



Energy System Analysis



A Reference Energy System is a network representation of all the major pathways of energy flow from resources to end use. Specific technologies, costs, environmental impacts and resource consumption are identified in the system. By constructing Reference Energy Systems for future years one has a means of analyzing the impact of new technologies or of shifts between modes of energy supply through a type of perturbation analysis. Phil Palmedo (left) and Ken Hoffman (right) check the construction of such a system for the year 1985.

Brookhaven And The Energy Shortage IV Energy Systems Analysis

Philip F. Palmedo

Events of the past few months have focused public attention on the critical and complex role that energy plays in our society. The importance of the environmental impacts of energy have been of wide-spread concern for some time. Many of the well informed have also been concerned by the coming exhaustion of our conventional energy resource. To these have now been added the additional concern for energy self-sufficiency and an interest in new energy technologies that can help us achieve that goal.

Previous articles in this series have outlined the ways in which Brookhaven is contributing to the development of new energy technologies and to the understanding of the environmental impacts of those technologies. But there is a further role that the technical community must play if the nation's energy system is to develop in a socially beneficial way; that is to form a bridge between the vast array of technical information on energy technologies and their environmental impacts and the energy planning and policy decisions that go on at various levels of government.

This article describes some of the energy systems analysis activities at Brookhaven designed to construct such a bridge. For the most part, these activities are being carried out in the Department of Applied Science under the general guidance of the Department Chairman, Warren Winsche.

The Origins

In 1970, an informal group at BNL began to formulate an approach to the analysis of one segment of energy planning: the allocation of energy research and development funds. The President, in his energy message of June 4, 1971, asked his science advisor to make "a detailed assessment of all the technological opportunities" in energy and to recommend R&D "projects which should receive priority attention." The President's Office of Science and Technology (OST) called upon the BNL group to structure the assessment and to provide analytical support for it. Funds for this activity were provided both by OST and by the National Science Foundation through a contract with AUI. The effort was directed by Leland Haworth.

In order to address the question of R&D priorities, a model of the U.S. energy system was created which could look at the value (in terms of resources conserved, environmental impact and cost) of specific new technologies at various times in the future. The method used, based on the work of Ken Hoffman, is now known as the Reference Energy System approach and has proved to be a powerful tool of energy policy analysis. The assessment was a major interagency effort resulting in recommendations with considerable impact on the Fiscal Year 1974 energy R&D budget. The importance of the two reports from the study, written by the BNL group, has become widely recognized.

The activities of the Energy Systems Analysis Group and associated efforts have diversified considerably from that initial OST study. Nevertheless, the basic rationale and approach remain the same: the development of energy analysis tools and the application of those tools, in collaboration with government planning groups, to energy policy questions of current importance.

Current Activities

Following the OST study, the AEC Office of Planning and Analysis (OPA) decided to extend the BNL energy systems analysis activities in support of their role as the central planning group of the AEC. This kind of activity took on increasing breadth and importance as the scope of the AEC mission in the energy field was broadened. A wide range of energy technology assessments and policy studies are now being performed for OPA under the direction of Ken Hoffman. This work entails both sorts of activities mentioned above: the development of models and



Frank Salzano Morris Beller

other assessment tools, and the application of those tools to particular policy questions.

The models now being constructed include time-dependent versions of the Brookhaven linear programming optimization model of the U.S. energy system. This modeling work is being performed primarily by Ellen Cherniavsky. Policy studies over the past year have emphasized the analysis of the means and implications of our becoming self-sufficient in energy by 1985. The group also provided a variety of assessments of the potential role of individual technologies and a number of scenario analyses for the recent formulation of a 5-year national energy R&D program carried out by AEC Chairman Dixy Lee Ray at the request of the President. Frank Salzano, Morris Beller and Walter Sevia were among the participants in these analyses.

Integrative energy policy studies require extensive information on processes, efficiencies, costs, and environmental impacts of the myriad activities that are presently carried out in the energy sector. About a year ago, the Council on Environmental Quality organized an interagency effort to construct a computerized energy data base to be used for energy/environmental policy studies.

BNL (with AEC support) and Hittman Associates collaborated on compiling the data base, with the Brookhaven group also responsible for structuring the system. This data system, which now contains some 30,000 pieces of fully documented information, is designed to be useful to a wide user community and will soon be available to outside users. Under the direction of Murray Goldberg, working in collaboration (Continued on page 2)

NSF Seeks Applicants In Energy Research

Vacancies now exist in NSF for positions in energy research management, and more vacancies are anticipated in the summer and fall. Individuals with appropriate training and experience who wish to be considered for these positions should submit resumes to the Personnel Officer, room 212, NSF, 1800 G Street, N.W., Washington, D.C. 20550.

