BROOKHAVEN BULLETIN
Vol. 35 - No. 36 September 18, 1981
BROOKHAVEN NATIONAL LABORATORY

Coping With The Fuel Oil Crisis

BNL Research Aids Homeowners

As a Long Islander, your home is probably heated by an oil-fired, forced hot water heating system - the type that accounts for about 95% of Long Island's residential heating units.

There are over 600,000 boilers here, using almost 800,000,000 gallons of oil annually to provide space heating and domestic hot water. In the past few years, DEE personnel have monitored many of those heating units to see how efficiently they are using fuel oil and to determine how that efficiency might be improved.

So far, BNL is involved with four DOE-funded programs in this area, all of which were organized under the leadership of Frank Salzano, ~~then~~ head of the Energy Storage and Con~~servation~~ Division. The Efficiency Testing Program, which began in 1976 and is now under the direction of research engineer Dick Krajewski, evaluates units in the laboratory. Since 1977, Bud Woodworth has headed the Space Conditioning Technology Program, managing contracts in research and development of more efficient heating systems. From 1979-1980, the BNL Oil Refit Program provided technical support to the Pilot Fuel Oil Conservation Marketing Program, which tested Long Island homeowners' heating units for efficiency and offered limited suggestions for upgrading them. The Oil Refit Option Qualification Field Test Program, begun in July 1980, investigates and evaluates additional options available in today's market. This program concludes in October.

Much of the information gathered from these programs is contained in DEE summaries (see Related Reports) prepared by Gerry Dennehy, head of the Conservation Programs Management Group. Bob Hoppe, Project Manager for the Oil Refit Program has been involved with all of the DEE efforts and recommends this reading material for the homeowner. "Understand your home heating system," he says. "Become familiar with the terms (see Glossary). Then you'll be in a better position to evaluate refit options and either optimize your unit or replace it."

BNL Report 51159, "Evaluating and Selecting Options for Oil Refit Programs," which Hoppe co-authored with Salzano and research engineer, William Graves, may be particularly helpful, he says. While this was originally intended for use by fuel suppliers and servicemen, it can also help the homeowner evaluate an option by determining the answers to such questions as: Can the option reclaim and recycle waste heat? Are off-cycle losses reduced? How much does it add to service costs? How much fuel will it save?

Applying these criteria to a host of devices in the Oil Refit Program, DEE has concluded that the flame retention head burner is the basic proven option for application to existing heating units with reasonable life expectancy. Both field and laboratory tests have shown that replacing the old oil burner of a boiler that is not equipped with fire tube baffles with this improved burner can yield an annual fuel savings up to 15%. And, since the new burner merely replaces a major component, rather than adding a new feature to the system, future service costs should not be affected.

Hoppe says that combining refit options is often preferable to treating them as single-choices, which is generally the way they are marketed. For example, when fire tube baffles are installed at the same time as a retention head burner, at an additional cost of about $25, the savings rate can go up to 19%. With the cost of boiler-burner replacement about five times that of replacing only the burner, Hoppe favors this approach. "Many homeowners have heating units in good condition," he says. "Rather than spending up to $2000 to replace one, perhaps they should optimize it by retrofit."

Ideally, fuel-savings in the home should focus on what Hoppe calls an Integrated Systems Refit approach. This involves looking at every system within the house - from the building envelope to food preparation - and retrofitting each one as needed.

Hoppe predicts this will be particularly crucial in the next few years. To explain why, he presents "A Scenario For Home Heating." Shown in the box, it summarizes typical conservation approaches taken since 1978. Note that, with the continual rise in fuel cost, homeowners have paid more each year for fuel, despite annual reductions in usage.

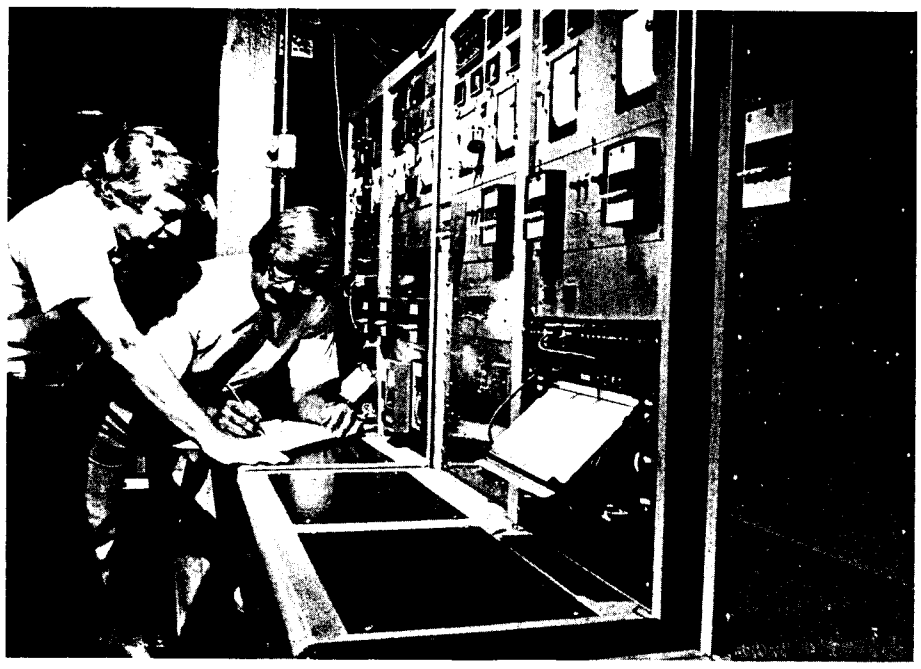
As the scenario shows, homeowners now stand at a threshold for major refit spending. With oil at $1.30 a gallon and projected to rise to $2 per gallon by 1985, Hoppe calls this a "fuel cost crisis." He points out that rising fuel costs will affect more than the

(Continued on page 2)

A Scenario For Home Heating

Typical Conservation Approach			Space Heat Loss (Typ.) (MBH)*	Annual Oil Use (gal.)	Oil Costs	
Year	Description	Avg. Cost			Per gal.	Annual
1978	Conventional weatherization (adding storm windows, caulking, more attic insulation)	$200	50	1,300	$.55	$715
1979	Price induced conservation (turning down thermostats, wearing sweaters)	-0-	47	1,200	$.85	$1,020
Threshold for moderate additional refit spending (triggered by rising fuel costs)						
1980	Heating equipment refit (replacing burners, using vent dampers, controls, etc.)	$400	47	1,000	$1.12	$1,120
Threshold for major refit spending (triggered by fuel cost crisis)						
1985	Major home envelope refit (adding super insulation, improving windows and doors, installing passive solar technology)	$8,500	30	650	$2.00	$1,300

*MBH - Thousand BTU per hour at design conditions (design heat loss)



Doug Humphrey

At the testing laboratory in Bldg. 526, Bob Hoppe (left) and Dick Krajewski analyze data recently obtained from the Efficiency Testing Program.

