5. B. Espensen, Ext. 3992.

15' FIBERGLASS MFG - 50 hp elec start Mercury, galvanized trailer. Dick, Ext. 2881, 286-3372.

Yard Sales

PORT JEFF STA - 149 Stuyvesant Dr, Aug 18-19, asstd items. Ext. 3609.

MIDDLE ISLAND - Woodville Rd, Aug 18-19, rain date Aug 25-26, 3 pc liv rm set, kitchen table, beds, loads of odds & ends Ext. 3284.

MASTIC - 10 Millford St, Aug 18-19. 399-4929 for directions.

MASTIC - 5 Ditmas Ave off Babylon St, Aug 18, rain date Aug 19, 10 a.m.-4 p.m. 281-8538.

CORAM - 151 Paul's Path No, Aug 18-19-20, contents of house, furn, clothes, tools, bric-a-brac. 732-9384.

Miscellaneous

TYPEWRITER - antique, Remington Model 10, manual, 1940's era, excel cond, works; French bks & texts, 13 different. Dennis, Ext. 4259, 736-2534 eves.

GIBSON GUITAR - 100w amp, like new. Cost \$266, asking \$185. 924-0960 after 5.

CHILD'S BIKE - Tyler 20" convertible. \$15. Ext. 4754, 689-8090.

A/C - Emerson Quiet Kool, has 3 cooling selections, 200v, 18,000 BTU, can cool up to 3 rms, very good cond. \$175. 744-5801.

SUZUKI CLASSICAL GUITAR - new cond, great projection top & back. \$175. Ext. 2807.

BIKE - 23" Dawes Galaxy w/Bellweather Pannier bags. \$135. Chip, Ext. 2345, 744-2069 after 6:30 p.m.

DINETTE SET - 5 pc, excel cond. \$50. Bob, Ext. 3309/3310.

LIV RM SET - couch, chair, love seat, ottoman, brn/white stripe Herculon, \$125; 1 coffee & 2 end tables, \$50; Sankyo LXL-125 super 8 movie camera w/case, like new, \$115. 928-6944.

REFRIG - w/freezer, Hotpoint 17 cu ft. 941-4581.

WEDDING DRESS - size 8-10, compl, used once, \$65; 2-drawer night tables, \$5 ea. 281-7844.

SINGER FLOOR POLISHER - \$70, negotiable. 736-2511 after 6.

GUITAR - Gibson Les Paul deluxe, w/case, mint cond; scuba equipment, fins \$15, hood \$12, gloves \$15, boots \$15, wgt belt \$20. Phil, Ext. 2563.

LADIES BIKE - 10-spd Mossberg, med wgt, good cond. \$100. P. Oster, 286-1248.

POLAROID LAND CAMERA - excel cond, \$12; collector's item, Billy Carter beer cans, best offer. 727-5912.

STORM WINDOWS - (3) 31"x55", \$15 ea; screens, (4) 28"x47", \$13 ea. Andy, Ext. 2424.

ESTEY ORGAN - dbl keyboard, good cond. \$100. 924-6582.

4 ALUM SASH & FRAMES - dbl hung, for masonry walls, 37¼"wx41"h, can be adapted to wood frame structure. \$15 ea, 4/\$55. Pat, Ext. 4519.

PANASONIC RCVR - turntable, Realistic stereo tape-deck, 25 w/channel amp, 2-12" 3-way spkrs. \$300 or best offer. George, Ext. 4311, 698-3174.

DISHWASHER - harvest gold, can be used as portable or stationary, \$50; 30" gas range, harvest gold, continuous cleaning oven, \$50. 981-5993 after 6.

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

HOLTSVILLE - 2 bedrm ranch, bsmt, fenced, beautifully landscaped prop, near Expressway & Nicols Rd, 20 min from Lab. \$22,000. Ext. 7654, 732-0917.

ROCKY POINT - Tide area, 3 bedrm ranch w/fin bsmt, ½ acre, prvt beach, near shopping center, many extras. Sam, Ext. 3911, 821-1810.

FT MYERS, FLA. - 2 bedrm, 1 bath, L/R, Fla rm, din area, patio, a/c, close to beaches, shopping & churches. 654-2972.

RIDGE - townhouse/condominium, 2 bedrms, a/c, w/w, 5 appl, 2½ mi from BNL, excel cond. \$2500 over mtg. 924-7963 after 6.

SHOREHAM - 4 bedrm colonial, 2½ bathts, fp, eik w/bay window, ½ acre, fenced, north of 25A, walk to beach. Ext. 2627, 744-3443 eves or weekend.

SHIRLEY - 75x125, custom built high-ranch, 3 bedrms, 2 full baths, formal D/R & fam rm. fp, huge eik, 2-car gar, enclosed patio, many extras. Ext. 3284, 281-3945.