Official & Special Events

- Wednesday, April 10
 - Navy Meeting - Brookhaven Center
 - Physics Club of New York Tour
- Thursday, April 11
 - Low Level Radiation Effects Meeting - Berkner Hall, Rooms A and B
- Tuesday, April 16
 - Suffolk County Nurses Tour
- Thursday, April 18
 - Long Island Bone Metabolism Discussion Group Meeting - Berkner Hall, Room C
- Saturday, April 20
 - Synchrotron Radiation Meeting (April 20-21)
- Monday, April 22
 - Philadelphia College of Textiles and Science Tour
- Tuesday, April 23
 - U.S. Military Academy Cadets Tour
- Wednesday, April 24
 - BNL Lecture
 - Interagency Advanced Power Group Superconductivity Panel Meeting (April 24-25)

Dr. Ruth Patrick To Speak At BNL

Dr. Ruth Patrick, limnologist, of the Academy of Natural Sciences, Philadelphia, will visit BNL on April 11. She will be the speaker at two seminars. The first, a joint energy-environment seminar to be held in Berkner Hall at 11:00 a.m., will be on "The Impact of Power Plants on the Aquatic Life in Rivers." Her second seminar at 4:00 p.m. in the Biology Library will be on "Aquatic Life Communities in Streams."

Dr. Patrick has had a life-long interest in diatoms, one of the most abundant groups of plants on earth. She was one of the very first of contemporary ecologists to apply modern methods in examination of effects of pollution on aquatic life. A member of the National Academy of Sciences, she is currently preminent among those examining the problems of power plant siting.

Energy Saving Tips

Since hot water is available 24 hours a day, the hot water heater is the second largest consumer of energy in the home, surpassed only by the heating and cooling systems.

The consumption of hot water is linked to the number of people in the family, their ages, and individual habits. A 40-gallon hot water tank is recommended for the average 4-member household. The water heater should be located close to points where it is needed, as long pipe runs cause loss of energy in the hot water through heat dissipation.

Parking Permits For SUNY-Stony Brook

The Transportation Section, Staff Services Division, has a supply of temporary parking permits for visits to the State University of New York at Stony Brook. The permits will be issued on a daily basis to employees who must go to Stony Brook on Laboratory business.

It is vital that the parking permits be returned to the Transportation Section so that they can be circulated among a large number of employees, ensuring the success of this program.

For more information, contact John Cross, Ext. 2535.



Ellen Cherniavsky Walter Sevia

Energy Systems (Cont'd)

with the Applied Mathematics Department, the data base will be extended in the next year to include new energy technologies and more complete cost information.

Energy plays a key role in the economic growth and viability of the nation and yet the current understanding of the interactions between energy technologies and our economy is at best crude. A set of studies under the direction of William Marcuse aims at improving our understanding of these relationships.



Joe Indusi and William Marcuse

The most wide-spread tool for analyzing the complex interrelationships of a national economy is the input-output (I-O) model. Such models, however, deal only very superficially with the energy sector, and, for example, cannot deal effectively with substitutions between fuels or the use of new technologies.

One facet of the BNL studies, being worked on by Mark Swift, is to interface the Brookhaven energy system models with the I-O model developed at the University of Illinois. Another economic study, supported by the National Science Foundation, is exploring the uses of the "shadow price" information generated by the BNL optimization model. When the use of a given fuel (say oil) is limited by supply constraints, thus forcing more expensive fuels to substitute for it (say electricity from coal and nuclear fuel) the shadow price indicates the worth of an additional supply of the original fuel. Among other things, it can be used, therefore, to estimate the amount that it is justifiable to pay for a new source that requires technological development (say oil from coal). Joe Indusi is involved with this and other economic modeling studies.

Urban centers must receive very high weighting in any evaluation of level of concern in energy planning. Cities not only have a high density of energy use; they also have a high density of receptors for energy-related pollutants. The National Science Foundation is supporting a joint study by the Energy Systems Analysis Group at BNL and the Urban and Policy Sciences Program at Stony Brook (which is directed by Robert Nathans) of energy options for New York City. The study manager for this project, which is just entering its second year, is Mike Jones.



Mike Jones Murrey Goldberg

The health and environmental impacts of energy generation and use are major factors in determining overall costs and benefits to society. For the most part, these effects have not been included in the economic costs of energy nor reflected in the prices paid by users.

Thus much of the health and environmental impact is an "external" cost of energy despite the possibility that some effects may be highly significant. These costs range from occupational health hazards and causation or aggravation of disease through polluted air or water, to alterations in agricultural and natural ecological

balances. Although some research and assessment has been carried out in this area, no comprehensive and integrated evaluation has been made of the relative biomedical and environmental costs of alternative energy systems. The construction of such a picture is the intent of the Biomedical and Environmental Assessment Group, a newly formed component of BNL's Energy Systems Analysis Group.

The BEAG is a collaborative effort carried out jointly by the Medical Department (principally Leonard Hamilton and Donald Borg) and by DAS (Salvador Bozzo, Samuel Morris, and Frank Drysdale). It involves epidemiologists, physicians, ecologists, systems analysts and others. The BEAG will participate in many of the general energy policy evaluations of the Energy Systems Analysis Group as a whole, and it will provide information to help guide the allocation of funds for laboratory, clinical and field research on environmental and health effects of energy processes.

This activity is supported by the Division of Biomedical and Environmental Research at the AEC and has already established working collaborative association with the U.S. Department of Health Education and Welfare, the National Cancer Institute, the Environmental Protection Agency and the National Center for Health Statistics.

In addition to the major, continuing activities, more limited projects are often undertaken when they either have importance for the development of the overall program or address an important national issue. An example of the former is a three-week study carried on last summer on basic methodological problems in dealing with the external costs of energy.