Related Reports

Available through DEE (Ext. 2360) or Public Relations (Ext. 2345):

Adding a Flue Damper to a Home-Heating System, Jan. 1981.

Adding a Flue Economizer to a Home-Heating System, Jan. 1981.

*As-Found Steady State Efficiency and the Changes Achieved by Refit for Oil-Fired Home Heating Units, W. Graves and R. Hoppe.

Boiler Water Temperature Reduction (BWTR), Oct. 1980.

Converting to a Flame-Retention Burner for More Efficient Heating, Jan. 1981.

BNL 51159, Evaluating and Selecting Options for Oil Refit Programs, W. Graves, R. Hoppe, and F.J. Salzano, Feb. 1980.

**Final Report for the BNL Oil Refit Option Field Test Program.

Gas Versus Oil as a Home Heating Fuel, Oct. 1980.

High Efficiency Residential Boilers, Jan. 1981.

Rating Your Oil Home-Heating System, Mar. 1980.

Upgrading Your Oil-Hot Water Home-Heating System, Aug. 1980 (with Feb. 1981 insert).

*available about 11/81
**available about 1/82

Glossary

Baffles (also called turbulators) - Plates that alter the flow of hot gases through a boiler equipped with a fire tube heat exchanger.

Boiler - A major component of a forced hot water home heating system. It includes the burner, combustion chamber and heat exchanger.

Burner - The heating system component that generates heat by burning fuel in a combustion chamber usually located at the bottom of the boiler, under its heat exchanger.

Flue - A metal pipe that connects the boiler to the chimney for disposal of noxious combustion gases.

Flue Damper - A circular plate in an approved electro-mechanical device which, when fitted in the flue and in the shut position, closes the pipe. This seals off the boiler if the burner is not firing and reduces off-cycle heat losses.

Flue Economizer - Recovers heat from hot flue gases by recirculating water that is returning to the boiler through a separate heat exchanger in the flue.

Furnace - A major component of a forced warm air home heating system.

Flame Retention Head Burner - An improved burner design which makes the entering air stream more turbulent improving the air/fuel mix and lessening excess air requirements.

Refit Options - Devices and systems available for upgrading existing home heating systems.

Steady-State Efficiency - A term used to quantify the performance of home heating units. Determined by analyzing flue gas concentrations of carbon dioxide or oxygen and the gas temperatures to estimate the percentage of input energy lost up the flue. Measurements are made while the heating unit is operating under steady-state conditions. The efficiency figure does not account for other losses that occur. During burner operation, energy is also lost through the boiler jacket to the surroundings. When the burner is off, the entire system uses heat to the surroundings and up the flue as it cools.

Carey To Visit Lab

Governor Hugh L. Carey is expected to make an announcement of major importance to the Laboratory and, consequently, to Long Island, on Monday, September 21, at 11 a.m. in Berkner Hall. The New York Governor will be accompanied by John S. Dyson, chairman of the Power Authority of the State of New York. Employees who can be excused from work are invited to attend.

Doug Humphrey

Participants in the contract signing this week were (from left) Harold Alford, Controller of I.H.C. Corp.; Ira Hamilton, President of I.H.C. Corp.; Vincent O'Leary, BNL Associate Director; and James Desmond, BNL Business Manager.

L.I. Firm Awarded Contract

The I.H.C. Corp. of Hempstead, New York, is the recipient of the largest lump sum construction contract ever awarded to a minority contractor by BNL. The contract, in the amount of $725,000, is for general construction at the Central Steam Plant which will result in the conservation of fuel, and is expected to be completed by September, 1982.

As outlined in a Bulletin story (February 27, 1981) Plant Engineering has embarked on a comprehensive project to retrofit all four oil-fired boilers at the Central Steam Plant. Under their contract, the I.H.C. Corp. will install new equipment such as the flue gas economizer, a boiler/burner management system, new burners, fuel oil pumps, air compressors and an UPS (uninterrupted power system), as well as do the necessary piping, electrical and structural work.

DOE's Office of Facilities and Construction Management is funding the project, and it was designed by Stone & Webster Engineering Corp., New York City. BNL's Ed Murphy is the project engineer.

Selected Reading

Scientific American 245 (3) September 1981.
Industrial Microbiology.
Arnold L. Demain and Nadine A. Solomon. 67-75.

BioScience 31 (7) July/August 1981
Quality vs. Quantity: Is a U.S. Water Crisis Imminent? Tineke Bodde. 485-88.

Nature 292 (5824) 13-19 August 1981
Scientists in the Soviet Union.
Dorothy Hirsch. 578.

Hendrie To Speak At ANS Meeting

Joseph Hendrie, former chairman of the U.S. Nuclear Regulatory Commission will be the guest speaker at a meeting of the Long Island Section of the American Nuclear Society, on Wednesday, September 30. Hendrie was NRC chairman at the time of the Three Mile Island accident, and he will reflect on that period and on the future of the nuclear industry. Dinner is at 7 p.m. ($9 per person) at the Bavarian Inn, preceded by a cash bar at 6 p.m. Members should make reservations before September 25 with Dianna Seaman at 929-6774.

Scholarship Addendum

Applicants for AUI Trustee Scholarships may also be the sons and daughters of regular, eligible *part-time* employees who began work no later than January 1, 1981. This category is in addition to those already mentioned in last week's Bulletin, namely, children of regular full-time employees, of retired employees, and of employees who died while on regular service at the Lab. Eligibility of stepchildren will be established if the employee regularly claims the child as a dependent for income tax purposes.

I.B.E.W. Meeting

Local 2230, I.B.E.W. will hold its regular monthly meeting on September 24, at 6 p.m. in the Knights of Columbus Hall, Railroad Ave., Patchogue. There will also be an afternoon meeting at 2 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.

William Horak Wins ANS Award

William C. Horak, Department of Nuclear Energy, has received the 1981 Mark Mills Award of the American Nuclear Society. Established in 1958, the award is presented annually and is for the best original technical paper on nuclear science and engineering submitted by a student.

Horak won the award for his paper on "Coarse Mesh Methods for the Efficient Numerical Solution of Laminar Flow Problems." He will receive a certificate and $500 at the ANS meeting in San Francisco later this year.