SHOREHAM - 3 bedrms, 2 baths, 2-car gar, full bsmt, fp, gas heat, a/c, L/R, fam rm, hall w/w, fenced-in yard. \$42,900. Must sell. Ext. 3707, 744-0007.

BELLPORT VILLAGE - \$5000 cash assumes 8½% mtg on 3 bedrm ranch, 6 yrs old, fully insulated, OHW, s/s, ½ acre. Wayne, Ext. 2824, 286-3404.

E. PATCHOGUE - So of So Country Rd, 2 or 3 bedrms, fp, screened porch, alum siding, full bsmt, gar, low taxes, assume mtg. \$35,500. Ext. 7992, 286-2905.

BROOKHAVEN HAMLET - charming older home, S. Country Rd, 3 bedrms, window seats, 29' L/R, D/R, eik, 2 fp, screened pch, fin bsmt w/bar, 2-car gar w/extra rm, chicken coop, 0.6 acre, lg veg & flr gdn, very low taxes, 8.5% mtg. Ext. 2633, 286-1056.

PORT JEFF STA - 4 bedrms, den, fam rm w/fp, 2½ baths, detached gar & ½ w/workshop, lg eik, insulated, partially fin bsmt, new stockade fence. \$34,990. Ron, Ext. 3162, 473-6862.

CORAM - Strathmore East, 3-4 bedrms, 2 full baths, play/hobby rm, 5 appl, a/c, carpeting, fenced yard, patio, energy-saving extras, Middle Country Schools. Asking \$34,900. Ext. 2482.

BELLPORT - S/S Country Rd, 9 rms, 4-5 bedrms, den, 3 baths, lg eik, fp, gas heat, 2-car gar, lg breezy front porch, huge trees. Anne, Ext. 3404, 286-3764.

ST. JAMES - Head-of-the-Harbor, 5 bedrm 2-story older home, 2½ baths, 3 fp, formal D/R, 1½ secluded acres, lg flr & veg gdns. \$62,000. Anne, Ext. 3404, 584-5685.

FLORIDA - Inverness Highlands West, 80x120 lot. Lists for \$3580, sell for \$3300 or best offer. Susan, Ext. 3404, 981-1195.

CENTEREACH - 3 bedrms, L/R, D/R, eik, bsmt, gar OHW, new roof, 6/10 acre, 8½% VA mtg, low cash over. Asking \$33,000. Ext. 3404, 981-1195.

CORAM - Tanglewood Hills, 4 bedrms, 15x20 den w/fp, L/R-D/R w/w, eik, 2 baths, 2 car gar, fenced, 4 appl, 4/10 acre, gas heat, SD # 12. Asking \$38,000. Ext. 3404, 698-4966.

SHOREHAM NORTH - 6 yr, 3 bedrm custom ranch, low taxes, fenced & treed, many extras. Asking \$50's. Ext. 3707, 744-8020.

MASTIC ACRES - 6 rms, full bsmt, baseboard heat, usable attic, ¼ acre. Ext. 2547, 281-5498.

BELLPORT VILLAGE - ideal location close to stores, water, beautiful mod 4 bedrm colonial, 2½ baths, eik, D/R, L/R, den w/fp, 2-car gar, full bsmt, assumable mtg. \$55,000. Ext. 7730, 286-8097.

CORAM - 4 bedrm cape, eik, D/R, L/R, 2-car gar, fenced-in prop, ½ acre. \$38,900. Ext. 2951, 473-1585 after 6.

SETAUKET - N/25A, 4 bedrms, 2-car gar, 2 baths, L/R & fam rm ea w/fp, D/R, ¾ acre landscaped. \$70,000 firm. Ext. 2337, 751-1283.

For Rent

MASTIC - 2 rms, bath, prvt ent, single or couple, no pets, no children, all util, a/c, avail Sept 1. Ext. 3289, 281-9411.

VT CHALET - beautiful furn, stone fp, woodland hiking trails, swimming pond, lake, canoeing, fishing, near golf, tennis, antiques, alpine slide, rent weekly. Ext. 3448, 757-5599.

NO. PATCHOGUE - 2 bedrms, carpeted, L/R, extra lg eat-in country kit, full bsmt, fenced yard. \$375. Ext. 7995, 654-2093.

CENTER MORICHES - Holiday Beach, 2 bedrm ranch, corner plot fenced, water view. \$275/mo. Bob, Ext. 3309/3310, 289-1568 after 6.

CORAM - modern 1 bedrm apt w/pool & tennis courts, sublet-so save on rent & security. Ext. 2336, 928-7760 eves.

REMSENBURG - new contemporary home, furn, L/R w/fp, 3 bedrms, den, kit, laundry rm, 2 baths, 1.75 acre, pretty area, 25 min from Lab. \$350/mo. Ext. 3046, 325-0582 after 5.