Donald Borg Leonard Hamilton

More than forty visitors including economists, political scientists, lawyers, sociologists and government officials took part in the study. Examples of the latter are the participation of members of the Energy Systems Analysis Group in writing the environmental impact statement for the LMFBR (liquid metal fast breeder reactor), preparing technical information for the "Citizens Actions Guide on Energy Conservation" published by the Citizens Advisory Committee on Environmental Quality and serving on the National Academy of Sciences Advisory Committee for the International Institute for Applied Systems Analysis in Vienna.

The Future

Each of the activities described above has somewhat the character of a new research area in which each project that is completed suggests a number of others that need attention. They are all in a state of growth and exhibit a vigor and health tied to national relevance that bodes well for the future.

In addition, two new areas are being looked at in a preliminary way for future programs. One of these is a much wider regional analysis than that pursued in the New York City Study focusing on the entire Northeastern U.S. Many energy planning problems such as major facility siting, interregional environmental impacts, offshore development, and nuclear energy parks require a larger regional approach than even the state level. The formulation of national energy policies also requires greater cognizance of particular regional problems and differences. A second program in the early formulation stage is the assessment of new energy technologies suitable for developing countries. The crucial role of energy in development and the heavy impact of increased energy costs on developing countries makes this a particularly important area for study.

Future studies will have the same underlying goal that characterizes the current efforts: the development and application of data and analytical tools to guide the evolution of energy technologies in ways most conducive to human welfare.



Meyer Garber (left) explains superconductivity to Dr. Levitov (right) while Steve Amoretty (center) translates. Tony Beliajeff and Stewart Shen look on.



Dr. Blinkov, the Soviet Committee head, examines data on superconductivity.

BNL Hosts Soviets

Two members of the Soviet Committee for Superconducting Power Transmission visited Brookhaven on Thursday, March 28.

Dr. Vladimir Levitov and Dr. Yevgeniy Blinkov, the Committee head, were welcomed to the Lab and given a brief description of the facilities by Associate Director Ronald Rau.

An introduction to the Power Transmission Program at Brookhaven was presented to them by John P. Blewett, the Special Assistant to the Director for Energy.

A tour of the Laboratory facilities included the AGS, the 7-foot Bubble Chamber, and the buildings housing the power transmission laboratories.

All conversations were handled through an interpreter. They were accompanied by Tony Beliajeff, a Department of State interpreter, but when more technical translation was required, BNL's Steve Amoretty stepped in.

The Russian visitors were given a formal luncheon before leaving the Lab for Tarrytown, N.Y., where they visited the Union Carbide Corporation.

On Monday, April 1, the remaining six members of the Soviet Committee arrived for a four-day stay at the Lab. Most of their time was spent in workshops with BNL scientists, discussing various aspects of power transmission.

The Soviet Committee will spend next week in Washington, D.C., in conference with a specially selected U.S. committee. The purpose of their meeting is to draw up an agreement of cooperation between the two countries in the field of superconducting power transmission research. Jack Jensen, Accelerator, who hosted the Russian visitors during their stay at BNL, is a member of the U.S. committee.

Women's Rights Berkeley Topic

The expression, "women's rights," has been heard with increasing frequency in organizations throughout the United States. The AEC research laboratories are no exception, including Brookhaven.

Two representatives from BNL recently attended a two-day conference hosted by the Lawrence Berkeley Laboratory in California, to discuss just that subject. Renee Flack, Equal Opportunity Assistant, and Virginia Wilson, Personnel Representative, were present at the AEC Research Laboratories Women's Conference along with eight other female coordinators from AEC labs.

They discussed various problems affecting women at each of the individual labs. The three major issues of concern were maternity leave, day care, and women's advancement programs.

Pregnancy and maternity leave should be regarded as any other illness or disability, and a woman should be able to use her accumulated paid sick leave, Flack said.

But once a woman returns to work, what does she do with her child all day? The logistics of being a working mother can be very complex. Because it is essential for many mothers to work for financial reasons, the day care issue was discussed at the conference. It is a major problem at those AEC research labs that are very isolated. The establishment of day care facilities would allow and encourage those women who have children to continue working, Flack said.

The need for setting up women's advancement programs was also discussed at the meeting. These programs would train women to take on jobs falling into four categories: official and managerial, technical, craft, and professional.

The women's conference was scheduled to coincide with the annual meeting of the Economic Employment Opportunity coordinators from the AEC research labs. Peter Chen, Assistant to the BNL Director for Affirmative Action, attended that meeting. Following the meetings, the two groups met to exchange ideas and opinions.

An account of the issues discussed at the conference will be prepared and submitted by Flack to the AEC General Manager, John A. Erlewine. She is presently the female representative to the General Manager's Affirmative Action Advisory Committee.

Arrivals & Departures

Arrivals

Frances L. Caruso Applied Math
Paul M. Haas Applied Science
Edward H. Zellner Central Shops

Departures

Joshi Anne Applied Science
John W. Kampe Plant Engrg.
Fridolin H. Kummer Chemistry
Richard A. Majestic Accelerator
Anthony J. Mirabelli, Jr. Physics
Henry Novetti Plant Engrg.
Richard W. Savage Mech. Engrg.
Sandra R. Simon Biology
Marie S. Weinmann Supply & Materiel



Published Weekly for the Employees of
Brookhaven National Laboratory

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Badminton Finals

The second annual BERA Badminton Tournament ended on March 29 after 15 weeks of competition. Ed Platner (Physics) became the singles champion for the second time by winning thirteen out of fifteen tournament matches. Second and third slots went to John Elmore (Medical) and Ken Foley (Physics).