At the University of Illinois, Horak obtained a B.S. in aeronautical engineering and his Ph.D. in nuclear engineering. His thesis advisor was Dr. John J. Dorning who won the 1967

Mort Rosen

William C. Horak

Mills award for his own research as a graduate student. Dorning did his prize-winning research at BNL and was a staff member from 1967 to 1970 before he joined the University of Illinois.

Horak, now an Assistant Nuclear Engineer with the Code Development, Verification and Application Group of Nuclear Safety Programs, also held student appointments at BNL during the summers of 1976, 77 and 78, in what was then called the Department of Applied Science. He joined the DNE staff in December 1979.

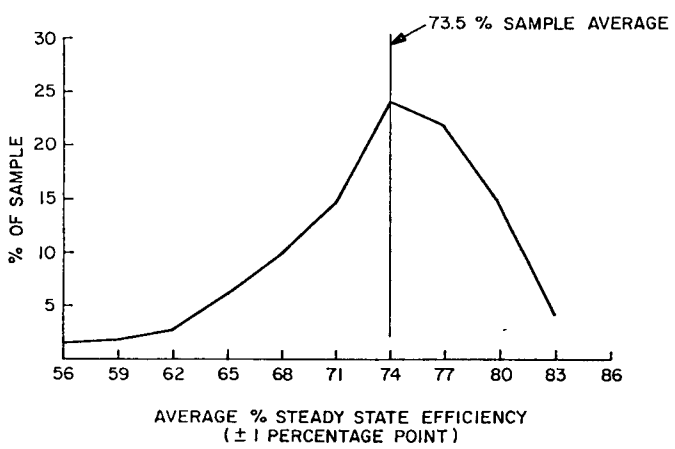
Coping With The Fuel Oil Crisis (Continued)

price of heating a home. For example as fuel costs increase, so will school taxes, transportation costs, and utility bills.

"Somebody has to get involved with this problem," Hoppe suggests, adding, "I anticipate too many people who own single family homes being unprepared for a fuel cost crisis." To minimize the impact of this situation, Hoppe says, "We have to reduce the energy requirements for our houses - perhaps up to 40%. But we need more research to provide more options than we have now." Increased research, innovative financing options, and homeowner education could soften the scenario, Hoppe says, but he adds that lifestyles may also have to be altered. One possible change is that more homeowners will rent out space in the home. "Now it's often illegal," he points out, "so there must be a change in the laws and in the tax structure, to encourage homeowners rather than penalize them. This will provide alternative housing, hopefully at reasonable cost, and enable those who own it to afford their costs."

"I'm presenting a lousy picture," said Hoppe, "but it's just over the horizon. We'll only get through the fuel cost crisis if people are made aware of their options and can take action."

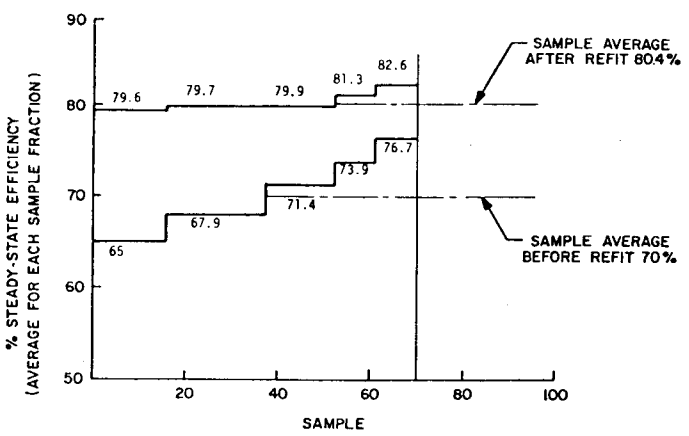
— Anita Cohen

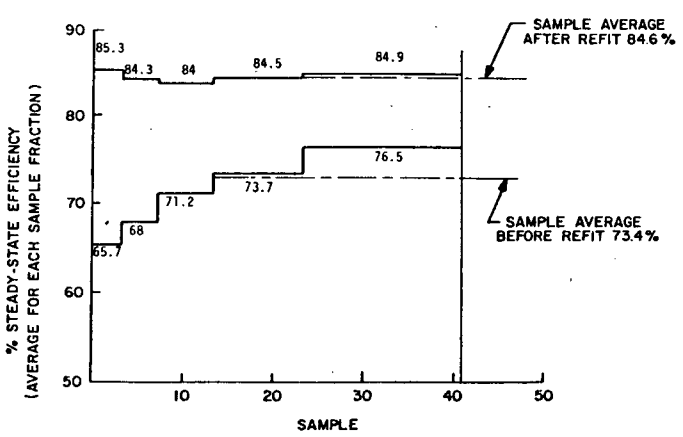


The chart opposite shows the as-found steady-state flue gas efficiencies for a sample of 2540 oil-fired heating units taken for the Pilot Fuel Oil Conservation Marketing Program. Included were 1471 steel boilers, 890 cast iron boilers, and 179 furnaces. 73.5% is the average for the random sample which was scattered throughout Nassau and Suffolk counties.

The effectiveness of retention head burners is indicated by the chart (bottom left). According to these data, taken from the Oil Refit Program, a sample of 70 steel boilers with non-retention head burners (with and without fire-tube baffles) had a steady-state efficiency of 70%. After being refitted with retention head burners, the sample's efficiency rose to 80.4%.

The advantages of combining refit options is illustrated below. As part of the Oil Refit Program, 41 steel boilers with nonretention head burners and a steady-state efficiency of 73.4% were refitted with retention head burners, fire tube baffles, fine tune option, and reduced firing rate. This brought efficiency up to 84.6%.





Arrivals & Departures

Arrivals

Judith A. Giordano .... Energy & Env.
Anthony M. LoCastro, M.D. .... Med.

Departures

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

James K. Ho ..... Applied Math.
Wayne W. Hulse ..... Personnel
Joseph P. LeLaidier ..... Accelerator
Donald S. Makowiecki ..... Physics
Arthur L. Minardi ..... Energy & Env.
Ann B. Roddy ..... Personnel

Think Strawberries

Now is the time to prepare a site for next spring's strawberry plants. As a start, the Cooperative Extension Association recommends improving the organic matter level, soil fertility, and weed control in the future strawberry bed.

Make a soil test in September. Select a site with a pH of at least 5.5. Add any necessary fertilizer and lime this fall. Don't wait until spring because strawberries are sensitive to these applications.

It is a good idea to plant a cover crop such as spring oats or winter rye. This will help to check erosion, retain nitrogen, and choke out weeds. Turn the cover crop under in early spring, then set the plants and be prepared for a delicious berry crop.

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Service Awards

The following employees will receive service awards during the month of September.