MILLER PLACE - lg barn apt, fp, deck, spectacular view, furn/unfurn, avail Sept 1, new paint, w/w. \$400. Ext. 2072, 473-3777.

WADING RIVER - lg 2 rm bsmt apt, fully furn, util incl, a/c, on beach, prvt ent. Lease, \$250. Ext. 4587, 929-8443.

BAYPORT - Fairview Ave, 3 bedrm house, excel location, good school dist, rent from Sept 79-June 80. \$375/mo. Ext. 4203, 472-2020.

SOUND BEACH - 1 bedrm apt, prvt ent, kit, L/R, full bath, single person preferred. \$260 incl util. Ext. 2521 928-8379.

STONY BROOK - studio apt, 364 sq ft, partially furn, 20 mi from Lab, bicycle distance to SUNY, carpool possible. \$250/mo incl util. Ext. 4044, 751-3889.

PATCHOGUE - 2 bedrms, L/R, kit, bath, no pets. \$325/mo incl util. Ext. 4823, 475-9131.

SOUND BEACH - 5 rms unfurn, incl util, lg prop, quiet neighborhood. Rich, Ext. 4308, 665-6189.

BELLPORT - 3 bedrm house, 1½ baths, stable, spacious paddock, near BNL, walk to shopping, golf, tennis, beach. Avail Nov for 1 yr. Ext. 3841, 286-9450.

E. PATCHOGUE - so. of So. Country Rd, 2-3 bedrm, fp, screened porch, alum siding, full bsmt, gar, \$350 plus util. 286-2905, Ext. 7992.

Wanted

PLEASE ADOPT - beautiful blk cat, 1 yr old, spayed, litter trained, affectionate. Ext. 4049.

BABYSITTER - for 6 yr girl, very active, from 12-5 starting 9/79. Ext. 3167.

BABYSITTER - for 2 children, prefer on-site, few days at end of Aug. Ext. 2980, 289-0532 after 5.

APT - 1 bedrm or studio. Ext. 2841.

MATURE WOMAN - to mind 3 yr old boy on site from 8 am-5 pm, desire someone w/child the same age. R. Cohen, Ext. 3480, 473-8717 eves.

SEWING MACHINE - old, no fancy options & cheap. Gene, Ext. 3225, Ext. 4821 eves.

COINS - buying coins, collections, estates, accumulations, highest prices paid. J. Spillman, Ext. 4605.

ROOMMATE - to share 3 bedrm furn apt in Shirley. Your total cost \$160/mo util incl. Willy, Ext. 3012.

BABYSITTER - 4 or 5 days/wk, part time. 928-5737 after 12:30.

ARCHERY EQUIPMENT - compound bow arrows, arm guard. Ext. 4506.

TERMINAL - silent, w/phone coupler preferred. M. Paranjape, Ext. 3941.

BABYSITTER - on-site, for 2-3 days/wk until Nov, 2 children 3 yrs & 10 mo. Dan, Ext. 3145, 689-8040.

LOVING HOME - for adorable male, tiger-striped kitten. 751-0851 days, 751-7661 eves.

CAMPING GEAR - 2-3 man tent, stove, lantern, etc. Dave, Ext. 3404, 286-0703 eves.

HOUSEMATE - to share 4 bedrm, 3 bath unfurn house in Coram. \$155/mo plus share util. Ext. 2521, 928-8379.

CLEANING HELP - part-time, 1 half day/wk, Miller Place. 331-3724.

OCCASIONAL BABYSITTER - for 2 yr old, Stony Brook/Setauket area, eves and/ or weekends. Ext. 2254.

BABYSITTER - 3 mo old baby, 3 days/wk, 9am-5pm, prefer on-site. 281-0197.

2 BEDRM APT - preferably in Pt Jeff Sta/Terryville area. Judy or Ken, 928-6939.

HOME - for white male poodle, 4 yrs, free. 281-9504.

HOME - needed for a beautiful, intelligent, protective dog, Doberman-Shepherd spayed female. Ext. 4883.

HOME - for pedigreed Keeshond, 3 yrs old. Mary, Ext. 4215.

EMPTY PLASTIC EGGS - from L Eggs panty hose, to make dolls for children. E. Pluta, Ext. 2957.

3 BEDRM HOUSE - Miller Place North, mid \$30's. Janet, Ext. 4049, 331-2018.

Car Pools

1 DRIVER NEEDED - vicinity Exit 32 So State Pkwy. Plotkin, Ext.4717.

MORE DRIVERS NEEDED - for existing car pool, Patchogue-Holbrook Rd area. John, Ext. 2485.

Lost & Found

LOST - book "The Sea The Sea" by Iris Murdoch. If found contact Anne, Ext. 2584.

Ads left out of this issue due to lack of space need not be re-submitted to appear in next week's issue. Please note that ads may not be more than 15 words long and must be received in the Bulletin office by noon, Monday, for publication on Friday.