Seven doubles teams competed with the J. Brandon/R.C. Anderson duo going into first place during the last week of competition. The teams of D. MacKenzie/R. Smol and E. Platner/K. Foley took second and third spots.

BNL Birders in Big Win

At the conclusion of the BERA Badminton Tournament, BNL's top three birders migrated to Queens to participate in the Class C Division, Metropolitan Badminton Association Championship matches. Ken Foley and John Elmore played through the semi-finals while BNL champion Ed Platner went on to take top tournament honors in the Division.

Hospitality Quilting Bee



Elke Brengard (right) shows examples of her quilting to Ruth Dimler, Hospitality Chairman. Elke created the vest she is wearing from 230 patchwork circles.



A variety of Elke's patchwork designs were on display at the Hospitality Committee's monthly get-together Tuesday. Those present admire the variety of articles ranging from pot holders to wall hangings.

Scotch Doubles Bowling Tournament

A Scotch Doubles Bowling Tournament is set for Saturday, May 11, 1974, from 2:00 - 6:00 p.m. at the Port Jeff Bowl.

The Rules:

1. A team shall consist of two bowlers, one male and one female. At least one member of each team must be a BNL employee (per BERA definition).
2. The tournament shall consist of 4 games per team. Each team will bowl a single score for each game with the team members alternating balls rolled. The first ball to start each game will be rolled by the female member of the team.
3. Team handicap shall be arrived at by averaging the two bowlers' handicaps which are calculated per regular season BNL League rules (80% of the difference between bowler's average and 200).
 - a. Bowlers in BNL League this season use BNL averages as of March 1, 1974.
 - b. Bowlers not in BNL League this season use highest current league average as of March 1, 1974.
 - c. Bowlers without current averages, some earlier averages may be used; check with Tournament Committee for applicable rules.
 - d. Bowlers with no average will be assigned blind scores for handicap purposes, 110 for women and 140 for men.
4. Prizes will be based on gross team scores and awards given as follows:

- 1st Place Team**
Two trophies and 6 bottles of Scotch.
- 2nd Place Team**
Two trophies and 4 bottles of Scotch.
- 3rd Place Team**
Two trophies and 2 bottles of Scotch.
- 4th Place Team**
Two trophies.
- 5th Place Team**
Two trophies.

The above prizes are guaranteed for the maximum of 64 entries. Prizes will be adjusted based upon the actual number of team entries. No ABC or WIBC prizes.

5. Team entry fee is \$10.50 which includes the cost of bowling and Cocktail Party with hot hors d'oeuvres. Entry blank and fee must be presented at the BERA Sales and Service Office in the Cafeteria not later than 2:30 p.m. on Friday, April 26, 1974. No entries will be accepted after the first 64 have been received. The fee is non-refundable; only in the event that the minimum number of team entries (30) is not reached will the fee be refunded and the tournament called off. Teams not present and ready to bowl at the start of the tournament will forfeit the team fee. The entry blank is on page 4 of this issue of the Bulletin.

6. The rules of the BNL Bowling Association are adopted for this tournament except as otherwise stated herein. Entrants are responsible for familiarizing themselves with tournament rules.

7. Decisions of the Tournament Committee shall be final.

8. Matchmaker Service, call Helen Caisey, Ext. 3323 or Audrey Blake, Ext. 3489.

9. For additional information call Skelly Frei, Tournament Chairman, Ext. 4417.

Renovating The "Energy House"



Dr. Philip Sporn converses with Eric Forsyth after giving a lecture on the Energy Crisis at Berkner Hall on Wednesday. Dr. Sporn, the retired President of the American Electric Power Company, first presented this lecture before a panel of the National Academy of Sciences in January. It was written in response to a question posed to him by NAS: are new institutional structures needed to serve public and private interests? He reached the conclusion that they are not needed but the existing structures must be modernized. He metaphorically referred to the existing energy-related institutions as the "energy house," badly in need of renovation but not demolition. He listed what he believed to be the causes of the Energy Crisis and called for the American people to "stop standing still" and do something about them. His will be one of a series of lectures soon to be incorporated into a book by NAS.

Bowling News

Grace Fales

Green League

Congratulations to J. Bartalomy for his 678 gross series, winning his Club Award. 200's for the night were J. Ferrero 239, A. Kreisberg 208, J. Bartalomy 221, N. Franklin 218, and E. Meier 202.

Pink League

With only two more weeks of bowling before position night, the girls are really bowling. First place, for the second half, will not be won easily. High games: Helen Caisey 198/510, Grace Fales 186, Marge Stoeckel 178, Helen Keeley 171, Jean Hamilton 167, Audrey Blake 163, Ellie Murgatroyd 160.

Black and Blue League

At the mid-point of the final third, there are only 5 points separating the top five teams. High games: Gene Fales 213, Roy Marlow 211, Joe Mayeski 201, Kit D'Ambrosio 196/171/524, Grace Fales 194, Peg Taylor 186, Nancy Jesaitis 163, Marge Nekerman 160. Congratulations to Peg Taylor for winning her 660 Club Award with a 687.