Thirty Years

Lola E. Kopp .. Energy & Environment
Ralph E. Weston, Jr. ..... Chemistry

Twenty-Five Years

Michael Degen ..... Nuclear Energy
Robert F. Glasmann ..... Accelerator

Twenty Years

Helen M. Caisey ..... Director's Office
Kenneth J. Foley ..... Physics
Anthony J. Fuoco ..... Nuclear Energy
Barry M. Gordon ..... Energy & Env.
Sanford Lacks ..... Biology
Rosalie Piccione ..... Cont. & Proc.

Ten Years

Anthony J. Baltz ..... Physics
Richard F. Casten ..... Physics
Carl B. Dover ..... Physics
Patricia Valli ..... Physics

Cooking Exchange

The International Cooking Exchange will hold its first meeting of the season on Wednesday, September 23 in the Recreation Building. The theme will be "Bringing in the Harvest" and will feature recipe demonstrations to help you cope with all that super-abundant garden produce.

Meetings are held from 12:30 to 2:30 p.m. and are open to employees and their immediate families. There is a charge of $1 per person at each meeting, and babysitting is provided at 50¢ for each child.

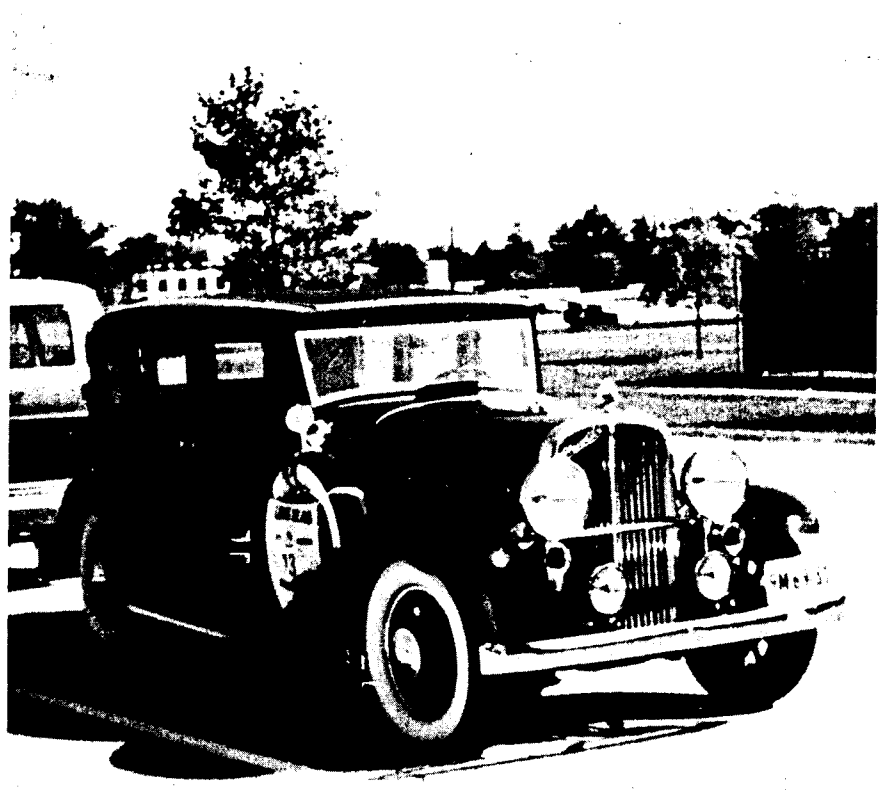
For more information call Mary Daum (744-1898) or Ruth Fernow (928-8465).

NYC Train Trip

The Hospitality Committee is planning a group railroad trip to the city on Wednesday, September 30. Departure will be at 7:55 a.m. from the Patchogue LIRR station. Round-trip fare for adults is $3.50, 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, September 24. 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.

Checkpoint BNL



Employees passing by the Lab this Sunday might have seen a procession of three hundred antique cars motoring on site through the main gate. Drivers of the cars, vintage 1902 to 1934, came for a tour of the Exhibit Center, the Lab being one of their checkpoints on a five-day Glidden Tour of Long Island. The original Glidden Tours were held in the early 1900s to prove the practicality of the automobile. They were revived in 1947, and have been held in various parts of the country each year since then. This is the first time the tour has been on Long Island. Antique car buff Ken Asselta, technician at the Tandem Van de Graaff, happened by on Sunday. He reports that among the Model A and Model T Fords were some more exotic cars like Deusenbergs, Bentleys, Packards and even a Reo. Asselta took this snapshot of an air-cooled 1932 Franklin.

At The BERA Sales Office

Next time you have film that needs processing or you want to buy a greeting card, don't wait until the end of the day. Stop in the BERA Sales Office any time between 9 a.m. and 1 p.m. And while you're there, take a look around.

Located in Berkner Hall, the Office serves as an outlet for film processing, a redemption center for participation cards from the BERA Awards Program, and a small store. Items for sale include greeting cards, Cooking Exchange cookbooks, photographic supplies and equipment, some seasonal merchandise, and tickets. The following is a listing of tickets now available.

Islanders Hockey

The Stanley Cup Champions will play pre-season exhibition games with Philadelphia, Boston, Buffalo and the Rangers at the Nassau Coliseum on September 23, 26, 29 and October 3, respectively. BERA has eight tickets for each game and is offering to sell them to employees at a two-for-one price of $15.00. The sale will begin at the Sales Office on Monday, September 21 on a first-come, first-served basis.

The first day of sales for regular season tickets will be announced in the Bulletin within the next two weeks.

Metropolitan Opera

Tickets for the 1981-82 season are moving quickly. Still available are for performances of Puccini Trittico, Tannhauser, Il Travatore, Il Barbieri di Siviglia and Fidelio. Call the Sales Office for performance dates.

Westbury Music Fair

Discounts for many performances are offered to employees. Schedule information is available at the Sales Office.

Magic Kingdom Membership Cards

Membership cards entitle holders to generous discounts at Disneyland and Disney World. Cards are issued free of charge to employees.

Great Adventure

Discount coupons are available which may be used for the remainder of the season.

Softball

League I
League Champions: Blue Jays
Playoff Champions: Six Pax

League II
League Champions: ROGA

Playoff Games:
ROGA defeated Moles
Big Sticks defeated DEEgenerates

League III

Final Standings:	Wins	Losses
Ice Pops	13	2
Magnuts	11	4
Dirty Sox	10	5
Electric Co.	10	5
Forties	9	7
Nuke Powers	8	7
Medical	4	11
Lights Out	2	13
Binary Bombers	1	14

Playoff Games:
Electric Co. 8 - Ice Pops 7

The league champions, the Ice Pops, were beaten by the fourth place team Electric Co.