Red League

High series for the night: J. Scesny 236/205/610 scratch and R. Wilson 231/604 scratch. Other high scores: R. Larsen 211/216, N. Carter 223, F. Hohmann 211, T. Jesaitis 219, R. Vignato 213, J. Follenius 210, T. Prach 207, G. McGovern 234, R. Adams 222/201, and W. Reams 206.

Selected Reading

- Nature 248, March 22, 1974
Science and public pleasure. 269
- New Sci. 61, March 14, 1974
The new psychology comes of age. M. Rutter. 672
- Competent newborns. T. Bower. 672-5.
- Biological timebombs under the law. B. Dickens. 681-3
- Design for an economy car. A. Curtis. 683-5
- Fast reactors: The U.S. debate goes critical. A. Lovins. 693-5
- Scientists go on strike. M. Sherwood. 698

Cafeteria Menu

Week Ending April 12, 1974

Monday, April 8	
Cream of Mushroom Soup	
Macaroni & Cheese w/1 Veg.	1.00
Sloppy Joe on Bun w/French Fries	1.00
Tuesday, April 9	
Turkey Noodle Soup	
Beef Hash w/1 Veg.	1.00
Chopped Steak w/1 Veg.	1.05
Wednesday, April 10	
Vegetable Soup	
Ham Steak w/1 Veg.	1.05
Broiled Fish w/1 Veg.	1.10
Thursday, April 11	
Puree of Mongol	
Stuffed Cabbage w/1 Veg.	1.00
Spaghetti w/Meat Sauce & Garlic	1.00
Bread - All you can eat	+ tax
Friday, April 12	
Manhattan Clam Chowder	
Chili con Carne w/Rice	1.00
Fish 'n' Chips	1.00

Mets Baseball Tickets

Tickets have been received and are now being sold for the 1974 Mets baseball season at the BERA Sales & Services Office in the Cafeteria Building. There is no limit on the number you may buy.

The BERA schedule includes all night games, Sundays and one holiday. Sunday games are indicated in bold type.

4/14	Philadelphia
4/21	Pittsburgh
5/3	San Diego
5/5	San Diego
5/6	San Francisco
5/7	San Francisco
5/8	San Francisco
5/17	Montreal
5/19	Montreal
5/20	Chicago
5/21	Chicago
5/22	Chicago
5/31	Houston
6/2	Houston
6/3	Cincinnati
6/4	Cincinnati
6/14	Los Angeles
6/16	Los Angeles
6/17	Atlanta
6/18	Atlanta
6/27	St. Louis
6/28	St. Louis
6/30	St. Louis
7/2	Philadelphia
7/4*	Philadelphia
7/5	San Francisco
7/7	San Francisco
7/8	San Diego
7/9	San Diego
7/27	Montreal
7/28	Montreal
7/30	Pittsburgh
8/1	Chicago
8/2	Chicago
8/9	Cincinnati
8/11	Cincinnati
8/12	Los Angeles
8/13	Los Angeles
8/26	Houston
8/27	Houston
8/30	Atlanta
9/1	Atlanta
9/9	Montreal
9/10	Montreal
9/11	St. Louis
9/12	St. Louis
9/13	Chicago
9/15	Chicago
9/26	Pittsburgh
9/27	Pittsburgh
9/29	Pittsburgh
9/30	Philadelphia
10/1	Philadelphia
10/2	Philadelphia

In the event the Mets go into the World Series this year, only employees who buy tickets to the games during the season will be eligible to put their names in the hat for the playoffs and series drawings.

*Holiday

Volleyball

Joe Mead

League play is finished with playoffs in both leagues remaining. The Cool Tools will battle the Spikers in the Men's League for the title. In the Mixed League the Playmates will engage the Trolls for their trophy.

League Standings (third round) Men's League

	Won	Lost
Cool Tools	11	1
Spikers	9	3
Circuits	5	7
Atom Spikers	4	8
76'ers	1	11
Mixed League		
Playmates	13	2
Nuts & Bolts	10	5
Trolls	10	5
Spikers	7	8
Sparks	3	12
Active Sites	2	13

Classified Advertisements

Placement Notices

Each week, the BROOKHAVEN BULLETIN lists personnel placement requisitions currently being processed. The purpose of these listings is, first, to give notice of all non-scientific staff positions being filled and, second, to give employees an opportunity to request consideration for themselves or others whom they wish to recommend to BNL. In filling vacancies, the Laboratory's objective is to give first consideration to present employees, as follows: employees within the immediate group having the vacancy, employees within the department or division, employees within the Laboratory as a whole.

For further information regarding a placement notice, please contact Supervisor, Personnel Placement and Development, extension 2879 or 2882.

OFFICE SERVICES ASSISTANT - Temporary position. Purchasing Division.

REFRIGERATION & AIR CONDITIONING FOREMAN - Plant Engineering Division.

HEATING SERVICES FOREMAN - Plant Engineering Division.

LAUNDRY OPERATORS B (2) - Temporary assignment, Plant Engineering. Application deadline: April 17, 1974.

REFRIGERATION & AIR CONDITIONING ENGR. (1) - Plant Engineering. Application deadline: April 16, 1974.

Autos & Auto Supplies

2 FIRESTONE PHOENIX RADIAL TIRES - W/rims, 165 HR 13, like new. \$35. 924-3170.

65 MERCURY MONTEREY - Mech excel, 390 cu in eng, V8, ps, r/h, 2 dr. \$250. 277-1284.

69 GTO - 2 dr htdp, 4 spd, 400 cu in, posi, air cond, ps, p/disc brakes, radial tires, dk brown, vinyl roof, gold int, extras. \$850. C. Kerr, Ext. 3362, 924-4097.

66 GALAXY DELUXE - \$225. 698-1813.

69 PLYMOUTH FURY III - Sm V8, full pwr, top shape. \$850. T. Logan, Ext. 3284.

CUSTOM SEAT FOR 350 HONDA - W. Lundgren, Ext. 3800, 585-3794.

69 FORD GALAXIE - 4 dr sedan, sm eng, auto, excel transp, very clean. \$695. 286-9260 eves.

68 SUPERBEE DODGE - New carb & motor, 383, 4 spd, very good cond. P. Cantera, 589-4883 after 4.

PARTS - Falcon starter motor, tire; VW rear fender, eng hood & rear window; new Valiant brake linings. Rich, Ext. 4172.

66 IMPALA - 4 dr, auto trans, ps, 283 cu in eng 1 yr old. 265-2231 after 7:30.

HOOKER HEADERS - For '65-'70 396-427 full size Chevy, \$40; headers for '66 Chevy Nova sm block, \$40; Holley cast iron intake manifold w/heads (w/o springs) for 396, \$25. Claire, Ext. 2346, 281-8306 after 5:30.

WEIAND ALUM INTAKE - W/new 4 bbl carb, for '64 Plymouth & Dodge. Claire, Ext. 2346, 281-8306 after 5:30.

4 EA 15" RIMS - For Chevy 1/2 ton, 6 bolt, w/1100/15 flotation tires, \$80. Bob, Ext. 4411.

SET OF SHOP MANUALS - For 1973 Ford & Mercury products. \$7. Bob, Ext. 4551.

2 W/W POLYESTER TIRES - E78-14 Uniroyal (5000 mi), plus one (about 12,000 mi). \$25/the lot. Ben, Ext. 4333.

4 TIRES - 6.95x14, 2 w/3000 mi use, 2 w/5000 mi use. All 4/\$40. Jerry, Ext. 2539.

3 TIRES - J78-14, same as 8.85x14. All 3/\$35. Torre, Ext. 4243, 281-5050 after 6.

Boats & Marine Supplies

14' THOMPSON - W/35 hp Johnson, 2 tanks. W. Chornoma, Ext. 3255, 325-0567.

PROP - 12x10 RH. \$25. J. Opkins, Ext. 3434.

FINN SAILBOAT - Elvstrom hull, Bruder mast & boom, Harstick sail, also orig rig, w/trailer. 475-4891.

12' RUNABOUT - Moulded plywood hull, steering wheel & controls. \$25. 744-3569.

MARINE TOILET & HOLDING TANK - Clam rake, 20 tooth. 475-4199.

NEW GARVEY CLAMBOAT - 20', oak & plywood construction, fiberglassed seams. \$590. 732-3296 eves & weekends.

FLYING JR - 13' fiberglass sailboat, Ratsey main & jib, Hard spinnaker, new trailer. 744-8623.

SUNFISH - Good sailing cond. \$300. Andy, Ext. 2424.

38' ACF CABIN CRUISER - Classic beauty, sleeps 6, twin Chrysler 125 hp ea, equipped, depth finder, reasonably priced. 727-0003 after 6.

Miscellaneous

GE DISHWASHER - Convertible, cutting board top, 4 yrs old, excel cond. Ext. 3126/3941.

VALLEY TRAILER HITCH - Fits most Chevrolets 1970 up, 1 yr old. \$40. R. Smith, 289-0005.

LOYDS AM/FM STEREO - FM multiplex, built-in 8 track, BSR mini changer, 2 spkrs, excel cond. \$75. Jerry, 698-2391.

ELEC CLOTHES DRYER - Frigidaire deluxe, copper-tone, excel cond. \$65. Kathy, 273-7022.

CARPET - 10'9"x12'0", Mohawk sculptured nylon, cocoa brown. \$35. 941-4328.

MATTRESS - 2 Simmons twin size, excel cond, used 6 mos. 744-1917.

DAVIS MOWER - Self-propelled, 22", 3.5 hp, B&S eng, used 2 seasons. \$70. Tony, 929-4903.

BEAUTICIAN'S SUPPLIES - Shampoo sink & vanity, hair dryer, shampoo chair, manicure table. L.A. Adamec, 475-9406.

GE DISHWASHER - Coppertone, dual cycle, front load, butcher block top, 2 yrs old, excel, moved to apt & now have 2. \$85. Betty, 589-0461 after 5.

AIR COND - GE 10,500 BTU, used 1 1/2 seasons, 10 temp therm set, excel cond, moved to apt w/air cond. Cost \$289, asking \$150. Betty, 589-0461 after 5.

ANTIQUA CHINA CLOSET - George, Ext. 4460/4453.

FISHER RECEIVER - Model 201, 2 channel AM/FM, FM stereo, many features, excel cond. \$150 firm. Glenn, Ext. 4217.

BABY CRADLE - Perf cond, like new, \$20; cassette tape player & recorder, hardly used, \$45; 11 tapes, \$3 ea. 399-0307.

4'x15' POOL - Filter, used 1 season. \$100. 924-6996.