Dirty Sox 11 - Magnuts 10

The third place Dirty Sox played the second place Magnuts.

Dirty Sox 12 - Electric Co. 4

The chamionship game between Dirty Sox and the Electric Co. was a hard-fought battle. The outstanding player for the two games for the Dirty Sox was Mike Dagg who went 8 for 8, scoring five runs and hitting a home run.

League Champions: Ice Pops
Playoff Champions: Dirty Sox

League IV
League and Playoff Champions: Survivors

League V
League Champions: No Names won both halves with an overall season standing of 15-1.

Cafeteria Menu

Week Ending September 25, 1981

Monday, September 21

French onion soup	(cup)	.55
	(bowl)	.65
Beef chow mein over rice		1.55
Pork & bean bake		1.55
Hot Deli: Sandwich steak w/pepper & onion	(on bread)	1.70
	(on roll)	1.80

Tuesday, September 22

Cream of tomato soup	(cup)	.55
	(bowl)	.65
Fried rice with beef		1.55
Roasted fresh ham w/barbeque sauce		1.65
Hot Deli: Meatball hero		1.70

Wednesday, September 23

Turkey rice soup	(cup)	.55
	(bowl)	.65
Beef stew over noodles		1.65
Southern fried chicken w/cranberry sauce & 1 veg.		1.55
Hot Deli: Baked Virginia ham	(on bread)	1.65
	(on roll)	1.75

Thursday, September 24

Minestrone soup	(cup)	.55
	(bowl)	.65
Corned beef & cabbage		1.60
Baked lasagna & 1 veg.		1.55
Hot Deli: Roasted turkey breast	(on bread)	1.65
	(on roll)	1.75

Friday, September 25

Manhattan clam chowder	(cup)	.60
	(bowl)	.70
Stuffed flounder & 1 veg.		1.55
Baked ham w/raisin sauce		1.55
Hot Deli: Meatloaf hero w/tomato sauce		1.70

SWE Meeting

Barbara Paley, legislative advisor to former U.S. Congressman Jerome Ambro, will be the guest speaker at a meeting of the New York section of the Society of Women Engineers to be held in Huntington on September 20 at 2:30 p.m. Paley will discuss the legislative process in regard to bills dealing with scientific issues. For directions and/or more information, call George Gammel, Ext. 2819, or Barbara Gammel, 423-5436, after 7 p.m.

Nursery School

The Upton Nursery School, which began its fall session this past Monday, offers classes for three and four-year olds, two or three mornings a week. Classes are taught by experienced, certified teachers who are assisted by "cooperating" parents.

For more information, call Karen Brunschwig, 924-0030; Janice Thern, 929-3550; or Ruth Fernow, 928-8465.

Motorcycle Club

Care to join a fish run to Montauk this Saturday to watch the boats bring in their catch of the day? Maybe that would whet your appetite for a fresh fish sandwich dockside. Meet after work today at 5:10 p.m. in the cafeteria parking lot to discuss details. The plan is to leave Saturday at 9 a.m. from the Lab.

Adult Swim Lessons

A course of swimming lessons, open to all on-site employees and their adult dependents, will be given at the pool starting Wednesday, September 30, at 5:15 p.m. The course will consist of one lesson each week on eight consecutive Wednesdays.

Registrations are being accepted at the pool during open hours through Wednesday, September 23. A fee of $15 (checks payable to BERA) will be due at the time of registration.

Theater Group

The BNL Theater Group will meet at 8 p.m. on Monday, September 28 in Berkner Hall.

For the evening's program, each person (or group) is invited to read a favorite short scene or poem. Call the program chairman, Kurt Fuchel (Ext. 4116 or 7927), if you have any questions or want suggestions and/or help. He will have some readings available at the meeting for those who want to take "pot-luck."

Runners Corner

The 10th BNL Fall Race — the longest running race series on Long Island — will take place on Sunday, October 18, starting in front of Berkner Hall. There will be a 30 kilometer Pace Run at 8:30 a.m. and five and ten kilometer Fun Runs at 9:30 a.m., with no registration fees, no certificates or prizes.

Registration and waiver signing will take place up to 15 minutes prior to each race. All times will be posted at the finish line. The first BERA male and female runners in the 10k race will have their names put on the Jack Baer Memorial plaque.

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 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 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, 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.

LABORATORY RECRUITMENT: Opportunities for present Laboratory employees.

1628. AUTOMOTIVE OFFICE CLERK - Staff Services Division.

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

1629. ENGINEER - To function as a fire protection engineer with responsibilities in fire protection planning, hazard analysis, design reviews and procedure development. A BS in engineering and several years pertinent experience is required. Safety and Environmental Protection Division.

1630. PROJECT ENGINEER - Requires MS in Chemical Engineering or equivalent experience. Will apply basic chemical engineering skills in the analysis and development of advanced processes. Department of Energy and Environment.

1631. RESEARCH ENGINEER - Requires BS in Chemical Engineering or equivalent background. Must have considerable industrial experience in the analysis and development of advanced processes. Department of Energy and Environment.

1632. TECHNICAL POSITION - Requires AAS in electronic technology or equivalent background. Should have experience in digital circuitry and applications of microprocessors. Some shift work required. Accelerator Department.

1633. TECHNICAL POSITION - Requires AAS degree or equivalent experience in electronic technology to operate and maintain the Tandem Van de Graaff accelerators and associated equipment. Should have background in complex electronic, electro-mechanical and mechanical equipment including some exposure to vacuum systems. Rotating shift schedule. Physics Department.

Autos & Auto Supplies

74 BUICK REGAL - 2 dr., maroon, wh. int, 84 k mi, a/c, p/s, p/b, good running, no dent, reg. gas. $1,100. Ext. 4725.

70 VW BUG - 45,000 orig. mi, orig. paint, mint cond, mounted snow tires, must see. $1,700 firm. Grace, Ext. 3711 or 728-2468 eves.

77 DATSUN B210 - hatchback, 4 spd, clean, runs excel, 65,000 mi. $2,900. Jim, Ext. 2957 or 281-4541.

73 DODGE MONACO - wgn, a/t, p/b, p/s, a/c, CB am/fm stereo, radials, 2 extra snows, 76,000 mi, many new parts. $1,200. Ext. 3926.

6' ELECTRIC PLOW - w/frame. $300. Bill S. Ext. 4434.

80 CHEVY MONTE CARLO - 21,000 mi, 6 cyl, p/s, p/b, p/w, a/c. Absolutely mint. To settle estate. $6,800. Ext. 3298 or 878-2172.

77 CJ-7 - 65,000 mi, new clutch, soft top, in excel cond. $3,750. J. Lynch, Ext. 4510 or 744-0843.

CUSTOM PARTS - accessories, performance for your vehicle, low prices. Name brands. Hans, 281-5563 or Ext. 4581.