8 TRACK TAPES - All new, many to choose from. C. Nielson, Ext. 3954.

EICO - 70 watt integrated stereo amp. \$40. Ext. 2005.

RCA 20" COLOR TV CONSOLE - Plays. \$25. Ext. 4489.

1 SET 3 OLD ORIG MOVIE CHAIRS - New upholstery. \$50. Saxon, Ext. 3435.

BLACK LAB PUPS - 6 wks old, AKC reg. 286-0623.

HOTPOINT WASHER - 12lb cap, working cond. \$10. J. Walker, Ext. 4460.

MAGNAVOX COLOR TV CONSOLE - Record player, AM/FM stereo, TV needs transformer. 744-3569.

ORLON YARN - Will deliver to Lab or pick up at my home, all colors. \$2.50/lb. Ann, Ext. 3143, 732-9384 after 6.

2 JALOUSIE WINDOWS - 27"x54", \$10; 2 s/s 5 1/4" x23 3/4" OD, \$10; screened-in porch, made from s/s doors, 14 1/2"x8 1/2", \$50. Neal, Ext. 3050.

BEDRM SET - Modern, full bed, 58" dresser, chest of drawers, 2 night tables, very good cond. 732-5266 after 6.

LITTLE BOY'S CLOTHING - Sizes T2 thru 7; suits, trousers, outer wear, shoes; superior quality & excel cond, some never worn. 928-1007.

COMPL BOY SCOUT UNIFORMS - Summer & winter, kerchief, slider, socks, belt, hat, etc., excel cond, size 14. \$15 takes all. 941-4328.

TYPEWRITER - Royal portable. \$30. Ext. 2041.

ELEC CARVING KNIFE - \$7; elec malt machine, \$5; immersible fry pan, 15x15 size, \$10; 40 pc oven set, \$15. Bob, Ext. 4288, 289-0357.

WOMAN'S COAT - Size 16, fur collar, \$30; boy's slacks 30W-30L, \$4; boys sports jackets, size 12-20, \$4-5. 744-5871.

GIRL'S BEDRM SET - Grey 5 pc Kroehler, full size bed. Ken, 475-4541.

2 SETS "N" GAUGE TRAINS - Extra track, 2 pwr packs, access, etc., all used for only 1 hr. Cost \$69, sell for \$40. H. Sauter, 732-2236.

BUREAU - Birdseye maple w/mirror, antique. \$35. 744-5871.

1967 SILVER EAGLE TRAILER - 16', sleeps 4, toilet, sink, gas stove & refrig. \$1195. 924-3293.

TRUMPET W/CASE - Good cond. \$55. A. Romano, Ext. 4019.

GRETSCH ELEC GUITAR - Old model Country Gentleman; Premier reverb unit; beginner's amp. Rich, Ext. 4172.

BEDRM SET - Dresser (lg, 6 drawers), dbl bed frame, blonde finish, good cond. 757-7467.

CAMERA - Single lens reflex, 50 & 135 mm lens, polarizing filter, cases. Walt, Ext. 3418.

FOR EASTER - Elec carving knife, brand new, never used. \$10. 286-3742.

2 TICKETS - Yehudi & Hephzibah Menuhin recital, Apr 14 eve, CW Post Center. \$8 ea. 286-3742.

FOR EASTER - Elec frying pan, Thermomware, fully immersible, brand new, never used. \$10. 286-3742.

ROTOTILLER - Clinton Model #A897C5B, good cond. Bill, Ext. 4051, 475-5894.

ZENITH 23" B&W TV - #B2417W4, wood console, 1 yr old, like new, make offer. Bill, Ext. 4051, 475-5894.

100 W STEREO AMP - Lafayette KT-550, needs some work. \$30. Torre, Ext. 4243, 281-5050 after 6.

GAS HOT WATER HEATER - 30 gal, new cond, \$40; cyclone fence wire, 4'h, 3 pcs, 2-27' long, 1-6' long, plus gate, \$25. Ext. 4243, 281-5050 after 6.

FREE - Full bred German Shepherd, 3 1/2 yrs old, housebroken, good w/children, blk & light beige around neck, named Bruno, seeks good family who will take care of him. Chris, Ext. 2441.

OLD NORGE WASHER & GAS DRYER - Washer needs transmission; dryer works well; w/manual. Both/\$50. M. Sakitt, Ext. 3812.

1964 TRAVEL TRAILER - Detroit, sink, 3 burner gas stove w/oven, gas heater, ice box, 2 bottle gas tanks, elec brakes, new 6-ply tires & spare. \$995. Steve, Ext. 2350, 585-8395.

SHEETROCK - 4'x8'x1/2", new. \$2. M. Greene, Ext. 4484.

OLYMPUS-PEN CAMERA - New. Ext. 3619.

23" ZENITH B/W TV - Good cond. \$25. Tom, 732-8751 after 5.

MAHOG SHERATON BREAKFRONT - \$375; Little Chippendale dropfront desk (copy), top needs repair, \$45. 924-3228.

4-DRAWER FILE CABINET - Letter size, tan metal, excel cond. \$20 or best offer. A. Bieber, Ext. 4386; Ext. 3011 after 5:30.

SUBSCRIPTION SERIES - Met Opera, 5 Mon & 1 Tues night, 2 tickets ea performance, 12 tickets total, family circle. \$72. S.A. Dunwoody, Ext. 3653.