62 CHEVY PARTS CAR - buy parts or whole car. Joe, Ext. 2556.

SNOW TIRES - (2) E78-14 on Chevy rims w/w, 4 ply, poly Goodyear, like new. Ext. 3507 or 286-8794.

ENGINE - 400 cu. in. small block Chevy engine. $250. Ext. 4539.

80 KAWASAKI - KX125 dirt bike, excel cond. $850. 477-0264 or 477-2269 after 5:30.

75 DATSUN - long bed, 4 spd, cap, extra wheels, 4 tires v.g. cond. $3,200. 298-5836.

79 GARELLI MOPED - only 400 miles, mint cond. $500. Lou, Ext. 4758 or 588-7260.

BATAUUS MOPED - 150 MPG, 20 MPH. Kochis, Ext. 4447.

76 BROUGHAM VAN - comfortable camper 18 ft., full headroom, sleeps 4, kitchen, enclosed toilet, gas heater. 286-1192.

74 HONDA - CB360, 3K on rebuilt engine, many extras, excel cond, garaged. $850. Pete, Ext. 4612.

COACHMEN - slide in truck camper, sleeps 6, bathroom shower, 3 way refrig. Asking $2,000. 399-2413.

BRONCO ENGINE - transfer case, 1973 Vega GT rear, frontend, tires, rims. 744-3968.

74 PLYMOUTH DUSTER - manual trans, new radials, mech. excel. $1,000. 286-2565 after 5 p.m.

67 FAIRLANE CLASSIC - wagon, excel interior-exterior, needs rear main seal. $400. 732-5445 or 689-8793.

75 PACER - 52,000 mi, new exhaust, front brakes, other parts. Best offer over $1,500. Liz, Ext. 2082.

75 MAVERICK - 70,000 mi, v.g. cond, good MPG, 6 cyl. $1,450. Ext. 4982.

BATTERIES - auto, marine, industrial, brand new w/warranty; car top carrier, fits any car, rail type. $9. J. Medina, Ext. 7636 or 924-6971.

70 FORD HEADS - valve covers, completely reworked, like new. Asking $100. set; intake manifold, $35; new Ford 4 barrel carb., never used. Asking $75. Ext. 3319 or 744-9802.

69 CHEVY NOVA - runs well. $175. Walt, Ext. 2913 or 698-0576.

RIMS - for Dodge or Plymouth (14"); also Ford 14" hubcaps. Morris, Ext. 4192.

71 CHRYSLER - New Yorker. $800. Jim, Ext. 4040 or 289-0876.

67 SAAB - Model 96, blue, 2 door sedan, good mech., new paint, 2 new tires. $650. Ext. 4240 or 286-0295.

72 AUDI 100LS - body excel, rebuilt motor, needs wiring. $750. Firm. 744-4440.

79 FORD FAIRMONT - 6 cyl, 4 dr, a/t, a/c, am/fm, p/s, p/b, 45,000 mi, good MPG $3,200. 499-8377.

FIAT 124 - blue, good cond, 4 dr. sedan, 4 spd. $1,350. Ext. 7927 or 878-2891.

TIRES - (2) 175SR15 radials on Volvo rims. $25. Ext. 2368 or 928-6654.

73 PINTO - hi mi., needs exhaust system & other minor work or use for parts. Make offer. Ext. 2517 or 331-3358.

65 OLDS - F85, V6 engine, runs good. Best offer. Ext. 5293.

70 VW BUG - conv., rebuilt engine, new paint, stereo. $1,550. Tony, 288-3535.

72 RIVIERA -V8 engine, v.g. cond, body needs some work. $850. Ext. 4907 or 399-5124.

78 MOTORCYCLE - GL1000 Gold Wing Honda, 4,000 mi, like new. $2,600. 473-8783.

70 VOLVO 164 - a/t, a/c, p/b, am/fm stereo. $850. John, Ext. 4214 or 475-5543.

Boats & Marine Supplies

22' SEAFARER - 1975 fiberglass sloop, 3 sails, fully equipped, sleeps 4, excel cond. Ext. 4798 or 929-4940.

TRAILER TIRE - 5:30x12 w/4 hole rim 15. Don, 286-1205.

SAILBOAT EQUIPMENT - bulkhead compass, $20; depth sounder, $30; knotmeter, $50; 35' Luff Genoa w/Furling equipment, $150. Don, Ext. 2249.

16' TOMBS GARVEY -1973 w/40 HP Johnson, good cond, in water, will demonstrate. $950. 286-0795 after 6 p.m.

18' GARVEY - w/1973 40 HP Johnson w/equipment, good cond. in water. $900. 286-1348.

15' STARCRAFT - F.G. Runabout, 40 HP Johnson & trailer, excel cond. $950. Bill, Ext. 7772 or 281-0557.

60 HP EVINRUDE - 1966 all elect., extras, can demo., excel cond. $350. Bob Doering, Ext. 4474.

18' CHRIS CRAFT - Lapstrake, mahogony customize, 1978 85 HP Evinrude, alum. trailer. $2,500. Ext. 4758 or 588-7260 Lou.

ELECTRIC BOAT MOTOR - 10 spd, forward/reverse, 10½ lb. thrust. Used twice. $70. Ext. 3887 or 286-0353.

20' CLAM BOAT - $850; 200 HP motor, $2,000; boat & motor together, $2,700. 924-5871 after 7 p.m.

'78 RENKEN - 19' Bowrider, 120 HP Volvo I/O, bilge pump, full canvas & instrumentation, galvanized trailer. Mint cond. $5,000. Ext. 3887 or 286-0353.

WINDSURFING BOARDS - off-season sales, f. glass, 12'6" lg. $695. Dinos, Ext. 4666 or 477-1783.

Yard Sale

YARD SALE - Sat. Sept. 19th, 10 a.m. to 4 p.m.; furniture, swimming pool equip., clothes; glassware; toys; books. Gateway Dr. & Zophar Mills Rd., Wading River. Diane, 929-6442; or Lora 929-6009.

Free

CATS - 3 affectionate, neutered cats, black/white, gray/white, and black. Kathy, Ext. 4615.

KITTEN - female gray/black stray has adopted us. We are allergic. Help us. Nick, Ext. 2490.

EMPTY COFFEE CANS - mostly one-pound size. Ext. 4382.

KITTENS - black, available mid October. Rick, 924-6199 or Ext. 2907.

Miscellaneous

TV - 25" color console, $250; Bell & Howell sound 8mm projector, $150. Edward, Ext. 3403 or 751-1826 after 6 p.m.