PHILCO 3 SPD RECORD PLAYER - Not stereo, dbl needle, \$35; travel iron, folding, \$2. 727-1617.

CAMERA - Eastman Kodak Co, about 1920's, folding, \$12; 2 old type bureaus, heavy, \$25 ea. 727-1617.

Wanted

DORY OR DORY SKIFF - W/well for outdoor motor, 14-17' long. 744-5724.

BETTY CROCKER COUPONS - Needed by St. James Episc SS for projector. Ext. 3373/3379.

FREEZER - Used, good operating cond, 10-15 cu ft, preferably w/o auto defrost. Walter, Ext. 3766, 286-2558.

GARDEN & LAWN TOOLS - Reasonable, ladders, hoes, rakes, etc. Ken, Ext. 3574.

TO BUY - Old dolls prior to 1930. 475-4199.

TELEPHONES - Very old. Saxon, Ext. 3435.

SUNFISH - Must be in excel cond. Ext. 4032, 751-1660.

APT - 2 bedrm, near Centereach or Medford area. Rich, Ext. 4172.

APT - Near transportation, for mature woman, 3 1/2 rms unfurn, Patchogue/Medford area preferred. 757-7467.

GE PARTYTIME PHONOGRAPH - Model V420/V421, needed for parts, does not have to work. John, Ext. 4143, 286-1348.

BROOKHAVEN HAMLET PEOPLE - Help with and/or attend 2nd Annual Scout Fair/Auction on 5/18/74. Call J. Bland, Ext. 4143, 286-1348 for details.

RECTOR SET - Any size. Ken, Ext. 2495.

PIANO - Sm upright. Saxon, Ext. 3435.

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 Rent

CALVERTON/RIVERHEAD - New townhouse, 3 bedrms, 1 1/2 baths, air cond, all appliances. \$289/mo plus elec. 488-2497.

E. MORICHES - 12 mi from Lab, newly decorated, furn 3 bedrm ranch, lg liv rm, mod kitchen, att garage, full bsmt, washer/dryer. \$350/mo. Ext. 4581, 878-0416, 878-0716.

Carpools

RIDE WANTED - To & from work from Moriches, at Bristol Real Estate on Montauk Hwy, 0830-1700. Ext. 3620/3696, 878-0744.

DRIVER WANTED - For existing carpool, Bayport/Blue Point area. Ext. 2977.

NEED 5th DRIVER - For carpool from Bayport. E. Divis, Ext. 4526.

Lost & Found

FOUND - Key on wire w/elec plug attached, found in Cafeteria parking lot Wed, 4/3. Ext. 2346.

Services

TENNIS CLASSES - Registration now open for summer children's instructions, 5 yrs & up, July-Aug, Shoreham. 744-1906, 5-10 p.m.

TYPING - Term papers, manuscripts, etc. Claire, Ext. 2346, 281-8306 after 5:30.

TENNIS CLASSES - Registration now open for spring instruction, class size 5, 8 wks, 10 hrs, Shoreham. \$40. 744-1906, 5-10 pm.

HOME MAINTENANCE SERVICES - Ext. 2375/2376, 281-3361 after 5.

CHAIN LINK & WOOD FENCE - Buy direct from installer & save. Russ, 744-8787 after 6.

FISHERMEN - Do you want your catch deliciously smoked? 744-9411 after 5:30.

ROTOTILLING - Holbrook/Ronkonkoma area. 588-5833.

ROTOTILLING - Custom rototilling, lawns, gardens. Bob, 732-95171 after 6.

CERAMIC TILE/CEMENT WORK/TERRAZZO - Professional work at reasonable prices, call for estimates. John, Ext. 4143, 286-1348, 281-8848.

INCOME TAXES - Prepared by experienced knowledgeable professionals, honestly interpreted w/maximum return assured. 924-3236, 924-6408.

ORGAN LESSONS - Experienced teacher, beginners & advanced, your home. Wilma Jo, 924-3236.

EMERGENCY PHONE NUMBERS

Medical 2222
Fire 3333
Police 4444

Scotch Doubles Bowling Tournament

Must be accompanied by \$10.50 (Non-Refundable Fee)
Make check payable to BNL Bowling Leagues

1. Male Bowler (Name) BNL Employee
 No average
 Average is in League Spouse
 at Lanes Guest

2. Female Bowler (Name) BNL Employee
 No average
 Average is in League Spouse
 at Lanes Guest

Received at BERA Office (Date) By

Assigned Team No. Saturday, May 11, 1974 - 2:00 - 6:00 p.m. - Port Jeff Bowl

Classified Ad Policy

Deadline is 12 noon Monday for publication Friday of the same 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.
- Firearms offered for sale or trade may not be brought on site.
- 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.
- Ads should be restricted to 20 words or less and typed or printed on the form provided, and must bear the employees signature.

For Sale: Auto & Auto Supplies Wanted Carpools
 For Sale: Boats & Marine Supplies Lost & Found
 For Sale: Miscellaneous Services

Check the heading applying to your ad. Print or type your ad in 20 words or less.

Ads concerning 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, Room 111, 40 Brookhaven Avenue.

Employee's Signature Life No. Ext.
 Send to: Brookhaven Bulletin, Building 460, 40 Brookhaven Avenue (Ext. 2345).

(Name & Phone No. To Call)