SOFAS - (2) 84" Colonial "Carlton Marcus" excel cond. $350. ea. 589-4363 after 6 p.m.

FREEZER - 23 cu. ft. mint cond, used one seasoh, $400. G. Ince, Ext. 3786 or 286-2889.

MOVIE CAMERA - Super 8, Keystone XL200 w/zoom lens, needs work, make offer. John, Ext. 3675.

COMMERCIAL CLAMRAKE - 8' "T" handle, $80. retail. Best offer. 981-4051 anytime.

WOOL RUG - Gulistan L. green, scroll, 9x12, good cond. L. Kopp, Ext. 2265.

ALUMINUM LADDER - 24 ft. $50. 281-5626.

LEBLANC CLARINET - B-flat Vito #7100, Norwood music stand. $130. Ext. 4417.

3 RECORD - Time/Life Swing Era albums w/book of text & pictures, $6. ea. album; mattress & box spring for single bed, foam rubber, $40. for both; washtub 2 ft. deep, good for animal watering; white pine & maple saplings. 281-2002.

CHAIR - French Prov., rust velvet, cane sides, perfect $60; area carpet, 6'x9' rust color, $30; kitchen set Colonial, dk pine formica topped round table, 4 chairs (2 Captain) $275. Excel. 286-0259.

FURNITURE - dining rm set; recliner chair; bed single; dinette set; bureau; electronic piano. 475-8162 after 6 p.m.

TV - Sharp color 15" portable, needs some work. $75. Louisa, Ext. 4207 or 286-2251.

HOCKEY SKATES - size 5, $10; cleats, size 4, $7; insulated, waterproof boots, steel shank, size 3. $5. Ext. 3218.

TV - B&W 23" Zenith w/stand, $25; old console record player, separate speaker, $10. 727-8631.

HARMON KARDON - vacuum tube stereo receiver & turntable. L. Belkin, 360-3235.

STUFFED CHAIR - green, Mediterranean style, $25; folding door, 42" width, $10. Ext. 3521 or 286-1688.

FIREPLACE SCREEN - draw type, black & brass. $10. Joe, Ext. 2556.

FIREWOOD - $125. cord. 286-3235.

CLOTHES DRYER - outdoor umbrella type, $8. 286-1522 eves.

GE REFRIG - $160; portable dishwasher, $200; electric dryer, $100; 3/4 violin, alto saxophone, excel cond. 928-8562.

CLEAN FILL - 585-5256 after 6 p.m. or Ext. 3139.

QUARTZ HEATER - excel, thermotech, new; slow cooker, West Bend, new all 1/2 price. 924-4991.

ROLL TOP DESK - perfect cond. HR3-1704.

FLUTE - Bundy, excel cond. $100. Bob, Ext. 2517 or 331-3358.

RUG - gold/brown w/pad, 12x14, $80; china service for 12, $100; Teak bedroom, $100. 928-7826 eves.

COUCH - French Prov., (end tables & coffee tables); antique china closet; 2 blue chairs; lamp; Jacobian chair. Ext. 4960.

TV - B&W, $65; sofa, $25. Ext. 3403 daytime or 3245 wkends.

CAMERA - Nikon SRL w/case, electronic flash & 3 lenses: 28/2.8, 50/2, 135/2.8; $275. Stu, Ext. 3227.

HEDSTROM STROLLER - Hoover/GE vacuums; woodtone GE office refrig; exercise bike; Copymate copy machine. Shelly, 698-8104.

HONEY - Organic local wild flower, 1 lb. $1.75, 3 lb. and over, $1.50. George, Ext. 2419 or 744-3289 after 6 p.m.

BOY'S DENIM SUIT - size 12, $15; shirts & sweater vests, size 10, $5. ea. Sharon, 744-4594.

WOOD STOVE - heats 1500 sq. ft. in excel cond. Sacrifice $195. Bob, Ext. 4551 or 289-2159 eves.

RIDING MOWER - 32" rear engine, electric start, excel cond, seldom used, 8 HP. 924-5192 after 5 p.m.

ENCYCLOPEDIA - Brit. Jr., 1975 Edition, 22 of 23 vols, excel cond. $25; boy's 3 piece suit, size 14 Navy, excel cond, $15. Ext. 3801 or 289-5770 after 6 p.m.

PING PONG TABLE - 3/4" folding type, good cond, paddles & net incl. $35. Olson, Ext. 4278 or 744-3203 after 5 p.m.

BIKE - 10 spd, 27" girls Ross superior, needs work. $55; Rawling baseball fielding mitt, left handed, $35. orig. $45. used twice. Ron, Ext. 4987.

LEAF VACUUM & BLOWER - new cond, $50. Walt, Ext. 2913 or 698-0576.

SEWING MACHINE - Singer Zig-Zag stitch, $40; handmixer, GE, $5. Ext. 2584 days, Ext. 3232 eves.

TEAK BEDROOM - $200; natural weave drapes, 84x96, $50; 8 cu. ft. refrig., $120; (2) 3 ft. brass lamps & shades, $200; fruitwood coffee & end table, $100; 2 cane occas. chairs, $50. 928-7826 p.m. only.

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

SHOREHAM - 2 story, 4 bdrm Clarendon Colonial, 2 baths, l/r with fp, d/r, dinette, kitchen & laundry rm w/2 stall garage on .45 acre corner lot. Deeded beach rights. 744-2766.

POQUOT - West side, ranch, ½ acre, mint cond, 3 bdrm, 2 baths, fp, patio, 200' to village beach, boating. $86,000 owner. Lois, Ext. 2959 or 751-0023.

MANORVILLE - 3 bdrm ranch, 1 acre, country kitchen, full bsmt, 1½ baths, garage, all appliances, w/w, s/s, 13-¾% adj. mtg. available. $43,000. Pete, Ext. 3868/4574 or 878-1225.

WADING RIVER - mobile home. 60'x12', 2 bdrm, enclosed sunroom, carport, extras, Ramblewood Park. Sound Ave. Bob Doering, Ext. 4474.

RIVERHEAD AREA - mobile home 10x50, 1 bdrm, stove, refrig, washer/dryer, tool shed, covered patio. Air cond. Ext. 3138.

WADING RIVER PROPERTY - one cleared & partially landscaped acre in prestigious area. Must sell. Asking $22,500. 929-4173 after 5 p.m.

For Rent

EAST PATCHOGUE - Sublet La Bonne Vie, 1 bdrm, lg. l/r, d/r, w/w carpeting, air cond, recreational facilities. Oct. occupancy. 289-5304 after 3 p.m.

BELLPORT VILLAGE - 2 bdrm, 1st floor apt, l/r, eik, unfurn, garage, priv. entr, lease. $460. incl. util. 286-8850.

POCONO'S - chalet sleeps 5, tennis, golf nearby, f/p. Fall special $75/wkend. Bob, Ext. 4551 or 289-2159 eves.

EAST PATCHOGUE - 3 bdrm, f/p, water view, 20 min. to Lab. $350/mo. + util. Ext. 3482.

CORAM - 2 bdrm, 2 baths, lg. l/r & kit., w/w throughout, yard. $415. incl. util. 10 min. from Lab. 698-0566.

SPRINGHILL, FLORIDA - by week or month, golf, lakes, beaches, tennis - 1½ hrs. from Orlando. Ext. 4226 or 261-2719 after 5 p.m.

MASTIC BEACH - lovely 3 bdrm ranch in wooded area, ½ mi., from Bay, near Smith Pt. $450/mo. + util. Ask for Pat, Ext. 7635.

STONY BROOK - 3 Village School, 4 bdrm, 2 full baths, lg. l/r, eik, laundry rm, 2 car garage, priv. backyard, walk to SUNY. 689-9409 eves.

SHOREHAM - 3 bdrm custom ranch, 2 baths, f/r. w/fp, d/r, l/r, gourmet kit, 2 car garage, bsmt, new oil burner, w/w throughout. Ext. 3064 or 821-0890 after 5:30 p.m.

NORTH PATCHOGUE - Share a store, 300 sq ft., private ent., ideal for service business. $200/mo. 475-8456.

Car Pools

FROM PATCHOGUE VIA BELLPORT - 9 yr. old car pool, on-time, has vacancy for paying rider. Alyce, Ext. 2901.

HUNTINGTON - car pool sought. Please call Andy Zangwill, Ext. 3714 or 549-5361 eves.

Lost & Found

LOST - brown trousers, yellow jacket, cap - in paper bag between Bldg. 510 & main gate on 9/9/81. Ext. 3712.

Wanted

DONATIONS - for Amnesty International auction, Sat. afternoon Sept. 26 at Smithtown Tri-Country Flea Market. Seeking suitable items/services of any value. Dave Burner, 584-6727

HOUSE TO RENT - Bellport Village or Brookhaven Hamlet, Ext. 5055 or 286-0919.

KEROSENE HEATER - preferably Kerosun. Edward, Ext. 3403 or 751-1826 after 6 p.m.

CLARINET - wooden, for student. Jim, Ext. 3372.

TIRES - pair H78-14 snow or regular tires. Paul, Ext. 2447.

TRAINS - Lionel, any "0" gauge or "027" gauge cars, track & equip. Frank, Ext. 3120.

ROOMMATE - to share rented house in Pt. Jeff Village. $190 + util. available Mid-Nov. Jack, Ext. 3433.

FATHER/SON - would like permission to hunt (archery) your upstate N.Y. property in Late Oct. Bill, Ext. 5383 or 698-4882.

LARGE RUG - 16x15. Can you donate to church group? Thank you. Claire, 281-2002.

GAS RANGE - small, oven & burners, must work well. 281-2002.

BUSINESS ASSOCIATE - spare time opportunity, excel income, tax advantages. 698-5861 after 7:30 p.m.

MOTORCYCLES - bent or broken, any age or cond. Kevin, 281-8031.

EFFICIENT PERSON - reliable to clean small townhouse, 1 or 2 half days per week. 924-0030.

DESK & CHAIR - for college student, reasonable. Terry, Ext. 3969 or 325-1080 after 5 p.m.

COUPON CLIPPERS/REFUNDERS - 2 experienced refunders want to swap; Bellport area. Cookie, 286-1688.

PROPANE TANKS - 2 ea. 30 lb. tanks for camper or trade for 2 (20 lb.) 286-1522 eves.

RIMS - for Ford Courier Pickup. Rich, Ext. 3381.

BARBIE DOLL COLLECTION - speed music or guitar notebooks; girl's 20" bike; camping equipment. 924-4991.

AIR COMPRESSOR - good working cond, good price; roll around tool box, Craftsman, Kennedy, etc. Joe, Ext. 2556.

BOAT TRAILER - 2000 lb. capacity, reasonable. Pete, 751-4323.

2 DESKS - and/or chairs for school children. Horst, Ext. 7179.

USED POOL COVER - to cover 22' boat, OK if torn. 744-9802 or Ext. 3319.

FREEZER - 6 to 12 cu. ft.; electric typewriter for student. Ext. 7637 or 286-4639.

Services

Services are listed as a courtesy to BNL employees. They are neither screened nor recommended by the ***Bulletin.***

POOL SERVICE - repairs, closings, maintenance, emergencies. 727-4186.

MOTORCYCLE REPAIR - tuneups, brakes, flats, lacing & wheel truing, engine work, etc. Kevin, 281-8031.

EARN EXTRA - Christmas money form your home. Call for appt. 732-6678.

SMALL APPLIANCE REPAIRS - incl. typewriters, sewing machines, etc. N. Patchogue, 654-3900.

OLD PHOTOS - copied & restored. 589-5337.

BABYSITTING - reliable mother w/1 yr. old, wkdays, my home, N. Shirley area. Dot, 924-7856.

BABYSITTING - mother will care for your child, reliable, reasonable. Mastic area. Penny, 399-4590.

ROOFING & SIDING - vinyl & alum., licensed & insured. Wayne Hulse, 878-8459.

BABYSITTING - mother willing to sit, lots of love & care. Shirley area. Mary, 399-6128.

SEWING INSTRUCTIONS - beginner, intermediate, advanced. JU5-8461.

BURGLAR/FIRE ALARM SYSTEMS - residential & commercial. Sales, service, free estimate. Ext. 3815.

SANDBLASTING - trailers, chassis headers, tanks, boxes, beds, chairs, any kind metal equipment. Reasonable rates. 744-3968.

ASPHALT PAVING - and sealing. Bob, 475-4382.

EXPERT POLYSEAL - any auto $15.95, Vans RVs, $19.95 for appt. call Dyna Shine, 689-8793 or 732-5445.

PRIVATE LESSONS - in ballet, tap, jazz, aerobics, ballroom. For info call Lilo Levine, 473-2754.

CARPENTRY - sm. repairs & modifications. 929-4251.

FIRESIDE CHIMNEY SWEEPS - f/p, wood coal & oil flues, dustless removal, insured. Lab discount. Bill, 584-6425.

BABYSITTING - responsible mother will sit at my home wkdays. Centereach area. 981-4626.

RIDING LESSONS - beginners, thru advanced, also dressage. Semi & private. $10/hr. Your home or in Yaphank. Renee, 924-6992.

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